United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

In Reply Refer To:
Mail Stop 953

September 11, 1978

Mr. Norman F. Williams
State Geologist
Arkansas Geological Commission
Vardelle Parham Geologic Center
3815 W. Roosevelt Road
Little Rock, Arkansas 72204

Dear Mr. Williams:

Re: DMEA-3097 (Diamonds)
John Q. St. Clair
Arkansas Diamond Mine
Pike County, Arkansas

Pursuant to our conversation today by phone, we are pleased to enclose a copy of "Mining Agreement", a 20-page document and two graphs, referred to as Exhibits A and B on page 8, in the docket file of the referenced DMEA application.

We hope this is the information you need.

Sincerely yours,

Harold Kirkemo

Harold Kirkemo, Chief
Office of Minerals Exploration

Enclosure

cc: D. Keefer

FILE COPY
SURNAME:

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

FEB - 9 1954

Mr. John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

Re: Docket No. DMEA-3097 (Diamonds)
Arkansas Diamond Mine
Pike County, Arkansas

Dear Mr. St. Clair:

Reference is made to your telephone conversation of January 20 and 25, 1954, with Mr. L. G. Houk, concerning the captioned application which has been held in an inactive status due to your inability to furnish a new Owner's Consent to Lien in accordance with the instructions in our letter dated September 15, 1953. Mr. Houk, in his recent conversations with you expressed some doubt as to the ultimate approval of your application and questioned the advisability of spending more time in securing an acceptable Consent until the factual aspects of the application were first reviewed by the DMEA to determine if the proposed work met the requirements of the exploration regulations. You concurred in that procedure.

Our review indicates that the objective of your project is to first determine whether known sources of diamond-bearing peridotite breccia are amenable to recovery methods employed in Africa and, if so, to construct a beneficiation plant of sufficient capacity to conduct a more comprehensive program with a view of justifying a large-scale commercial operation. It is proposed to select sample material by core drilling and mechanical trenching in areas where previous exploration has delineated the most favorable mineralization. You estimate the cost of such a program to be $161,172, of which 90% would be furnished by the DMEA.

It is our opinion that your project is designed to demonstrate the feasibility of commercial recovery of fine-mesh gem and industrial diamonds from presently known sources and, therefore cannot be approved as an exploration project as defined under Section 2(a) of our regulations. Your request for exploration funds for that stated purpose is accordingly denied.

DENIED

R.C.G.
2-9-54

Your interest in this difficult recovery problem is greatly appreciated, and it is regretted that our decision in this instance was not made and conveyed to you in the early consideration of your application.

Sincerely yours,

R. O. Mittendorf

Administrator

LGHouk/COMittendorf/bih
2/5/54
Copy to: Docket
Admr. Reading File
Field Team, Region VI (2)
Operating Committee
Messrs. Hedges - 4604
Chandler - 3520
Larrabee - G-232 GSA Bldg.
Houk

MF-200 (A)
(February 1952)

DOCKET NO. DMEA 3097

COMMODITY Industrial diamonds (bort)

Government's Copy

UNITED STATES OF AMERICA
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

EXPLORATION PROJECT CONTRACT[1]
(Short Form)

IT IS AGREED this _____ day of _____, 195__, between the United States of America, acting through the Department of the Interior, Defense Minerals Exploration Administration, hereinafter called the "Government," and[2] John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

hereinafter called the "Operator," as follows: and as set forth in Annexes I and II and Fig. I attached hereto and made a part hereof:

ARTICLE 1. *Authority for contract.*—This agreement is entered into under the authority of the Defense Production Act of 1950, as amended, pursuant to DMEA Order 1 entitled "Government Aid in Defense Exploration Projects."

ARTICLE 2. *Operator's property rights.*—With respect to that certain land situated in the State of Arkansas, County of Pike, described as ~~follows~~[3] set forth in Annex I and Fig. I entitled "Caddo Gap, Ark."

the Operator represents and undertakes:[4]

~~(a) That the Operator is the owner in possession and entitled to possession and that the property is subject only to the following liens or encumbrances as to each of which the subordination agreement to the lien be attached:~~

(b) That the Operator is a lessee, in possession and entitled to possession, and the Owner's Consent to Lien is attached.

The Operator shall devote the land and all existing improvements, facilities, buildings, installations, and appurtenances to the purposes of the exploration project without any allowance for the use, rental value, depreciation, depletion, or other cost of acquiring, owning, or holding possession thereof.

ARTICLE 3. *Exploration project.*—The Operator, within 30 days from the date of this contract shall commence work on a project of exploration for[5] industrial diamonds (bort)

in or upon the described land; and shall bring the project to completion within a period of 90 days from the date of this contract. The work to be performed is more fully described in Exhibit "A" attached hereto, which, with any maps or drawings thereto attached, are made a part of this contract. The Government will contribute to the cost of this work as hereafter provided. The work shall be performed by the Operator or by independent contractor or contractors efficiently, expertly, in a workmanlike manner, in accordance with good mining standards and State regulations for health and safety and for workmen's compensation and employers' liability insurance, with suitable and adequate equipment, materials, and labor, to bring the project to completion within the time fixed. The Government shall have the right to enter and observe and inspect the work at all reasonable times, and the Operator shall provide the Government with all available means for doing so. The Government may consult with and advise the Operator on all phases of the work.

ARTICLE 4. *Costs of the project.*—The agreed, estimated costs of performing the work, expressed in terms of units of work to be performed (per foot of drifting, per foot of drilling, per cubic yard of material to be moved, etc.) are set forth in Exhibit "A," attached hereto. The Government will pay 90 percent of these agreed, estimated costs, as they accrue, for units of work actually performed that conform with the description or specifications for the work set forth in this contract, in an aggregate total amount not in excess of $3,150.00, which is 90 percent of $3,500.00, the agreed, estimated total cost of the project in which the Government will participate: *Provided,* That until the Operator's final report and final accounting have been rendered to the Government and any final check or auditing required by the Government has been made, and a final settlement of the contract has been made, the Government may withhold from the last voucher or vouchers such sums as it sees fit not in excess of ten (10) percent of the maximum total which the Government might have been called upon to pay under the terms of the contract. The Government may, as it sees fit, make payments direct to the Operator's independent contractors, if any, for the account of the Operator, rather than to the Operator.

ARTICLE 5. *Reports, accounts, audits.*—(*a*) *Progress reports.* The Operator shall provide the Government with monthly reports of units of work performed under the contract, in quintuplicate (five copies), upon forms provided by the Government. These progress reports shall be certified by the Operator, and shall constitute both the Operator's invoice of units of work performed on the project during the period covered by the report and his voucher for repayment by the Government, unless the Government requires the use of a standard voucher form with invoice attached. Progress reports shall include surface and/or underground engineering-geological maps or sketches showing the progress of the exploration, with assay-reports on samples taken concurrently with the advance in mineralized ground.

[1] If sufficient space is not provided in any blank, use an extra sheet of paper and refer to it in the blank.
[2] State name, address, and nature of organization if any.
[3] Give legal description or enough to identify the property, particularly excluding any land or interest therein to which the Government's lien is not to attach or the production from which is not to be subject to the Government's percentage royalty.
[4] Strike out the provision not applicable.
[5] Name of mineral or minerals.

(*b*) *Final report.*—Upon completion of the exploration work or termination of the contract the Operator shall provide the Government with an adequate geological and engineering report, in quintuplicate (five copies), including an estimate of ore reserves resulting from the exploration work.

(*c*) *Compliance with requirements.*—If, in the opinion of the Government, any of the Operator's reports are insufficient or incomplete, the Government may procure the making or completion of such reports and attachments as an expense of the exploration work; and the Government may withhold approval and payment of any vouchers depending upon insufficient or incomplete reports.

(*d*) *Accounts and audits.*—The Operator shall keep suitable records and accounts of the units of work performed, which the Government may inspect and audit at any time. The Government may at any time require a check of the work performed and an audit of the Operator's records and accounts, by a certified public accountant or otherwise, the cost thereof to be treated as a cost of the project. The Operator shall keep and preserve said records and accounts for at least 3 years after the completion of the project or the termination of this contract. Upon the completion of the project or termination of the contract the Operator shall render a final account and statement of work performed to accompany his final report.

ARTICLE 6. *Repayment by Operator.*—(*a*) If, at any time, the Government considers that a discovery or a development from which production may be made has resulted from the exploration work, the Government, at any time not later than 6 months after the Operator has rendered the required final report and final account, may so certify in writing to the Operator. The certification shall describe broadly or indicate the nature of the discovery or development. In the event of such certification, any minerals mined or produced from the land described in Article 2 within 10 years from the date of this contract, including any mined or produced before the certification, shall be subject to a percentage royalty which the Operator or his successor in interest shall pay to the Government, upon the net smelter returns, the net concentrator returns, or other net amounts realized from the sale or other disposition of any such production, in whatever form disposed of, including ore, concentrates, or metal, until the total amount contributed by the Government, without interest, is fully repaid, or said 10 years have elapsed, whichever occurs first, as follows: See Annex II, substituted for that part of 6(a) preceding the colon.

(1) One and one-half (1½) percent of any such net amounts not in excess of eight dollars ($8.00) per ton.

(2) One and one-half (1½) percent of any such net amounts, plus one-half (½) percent of such net amounts for each additional full fifty cents ($0.50) by which such net amounts exceed eight dollars ($8.00) per ton, but not in excess of five (5) percent of such net amounts.

(For instance: The percentage royalty on a net amount of five dollars ($5.00) per ton, would be one and one-half (1½) percent; on a net amount of ten dollars ($10.00) per ton, three and one-half (3½) percent.)

(*b*) As here used, "net smelter returns," "net concentrator returns," and "other net amounts realized from the sale or other disposition," mean gross revenue from sales, or if not sold, the market value of the material after it is mined in the form in which and the place where it is held. In the case of integrated operations in which the material is not disposed of as such, these terms mean what is or would be the gross income from mining operations for percentage depletion purposes in income-tax determination.

(*c*) To secure the payment of its percentage royalty, the Government shall have and is hereby granted a lien upon the land described in Article 2 and upon any production of minerals therefrom, until the royalty claim is extinguished by lapse of time or is fully paid.

(*d*) This article is not to be construed as imposing any obligation on the Operator or the Operator's successor in interest to engage in any mining or production operations.

ARTICLE 7. *Assignment, transfer, or loss of Operator's interest.*—Without the written consent of the Government, the Operator shall not assign or otherwise transfer or hypothecate this contract or any rights thereunder. The Operator shall not make any voluntary nor permit any involuntary transfer or conveyance of the Operator's rights in the land described in Article 2, without making suitable provision for the preservation of the Government's right to a percentage royalty on production and lien for the payment thereof; *Provided,* that mere failure by the Operator to maintain the Operator's rights in the land, without any consideration running to the Operator other than relief from the cost of maintaining such rights (as by surrender of a leasehold, failure to perform assessment work, or failure to exercise an option), coupled with complete abandonment by the Operator of all interest in or operations on the land for a period of 10 years from the date of this contract, shall not constitute such a transfer or conveyance. Should the Operator make or permit any transfer or conveyance in violation of this provision, the Operator shall be and remain liable for payment to the Government of the same amounts, at the same times, as would have been paid under the terms of the percentage royalty on production. If for any reason the net smelter returns, net concentrator returns, or other net amounts realized from the sale or other disposition of such production are not available as a means of measuring the amount of the Operator's liability, the amount thereof shall be estimated as well as may be, and in the event of dispute as to such estimates, the determination thereof by the Administrator of Defense Minerals Exploration Administration or by his successor shall be final and binding upon the Operator.

ARTICLE 8. *Termination and completion.*—The Government may, at any time, by written notice to the Operator, terminate this contract: (*a*) If the Operator fails to provide his share of the money necessary to prosecute operations pursuant to the terms of the contract; (*b*) if the Operator, in the opinion of the Government, fails to prosecute operations pursuant to the terms of the contract; or (*c*) if, in the opinion of the Government, operations up to the time of the notice have not indicated the probability of making any worth while discovery and in the opinion of the Government further operations are not justified.

ARTICLE 9. *Changes and added provisions* _____

Executed in sextuplicate the day and year first above written.

THE UNITED STATES OF AMERICA

XXXXX

By _____
Administrator, Defense Minerals Exploration Administration

By _____
John Q. St. Clair - Operator

I, _____, certify that I am the _____ secretary of the corporation named as Operator herein; that _____, who signed this contract on behalf of the Operator, was then _____ of said corporation; that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

_____ [CORPORATE SEAL]

U. S. GOVERNMENT PRINTING OFFICE 16—66329-1

EXPLORATION PROJECT CONTRACT
JOHN Q. ST. CLAIR
DOCKET NO. DMEA-3097

ANNEX I

All that part of the East half of Section Twenty (20) lying East of Prairie Creek, containing Ninety (90) acres, more or less,

The Northwest Quarter of the Northwest Quarter of Section Twenty One (21) containing Forty (40) acres, more or less,

The South Half of the Northwest Quarter of Section Twenty One (21), containing Eighty (80) acres, more or less,

The Southwest Quarter of Section Twenty One (21) containing One Hundred Sixty (160) acres, more or less,

The Southwest Quarter of the Northwest Quarter of Section Twenty Seven (27), except one half (1/2) acres in the Southwest corner thereof, containing Thirty Nine and one half (39-1/2) acres, more or less,

All that part of Section Twenty Eight (28) lying North and East of the Little Missouri River, containing Three Hundred and fifty three and fifty three hundredths (353.53) acres, more or less,

All that part of the West half of Section Twenty eight (28) lying South of the Little Missouri River and North of Duncan Slough, containing sixty (60) acres more or less, and

All that part of the Northeast Quarter of the Northeast Quarter of Section Twenty Nine (29) bounded on the North, East and West by the Little Missouri River, and on the South by a certain Slough dividing said land from the McBrayer land sold to Stewart, containing Five (5) acres, more or less,

All in Township Eight (8) South of the Base Line in Range Twenty Five (25) West of the Fifth Principal Meridian in Arkansas and containing in the aggregate Eight Hundred Twenty eight and three hundredths (828.03) acres, more or less.

EXPLORATION PROJECT CONTRACT
JOHN Q. ST. CLAIR
DOCKET NO. DMEA-3097

ANNEX II

The following provisions are in lieu of all of paragraph (a) of Article 6 which precedes the colon:

If the Government considers that a discovery or development from which production may be made has resulted from the exploration work, the Government, at any time not later than six months after a sufficient, complete, final report and final account referred to in the contract has been rendered, may so certify in writing to the Operator. Such certification shall describe broadly or indicate the nature of the discovery or development. The Operator, or his successor in interest, shall pay to the Government a royalty on all minerals mined or produced from the land described in Article 2, as follows: (1) Regardless of any certification of discovery or development, from the date of the contract until the lapse of the time within which the Government may make such certification of discovery or development, or until the total net amount contributed by the Government, without interest, is fully repaid, whichever occurs first, unless the Government waives its right to a royalty; or (2) if the Government makes a certification of discovery or development, for a period of ten years from the date of the contract, or until the total net amount contributed by the Government, without interest, is fully repaid, whichever occurs first. Said royalty shall be a percentage of the net smelter returns, the net concentrator returns, or other net amounts realized from the sale or other disposition of any such production (including any bonuses), in whatever form disposed of, including ore, concentrates, or metal, as follows:

EXPLORATION PROJECT CONTRACT
JOHN Q. ST. CLAIR
DOCKET NO. DMEA-3097

EXHIBIT "A"

Description of the Work

The area shown on the attached map captioned "Exploration Program, Arkansas Diamond Mines, Pike County, Arkansas", shall be explored for diamondiferous material, as there indicated, by auger drilling sampling holes. Six tons of drill cutting samples, shall be obtained from these holes. The drill cuttings from each alternate hole, or three tons of material, shall be packed separately and delivered to the Bureau of Mines at the project site. The drill cuttings from the other alternate holes, or the remaining three tons, shall be packed, and shipped to, and tested for diamond content by, the Western Machinery Company of San Francisco. The testing shall include a screen analysis of the diamond size distribution. A full report on the results of the testing shall be furnished to the Government.

Agreed Unit Costs

Six tons of drill cutting samples, and all packing of samples, including all costs of the work 1/	$2,250.00	
Testing three tons of drill cutting samples by Western Machinery Company of San Francisco, including freight, and report on results of testing 1/	1,250.00	
Total Agreed Unit Costs		$3,500.00
Government Participation @ 90%		$3,150.00

1/ The completed work constitutes the unit.

MF-200 (A)
(February 1952)

DOCKET NO. DMEA 3097

COMMODITY Industrial diamonds (bort)

UNITED STATES OF AMERICA
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Field Team's Copy

EXPLORATION PROJECT CONTRACT [1]

(Short Form)

IT IS AGREED this .... day of ...., 195..., between the United States of America, acting through the Department of the Interior, Defense Minerals Exploration Administration, hereinafter called the "Government," and [2] John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

hereinafter called the "Operator," as follows and as set forth in Annexes I and II and Fig. I attached hereto and made a part hereof:

ARTICLE 1. *Authority for contract.*—This agreement is entered into under the authority of the Defense Production Act of 1950, as amended, pursuant to DMEA Order 1 entitled "Government Aid in Defense Exploration Projects."

ARTICLE 2. *Operator's property rights.*—With respect to that certain land situated in the State of Arkansas, County of Pike, described as xxxxx [3] set forth in Annex I and Fig. I entitled "Caddo Gap, Ark."

the Operator represents and undertakes: [4]

~~(a) That the Operator is the owner, in possession and entitled to possession, and that the property is subject only to the following claims, liens, or encumbrances as to each of which the subordination agreement of the holder is attached:~~

(*b*) That the Operator is a lessee, in possession and entitled to possession, and the Owner's Consent to Lien is attached.

The Operator shall devote the land and all existing improvements, facilities, buildings, installations, and appurtenances to the purposes of the exploration project without any allowance for the use, rental value, depreciation, depletion, or other cost of acquiring, owning, or holding possession thereof.

ARTICLE 3. *Exploration project.*—The Operator, within 30 days from the date of this contract shall commence work on a project of exploration for [5] industrial diamonds (bort) in or upon the described land; and shall bring the project to completion within a period of 90 days from the date of this contract. The work to be performed is more fully described in Exhibit "A" attached hereto, which, with any maps or drawings thereto attached, are made a part of this contract. The Government will contribute to the cost of this work as hereafter provided. The work shall be performed by the Operator or by independent contractor or contractors efficiently, expertly, in a workmanlike manner, in accordance with good mining standards and State regulations for health and safety and for workmen's compensation and employers' liability insurance, with suitable and adequate equipment, materials, and labor, to bring the project to completion within the time fixed. The Government shall have the right to enter and observe and inspect the work at all reasonable times, and the Operator shall provide the Government with all available means for doing so. The Government may consult with and advise the Operator on all phases of the work.

ARTICLE 4. *Costs of the project.*—The agreed, estimated costs of performing the work, expressed in terms of units of work to be performed (per foot of drifting, per foot of drilling, per cubic yard of material to be moved, etc.) are set forth in Exhibit "A," attached hereto. The Government will pay 90 percent of these agreed, estimated costs, as they accrue, for units of work actually performed that conform with the description or specifications for the work set forth in this contract, in an aggregate total amount not in excess of $3,150.00, which is 90 percent of $3,500.00, the agreed, estimated total cost of the project in which the Government will participate: *Provided,* That until the Operator's final report and final accounting have been rendered to the Government and any final check or auditing required by the Government has been made, and a final settlement of the contract has been made, the Government may withhold from the last voucher or vouchers such sums as it sees fit not in excess of ten (10) percent of the maximum total which the Government might have been called upon to pay under the terms of the contract. The Government may, as it sees fit, make payments direct to the Operator's independent contractors, if any, for the account of the Operator, rather than to the Operator.

ARTICLE 5. *Reports, accounts, audits.*—(*a*) *Progress reports.* The Operator shall provide the Government with monthly reports of units of work performed under the contract, in quintuplicate (five copies), upon forms provided by the Government. These progress reports shall be certified by the Operator, and shall constitute both the Operator's invoice of units of work performed on the project during the period covered by the report and his voucher for repayment by the Government, unless the Government requires the use of a standard voucher form with invoice attached. Progress reports shall include surface and/or underground engineering-geological maps or sketches showing the progress of the exploration, with assay-reports on samples taken concurrently with the advance in mineralized ground.

