MME Form 9
Rev. Mar. 59

UNITED STATES
DEPARTMENT OF THE INTERIOR
Office of Minerals Exploration

OFFICIAL DOCKET FILE

Contract No. 14-23-_____ Docket No. MME-6507

Application
- [x] Denied
- [ ] Withdrawn

Contract
- [ ] Terminated - Not Certified
- [ ] Terminated - Certified
- [ ] Cancelled
- [ ] Royalty Agreement

The records contained in this file are marked (x) and arranged in this order:

Folder No. 1:

Left Side

- [ ] Royalty Audits
- [ ] Certification of Discovery
- [ ] Closing Letter
- [ ] Cost Audits
- [ ] Termination Notice or Agreement
- [ ] Recision Notice
- [ ] Assignment of Contract
- [ ] Contract Amendments
- [ ] Contract with all exhibits and annexes
- [ ] Owner's Consent to Lien and Subordination Agreement
- [x] Application and Attachments

Right Side

- [ ] Project Summary (final)
- [ ] Work Completed Analysis (final)
- All other material filed in chronological order including the following reports if checked:
- [ ] Field Team Semiannual Report for Certified Project
- [ ] Final Field Team Report (Tab)
- [ ] Operator's Final Report (Tab)
- [ ] Interim Field Team Reports
- [ ] Operator's monthly reports and all attachments
- [x] On-site Exam. Report (Tab)
- [ ] Settlement Sheets
- [ ] Drill Logs

Additional Folders:

Left Side

Folders No._____: Reports
- [ ] Analysis of Semiannual Inspection Reports
- [ ] Project Summary (Interim) by MME Engineers

Right Side

- [ ] Field Team Semiannual Report for Certified Project
- [ ] Field Team Interim Reports
- [ ] Operator's Monthly Reports with Transmittal, Narrative and Maps

Folders No._____: Maps (Use pocket folder or envelope)

Folders No._____: Settlement Sheets

Folders No._____: Drill Logs

Folders No._____: Royalty Material

52615

MME Form 40
Jan. 65

Budget Bureau No. 42-R1368
Approval expires Dec. 31, 1968

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION

APPLICATION FOR FINANCIAL ASSISTANCE IN MINERALS EXPLORATION

Pursuant to Public Law 85–701 (72 Stat. 700; 30 U.S.C. 641)

NAME OF APPLICANT *(Full legal name and mailing address as they should appear on contract if one is executed.)*

Texas Mercury Company
P. O. Box 19508
Dallas, Texas 75219

APPLICANT DO NOT USE THIS BLOCK

DOCKET NUMBER: 6507

DATE RECEIVED: 10-8-65

REGION: III

DIVISION CODE: 120M

BUSINESS ORGANIZATION *(Check one)*

- INDIVIDUAL [ ]
- CORPORATION [ ]
- PARTNERSHIP [X]
- OTHER *(Specify)* [ ]

STATE IN WHICH FIRM IS ORGANIZED: Texas

LIST CORPORATE OFFICERS OR PARTNERS HERE, IF APPLICABLE

NAME	ADDRESS	TITLE
W. R. Ransone	3806 Cedar Springs Rd. Dallas, Texas	Managing Partner
E. C. Reagor	" " "	Partner
C. V. A. Pittman	" " "	"
Eugene McDermott	4701 Drexel Dr., Dallas, Tex.	"
Roger H. Davis	220 Mercantile Continental Bldg., Dallas, Texas	"
Carroll Deely	6210 N. Central Expressway, Dallas, Texas	"

MINERAL(S) FOR WHICH YOU WISH TO EXPLORE: Silver

ESTIMATED COST OF PROJECT: $ $80,000.00

PROPERTY NAME	LOCATION COUNTY	STATE
Ruidosa	Presidio County,	Texas

GENERAL INSTRUCTIONS

Before filling out this application, please read the *OME Regulations for Obtaining Federal Assistance in Financing Explorations for Mineral Reserves* (30 CFR Chap. III). To assure prompt action, your application must provide all applicable material and information specified on the back of this application form. Avoid unnecessary correspondence and delays by submitting complete and accurate information. *Please submit two copies of this application and all accompanying papers* except as otherwise noted. Place your name and address on each sheet. Each item of information, maps, and reports required as a part of this application is described on the back of this form. Identify each attached statement by the item number to which it applies. If an item does not apply to your application, show the item number on your statement and after it write "not applicable." Maps or sketches should be used to supplement narrative descriptions of the property location and boundaries in item 2, existing mine workings and geology in item 3, and the proposed exploration work in item 5. When this information is not too complex, all of it may be shown on one map or sketch. All documents and other attachments submitted as a part of this application, except those in item 3(g) which you mark to be returned, become the property of the Government and will not be returned to the applicant. Send true copies, *not originals*, of leases, contracts, and other documents which are an essential part of your business records. *File this application with the Office of Minerals Exploration, Department of the Interior, Washington 25, D. C., or with the nearest OME Field Office.*

CERTIFICATION

The undersigned, whether as an individual, corporate officer, partner, or otherwise, both in his own behalf and acting for the applicant, certifies that the information set forth in this form and accompanying papers is correct and complete, to the best of his knowledge and belief, and that he would not ordinarily undertake the proposed exploration under current conditions and circumstances at his sole expense.

October 7, 1965
DATED

W. R. Ransone
BY *(Signature)*

W. R. Ransone
Managing Partner
TITLE

A wilfully false statement or certification to any Department or Agency of the United States Government is a criminal offense. U. S. Code, Title 18, Sec. 1001.

INFORMATION REQUIRED WITH THIS APPLICATION

1. Financial Eligibility:

(a) Submit evidence of efforts made within 90 days preceding the filing of this application to obtain credit from your bank of account and at least one other banking institution or other private source of credit. Such evidence shall include true copies of correspondence which show: (1) date of loan request, (2) amount and terms requested, (3) proposed use of loan funds, and (4) the replies from credit sources. If the loan was offered under terms which you consider unreasonable, state why you consider them so.

(b) List names and addresses of affiliated, parent, or controlling companies or organizations and state extent and nature of their interest.

(c) State how you propose to furnish your share of the cost of the exploration work.

2. Applicant's Rights in Land:

(a) State your interest in the land and mineral rights, whether owner, lessee, purchaser under contract, or other. If you are not the owner, submit one true copy of the lease, contract, or other document (with address of owner) under which you control the property. Describe all liens, mortgages, or other encumbrances on the land and state book and page number and official place where recorded.

(b) State the legal description (section, township, and range; metes and bounds; patent number of claims) of the land upon which you wish to explore and all adjacent land which you own or control. Describe any part of the land or workings which should not be subject to Government royalty and liens. If the land consists of unpatented claims, state book and page number for each recorded location notice, including amended locations, and official place where recorded. State all the names by which you know the property.

(c) For all land or mineral rights encumbered or not owned, submit five copies of Lien and Subordination Agreements on MME Form 52. If the agreements cannot be obtained, state reasons and provide copies of letters of refusal.

3. Physical Description:

(a) Describe in detail and illustrate with maps or sketches all mining or exploration operations which you know have been or are being conducted upon the land. Include existing mine workings and all production facilities.

(b) State your interest, if any, in operations described in (a).

(c) State, if you know, the past and current production, supporting your statement with copies of settlement sheets, mine records, or published data if available.

(d) Describe known ore reserves, giving quantities and grades and sampling methods used. Support your statement with copies of assay certificates and assay maps if available.

(e) Describe by narrative and maps or sketches the geologic features of the property, including ore minerals, geologic formations if known, and type of deposit (vein, bedded, etc.).

(f) State your reasons for expecting to find ore, and if you have sampled the area you propose to explore, show where the samples were taken, describe sampling methods used, and provide copies of assay certificates.

(g) Send with your application at least *two* copies of all geologic or engineering reports, assay maps, or technologic information which you have, indicating whether you require their return.

4. Accessibility of Property:

(a) To aid the OME representative who may examine the property, state name and address of person who will meet him; give directions for reaching the property; and describe accessibility of property and of any mine workings.

(b) Name the shipping and supply points and state the distances to the property.

5. Exploration Work:

(a) Describe fully the proposed exploration work giving individual footages and sizes of openings *for each item of work.* Use narrative, maps, plans, and sections as necessary. Show location of the proposed work as related to geologic features such as veins, ore-bearing beds, contacts of rock formations, etc. Show also the relation of the proposed work to any existing mine workings and to *land boundaries* or to the closest identifiable corner.

(b) If an access road must be built, show the proposed location on the property map and state the length, type and construction methods proposed.

(c) If an OME contract is executed, state how soon thereafter work would be started and finished. State your anticipated average daily or monthly rate of progress for each type of work.

6. Experience:

State your operating experience and background to conduct this exploration work and also that of the person who will supervise the work.

7. Estimate of Costs:

Furnish detailed estimates of the necessary costs *for each item of the work proposed in 5(a)* under the headings listed below with a total for each heading and the estimated total cost of the work. Costs for any work to be performed by an independent contractor should be listed separately under category (a) below. Costs for any work that is not to be performed by an independent contractor should be listed under categories (b) through (g).

(a) Independent contracts. State the total cost of any proposed independent contract for all or any part of the work, and the number of units and the unit cost for each type of work, such as per foot of drilling, per foot of drifting, per hour of bulldozer operations, or per cubic yard of material moved. Cost estimates should be supported by bids from three contractors if possible. (*Note*—If none of the work is to be contracted, write "none" after this item.)

(b) Personal services. The cost of supervision, engineering and geological services, outside consultants, and labor should be itemized by numbers and classes of employees; rates of wages, salaries or fees; and periods of employment. State whether these services are available.

(c) Operating materials and supplies. List items of material and supplies giving quantity and cost of each. Include under this heading power, water, and fuel, and units of equipment and tools costing less than $50 each.

(d) Operating equipment. List items of equipment and tools costing $50 or more per unit. Give specifications and indicate how each item is to be acquired—i.e., rented, purchased or provided by the applicant. If rented or purchased, state the estimated rental or purchase price. If furnished by the applicant, state condition and present fair market value.

(e) Initial rehabilitation and repairs. Describe the type and the cost of *initial* rehabilitation or repair of existing buildings, fixtures, installations (exclusive of mine workings), and movable operating equipment now owned by the applicant which will be used in the exploration work.

(f) New buildings, fixtures, installations. Describe each building, fixed improvement, and installation to be purchased, constructed, or installed for the exploration work, stating specifications and cost including labor, materials, and supervision.

(g) Miscellaneous. Describe the type and estimate the cost of repairs and maintenance of the operating equipment listed in 7(d). Do not repeat initial repairs listed in 7(e). Show also the costs of analytical work, accounting, workmen's compensation and employees' liability insurance, payroll taxes, and other required costs that do not fall within the previous categories. [*Note*—The Government will not contribute to costs incurred before the date of the contract, or to costs of or incident to: (1) acquiring, using, or possessing land and any existing improvements, facilities, buildings, installations, and appurtenances, or the depreciation and depletion thereof; (2) general overhead, corporate management, interest and taxes (other than payroll and sales taxes); (3) insurance (other than employees' liability insurance); and (4) damages to persons or property (other than authorized repair to or replacement of equipment or other property used in the work).]

INT.-DUP. SEC., WASH., D.C

APPLICATION OF TEXAS MERCURY COMPANY TO OME

RUIDOSA PROSPECT AREA

1. Financial Eligibility:

(a) Enclosed are copies of correspondence in a futile attempt to obtain loans from Republic National Bank of Dallas and First National Bank in Dallas.

(b) Texas Mercury Company is a separate company from any other.

(c) The Texas Mercury Company share of the exploration cost is to be supplied by the partners of Texas Mercury Company by capital contribution to a fund reserved for this purpose.

2. Applicant's Rights in Land:

(a) Texas Mercury Company's rights to the minerals are by virtue of prospecting permits from the State of Texas covering Sections 38, 50 and 60, Block 2, D & P Ry. Co. Survey, Presidio County, Texas, copies of which are attached. Upon conversion to lease, such leases are subject to a 6¼% royalty. There are no other encumbrances.

(b) We anticipate working an area six miles long north-south and four miles wide east-west, with Section 38 lying near the center, as shown on the attached map (Fig. 1). We have discussed a lease option with the Benavides interests, who control a large portion of this land through ownership. Even-numbered sections other than those set out in 2(a) are available from the State of Texas for prospecting permits and subsequent leasing.

(c) Copy of letter from Commissioner of the General Land Office of the State of Texas is attached. There is no statutory authority for such a subordination as is requested.

3. Physical Description:

(a)-(d) In the immediate area which we plan to explore, we know of no previous production.

(e) The Ruidosa Prospect Area is geologically similar to the area of the Shafter Mine in Sections 5 and 8, G. H. & S. A. R. R. Co. Survey, Block 6, Presidio County, Texas, which is fully discussed in United States Department of the Interior, Geological Survey, Bulletin 928-B, "GEOLOGY AND ORE DEPOSITS OF THE SHAFTER MINING DISTRICT, PRESIDIO COUNTY, TEXAS." The controlling factor for accumulation there appears to be the Mina Grande Fault and possibly a local anticlinal closure. The accumulation of silver there occurred in the Permian, quoting from the above report: "The ore occurs mainly as replacement deposits controlled by bedding planes and to some extent by fault fissures in the Permian limestone.....and some replacement deposits in the Cretaceous beds."

As a demonstration, soil samples have been taken across the Shafter Mine, immediately north of the Shafter Mine, and still farther north in the area just mentioned. A copy of this map (Fig. 2) is attached, and the positions of the Shafter Mine and Mina Grande Fault are shown with relation to the geochemical sample points. The soil samples have been analyzed by a Perkin-Elmer #303 Atomic Absorption Spectrophotometer and the values have been placed on the locations on the map in parts per million. The map has been contoured on a value of 4.0 per million, and a reasonable relationship is shown between these high points and the Shafter Mine. The contrast between these high points and the apparent negative background is approximately 8 to 1. The location of the geochemical survey and its relationship to the geology of the area can be seen on the map entitled "GEOLOGIC MAP OF CHINATI PEAK QUADRANGLE, PRESIDIO COUNTY, TEXAS" (Fig. 3).

(f) In the Ruidosa Prospect Area, Permian and Cretaceous beds are also present, accompanied by a major anticline, the Loma Plata Anticline, and faulting which makes the geological setting similar to that at the Shafter Mine area. Here, also, a preliminary geochemical survey has been made and the map contoured on silver values of 4.0 and greater. Several high values occur on the west portion of the Loma Plata Anticline in Section 38, as shown on the attached map (Fig. 4), indicating a silver prospect area. As mentioned above, we

have obtained prospecting permits on State lands in this area, and the other lands are available. We propose to complete our geochemical survey using both broad-based points on 528' centers and, later, detailed points on 52.8' centers to delineate the new prospective areas, which we expect to core drill in direct search for ore.

(g) The position of the Loma Plata Anticline and Bienevides Fault is shown on the preliminary geochemical map (Fig. 4) mentioned in 3(f) above and determined from the enclosed "GEOLOGIC MAP OF PINTO CANYON AREA, PRESIDIO COUNTY, TEXAS," published by The University of Texas Bureau of Economic Geology, with geology by David L. Amsbury (Fig. 5).

4. Accessibility of Property:

(a) OME representative may contact Mr. John H. Baker, General Manager, Texas Mercury Company, P. O. Box 61, Terlingua, Texas, Telephone No. Area Code 915, TE-7-4437, Mobile Unit #118. The property may be reached by Farm-to-Market Road #2810 between the city of Marfa, Texas, and the town of Ruidosa, Texas, by way of the farm road to the Benavides Ranch. Arrangements can be made to meet the OME representative at Terlingua, Marfa or Alpine, Texas.

(b) Marfa, Texas, approximately 34 miles from the prospect area.

5. Exploration Work:

(a) Estimated 2000 samples collected at 528' centers with an additional 2000 detail samples on 52.8' centers, requiring three months with Geochemical Surveys field party. Analysis of samples for silver content, maps and interpretation to be furnished by Geochemical Surveys. Areas of high concentration of significant silver values to be ~~core~~ drilled on 52.8' ? centers. It is estimated that 34 ~~core~~ holes will be drilled to a depth of 100 feet and ten ~~core~~ holes will be drilled to 300 feet, requiring three months. The ~~core~~ drilling will be conducted using a vacuum drill which draws all cuttings through the drill pipe by means of a vacuum pump. These

are recovered and sacked continuously in transparent polyethylene bags. There is no loss of circulation, as previously experienced in the district, when mud or air were circulated under pressures. Samples from brecciated, faulted zones and from the tops and floors of caves should be obtained rather than lost as they have been in the past. Since the known silver deposits occur under these conditions, this drill should sample the most ore-likely parts of the hole. This drill will be used to depths not more than 300 feet. The vacuum drill has the following unique advantages:

(1) Uncontaminated samples recovered through pipe bore.

(2) Samples not reground between pipe and wall as in conventional drilling.

(3) Uniform pipe bore produces constant uniform velocity to carry cuttings to surface in the same relation to each as they left bottom; i.e., fines stay closely associated with heavier cuttings.

(4) All drilled bore holes vary widely in diameter; consequently, the return drilling medium continuously changes velocity which in turn tends to separate the fine cuttings from the large. This causes the fines from one zone to be sampled with the larger cuttings from a different zone to result in erroneous values. This is eliminated with the vacuum drill.

(5) Vacuum drilling is effective only in dry formations. Terlingua district formations are dry and well suited to vacuum-type drilling.

(b) Unknown at this time.

(c) Work will be started within thirty (30) days and will be continuous until completed. It is estimated that the geochemical phase will be completed within three months' time and the ~~core~~ drilling within three months thereafter.

6. Experience:

The partners of Texas Mercury Company, with their background and experience, are as follows:

(1) Eugene McDermott, a director and former President and Board Chairman of Texas Instruments, Inc., and a partner of Geochemical Surveys, Dallas, Texas.

(2) W. R. Ransone, Managing Partner of Texas Mercury Company and of Geochemical Surveys, an oil and mineral exploration firm with over 20 years' experience.

(3) E. C. Reagor, a partner of Geochemical Surveys.

(4) C. V. A. Pittman, a partner of Geochemical Surveys.

(5) Carroll Deely, former President of Drilling and Service, Inc., the inventor and developer of the diamond core bit, and a Vice President and director and largest stockholder of New Idria Mining and Chemical Company, Idria, California, the largest domestic producer of mercury.

(6) Roger H. Davis, oil operator and director of Ozark Mahoning Company of Tulsa, the largest fluorspar mining company in the United States.

The General Manager of Texas Mercury Company is John H. Baker, a graduate mining engineer. A listing of his background and experience is enclosed.

7. Estimate of Costs:

(a) Independent Contracts.

(1) Geochemical Surveys, Dallas, Texas - for collection of all samples in the field, analysis for silver content by Perkin-Elmer Atomic Absorption Spectrophotometer (comparable to assay) of each sample, mapping and interpretative reports - three months @ $16,000.00/mo. $ 48,000.00

(2) Geochemical Surveys, Dallas, Texas - for analysis for silver content of core cuttings - 1650 samples @ $8.00 each 13,200.00

(3) Walters Drilling Company, Inc., Dallas, Texas - core drill and crew - 66 days @ $150.00/day 9,900.00

(b) Personal Services.

Supervision @ $1,000.00 per month for six months 6,000.00

(c) Operating materials and supplies, including bits, etc. 2,900.00

(d) Operating Equipment. Vacuum equipment for use by core drill to be furnished (previously purchased by Texas Mercury Company under OME contract for mercury exploration) -0-

$ 80,000.00

ITEM 1 (a)

Dependable Service Since 1875

FIRST NATIONAL BANK IN DALLAS

P.O. Box 6031 • Dallas, Texas 75222 • 214 RI9-4011

LEO PATTERSON, JR.
SENIOR VICE PRESIDENT
RI 9-4467

October 5, 1965

Texas Mercury Company
P. O. Box 19508
Dallas, Texas

ATTENTION: R. S. Usry

Gentlemen:

This is in response to your letter of October 4, 1965 wherein Texas Mercury Company requested a loan of $110,000.00 to be secured by mortgages on certain prospective silver and mercury ore mining tracts in Presidio and Brewster Counties, Texas. The proposed use of the borrowed funds is for exploration and development of the silver and mercury ore.

Texas Mercury Company, according to your letter, is a partnership of several responsible and substantial individuals, and I am certain that loans to these persons could be favorably considered although not in the connection as outlined in your correspondence. The purpose of the loan, the proposed collateral, and the company balance sheet dated July, 1965, prevent our consideration of this specific request.

Yours very truly,

Leo Patterson Jr.

Senior Vice President

LP:kp

TEXAS MERCURY COMPANY
P. O. Box 19508
Dallas, Texas 75219

October 4, 1965

Mr. Leo Patterson
First National Bank
Dallas, Texas

Dear Mr. Patterson:

In accordance with our recent conversation, Texas Mercury Company is requesting from First National Bank a loan of $60,000.00. This is to pay for three-fourths of the estimated cost of exploring for silver in and around Section 38, Block 2, D & P Ry. Co. lands, Presidio County, Texas, owned or controlled by Texas Mercury Company. It is anticipated that silver in paying quantities will be discovered.

Texas Mercury Company is also requesting a loan for $50,000.00 to pay for one-half of the estimated cost of exploring for mercury on six areas owned or controlled by Texas Mercury Company in Sections 43, 44, 45, 46, 56 and 58, Block G-12, Brewster County, Texas. It is anticipated that cinnabar (mercury ore) in paying quantities will be discovered.