[1] If sufficient space is not provided in any blank, use an extra sheet of paper and refer to it in the blank.
[2] State name, address, and nature of organization if any.
[3] Give legal description or enough to identify the property, particularly excluding any land or interest therein to which the Government's lien is not to attach or the production from which is not to be subject to the Government's percentage royalty.
[4] Strike out the provision not applicable.
[5] Name of mineral or minerals.

(*b*) *Final report.*—Upon completion of the exploration work or termination of the contract the Operator shall provide the Government with an adequate geological and engineering report, in quintuplicate (five copies), including an estimate of ore reserves resulting from the exploration work.

(*c*) *Compliance with requirements.*—If, in the opinion of the Government, any of the Operator's reports are insufficient or incomplete, the Government may procure the making or completion of such reports and attachments as an expense of the exploration work; and the Government may withhold approval and payment of any vouchers depending upon insufficient or incomplete reports.

(*d*) *Accounts and audits.*—The Operator shall keep suitable records and accounts of the units of work performed, which the Government may inspect and audit at any time. The Government may at any time require a check of the work performed and an audit of the Operator's records and accounts, by a certified public accountant or otherwise, the cost thereof to be treated as a cost of the project. The Operator shall keep and preserve said records and accounts for at least 3 years after the completion of the project or the termination of this contract. Upon the completion of the project or termination of the contract the Operator shall render a final account and statement of work performed to accompany his final report.

ARTICLE 6. *Repayment by Operator.*—(*a*) If, at any time, the Government considers that a discovery or a development from which production may be made has resulted from the exploration work, the Government, at any time not later than 6 months after the Operator has rendered the required final report and final account, may so certify in writing to the Operator. The certification shall describe broadly or indicate the nature of the discovery or development. In the event of such certification, any minerals mined or produced from the land described in Article 2 within 10 years from the date of this contract, including any mined or produced before the certification, shall be subject to a percentage royalty which the Operator or his successor in interest shall pay to the Government, upon the net smelter returns, the net concentrator returns, or other net amounts realized from the sale or other disposition of any such production, in whatever form disposed of, including ore, concentrates, or metal, until the total amount contributed by the Government, without interest, is fully repaid, or said 10 years have elapsed, whichever occurs first, as follows: **See Annex II, substituted for that part of 6(a) preceding the colon.**

(1) One and one-half (1½) percent of any such net amounts not in excess of eight dollars ($8.00) per ton.

(2) One and one-half (1½) percent of any such net amounts, plus one-half (½) percent of such net amounts for each additional full fifty cents ($0.50) by which such net amounts exceed eight dollars ($8.00) per ton, but not in excess of five (5) percent of such net amounts.

(For instance: The percentage royalty on a net amount of five dollars ($5.00) per ton, would be one and one-half (1½) percent; on a net amount of ten dollars ($10.00) per ton, three and one-half (3½) percent.)

(*b*) As here used, "net smelter returns," "net concentrator returns," and "other net amounts realized from the sale or other disposition," mean gross revenue from sales, or if not sold, the market value of the material after it is mined in the form in which and the place where it is held. In the case of integrated operations in which the material is not disposed of as such, these terms mean what is or would be the gross income from mining operations for percentage depletion purposes in income-tax determination.

(*c*) To secure the payment of its percentage royalty, the Government shall have and is hereby granted a lien upon the land described in Article 2 and upon any production of minerals therefrom, until the royalty claim is extinguished by lapse of time or is fully paid.

(*d*) This article is not to be construed as imposing any obligation on the Operator or the Operator's successor in interest to engage in any mining or production operations.

ARTICLE 7. *Assignment, transfer, or loss of Operator's interest.*—Without the written consent of the Government, the Operator shall not assign or otherwise transfer or hypothecate this contract or any rights thereunder. The Operator shall not make any voluntary nor permit any involuntary transfer or conveyance of the Operator's rights in the land described in Article 2, without making suitable provision for the preservation of the Government's right to a percentage royalty on production and lien for the payment thereof; *Provided,* that mere failure by the Operator to maintain the Operator's rights in the land, without any consideration running to the Operator other than relief from the cost of maintaining such rights (as by surrender of a leasehold, failure to perform assessment work, or failure to exercise an option), coupled with complete abandonment by the Operator of all interest in or operations on the land for a period of 10 years from the date of this contract, shall not constitute such a transfer or conveyance. Should the Operator make or permit any transfer or conveyance in violation of this provision, the Operator shall be and remain liable for payment to the Government of the same amounts, at the same times, as would have been paid under the terms of the percentage royalty on production. If for any reason the net smelter returns, net concentrator returns, or other net amounts realized from the sale or other disposition of such production are not available as a means of measuring the amount of the Operator's liability, the amount thereof shall be estimated as well as may be, and in the event of dispute as to such estimates, the determination thereof by the Administrator of Defense Minerals Exploration Administration or by his successor shall be final and binding upon the Operator.

ARTICLE 8. *Termination and completion.*—The Government may, at any time, by written notice to the Operator, terminate this contract: (*a*) If the Operator fails to provide his share of the money necessary to prosecute operations pursuant to the terms of the contract; (*b*) if the Operator, in the opinion of the Government, fails to prosecute operations pursuant to the terms of the contract; or (*c*) if, in the opinion of the Government, operations up to the time of the notice have not indicated the probability of making any worth while discovery and in the opinion of the Government further operations are not justified.

ARTICLE 9. *Changes and added provisions* _____

_____

_____

_____

_____

Executed in sextuplicate the day and year first above written.

THE UNITED STATES OF AMERICA

_____

[redacted]

By _____

John Q. St. Clair - Operator

By _____

Administrator, Defense Minerals Exploration Administration

I, _____, certify that I am the _____ secretary of the corporation named as Operator herein; that _____, who signed this contract on behalf of the Operator, was then _____ of said corporation; that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

_____ [CORPORATE SEAL]

U. S. GOVERNMENT PRINTING OFFICE 16—66329-1

EXPLORATION PROJECT CONTRACT
JOHN Q. ST. CLAIR
DOCKET NO. DMEA-3097

ANNEX I

All that part of the East half of Section Twenty (20) lying East of Prairie Creek, containing Ninety (90) acres, more or less,

The Northwest Quarter of the Northwest Quarter of Section Twenty One (21) containing Forty (40) acres, more or less,

The South Half of the Northwest Quarter of Section Twenty One (21), containing Eighty (80) acres, more or less,

The Southwest Quarter of Section Twenty One (21) containing One Hundred Sixty (160) acres, more or less,

The Southwest Quarter of the Northwest Quarter of Section Twenty Seven (27), except one half (1/2) acres in the Southwest corner thereof, containing Thirty Nine and one half (39-1/2) acres, more or less,

All that part of Section Twenty Eight (28) lying North and East of the Little Missouri River, containing Three Hundred and fifty three and fifty three hundredths (353.53) acres, more or less,

All that part of the West half of Section Twenty eight (28) lying South of the Little Missouri River and North of Duncan Slough, containing sixty (60) acres more or less, and

All that part of the Northeast Quarter of the Northeast Quarter of Section Twenty Nine (29) bounded on the North, East and West by the Little Missouri River, and on the South by a certain Slough dividing said land from the McBrayer land sold to Stewart, containing Five (5) acres, more or less,

All in Township Eight (8) South of the Base Line in Range Twenty Five (25) West of the Fifth Principal Meridian in Arkansas and containing in the aggregate Eight Hundred Twenty eight and three hundredths (828.03) acres, more or less.

EXPLORATION PROJECT CONTRACT
JOHN Q. ST. CLAIR
DOCKET NO. DMEA-3097

ANNEX II

The following provisions are in lieu of all of paragraph (a) of Article 6 which precedes the colon:

If the Government considers that a discovery or development from which production may be made has resulted from the exploration work, the Government, at any time not later than six months after a sufficient, complete, final report and final account referred to in the contract has been rendered, may so certify in writing to the Operator. Such certification shall describe broadly or indicate the nature of the discovery or development, The Operator, or his successor in interest, shall pay to the Government a royalty on all minerals mined or produced from the land described in Article 2, as follows: (1) Regardless of any certification of discovery or development, from the date of the contract until the lapse of the time within which the Government may make such certification of discovery or development, or until the total net amount contributed by the Government, without interest, is fully repaid, whichever occurs first, unless the Government waives its right to a royalty; or (2) if the Government makes a certification of discovery or development, for a period of ten years from the date of the contract, or until the total net amount contributed by the Government, without interest, is fully repaid, whichever occurs first. Said royalty shall be a percentage of the net smelter returns, the net concentrator returns, or other net amounts realized from the sale or other disposition of any such production (including any bonuses), in whatever form disposed of, including ore, concentrates, or metal, as follows:

EXPLORATION PROJECT CONTRACT
JOHN Q. ST. CLAIR
DOCKET NO. DMEA-3097

EXHIBIT "A"

Description of the Work

The area shown on the attached map captioned "Exploration Program, Arkansas Diamond Mines, Pike County, Arkansas", shall be explored for diamondiferous material, as there indicated, by auger drilling sampling holes. Six tons of drill cutting samples, shall be obtained from these holes. The drill cuttings from each alternate hole, or three tons of material, shall be packed separately and delivered to the Bureau of Mines at the project site. The drill cuttings from the other alternate holes, or the remaining three tons, shall be packed, and shipped to, and tested for diamond content by, the Western Machinery Company of San Francisco. The testing shall include a screen analysis of the diamond size distribution. A full report on the results of the testing shall be furnished to the Government.

Agreed Unit Costs

Six tons of drill cutting samples, and all packing of samples, including all costs of the work 1/	$2,250.00	
Testing three tons of drill cutting samples by Western Machinery Company of San Francisco, including freight, and report on results of testing 1/	1,250.00	
Total Agreed Unit Costs		$3,500.00
Government Participation @ 90%		$3,150.00

1/ The completed work constitutes the unit.

MF-200 (A)
(February 1952)

DOCKET NO. DMEA 3097

COMMODITY Industrial diamonds (bort)

Finance Office's Copy

UNITED STATES OF AMERICA
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

EXPLORATION PROJECT CONTRACT[1]

(Short Form)

IT IS AGREED this _____ day of _____, 195__, between the United States of America, acting through the Department of the Interior, Defense Minerals Exploration Administration, hereinafter called the "Government," and[2] John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

hereinafter called the "Operator," as follows: and as set forth in Annexes I and II and Fig. I attached hereto and made a part hereof:

ARTICLE 1. *Authority for contract.*—This agreement is entered into under the authority of the Defense Production Act of 1950, as amended, pursuant to DMEA Order 1 entitled "Government Aid in Defense Exploration Projects."

ARTICLE 2. *Operator's property rights.*—With respect to that certain land situated in the State of Arkansas, County of Pike, described as ~~xxxxx~~ set forth in Annex I and Fig. I entitled "Caddo Gap, Ark."

the Operator represents and undertakes:[4]

(*a*) ~~That the Operator is the owner in possession and entitled to possession and that the property is subject only to the following encumbrances or encumbrances covered by the Owner's Consent to Lien attached:~~

(*b*) That the Operator is a lessee, in possession and entitled to possession, and the Owner's Consent to Lien is attached.

The Operator shall devote the land and all existing improvements, facilities, buildings, installations, and appurtenances to the purposes of the exploration project without any allowance for the use, rental value, depreciation, depletion, or other cost of acquiring, owning, or holding possession thereof.

ARTICLE 3. *Exploration project.*—The Operator, within 30 days from the date of this contract shall commence work on a project of exploration for[5] Industrial diamonds (bort)

in or upon the described land; and shall bring the project to completion within a period of 90 days from the date of this contract. The work to be performed is more fully described in Exhibit "A" attached hereto, which, with any maps or drawings thereto attached, are made a part of this contract. The Government will contribute to the cost of this work as hereafter provided. The work shall be performed by the Operator or by independent contractor or contractors efficiently, expertly, in a workmanlike manner, in accordance with good mining standards and State regulations for health and safety and for workmen's compensation and employers' liability insurance, with suitable and adequate equipment, materials, and labor, to bring the project to completion within the time fixed. The Government shall have the right to enter and observe and inspect the work at all reasonable times, and the Operator shall provide the Government with all available means for doing so. The Government may consult with and advise the Operator on all phases of the work.

ARTICLE 4. *Costs of the project.*—The agreed, estimated costs of performing the work, expressed in terms of units of work to be performed (per foot of drifting, per foot of drilling, per cubic yard of material to be moved, etc.) are set forth in Exhibit "A," attached hereto. The Government will pay 90 percent of these agreed, estimated costs, as they accrue, for units of work actually performed that conform with the description or specifications for the work set forth in this contract, in an aggregate total amount not in excess of $3,150.00 which is 90 percent of $3,500.00, the agreed, estimated total cost of the project in which the Government will participate: *Provided,* That until the Operator's final report and final accounting have been rendered to the Government and any final check or auditing required by the Government has been made, and a final settlement of the contract has been made, the Government may withhold from the last voucher or vouchers such sums as it sees fit not in excess of ten (10) percent of the maximum total which the Government might have been called upon to pay under the terms of the contract. The Government may, as it sees fit, make payments direct to the Operator's independent contractors, if any, for the account of the Operator, rather than to the Operator.

ARTICLE 5. *Reports, accounts, audits.*—(*a*) *Progress reports.* The Operator shall provide the Government with monthly reports of units of work performed under the contract, in quintuplicate (five copies), upon forms provided by the Government. These progress reports shall be certified by the Operator, and shall constitute both the Operator's invoice of units of work performed on the project during the period covered by the report and his voucher for repayment by the Government, unless the Government requires the use of a standard voucher form with invoice attached. Progress reports shall include surface and/or underground engineering-geological maps or sketches showing the progress of the exploration, with assay-reports on samples taken concurrently with the advance in mineralized ground.

[1] If sufficient space is not provided in any blank, use an extra sheet of paper and refer to it in the blank.
[2] State name, address, and nature of organization if any.
[3] Give legal description or enough to identify the property, particularly excluding any land or interest therein to which the Government's lien is not to attach or the production from which is not to be subject to the Government's percentage royalty.
[4] Strike out the provision not applicable.
[5] Name of mineral or minerals.

(*b*) *Final report.*—Upon completion of the exploration work or termination of the contract the Operator shall provide the Government with an adequate geological and engineering report, in quintuplicate (five copies), including an estimate of ore reserves resulting from the exploration work.

(*c*) *Compliance with requirements.*—If, in the opinion of the Government, any of the Operator's reports are insufficient or incomplete, the Government may procure the making or completion of such reports and attachments as an expense of the exploration work; and the Government may withhold approval and payment of any vouchers depending upon insufficient or incomplete reports.

(*d*) *Accounts and audits.*—The Operator shall keep suitable records and accounts of the units of work performed, which the Government may inspect and audit at any time. The Government may at any time require a check of the work performed and an audit of the Operator's records and accounts, by a certified public accountant or otherwise, the cost thereof to be treated as a cost of the project. The Operator shall keep and preserve said records and accounts for at least 3 years after the completion of the project or the termination of this contract. Upon the completion of the project or termination of the contract the Operator shall render a final account and statement of work performed to accompany his final report.

ARTICLE 6. *Repayment by Operator.*—(*a*) If, at any time, the Government considers that a discovery or a development from which production may be made has resulted from the exploration work, the Government, at any time not later than 6 months after the Operator has rendered the required final report and final account, may so certify in writing to the Operator. The certification shall describe broadly or indicate the nature of the discovery or development. In the event of such certification, any minerals mined or produced from the land described in Article 2 within 10 years from the date of this contract, including any mined or produced before the certification, shall be subject to a percentage royalty which the Operator or his successor in interest shall pay to the Government, upon the net smelter returns, the net concentrator returns, or other net amounts realized from the sale or other disposition of any such production, in whatever form disposed of, including ore, concentrates, or metal, until the total amount contributed by the Government, without interest, is fully repaid, or said 10 years have elapsed, whichever occurs first, as follows: See Annex II, substituted for that part of 6(a) preceding the colon.

(1) One and one-half (1½) percent of any such net amounts not in excess of eight dollars ($8.00) per ton.

(2) One and one-half (1½) percent of any such net amounts, plus one-half (½) percent of such net amounts for each additional full fifty cents ($0.50) by which such net amounts exceed eight dollars ($8.00) per ton, but not in excess of five (5) percent of such net amounts.

(For instance: The percentage royalty on a net amount of five dollars ($5.00) per ton, would be one and one-half (1½) percent; on a net amount of ten dollars ($10.00) per ton, three and one-half (3½) percent.)

(*b*) As here used, "net smelter returns," "net concentrator returns," and "other net amounts realized from the sale or other disposition," mean gross revenue from sales, or if not sold, the market value of the material after it is mined in the form in which and the place where it is held. In the case of integrated operations in which the material is not disposed of as such, these terms mean what is or would be the gross income from mining operations for percentage depletion purposes in income-tax determination.

(*c*) To secure the payment of its percentage royalty, the Government shall have and is hereby granted a lien upon the land described in Article 2 and upon any production of minerals therefrom, until the royalty claim is extinguished by lapse of time or is fully paid.

(*d*) This article is not to be construed as imposing any obligation on the Operator or the Operator's successor in interest to engage in any mining or production operations.

ARTICLE 7. *Assignment, transfer, or loss of Operator's interest.*—Without the written consent of the Government, the Operator shall not assign or otherwise transfer or hypothecate this contract or any rights thereunder. The Operator shall not make any voluntary nor permit any involuntary transfer or conveyance of the Operator's rights in the land described in Article 2, without making suitable provision for the preservation of the Government's right to a percentage royalty on production and lien for the payment thereof; *Provided*, that mere failure by the Operator to maintain the Operator's rights in the land, without any consideration running to the Operator other than relief from the cost of maintaining such rights (as by surrender of a leasehold, failure to perform assessment work, or failure to exercise an option), coupled with complete abandonment by the Operator of all interest in or operations on the land for a period of 10 years from the date of this contract, shall not constitute such a transfer or conveyance. Should the Operator make or permit any transfer or conveyance in violation of this provision, the Operator shall be and remain liable for payment to the Government of the same amounts, at the same times, as would have been paid under the terms of the percentage royalty on production. If for any reason the net smelter returns, net concentrator returns, or other net amounts realized from the sale or other disposition of such production are not available as a means of measuring the amount of the Operator's liability, the amount thereof shall be estimated as well as may be, and in the event of dispute as to such estimates, the determination thereof by the Administrator of Defense Minerals Exploration Administration or by his successor shall be final and binding upon the Operator.

ARTICLE 8. *Termination and completion.*—The Government may, at any time, by written notice to the Operator, terminate this contract: (*a*) If the Operator fails to provide his share of the money necessary to prosecute operations pursuant to the terms of the contract; (*b*) if the Operator, in the opinion of the Government, fails to prosecute operations pursuant to the terms of the contract; or (*c*) if, in the opinion of the Government, operations up to the time of the notice have not indicated the probability of making any worth while discovery and in the opinion of the Government further operations are not justified.

ARTICLE 9. *Changes and added provisions* _____

_____

_____

_____

_____

Executed in sextuplicate the day and year first above written.

THE UNITED STATES OF AMERICA

By _____
Administrator, Defense Minerals Exploration Administration

_____
[redacted]

By _____
John C. St. Clair - Operator

I, _____, certify that I am the _____ secretary of the corporation named as Operator herein; that _____, who signed this contract on behalf of the Operator, was then _____ of said corporation; that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

_____ [CORPORATE SEAL]

U. S. GOVERNMENT PRINTING OFFICE 16—66329-1

EXPLORATION PROJECT CONTRACT
JOHN Q. ST. CLAIR
DOCKET NO. DMSA-3097

ANNEX I

All that part of the East half of Section Twenty (20) lying East of Prairie Creek, containing Ninety (90) acres, more or less,

The Northwest Quarter of the Northwest Quarter of Section Twenty One (21) containing Forty (40) acres, more or less,

The South Half of the Northwest Quarter of Section Twenty One (21), containing Eighty (80) acres, more or less,

The Southwest Quarter of Section Twenty One (21) containing One Hundred Sixty (160) acres, more or less,

The Southwest Quarter of the Northwest Quarter of Section Twenty Seven (27), except one half (1/2) acres in the Southwest corner thereof, containing Thirty Nine and one half (39-1/2) acres, more or less,

All that part of Section Twenty Eight (28) lying North and East of the Little Missouri River, containing Three Hundred and fifty three and fifty three hundredths (353.53) acres, more or less.

All that part of the West half of Section Twenty eight (28) lying South of the Little Missouri River and North of Duncan Slough, containing sixty (60) acres more or less, and

All that part of the Northeast Quarter of the Northeast Quarter of Section Twenty Nine (29) bounded on the North, East and West by the Little Missouri River, and on the South by a certain Slough dividing said land from the McBrayer land sold to Stewart, containing Five (5) acres, more or less,

All in Township Eight (8) South of the Base Line in Range Twenty Five (25) West of the Fifth Principal Meridian in Arkansas and containing in the aggregate Eight Hundred Twenty eight and three hundredths (828.03) acres, more or less.

EXPLORATION PROJECT CONTRACT
JOHN Q. ST. CLAIR
LOCKE M. DEL-SOL

ANNEX 22

The following provisions are in lieu of all of paragraph (a) of Article 6 which precedes the colon:

If the Government considers that a discovery or development from which production may be made has resulted from the exploration work, the Government, at any time not later than six months after a sufficient, complete, final report and final account referred to in the contract has been rendered, may so certify in writing to the Operator. Such certification shall describe broadly or indicate the nature of the discovery or development, The Operator, or his successor in interest, shall pay to the Government a royalty on all minerals mined or produced from the land described in Article 2, as follows: (1) Regardless of any certification of discovery or development, from the date of the contract until the lapse of the time within which the Government may make such certification of discovery or development, or until the total net amount contributed by the Government, without interest, is fully repaid, whichever occurs first, unless the Government waives its right to a royalty; or (2) if the Government makes a certification of discovery or development, for a period of ten years from the date of the contract, or until the total net amount contributed by the Government, without interest, is fully repaid, whichever occurs first. Said royalty shall be a percentage of the net smelter returns, the net concentrator returns, or other net amounts realized from the sale or other disposition of any such production (including any bonuses), in whatever form disposed of, including ore, concentrates, or metal, as follows:

EXPLORATION PROJECT CONTRACT
JOHN Q. ST. CLAIR
DOCKET NO. DMRA-3097

EXHIBIT "A"

Description of the Work

The area shown on the attached map captioned "Exploration Program, Arkansas Diamond Mines, Pike County, Arkansas", shall be explored for diamondiferous material, as there indicated, by auger drilling sampling holes. Six tons of drill cutting samples, shall be obtained from these holes. The drill cuttings from each alternate hole, or three tons of material, shall be packed separately and delivered to the Bureau of Mines at the project site. The drill cuttings from the other alternate holes, or the remaining three tons, shall be packed, and shipped to, and tested for diamond content by, the Western Machinery Company of San Francisco. The testing shall include a screen analysis of the diamond size distribution. A full report on the results of the testing shall be furnished to the Government.

Agreed Unit Costs

Six tons of drill cutting samples, and all packing of samples, including all costs of the work 1/	$2,250.00	
Testing three tons of drill cutting samples by Western Machinery Company of San Francisco, including freight, and report on results of testing 1/	1,250.00	
Total Agreed Unit Costs		$3,500.00
Government Participation @ 90%		$3,150.00

1/ The completed work constitutes the unit.

MF-200 (A)
(February 1952)

DOCKET NO. DMEA 3097

COMMODITY Industrial diamonds (bort)

Division Copy

UNITED STATES OF AMERICA
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

EXPLORATION PROJECT CONTRACT[1]

(Short Form)

IT IS AGREED this _____ day of _____, 195__, between the United States of America, acting through the Department of the Interior, Defense Minerals Exploration Administration, hereinafter called the "Government," and[2] John Q. St. Clair
703 Hoover Street
Norman, Oklahoma

hereinafter called the "Operator," as follows: and as set forth in Annexes I and II and Fig. I attached hereto and made a part hereof:

ARTICLE 1. *Authority for contract.*—This agreement is entered into under the authority of the Defense Production Act of 1950, as amended, pursuant to DMEA Order 1 entitled "Government Aid in Defense Exploration Projects."

ARTICLE 2. *Operator's property rights.*—With respect to that certain land situated in the State of Arkansas, County of Pike, described as ~~follows:~~ set forth in Annex I and Fig. I entitled Caddo Gap, Ark.

the Operator represents and undertakes:[4]

(a) ~~That the Operator is the owner of the property described above and the owner's consent to lien is attached hereto and made a part hereof:~~

(b) That the Operator is a lessee, in possession and entitled to possession, and the Owner's Consent to Lien is attached.

The Operator shall devote the land and all existing improvements, facilities, buildings, installations, and appurtenances to the purposes of the exploration project without any allowance for the use, rental value, depreciation, depletion, or other cost of acquiring, owning, or holding possession thereof.

ARTICLE 3. *Exploration project.*—The Operator, within 30 days from the date of this contract shall commence work on a project of exploration for[5] industrial diamonds (bort)

in or upon the described land; and shall bring the project to completion within a period of 90 days from the date of this contract. The work to be performed is more fully described in Exhibit "A" attached hereto, which, with any maps or drawings thereto attached, are made a part of this contract. The Government will contribute to the cost of this work as hereafter provided. The work shall be performed by the Operator or by independent contractor or contractors efficiently, expertly, in a workmanlike manner, in accordance with good mining standards and State regulations for health and safety and for workmen's compensation and employers' liability insurance, with suitable and adequate equipment, materials, and labor, to bring the project to completion within the time fixed. The Government shall have the right to enter and observe and inspect the work at all reasonable times, and the Operator shall provide the Government with all available means for doing so. The Government may consult with and advise the Operator on all phases of the work.

ARTICLE 4. *Costs of the project.*—The agreed, estimated costs of performing the work, expressed in terms of units of work to be performed (per foot of drifting, per foot of drilling, per cubic yard of material to be moved, etc.) are set forth in Exhibit "A," attached hereto. The Government will pay 90 percent of these agreed, estimated costs, as they accrue, for units of work actually performed that conform with the description or specifications for the work set forth in this contract, in an aggregate total amount not in excess of $3,150.00, which is 90 percent of $3,500.00, the agreed, estimated total cost of the project in which the Government will participate: *Provided,* That until the Operator's final report and final accounting have been rendered to the Government and any final check or auditing required by the Government has been made, and a final settlement of the contract has been made, the Government may withhold from the last voucher or vouchers such sums as it sees fit not in excess of ten (10) percent of the maximum total which the Government might have been called upon to pay under the terms of the contract. The Government may, as it sees fit, make payments direct to the Operator's independent contractors, if any, for the account of the Operator, rather than to the Operator.

ARTICLE 5. *Reports, accounts, audits.*—(a) *Progress reports.* The Operator shall provide the Government with monthly reports of units of work performed under the contract, in quintuplicate (five copies), upon forms provided by the Government. These progress reports shall be certified by the Operator, and shall constitute both the Operator's invoice of units of work performed on the project during the period covered by the report and his voucher for repayment by the Government, unless the Government requires the use of a standard voucher form with invoice attached. Progress reports shall include surface and/or underground engineering-geological maps or sketches showing the progress of the exploration, with assay-reports on samples taken concurrently with the advance in mineralized ground.

[1] If sufficient space is not provided in any blank, use an extra sheet of paper and refer to it in the blank.
[2] State name, address, and nature of organization if any.
[3] Give legal description or enough to identify the property, particularly excluding any land or interest therein to which the Government's lien is not to attach or the production from which is not to be subject to the Government's percentage royalty.
[4] Strike out the provision not applicable.
[5] Name of mineral or minerals.

(*b*) *Final report.*—Upon completion of the exploration work or termination of the contract the Operator shall provide the Government with an adequate geological and engineering report, in quintuplicate (five copies), including an estimate of ore reserves resulting from the exploration work.

(*c*) *Compliance with requirements.*—If, in the opinion of the Government, any of the Operator's reports are insufficient or incomplete, the Government may procure the making or completion of such reports and attachments as an expense of the exploration work; and the Government may withhold approval and payment of any vouchers depending upon insufficient or incomplete reports.

(*d*) *Accounts and audits.*—The Operator shall keep suitable records and accounts of the units of work performed, which the Government may inspect and audit at any time. The Government may at any time require a check of the work performed and an audit of the Operator's records and accounts, by a certified public accountant or otherwise, the cost thereof to be treated as a cost of the project. The Operator shall keep and preserve said records and accounts for at least 3 years after the completion of the project or the termination of this contract. Upon the completion of the project or termination of the contract the Operator shall render a final account and statement of work performed to accompany his final report.

ARTICLE 6. *Repayment by Operator.*—(*a*) If, at any time, the Government considers that a discovery or a development from which production may be made has resulted from the exploration work, the Government, at any time not later than 6 months after the Operator has rendered the required final report and final account, may so certify in writing to the Operator. The certification shall describe broadly or indicate the nature of the discovery or development. In the event of such certification, any minerals mined or produced from the land described in Article 2 within 10 years from the date of this contract, including any mined or produced before the certification, shall be subject to a percentage royalty which the Operator or his successor in interest shall pay to the Government, upon the net smelter returns, the net concentrator returns, or other net amounts realized from the sale or other disposition of any such production, in whatever form disposed of, including ore, concentrates, or metal, until the total amount contributed by the Government, without interest, is fully repaid, or said 10 years have elapsed, whichever occurs first, as follows: See Annex II, substituted for that part of 6(a) preceding the colon.

(1) One and one-half (1½) percent of any such net amounts not in excess of eight dollars ($8.00) per ton.

(2) One and one-half (1½) percent of any such net amounts, plus one-half (½) percent of such net amounts for each additional full fifty cents ($0.50) by which such net amounts exceed eight dollars ($8.00) per ton, but not in excess of five (5) percent of such net amounts.

(For instance: The percentage royalty on a net amount of five dollars ($5.00) per ton, would be one and one-half (1½) percent; on a net amount of ten dollars ($10.00) per ton, three and one-half (3½) percent.)

(*b*) As here used, "net smelter returns," "net concentrator returns," and "other net amounts realized from the sale or other disposition," mean gross revenue from sales, or if not sold, the market value of the material after it is mined in the form in which and the place where it is held. In the case of integrated operations in which the material is not disposed of as such, these terms mean what is or would be the gross income from mining operations for percentage depletion purposes in income-tax determination.

(*c*) To secure the payment of its percentage royalty, the Government shall have and is hereby granted a lien upon the land described in Article 2 and upon any production of minerals therefrom, until the royalty claim is extinguished by lapse of time or is fully paid.

(*d*) This article is not to be construed as imposing any obligation on the Operator or the Operator's successor in interest to engage in any mining or production operations.

ARTICLE 7. *Assignment, transfer, or loss of Operator's interest.*—Without the written consent of the Government, the Operator shall not assign or otherwise transfer or hypothecate this contract or any rights thereunder. The Operator shall not make any voluntary nor permit any involuntary transfer or conveyance of the Operator's rights in the land described in Article 2, without making suitable provision for the preservation of the Government's right to a percentage royalty on production and lien for the payment thereof; *Provided*, that mere failure by the Operator to maintain the Operator's rights in the land, without any consideration running to the Operator other than relief from the cost of maintaining such rights (as by surrender of a leasehold, failure to perform assessment work, or failure to exercise an option), coupled with complete abandonment by the Operator of all interest in or operations on the land for a period of 10 years from the date of this contract, shall not constitute such a transfer or conveyance. Should the Operator make or permit any transfer or conveyance in violation of this provision, the Operator shall be and remain liable for payment to the Government of the same amounts, at the same times, as would have been paid under the terms of the percentage royalty on production. If for any reason the net smelter returns, net concentrator returns, or other net amounts realized from the sale or other disposition of such production are not available as a means of measuring the amount of the Operator's liability, the amount thereof shall be estimated as well as may be, and in the event of dispute as to such estimates, the determination thereof by the Administrator of Defense Minerals Exploration Administration or by his successor shall be final and binding upon the Operator.

ARTICLE 8. *Termination and completion.*—The Government may, at any time, by written notice to the Operator, terminate this contract: (*a*) If the Operator fails to provide his share of the money necessary to prosecute operations pursuant to the terms of the contract; (*b*) if the Operator, in the opinion of the Government, fails to prosecute operations pursuant to the terms of the contract; or (*c*) if, in the opinion of the Government, operations up to the time of the notice have not indicated the probability of making any worth while discovery and in the opinion of the Government further operations are not justified.

ARTICLE 9. *Changes and added provisions* _____

_____

_____

_____

_____

Executed in sextuplicate the day and year first above written.

THE UNITED STATES OF AMERICA

_____

[redacted]

By _____

John C. St. Clair - Operator

By _____

Robin Stone

Administrator, Defense Minerals Exploration Administration

_____

I, _____, certify that I am the _____ secretary of the corporation named as Operator herein; that _____, who signed this contract on behalf of the Operator, was then _____ of said corporation; that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

_____ [CORPORATE SEAL]

U. S. GOVERNMENT PRINTING OFFICE 16—66329-1

EXPLORATION PROJECT CONTRACT
JOHN Q. ST. CLAIR
DOCKET NO. DMEA-3097

ANNEX I

All that part of the East half of Section Twenty (20) lying East of Prairie Creek, containing Ninety (90) acres, more or less,

The Northwest Quarter of the Northwest Quarter of Section Twenty One (21) containing Forty (40) acres, more or less,

The South Half of the Northwest Quarter of Section Twenty One (21), containing Eighty (80) acres, more or less,

The Southwest Quarter of Section Twenty One (21) containing One Hundred Sixty (160) acres, more or less,

The Southwest Quarter of the Northwest Quarter of Section Twenty Seven (27), except one half (1/2) acres in the Southwest corner thereof, containing Thirty Nine and one half (39-1/2) acres, more or less,

All that part of Section Twenty Eight (28) lying North and East of the Little Missouri River, containing Three Hundred and fifty three and fifty three hundredths (353.53) acres, more or less,

All that part of the West half of Section Twenty eight (28) lying South of the Little Missouri River and North of Duncan Slough, containing sixty (60) acres more or less, and

All that part of the Northeast Quarter of the Northeast Quarter of Section Twenty Nine (29) bounded on the North, East and West by the Little Missouri River, and on the South by a certain Slough dividing said land from the McBrayer land sold to Stewart, containing Five (5) acres, more or less,

All in Township Eight (8) South of the Base Line in Range Twenty Five (25) West of the Fifth Principal Meridian in Arkansas and containing in the aggregate Eight Hundred Twenty eight and three hundredths (828.03) acres, more or less.

ANNEX [illegible]

The following provisions are in lieu of all of paragraph (a) of Article [illegible] which precedes the colon:

If the Government considers that a discovery or development from which production may be made has resulted from the exploration work, the Government, at any time not later than six months after a sufficient, complete, final report and final account referred to in the contract has been rendered, may so certify in writing to the Operator. Such certification shall describe broadly or indicate the nature of the discovery or development, The Operator, or his successor in interest, shall pay to the Government a royalty on all minerals mined or produced from the land described in Article 2, as follows: (1) Regardless of any certification of discovery or development, from the date of the contract until the lapse of the time within which the Government may make such certification of discovery or development, or until the total net amount contributed by the Government, without interest, is fully repaid, whichever occurs first, unless the Government waives its right to a royalty; or (2) if the Government makes a certification of discovery or development, for a period of ten years from the date of the contract, or until the total net amount contributed by the Government, without interest, is fully repaid, whichever occurs first. Said royalty shall be a percentage of the net smelter returns, the net concentrator returns, or other net amounts realized from the sale or other disposition of any such production (including any bonuses), in whatever form disposed of, including ore, concentrates, or metal, as follows:

EXPLORATION PROJECT CONTRACT
JOHN Q. ST. CLAIR
DOCKET NO. DMEA 3097

EXHIBIT A

Description of the Work

The area shown on the attached map captioned Exploration Program, Arkansas Diamond Mines, Pike County, Arkansas , shall be explored for diamondiferous material, as there indicated, by auger drilling sampling holes. Six tons of drill cutting samples, shall be obtained from these holes. The drill cuttings from each alternate hole, or three tons of material, shall be packed separately and delivered to the Bureau of Mines at the project site. The drill cuttings from the other alternate holes, or the remaining three tons, shall be packed, and shipped to, and tested for diamond content by, the Western Machinery Company of San Francisco. The testing shall include a screen analysis of the diamond size distribution. A full report on the results of the testing shall be furnished to the Government.

Agreed Unit Costs

Six tons of drill cutting samples, and all packing of samples, including all costs of the work 1/	$2,250.00	
Testing three tons of drill cutting samples by Western Machinery Company of San Francisco, including freight, and report on results of testing 1/	1,250.00	
Total Agreed Unit Costs		$3,500.00
Government Participation @ 90%		$3,150.00

1/ The completed work constitutes the unit.

MF-200 (A)
(February 1952)

DOCKET NO. DMEA 3097

COMMODITY Industrial diamonds (bort)

UNITED STATES OF AMERICA
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Operator's Copy

EXPLORATION PROJECT CONTRACT[1]

(Short Form)

IT IS AGREED this _____ day of _____, 195__, between the United States of America, acting through the Department of the Interior, Defense Minerals Exploration Administration, hereinafter called the "Government," and[2] John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

hereinafter called the "Operator," as follows: and as set forth in Annexes I and II and Fig. I attached hereto and made a part hereof:

ARTICLE 1. *Authority for contract.*—This agreement is entered into under the authority of the Defense Production Act of 1950, as amended, pursuant to DMEA Order 1 entitled "Government Aid in Defense Exploration Projects."

ARTICLE 2. *Operator's property rights.*—With respect to that certain land situated in the State of Arkansas, County of Pike, described as ~~xxxxx~~ set forth in Annex I and Fig. I entitled "Caddo Gap, Ark."

the Operator represents and undertakes:[4]

~~(a) That the Operator is the owner, in possession and entitled to possession, and that the property is subject only to the following liens, encumbrances, or exceptions, or a copy of which is attached:~~

(b) That the Operator is a lessee, in possession and entitled to possession, and the Owner's Consent to Lien is attached.

The Operator shall devote the land and all existing improvements, facilities, buildings, installations, and appurtenances to the purposes of the exploration project without any allowance for the use, rental value, depreciation, depletion, or other cost of acquiring, owning, or holding possession thereof.

ARTICLE 3. *Exploration project.*—The Operator, within 30 days from the date of this contract shall commence work on a project of exploration for[5] industrial diamonds (bort)

in or upon the described land; and shall bring the project to completion within a period of 90 days from the date of this contract. The work to be performed is more fully described in Exhibit "A" attached hereto, which, with any maps or drawings thereto attached, are made a part of this contract. The Government will contribute to the cost of this work as hereafter provided. The work shall be performed by the Operator or by independent contractor or contractors efficiently, expertly, in a workmanlike manner, in accordance with good mining standards and State regulations for health and safety and for workmen's compensation and employers' liability insurance, with suitable and adequate equipment, materials, and labor, to bring the project to completion within the time fixed. The Government shall have the right to enter and observe and inspect the work at all reasonable times, and the Operator shall provide the Government with all available means for doing so. The Government may consult with and advise the Operator on all phases of the work.

ARTICLE 4. *Costs of the project.*—The agreed, estimated costs of performing the work, expressed in terms of units of work to be performed (per foot of drifting, per foot of drilling, per cubic yard of material to be moved, etc.) are set forth in Exhibit "A," attached hereto. The Government will pay 90 percent of these agreed, estimated costs, as they accrue, for units of work actually performed that conform with the description or specifications for the work set forth in this contract, in an aggregate total amount not in excess of $3,150.00, which is 90 percent of $3,500.00, the agreed, estimated total cost of the project in which the Government will participate: *Provided,* That until the Operator's final report and final accounting have been rendered to the Government and any final check or auditing required by the Government has been made, and a final settlement of the contract has been made, the Government may withhold from the last voucher or vouchers such sums as it sees fit not in excess of ten (10) percent of the maximum total which the Government might have been called upon to pay under the terms of the contract. The Government may, as it sees fit, make payments direct to the Operator's independent contractors, if any, for the account of the Operator, rather than to the Operator.