In connection with this application for credit, we are enclosing a balance sheet of Texas Mercury Company as of July 31, 1965. For your information, Texas Mercury Company is a partnership composed of Messrs. W. R. Ransone, C. V. A. Pittman, E. C. Reagor, Eugene McDermott, Roger H. Davis and Carroll Deely. As security for these loans, Deeds of Trust could be executed on the mineral leases owned by Texas Mercury Company on which exploration will be conducted with the proceeds on these loans.

We would appreciate hearing from you as soon as possible regarding these loan requests.

Yours very truly,

TEXAS MERCURY COMPANY

R. S. Usry

RSU:sg

Enclosure

ITEM 1 (a)

REPUBLIC NATIONAL BANK OF DALLAS

P. O. Box 5961 Dallas, Texas 75222

H. R. SANDERS, JR.
ASSISTANT VICE PRESIDENT

October 5, 1965

Texas Mercury Company
P. O. Box 6508
Dallas, Texas 75219

Attention: Mr. R. S. Usry

Gentlemen:

We have reviewed your application of October 1, 1965 wherein you request a loan in the amount of $60,000 to cover your three-fourths of the estimated cost of exploring for silver in and around Section 38, Block 2, D & P Ry. Co. lands, Presidio County, Texas.

As discussed with you, we require that loans of this nature be secured by proven reserves producing sufficient revenue to retire the loan in an orderly manner. In view of this we regret to inform you that we will be unable to grant this loan.

Very truly yours,

HRSJr/jp

TEXAS MERCURY COMPANY
P. O. Box 19508
Dallas, Texas 75219

October 1, 1965

Mr. H. R. Sanders, Jr.
Assistant Vice President
Republic National Bank
Dallas, Texas

Dear Mr. Sanders:

In accordance with our recent conversation, Texas Mercury Company is requesting from Republic National Bank a loan of $60,000.00. This is to pay for three-fourths of the estimated cost of exploring for silver in and around Section 38, Block 2, D & P Ry. Co. lands, Presidio County, Texas, owned or controlled by Texas Mercury Company. It is anticipated that silver in paying quantities will be discovered.

We would appreciate hearing from you as soon as possible regarding this loan request.

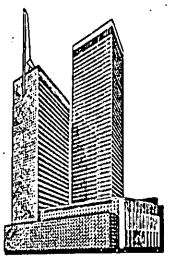
Yours very truly,

TEXAS MERCURY COMPANY

R. S. Usry

RSU:sg

ITEM 1 (a)



REPUBLIC NATIONAL BANK OF DALLAS

P. O. Box 5961 Dallas, Texas 75222

H. R. SANDERS, JR.
ASSISTANT VICE PRESIDENT

October 5, 1965

Texas Mercury Company
P. O. Box 6508
Dallas, Texas 75219

Attention: Mr. R. S. Usry

Gentlemen:

We have reviewed your application of October 1, 1965 wherein you request a loan in the amount of $50,000 to cover your one-half of the estimated cost of exploring for mercury on six areas owned or controlled by you in Sections 43, 44, 45, 46, 56 and 58, Block G-12, Brewster County, Texas.

As discussed with you, we require that loans of this nature be secured by proven reserves producing sufficient revenue to retire the loan in an orderly manner. In view of this we regret to inform you that we will be unable to grant this loan.

Very truly yours,

HRSJr/jp

TEXAS MERCURY COMPANY
P. O. Box 19508
Dallas, Texas 75219

October 1, 1965

Mr. H. R. Sanders, Jr.
Assistant Vice President
Republic National Bank
Dallas, Texas

Dear Mr. Sanders:

In accordance with our recent conversation, Texas Mercury Company is requesting from Republic National Bank a loan of $50,000.00. This is to pay for one-half of the estimated cost of exploring for mercury on six areas owned or controlled by Texas Mercury Company in Sections 43, 44, 45, 46, 56 and 58, Block G-12, Brewster County, Texas. It is anticipated that cinnabar (mercury ore) in paying quantities will be discovered.

We would appreciate hearing from you as soon as possible regarding this loan request.

Yours very truly,

TEXAS MERCURY COMPANY

R. S. Usry

RSU:sg

ITEM 2 (a)

PERMIT NO. 58153 TO PROSPECT

Date June 8, 1965

WHEREAS, Texas Mercury Company of Presidio, on the 2nd day of June, 1965, filed in this office his application to prospect the following area for minerals other than oil, gas, coal, lignite, sulphur, salt, potash, shell, sand and gravel in accordance with the provisions of Article 5421c-7, V. C. S., as amended by Senate Bill 348, Acts of the 55th Legislature, 1957, and has paid the amount of $160.00 as rental provided by law.

Part	Sec.	Blk.	Tsp.	Cert.	Grantee	Acres	County
All	38	2			D & P Ry. Co.	640	Presidio

NOW THEREFORE, I, JERRY SADLER Commissioner of the General Land Office of the State of Texas, do hereby issue to the applicant a permit to enter upon said land to prospect for minerals other than those herein named, for a period of one year from and after June 2nd, 1965.

None of the minerals shall be removed in commercial quantities from the area covered by this permit before a lease is issued.

If the owner of this permit should fail or refuse to prospect the area embraced herein within a reasonable time and in good faith, or if the owner or his authorized agent should make any false report concerning such prospecting, or should fail or refuse to furnish information concerning such prospecting or development of such area to the Commissioner of the General Land Office, or his representative, this permit shall become subject to forfeiture.

IN TESTIMONY WHEREOF, I hereunto set my hand and cause to be affixed the seal of said office on this the date first above written.

Jack Gibson ACTING
COMMISSIONER OF THE GENERAL LAND OFFICE

JERRY SADLER

Approved
Audit
Legal
Geology
Execution
Engineering

ITEM 2 (a)

PERMIT NO. 58441 TO PROSPECT

Date August 25, 1965

WHEREAS, Texas Mercury Company of Dallas, Texas, on the 25th day of May, 1965, filed in this office his application to prospect the following area for minerals other than oil, gas, coal, lignite, sulphur, salt, potash, shell, sand and gravel in accordance with the provisions of Article 5421c-7, V. C. S., as amended by Senate Bill 348, Acts of the 55th Legislature, 1957, and has paid the amount of $160.00 as rental provided by law.

Part	Sec.	Blk.	Tsp.	Cert.	Grantee	Acres	County
All	50	2			D&P Ry. Co.	640	Presidio

NOW THEREFORE, I, JERRY SADLER Commissioner of the General Land Office of the State of Texas, do hereby issue to the applicant a permit to enter upon said land to prospect for minerals other than those herein named, for a period of one year from and after May 25th, 1965.

None of the minerals shall be removed in commercial quantities from the area covered by this permit before a lease is issued.

If the owner of this permit should fail or refuse to prospect the area embraced herein within a reasonable time and in good faith, or if the owner or his authorized agent should make any false report concerning such prospecting, or should fail or refuse to furnish information concerning such prospecting or development of such area to the Commissioner of the General Land Office, or his representative, this permit shall become subject to forfeiture.

IN TESTIMONY WHEREOF, I hereunto set my hand and cause to be affixed the seal of said office on this the date first above written.

JERRY SADLER
COMMISSIONER OF THE GENERAL LAND OFFICE

Approved
Auditor
Legal VRD
Geology
Execution
Engineering

ITEM 2 (a)

PERMIT NO. 58440 TO PROSPECT

Date August 25, 1965

WHEREAS, Texas Mercury Company of Dallas, Texas, on the 25th day of May, 1965, filed in this office his application to prospect the following area for minerals other than oil, gas, coal, lignite, sulphur, salt, potash, shell, sand and gravel in accordance with the provisions of Article 5421c-7, V. C. S., as amended by Senate Bill 348, Acts of the 55th Legislature, 1957, and has paid the amount of $160.00 as rental provided by law.

Part	Sec.	Blk.	Tsp.	Cert.	Grantee	Acres	County
All	60	2			D&P Ry. Co.	640	Presidio

NOW THEREFORE, I, JERRY SADLER Commissioner of the General Land Office of the State of Texas, do hereby issue to the applicant a permit to enter upon said land to prospect for minerals other than those herein named, for a period of one year from and after May 25th, 1965.

None of the minerals shall be removed in commercial quantities from the area covered by this permit before a lease is issued.

If the owner of this permit should fail or refuse to prospect the area embraced herein within a reasonable time and in good faith, or if the owner or his authorized agent should make any false report concerning such prospecting, or should fail or refuse to furnish information concerning such prospecting or development of such area to the Commissioner of the General Land Office, or his representative, this permit shall become subject to forfeiture.

IN TESTIMONY WHEREOF, I hereunto set my hand and cause to be affixed the seal of said office on this the date first above written.

JERRY SADLER
COMMISSIONER OF THE GENERAL LAND OFFICE

Approved
Audit
Legal
Geology
Execution
Engineering

ITEM 2 (c)

GENERAL LAND OFFICE
AUSTIN, TEXAS

JERRY SADLER
COMMISSIONER

June 23, 1965

Texas Mercury Company
P. O. Box 6508
Dallas, Texas 75219

Attention: Mr. R. S. Usry

Gentlemen:

In reply to your letter received June 17, 1965, requesting the execution of a subordination agreement to the rights of the mineral interest owner and in favor of the United States Government to secure the payment of royalty on production of this land, this is to advise that I am not authorized to execute any subordination agreement of this nature.

Yours very truly,

JERRY SADLER, COMMISSIONER

JS:kk

TEXAS MERCURY COMPANY
P. O. Box 6508
Dallas, Texas 75219

June 16, 1965

Mr. Jerry Sadler, Commissioner
General Land Office
Austin, Texas

Dear Mr. Sadler:

We are contemplating some additional mineral exploration on that part of Section 52, Block G-12, Brewster and Presidio Counties, Texas on which we hold a prospecting permit in the name of W. R. Ransone, Trustee. This exploration would consist of drilling and sampling three hundred (300) five (5) to six (6) foot test holes for analysis and assay, and core drilling approximately thirty-five (35) two hundred (200) foot holes. To enable us to donduct this exploration, we plan to apply for a loan from the Office of Minerals Exploration, United States Department of the Interior.

We are enclosing a copy of MME Form 52 which is required by the Government and which subordinates the rights of the mineral interest owner to the United States Government to secure the payment of royalty on production from this land.

Please let us know whether such an instrument can be executed by you on behalf of the State of Texas.

Yours very truly,

TEXAS MERCURY COMPANY

R. S. Usry

RSU:aw

Encl.

ITEM 6

PERSONAL EXPERIENCE RECORD

Name. . . . . .John H. Baker Address . . . . . Box #367
Idria, California

Birth Date . . . . February 19, 1909 Telephone . . . . Line #7, New Idria Mine
Idria, California

Height . . . . . 5' 10½" Weight . . . 200 Lbs. Health . . .Excellent

Dependents . . . .Lillian D. Baker Children . . .Connie M. Hafen (Married)

Societies, etc. AIMME
Registered Professional Engineer, Utah

Education:

		Year Graduated
	Wilburton and Elkhart, Kansas, High School	1926
	Colorado School of Mines E. M. Degree	1935

Job Experience:

1935-1940	Mountain City Copper Co. Rio Tinto, Nevada (Anaconda)	Laborer-Miner Shift Boss, Mine Engr.
1940-1945	Military Service -1st Lt. to Lt. Col. Engrs. Airport Construction, European and Pacific Theatres	
1945-1947	Mountain City Copper Co. Rio Tinto, Nevada	Mine Foreman Chief Engr. & Geologist
1947-1949	American Gilsonite Co. Bonanza, Utah	General Engineering
1949-1956	American Gilsonite Co. Bonanza, Utah	General Superintendent
1956-1959	American Gilsonite Co. Salt Lake City, Utah	Asst. Prod. Mgr.
1959-1961	American Gilsonite Co. Salt Lake City, Utah	Asst. Chief Engr.
1961-1962	Consulting	
1962-1963	American Chemet Corp. Sheridan, Montana	Plant Manager
1963-1964	Calf Springs Ranch St. George, Utah	Partner
1964-March 1965	New Idria Mining & Chem. Co. Idria, California	Manager

Noteworthy Accomplishments:

Co-Patentee of Gilsulate (Hot Pipe Insulation)
Chief Developer of Hydraulic Mining of Gilsonite
Author of Papers on Hydraulic Mining for:
American Mining Congress, AIMME, and National Western Mining Convention.

References:

J. F. Dugan, Consultant Anaconda Company
35 Haxton Place
Salt Lake City, Utah

Clarence F. Hansen, Staff Engineer (Retired)
Standard Oil of California
225 Bush Street
San Francisco, California

L. C. Wooster (Retired)
American Gilsonite Company
924 Conner Street
Salt Lake City, Utah

C. Hyde Lewis, President
New Idria Mining and Chemical Co.
Idria, California

Item 7

GEOCHEMICAL SURVEYS
3806 CEDAR SPRINGS ROAD
DALLAS, TEXAS 75219

MAILING ADDRESS
P. O. BOX 6508

TELEPHONE
LAKESIDE 1-5145

October 7, 1965

Texas Mercury Company
P. O. Box 19508
Dallas, Texas 75219

Gentlemen:

Geochemical Surveys' standard price for a geochemical field party with analysis for mercury or silver is $16,000 per month, plus camp expenses, where applicable. Where samples are furnished to Geochemical Surveys in Dallas, Texas, and map work and interpretative reports are not required, we will analyze for silver on the Perkin-Elmer atomic absorption spectrophotometer for $8.00 per sample.

Yours very truly,

GEOCHEMICAL SURVEYS

H. Trueheart Brown

H. Trueheart Brown

HTB:sg

Item 7

WALTERS DRILLING COMPANY, INC.

4519 SOUTH FITZHUGH
DALLAS 23, TEXAS

C. G. WALTERS
PRESIDENT

September 29, 1965

Texas Mercury Company
P. O. Box 6058
Dallas, Texas

Attention: Mr. W. R. Ransome

Dear Mr. Ransome:

The following is our quotation for supplying equipment for your exploration program in west Texas.

We will supply a Mayhew 1,000 drill, drill pipe, pick-up, operating personnel and pay operating expense of the drilling equipment for a price of fifteen dollars ($15.00) per hour of field time.

You will be responsible for designating locations, preparing roads to the location and for bits.

Very truly yours,

C. G. Walters

C. G. Walters

CGW:ap

INSTRUCTIONS FOR USE

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3. Write Clearly
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65-107

FIG. 5 -3-(G)
RUIDOSA

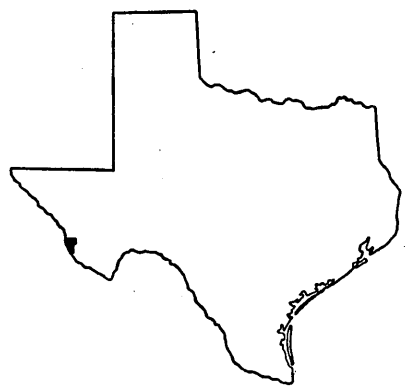
BUREAU OF ECONOMIC GEOLOGY
THE UNIVERSITY OF TEXAS
AUSTIN 12, TEXAS

JOHN T. LONSDALE, DIRECTOR

GEOLOGIC QUADRANGLE MAP NO. 22

Geology of the Pinto Canyon Area, Presidio County, Texas

BY
DAVID L. AMSBURY



November 1958

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
11/21	RM Smith	120 m
11/21/66	Kirkemo	120
11/22	Wilgoose	910
11/22	Wyn	220
		110
		220

NOV 28 1966

Texas Mercury Company
P. O. Box 19508
Dallas, Texas 75219

Re: OME-6507 (Silver)
Texas Mercury Company
Secs. 38, 50, and 60, Block 2
D & P Ry. Co. Survey
Presidio County, Texas

Gentlemen:

Your application for financial assistance to explore the referenced area and other information relating thereto have been carefully reviewed.

This review indicates that the probability of making a significant discovery of silver on your property is not sufficiently promising to justify Government participation in your proposed program. Accordingly, we regret to inform you that the application is denied.

We regret the necessity of taking such action which, however, is taken without prejudice to the property. If your future work reveals evidence that could materially alter this opinion, we shall be pleased to consider a new application.

Please accept our apology for the abnormal delay in reaching a decision on your proposed project. The delay was owing to a heavy backlog of work in Region III.

Sincerely yours,

FRANK E. JOHNSON (gla)

Frank E. Johnson
Chief, Office of
Minerals Exploration

cc: Director's Reading File
Division File
Economic Geology File
OME Docket
130
120M
OME Reading File
Region III
Mr. Smith

RMSmith/mm (11/21/66)

23263

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
11/21	RM Smith	
11/21/66	Kirkham	
"	Johnson	

November 21, 1966

Memorandum

To: The File

From: R. M. Smith, Office of Minerals Exploration

Subject: OME-6507 (Silver)
Texas Mercury Company
Secs. 38, 50, and 60, Block 2
D & P Ry. Co. Survey
Presidio County, Texas

Justification for Denial of Application

The purpose of the project proposed by the Applicant is to prospect a 4 x 6 mile portion of the Pinto Canyon area about 8 miles east of Ruidosa, Texas, along the north-trending Benevides fault and Loma Plata anticline from 2 to 8 miles south of the Loma Plata Silver Mine (no production) by blanket geochemical sampling and subsequent surface drilling on a grid pattern for silver ores in caves or along steep faults or gently dipping bedding planes in limestones of Permian and Cretaceous ages.

The Applicant's three reasons for expecting to find ore are: (1) the Shafter (Presidio) mine area which is 18 miles to the southeast also contains a fault and an anticline in Permian and Cretaceous limestone, (2) geochemical sampling along the road crossing the Shafter silver mine indicates a silver anomaly of as much as 5.8 ppm (8 x background), and (3) geochemical sampling along roads crossing the Applicant's land indicates a silver anomaly of 4 to 6 ppm in sec. 38, a manganese anomaly in about the same locality, and mercury, lead, and copper anomalies in various other unrelated localities.

The work proposed by the Applicant consists of three successive steps:

1. Geochemical sampling of 20 square miles by 2,000 samples on 528-foot centers - 100 samples per square mile analyzed for five metals.

2. Geochemical sampling of any anomalous areas found in step 1 by 2,000 samples on 52.8-foot centers.

23263

3. Drilling of any areas found in step 2 having ". . . a high concentration of significant silver values" with 44 vertical holes on 52.8-foot centers, 10 of the holes to be 300 feet deep and the remaining 34 to be 100 feet deep.

The OME Field Officer examined the Applicant's land and found no evidence to suggest the occurrence of ore deposits in the area. He concluded that the proposed work has no specific geologic target, that it is prospecting rather than exploration, and that the probability of discovering silver deposits is remote. I concur in his recommendation that the application be denied.

R. M. Smith

R. M. Smith

cc: Director's Reading File
Division File
Economic Geology File
OME Reading File
Smith

RMSmith/mm (11/21/66)

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
FEDERAL CENTER, DENVER, COLORADO 80225
Office of Minerals Exploration

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HK 120
Smith

November 14, 1966

To: Chief, OME

From: Field Officer, Region III

Subject: Report of examination: OME-6507 (Silver)
Texas Mercury Company
Sections 38, 50 and 60, Block 2
D & P Railroad Co. Survey
Presidio County, Texas

Transmitted herewith is an original and one copy, including figure, of a report of examination on the above-mentioned subject.

The Texas Mercury Company, 3806 Cedar Springs Road, Dallas, Texas applied to the Office of Minerals Exploration, U. S. Geological Survey for financial assistance to explore for silver on Sections 38, 50 and 60, Block 2, D & P Railroad Co. Survey, Presidio County, Texas. The application was referred to the field and an examination was made July 14, 1966. The applicant has completed preliminary geochemical surveys of the area and proposed to explore for silver with additional geochemical work. The area is thought by the applicant to be similar to the Shafter Mine area, which certainly involves similar rocks and is similar structurally, however, upon examination it was concluded that the Ruidosa prospect area is still in the "Prospect" stage and that considerable additional prospective and exploration work needs to be completed to define specific targets containing essentially visible mineralized material such as replacement deposits in the limestone and/or along faults in the area. Little actual mineralized material was observed during the field examination. It is concluded that the chances of finding new and undiscovered deposits of silver at the present stage of "prospecting" is remote and it is therefore recommended that the application be denied without prejudice. Should additional exploration work discover positive targets then a new application could then be considered.

J. William Hasler

J. William Hasler,
Field Officer, Region III
Office of Minerals Exploration

UNITED STATES

DEPARTMENT OF THE INTERIOR

STEWART L. UDALL, SECRETARY

U. S. GEOLOGICAL SURVEY

OFFICE OF MINERALS EXPLORATION

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O. M. E.
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NOV 16 1966
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REPORT OF EXAMINATION

REGION III

OME Docket - 6507 (Silver)

TEXAS MERCURY COMPANY

Sections 38, 50 and 60, Block 2

D. and P. Railroad Co. Survey

PRESIDIO COUNTY, TEXAS

By

J. WILLIAM HASLER

GEOLOGIST

NOVEMBER 1966

FIELD
EXAM REPT.