ARTICLE 5. *Reports, accounts, audits.*—(a) *Progress reports.* The Operator shall provide the Government with monthly reports of units of work performed under the contract, in quintuplicate (five copies), upon forms provided by the Government. These progress reports shall be certified by the Operator, and shall constitute both the Operator's invoice of units of work performed on the project during the period covered by the report and his voucher for repayment by the Government, unless the Government requires the use of a standard voucher form with invoice attached. Progress reports shall include surface and/or underground engineering-geological maps or sketches showing the progress of the exploration, with assay-reports on samples taken concurrently with the advance in mineralized ground.

[1] If sufficient space is not provided in any blank, use an extra sheet of paper and refer to it in the blank.
[2] State name, address, and nature of organization if any.
[3] Give legal description or enough to identify the property, particularly excluding any land or interest therein to which the Government's lien is not to attach or the production from which is not to be subject to the Government's percentage royalty.
[4] Strike out the provision not applicable.
[5] Name of mineral or minerals.

(*b*) *Final report.*—Upon completion of the exploration work or termination of the contract the Operator shall provide the Government with an adequate geological and engineering report, in quintuplicate (five copies), including an estimate of ore reserves resulting from the exploration work.

(*c*) *Compliance with requirements.*—If, in the opinion of the Government, any of the Operator's reports are insufficient or incomplete, the Government may procure the making or completion of such reports and attachments as an expense of the exploration work; and the Government may withhold approval and payment of any vouchers depending upon insufficient or incomplete reports.

(*d*) *Accounts and audits.*—The Operator shall keep suitable records and accounts of the units of work performed, which the Government may inspect and audit at any time. The Government may at any time require a check of the work performed and an audit of the Operator's records and accounts, by a certified public accountant or otherwise, the cost thereof to be treated as a cost of the project. The Operator shall keep and preserve said records and accounts for at least 3 years after the completion of the project or the termination of this contract. Upon the completion of the project or termination of the contract the Operator shall render a final account and statement of work performed to accompany his final report.

ARTICLE 6. *Repayment by Operator.*—(*a*) If, at any time, the Government considers that a discovery or a development from which production may be made has resulted from the exploration work, the Government, at any time not later than 6 months after the Operator has rendered the required final report and final account, may so certify in writing to the Operator. The certification shall describe broadly or indicate the nature of the discovery or development. In the event of such certification, any minerals mined or produced from the land described in Article 2 within 10 years from the date of this contract, including any mined or produced before the certification, shall be subject to a percentage royalty which the Operator or his successor in interest shall pay to the Government, upon the net smelter returns, the net concentrator returns, or other net amounts realized from the sale or other disposition of any such production, in whatever form disposed of, including ore, concentrates, or metal, until the total amount contributed by the Government, without interest, is fully repaid, or said 10 years have elapsed, whichever occurs first, as follows: **See Annex II, substituted for that part of 6(a) preceding the colon.**

(1) One and one-half (1½) percent of any such net amounts not in excess of eight dollars ($8.00) per ton.

(2) One and one-half (1½) percent of any such net amounts, plus one-half (½) percent of such net amounts for each additional full fifty cents ($0.50) by which such net amounts exceed eight dollars ($8.00) per ton, but not in excess of five (5) percent of such net amounts.

(For instance: The percentage royalty on a net amount of five dollars ($5.00) per ton, would be one and one-half (1½) percent; on a net amount of ten dollars ($10.00) per ton, three and one-half (3½) percent.)

(*b*) As here used, "net smelter returns," "net concentrator returns," and "other net amounts realized from the sale or other disposition," mean gross revenue from sales, or if not sold, the market value of the material after it is mined in the form in which and the place where it is held. In the case of integrated operations in which the material is not disposed of as such, these terms mean what is or would be the gross income from mining operations for percentage depletion purposes in income-tax determination.

(*c*) To secure the payment of its percentage royalty, the Government shall have and is hereby granted a lien upon the land described in Article 2 and upon any production of minerals therefrom, until the royalty claim is extinguished by lapse of time or is fully paid.

(*d*) This article is not to be construed as imposing any obligation on the Operator or the Operator's successor in interest to engage in any mining or production operations.

ARTICLE 7. *Assignment, transfer, or loss of Operator's interest.*—Without the written consent of the Government, the Operator shall not assign or otherwise transfer or hypothecate this contract or any rights thereunder. The Operator shall not make any voluntary nor permit any involuntary transfer or conveyance of the Operator's rights in the land described in Article 2, without making suitable provision for the preservation of the Government's right to a percentage royalty on production and lien for the payment thereof; *Provided*, that mere failure by the Operator to maintain the Operator's rights in the land, without any consideration running to the Operator other than relief from the cost of maintaining such rights (as by surrender of a leasehold, failure to perform assessment work, or failure to exercise an option), coupled with complete abandonment by the Operator of all interest in or operations on the land for a period of 10 years from the date of this contract, shall not constitute such a transfer or conveyance. Should the Operator make or permit any transfer or conveyance in violation of this provision, the Operator shall be and remain liable for payment to the Government of the same amounts, at the same times, as would have been paid under the terms of the percentage royalty on production. If for any reason the net smelter returns, net concentrator returns, or other net amounts realized from the sale or other disposition of such production are not available as a means of measuring the amount of the Operator's liability, the amount thereof shall be estimated as well as may be, and in the event of dispute as to such estimates, the determination thereof by the Administrator of Defense Minerals Exploration Administration or by his successor shall be final and binding upon the Operator.

ARTICLE 8. *Termination and completion.*—The Government may, at any time, by written notice to the Operator, terminate this contract: (*a*) If the Operator fails to provide his share of the money necessary to prosecute operations pursuant to the terms of the contract; (*b*) if the Operator, in the opinion of the Government, fails to prosecute operations pursuant to the terms of the contract; or (*c*) if, in the opinion of the Government, operations up to the time of the notice have not indicated the probability of making any worth while discovery and in the opinion of the Government further operations are not justified.

ARTICLE 9. *Changes and added provisions* .....

Executed in sextuplicate the day and year first above written.

THE UNITED STATES OF AMERICA

.....

~~Operator~~

By .....

Administrator, Defense Minerals Exploration Administration

By .....

John Q. St. Clair - Operator

I, , certify that I am the secretary of the corporation named as Operator herein; that , who signed this contract on behalf of the Operator, was then of said corporation; that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

..... [CORPORATE SEAL]

U. S. GOVERNMENT PRINTING OFFICE 16—66329-1

EXPLORATION PROJECT CONTRACT
JOHN Q. ST. CLAIR
DOCKET NO. DMEA-3097

ANNEX I

All that part of the East half of Section Twenty (20) lying East of Prairie Creek, containing Ninety (90) acres, more or less,

The Northwest Quarter of the Northwest Quarter of Section Twenty One (21) containing Forty (40) acres, more or less,

The South Half of the Northwest Quarter of Section Twenty One (21), containing Eighty (80) acres, more or less,

The Southwest Quarter of Section Twenty One (21) containing One Hundred Sixty (160) acres, more or less,

The Southwest Quarter of the Northwest Quarter of Section Twenty Seven (27), except one half (1/2) acres in the Southwest corner thereof, containing Thirty Nine and one half (39-1/2) acres, more or less,

All that part of Section Twenty Eight (28) lying North and East of the Little Missouri River, containing Three Hundred and fifty three and fifty three hundredths (353.53) acres, more or less,

All that part of the West half of Section Twenty eight (28) lying South of the Little Missouri River and North of Duncan Slough, containing sixty (60) acres more or less, and

All that part of the Northeast Quarter of the Northeast Quarter of Section Twenty Nine (29) bounded on the North, East and West by the Little Missouri River, and on the South by a certain Slough dividing said land from the McBrayer land sold to Stewart, containing Five (5) acres, more or less,

All in Township Eight (8) South of the Base Line in Range Twenty Five (25) West of the Fifth Principal Meridian in Arkansas and containing in the aggregate Eight Hundred Twenty eight and three hundredths (828.03) acres, more or less.

EXPLORATION PROJECT CONTRACT
JOHN Q. ST. CLAIR
DOCKET NO. DMEA-3097

ANNEX II

The following provisions are in lieu of all of paragraph (a) of Article 6 which precedes the colon:

If the Government considers that a discovery or development from which production may be made has resulted from the exploration work, the Government, at any time not later than six months after a sufficient, complete, final report and final account referred to in the contract has been rendered, may so certify in writing to the Operator. Such certification shall describe broadly or indicate the nature of the discovery or development, The Operator, or his successor in interest, shall pay to the Government a royalty on all minerals mined or produced from the land described in Article 2, as follows: (1) Regardless of any certification of discovery or development, from the date of the contract until the lapse of the time within which the Government may make such certification of discovery or development, or until the total net amount contributed by the Government, without interest, is fully repaid, whichever occurs first, unless the Government waives its right to a royalty; or (2) if the Government makes a certification of discovery or development, for a period of ten years from the date of the contract, or until the total net amount contributed by the Government, without interest, is fully repaid, whichever occurs first. Said royalty shall be a percentage of the net smelter returns, the net concentrator returns, or other net amounts realized from the sale or other disposition of any such production (including any bonuses), in whatever form disposed of, including ore, concentrates, or metal, as follows:

EXPLORATION PROJECT CONTRACT
JOHN Q. ST. CLAIR
DOCKET NO. DMRA-3097

EXHIBIT "A"

Description of the Work

The area shown on the attached map captioned "Exploration Program, Arkansas Diamond Mines, Pike County, Arkansas", shall be explored for diamondiferous material, as there indicated, by auger drilling sampling holes. Six tons of drill cutting samples, shall be obtained from these holes. The drill cuttings from each alternate hole, or three tons of material, shall be packed separately and delivered to the Bureau of Mines at the project site. The drill cuttings from the other alternate holes, or the remaining three tons, shall be packed, and shipped to, and tested for diamond content by, the Western Machinery Company of San Francisco. The testing shall include a screen analysis of the diamond size distribution. A full report on the results of the testing shall be furnished to the Government.

Agreed Unit Costs

Six tons of drill cutting samples, and all packing of samples, including all costs of the work 1/	$2,250.00	
Testing three tons of drill cutting samples by Western Machinery Company of San Francisco, including freight, and report on results of testing 1/	1,250.00	
Total Agreed Unit Costs		$3,500.00
Government Participation @ 90%		$3,150.00

1/ The completed work constitutes the unit.

MF-200 (A)
(February 1952)

DOCKET NO. DMEA 3097

COMMODITY Industrial Diamonds (bort)

Docket Copy

UNITED STATES OF AMERICA
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

EXPLORATION PROJECT CONTRACT[1]
(Short Form)

IT IS AGREED this _____ day of _____, 195__, between the United States of America, acting through the Department of the Interior, Defense Minerals Exploration Administration, hereinafter called the "Government," and[2] John Q. St. Clair
703 Hoover Street
Norman, Oklahoma

hereinafter called the "Operator," as follows: and as set forth in Annexes I and II and Fig. I attached hereto and made a part hereof:

ARTICLE 1. *Authority for contract.*—This agreement is entered into under the authority of the Defense Production Act of 1950, as amended, pursuant to DMEA Order 1 entitled "Government Aid in Defense Exploration Projects."

ARTICLE 2. *Operator's property rights.*—With respect to that certain land situated in the State of Arkansas, County of Pike, described as ~~xxxx~~ set forth in Annex I and Fig. I entitled Caddo Gap, Ark

the Operator represents and undertakes:[4]

~~(a) That the Operator is the owner in possession and entitled to possession, and that the property is subject only to the following encumbrances, exceptions, and reservations, which the Government's Consent to Lien is attached:~~

(*b*) That the Operator is a lessee, in possession and entitled to possession, and the Owner's Consent to Lien is attached.

The Operator shall devote the land and all existing improvements, facilities, buildings, installations, and appurtenances to the purposes of the exploration project without any allowance for the use, rental value, depreciation, depletion, or other cost of acquiring, owning, or holding possession thereof.

ARTICLE 3. *Exploration project.*—The Operator, within 30 days from the date of this contract shall commence work on a project of exploration for[5] industrial diamonds (bort)

in or upon the described land; and shall bring the project to completion within a period of 90 days from the date of this contract. The work to be performed is more fully described in Exhibit "A" attached hereto, which, with any maps or drawings thereto attached, are made a part of this contract. The Government will contribute to the cost of this work as hereafter provided. The work shall be performed by the Operator or by independent contractor or contractors efficiently, expertly, in a workmanlike manner, in accordance with good mining standards and State regulations for health and safety and for workmen's compensation and employers' liability insurance, with suitable and adequate equipment, materials, and labor, to bring the project to completion within the time fixed. The Government shall have the right to enter and observe and inspect the work at all reasonable times, and the Operator shall provide the Government with all available means for doing so. The Government may consult with and advise the Operator on all phases of the work.

ARTICLE 4. *Costs of the project.*—The agreed, estimated costs of performing the work, expressed in terms of units of work to be performed (per foot of drifting, per foot of drilling, per cubic yard of material to be moved, etc.) are set forth in Exhibit "A," attached hereto. The Government will pay 90 percent of these agreed, estimated costs, as they accrue, for units of work actually performed that conform with the description or specifications for the work set forth in this contract, in an aggregate total amount not in excess of $3,150.00, which is 90 percent of $3,500.00, the agreed, estimated total cost of the project in which the Government will participate: *Provided,* That until the Operator's final report and final accounting have been rendered to the Government and any final check or auditing required by the Government has been made, and a final settlement of the contract has been made, the Government may withhold from the last voucher or vouchers such sums as it sees fit not in excess of ten (10) percent of the maximum total which the Government might have been called upon to pay under the terms of the contract. The Government may, as it sees fit, make payments direct to the Operator's independent contractors, if any, for the account of the Operator, rather than to the Operator.

ARTICLE 5. *Reports, accounts, audits.*—(*a*) *Progress reports.* The Operator shall provide the Government with monthly reports of units of work performed under the contract, in quintuplicate (five copies), upon forms provided by the Government. These progress reports shall be certified by the Operator, and shall constitute both the Operator's invoice of units of work performed on the project during the period covered by the report and his voucher for repayment by the Government, unless the Government requires the use of a standard voucher form with invoice attached. Progress reports shall include surface and/or underground engineering-geological maps or sketches showing the progress of the exploration, with assay-reports on samples taken concurrently with the advance in mineralized ground.

[1] If sufficient space is not provided in any blank, use an extra sheet of paper and refer to it in the blank.
[2] State name, address, and nature of organization if any.
[3] Give legal description or enough to identify the property, particularly excluding any land or interest therein to which the Government's lien is not to attach or the production from which is not to be subject to the Government's percentage royalty.
[4] Strike out the provision not applicable.
[5] Name of mineral or minerals.

(*b*) *Final report.*—Upon completion of the exploration work or termination of the contract the Operator shall provide the Government with an adequate geological and engineering report, in quintuplicate (five copies), including an estimate of ore reserves resulting from the exploration work.

(*c*) *Compliance with requirements.*—If, in the opinion of the Government, any of the Operator's reports are insufficient or incomplete, the Government may procure the making or completion of such reports and attachments as an expense of the exploration work; and the Government may withhold approval and payment of any vouchers depending upon insufficient or incomplete reports.

(*d*) *Accounts and audits.*—The Operator shall keep suitable records and accounts of the units of work performed, which the Government may inspect and audit at any time. The Government may at any time require a check of the work performed and an audit of the Operator's records and accounts, by a certified public accountant or otherwise, the cost thereof to be treated as a cost of the project. The Operator shall keep and preserve said records and accounts for at least 3 years after the completion of the project or the termination of this contract. Upon the completion of the project or termination of the contract the Operator shall render a final account and statement of work performed to accompany his final report.

ARTICLE 6. *Repayment by Operator.*—(*a*) If, at any time, the Government considers that a discovery or a development from which production may be made has resulted from the exploration work, the Government, at any time not later than 6 months after the Operator has rendered the required final report and final account, may so certify in writing to the Operator. The certification shall describe broadly or indicate the nature of the discovery or development. In the event of such certification, any minerals mined or produced from the land described in Article 2 within 10 years from the date of this contract, including any mined or produced before the certification, shall be subject to a percentage royalty which the Operator or his successor in interest shall pay to the Government, upon the net smelter returns, the net concentrator returns, or other net amounts realized from the sale or other disposition of any such production, in whatever form disposed of, including ore, concentrates, or metal, until the total amount contributed by the Government, without interest, is fully repaid, or said 10 years have elapsed, whichever occurs first, as follows: See Annex II, substituted for that part of 6(a) preceding the colon.

(1) One and one-half (1½) percent of any such net amounts not in excess of eight dollars ($8.00) per ton.

(2) One and one-half (1½) percent of any such net amounts, plus one-half (½) percent of such net amounts for each additional full fifty cents ($0.50) by which such net amounts exceed eight dollars ($8.00) per ton, but not in excess of five (5) percent of such net amounts.

(For instance: The percentage royalty on a net amount of five dollars ($5.00) per ton, would be one and one-half (1½) percent; on a net amount of ten dollars ($10.00) per ton, three and one-half (3½) percent.)

(*b*) As here used, "net smelter returns," "net concentrator returns," and "other net amounts realized from the sale or other disposition," mean gross revenue from sales, or if not sold, the market value of the material after it is mined in the form in which and the place where it is held. In the case of integrated operations in which the material is not disposed of as such, these terms mean what is or would be the gross income from mining operations for percentage depletion purposes in income-tax determination.

(*c*) To secure the payment of its percentage royalty, the Government shall have and is hereby granted a lien upon the land described in Article 2 and upon any production of minerals therefrom, until the royalty claim is extinguished by lapse of time or is fully paid.

(*d*) This article is not to be construed as imposing any obligation on the Operator or the Operator's successor in interest to engage in any mining or production operations.

ARTICLE 7. *Assignment, transfer, or loss of Operator's interest.*—Without the written consent of the Government, the Operator shall not assign or otherwise transfer or hypothecate this contract or any rights thereunder. The Operator shall not make any voluntary nor permit any involuntary transfer or conveyance of the Operator's rights in the land described in Article 2, without making suitable provision for the preservation of the Government's right to a percentage royalty on production and lien for the payment thereof; *Provided*, that mere failure by the Operator to maintain the Operator's rights in the land, without any consideration running to the Operator other than relief from the cost of maintaining such rights (as by surrender of a leasehold, failure to perform assessment work, or failure to exercise an option), coupled with complete abandonment by the Operator of all interest in or operations on the land for a period of 10 years from the date of this contract, shall not constitute such a transfer or conveyance. Should the Operator make or permit any transfer or conveyance in violation of this provision, the Operator shall be and remain liable for payment to the Government of the same amounts, at the same times, as would have been paid under the terms of the percentage royalty on production. If for any reason the net smelter returns, net concentrator returns, or other net amounts realized from the sale or other disposition of such production are not available as a means of measuring the amount of the Operator's liability, the amount thereof shall be estimated as well as may be, and in the event of dispute as to such estimates, the determination thereof by the Administrator of Defense Minerals Exploration Administration or by his successor shall be final and binding upon the Operator.

ARTICLE 8. *Termination and completion.*—The Government may, at any time, by written notice to the Operator, terminate this contract: (*a*) If the Operator fails to provide his share of the money necessary to prosecute operations pursuant to the terms of the contract; (*b*) if the Operator, in the opinion of the Government, fails to prosecute operations pursuant to the terms of the contract; or (*c*) if, in the opinion of the Government, operations up to the time of the notice have not indicated the probability of making any worth while discovery and in the opinion of the Government further operations are not justified.

ARTICLE 9. *Changes and added provisions* .....

Executed in sextuplicate the day and year first above written.