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Summary and conclusions---------- 1

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Geology and Ore Deposits---------- 2

Structure---------- 3

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Resume' of Applicant's Geochemical Surveys---------- 7

Applicant's Proposed Exploration---------- 8

Conclusions and recommendations---------- 10

Figure

Figure 1. Texas Mercury Company, Ruidosa Prospect, Presidio County, Texas----------In back

Summary and conclusions

The Texas Mercury Company, 3806 Cedar Springs Road, Dallas, Texas applied to the Office of Minerals Exploration, U. S. Geological Survey for financial assistance to explore for silver on Sections 38, 50 and 60, Block 2, D & P Railroad Co., Survey, Presidio County, Texas. The application was referred to the field and an examination was made July 14, 1966. The applicant has completed preliminary geochemical surveys of the area and proposed to explore for silver with additional geochemical work. The area is thought by the applicant to be similar to the Shafter Mine area, which certainly involves similar rocks and is similar structurally, however, upon examination it was concluded that the Ruidosa prospect area is still in the "Prospect" stage and that considerable additional prospective and exploration work needs to be completed to define specific targets containing essentially visible mineralized material such as replacement deposits in the limestone and/or along faults in the area. Little actual mineralized material was observed during the field examination. It is concluded that the chances of finding new and undiscovered deposits of silver at the present stage of "prospecting" is remote and it is therefore recommended that the application be denied without prejudice. Should additional exploration work discover positive targets then a new application could then be considered.

The property

The Texas Mercury Company, Dallas, Texas has obtained the mineral rights on Sections 38, 50 and 60, Block 2, D & P Railroad Company Survey, Presidio County, Texas by virtue of prospecting permits from the State of Texas. (Figure 1). Upon conversion to lease, such leases are subject to a 6 1/4% royalty. The State of Texas will in no way encumber mineral rights on any of its land, a prospecting permit and or lease, consequently a lien and subordination agreement cannot be executed. The property under consideration is accessible by good county roads for the most part, and may be reached by Farm-to-Market Road No. 2810 between Marfa, Texas and Ruidosa, Texas, thence by way of the farm road to the Benavides Ranch a distance from Marfa of approximately 34 miles.

Geology and Ore Deposits

According to the applicant the Block 2 area is geologically similar to the area of the Shafter Mine (Presidio Mine) in Sections 5 and 8, G. H. & S. A. R. R. Co. Survey, Block 6, Presidio County, Texas, which is 18 miles SE of Block 2 see U. S. Geological Survey Bulletin 928-B, "Geology and Ore Deposits of the Shafter Mining District, Presidio County, Texas; and the University of Texas, Bureau of Economic Geology, Geologic Map of the Chinati Peak Quadrangle, Presidio County, Texas. However, in the Ruidosa (Block 2) area proper the geology of the area is described as follows[1/]:

29°28.7' N
104°19' W

Structure

The Pinto Canyon area lies between the post-Cretaceous orogenic belt of the Mexican geosyncline and the nearly stable Texas shelf; it is also in the southeastern part of the late Tertiary basin-and-range block fault region. A gentle anticline was formed before deposition of the Jeff conglomerate (late Eocene?). Steep normal faults, striking N. 30° E., followed the folding. Thick lava flows poured out, with local, steep doming between deposition of the lower and upper portions of the Shelly group. Block faulting then occurred; it has continued through Recent time. The trends of these latter faults in the Pinto Canyon area are N. 10° W. and N. 85° E.; displacements range to 1,500 feet.

Economic Geology

"Possibilities for the economic production of oil within the Pinto Canyon area in the near future are negligible. The Loma Plata anticline probably arches good reservoir and source beds in the subsurface, but exposed rocks have been shattered by numerous faults and joints. At the most obvious surface structure, a small intrusive body probably indicates larger intrusions at depth; much of the region is covered with volcanic rocks.

There are remarkably few mineral deposits, considering the number of different types of igneous intrusions. Notable localities are the Loma Plata mine in search of silver, and a mill was constructed by the Marfa Mining Company. The pits are in the upper part of the Loma Plata fault, in an area of abundant red iron stains, calcite veins, and sink-holes.

The Burny prospect, on the north side of San Antonio Canyon near its mouth, was mined at various times since 1895 for lead, silver, and fluorite. The ore body is composed of fluorite, lead and zinc sulfides, and other minerals in crushed rock along a fault in the West Chinati intrusion (J. S. Cullison and A. E. Weissenborn, U. S. Geological Survey, personal communication).

The Shely uranium prospect is located in a saddle on the north side of Organ Pipe Hill about one-fourth mile S. 45° E. from the Government trapper's house (locality 60); the dump is visible from the house. A foot trail leads from the house to the prospect, and an unimproved mine road takes a circuitous route around the hill to the northeast and comes into the property from the east. The mineral claims, owned by Fred and Terry Shely, are staked on the T. W. Shely & Sons ranch. The property was visited by P. T. Flawn on July 14, 1958 in company with J. A. Stewart, who resides in the trapper's house. The following information was supplied by Flawn.

Yellow uranium minerals are erratically distributed in a soft buff to yellowish clay gouge about 1 foot thick which occurs in a small fault entirely within the body of Ta_2 oligoclase rhyolite which forms Organ Pipe Hill. The fault strikes N. 80° E. and dips 50° south. An open cut about 8 feet deep and 6 feet wide has been excavated, by bulldozer and pick and shovel, along the strike of the fault for a length of 140 feet. Locally there is brecciation along the fault and locally manganese oxides are concentrated in the hanging wall.

It is reported by Mr. Stewart that a series of channel samples taken along the length of the open cut averaged 0.34 percent U_3O_8 and that about 200 tons of "ore" are stored in an adobe building near the trapper's house.

Native alum occurs in the Alta formation at locality 2. It is associated with yellow iron sulfates and probably is iron alum.

Layers of perlite without overburden crop out south of the old Allen place, 100 to 200 feet above the adjacent Marfa-Ruidosa road (locality 60). Quarrying and loading would be no problem, though transportation costs might be too high for economic production.

Water is the most valuable resource in the Pinto Canyon at present.

1/ Amsbury, David L., 1958, Geology of the Pinto Canyon Area, Presidio County, Texas; Geologic Quadrangle Map No. 22, Bureau of Economic Geology, The University of Texas.

Resume' of Applicant's Geochemical Surveys

The applicant has taken a series of soil samples across the Shafter Mine, immediately north of the Shafter Mine, and still farther north in the area just mentioned. A copy of a map of the area accompanies the application (Fig. 2), and the positions of the Shafter Mine and Mina Grande Fault are shown with relation to the geochemical sample points. The soil samples have been analyzed by a Perkin-Elmer No. 303 Atomic Absorption Spectrophotometer and the values have been shown on the maps in parts per million. The map has been contoured on a value of 4.0 parts per million, and a reasonable relationship is shown between these high points and the Shafter Mine. The contrast between these high points and the apparent negative background is approximately 8 to 1. The location of the geochemical survey and its relationship to the geology of the area can be seen on the map entitled "GEOLOGIC MAP OF CHINATI PEAK QUADRANGLE, PRESIDIO COUNTY, TEXAS" (fig. 3) accompanying the application.

In the Ruidosa Prospect Area, Permian and Cretaceous beds are also present, accompanied by a major anticline, the Loma Plata Anticline, and faulting which makes the geological setting similar to that at the Shafter Mine area. Here, also, a preliminary geochemical survey has been made and the map contoured on silver values of 4.0 and greater. Several high values occur on the west portion of the Loma Plata Anticline in Section 38, as shown on map (fig. 4), accompanying the application, indicating a silver prospect area.

Applicant's Proposed Exploration

The applicant proposes the following exploration program; at a total estimated cost of $80,000.00. It is proposed to collect an estimated 2000 samples collected at 528' centers, with an additional 2000 detail samples of 52.8' centers, requiring three months with Geochemical Surveys field party. Analysis of samples for silver content, maps and interpretation to be furnished by Geochemical Surveys. Areas of high concentration of significant silver values to be rotary drilled on 52.8' centers. It is estimated that 34 rotary drill holes will be drilled to a depth of 100 feet and ten rotary drill holes will be drilled to a depth of 100 feet and ten rotary drill holes will be drilled to 300 feet, requiring three months. The rotary drilling will be conducted using a vacuum drill which draws all cutting through the drill pipe by means of a vacuum pump. These are recovered and sacked continuously in transparent polyethylene bags. There is no loss of circulation, as previously experienced in the district, when mud or air were circulated under pressures. Samples from brecciated, faulted zones and from the tops and floors of caves should be obtained rather than lost as they have been in the past. Since the known silver deposits occur under these conditions, this drill should sample the most ore-likely parts of the hole. This drill will be used to depths not more than 300 feet. The vacuum drill has the following unique advantages:

(1) Uncontaminated samples recovered through pipe bore.

(2) Samples not reground between pipe and wall as in conventional drilling.

(3) Uniform pipe bore produces constant uniform velocity to carry cuttings to surface in the same relation to each as they left bottom; i.e., fines stay closely associated with heavier cuttings.

(4) All drilled bore holes vary widely in diameter; consequently, the return drilling medium continuously changes velocity which in turn tends to separate the fine cuttings from the large. This causes the fines from one zone to be sampled with the larger cuttings from a different zone to result in erroneous values. This is eliminated with the vacuum drill.

(5) Vacuum drilling is effective only in dry formations. Terlingua district formations are dry and well suited to vacuum-type drilling. Unknown at this time.

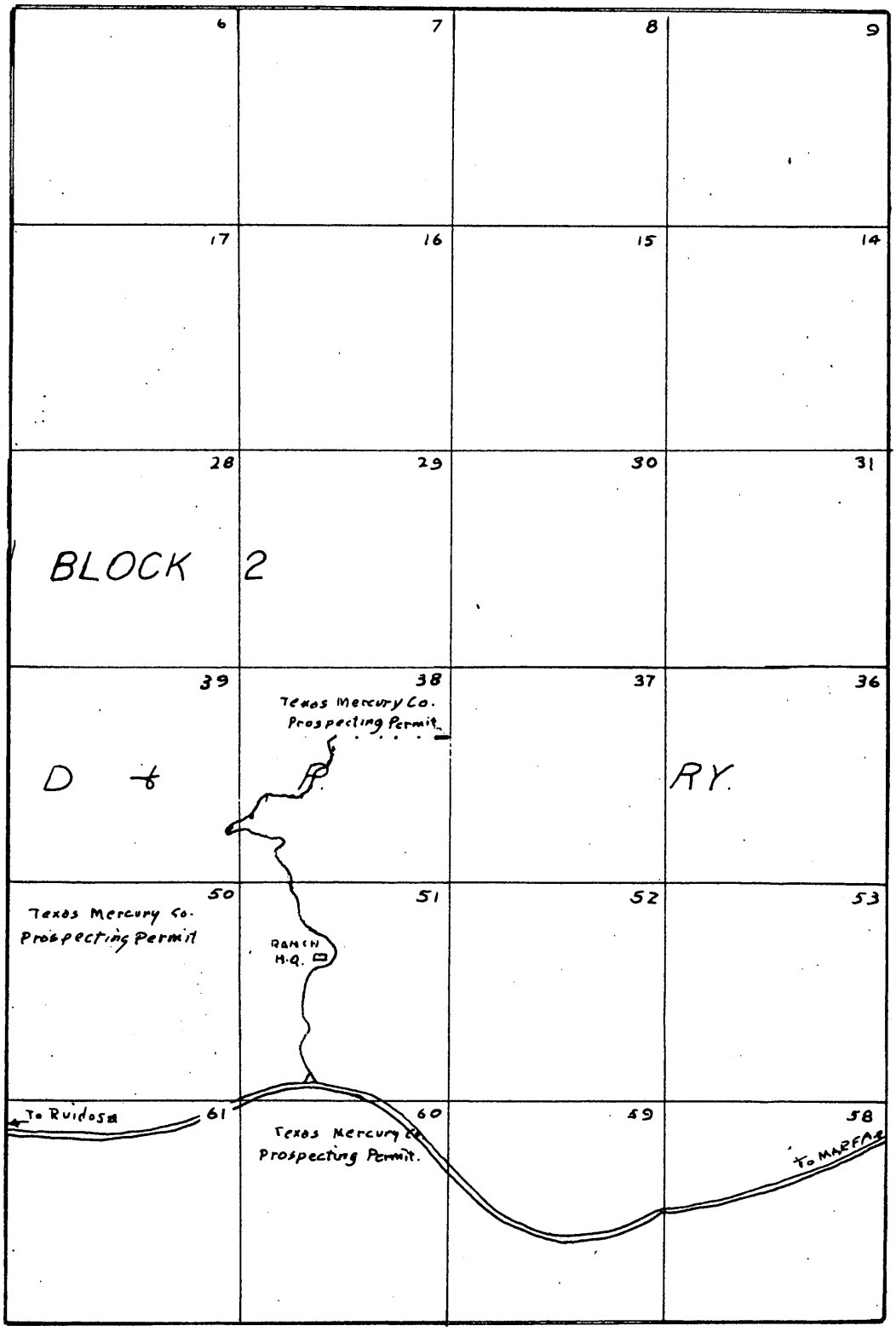
Work will be started within thirty (30) days and will be continuous until completed. It is estimated that the geochemical phase will be completed within three months' time and the core drilling within three months thereafter.

Conclusions and recommendations

The applicant, as stated previously, believes the Ruidosa project area to be geologically similar to the Shafter Mine area as follows: The area of the Shafter Mine in Sections 5 and 8, G. H. & S. A. R.R. Co. Survey, Block 6, Presidio County, Texas, which is fully discussed in United States Department of the Interior, Geological Survey, Bulletin 928-B, "GEOLOGY AND ORE DEPOSITS OF THE SHAFTER MINING DISTRICT, PRESIDIO COUNTY, TEXAS", p. 45. The controlling factor for accumulation there appears to be the Mina Grande Fault and possibly a local anticlinal closure. The accumulation of silver there occurred in the Permian, quoting from the above report: "The ore occurs mainly as replacement deposits controlled by bedding planes and to some extent fault fissures in the Permian limestone.....and some replacement deposits in the Cretaceous beds."

In the Ruidosa area, Permian and Cretaceous beds are also present, accompanied by a major anticline, the Loma Plata Anticline and the faulting which makes the geological setting similar to that at the Shafter Mine area. Several high values occur on the west portion of the Loma Plata Anticline in Section 38 (Fig. 4, accompanying application) indicating a silver prospect area. During the course of the field examination the county road was traversed and the area of high silver values in Section 38 was investigated. At no place in the area of high values was there any indication of mineralized material that would indicate the occurrences of possible ore grade material as replacement deposits controlled by bedding planes, or along the area of the Benavides fault. There was some concretionary calcite within the limestone as well as some calcite stringers and veinlets with a small area of brecciation along the fault, but there were no vein containing galena, sphalerite, or argentite, in the area examined.

It is the opinion of the examining geologist that although the area is geologically similar to that of the Shafter Mine area, there is no indication of concentrations of mineralized material, other than those ascertained by the applicant that would warrant government participation in an exploration program at this stage. The area should be further "prospected" by the applicant to find specific target areas containing an indication of ore grade material, before an exploration contract could be considered feasible by the Office of Minerals Exploration. It is concluded that the chances of finding new ore deposits of silver in the Ruidosa prospect area are quite remote unless considerable additional prospecting and exploratory work is accomplished. It is therefore recommended that the application be denied.



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NOV 16 1966

TEXAS MERCURY COMPANY
RUIDOSA PROSPECT
PRESIDIO COUNTY, TEXAS
SCALE 1" = 4000'

Figure 1

July 20, 1966

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O. M. E.
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JUL 25 1966

Mr. J. W. Hasler, Field Officer
United States Geological Survey
Office of Minerals Exploration
Region III, Room 2264, Building 25
Denver Federal Center
Denver, Colorado 80225

RE: OME-6507 (Silver)
Texas Mercury Company
Secs. 38, 50 and 60, Block 2
D & P Ry. Co. Survey
Presidio County, Texas

Dear Sir:

Following your visit to Terlingua, we have revised the cost estimates on the silver application captioned above, and a new Page 6 is enclosed for substitution in our original application. In line with the questions which you asked, you will note that under 7.(a)(1) Geochemical Surveys will collect all samples in the field and make analysis for silver, manganese, copper, lead and mercury, and their customary charge for this service is $16,000 per month which, of course, includes a reasonable profit. As a total of four thousand samples are to be collected and analyzed for five metals, this computes to a $12.00 price per sample. We feel this is certainly a reasonable figure. We are having these samples analyzed for these additional metals because some of them are indicator metals. Also, any of them except mercury could be present in this area in commercial quantities. We may have the samples analyzed for still other metals if we deem it necessary. Under Item 7.(a)(2), Geochemical Surveys will charge for analysis of the core cuttings $3.50 for silver, plus $1.00 additional for each other metal which may appear to be called for at the time, making a maximum of $6.50 for analysis for silver, manganese, copper and lead. We do not feel that an analysis of these cuttings for mercury will be required. Under Item 7.(a)(3), the $1.65 per foot figure is actual for the current drilling and not an estimate. We have reviewed the other items insofar as we can to give a more accurate cost for each item.

Since visiting the Ruidosa area with you, I found that we had already enlarged the geological map to a scale of 1" = 1,000'. A copy of this is enclosed, and you will find it fits very well with the chemical maps as prepared by Mr. Kay. A good common point is the Juan Benevides Ranch house. The last point that we visited together was point #27 which is still on Cretaceous, the Permian outcrop being essentially east of us. The additional points on the line are in sequence due east from this point and are north of the road. They do not cross over the Tertiary outcrop. You may remember that Mr. Davis went still further east and could see east turnover of the large Loma Plata Anticline, and he also thought he saw southeast dip suggesting a domal structure.

Also enclosed herewith are the geochemical maps on the other metals, and I think you will find it interesting to note how closely the mercury follows the silver. Mn parallels Ag, but Hg, Pb, and Cu do not

For your information, the prospecting permits under which we hold rights within the Ruidosa area are issued for a period of one year, subject to extension for a full five year term by the Commissioner of the General Land Office of the State of Texas. This gives the holder exclusive right to prospect within that area and may be converted at any time during the term of the permit to a lease from the State of Texas by a first rental payment of $2.00 per acre, with subsequent rental payments of $1.00 per acre annually. The lease issued by the State is for a primary term of five years and as long thereafter as minerals are produced in paying quantities with the payment of a one-sixteenth royalty to the State.

Yours very truly,

TEXAS MERCURY COMPANY

W. R. Ransone

WRR:sg
Enclosures
cc. Office of Minerals Exploration
Washington, D. C. - w/enclosures
cc. John Baker - w/enclosures

Ruidosa Prospect Area

7. Estimate of Costs:

(a)	Independent Contracts.	
	(1) Geochemical Surveys, Dallas, Texas - for collection of all samples in the field, analysis for silver, manganese, copper, lead and mercury content by Perkin-Elmer Atomic Absorption Spectrophotometer (comparable to assay) of each sample, mapping and interpretative reports - three months @ $16,000/mo., or 4,000 samples @ $12.00/sample	$ 48,000.00
	(2) Geochemical Surveys, Dallas, Texas - for analysis for silver content of core cuttings - 1,650 samples @ $6.50 each	10,725.00
	(3) Walters Drilling Company, Inc., Dallas, Texas - core drill and crew - 6,400 feet @ $1.65/ft.	10,560.00
(b)	Personal Services	
	Supervision @ $1,000.00 per month for six months	6,000.00
(c)	Operating materials and supplies, including bits, etc.	2,900.00
(d)	Operating equipment (Texas Mercury Co.-owned)	
	(1) Vacuum Unit for use with core drill - Cost $8,471.73 - 1/60 charged plus $100/mo. maintenance. - 3 mos. @ $241.19/mo.	723.57
	(2) 4-wheel drive pickup - Cost $1,800.00 - 1/36 charged plus operation and maintenance $125/mo. - 6 mos. @ $175/mo.	1,050.00
(e)	Initial rehabilitation and repairs	-0-
(f)	New buildings, fixtures, installations	-0-
(g)	Miscellaneous	-0-
		$ 79,958.57

Standard Form No. 65
November 1961
General Services Administration
FPMR (41 CFR) 101-11.6

U.S. Government Messenger Envelope

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~~Purchasing Section~~ ~~Room 5213 GSA~~	STOP		STOP
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~~Geologic Inquiries~~ Rm 1316 Interior Bldg.	STOP		STOP
~~John Musser~~ ~~GSA~~	STOP		STOP

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65-107

(6507)

U. S. Geological Survey - Denver Federal Center
Building 25 - Room 2284
Denver, Colorado 80225

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July 6, 1966

Mr. W. R. Ransone
Texas Mercury Company
P.O. Box 19508
Dallas, Texas 75219

Dear Mr. Ransone:

This letter is in reply to yours dated June 30, 1966, relative to a field examination in references to field docket OME-6507 and OME-6508, during the week of July 11, 1966.

My present plans are that I will leave Denver and fly to El Paso and will arrive there at 12:48 p.m. July 12. I will drive directly to Terlingua that day and will arrive there late that night as it will be quite some distance.

Would you please make reservations for me at the Big Bend National Park immediately east of Terlingua as you and Mr. Davis also have reservations there.

We can examine the Mercury property there and then proceed to the silver area near Ruidosa.

Sincerely yours,

J. William Hasler

J. William Hasler
Field Officer, Region III
Office of Minerals Exploration

cc: Chief, OME
OME chron
Hasler chron
OME-6507

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
1/6/66	Selfridge	120
1/10	Johnson	110
1/10	Cac	220
		120M

JAN 10 1966

Memorandum

To: Field Officer, Region III

From: Chief, Office of Minerals Exploration

Subject: OME-6507 (Silver)
Texas Mercury Company
Secs. 38, 50, and 60, Block 2
D & P Ry. Co. Survey
Presidio County, Texas

As explained in our memorandum to you under OME-6508, this application is referred to you for a field examination.

Only lump sum costs are given and the only support for the proposed work consists of a structural setup reportedly similar to that at the Shafter mine and an anomalous area of limited sampling. The Office of Minerals Exploration could do no work on any land that is not controlled by the Applicant. Probably for the time being any work, if warranted, should be limited to Sec. 38. If a contract is recommended, we would need a complete breakdown of costs and rate of performance and, eventually, a Performance Bond would have to be furnished in the amount of the Government's participation.

(signed) FRANK E. JOHNSON

Frank E. Johnson

GCSelfridge/gla (1-10-66)
cc to: Director's Reading File
Division File
Economic Geology File
OME File
OME Reading File
Mr. Selfridge (2)

23263

MME Form 7
(2/63)

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Date	Surname	Code
1/5/66	Selfridge	120
1/10	Johnson	110
1/10	Cal	220
		120M

JAN 1 0 1966

Texas Mercury Company
P. O. Box 19508
Dallas, Texas 75219

Re: OME-6507 (Silver)
Texas Mercury Company
Secs. 38, 50, and 60, Block 2
D & P Ry. Co. Survey
Presidio County, Texas
and
OME-6508 (Mercury)
Texas Mercury Company
Secs. 43 to 46 and 56 to 58, inclusive
Brewster County, Texas

Gentlemen:

At the conference last fall with Messrs. Ransone, Davis, and Usry, mention was made of certain information necessary to complete the subject applications. Except for the rush of work, we should have contacted you sooner. In order that no more time might be lost, we are referring the subject applications to Mr. J. W. Hasler, Field Officer, U. S. Geological Survey, Office of Minerals Exploration, Region III, Room 2284, Building 25, Denver Federal Center, Denver, Colorado 80225.

The Regional Office will notify you in case additional information concerning the applications is needed.

Sincerely yours,

(signed) FRANK E. JOHNSON

Frank E. Johnson
Chief, Office of
Minerals Exploration

GCSelfridge/gla (1-10-66)
cc to: Director's Reading File
Division File
Economic Geology File
Docket OME-6507
Docket OME-6508
OME Reading File
OME Region III Mr. Selfridge

23263

TEXAS MERCURY COMPANY
3806 Cedar Springs Road
Dallas, Texas 75219

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| 120
| 220

September 24, 1965

6507
to
6508

Mr. George C. Selfridge
Chief of Exploration Operations
Office of Minerals Exploration
Department of the Interior
Washington, D. C.

Dear Mr. Selfridge:

We have found it necessary to postpone our scheduled trip to Washington on September 28, 1965. Accordingly, we would like to cancel our appointment with you for 9 AM. However, we expect to re-schedule our trip for a later date and will contact you in advance and set up a time to meet with you.

Yours very truly,

TEXAS MERCURY COMPANY

R. S. Usry

R. S. Usry

RSU:sg

Texas Mercury Company
P. O. Box 19508
Dallas, Texas 75219

Re: OME-6507 (Silver)
Presidio County, Texas

Gentlemen:

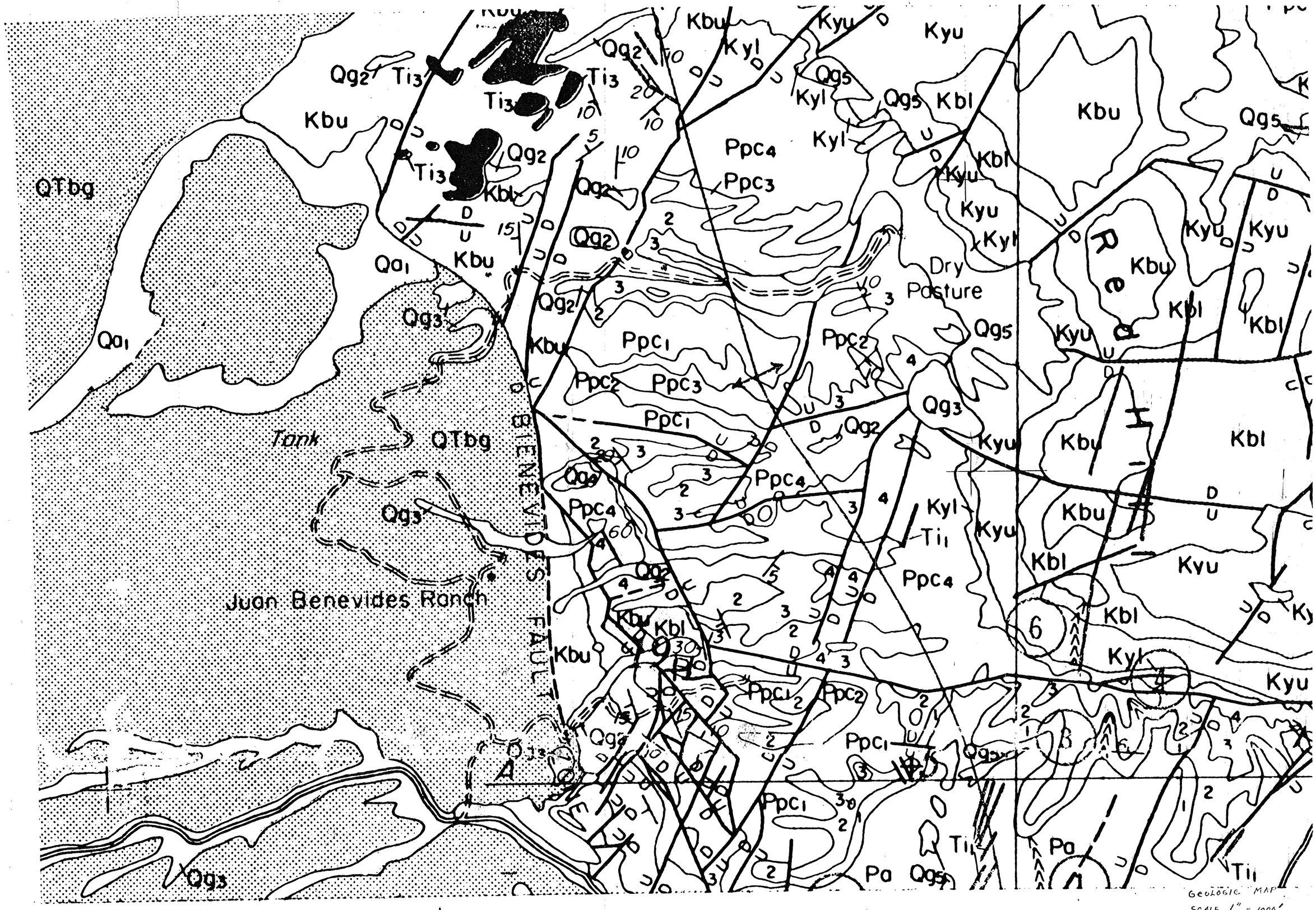
Your application for exploration assistance, dated October 7, 1965, submitted to our Washington office, has been assigned Docket No. OME-6507.

Please identify all future correspondence relating to your application by this docket number.

Sincerely yours,

Frank E. Johnson
Chief, Office of
Minerals Exploration

Copy to Region III w/cy application and attachments


Kbu
Qg2
Ti3
Kyl
Kyu
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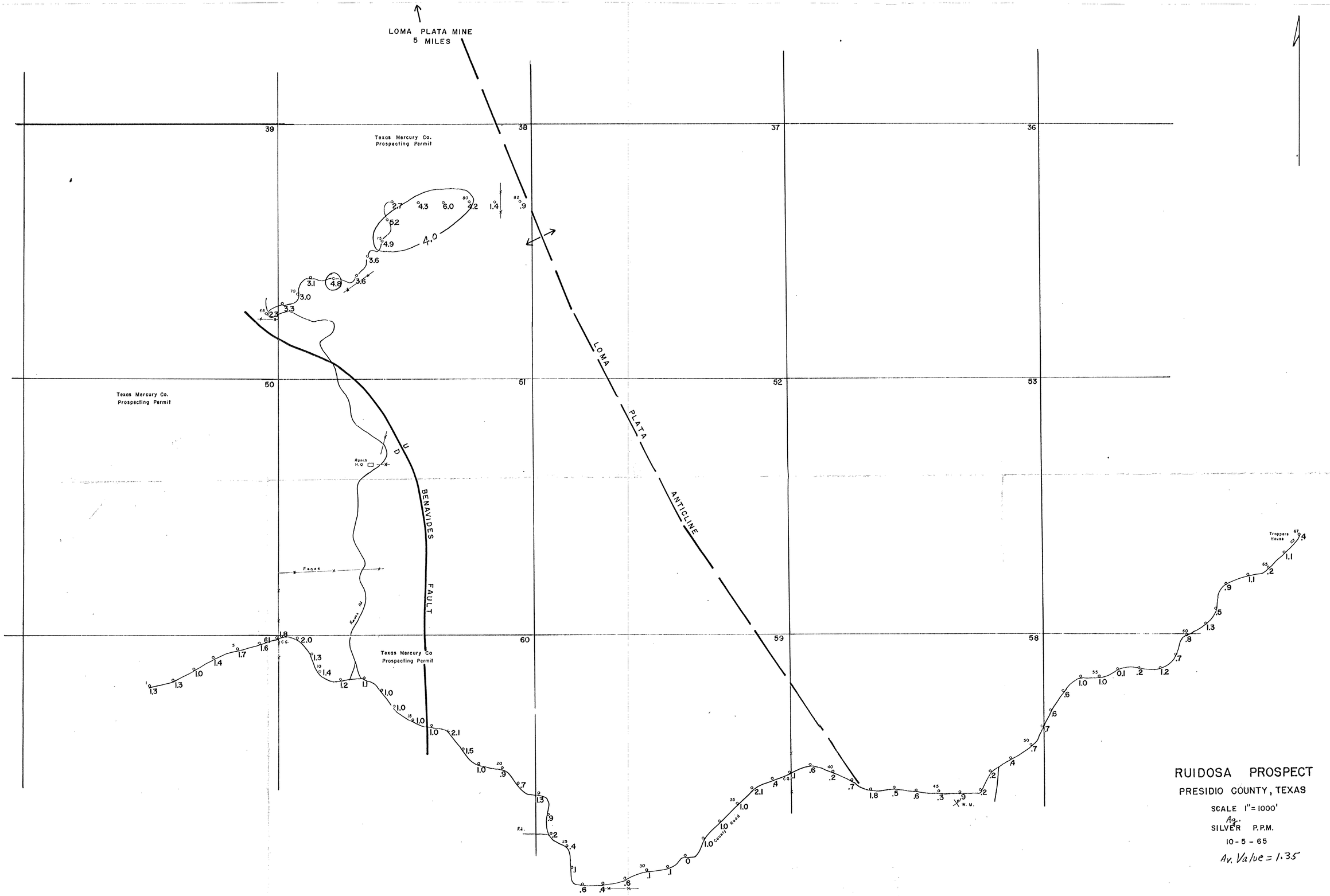
Kbl
QTbg
Qa1
Qg3
Ppc4
Ppc3
Ppc1
Ppc2
Dry Pasture
Tank
Juan Benevides Ranch
Ti1
Po
Geologic Map
Scale 1" = 1000'



RUIDOSA PROSPECT

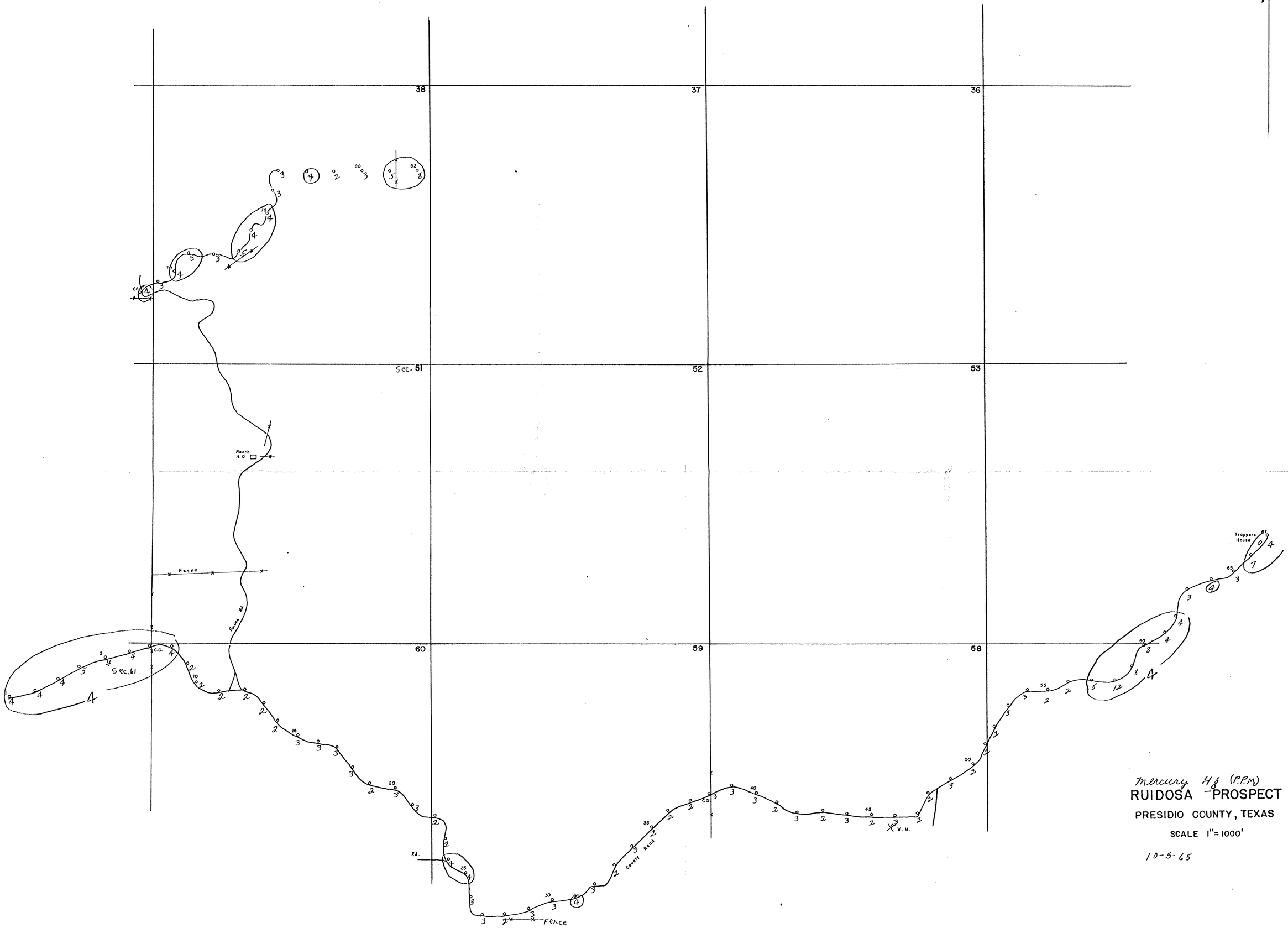
PRESIDIO COUNTY, TEXAS

SCALE 1" = 1000'

Ag.
SILVER P.P.M.

10 - 5 - 65

Av. Value = 1.35



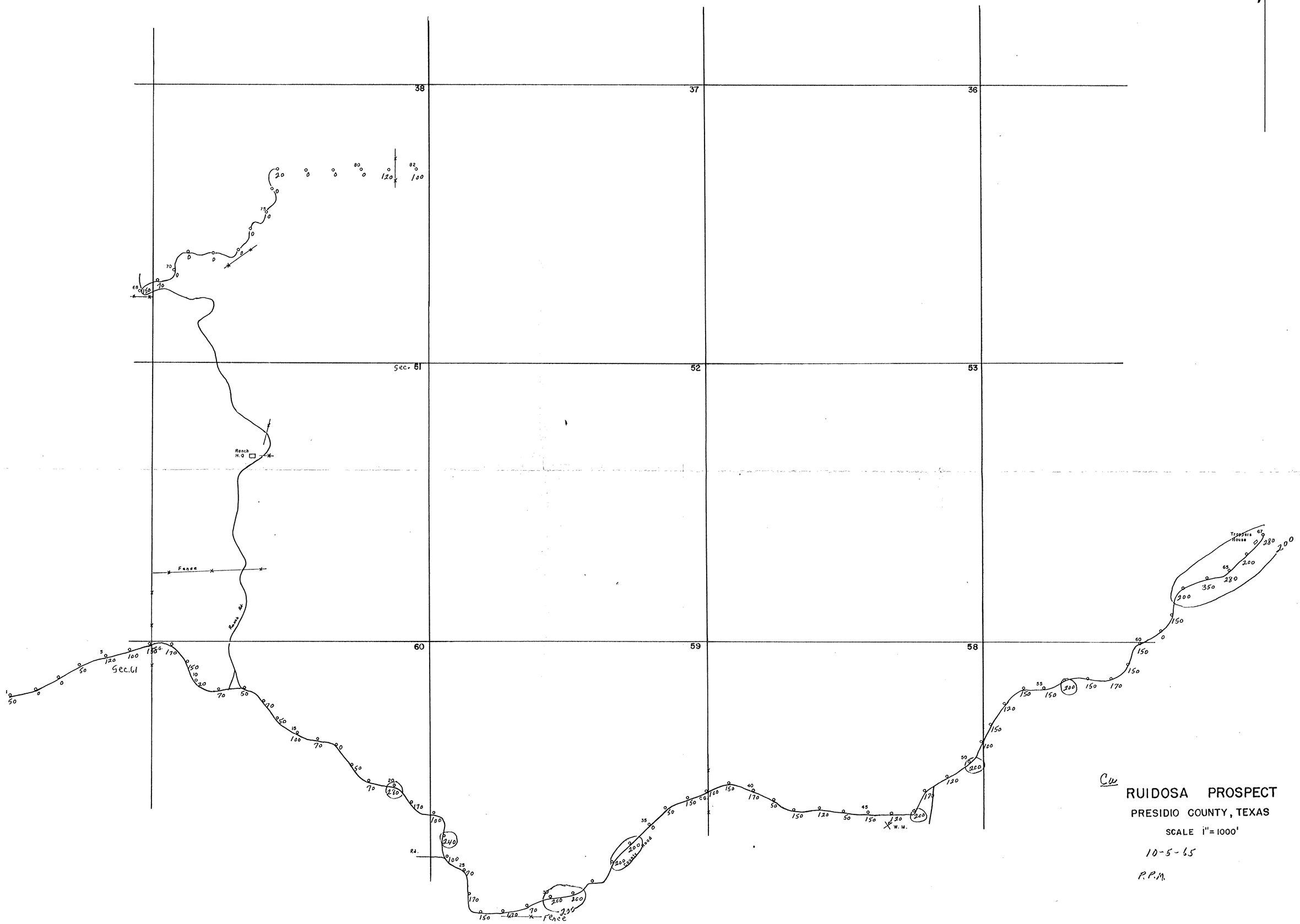
Mercury Hg (P.P.M)

RUIDOSA PROSPECT

PRESIDIO COUNTY, TEXAS

SCALE 1" = 1000'

10-5-65



Cw

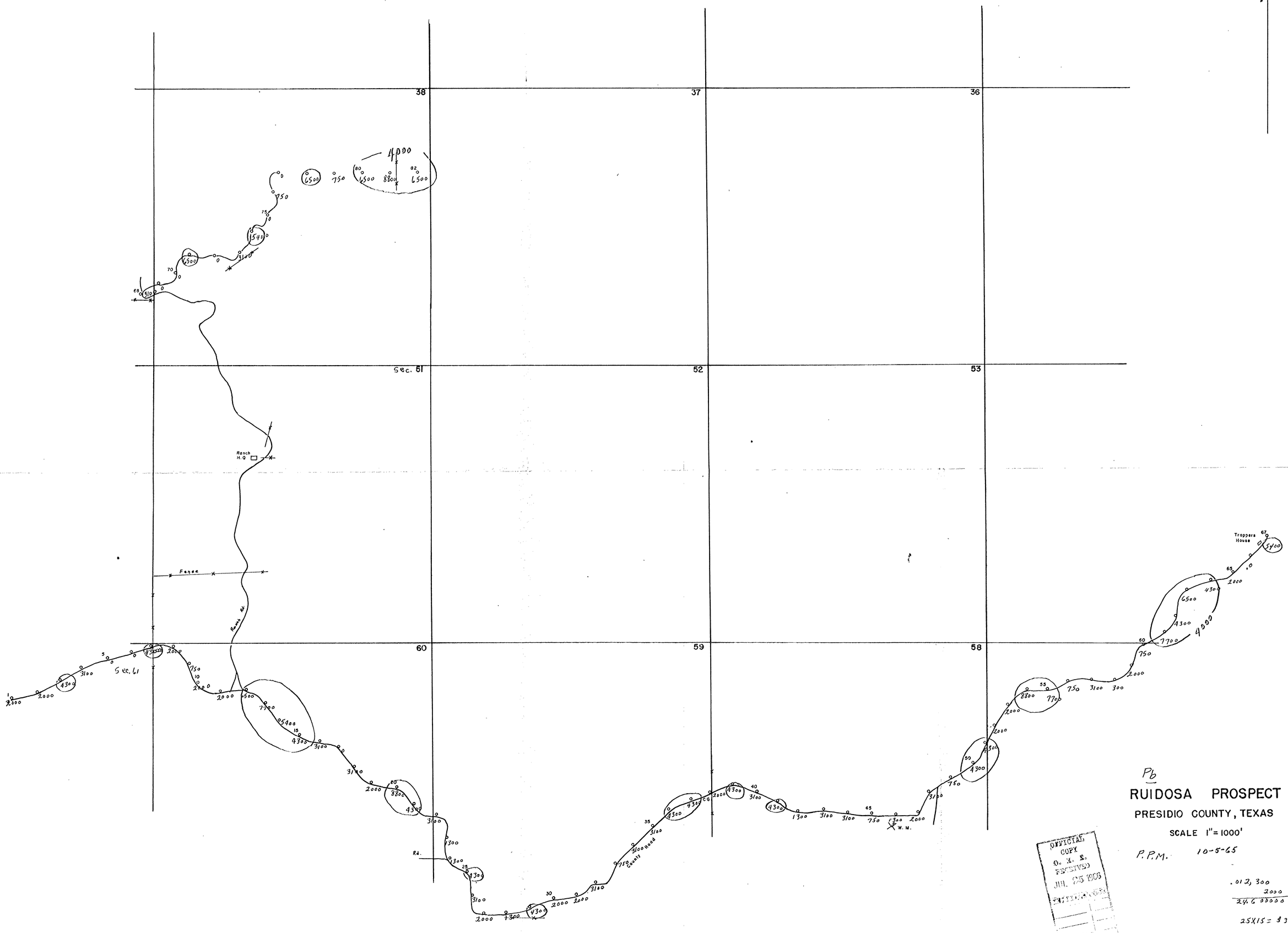
RUIDOSA PROSPECT

PRESIDIO COUNTY, TEXAS

SCALE 1" = 1000'

10-5-65

R.P.M.