THE UNITED STATES OF AMERICA

By .....
Administrator, Defense Minerals Exploration Administration

Peter Dekane

.....
SECRETARY

By .....
John C. St. Clair - Operator

I, , certify that I am the secretary of the corporation named as Operator herein; that , who signed this contract on behalf of the Operator, was then of said corporation; that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the

[CORPORATE SEAL]

16—66329-1

EXPLORATION PROJECT CONTRACT
JOHN Q. ST. CLAIR
DOCKET NO. DMEA-3097

ANNEX I

All that part of the East half of Section Twenty (20) lying East of Prairie Creek, containing Ninety (90) acres, more or less,

The Northwest Quarter of the Northwest Quarter of Section Twenty One (21) containing Forty (40) acres, more or less,

The South Half of the Northwest Quarter of Section Twenty One (21), containing Eighty (80) acres, more or less,

The Southwest Quarter of Section Twenty One (21) containing One Hundred Sixty (160) acres, more or less,

The Southwest Quarter of the Northwest Quarter of Section Twenty Seven (27), except one half (1/2) acres in the Southwest corner thereof, containing Thirty Nine and one half (39-1/2) acres, more or less,

All that part of Section Twenty Eight (28) lying North and East of the Little Missouri River, containing Three Hundred and fifty three and fifty three hundredths (353.53) acres, more or less.

All that part of the West half of Section Twenty eight (28) lying South of the Little Missouri River and North of Duncan Slough, containing sixty (60) acres more or less, and

All that part of the Northeast Quarter of the Northeast Quarter of Section Twenty Nine (29) bounded on the North, East and West by the Little Missouri River, and on the South by a certain Slough dividing said land from the McBrayer land sold to Stewart, containing Five (5) acres, more or less,

All in Township Eight (8) South of the Base Line in Range Twenty Five (25) West of the Fifth Principal Meridian in Arkansas and containing in the aggregate Eight Hundred Twenty eight and three hundredths (828.03) acres, more or less.

SIGNATURE

1—186

ANNEX

The following provisions are in lieu of all of paragraph (a) of Article 3 which precedes the colon:

If the Government considers that a discovery or development from which production may be made has resulted from the exploration work, the Government, at any time not later than six months after a sufficient, complete, final report and final account referred to in the contract has been rendered, may so certify in writing to the Operator. Such certification shall describe broadly or indicate the nature of the discovery or development, The Operator, or his successor in interest, shall pay to the Government a royalty on all minerals mined or produced from the land described in Article 2, as follows: (1) Regardless of any certification of discovery or development, from the date of the contract until the lapse of the time within which the Government may make such certification of discovery or development, or until the total net amount contributed by the Government, without interest, is fully repaid, whichever occurs first, unless the Government waives its right to a royalty; or (2) if the Government makes a certification of discovery or development, for a period of ten years from the date of the contract, or until the total net amount contributed by the Government, without interest, is fully repaid, whichever occurs first. Said royalty shall be a percentage of the net smelter returns, the net concentrator returns, or other net amounts realized from the sale or other disposition of any such production (including any bonuses), in whatever form disposed of, including ore, concentrates, or metal, as follows:

EXPLORATION PROJECT CONTRACT
JOHN Q. ST. CLAIR
DOCKET NO. DMEA-3097

EXHIBIT A

Description of the Work

The area shown on the attached map captioned Exploration Program, Arkansas Diamond Mines, Pike County, Arkansas, shall be explored for diamondiferous material, as there indicated, by auger drilling sampling holes. Six tons of drill cutting samples, shall be obtained from these holes. The drill cuttings from each alternate hole, or three tons of material, shall be packed separately and delivered to the Bureau of Mines at the project site. The drill cuttings from the other alternate holes, or the remaining three tons, shall be packed, and shipped to, and tested for diamond content by, the Western Machinery Company of San Francisco. The testing shall include a screen analysis of the diamond size distribution. A full report on the results of the testing shall be furnished to the Government.

Agreed Unit Costs

Six tons of drill cutting samples, and all packing of samples, including all costs of the work 1/	$2,250.00	
Testing three tons of drill cutting samples by Western Machinery Company of San Francisco, including freight, and report on results of testing 1/	1,250.00	
Total Agreed Unit Costs		$3,500.00
Government Participation @ 90%		$3,150.00

1/ The completed work constitutes the unit.

MF-200 (A)
(February 1952)

DOCKET NO. DMEA [illegible]

COMMODITY [illegible]

Extra Copy

UNITED STATES OF AMERICA
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

EXPLORATION PROJECT CONTRACT[1]
(Short Form)

IT IS AGREED this _____ day of _____, 195__, between the United States of America, acting through the Department of the Interior, Defense Minerals Exploration Administration, hereinafter called the "Government," and[2] [illegible]

hereinafter called the "Operator," as follows: [illegible]

ARTICLE 1. *Authority for contract.*—This agreement is entered into under the authority of the Defense Production Act of 1950, as amended, pursuant to DMEA Order 1 entitled "Government Aid in Defense Exploration Projects."

ARTICLE 2. *Operator's property rights.*—With respect to that certain land situated in the State of [illegible] County of [illegible] described as follows:[3] [illegible]

the Operator represents and undertakes:[4]

(*a*) That the Operator is the owner, in possession and entitled to possession, and that the property is subject only to the following claims, liens, or encumbrances as to each of which the subordination agreement of the holder is attached: _____

(*b*) That the Operator is a lessee, in possession and entitled to possession, and the Owner's Consent to Lien is attached.

The Operator shall devote the land and all existing improvements, facilities, buildings, installations, and appurtenances to the purposes of the exploration project without any allowance for the use, rental value, depreciation, depletion, or other cost of acquiring, owning, or holding possession thereof.

ARTICLE 3. *Exploration project.*—The Operator, within [illegible] days from the date of this contract shall commence work on a project of exploration for[5] [illegible]

in or upon the described land; and shall bring the project to completion within a period of [illegible] from the date of this contract. The work to be performed is more fully described in Exhibit "A" attached hereto, which, with any maps or drawings thereto attached, are made a part of this contract. The Government will contribute to the cost of this work as hereafter provided. The work shall be performed by the Operator or by independent contractor or contractors efficiently, expertly, in a workmanlike manner, in accordance with good mining standards and State regulations for health and safety and for workmen's compensation and employers' liability insurance, with suitable and adequate equipment, materials, and labor, to bring the project to completion within the time fixed. The Government shall have the right to enter and observe and inspect the work at all reasonable times, and the Operator shall provide the Government with all available means for doing so. The Government may consult with and advise the Operator on all phases of the work.

ARTICLE 4. *Costs of the project.*—The agreed, estimated costs of performing the work, expressed in terms of units of work to be performed (per foot of drifting, per foot of drilling, per cubic yard of material to be moved, etc.) are set forth in Exhibit "A," attached hereto. The Government will pay [illegible] percent of these agreed, estimated costs, as they accrue, for units of work actually performed that conform with the description or specifications for the work set forth in this contract, in an aggregate total amount not in excess of $[illegible], which is [illegible] percent of $[illegible], the agreed, estimated total cost of the project in which the Government will participate: *Provided,* That until the Operator's final report and final accounting have been rendered to the Government and any final check or auditing required by the Government has been made, and a final settlement of the contract has been made, the Government may withhold from the last voucher or vouchers such sums as it sees fit not in excess of ten (10) percent of the maximum total which the Government might have been called upon to pay under the terms of the contract. The Government may, as it sees fit, make payments direct to the Operator's independent contractors, if any, for the account of the Operator, rather than to the Operator.

ARTICLE 5. *Reports, accounts, audits.*—(*a*) *Progress reports.* The Operator shall provide the Government with monthly reports of units of work performed under the contract, in quintuplicate (five copies), upon forms provided by the Government. These progress reports shall be certified by the Operator, and shall constitute both the Operator's invoice of units of work performed on the project during the period covered by the report and his voucher for repayment by the Government, unless the Government requires the use of a standard voucher form with invoice attached. Progress reports shall include surface and/or underground engineering-geological maps or sketches showing the progress of the exploration, with assay-reports on samples taken concurrently with the advance in mineralized ground.

[1] If sufficient space is not provided in any blank, use an extra sheet of paper and refer to it in the blank.
[2] State name, address, and nature of organization if any.
[3] Give legal description or enough to identify the property, particularly excluding any land or interest therein to which the Government's lien is not to attach or the production from which is not to be subject to the Government's percentage royalty.
[4] Strike out the provision not applicable.
[5] Name of mineral or minerals.

(*b*) *Final report.*—Upon completion of the exploration work or termination of the contract the Operator shall provide the Government with an adequate geological and engineering report, in quintuplicate (five copies), including an estimate of ore reserves resulting from the exploration work.

(*c*) *Compliance with requirements.*—If, in the opinion of the Government, any of the Operator's reports are insufficient or incomplete, the Government may procure the making or completion of such reports and attachments as an expense of the exploration work; and the Government may withhold approval and payment of any vouchers depending upon insufficient or incomplete reports.

(*d*) *Accounts and audits.*—The Operator shall keep suitable records and accounts of the units of work performed, which the Government may inspect and audit at any time. The Government may at any time require a check of the work performed and an audit of the Operator's records and accounts, by a certified public accountant or otherwise, the cost thereof to be treated as a cost of the project. The Operator shall keep and preserve said records and accounts for at least 3 years after the completion of the project or the termination of this contract. Upon the completion of the project or termination of the contract the Operator shall render a final account and statement of work performed to accompany his final report.

ARTICLE 6. *Repayment by Operator.*—(*a*) If, at any time, the Government considers that a discovery or a development from which production may be made has resulted from the exploration work, the Government, at any time not later than 6 months after the Operator has rendered the required final report and final account, may so certify in writing to the Operator. The certification shall describe broadly or indicate the nature of the discovery or development. In the event of such certification, any minerals mined or produced from the land described in Article 2 within 10 years from the date of this contract, including any mined or produced before the certification, shall be subject to a percentage royalty which the Operator or his successor in interest shall pay to the Government, upon the net smelter returns, the net concentrator returns, or other net amounts realized from the sale or other disposition of any such production, in whatever form disposed of, including ore, concentrates, or metal, until the total amount contributed by the Government, without interest, is fully repaid, or said 10 years have elapsed, whichever occurs first, as follows: [illegible]

(1) One and one-half (1½) percent of any such net amounts not in excess of eight dollars ($8.00) per ton.

(2) One and one-half (1½) percent of any such net amounts, plus one-half (½) percent of such net amounts for each additional full fifty cents ($0.50) by which such net amounts exceed eight dollars ($8.00) per ton, but not in excess of five (5) percent of such net amounts.

(For instance: The percentage royalty on a net amount of five dollars ($5.00) per ton, would be one and one-half (1½) percent; on a net amount of ten dollars ($10.00) per ton, three and one-half (3½) percent.)

(*b*) As here used, "net smelter returns," "net concentrator returns," and "other net amounts realized from the sale or other disposition," mean gross revenue from sales, or if not sold, the market value of the material after it is mined in the form in which and the place where it is held. In the case of integrated operations in which the material is not disposed of as such, these terms mean what is or would be the gross income from mining operations for percentage depletion purposes in income-tax determination.

(*c*) To secure the payment of its percentage royalty, the Government shall have and is hereby granted a lien upon the land described in Article 2 and upon any production of minerals therefrom, until the royalty claim is extinguished by lapse of time or is fully paid.

(*d*) This article is not to be construed as imposing any obligation on the Operator or the Operator's successor in interest to engage in any mining or production operations.

ARTICLE 7. *Assignment, transfer, or loss of Operator's interest.*—Without the written consent of the Government, the Operator shall not assign or otherwise transfer or hypothecate this contract or any rights thereunder. The Operator shall not make any voluntary nor permit any involuntary transfer or conveyance of the Operator's rights in the land described in Article 2, without making suitable provision for the preservation of the Government's right to a percentage royalty on production and lien for the payment thereof; *Provided*, that mere failure by the Operator to maintain the Operator's rights in the land, without any consideration running to the Operator other than relief from the cost of maintaining such rights (as by surrender of a leasehold, failure to perform assessment work, or failure to exercise an option), coupled with complete abandonment by the Operator of all interest in or operations on the land for a period of 10 years from the date of this contract, shall not constitute such a transfer or conveyance. Should the Operator make or permit any transfer or conveyance in violation of this provision, the Operator shall be and remain liable for payment to the Government of the same amounts, at the same times, as would have been paid under the terms of the percentage royalty on production. If for any reason the net smelter returns, net concentrator returns, or other net amounts realized from the sale or other disposition of such production are not available as a means of measuring the amount of the Operator's liability, the amount thereof shall be estimated as well as may be, and in the event of dispute as to such estimates, the determination thereof by the Administrator of Defense Minerals Exploration Administration or by his successor shall be final and binding upon the Operator.

ARTICLE 8. *Termination and completion.*—The Government may, at any time, by written notice to the Operator, terminate this contract: (*a*) If the Operator fails to provide his share of the money necessary to prosecute operations pursuant to the terms of the contract; (*b*) if the Operator, in the opinion of the Government, fails to prosecute operations pursuant to the terms of the contract; or (*c*) if, in the opinion of the Government, operations up to the time of the notice have not indicated the probability of making any worth while discovery and in the opinion of the Government further operations are not justified.

ARTICLE 9. *Changes and added provisions* _____

_____

_____

_____

_____

Executed in sextuplicate the day and year first above written.

THE UNITED STATES OF AMERICA

_____
(Operator)

By _____

By _____
[illegible]

I, _____, certify that I am the _____ secretary of the corporation named as Operator herein; that _____, who signed this contract on behalf of the Operator, was then _____ of said corporation; that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

_____ [CORPORATE SEAL]

U. S. GOVERNMENT PRINTING OFFICE 16—66329-1

EXPLORATION PROJECT CONTRACT
JOHN Q. ST. CLAIR
DOCKET NO. DMSA-3097

ANNEX I

All that part of the East half of Section Twenty (20) lying East of Prairie Creek, containing Ninety (90) acres, more or less.

The Northwest Quarter of the Northwest Quarter of Section Twenty One (21) containing Forty (40) acres, more or less.

The South Half of the Northwest Quarter of Section Twenty One (21), containing Eighty (80) acres, more or less.

The Southwest Quarter of Section Twenty One (21) containing One Hundred Sixty (160) acres, more or less.

The Southwest Quarter of the Northwest Quarter of Section Twenty Seven (27), except one half (1/2) acres in the Southwest corner thereof, containing Thirty Nine and one half (39-1/2) acres, more or less.

All that part of Section Twenty Eight (28) lying North and East of the Little Missouri River, containing Three Hundred and fifty three and fifty three hundredths (353.53) acres, more or less.

All that part of the West half of Section Twenty eight (28) lying South of the Little Missouri River and North of Duncan Slough, containing sixty (60) acres more or less, and

All that part of the Northeast Quarter of the Northeast Quarter of Section Twenty Nine (29) bounded on the North, East and West by the Little Missouri River, and on the South by a certain Slough dividing said land from the McBrayer land sold to Stewart, containing Five (5) acres, more or less,

All in Township Eight (8) South of the Base Line in Range Twenty Five (25) West of the Fifth Principal Meridian in Arkansas and containing in the aggregate Eight Hundred Twenty eight and three hundredths (828.03) acres, more or less.

ANNEX _____

The following provisions are in lieu of all of paragraph (a) of Article ____ which precedes the colon:

If the Government considers that a discovery or development from which production may be made has resulted from the exploration work, the Government, at any time not later than six months after a sufficient, complete, final report and final account referred to in the contract has been rendered, may so certify in writing to the Operator. Such certification shall describe broadly or indicate the nature of the discovery or development, The Operator, or his successor in interest, shall pay to the Government a royalty on all minerals mined or produced from the land described in Article 2, as follows: (1) Regardless of any certification of discovery or development, from the date of the contract until the lapse of the time within which the Government may make such certification of discovery or development, or until the total net amount contributed by the Government, without interest, is fully repaid, whichever occurs first, unless the Government waives its right to a royalty; or (2) if the Government makes a certification of discovery or development, for a period of ten years from the date of the contract, or until the total net amount contributed by the Government, without interest, is fully repaid, whichever occurs first. Said royalty shall be a percentage of the net smelter returns, the net concentrator returns, or other net amounts realized from the sale or other disposition of any such production (including any bonuses), in whatever form disposed of, including ore, concentrates, or metal, as follows:

EXPLORATION PROJECT CONTRACT
JOHN Q. ST. CLAIR
DOCKET NO. DMEA-3097

EXHIBIT A

Description of the Work

The area shown on the attached map captioned Exploration Program, Arkansas Diamond Mines, Pike County, Arkansas, shall be explored for diamondiferous material, as there indicated, by auger drilling sampling holes. Six tons of drill cutting samples, shall be obtained from these holes. The drill cuttings from each alternate hole, or three tons of material, shall be packed separately and delivered to the Bureau of Mines at the project site. The drill cuttings from the other alternate holes, or the remaining three tons, shall be packed, and shipped to, and tested for diamond content by, the Western Machinery Company of San Francisco. The testing shall include a screen analysis of the diamond size distribution. A full report on the results of the testing shall be furnished to the Government.

Agreed Unit Costs

Six tons of drill cutting samples, and all packing of samples, including all costs of the work 1/	$2,250.00	
Testing three tons of drill cutting samples by Western Machinery Company of San Francisco, including freight, and report on results of testing 1/	1,250.00	
Total Agreed Unit Costs		$3,500.00
Government Participation @ 90%		$3,150.00

1/ The completed work constitutes the unit.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

January 27, 1954

Memorandum

To: Mr. Lawrence G. Houk, Chief, Nonmetallic Minerals Division, Defense Minerals Exploration Administration

From: Commodity Specialist, Construction and Chemical Materials Branch

Subject: Review of report by Mr. W. P. Williams, Region VI, on Docket No. DMEA-3097, Arkansas Diamond Mine

On August 13 and 14, 1953, Mr. W. P. Williams and Mr. Norman F. Williams, Arkansas State Geologist, made a field examination of the Arkansas Diamond Mine, Pike County, Arkansas.

The recommendation was that a DMEA contract be approved allowing the applicant, Mr. John Q. St. Clair of Norman, Oklahoma, to perform exploration and testing work in stages.

As it is the only prospective source of diamonds in North America we concur with Mr. Williams that this deposit should be investigated with sufficient thoroughness to determine whether or not it contains enough additional small diamonds to warrant commercial development.

Henry P. Chandler

Henry P. Chandler, Commodity Specialist
Construction and Chemical Materials Branch

TELEPHONES:
35-3264 43-5770
P.O. BOX 6846
Norman 138
5276-R

Defense Minerals Administration
RECEIVED
DEC 22 1953

LICENSED DIAMOND DEALER
FIFTH FLOOR,
BARCLAY BUILDINGS,
JOHANNESBURG,
SOUTH AFRICA.

JOHN Q. ST. CLAIR
MINING GEOLOGIST

1030 Cruce Street,
Norman, Oklahoma
December 19,1953

Mr. Lawrence G. Houk, Chief,
Nonmetallic Minerals Division,
Defense Minerals Exploration Administration,
Department of Interior,
Washington 25, D.C.

Re: Docket No.DMEA-3097
Arkansas Diamond Mine
Pike County, Arkansas

Dear Mr. Houk:

This will acknowledge receipt of your letter of December 8th, 1953 advising me regarding the time limit set for processing my application and that my application will be processed under criteria in effect prior to Amendment No.3 to DMEA Order-1.

The delay in this matter has been caused by the failure of the fee owners to send your Agency the Owner's Consent to Lien and the information on the Trust "A" agreement. We have been assured that this information will be forwarded to you, but up to the date of writing we have had no action. A copy of your letter was sent to them, along with a letter requesting immediate response.

Please note my change of address from 708 Hoover Street to 1030 Cruce Street in Norman, Oklahoma.

As mentioned in our last telephone conversation, the question of the recovery of the minus 10 Tyler mesh diamonds will not be left to the Western Machinery Company. The minus 10 Tyler mesh will be recovered on a grease tabling operation now being used at the Premier mine in South Africa. This unit will have to be constructed, and prior to this the fine material will be stored for processing and not discarded. It is estimated that this unit can be made available within 20 days.