Pb

RUIDOSA PROSPECT

PRESIDIO COUNTY, TEXAS

SCALE 1" = 1000'

P.P.M. 10-5-65

.012, 300
2000
24.6 00000 lbs./ton

25X15 = $3.75/ton

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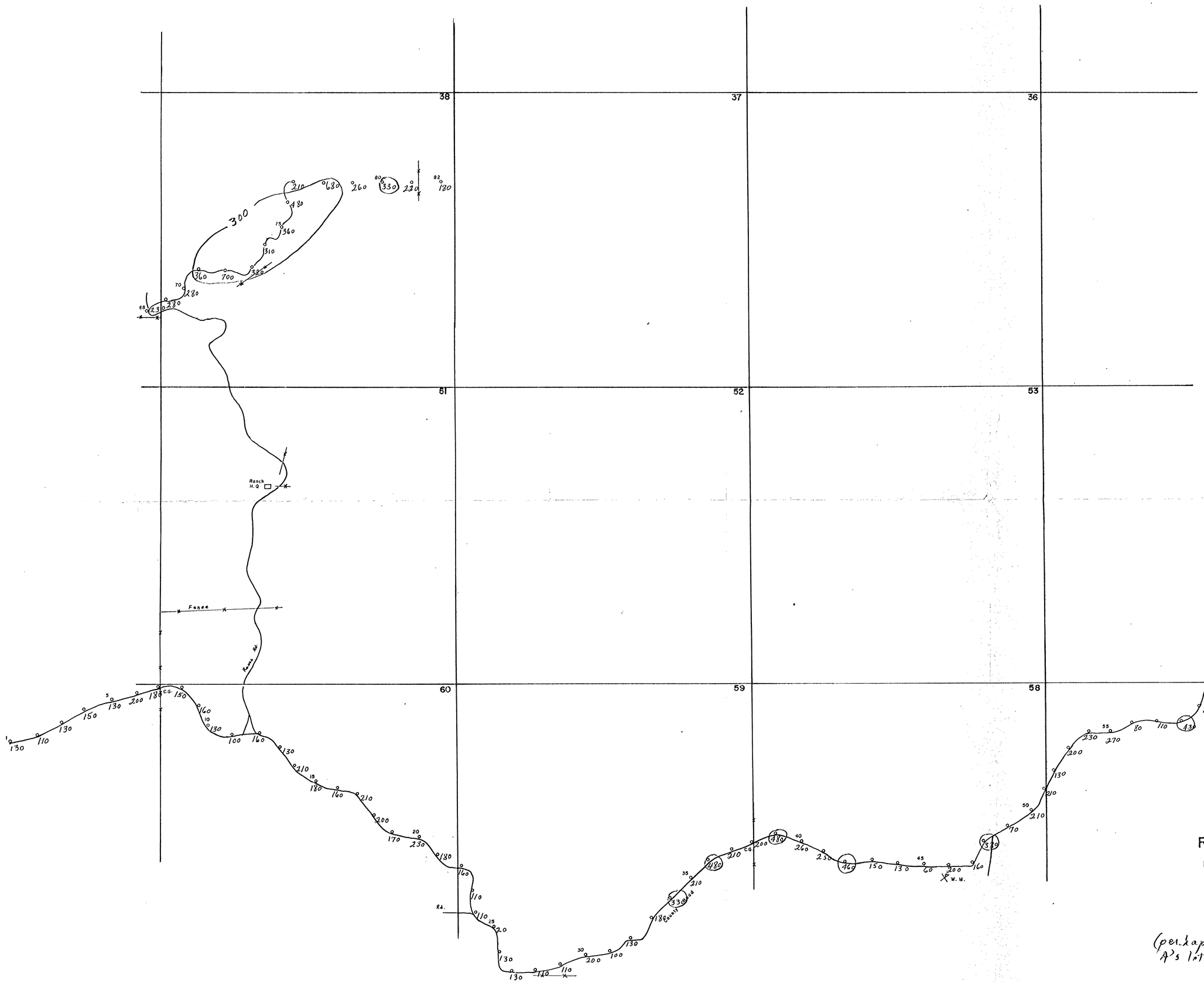

Mn - P.P.M

RUIDOSA PROSPECT

PRESIDIO COUNTY, TEXAS

SCALE 1" = 1000'

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(perhaps this is Hg — see A's letter of July 20, 1944)

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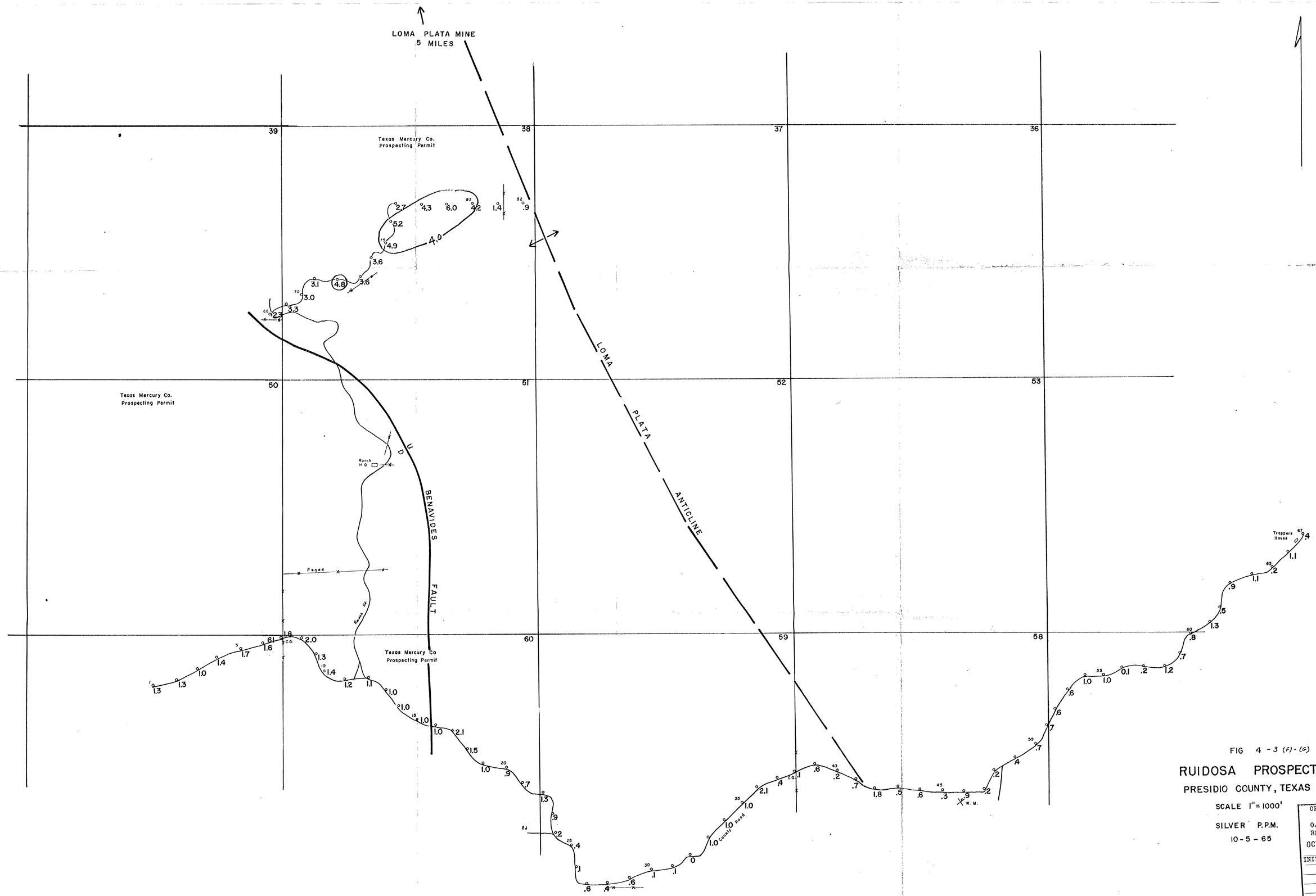

FIG 4 - 3 (F) - (G)

RUIDOSA PROSPECT

PRESIDIO COUNTY, TEXAS

SCALE 1" = 1000'

SILVER P.P.M.

10 - 5 - 65

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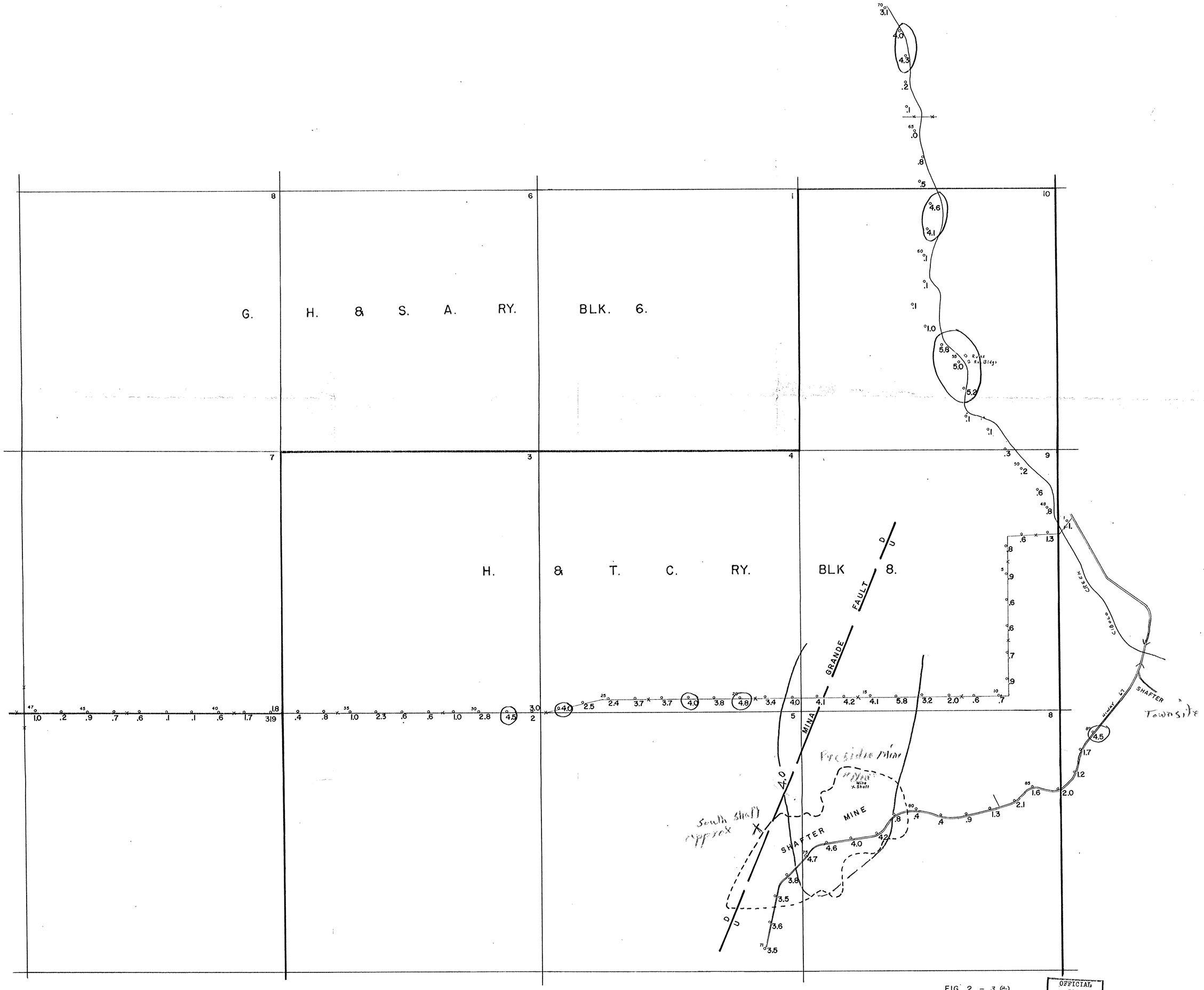

FIG 2 - 3 (a)

SHAFTER PROSPECT

PRESIDIO COUNTY, TEXAS

SCALE 1" = 1000'

SILVER P.P.M.

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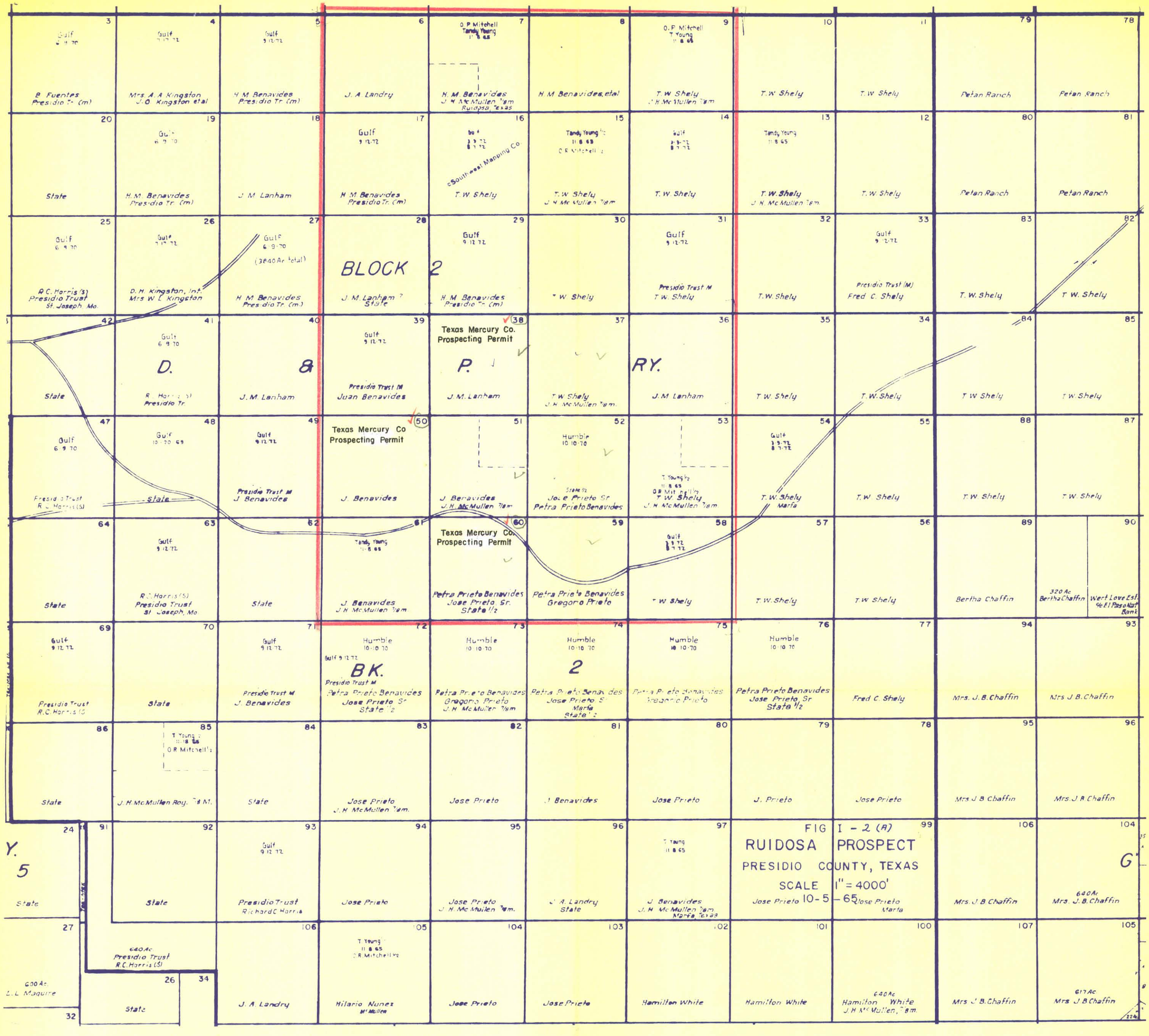


Read OCT 8 1965

THE UNIVERSITY OF TEXAS
BUREAU OF ECONOMIC GEOLOGY
JOHN T. LONSDALE, DIRECTOR
(Preliminary editon)

GEOLOGIC MAP OF CHINATI PEAK QUADRANGLE, PRESIDIO COUNTY, TEXAS

WITH STRUCTURE SECTIONS

EXPLANATION

QUATERNARY

- Qal — Alluvium
- Q3, Q2, Q1 — Terrace gravels

UNCONFORMITY

TERTIARY

Chinati Mountain volcanic series

- Tig — Intrusive igneous rocks
- T8 — Soda rhyolite
- T7 — Olivine augite andesine trachyte
- T6 — Soda rhyolite
- T5 — Quartz trachyte
- T4 — Lower part, rhyolite; upper part, enigmatite trachyte.

Buck Hill volcanic series

- T3 — Soda rhyolite
- T2 — Porphyritic olivine labradorite basalt
- T1 — Olivine basalt and tuff

UNCONFORMITY

CRETACEOUS

Comanche series

Fredericksburg group

- Kfu, Kfl — Finlay formation. *Upper member: massive cherty limestone; lower member: loosely consolidated marl.*

Trinity group

- Ks — Shafter formation. *Alternating beds of ferruginous sandstone and nodular fossiliferous limestone.*
- Kp — Presidio formation. *Sandstone, conglomerate and limestone.*

UNCONFORMITY

PERMIAN

Guadalupe series

- Pm — Mina Grande formation. Dolomitic reef limestone
- Pr — Ross Mine formation. *Sandstone, shale, chert, and limestone.*

Leonard series

- Pc — Cibolo formation. *Shale and limestone; reef limestone in upper part.*

PENNSYLVANIAN

Wolfcamp series

- Pa — Alta formation. *Lower part black shale with thin sandstone interbeds; upper part yellow sandstone.*

Strawn-Canyon(?)-Cisco series

- Cc — Cieneguita formation. *Quartz-pebble conglomerate, coarse sandstone, sandy shale, and reef limestone.*

Measured section with offset

U, upthrown side; D, downthrown side, dashed where inferred; dotted where concealed.

Thrust fault

Axis of syncline

Axis of anticline

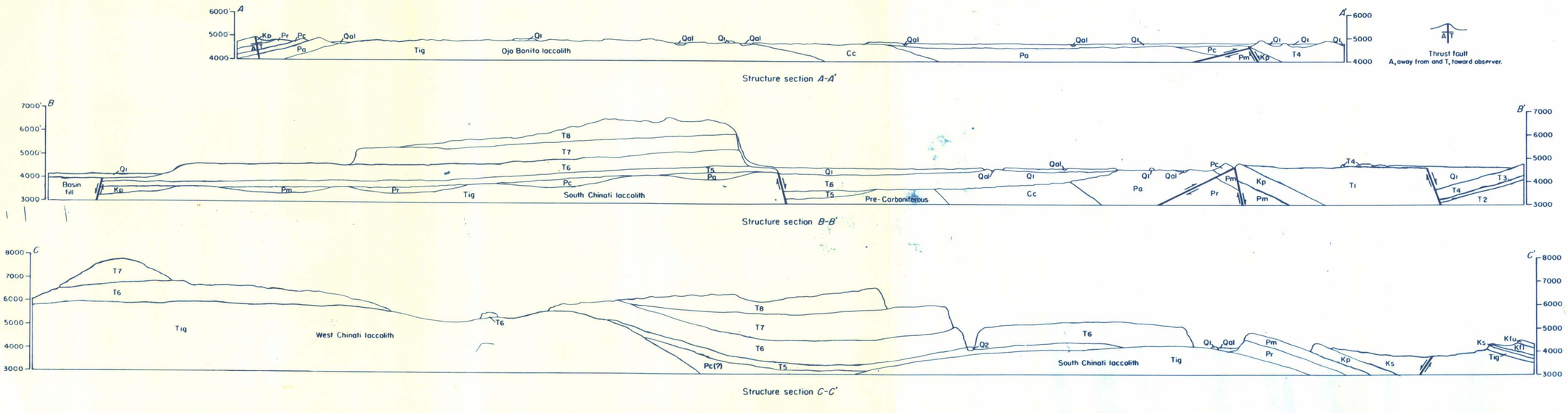
Strike and dip of beds

Windmill

Mine

USC&GS Triangulation station

Fence



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SHAFTER
FIG 3
3 (2)

THE UNIVERSITY OF TEXAS
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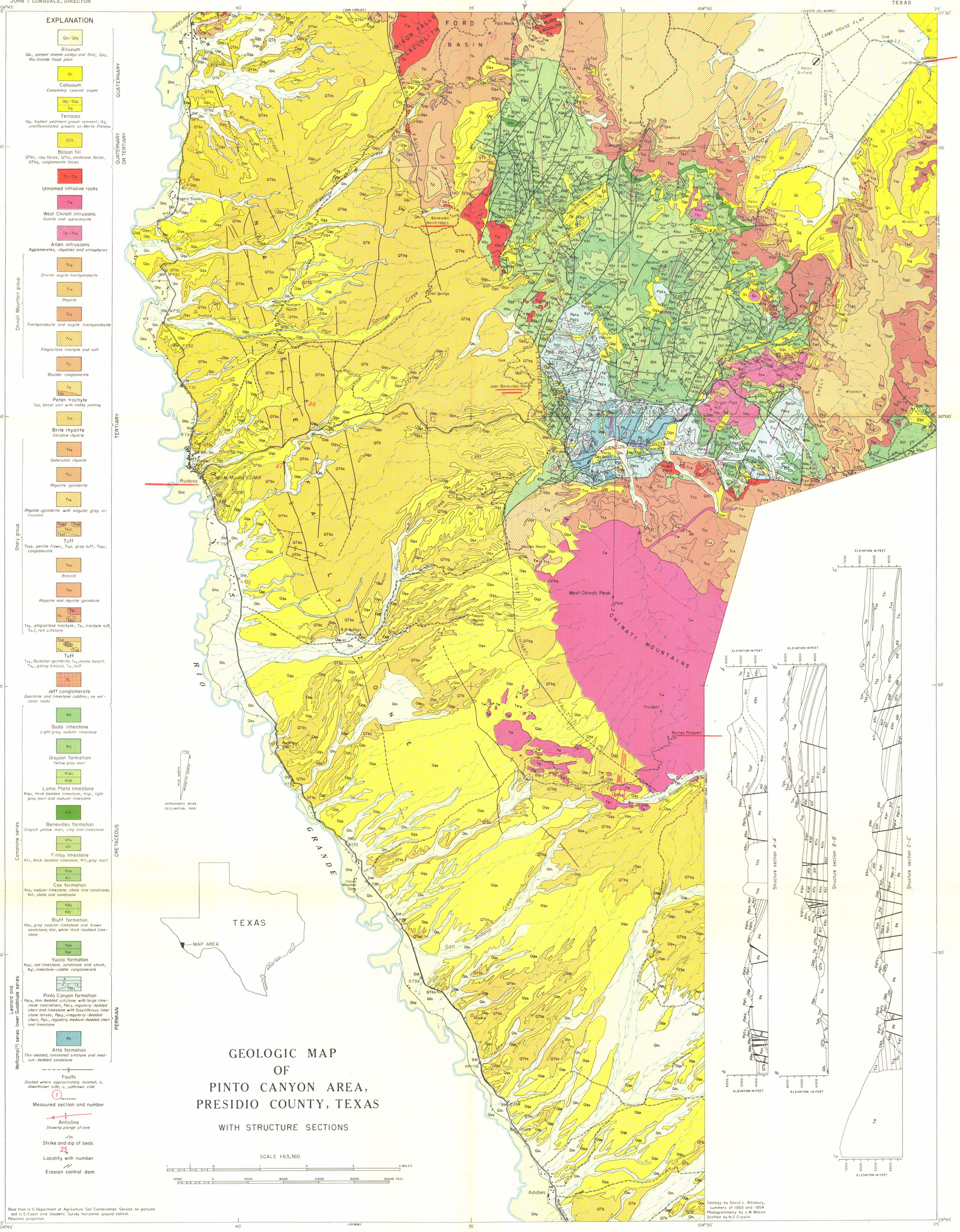
JOHN T LONSDALE, DIRECTOR

QUADRANGLE MAP NO 22
PINTO CANYON
TEXAS

Loma Plata mine



1:5"
Presidio (Shafter) mine

GEOLOGY OF THE PINTO CANYON AREA, PRESIDIO COUNTY, TEXAS

DAVID L. AMSBURY

GENERAL SETTING

The Pinto Canyon area covers the junction of the Sierra Vieja and Chinati Mountains in southwestern Presidio County, Texas. Permian and Comanche strata are exposed in a faulted Laramide anticline, which is buried by three groups of Tertiary volcanic strata; all are cut by Tertiary intrusions. Block-faulting developed the Presidio bolson, which was filled with Tertiary-Quaternary sediments. In the northeastern corner of the area gentle dip slopes on Tertiary strata pass northeastward into the Marfa basin, but throughout most of the area, tributaries to the Rio Grande have developed a rugged topography.

Study of the Pinto Canyon area was undertaken as part of a west Texas project of the Bureau of Economic Geology, The University of Texas. Baker, Rigby, Cress, and others had done reconnaissance work in Pinto Canyon and Rix in the adjoining Chinati Mountains. A total of eight months was spent in the field during 1953 and 1954. Jim Bell, 1953, and Dean Callender, 1954, gave able assistance in the field. About 25 square miles in the northwestern part of the area was mapped by Charles Mankin and Bill J. McGrew.

A more detailed treatment of the material covered herein has been prepared by the writer as a University of Texas doctoral dissertation under the supervision of R. K. DeFord.

GEOLOGIC FORMATIONS

PERMIAN SYSTEM

Alta Formation (Pa)

The Alta formation, containing the oldest rocks exposed in the Pinto Canyon area, crops out in the lower part of Pinto Canyon at the junction of the Loma Plata and Pinto Canyon anticlines. It is the lower member of an unnamed unit (Cress, 1953) and is Rigby's (1953, p. 78) "Lower unit (Leonard?)." Dark gray, thin-bedded mudstone forms about 80 percent of the 610 feet exposed in a measured section at locality 1; talus-covered mudstone slopes are broken every few feet by 6- to 12-inch ledges of dark gray, calcareous, fine sandstone.

Pre-solidification features, the result of submarine slides, are abundant. The most spectacular is at locality 2, where a slump block about 100 yards across and at least 30 feet thick is exposed. Thrust faults, overturned folds, and Z folds are prominent. There are angular unconformities in many places along Pinto Creek, with angles up to 20° between the beds involved. The unconformities are local and may be the result of erosion of, and deposition on, small slump blocks.

Indeterminate fusulinids were found in one concretion at locality 2; most bedding surfaces of the siltstone are covered with irregular black depressed marks about 3/16 of an inch wide and a few inches long, which probably represent animal trails. Age designation rests at present upon correlation with the Alta formation of the Shafter area, the upper part of which contains Wolfcamp fossils (Rix, 1953).

Pinto Canyon Formation (Ppc)

The name Pinto Canyon is proposed for all Permian rocks above the Alta in the area. It is the middle and upper members of Cress's (1953) Permian unit and Rigby's "Upper unit (correlated with Word)."

The type section is in the bed of Pinto Creek; the base is at locality 3, 3/16 mile upstream from the fourth creek crossing of the Marfa-Ruidosa road. The basal bed in the type section is medium-bedded black chert that forms a small waterfall; the base on hillsides is placed at the lowest resistant chert, cherty claystone, or cherty limestone bed which forms a ledge or cliff unless completely covered. The top of the formation is unconformably overlain by the basal conglomerate of the Cretaceous.

Pinto Canyon rocks include microcrystalline limestone, chert, and cherty limestone with varying amounts of clay, in dark, internally laminated, locally wavy beds 1 to 6 inches thick, and lenses of fine-grained calcarenite grading to fusulinid calcarenite; the upper part of the formation has large limestone concentrations. Between the Pinto Canyon formation and the Alta formation near locality 4, there are local, lenticular deposits of coarse encrinite up to 10 feet thick and 100 feet long, composed of calcite grains, crinoid columnals, and shell debris with grain size from ⅛ to ½ inch.

Fusulinids from the Pinto Canyon formation identified by R. V. Hollingsworth range in age from lower(?) Leonard to middle Guadalupe (correlative with Cherry Canyon). Macrofossils are abundant in some limestone lenses. Small faunas were obtained from several beds; results supported microfossil data but allowed only equivocal identifications.

Member 1 (Ppc 1).—The lowest mappable subdivision of the Pinto Canyon formation is medium-bedded, dark gray chert and microcrystalline limestone, with interbeds of less resistant siltstone similar to Alta siltstone. The base is well marked on hillsides by an abrupt steepening in slope and by reddish talus, and in creek beds by the sudden appearance of medium-bedded, ledge-forming black chert. Locally the contact is marked by crinoidal limestone. The thickness of the member increases from 95 feet at the type locality to 170 feet in MS 5, about 4 miles to the west.

Submarine slide blocks of Member 2 are interbedded with chert similar to that of Member 1, but because the blocks appear to occur only above a distinct stratigraphic level, the upper contact of Member 1 was drawn at the base of the lowest block and projected on prominent chert ledges between slide blocks.

No fossils were found in Member 1 above the crinoidal limestone at the base, but the crinoidal lenses have lower(?) Leonard fusulinids, and the middle of Member 2 has Leonard fusulinids.

Member 2 (Ppc 2).—Member 2 is a lithologic zone 110 to 170 feet thick containing prominent cliff-forming, submarine-slide blocks, which crop out nearly continuously around the exposure of the Pinto Canyon formation along Pinto Creek, to the north along the crest of the Loma Plata anticline, and locally in the Permian beds faulted up northwest of the Fred Shely ranchhouse. Cliffs are from 10 to 50 feet high, making excellent exposures of irregular beds of chert, cherty limestone, microcrystalline limestone, calcareous sandstone, and cherty sandstone.

The unit grades laterally into both Member 1 and Member 3; blocks pass laterally and vertically into regularly bedded chert and limestone within a few feet. Though the bedding seems uninterrupted in the places where slump blocks are absent, the bases of the blocks form a regular line when viewed from a mile away across Pinto Creek. Beds caught in the slumped blocks are much more lenticular than beds surrounding them, with much more rapid lateral changes. The lenticularity is probably due to squeezing while soft beds were in motion.

The base of Member 2 is the base of the lowest ledge- or cliff-forming slide block at any place. The top is at the base of the lowest fossiliferous, ledge-forming limestone bed of Member 3 at any place, which seems always to be above the highest slide block. In the area southwest, west, and northwest of locality 5, the top of Member 2 is a medium-bedded, bluish-gray chert, from 3 to 6 feet thick. The chert is spicular and slightly sandy; most beds are ripple-marked with a crest-to-crest distance of about an inch, and with crestal trends ranging from N. 35° E. to N. 65° E.

Fusulinids in a chert bed near the top of the highest slide block of Member 2 near MS 4 according to Hollingsworth are "Leonard, nondescript types" (PL No. 6337). The basal beds of Member 3 at various localities contain fusulinids ranging in age from middle Leonard to early Guadalupe (correlative with Brushy Canyon). Therefore, the age of Member 2 ranges from probable middle Leonard to probable early Guadalupe; the top is not the same age at every place. One small lens of dark gray, fossiliferous limestone in Member 2 (locality 8) has a fauna of brachiopods, sponges, bryozoans, gastropods, rare pelecypods, and rare ammonoids.

Member 3 (Ppc 3).—About 25 percent of Member 3 is very fossiliferous, dark gray, internally structureless, bituminous, microcrystalline limestone, in gray-weathering lenticular, ledge-forming beds up to 3 feet thick interbedded with dark gray, internally laminated, pyritic, bituminous chert, microcrystalline limestone, and very clayey chert. The base of Member 3 is the base of the lowest fusulinid-bearing limestone ledge above the highest slide block at any place, and the top is the top of the highest fusulinid-bearing ledge at any place. Member 3 is 170 feet thick at the type locality.

Fossiliferous limestone beds in the unit are probably a result of submarine turbidity flows of fossiliferous ooze. The contacts with laminated, unfossiliferous limestone show clearly that underlying laminae were squeezed up between fossils when the mass of debris came to rest.

Basal beds of Member 3 have a middle Leonard age in western outcrops and an early Guadalupe age in eastern outcrops near the type locality. Several fossiliferous beds near MS 5, in the lower 30 feet of the member, have *Parafusulina* dated by Hollingsworth "Leonard, cf. middle Leonard" (28 specimens, PL Nos. 6334, 6335, 6336). The basal bed at locality 7 has *Parafusulina* dated as "Upper Leonard, close to *Schwagerina setum* zone in age" (13 specimens, PL No. 6338). In the general area represented by these samples, higher beds of the member have been eroded away.

In MS 4, about 1 mile east of MS 5, *Parafusulina* in the basal beds of Member 3 are "Guadalupe, Brushy Canyon, close to, but not the same as, our 545 types, which are from the lower Brushy Canyon in the Delaware Mountains" (7 specimens, PL No. 6330). At the type locality in Pinto Creek, *Parafusulina* from the basal bed are "Guadalupe, Brushy Canyon, slightly older than our 545 which are from the upper Brushy Canyon in the Delaware Mountains" (16 specimens, PL Nos. 6324, 6327).

At the type locality *Parafusulina* described as "Guadalupe, Brushy Canyon, nondescript types" (22 specimens, PL Nos. 6325, 6326, 6328) occur throughout the member. The higher beds in MS 4 contain *Parafusulina* which are "Guadalupe, Cherry Canyon, Getaway, close to our 551 types, which are from the Getaway limestone in the Delaware Mountains" (28 specimens, PL Nos. 6332, 6333). Member 3 also contains bryozoans, brachiopods, crinoid stems, gastropods, rare corals, and locally abundant ammonoids.

Member 4 (Ppc 4).—The youngest mappable unit of the Pinto Canyon formation contains thin- to medium-bedded, dark, bituminous, pyritic, cherty, dolomitic siltstone with dark gray, microcrystalline limestone concretions up to 4 feet long and medium gray chert concretions about 1 inch in diameter. Rocks of Member 4 weather to a distinctive reddish brown. Talus from Member 4 is composed of rhombohedral fragments formed by the thin bedding and two prominent joint systems which intersect at 60 and 120 degrees. Below its eroded top, 93 feet of the unit remains at the type locality.

The member grades laterally and vertically into Member 3. For convenience in mapping, the lower boundary of Member 4 was set at the highest fossiliferous limestone ledge at any place. Member 4 is overlain disconformably by the Cretaceous basal conglomerate. On the north and northeast flanks of the Ojo Bonito laccolith, rocks of the Ross Mine formation (Rix, 1953) similar to and probably correlative with Member 4 contain *Waagenoceras* and *Pseudogastrioceras* (Rix, 1953, p. 77); Member 4 is therefore of Guadalupe age.

CRETACEOUS SYSTEM

COMANCHE SERIES

Yucca Formation

Lower member (Kyl).—The earliest known Cretaceous deposits in the area are limestone conglomerate, resting disconformably on Permian rocks. The well-rounded pebbles and cobbles consist of light gray and light yellow-gray limestone, with scattered black, white, and green chert pebbles. Boulders of Member 4 of the Pinto Canyon formation are common near the base. The matrix is limestone sand, cemented by light gray, fine-crystalline calcite.

The top of the basal conglomerate grades into the upper member of the Yucca. The conglomerate typically crops out in a vertical cliff up to 100 feet high, at the top of which less resistant, finer conglomerate beds are interbedded with and grade into nodular, fine-grained limestone and marl of the upper member. The first red beds are several feet above the top of the cliff.

Bedding in the conglomerate ranges from rudely cross-stratified to parallel; individual beds are 6 inches to several feet thick. In the typical section (MS 6) on Red Hill the basal conglomerate is 106 feet thick, in MS 7 it is 77 feet, and at locality 15 it is less than 30 feet. At locality 15 the upper part of the member consists of gray, cross-bedded calcarenite composed of microcrystalline limestone and large calcite grains. Conglomerate elsewhere is locally interbedded with thick-bedded, hard, yellow-gray, pebbly medium-grained calcarenite (*e.g.*, about 100 yards southeast of the base of MS 7).

Upper member (Kyu).—About one-fourth of the upper member of the Yucca formation is red limestone, red and purple shale, and brown sandstone, and their weathering products and talus give a distinctive reddish hue to all outcrops. The top of the member is at the base of the lowest light gray limestone ledge or cliff of the Bluff formation. The member is 500 to 550 feet thick throughout most of its outcrop area.

The lower 200 feet crops out in a series of ledges up to 4 feet high, formed by fine-grained calcarenite and conglomerate, which alternate with slopes up to 10 feet high, developed on shale, calcareous sandstone, and nodular limestone. The next 200 feet is characterized by two or three cliffs up to 40 feet high, formed by gray and red calcarenite composed of limestone and calcite grains, separated by slopes and ledges similar to those of the lower part of the member. The 100 feet of the member above the middle section is characterized by prominent 6-foot cliffs formed on cross-bedded, medium-grained, siliceous quartz sandstone which weathers dark brown, separated by slopes formed on calcareous sandstone. The uppermost part of the member crops out in a slope 50 feet high, cut in shale and calcareous sandstone, with one 2-foot cliff formed by yellow-orange, fine-grained limestone. This bed is an excellent marker over most of the Yucca outcrop area.

A few limestone beds in the upper member are fossiliferous but, because the fossils are embedded in hard limestone, none was identified. A 2-foot conglomerate bed, about ½ mile east-northeast of locality 50, consists of microcrystalline limestone pebbles coated by calcareous algae, in medium calcarenite.

Near locality 16, the upper member is only 360 feet thick (MS 7). The lower 250 feet there closely resembles the lower 200 feet on the south face of Red Hill (MS 6), 1½ miles distant, but the unit of limestone cliffs and the unit of prominent dark brown sandstone ledges are missing. The upper 110 feet of the member is mostly red shale.

Near the Dipper ranch, about half a mile east of the area, the upper member of the Yucca formation is absent. The basal conglomerate there may be synchronous with the lower member of the Bluff formation in Pinto Canyon.

Bluff Formation

The Bluff formation consists of 200 feet of very light gray, thick-bedded limestone overlain by 450 feet of dark gray, nodular, *Orbitolina*-bearing limestone interbedded with light-colored, cross-bedded sandstone. It has the largest outcrop area of any pre-Tertiary formation. The Bluff is the equivalent of the upper part of the Presidio formation and the lower part of the Shafter formation; Yucca formation as used herein is equivalent to the basal part of the Presidio formation at Shafter. The Presidio has a basal conglomerate like the lower member of the Yucca formation, but the overlying rocks are gray limestone with sandstone, not red calcarenite and shale. In Cross's terminology (1953, pp. 23–24), the unit herein termed Bluff formation includes the "white to gray massive limestone beds" in the upper part of the "Yucca formation," all the "Cuchillo formation," and the "lower gray limestone member" of the "Glen Rose formation."

Lower member (Kbl).—The lower member of the Bluff formation is a series of cliff-forming beds of white limestone, with slope-forming interbeds of shale and nodular limestone. On the south face of Red Hill (MS 6), there are five units of very light gray and light yellowish-gray, thick-bedded, fine-crystalline limestone with subconchoidal fracture, which form white cliffs 15 to 20 feet high. There are also three layers of thick-bedded, cross-bedded, quartz-cemented, medium-grained sandstone which form dark brown cliffs 8 to 20 feet high.

The base of the member is at the base of the lowermost cliff-forming, very light-colored limestone bed. The top of the member is at the top of the highest cliff-forming, light-colored limestone bed, underlying dark gray, nodular, rudistid- or *Obitolina*-bearing limestone of the upper member.

The lower member extends eastward into the Shafter area and upper Cibolo basin as one or two light-colored, ledge-forming beds below dark gray *Orbitolina*-bearing beds in the upper part of the Presidio formation. Dark gray, nodlar limestone beds occur between and below the white, massive beds in the Presidio formation, and in Pinto Canyon a few dark gray beds occur in the lower member of the Bluff. These contain no *Orbitolina* but have locally abundant gastropods and angular molluscan debris.

Upper member (Kbu).—The upper member of the Bluff formation is dark gray limestone alternating with light brown and pink sandstone; there are four such cycles in the area. The top of the upper member is at the top of the uppermost *Orbitolina*-bearing, nodular limestone bed, which is about 10 feet thick. *Orbitolina* is used here as a sedimentary particle characteristic of a rock type, not as a zone fossil.

Typical cycles are about 120 feet thick; they begin with resistant, medium- to thick-bedded, very hard, rudistid-bearing or unfossiliferous, medium gray, fine-crystalline limestone, which forms the top and back slope of a cuesta. The valley updip from this cuesta and the foreslope of the next are cut in dark gray, nodular, *Orbitolina*-bearing limestone and marl, which alternate with dark clay shale. Overlying the shale is resistant, cross-bedded, light brown, medium-grained, quartz-cemented sandstone which grades laterally and vertically into less resistant, calcareous sandstone.

The lowest cycle, called the caprock sequence, is different from the rest. Over most of the Pinto Canyon area (typified by MS 11), the basal hard limestone is about 40 feet thick and is overlain by light-colored sandstone, a persistent 10-foot oyster bed, and a 50-foot clay-shale section. Sandstone of the caprock passes laterally and vertically into hard, cross-bedded, medium-grained, quartz-sandy calcarenite, which weathers brownish gray with streaks of dark brown sand along cross-bedding planes. The whole sequence is typically 180 to 190 feet thick. Udden (1904) placed the top of the Presidio formation at the top of the caprock, which he called "the mortar rock."

The caprock sequence is the only unit below the middle Albian Benevides formation which can be definitely correlated with the worldwide Lower Cretaceous zone system. It contains *Douvilleiceras* near *D. mammillatum baylori* Spath (locality 50), *Cheloniceras adkinsi* Scott (locality 19), and *Trigonia stolleyi* Hill and *T. mearnsi* Stoyanow (locality 50). The age is lower Albian, roughly correlative with the Glen Rose formation of central Texas. Fossils in the rest of the member are *Orbitolina*, oysters, echinoids, and poorly preserved internal molds of clams, gastropods, and rudistids.