Cordially yours,

John Q. St. Clair

John Q.St.Clair

JSTO/n

FILE COPY
SURNAME:

Houck
Mytheson
Johnson

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

600

DEC 8 - 1953

Mr. John Q. St. Clair
706 Hoover Street
Norman, Oklahoma

Re: Docket No. DMEA-3097 - Diamonds
Arkansas Diamond Mine
Pike County, Arkansas

Dear Mr. St. Clair:

Reference is made to our letters of September 15, and 16, 1953, requesting additional information necessary to further process your application for exploration assistance on industrial diamonds in Arkansas.

Inasmuch as we have received no reply we wish to inquire if you desire to proceed with the application. We wish to cooperate with you in the matter of allowing ample time to prepare this information but if we do not hear from you by January 15, 1954, we will then consider the docket closed.

On November 3, 1953, Amendment No. 3 to DMEA Order-1 eliminated industrial diamonds from the list of minerals eligible for exploration assistance. Your application will be processed under the criteria previously in effect. However, this office is making an effort to complete the processing of the deleted minerals at an early date.

Sincerely yours,

SIGNED

Lawrence G. Houk, Chief
Nonmetallic Minerals Division

LGHouk:gad 12/8/53
Copy to: Admr. R. File
Docket File
Field Team, Region VI
Mr. Chandler, 3520
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

P.C.L.
12-8-53

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

140

September 15, 1953

Memorandum

To: The Administrator
Through: L. G. Houk

From: Chief Counsel

Subject: John Q. St. Clair - Docket No. DMEA-3097
(Industrial diamonds - bort)

There is attached, in satisfactory legal form for execution, a contract covering the above-identified project, subject to the attachment of the property map (Fig. 1) and the work map referred to in the contract; and subject to the attachment of the Owner's Consent to Lien.

It is noted that the lease is executed by two trustees, jointly, as lessors. However, the settlor of the trust (that is the creator of the trust) is not identified except by reference to a "Trust Number 'A'"created in an agreement dated July 1, 1941, which is unrecorded, and the nature of the trust is undisclosed. Therefore, we require that the Trust Agreement be further identified in execution of the Owner's Consent to Lien, that is, that the name of the creator of the trust be disclosed; and also that the nature of the trust be disclosed, that is, whether under a will or otherwise.

for J. L. Hofflund
Chief Counsel

Attachments

UNITED STATES
DEPARTMENT OF THE INTERIOR 140
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

September 15, 1953

Memorandum

To: The Administrator
Through: L. G. Houk

From: Chief Counsel

Subject: John Q. St. Clair - Docket No. DMEA-3097
(Industrial diamonds - bort)

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Albert E. Kane

for J. L. Hofflund
Chief Counsel

Attachments

AIR MAIL

WESTERN MACHINERY COMPANY

OFFICES AND WAREHOUSES
SAN FRANCISCO, CALIFORNIA
SACRAMENTO, CALIFORNIA
SALT LAKE CITY, UTAH
JEFFERSONVILLE, INDIANA
SPOKANE, WASHINGTON
HIBBING, MINNESOTA
DENVER, COLORADO
POCATELLO, IDAHO
PHOENIX, ARIZONA
TUCSON, ARIZONA
CHICAGO, ILLINOIS
NEW YORK, N. Y.

"Wemco Products"

EXBROOK 2-4167
760-766 FOLSOM STREET
SAN FRANCISCO 7, CALIFORNIA

WEMCO

CABLE ADDRESS
"WEMACHY"

September 14, 1953

copy

Mr. John St. Clair
Geological Exploration Company
708 Hoover Street
Norman, Oklahoma

Dear Mr. St. Clair:

This letter is to confirm our telephone discussions regarding the testing of a sizable sample of diamond bearing ground from the Pike County of Arkansas.

Our laboratory here is equipped with a standard, Wemco 20" Laboratory HMS Testing Unit, and auxiliary items such as a vibratory feeder, mixing equipment and magnetic media cleaning equipment. In addition, we have the usual sample preparation equipment consisting of a small jaw crusher, coffee mill for secondary crushing, and a vibratory screen for removing fines preparatory to Heavy Media Testing. We do not have jigging equipment, but can arrange for having this phase of your testing program conducted by another laboratory in the event you feel that a jig test is required.

We are not familiar with the diamond bearing ground in Arkansas, and our experience in treating diamondiferous materials is limited to that which we have had in applying our equipment to the treatment of the grounds found in the Belgium Congo and Tanganyika. It is our understanding that the samples which you will send us will consist of the borings from the test holes drilled at various points of your property. It is suggested that as a preliminary step to sending us a large sample for testing that you send us a small, hand sample of these borings for our inspection. This would enable us to more accurately plan for whatever sample preparation work would be required for handling the large 3-ton sample you are preparing.

A copy of the United States Bureau of Mines report of investigations, No. 4549, covering their work on the Pike County, Arkansas Diamond Ground has just reached us. In looking it over, we find some mention is made of the fact that portions of this ground contain considerable blue clay material, which breaks down into fine, crumbly material after a short period of air drying. If there is much of this

Mr. John St. Clair 9/14/53

material included in your proposed sample, consideration might be given to doing sample preparation work at the property before shipment to our laboratory here in San Francisco. As you know, Heavy Media Separation is considered suitable for treatment of particles having a size range in excess of 10 mesh. By removing the minus 10 mesh material from your sample at the property after a short period of air slacking followed by suitable washing, the bulk of the sample to be treated here in our laboratory could be considerably reduced. This suggestion is being made in the event that it might be a means of reducing the overall costs.

As you know, our laboratory is operated on a non-profit basis, and charges for work cover our actual expenditures. The rate of charge for Heavy Media Separation Tests is $8.50 per laboratory hour. It is estimated that the cost of test work on a 3-ton sample of diamond gravel from Arkansas would cost approximately $1,250., which would include freight on the sample from your shipping point to our laboratories here in San Francisco.

We are looking forward to hearing from you further regarding your plans for this test work and will appreciate receiving a small preliminary sample of the material which you wish us to test. Meanwhile, if there is any further way in which we can be of assistance to you, please do not hesitate to call upon us.

Yours truly,

WEMCO DIVISION
Western Machinery Company

F. V. Schneider
Manager
Central Sales Department

FVS:ao

cc: L. G. Houk
Room 4637
Defense Materials Exploration Agency
Dept of the Interior
Washington 25, D.C.

WESTERN MACHINERY COMPANY
760-766 Folsom Street
SAN FRANCISCO 7, CALIF.

SAN FRANCISCO CALIF. SEP 14 '53
U.S. POSTAGE 06
PB METER P.D. 155642

VIA AIR MAIL

Mr. L. G. Houk
Room 4637
Defense Materials Exploration Agency
Department of the Interior
Washington 25, D.C.

"Wemco Products"

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D.C.

Joplin, Missouri

August 26, 1953

Operating Committee, DMEA
Interior Building
Washington 25, D.C.

Docket No. DMEA-3097-Diamonds
John Q. St. Clair
Arkansas Diamond Mine
Pike County, Arkansas

Gentlemen:

Enclosed herewith are the original and 3 carbon copies of Report of Field Examination concerning the above referenced property.

Very truly yours,

W. P. Williams

W. P. Williams
Executive Officer, DMEA
Region VI

WPW:tl

Enclosure

AB

Reviewed by
DMEA OPERATING COMMITTEE
9-9-53
(date)

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON, D.C.

Joplin, Missouri

August 26, 1953

1/27/54

REPORT OF FIELD EXAMINATION

Docket No. DMEA-3097 - Diamonds

John Q. St. Clair
Arkansas Diamond Mine
Pike County, Arkansas

The name and address of the applicant is:

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

The equivalent of two days was spent by the writer in making a field examination of property leased by the applicant. Mr. John St. Clair, applicant, and Mr. Norman F. Williams, Arkansas State Geologist, accompanied the writer on August 13, 14, 1953 during the field examination.

SUMMARY AND RECOMMENDATIONS

It is recommended that a DMEA contract be approved allowing the applicant to perform exploration work essentially as outlined in Phase I of the Application and at the costs outlined therein. Arrangements and approval of a possible Stage II will depend directly upon results achieved in Stage I.

Reviewed by
DMEA OPERATING COMMITTEE

9-9-53
(date)

Recommendation for approval is based on the following principal premises:

(1). Geologic conditions on the applicant's lease are favorable for the formation of diamontiferous deposits. The locality in question bears marked resemblance to the diamond-bearing pipes of South Africa.

(2). The district has already produced some 50,000 stones. (Where there's some, there might be more).

(3). The applicant appears well qualified by virtue of having had a good technical education as well as experience in the diamond fields of South Africa.

(4). The applicant proposes to utilize recovery methods proven in South Africa that have not heretofore been used on Murfreesboro ores.

DESCRIPTION OF PROPERTY AND PROPERTY RIGHTS

The applicant has 828 acres under fifty year lease. Examination of the lease indicates that the applicant's interest in the land is sufficient for DMEA purposes; however, the lease does not appear to be recorded.

The location of the applicant's leasehold is shown on the attached Fig. 1. The property consists of the old Arkansas Diamond Company holdings and is located about 2.5 miles south-east of Murfreesboro, Pike County, Arkansas, on a good all-weather county road. Power, labor, materials, and supplies are available in Murfreesboro.

No subordination agreements, or consents to lien, have been signed by the landowners, but the applicant states the agreements can be obtained if it appears likely that a DMEA contract will be approved. In addition, the applicant's lease states, "It is contemplated that the Lessee may enter into a contract with the Defense Minerals Exploration Administration--------."

Existing equipment and fixtures on the property consist of the frame of a large mill building, a combined office and laboratory building, two 14-foot washing pans and three grease tables. These items remain from an operation conducted by the Glenn L. Martin Company in 1948-49. The applicant does not intend to use the existing mechanical equipment since it is not applicable to his proposed plan of operations.

PAST OPERATIONS, PRODUCTION, AND EXPLORATION

Search of available reliable reports indicate that the entire district has produced about 50,000 diamonds of which about 80 percent came from the applicant's leasehold. The average size of the stones was about one-quarter carat. Ninety percent were industrial stones and the rest of gem quality.

The applicant's leasehold has been known variously through the years as "The Arkansas Mine", - "North American Diamond Corp.", - and "The Diamond Corporation of America".

Latest operations on the property were conducted by the Glenn L. Martin Corporation in 1948-1949. The applicant states that this corporation treated approximately 125,000 tons of ore and recovered 246 carats for an average grade of about 0.002 carats per short ton - which was uneconomic.

The latest exploration was conducted on the property by the U.S. Bureau of Mines in 1943 and 1944. Results of that work are published in U.S.B.M. Report of Investigations 4549, "Investigation of the Prairie Creek Diamond Area, Pike County, Ark." In its project the Bureau treated a total of 435 tons of bucket-drill sample. Total recovery amounted to 8.4 carats which gives an average grade of 0.0193 carats per short ton of ore. The stones were appraised as being of excellent industrial quality with a few possible gems.

Mine workings on the property consist only of open pit trenches and pits up to 15 feet in depth.

GEOLOGY

The geology of the diamontiferous areas in Arkansas has been ably set forth by Hugh D. Miser, A. H. Purdue, and C. S. Ross of the U. S. Geological Survey. Descriptions of the geology near Murfreesboro can be found in U.S.G.S. Bulletins 735 and 808 by the above writers.

The diamontiferous deposits near Murfreesboro, Arkansas are composed of peridotite "pipes" and dikes of Cretaceous age which intrude the Jackfork sandstone and Trinity (clay and sand) formation of Carboniferous and Cretaceous ages.

The peridotite may be divided into three general types:

(1). Intrusive peridotite: A dense porphyritic rock which is dull black, greenish black, or brownish black. Forms topographic highs and occupies only about 12 acres out of a total of

about 73 acres of peridotite area. Contains few diamonds. ("hardebank" of the miners).

(2). Volcanic breccia: A pyroclastic rock composed of coarse and fine-grained fragments of peridotite. Weathers to clay and soft rock. May be yellow, blue, or green. Forms a soft, black surface soil about 1 foot thick. Pits and drill holes indicate the weathered material is at least 200 feet deep. This rock and its overlying black soil has produced most of the diamonds in the district.

(3). Tuff and fine-grained breccia: Light bluish gray hard rock, generally even and fine-grained. Composed mostly of pale blue-green chlorite and phlogopite. Probably derived from an olivine-mica peridotite. No diamonds reported found in this rock.

The areal geology of the above rock types in part of the district is shown on attached Fig. II.

Miser and Purdue, in comparing the Arkansas diamontiferous rocks with those of South Africa say, "--------striking points of similarity between the diamond-bearing rocks of South Africa and of Arkansas are evident."

ORE RESERVES

The area of outcrop of the peridotite breccia on the applicant's property was checked and the applicant's figure of 1,000,000 square feet (P.9 application) of outcrop appears to be reasonably correct. However, on the same page, the applicant, using a tonnage factor of 13.5 cu. ft. per ton (which is probably low by African diamond mining standards (One "load" equals 16 cu. ft. weighing 1600 lb.), states the potential tonnage is 740,000 short tons per foot of depth. That figure is erroneous and should be 74,000 short tons per foot of depth. The applicant's figure of 74,000,000 short tons of possible ore for a depth of 1000 feet appears reasonably correct.

THE PROPOSED PROJECT

The applicant proposes to determine the tenor and extent of diamontiferous deposits on his leasehold by means of auger drilling and laboratory and mill tests. An exploration program composed of two stages is proposed. Stage I, a modest program, provides for a total expenditure of $2,750.00. Samples would be taken by means of 6" diameter deep-mounted auger drill. Use of the auger drill would be donated by the Arkansas Geological Survey. About 3 tons of typical peridotite breccia would be obtained by the auger. All samples would be shipped to the laboratories of the Western Machinery

Company, San Francisco, to determine if the peridotite breccia is amenable to modern recovery techniques now in use in South Africa.

State II provides for a much more comprehensive drilling, assaying, and testing program. Commencement of Stage II is contingent upon success obtained in Stage I.

The applicant proposes to make tests designed to recover diamond sizes of less than 20-mesh. The Bureau of Mines did not attempt recovery of minus 20-mesh diamonds.

The Premier Mine, Cullinan, Transvaal, South Africa went back into production in 1950 after a shut-down of 18 years. This come-back was brought about by the advent of heavy-media and magnetic separation to diamond recovery practice. The applicant also plans to conduct tests on electrostatic separation. The Bureau of Mines did not include any of those methods in their recovery tests.

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The applicant calculates (P. 15, Application) that the total costs for a proposed operation will amount to $1.309 per short ton of ore milled. This cost is based on costs at the Premier Mine, and the applicant is confident that Premier costs can be duplicated in Arkansas, as seems likely. At an estimated value of $16.00 per carat a diamond content of .0818 carats per short ton would represent the cut-off grade for a successful operation. The Bureau of Mines treated a total of 435 tons of sample and recovered 1,686.0 mg. or 8.4 carats giving a grade of .0193 carats per short ton of ore. The new proposed tests, therefore, will have to be better than the Bureau of Mines results - to the tune of (.0818 - .0193) = .0625 carats per short ton of ore.

THE APPLICANT

Personal interview and inquiry indicates the applicant is capable, efficient, experienced, and in every way qualified to supervise a DMEA project. His experience and acquaintance with the diamond industry in South Africa should serve as a valuable asset to a diamond exploration project in Arkansas.

CONCLUSIONS

On the basis of field examination and the above considerations it is recommended that a DMEA contract be approved that will allow the applicant to explore diamontiferous areas on the applicant's lease. Locations of proposed auger drill holes as well as the sampling methods are approved by the writer, and the costs of Stage I of the contract should be essentially as follows:

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Auger drilling (donated by Arkansas Geological Survey)	
Test work by Western Machinery Co., San Francisco (including cost of freight shipment of 3 ton sample)	1,250.00
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Miscellaneous Expenses	500.00
Total Cost Stage I	$2,670.00

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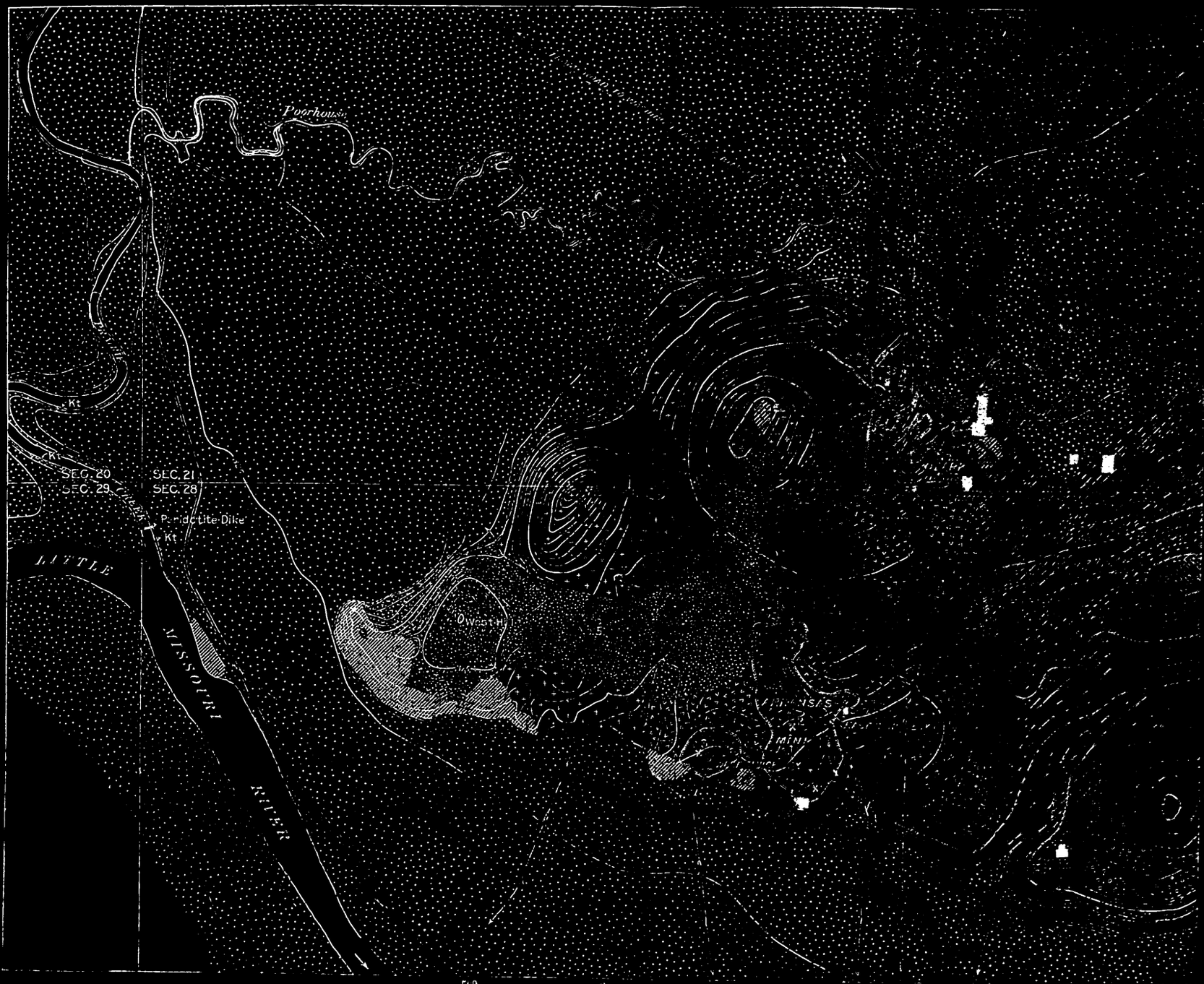
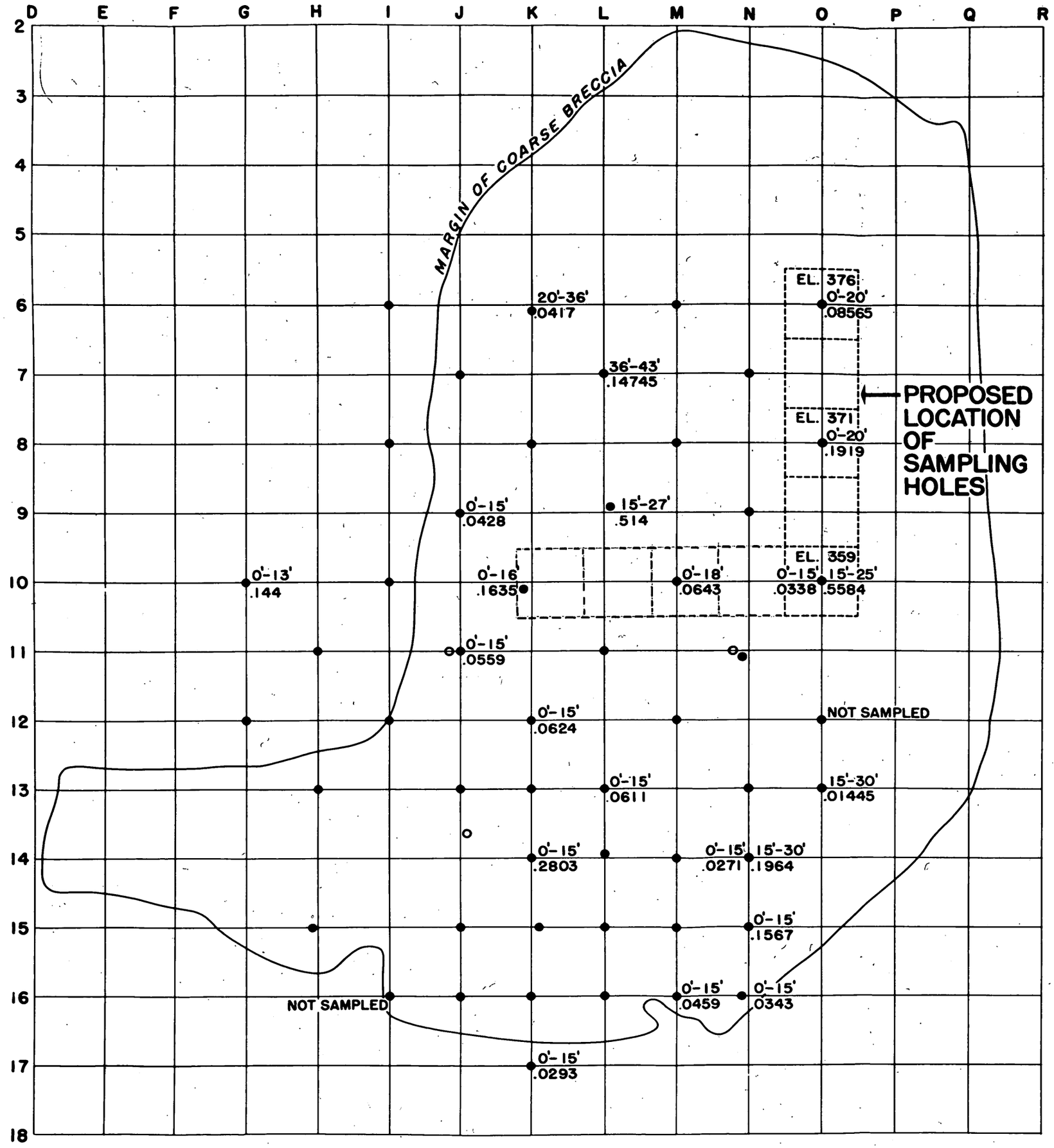
W. P. Williams