Cox Formation

The Cox formation, about 450 feet thick in the Pinto Canyon area, is characterized by resistant beds of quartzose sandstone which weather to dark red-dish-brown ledges. These alternate with calcareous sandstone, shale, light gray limestone, and marl. The formation crops out on steep slopes under cliffs formed by the upper member of the Finlay formation and forms steep hills or a series of small cuestas where the Finlay has been eroded away.

The upper boundary of the Cox in Pinto Canyon was placed at the top of the uppermost ledge-forming sandstone bed. The top of the Cox is placed at the same level as the top of the Shafter formation in the Shafter area, and the Cox formation is equivalent to the upper part of the Shafter.

Two members were mapped. The lower (Kcl) is gradational, by interbedding, with the upper member of the Bluff formation; it contains a few thin beds of hard medium gray limestone near the base. The bulk of the member is hard, resistant, thick-bedded, cross-bedded, quartz-cemented, fine- to medium-grained sandstone which weathers reddish brown, interbedded with fairly soft, cross-bedded, light-colored, calcite- and quartz-cemented sandstone. Sandstone bads are separated by, and pass laterally into, gray, red, and purple shale. Some of the rare limestone beds contain gastropods, oysters, clams, and shell fragments. *Exogyra texana* is rare.

About a third of the upper member (Kcu) is hard, nodular, medium- to thick-bedded, light limestone which contains locally abundant *Exogyra texana* (Roemer). The rest of the unit is shale, with marl and sandstone as in the lower member. The major *E. texana* bed is a good marker bed throughout the area, as is a light orange-yellow, aphanitic limestone bed in the lowest limestone of the member. *Acteonella dolium* Roemer, an easily recognized large gastropod, is abundant at the top in MS 11 and at the top of the lowest limestone of the member at locality 23 on the Marfa-Ruidosa road. Many of the sandstone beds contain silicified wood.

Finlay Formation

Typical outcrops of the Finlay formation are cliffs jutting from the face east and south of Cleveland triangulation station, along the outside edge of the central uplift; the total thickness is about 300 feet. The upper member (Kfu) is thick-bedded, resistant, aphanitic limestone with locally abundant rudistids. It is not cherty in MS 11 but does contain many zones of nodular chert near locality 28. The lower marl member (Kfl) is sandy at the base and contains small clams and other mollusks. The contact between the two members is interbedded gradational; it was mapped at the base of a prominent cliff. The upper contact of the Finlay formation is abrupt, because the overlying yellowish Benevides formation contrasts sharply with the white Finlay bench.

Benevides Formation (Kbl)

Shale and calcarenite with a thickness of 125 to 150 feet are herein designated the Benevides formation, named from the Benevides ranch. The type section, where the formation is 125 feet thick, is 1.5 miles southwest of Cleveland triangulation station (MS 12).

The lower portion of the formation is dark gray shale, weathering to distinctive yellowish slopes. It is overlain by yellow-brown skeletal calcarenite that forms a prominent caprock; the top of the formation is at the top of this bed. A large fauna of gastropods, clams, oysters, corals, echinoids, and ammonites occurs in the Benevides; *Oxytropidoceras bravoense* (Böse), a middle Albian fossil, was found throughout. The formation appears to be synchronous with the Kiamichi of north Texas.

Loma Plata Limestone

The Loma Plata limestone is named herein for those strata between the caprock of the Benevides formation and the base of the Grayson marl. The name is taken from Loma Plata in the north-central part of the area. The type section for the lower part is in MS 12 and for the top in MS 13. The total thickness is 720 feet.

The Loma Plata limestone consists of a lower nodular, slope-forming limestone member, and an upper thick-bedded, cliff-forming limestone member. The lower member is similar to the Espy formation near Sierra Blanca (Huffington, 1943; Smith, 1940), but the type Espy includes recognizable Del Rio and Buda strata, most of the soft beds are covered, and the base is not exposed. The upper member resembles the Devils River limestone.

The lower member (Klpl), 340 feet thick in MS 12, crops out on steep slopes. Much of the basal portion is covered, but there are scattered outcrops of silty, buff-colored shale and thin beds of nodular limestone. The shale grades upward by interbedding into hard, nodular, very light gray, aphanitic limestone. In the upper half of the member at most outcrops, there is a prominent cliff formed on siliceous, aphanitic limestone that weathers rough and brownish. A small fauna found in the lower 25 feet of the member at several places includes *Craginites serratescens* (Cragin) and *Gryphaea* sp. cf. *G. washitaensis* Hill and Vaughan, upper Albian fossils.

The upper member (Klpu) is thick-bedded, massive, light brownish gray, cherty and siliceous, rudistid-bearing fine- to medium-crystalline limestone. The base, in MS 12, is at the base of a prominent cliff-forming bed; the top is gradational with the Grayson formation through an interval of 40 feet, but the contact was mapped at the top of a hard, *Toucasia*-bearing limestone. Upper beds also contain *Acteonella dolium* Roemer, *Nerinea*, and *Chondrodonta*.

Grayson and Buda Formations

The Grayson-Buda outcrop is about 200 yards long and 200 feet across, north of the Loma Plata mine at the extreme north end of the Loma Plata anticline. The Grayson (Kg), 87 feet thick, is composed of light gray, nodular, argillaceous limestone interbedded with light gray to light yellow-gray marl. The middle has the most clay; limestone beds increase in number and thickness toward both contacts. The Buda formation (Kb) is light gray, resistant, nodular limestone. Five feet remain below the Tertiary Jeff conglomerate. *Exogyra arietina* Roemer and "*Budaiceras*" sp. indicate equivalence of the Grayson and Buda with upper Washita strata elsewhere.

TERTIARY STRATA

Tertiary volcanic strata form the Sierra Vieja and most of the Chinati Mountains. The oldest strata crop out north of the Pinto Canyon area, with progressively younger beds overlapping onto the pre-volcanic uplift. The total thickness is about 8,000 feet, though in most places less than 2,000 feet of the beds remain. Because the basal strata about 1.5 miles north of the area contain Chadronian vertebrate fossils, the age of at least the lower part of the volcanic rocks is Oligocene.

The Pinto Canyon area is on the northern flank of the Chinati Mountains volcanic center, although tuff and lava beds extend into the area from the northern Sierra Vieja. Volcanism began early in the Oligocene epoch with the deposition of the Tv tuff and conglomerate over a surface which was nearly flat except for the Loma Plata anticline. Most of the anticline was covered by the lower portion of the Shely group; Tsl tuff and Ts2 plagioclase trachyte fill canyons cut several hundred feet into Comanche strata. The lower portion of the Shely group is thin in some places near the Terry Shely ranchhouse, because of deposition on a hilly surface. From this and other evidence, it seems certain that the topographically highest part of the anticlinal uplift was south of Pinto Creek, as was the structurally highest part. The present low topographical position of this area was effected partly by erosion and partly by faulting.

After deposition of the lower portion of the Shely group, a deep local basin (structural and topographic) formed near the Terry Shely ranchhouse. Into this hole poured debris from erosion of volcanic rocks to the northwest, north, and northeast. A thick alluvial fan was formed over the eroded remnants of the lower portion of the Shely group, and evenly bedded tuff built up around the fan to eventually cover it. Lava flows of the upper portion of the Shely group poured out over the tuff; they in turn were covered by the Brite rhyolite and Petan trachyte. A large amount of material was eroded from the Loma Plata anticline prior to deposition of the Chinati Mountain group. The basal conglomerate (Tcl) rests on the Yucca formation but is composed mostly of material from the upper member of the Bluff formation. The base of Tc2 is not exposed, but Tc3 rests on a surface of considerable relief, with exposures of the Bluff formation in several places. The Chinati Mountain group is more than 3,500 feet thick; the outcrop is limited to the Chinati Mountains, and individual flow units are very thick, indicating a rapid local build-up, perhaps in a sinking block bounded by faults. The source of the lava is almost certainly within the Chinati Mountains.

Jeff Conglomerate (Tj)

The Jeff conglomerate (Eifler, 1951) crops out north of the Loma Plata mine, overlying the Loma Plata, Grayson, and Buda formations with 5° to 15° angular unconformity and underlying the lower tuff member of the Vieja formation. It is composed of sedimentary quartzite and limestone cobbles in a sand and caliche matrix. The thickness varies from 0 to 60 feet.

Tv Tuff Formation

The formation designated by the map symbol Tv is the southward extension of the lower part of the Vieja group. It is composed mainly of dingy tuff and conglomerate (Tvl), capped by remnants of the Buckshot ignimbrite (DeFord, 1958). The thickness is 500 feet at the north boundary of the area but thins southward onto the Loma Plata anticline to pinch out near Cleveland triangulation station.

The Buckshot ignimbrite (Tv4) is typically pale brown, light gray, or grayish red, porphyritic, vesicular, sanidine-rhyolite ignimbrite with many xenoliths. Peculiar dark red to black rims around many vesicles make the rock look as though a charge of buckshot had been fired into it.

Near the Loma Plata mine the Tv tuff contains several local layers of lava rock. A wedge of grayish-yellow-green glassy breccia (Tv2), with angular fragments of medium grayish-red, white, and pale green glass, replaces beds of tuff in MS 13 eastward along the strike. This unit also crops out in the bottom of an exhumed canyon in the Loma Plata limestone at locality 52. North of the Loma Plata mine, 50 feet of olivine basalt porphyry (Tv3) crops out under the ignimbrite member. The rock is dusky yellowish gray weathering brownish gray, composed of olivine phenocrysts in an aphanitic groundmass of labradorite (An_{55}) and clinopyroxene laths.

Shely Group (Ts)

The Shely group (new name) consists of trachyte tuff, trachyte, rhyolite and rhyolite ignimbrite, and conglomerate; it crops out in a narrow belt from the northern boundary of the area southward to the Fred Shely ranchhouse at the foot of Chinati Peak. Near the Loma Plata mine it overlies the Buckshot ignimbrite of the Tv formation, from Loma Plata mine to Pinto Creek it overlies progressively older Comanche strata, and along the Shely rim it rests on Member 4 of the Pinto Canyon formation. The lower portion contains Ts1 tuff, Ts2 plagioclase trachyte, and Ts3 rhyolite and rhyolite ignimbrite. It is overlain by the Brite rhyolite north of Pinto Creek and, with as much as 25° angular unconformity, by the upper portion of the Shely group south of Pinto Creek. Ts4 breccia crops out near the Government trapper's house on Pinto Creek; its relations with other Tertiary beds are obscure.

The type locality of the Shely group (named for the Terry Shely ranch) is the canyon west of Cleveland triangulation station (MS 15); the lower part of Tsl tuff, including the red siltstone member, is best exposed just north of the Pinto Canyon area near Nixon Falls. Typical exposures of the upper part, including Ts5 tuff and conglomerate and Ts6 rhyolite ignimbrite, occur along the east side of Pinto Canyon north of the Terry Shely ranchhouse; good exposures of Ts7 rhyolite ignimbrite and Ts8 spherulitic rhyolite are at locality 32.

Ts1 tuff.—Unit Tsl is fine- to coarse-grained crystal tuff with conglomerate lenses. It is white to red, thin to thick bedded, and even- to cross-bedded. Tsl tuff is 1,500 feet thick 1¾ miles northwest of the Ford ranch; the total thickness from the mae of Tsl to the base of the Brite rhyolite porphyry at Cleveland triangulation station is 1,100 feet. Ts2 trachyte and Ts3 rhyolite and rhyolite ignimbrite replace the upper part of Tsl, so that at Cleveland triangulation station only 340 feet of tuff remain. Tsl tuff is a southward extension of the Capote Mountain tuff (DeFord, 1958).

The upper contact in northern exposures is at the base of the Brite rhyolite. A persistent bed of brownish-gray sand, up to 50 feet thick and overlain by as much as 50 feet of reddish-brown silt, underlies the Brite. The lower part of Tsl is harder than the upper part, with blockier joints. Slopes typically expose white tuff with red bands below some of the bedding planes and layers of igneous pebble to boulder conglomerates up to 10 feet thick. In parts of the Ford basin, a colorful siltstone member separates the upper and lower tuff members of Tsl. The siltstone is a pale purple to dark yellowish-orange, hard, cross-laminated, well-sorted, angular sanidine arkose with blocky joints. It crops out in a dark red cliff from 2 to 40 feet high.

A turtle, identified by J. A. Wilson as *Stylemys* cf. *nebrascensis*, was found about 50 feet below the top of Tsl, at locality 48. The indicated age is Oligocene? (BEG UT 40190–1).

Ts2 trachyte.—Unit Ts2 is medium purplish-gray to grayish-red, plagioclase trachyte porphyry and vitrophyre. It has three nodes of weathering: irregular cliffs formed on lenticular lenses of flow breccia, well-marked platy and tabular jointing in massive lava, and pink, lavender, and gray soil as much as 50 feet deep in both lava and breccia. The color, weathered phenocrysts up to 3 mm long, and modes of weathering are characteristic. The general thickness is about 400 feet, though it pinches out abruptly 2¼ miles northeast of Cleveland triangulation station. The unit is composed of a myriad of separate tongues of breccia and massive lava, all nearly identical in appearance and composition. Ts2 overlies tuff above the red siltstone member in the northeastern outcrops, red and white tuff at Cleveland, and various Comanche beds to the south. It is overlain by Ts3 rhyolite ignimbrite and by lenses of cobble conglomerate up to 50 feet thick.

Ts3 rhyolite.—Unit Ts3 is composed of two separate lava flows, typically totalling 70 feet thick. The lower is pale grayish-red, pale brown, or brownish-gray, partly crystalline, slightly porphyritic, dense rhyolite ignimbrite with subconchoidal fracture and pronounced flow structure; the upper is brownish-gray to grayish-red, partly crystalline, vesicular to dense, slightly porphyritic, extremely fine-grained rhyolite with uneven to subconchoidal fracture and pronounced flow structure. Ts3 concordantly underlies the Brite rhyolite from about the north boundary of the Pinto Canyon area to the Petan ranchhouse; along upper Pinto Creek Ts3 is overlain by tuff and conglomerate of Ts5 with from 10° to 30° angular unconformity.

Ts4 breccia.—Ts4 breccia crops out in the northwest bank of Pinto Creek behind the Government trapper's house, and upstream (east-northeast) along the tributary that joins Pinto Creek about 25 yards below the house. Exposures are sporadic over several acres; the aggregate exposed thickness is less than 30 feet. The grayish-brown rock has angular to subangular fragments of Permian rocks to pebble size, in a matrix of silt also derived from Permian rocks. It also contains scattered fragments of white to yellow vitrophyre with phenocrysts of sanidine and quartz. It is intruded by dikes of similar rock, part of the Ta2 mass.

Ts4 was deposited in a stream valley cut into the anticline as deeply as the present Pinto Canyon; it is pre-upper Shely group in age and may be as old as the Jeff conglomerate.

Ts5 tuff.—Along Pinto Creek north of the Terry Shely ranchhouse, the basal third of Ts5 is very pale green to very light gray, conglomeratic, thin-bedded calcareous tuff. This is overlain by a wedge of evenly thick-bedded, ledge-forming conglomerate composed of pebbles, cobbles, and boulders of igneous rock in a matrix of tuffaceous sand. The upper third of Ts5 is very light gray to white, thin-bedded, conglomeratic tuff. Light gray to medium gray perlite occurs locally at the top of Ts5; several units of brownish-gray perlite, total thickness about 100 feet, crop out in this stratigraphic position near locality 35. In MS 16 a hornito(?) of banded pale red and very light gray, spherulitic, sanidine-bearing, vitrophyre flow breccia and micrograined lava occurs. These local glasses are probably closely related to the Allen intrusive complex.

The conglomerate wedge of Ts5 probably was an alluvial fan made of debris dumped into a structurally and topographically low area from northern and western sources. The conglomerate is thickest along Pinto Creek near MS 16; it wedges out rapidly westward against the underlying Ts3 rhyolite and passes southward into thin- to medium-bedded, light gray, conglomeratic tuff. Northward the conglomerate pinches out gradually; near the head of Pinto Canyon white to light yellow vitrophyre occurs at approximately the same position. Conglomerate overlying Ts2 trachyte and underlying Ts6 ignimbrite is widespread along the eastern border north of the area. Many cobbles in the conglomerate wedge look like Ts3 rhyolite, but the others do not closely resemble igneous rocks in the Pinto Canyon, Shafter, and Candelaria areas.

Ts6 ignimbrite.—Ts6, 200 to 250 feet thick, is medium brownish-gray (middle part) and medium grayish-red rhyolite ignimbrite; it is hard, dense, xenolithic, very fine grained, and slightly vesicular. The rock is easily recognized by its abundant angular fragments of very light gray, very fine-grained trachyte(?), up to half an inch long. Known outcrops of Ts6 form rims east of Pinto Creek, on the north-trending plateau between the Fred Shely ranchhouse and the north boundary of the area. Ts6 is the lower part of Rix's (1953) "Unit T4 of the Buck Hill volcanic series," which is xenolithic, anorthoclase-bearing rhyolite.

Ts7 ignimbrite.—Ts7 forms slopes and ledges and is probably composed of several flow units; the rock is medium brownish-gray, pale brown, grayish-orange-pink, and pale red, hard, dense, partly crystalline, slightly porphyritic, very fine grained, rhyolitic ignimbrite. The maximum thickness is approximately 75 feet. Ts7 closely resembles Ts3 rhyolite and ignimbrite; both closely resemble Rix's (1953) "Unit T3 of the Buck Hill volcanic series."

Ts8 spherulitic rhyolite.—Ts8 forms cliffs on rim faces and gentle slopes behind. The rock has excellent flow banding, colored medium bluish gray and green-speckled yellowish gray; it is dense to pumiceous, slightly porphyritic, spherulitic, aegerite-bearing rhyolite. The maximum thickness is about 250 feet.

Brite Rhyolite

The southern Sierra Vieja (Capote rim) is held up by the Brite rhyolite, which is about 250 feet thick in most exposures. A typical outcrop forms the wall of the canyon west of Cleveland triangulation station. The rock is very light brownish-gray, hard, dense, porphyritic, slightly vesicular, glassy rhyolite with subconchoidal fracture and fair flow structure. Phenocrysts are sanidine rhombs up to 4 mm long with blue opalescence, and glassy quartz in subequant grains up to 2 mm across. Characteristic inclusions are dark vitrophyre with subequant phenocrysts of alkali feldspar 3 to 8 mm long; the inclusions have uneven fracture, are pulled out parallel to flow lines in the lava, and are up to 6 inches long. There are several major flow units in the formation with the same composition and similar field appearance but different microscopic texture. Ignimbrite has been reported from the Brite rhyolite north of the Pinto Canyon area (DeFord, 1958, p. 28), but only microcrystalline lava was found within the Pinto Canyon area.

The Brite is overlain by the Petan trachyte with local remnants of other flows between. It is probably younger than all units of the Shely group, because there are no pebbles of Brite rhyolite in conglomerates of Ts5.

Petan Trachyte

The Petan trachyte crops out on the backslope of the Capote rim from about Lat. 30°05′ N. northward, forming high, steep, dark hills where eroded by Capote draw drainage and local cliffs on rim faces. An exposed thickness of about 500 feet is built up of lenticular units 2 to 150 feet thick. The Petan trachyte is named for the Petan ranch (Deford, 1958); the type locality is here designated the steep hill upon which is Cleveland triangulation station.

Most flow units of the Petan are dark gray or brownish-gray, tough, vesicular, porphyritic, fine-grained, plagioclase trachyte weathering dark brown to dark gray. A flow remnant at locality 36 is reddish brown, with abundant spheroidal calcite amygdules; the composition is typical of the Petan. Several remnants of olive-gray, tough, plagioclase trachyte porphyry with slabby joints, and dark gray, olivine trachyandesite porphyry occur as buried hills in the base of the Petan (locality 49). The reddish-brown phase of the Petan suggests possible continuity with the reddish-brown Tc5 trachyandesite of the Chinati Mountain group, which has a very similar mineral content and texture.

Chinati Mountain Group

The Chinati Mountain group, composed of more than 3,500 feet of plagioclase trachyte, rhyolite, and tuff, crops out south of the Shely fault to form the Chinati Mountains. The Chinati Mountain group is here expanded to include 1,500 feet of plagioclase trachyte, tuff, and local basal conglomerate, which are probably older than the lowest unit at the type locality as designated by Rix (1953, p. 118). Where the base is exposed, the group overlies Comanche strata; it is in fault contact with the Shely group.

Tc1 conglomerate.—More than 100 feet of conglomerate is exposed along the north side of a major tributary to Pinto Creek, from the Prieto ranchhouse to the base of MS 7. It has boulders, cobbles, and pebbles of Comanche limestone (mostly from the upper member of the Bluff formation) in a matrix of sand, silt, and clay, also derived from Comanche beds. Tcl unconformably overlies the Yucca formation and underlies Tc3 trachyte.

Tc2 trachyte.—Unit Tc2 is composed of dark (reddish), porphyritic, very hard to easily weathered, amygdaloidal, very fine-grained plagioclase trachyte interbedded with greenish, fine- to coarse-grained, conglomeratic tuff. It crops out northeast of the Juan Morales ranchhouse, dipping eastward under Tc3 plagioclase trachyte. The estimated exposed thickness is 500 feet. Tc2 may be the same as Rix's (1953) "Unit T5 (quartz trachyte) of the Chinati Mountain volcanic series," which contains phenocrysts of plagioclase.