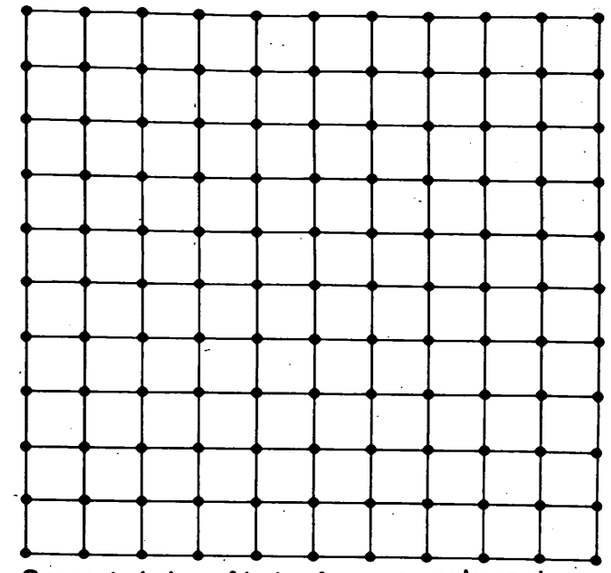
W. P. Williams
Executive Officer, DMEA
Region VI



GEOLOGIC MAP OF THE PRAIRIE CREEK AREA OF PERIDOTITE IN T. 8 S., R. 25 W., 2 MILES SOUTHEAST OF MURFREESBORO, PIKE COUNTY, ARK.

Surveyed with plane table in 1916 by H. D.





Suggested plan of holes for each 100' X 100' area

LEGEND

○● Holes drilled by Bureau of Mines

● 20' X 36'
.0417 cts./cu. yd.

EXPLORATION PROGRAM

ARKANSAS DIAMOND MINES
PIKE COUNTY, ARKANSAS

22nd June, 1953

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS
EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE TO AVOID
PAYMENT OF POSTAGE, $300
(GPO)

Mr. John Q. St.Clair
708 Hoover Street
Norman, Oklahoma

~~Aide - 700~~

~~Mr. A. P. Butler, Jr., Rm. 3212, GSA~~

Aide - 600

FILE COPY
SURNAME:

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

600

SEP 1 - 1953

Mr. John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

Re: Docket No. DMEA-3097 - Diamonds
Arkansas Diamond Mine
Pike County, Arkansas

Dear Mr. St. Clair:

Reference is made to the air mail letter from the Western Machinery Company, dated September 14, 1953, on the subject of testing diamond bearing material from Pike County, Arkansas, particularly to the latter portion of the fourth paragraph which recommends sample preparation at the property before shipment to the laboratory in San Francisco. Any type of treatment that will eliminate the minus 10 mesh from the sample is objectionable, inasmuch as the principal thesis of your application is that the minus 20 mesh material contains appreciable quantities of diamonds.

The Western Machinery Company make no mention of method of treating the minus 20 mesh material and this is the area of our particular interest. Under no circumstances is the minus 10 mesh material to be eliminated from the sample. We wish to be provided with a statement from you or the Western Machinery Company on how separation of the minus 10 mesh diamonds from the gangue is to be accomplished.

Sincerely yours,

SIGNED

Lawrence G. Houk, Chief
Nonmetallic Minerals Division

MSD 9-16-53

LGHouk:gad 9/16/53
Copy to: Admr. R. File
Docket File
Field Team, Region VI
Mr. Chandler, 3520
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

FILE COPY
SURNAME:

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

140

Partin
AEKane

September 15, 1953

Memorandum

To: The Administrator
Through: L. G. Houk

From: Chief Counsel

Subject: John Q. St. Clair - Docket No. DMEA-3097
(Industrial diamonds - bort)

There is attached, in satisfactory legal form for execution, a contract covering the above-identified project, subject to the attachment of the property map (Fig. 1) and the work map referred to in the contract; and subject to the attachment of the Owner's Consent to Lien.

It is noted that the lease is executed by two trustees, jointly, as lessors. However, the settlor of the trust (that is the creator of the trust) is not identified except by reference to a "Trust Number 'A'" created in an agreement dated July 1, 1941, which is unrecorded, and the nature of the trust is undisclosed. Therefore, we require that the Trust Agreement be further identified in execution of the Owner's Consent to Lien, that is, that the name of the creator of the trust be disclosed; and also that the nature of the trust be disclosed, that is, whether under a will or otherwise.

Albert E. Kane

for J. L. Hofflund
Chief Counsel

Attachments

HCRubin/ema
cc: Mails & Files
L. G. Houk
H. C. Rubin
J. L. Hofflund
Chron.

FILE COPY
SURNAME:

Lawrence G. Houk

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

600

SEP 15 1953

Mr. John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

Re: Docket No. DMEA-3097 - Diamonds
Arkansas Diamond Mine
Pike County, Arkansas

Dear Mr. St. Clair:

Reference is made to the new Owner's Consent to Lien forms forwarded to you on September 10, 1953, for execution.

It is noted that the lease is executed by two trustees, jointly, as lessors. However, the settlor of the trust (that is the creator of the trust) is not identified except by reference to a "Trust Number 'A'" created in an agreement dated July 1, 1941, which is unrecorded, and the nature of the trust is undisclosed. Therefore, we require that the Trust Agreement be further identified in execution of the Owner's Consent to Lien, that is, that the name of the creator of the trust be disclosed; and also that the nature of the trust be disclosed, that is, whether under a will or otherwise.

Under separate cover the diamonds are being returned by registered mail.

Sincerely yours,

SIGNED
Lawrence G. Houk, Chief
Nonmetallic Minerals Division

LGHouk:gad 9/15/53
Copy to: Admr. R. File
Docket File
Field Team, Region VI
Mr. Chandler, 3520
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

9-15-53

FILE COPY
SURNAME: 98

Lawrence G. Houk

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

600

SEP 10 1953

Mr. John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

Re: Docket No. DMEA-3097 - Diamonds
Arkansas Diamond Mine
Pike County, Arkansas

Dear Mr. St. Clair:

Reference is made to our telephone conversation of September 10, 1953, covering your application for exploration assistance.

We are enclosing seven copies of our new form of Owner's Consent to Lien to be signed by the lessor. It will be necessary to execute six copies of this new Owner's Consent to Lien form and forward them to this office.

Sincerely yours,

SIGNED

Lawrence G. Houk, Chief
Nonmetallic Minerals Division

Enclosures 7

LGHouk:gad 9/10/53

Copy to: Admr. R. File
Docket File
Field Team, Region VI
Mr. Chandler, 3520
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

R.C.H. 9-10-53

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

IN REPLY REFER TO:

DEPARTMENT OF THE G-MD-CNM
Defense Minerals Administration
RECEIVED
SEP 9 - 1953

September 8, 1953

Memorandum

REVIEW OF FIELD TEAM REPORT ON APPLICATION DMEA-3097 (diamonds)

To: L. G. Houk, Defense Minerals Exploration Administration
From: D. M. Larrabee, U. S. Geological Survey
Applicant: John Q. St. Clair
Name of property: Arkansas diamond mine.
Location of property: Near Murfreesboro, Arkansas.
Date of field team report: August 26, 1953.
Authorship of field team report: W. P. Williams
Field team's recommendation:
Approval of Stage 1.
Approval of Stage 2 if Stage 1 is successful.

Comments:

1. Dr. Miser was unable to pan out any of the small size diamonds which are being sought, although he tried many times.

2. The Martin and Bureau of Mines explorations were unsuccessful.

3. Stage 2 should be entirely eliminated. If sufficient diamonds are found in Stage 1, the applicant should take over on his own.

ACTION SUGGESTED:

Approval of Stage 1, with duplicate samples provided for later work if desired, for a total cost of $3,000 - $3,500, including person to check results of milling tests in California.

D. M. Larrabee

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

Joplin, Missouri

COPY

August 26, 1953

Operating Committee, DMEA
Interior Building
Washington 25, D.C.

Docket No. DMEA-3097-Diamonds
John Q. St. Clair
Arkansas Diamond Mine
Pike County, Arkansas

Gentlemen:

Enclosed herewith are the original and 3 carbon copies of Report of Field Examination concerning the above referenced property.

Very truly yours,

W. P. Williams
Executive Officer, DMEA
Region VI

WPW:tl

Enclosure

Reviewed by
DMEA OPERATING COMMITTEE

9-9-53
(date)

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
~~WASHINGTON 25, D. C.~~

Joplin, Missouri

August 26, 1953

REPORT OF FIELD EXAMINATION

Docket No. DMEA-3097 - Diamonds

John Q. St. Clair
Arkansas Diamond Mine
Pike County, Arkansas

The name and address of the applicant is:

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

The equivalent of two days was spent by the writer in making a field examination of property leased by the applicant. Mr. John St. Clair, applicant, and Mr. Norman F. Williams, Arkansas State Geologist, accompanied the writer on August 13, 14, 1953 during the field examination.

SUMMARY AND RECOMMENDATIONS

It is recommended that a DMEA contract be approved allowing the applicant to perform exploration work essentially as outlined in Phase I of the Application and at the costs outlined therein. Arrangements and approval of a possible Stage II will depend directly upon results achieved in Stage I.

Reviewed by
DMEA OPERATING COMMITTEE
9-9-53
(date)

Recommendation for approval is based on the following principal premises:

(1). Geologic conditions on the applicant's lease are favorable for the formation of diamontiferous deposits. The locality in question bears marked resemblance to the diamond-bearing pipes of South Africa.

(2). The district has already produced some 50,000 stones. (Where there's some, there might be more).

(3). The applicant appears well qualified by virtue of having had a good technical education as well as experience in the diamond fields of South Africa.

(4). The applicant proposes to utilize recovery methods proven in South Africa that have not heretofore been used on Murfreesboro ores.

DESCRIPTION OF PROPERTY AND PROPERTY RIGHTS

The applicant has 828 acres under fifty year lease. Examination of the lease indicates that the applicant's interest in the land is sufficient for DMEA purposes; however, the lease does not appear to be recorded.

The location of the applicant's leasehold is shown on the attached Fig. 1. The property consists of the old Arkansas Diamond Company holdings and is located about 2.5 miles south-east of Murfreesboro, Pike County, Arkansas, on a good all-weather county road. Power, labor, materials, and supplies are available in Murfreesboro.

No subordination agreements, or consents to lien, have been signed by the landowners, but the applicant states the agreements can be obtained if it appears likely that a DMEA contract will be approved. In addition, the applicant's lease states, "It is contemplated that the Lessee may enter into a contract with the Defense Minerals Exploration Administration--------."

Existing equipment and fixtures on the property consist of the frame of a large mill building, a combined office and laboratory building, two 14-foot washing pans and three grease tables. These items remain from an operation conducted by the Glenn L. Martin Company in 1948-49. The applicant does not intend to use the existing mechanical equipment since it is not applicable to his proposed plan of operations.

PAST OPERATIONS, PRODUCTION, AND EXPLORATION

Search of available reliable reports indicate that the entire district has produced about 50,000 diamonds of which about 80 percent came from the applicant's leasehold. The average size of the stones was about one-quarter carat. Ninety percent were industrial stones and the rest of gem quality.

The applicant's leasehold has been known variously through the years as "The Arkansas Mine", - "North American Diamond Corp.", - and "The Diamond Corporation of America".

Latest operations on the property were conducted by the Glenn L. Martin Corporation in 1948-1949. The applicant states that this corporation treated approximately 125,000 tons of ore and recovered 246 carats for an average grade of about 0.002 carats per short ton - which was uneconomic.

The latest exploration was conducted on the property by the U.S. Bureau of Mines in 1943 and 1944. Results of that work are published in U.S.B.M. Report of Investigations 4549, "Investigation of the Prairie Creek Diamond Area, Pike County, Ark." In its project the Bureau treated a total of 435 tons of bucket-drill sample. Total recovery amounted to 8.4 carats which gives an average grade of 0.0193 carats per short ton of ore. The stones were appraised as being of excellent industrial quality with a few possible gems.

Mine workings on the property consist only of open pit trenches and pits up to 15 feet in depth.

GEOLOGY

The geology of the diamontiferous areas in Arkansas has been ably set forth by Hugh D. Miser, A. H. Purdue, and C. S. Ross of the U. S. Geological Survey. Descriptions of the geology near Murfreesboro can be found in U.S.G.S. Bulletins 735 and 808 by the above writers.

The diamontiferous deposits near Murfreesboro, Arkansas are composed of peridotite "pipes" and dikes of Cretaceous age which intrude the Jackfork sandstone and Trinity (clay and sand) formation of Carboniferous and Cretaceous ages.

The peridotite may be divided into three general types:

(1). Intrusive peridotite: A dense porphyritic rock which is dull black, greenish black, or brownish black. Forms topographic highs and occupies only about 12 acres out of a total of

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W. P. Williams
Executive Officer, DMEA
Region VI

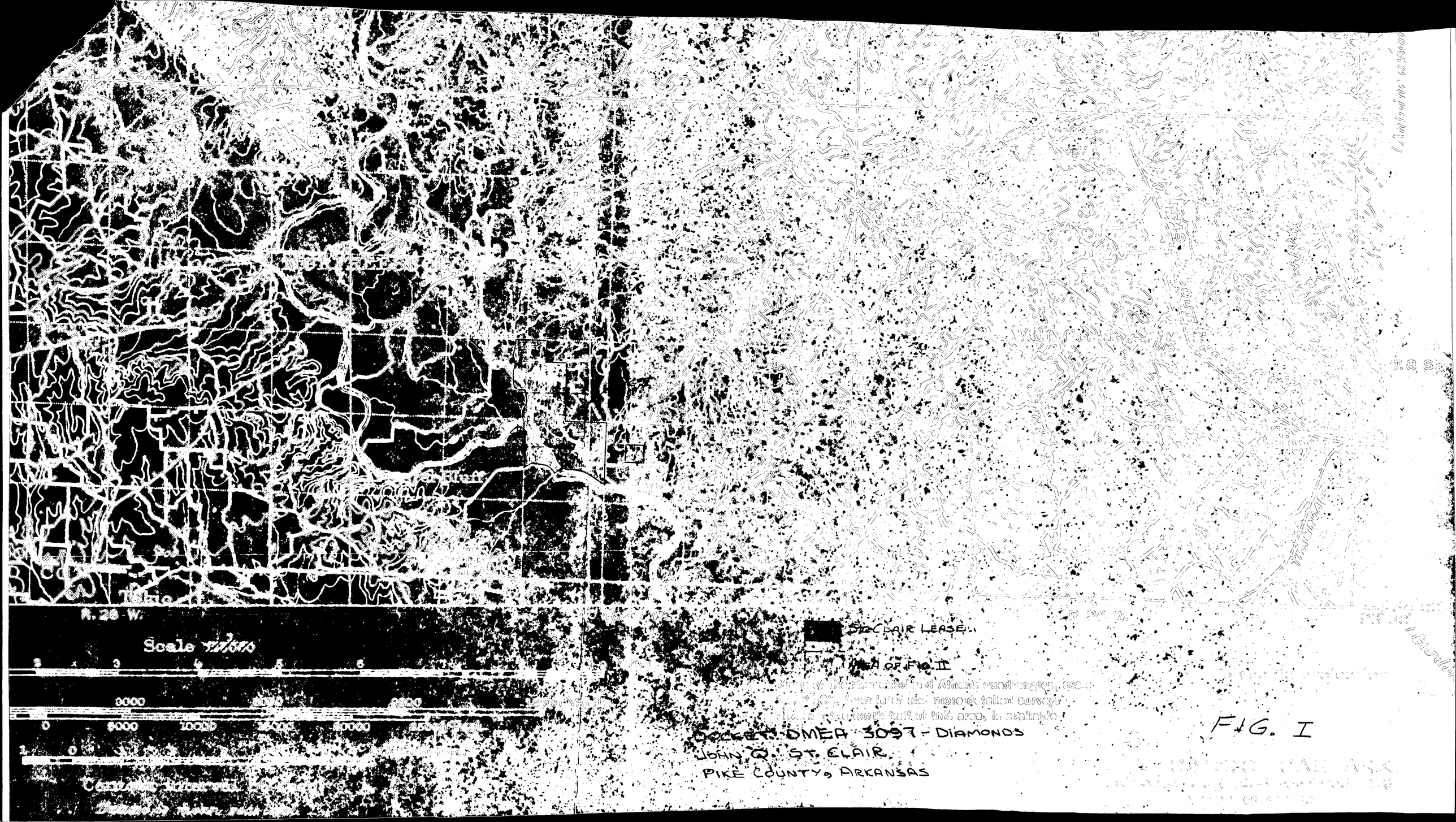
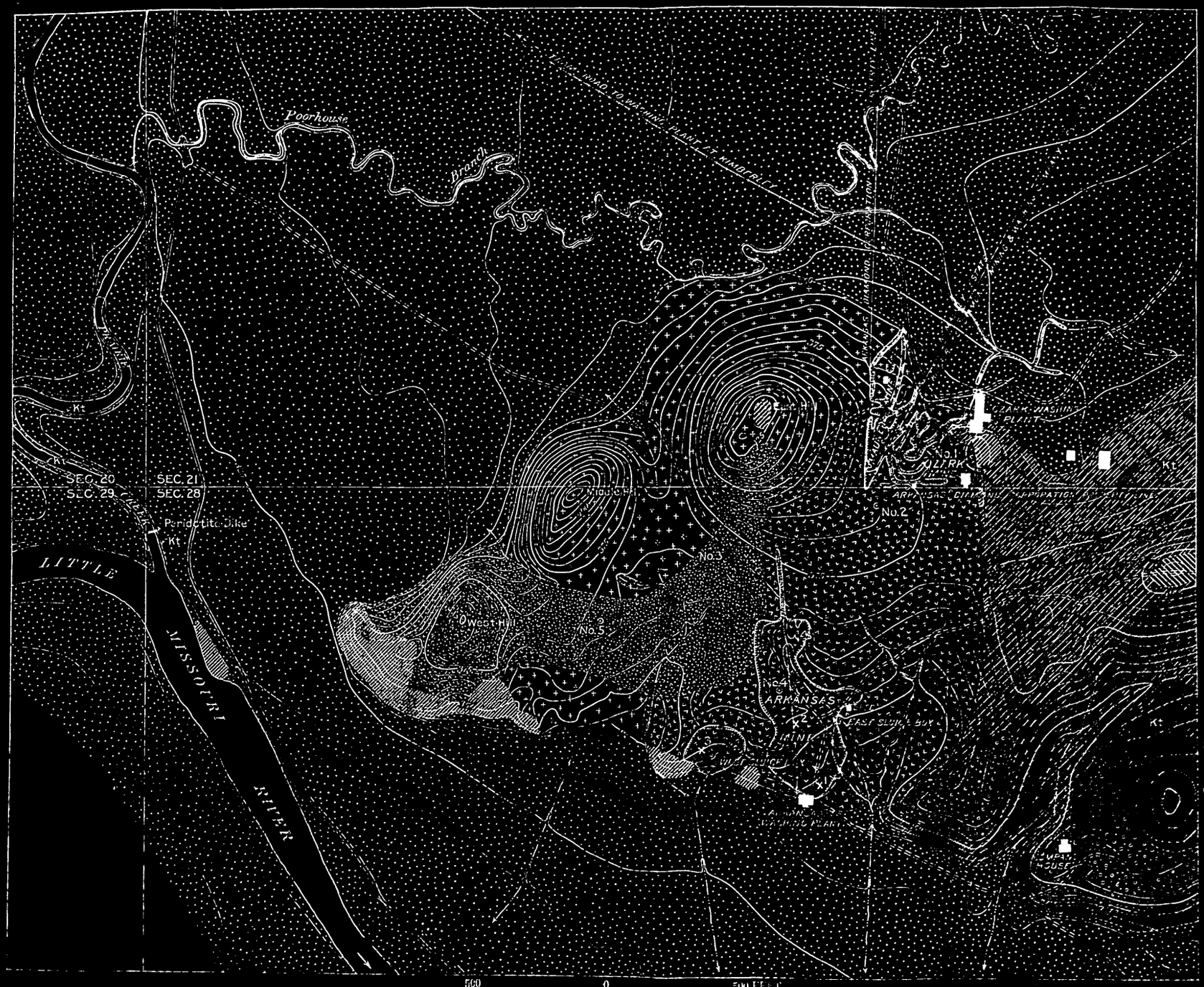