Tc3 trachyte.—Tc3 is composed of about 1,000 feet of lava flows and associated intrusions (Ti4); the lava is medium to dark gray, light to dark olive-gray, and dark greenish-gray, porphyritic, very hard and tough to deeply weathered, very fine-grained plagioclase trachyte and trachyandesite weathering reddish. Individual cliff-forming units are indicated on the geologic map. Tc3 is underlain by Tc2 trachyte north-northwest of West Chinati Peak; by the upper member of the Bluff formation north of West Chinati Peak and south of the Prieto ranchhouse; and by Tcl along the south bank of the tributary to Pinto Creek, from the Prieto ranchhouse to the base of MS 7. It is overlain by Tc4 north of the saddle between Chinati and West Chinati Peaks.

Rare pebbles and cobbles of milky vein quartz (pre-Cambrian?) occur in the lowest flow unit south of the Prieto ranchhouse; other flow units have veins and amygdules of clear, singly-terminated quartz crystals to 4 inches long.

Tc4 rhyolite.—Tc4 forms the lower cliffs of Chinati Peak; good exposures occur south of the Fred Shely ranchhouse. The rock is light brownish-black, irregularly porphyritic, fine-grained rhyolite, with sanidine-anorthoclase phenocrysts up to 1 cm long and xenoliths of reddish felsite porphyry. Tc4 is the unit Rix (1953) called "Unit T6 (soda rhyolite) of the Chinati Mountain volcanic series." There are many thick, cliff-froming flows; the total thickness may be 500 feet.

Tc5 trachyte.—Tc5 forms most of Chinati Peak; good exposures occur southeast of the Fred Shely ranchhouse. The unit is composed of many thick flows of reddish-brown to grayish-black, porphyritic, dense to slightly vesicular and amygdaloidal, hard, tough, very fine-grained plagioclase trachyte with some vitrophyre. Tc5 is the unit Rix (1953) called "Unit T7 (olivine augite andesite trachyte) of the Chinati Mountain volcanic series"; he gave an approximate thickness of 930 feet. Tc5 may be correlative with the Petan trachyte, but definite field evidence is lacking at present.

TERTIARY INTRUSIONS

Intrusive bodies in the area range in size from dikes a few inches wide to the 27-square-mile West Chinati mass, and in composition from granite, through trachyandesite, to iddingsite basalt. Ages are poorly known; intrusion of the West Chinati Peak mass was post-Chinati Mountain group, pre-major faulting. The intrusive rocks cut Tc2 trachyte and Tc3 trachyte sharply but gently arch Tc4 rhyolite and Tc5 trachyte. The West Chinati mass has been extensively faulted and is on the upthrown side of the postulated West Chinati fault. Other intrusive rocks probably post-date volcanic strata and antedate major late-Tertiary faults. Many of the smaller dikes follow early Tertiary faults and joints, but none are known that follow late Tertiary faults.

West Chinati Intrusion (Tw)

The West Chinati intrustion is oval in plan, 6 miles long and 6 miles wide, with an area of at least 27 square miles. It is composed of at least two major rock types: an inner core of speckled yellowish-gray, porphyritic, fine-grained, plagioclase-bearing granite; and an outer rim of mottled light olive-gray and dark gray, medium- to coarse-grained, plagioclase-bearing rock. The granite has the larger volume; it forms the very steep, bare-rock knobs of West Chinati Peak.

The largest mass (about 10 square miles) of the dark outer rock is in San Antonio Canyon, where it gently arches Tc4 rhyolite and Tc5 trachyte. The lower units of the Chinati Mountain group are not visible there; possibly they were absorbed by the intrusion. The canyon is cut in a phase of the rock that weathers deeply to large spheroidal balls composed of coarse feldspar sand. Rix (1953) described this rock as hornblende-magnetite-gabbro. Radial and concentric dikes of granite cut the dark rock throughout San Antonio Canyon.

On the northern and northeastern sides of West Chinati Peak the lower members of the Chinati Mountain group are cut sharply by the intrusion. There, the dark outer mass is thin; it is composed of medium-grained, plagioclase-bearing quartz syenite. Dikes of light-colored granite cut the neighboring lava flows in several places.

Allen Complex (Ta)

The Allen intrusive complex is composed of rhyolite porphyries, vitrophyres, perlite, glassy breccias, and some sedimentary breccia. Most rock types of the complex crop out in the belt of intrusions that trends west-southwest—east-northeast south of the old Allen place. Many contacts between units of the complex, and contacts with older rocks, are sharp, nearly vertical surfaces; in many places the more resistant rock stands in a vertical wall. The complex of intrusions is younger than Tc5 tuff but may be older than Tc6 ignimbrite.

Tal sanidine rhyolite porphyry forms three major stocks which rise 1,500 feet above the surrounding sedimentary rocks. A large part of the northernmost stock is not resistant to erosion but crops out only in creek beds cut through the extensive alluvium; the southwestern portion of the stock is similar to other stocks in being very resistant. The resistant part surrounded a large mass of the Cox formation without disturbing bedding or metamorphosing the sedimentary rocks. The southernmost stock cuts Ts2 trachyte, Ts3 rhyolite, and Ts5 tuff, as well as Comanche strata. Typical Tal rock is pale grayish-red to grayish-orange, slightly vesicular, sanidine rhyolite porphyry composed of rounded and embayed phenocrysts of quartz and euhedral phenocrysts of sanidine up to 4 mm across, in a spherulitic and granophyric or hypautomorphic, very fine-crystalline groundmass of alkali feldspar and quartz.

Ta2 oligoclase rhyolite crops out in a large mass south of the Government trapper's house. The mass is composite, formed of many separate intrusive bodies both resistant and non-resistant to weathering. A resistant portion directly across the Marfa-Ruidosa road from the trapper's house has excellent vertical jointing and many shallow caves. Typical Ta2 rock is very pale red purple to pinkish gray or light yellowish gray, composed of embayed phenocrysts of quartz and euhedral phenocrysts of oligoclase (An_{10-15}) and sanidine, to 4 mm across, in a microcrystalline to very fine-crystalline groundmass of quartz, alkali feldspar (in part plagioclase), and non-opaque accessories. Near the contacts with Ta3, Ta2 has fewer phenocrysts, in a microcrystalline to nearly glassy groundmass. Ta2 cuts Comanche strata and Ts4 breccia.

Ta3 rhyolite crops out at several localities south of the Marfa-Ruidosa road. Two color phases are evident; very light gray to light yellowish gray and pale to moderate red. Ta3 is easily recognized by the intense flow structure, which gives the rock the appearance of petrified wood or schist, and by the lack of phenocrysts. It is in dikes and plugs in most places; east of locality 54 it is either a sill or a flow. Ta3 cuts the upper member of the Bluff formation with vertical contacts which are irregular in plan; contacts with Ta2 porphyry are also vertical.

Ta4 breccia and Ta5 breccia consist respectively of white, microcrystalline matrix material surrounding angular fragments of pale red, streaked, cryptograined rock and grayish-purple to brown, streaked, spherulitic, cryptograined rock. These occur in irregular masses, dikes, and plugs, both resistant and non-resistant to weathering; rock types intergrade. Ta6 vitrophyre is black, porphyritic pitchstone with flow lines and sanidine phenocrysts to 6 mm across; it occurs in dikes to 30 feet wide and 200 yards long. Ta7 perlite is striped brown and green with zones of cryptograined rhyolite and black and white, glassy breccia; it occurs in irregular masses to 100 yards across. Ta8 breccia resembles Ta4, but some angular fragments are biotite-rich; it crops out in a dike 100 feet wide and 100 yards long. Ta9 tuff breccia is a sedimentary deposit of steeply dipping, crudely bedded, tuffaceous rock that crops out within the main belt of intrusion; it contains fragments of Permian rocks, Ta2 rhyolite, Ta3 rhyolite, and chalcedony.

Other Instrusions

Many small intrusions, of diverse composition and occurrence, are exposed in the Pinto Canyon area. Dark dikes (Til) follow many of the early Tertiary faults and joints in Permian and Comanche beds; the common strike is N. 20° E. Several are well exposed in Pinto Creek, where they cut the Alta formation. Two types of dikes were recognized: those easily weathered to loose, dark greenish material and those resistant to weathering, which form low ridges in creek beds. The thickness varies from a few inches to several feet; in vertical section most dikes fork and branch. An irregular dike at the fourth creek crossing of the Marfa-Ruidosa road is composed of dark gray, hard, tough, slightly porphyritic, fine-grained trachyandesite, which weathers red. The Til dikes may be closely related to the Chinati Mountain group or the West Chinati dark rock.

A sill (Ti2) which crops out near locality 44 and north of the Benevides ranch headquarters is composed of dark brownish-gray to dusky red, red-speckled, porphyritic, xenolithic, vesicular, slightly amygdaloidal, fine-grained iddingsite basalt. Amygdules are filled with calcite; xenoliths are angular fragments of the red siltstone member of Tsl, up to 2 feet long. The sill underlies the Brite rhyolite, with a maximum thickness of about 70 feet.

Southeast of the Benevides ranch headquarters, a sill, stock, and several minor bodies of pale red and very light brown, porphyritic, sanidine- and quartz-bearing, very fine-grained rhyolite crop out. The rock is probably the same as Tal sanidine rhyolite, but because of geographic separation, color differences, and the fact that the rock weathers spheroidally, it was mapped as a separate type, Ti3.

Intrusive bodies here called Ti4 are dikes and irregular plugs associated with Tc3 plagioclase trachyte, near the Shely fault. The rocks are dark olive-gray to medium gray, plagioclase trachyte porphyry, with good jointing; they weather to reddish and brownish spheroidal boulders. In the creek bed east of the Prieto ranchhouse, rock of this type cuts white tuff with a fossil soil at the top, which is overlain by lava of Tc3 plagioclase trachyte.

A U-shaped intrusion (Ti5) about a third of a mile across crops out east of the Prieto ranchhouse. It is composed of resistant, pale purplish-gray to pale red, microcrystalline rhyolite breccia that looks like welded tuff. It contains abundant boulders, cobbles, and pebbles of Bluff limestone, sedimentary quartzite, rhyolite breccia, and other rocks, probably derived from Tc1 conglomerate. In the creek bed east of the Prieto ranchhouse the breccia fills cracks and joints in the previously mentioned mass of Ti4 plagioclase trachyte. In large cracks, rhyolite and other rock fragments range to boulder size; hairline cracks are filled with tiny angular chips.

Intrusive rock type Ti6 occurs in the Nixon Falls and Loma Plata laccoliths. The Nixon Falls laccolith covers more than a square mile, east of the Candelaria fault. The base rests on Tsl tuff below the red siltstone member; the top is partly below, partly above the siltstone.

The Loma Plata laccolith apparently rests on the Buckshot ignimbrite, uparching the red siltstone. The rock is light gray trachyte, with phenocrysts of bronze biotite, augite, and alkali feldspar in a very fine-crystalline groundmass.

QUATERNARY FEATURES

Bolson Deposits (QTb)

Conglomerate, sandstone, and clay of the Presidio bolson underlie about 150 square miles of the area. They were deposited in alluvial fans, deltas, and lakes in a large playa basin some 65 miles long and 15 wide, which is the present site of the Rio Grande Valley.

Thick, lenticular conglomerate beds (QTbg), formed of well-rounded pebbles, cobbles, and boulders of all rock types occurring in Pinto Canyon, are more than 500 feet thick near the foothills of the Sierra Vieja. In places, the conglomerate is in fault contact with other rocks; in places, it lapped onto a terrain with as much relief as the present one. Toward the center of the basin, conglomerate beds thin and intertongue with thin- to medium-bedded sandstone and siltstone (QTbs). At least 600 feet of the sandstone is exposed; excellent outcrops are in the central Naegele fault zone east of Ruidosa. Cements in conglomerate and sandstone are calcite, opal, and quartz. From Ruidosa southward to Pinto Creek, light greenish-gray and pale brown, gypsiferous, salty, bentonitic clay (QTbc) crops out. Clay beds intertongue with, and are overlain by, thin-bedded sandstone; a maximum of 50 feet is exposed.

No fossils except land snails were found in the bolson fill; the deposits are younger than all exposed lava flows and younger than perhaps 80 percent of the basin-and-range fault displacement but older than the pediment surfaces cut in them.

Plateau Gravels (Qg)

Conglomerate lenses with interbedded siltstone and caliche occur in the northeast part of the area on uplands. The conglomerate contains well-rounded pebbles, cobbles, and boulders from lavas of the Sierra Vieja and Chinati Mountains, with scattered pebbles of syenite from West Chinati Peak. Maximum thickness of these deposits is about 100 feet; they are at the southern border of a much larger mass of this material.

Pediment Gravels

The valley of the Rio Grande has many different gravel-capped pediment surfaces which extended from cliffs and talus slopes at the rim to gently sloping plains near the river. The oldest gravels remain as terrace deposits on interfluves, the younger ones as interfluve gravels along tributary valley walls, and the youngest are the valley fill and alluvial fans of present braided streams. From youngest to oldest, the mapped levels are: Qa2, the floodplain deposits of the Rio Grande; Qa1, the valley fill and alluvial fans of present braided streams; Qg6, Qg5, Qg4, Qg3, Qg2, and Qg1, at progressively higher levels. Qg6 is a general term for several low, irregular deposits at levels between present stream valleys and Qg5, the lowest relatively smooth, even terrace. Qg2 is present on the highest interfluves near the foothills of the Sierra Vieja; Qg1 occurs as a few remnants near the Ford ranch. The pediment surfaces are capped by conglomerate 30 to 50 feet thick, similar to bolson-fill conglomerate. Terrace conglomerate, however, extends to the Rio Grande; Qg4 conglomerate overlies the sandstone and clay facies of the fill near Ruidosa.

STRUCTURE

The Pinto Canyon area lies between the post-Cretaceous orogenic belt of the Mexican geosyncline and the nearly stable Texas shelf; it is also in the southeastern part of the late Tertiary basin-and-range block fault region. A gentle anticline was formed before deposition of the Jeff conglomerate (late Eocene?). Steep normal faults, striking N. 30° E., followed the folding. Thick lava flows poured out, with local, steep doming between deposition of the lower and upper portions of the Shely group. Block faulting then occurred; it has continued through Recent time. The trends of these latter faults in the Pinto Canyon area are N. 10° W. and N. 85° E.; displacements range to 1,500 feet.

PRE-VOLCANIC EVENTS

The Loma Plata anticline and subsidiary Pinto Canyon anticline are parts of a large Laramide fold, with axial strikes of N. 30° W. to N. and N. 35° E. to N. 85° E., respectively. The Loma Plata anticline plunges 15° N. under nearly horizontal Tv beds; the Pinto Canyon anticline plunges about 10° E. under Shely strata. The anticlines are cut off along the west and south sides by late Tertiary faults, which locally increase dips of strata to 45°; most dips due directly to the pre-lava folding are less than 10°. At Shafter, Permian and Comanche strata dip southeastward under Tertiary flows; if this occurrence is the southern end of the Loma Plata anticline, its length is 27 miles.

After the folding but before deposition of volcanic rocks, normal faulting occurred throughout the present Permian and Cretaceous outcrop area. Fault strikes range from N. 15° E. to N. 40° E., with an average of N. 30° E.; dips are nearly vertical. The displacement of the Cleveland fault is about 700 feet; most faults have less than 200 feet displacement. Minor faults occur at right angles to the N. 30° E. trend.

POST-VOLCANIC EVENTS

With the exception of the formation of the steep local basin near the Terry Shely ranchhouse, in lower Shely strata, no structural events are known for the Pinto Canyon area during deposition of the Tertiary volcanic strata. Basin-and-range block faults cut the volcanic rocks to form the Sierra Vieja. The general trends of the faults are N. 5° W. and N. 85° E., though the en echelon faults coalesce and bifurcate; individual segments range from N. 30° W. to N. 30° E. and from N. 60° E. to S. 85° E. Fault dips are nearly vertical; most of the northward-trending faults are downthrown to the west, and the longest eastward-trending faults are downthrown to the south. Tertiary strata have been tilted eastward to form long blocks with the downthrown side dipping into the faults. The Candelaria fault, on the other hand, has strata on the downthrown side dipping away from the fault. This fault displaces the Brite rhyolite several hundred feet and was rejuvenated to displace a Qg2 terrace about 50 feet in the same direction.

The major displacement near the Loma Plata mine is expressed in the Loma Plata fault, which does not cut the alluvium at its southern end. The Naegele fault zone is 25 miles long and 5 miles wide; faults cut bolson fill, the older terraces, and rarely, the youngest terraces. The fault dips are steep, with displacements to 100 feet, downthrown to the west. The Shely fault, trending eastward, is composed of many segments with diverse strikes. Displacement is southward, to bring the upper member of the Bluff formation against Member 2 of the Pinto Canyon formation and lavas of the Chinati Mountain group against those of the Shely group.

ECONOMIC GEOLOGY

Possibilities for the economic production of oil within the Pinto Canyon area in the near future are negligible. The Loma Plata anticline probably arches good reservoir and source beds in the subsurface, but exposed rocks have been shattered by numerous faults and joints. At the most obvious surface structure, a small intrusive body probably indicates larger intrusions at depth; much of the region is covered with volcanic rocks.

There are remarkably few mineral deposits, considering the number of different types of igneous intrusions. Notable localities are the Loma Plata mine and the Burny prospect. Several prospect pits and tunnels were dug at the Loma Plata mine in search of silver, and a mill was constructed by the Marfa Mining Company. The pits are in the upper part of the Loma Plata limestone on the crest of the Loma Plata anticline, near the Loma Plata fault, in an area of abundant red iron stains, calcite veins, and sink-holes.

The Burny prospect, on the north side of San Antonio Canyon near its mouth, was mined at various times since 1895 for lead, silver, and fluorite. The ore body is composed of fluorite, lead and zinc sulfides, and other minerals in crushed rock along a fault in the West Chinati intrusion (J. S. Cullison and A. E. Weissenborn, U. S. Geological Survey, personal communication).

The Shely uranium prospect is located in a saddle on the north side of Organ Pipe Hill about one-fourth mile S. 45° E. from the Government trapper's house (locality 60); the dump is visible from the house. A foot trail leads from the house to the prospect, and an unimproved mine road takes a circuitous route around the hill to the northeast and comes into the property from the east. The mineral claims, owned by Fred and Terry Shely, are staked on the T. W. Shely & Sons ranch. The property was visited by P. T. Flawn on July 14, 1958, in company with J. A. Stewart, who resides in the trapper's house. The following information was supplied by Flawn.

Yellow uranium minerals are erratically distributed in a soft buff to yellowish clay gouge about 1 foot thick which occurs in a small fault entirely within the body of Ta2 oligoclase rhyolite which forms Organ Pipe Hill. The fault strikes N. 80° E. and dips 50° south. An open cut about 8 feet deep and 6 feet wide has been excavated, by bulldozer and pick and shovel, along the strike of the fault for a length of 140 feet. Locally there is brecciation along the fault and locally manganese oxides are concentrated in the hanging wall.

It was reported by Mr. Stewart that a series of channel samples taken along the length of the open cut averaged 0.34 percent U_3O_8 and that about 200 tons of "ore" are stored in an adobe building near the trapper's house.

Native alum occurs in the Alta formation at locality 2. It is associated with yellow iron sulfates and probably is iron alum.

Layers of perlite without overburden crop out south of the old Allen place, 100 to 200 feet above the adjacent Marfa-Ruidosa road (locality 60). Quarrying and loading would be no problem, though transportation costs might be too high for economic production.

Water is the most valuable resource in the Pinto Canyon area at present. Though the Rio Grande flows too sporadically for dependable irrigation, there is abundant shallow and deep ground water for farming the floodplain. Springs in the Pinto Canyon area are small; along with the few wells, they barely support sheep and goat ranching. Springs on the inface of the rim are probably charged through fractures in the lava flows which comprise the Sierra Vieja; nearly all are on faults. Springs in the bolson fill occur on or near faults. Notable ones are at Hot Springs, the Naegele ranch, locality 46, and locality 47. Their water is highly mineralized. At Hot Springs, the water seeps from conglomerate lenses in QTbg well above creek level, at a temperature according to R. K. DeFord of 113°; the springs are near faults but not on them.

Longitude and Latitude of Localities

LOCALITY

NO.	LONGITUDE	LATITUDE
1	104° 31′ 49″	29° 59′ 33″
2	104° 30′ 48″	29° 59′ 36″
3	104° 30′ 37″	29° 59′ 58″
4	104° 32′ 22″	29° 58′ 50″
5	104° 32′ 13″	30° 00′ 03″
7	104° 32′ 49″	29° 59′ 33″
8	104° 32′ 23″	29° 59′ 27″
15	104° 30′ 50″	30° 02′ 48″
16	104° 29′ 45″	29° 59′ 13″
19	104° 33′ 04″	30° 00′ 21″
23	104° 28′ 06″	30° 01′ 43″
28	104° 31′ 25″	29° 57′ 52″
32	104° 27′ 08″	29° 59′ 22″
35	104° 29′ 55″	30° 00′ 21″
36	104° 29′ 08″	30° 05′ 32″
46	104° 37′ 45″	30° 00′ 18″
47	104° 39′ 00″	29° 59′ 10″
48	104° 34′ 37″	30° 07′ 06″
49	104° 28′ 55″	30° 05′ 22″
50	104° 33′ 04″	29° 59′ 01″
52	104° 32′ 56″	30° 06′ 01″
54	104° 29′ 36″	30° 00′ 59″
60	104° 29′ 53″	30° 00′ 08″

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