R. 26 W.
Scale
ST. CLAIR LEASE
AREA OF FIG. II
DOCKET: DMEA 3097 - DIAMONDS
JOHN Q. ST. CLAIR
PIKE COUNTY, ARKANSAS

FIG. I



Contour interval 5 feet
Datum is mean sea level

EXPLANATION

SEDIMENTARY ROCKS

QUATERNARY
- Alluvium
- Terrace deposits

CRETACEOUS
- Upper Cretaceous: Eingen formation(?)
- UNCONFORMITY
- Lower Cretaceous: Kt, Trinity formation

CARBONIFEROUS
- UNCONFORMITY
- Jackfork(?) sandstone

IGNEOUS ROCKS
(Peridotite)

CRETACEOUS
- Tuffs and fine grained breccia (Gray-blue)
- Volcanic breccia (Greenish brown)
- Hypabyssal intrusive peridotite

No. 1 Drill hole (Number same as in text)

x1 First diamond found in Pike County, Ark., was discovered in August, 1906, by J. W. Huddleston

x2 Specimen of "green ground" containing diamond was found

x3 Cut and diamond weighing 17.86 carats was found in May, 1917, by Lee Walker

Mine workings

GEOLOGIC MAP OF THE PRAIRIE CREEK AREA OF PERIDOTITE IN T. 8 S., R. 25 W., 2½ MILES SOUTH-SOUTHEAST OF MURFREESBORO, PIKE COUNTY, ARK.

Surveyed with plane table in 1916 by H. D. Miller.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
~~WASHINGTON 25, D. C.~~
Joplin, Missouri
July 31, 1953

Department of the Interior
Defense Minerals Administration
RECEIVED
AUG 3 1953

Memo

To: Operating Committee

From: W. P. Williams, Executive Officer, Field Team, Region VI

Subject: Sampling of the diamond-bearing area in Arkansas

In a letter to me dated July 20, 1953, you request any information we may have with regard to sampling a "diamond-bearing area in Arkansas."

In connection with this request I wrote to R. G. Knickerbocker, U. S. Bureau of Mines, Rolla, Missouri asking him to forward to me any information he might have with regard to the sampling. The Bureau of Mines responded by sending me copies of various correspondence regarding sampling the diamond-bearing areas. I am enclosing copies of material sent to me by the Bureau of Mines.

I hope this material will satisfy your request. Please let me know if there are any other data I can obtain for you on this subject.

W. P. Williams
Executive Officer, DMEA
Field Team, Region VI

WPW:jd
Encs.

MF-500

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

REFERENCE SLIP

DATE AUG 4 1953

REFERRED TO:

1. ~~Mr. Perry Smith 24~~
2. ~~Mr. Selfridge, Rm. 4631~~
3. ~~Mr. Honk, Rm. 4637~~
4. Code 220

FOR:

..... Action	..... Recommendation
..... Approval	..... Record of .....
..... Comment	..... Referring to .....
..... Conference	..... Reply for signature of .....
..... Consideration	..... Rewriting
..... Filing	..... Signature
..... Instructions	..... Suggestions
..... Investigation	..... Your information
..... Initials	
..... Mailing	
..... Previous correspondence	

REMARKS: I sent original of Field ltr. to R&R. Only 1 cy ea. of attachments rec'd. These should eventually end up in the Central Files. Do you think Committee interested in this information? Hazel

Check (X) before the items needing attention.

ROBERT E. ADAMS
Initials of sender.

GPO 16—63815-1

(copy)

July 27, 1953

DEPARTMENT OF THE INTERIOR
Bureau Mines Mail Room
RECEIVED
AUG - 3 1953

Mr. John St. Clair
708 Hoover St.
Norman, Oklahoma

Dear Mr. St. Clair:

This refers to our recent telephone conversation concerning your DMEA application for a government loan on a Murfreesboro mining property.

I have received on July 22 a copy of a letter from G. C. Selfridge to our Joplin DMEA office which handles the phase of our work in Region VI.

I suggest that instead of coming to Rolla, as you mentioned over the phone the other day, that if you feel it necessary you should contact our Joplin office concerning this application. I have already asked that all the pertinent data, including the laboratory reports on this property, be sent to Mr. Knox in the DMEA office at Joplin.

You understand that if after you have visited Joplin and discussed the subject, you still feel that you wish to talk over the metallurgical laboratory work as well as the mining field work with members of our staff in this office that we will be very glad to do so at whatever time you find convenient to come to Rolla. However, I believe that all of the factual data are thoroughly understood by Mr. Knox since I have discussed this subject with him on July 22 in this office, and I am of the opinion that Mr. Knox will have all of the available factual data.

Sincerely yours,

(signed) R. G. Knickerbocker
R. G. Knickerbocker, Chief
Minerals Technology Division
Region VI

Copy to: Paul Zinner (2)
C. C. Knox
J. H. Hedges

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
P. O. BOX 136
ROLLA, MISSOURI

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
AUG - 3 1953

RECEIVED
MINERALS TECHNOLOGY
DIVISION
JUL 28 1953
BUREAU OF MINES
JOPLIN, MO.

July 27, 1953

Memorandum

To: C. C. Knox

From: L. T. McElvenny

Subject: Arkansas diamonds

Please note the attached copy of a letter from Mr. George C. Selfridge to Mr. W. P. Williams, D.M.E.A. Office, Joplin, dated July 20, 1953, and the attached copy of the September 18, 1952 letter from the Chief of the Minerals Technology Division to Mr. Tom Lyons, to which Mr. Selfridge's letter refers.

Please submit the following information to Mr. Williams for his use in answering Mr. Selfridge's letter of July 20:

By letter of August 19, 1952, to this Division, Mr. Howard A. Millar requested that tests be made to investigate the reported presence of "diamond dust" in the "kimberlite breccia".

In the latter part of October, 1952, our engineer, C. M. Boos, accompanied by Mr. Millar, took seven relatively small samples representative of the various types of presumed diamond-bearing rock exposed in the pits and open cuts on the deposit.

Subsequently, the samples were subjected to intensive examination and tests by the Mineral Dressing and Analytical Section of the Metallurgical Branch. The results of these studies are incorporated in the attached copy of memorandum from R. G. Knickerbocker to L. T. McElvenny dated June 23, 1953.

Your attention is called to the last paragraph of Mr. Knickerbocker's report.

Enclosed is a copy of R.I. 4549.

L. T. McElvenny

L. T. McElvenny

Enclosures

(COPY)ngj

June 23, 1953

Memorandum

To: L. T. McElvenny

From: R. G. Knickerbocker

Subject: Samples from diamond-bearing ground, Pike County, Arkansas

This is in reference to samples 1 through 7 (Maynard Boos) from diamond-bearing ground in secs. 21 and 28, T. 8 S., R. 25 W., Pike County, Arkansas, that you transmitted by analytical report form under date of November 10, 1952, to ascertain whether or not microscopic diamonds were present.

These samples were marked as follows:

CMB-1 - Blue tuff
CMB-2 - "Harde Bank" porphyritic peridotite - Ozark mine area
CMB-3 - Coarse-grained breccia - "Kimberlite" from Ozark mine area
CMB-4 - Fine-grained breccia
CMB-5 - Fresh peridotite of Middle Hill
CMB-6 - Fine-grained breccia from Glen Martin cut on West Hill
CMB-7 - "Yellow Ground", weathered Kimberlite breccia

Coarse pieces, minus 20-mesh deslimed screen fractions, settled material from minus 270-mesh slime pulp, products of heavy liquid separations, and individual grains of sink products in immersion oils of each sample were examined under binocular and petrographic microscopes and in ultraviolet light but no diamonds were found in any of the samples.

Because of the extremely low concentration of the material being sought (probably less than 1 part per million) it is not possible to state categorically that no diamonds were present in the samples received but merely that none were found by a thorough petrographic examination.

R. G. Knickerbocker

RECEIVED

(COPY)ngj
of copy

September 18, 1952

Mr. Tom Lyon
Director
Domestic Expansion Division
Defense Materials Procurement Agency
Washington 25, D. C.

My dear Mr. Lyon:

Reference is to your letter of September 10 concerning possible diamond dust in the kimberlite near Murfreesboro, Ark.

According to Mr. Howard A. Millar, who is interested in the deposit, he has been informed that tests made of specimens of the kimberlite breccia contain as much as four carats of diamond dust to the ton of rock.

We intend to procure a few samples of the rock for preliminary testing within the next month or so--the sampling to be done by one of our mining engineers. Further programming will depend on the results of the preliminary tests.

We will keep you advised.

Sincerely yours,

L. T. McElvenny, Acting for
R. G. Knickerbocker, Chief
Minerals Technology Division
Region VI

Received

(COPY)ngj

September 18, 1952

Mr. Howard A. Millar

Murfreesboro, Arkansas

My dear Mr. Millar:

Reference is made to your letter of August 19, 1952, to Mr. Reynolds of this office concerning the reported diamond dust content of the Kimberlite breccia near Murfreesboro.

One of our mining engineers will be in the vicinity of Murfreesboro within the next month or so and we plan to have him procure a few samples of the Kimberlite breccia for some preliminary testing here at Rolla.

The engineer will be instructed to contact you at Murfreesboro after you have been advised as to the date of his arrival.

Sincerely yours,

L. T. McElvenny, Acting for
R. G. Knickerbocker, Chief
Minerals Technology Division
Region VI

(COPY)ngj DEFENSE MINERALS ADMINISTRATION

Joplin, Missouri
August 22, 1952

Memo

To: O. N. Rove, Earl Ingerson, R. G. Knickerbocker, and DMPA Industrial Minerals Branch

From: David Gallagher, Field Team Executive Officer, Region VI

Subject: Possible diamond dust at Murfreesboro, Arkansas

Attached are copies of self-explanatory correspondence. Any information or suggestions that any of you have to offer will be appreciated.

I would particularly welcome your opinions on (1) the advisability of testing, (2) who can do the testing and where, and (3) sampling.

/s/ David Gallagher

David Gallagher

(COPY)ngj DEFENSE MINERALS ADMINISTRATION

Joplin, Missouri
August 22, 1952

Mr. Howard F. Millar
The Crater of Diamonds
Murfreesboro, Arkansas

Dear Mr. Millar:

This is a brief preliminary reply to your letter of August 19, 1952 to me. I want to assure you that the matter is receiving immediate attention.

I phoned to Bruce Williams and he says that his laboratory is not equipped, nor is his staff educated, to handle the job.

I will take the matter up with the U. S. Geological Survey laboratory in Washington, and also with Mr. R. G. Knickerbocker who is Chief of the Minerals Technology Division at the Rolla Office of the U. S. Bureau of Mines. I will keep you informed as information comes to me.

Sincerely yours,

David Gallagher
Executive Officer
DMEA Field Team, Region VI

(COPY)ngj THE CRATER OF DIAMONDS

Murfreesboro, Arkansas
August 19th, 1952

(Note: This was a personal letter to Mr. B. M. Reynolds)

Dear Mr. Reynolds:

Our mutual friend Hugh D. Miser in reply to my letter suggested I write you regarding the subject of having the kimberlite breccia from this crater tested for diamond dust or microscopic diamond content.

For the past two or three years, several groups have approached us with the statements that they have had tests made of specimens of kimberlite breccia from this crater that tested as high as four carats of diamond dust to the ton of rock.

We desire to check this by having some tests made preferably by Government agency, or someone they would recommend, as it might be an important source of this scarce material which as you probably know has increased in price from 72¢ per carat to nearly $3 at this date.

Will you kindly give me your suggestion how to go about getting reliable information as to the dust content of our kimberlite breccia.

With warm personal regards.

Very sincerely,

/s/ Howard A. Millar

Received

(COPY)ngj THE CRATER OF DIAMONDS

Murfreesboro, Arkansas
August 19th, 1952

Mr. David Gallagher
U. S. Geological Survey
Joplin, Missouri

Dr. Hugh D. Miser, of Norman, Okla., suggested that I contact you in reference to having some tests made of kimberlite breccia from the Crater of Diamonds for the possibility of the occurrence of microscopic diamond content.

I have for many years been associated with the diamond mines here from which we have recovered thousands of diamonds, and was with Hugh Miser during his field work for preparation of his bulletins but neither he nor this writer ever considered the possibility of the "diamond dust" in our work here.

For the past two years several groups have contacted me stating they have had samples of the kimberlite breccia tested, and have reports that a large caratage of "diamond dust" occurs in the rocks from this property.

We would like to check these statements and of course would prefer the test be conducted by U.S.G.S. or some governmental agency, or by some responsible laboratory that you may suggest that are equipped to do such work. Do you think Bruce Williams could do this for us.

I would like your suggestions, and recommendations in this matter.

With best regards,

Sincerely

/s/ Howard A. Millar

(COPY)ngj GEOLOGICAL SURVEY

c/o Oklahoma Geological Survey
Norman, Okla.
August 15, 1952

Dear Dave:

A good friend of mine, Howard A. Millar of Little Rock and Murfreesboro, Ark., has written me a most interesting letter under date of August 13. The letter is herewith and also a folder about the diamond hunters and keepers who pay to enter the diamond property for a look for diamonds.

I have suggested to Mr. Millar that he might receive aid from funds of DMA and have suggested that he write you and also write Burton Reynolds.

The preparation of the geologic map of Oklahoma is progressing well. First copy has been drafted; first colored copy has been made. Next jobs include preparation of explanation, source data map and list, besides a lot of further checking. I plan the completion of the work in Oklahoma by the end of the year 1952.

Sincerely yours,

/s/ Hugh D. Miser

(COPY)ngj
of copy

1619 West 20th Street
Little Rock, Arkansas
August 13, 1952

Dear Hugh:

I am spending most of my time at Murfreesboro, operating the "Crater of Diamonds" tourist attraction on the diamond property.

We have been contacted by a New York group who desire to operate the diamond mines for the recovery of "diamond dust" which they state they have had secret tests conducted for several months by a Dr. Richardson of S.M.U. who has reported that the kimberlite from our property tests out four carats of diamond dust per ton of kimberlite which he stated was worth $3.50 per carat on present market. The Wall Street Journal's present quotation for August is $2.25 per carat against $0.72 during World War II.

Can you get a test for dust from the kimberlite from our property made for us, at this time, and what would be the approximate cost, etc. We would like this information as early as possible.

The tourist attraction is now "clicking" much better than we anticipated.

With warm personal regards,

Very sincerely,

/s/ Howard A. Millar

Please address mail to Murfreesboro.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
~~WASHINGTON 25, D. C.~~
Joplin, Missouri
July 27, 1953

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
JUL 28 1953

Memo

To: Operating Committee

From: W. P. Williams, Executive Officer, Field Team, Region VI

Subject: Request for Field Examination - Docket No. DMEA-3097(Diamonds)
John Q. St. Clair
Arkansas Diamond Mine
Pike County, Arkansas

We have received the subject application and take this means to notify you that the application will be studied carefully, a field examination will be made, and full report submitted as soon as possible.

W. P. Williams

W. P. Williams
Executive Officer, DMEA
Field Team, Region VI

WPW:jd

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.
~~XXXXXXXXXXXXXXXX~~
Joplin, Missouri
July 27, 1953

Mr. R. G. Knickerbocker
U. S. Bureau of Mines
P. O. Box 136
Rolla, Missouri

Re: Docket No. DMEA-3097 (Diamonds)
John Q. St. Clair
Arkansas Diamond Mine
Pike County, Arkansas

Dear Mr. Knickerbocker:

The Defense Minerals Exploration Administration has received an application for federal assistance in exploring reported diamond bearing lands near Murfreesboro, Arkansas. Naturally the DMEA would like to have all available information concerning the deposits.

A few days ago I received a letter from the Operating Committee, DMEA in Washington, requesting information concerning samples taken from the diamond bearing area. I note that you received a copy of that letter. We would appreciate it very much if you would forward any information you have on the samples to the Operating Committee, DMEA, Washington 25, D. C. Inasmuch as this office has been asked to make a field examination of the subject property we would also appreciate receiving a copy of the same data you send to Washington.

Sincerely yours,

W. P. Williams
Executive Officer, DMEA
Field Team, Region VI

WPW:jd

cc - Operating Committee

FILE COPY
SURNAME:

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C. 600

JUL 21 1953

Houk
Hedges
Selfridge
Johnson

Mr. William F. Williams
Executive Officer, DMEA
Field Team, Region VI
221 West 3rd Street
Joplin, Missouri

Subject: Docket No. DMEA-3097 - Diamonds
John Q. St. Clair
Arkansas Diamond Mine
Pike County, Arkansas

Dear Mr. Williams:

Please review the subject application and arrange for a field examination if you deem it advisable.

Copies of memoranda from the Geological Survey and the Bureau of Mines are enclosed for your information.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee (GCS)

Approved:

MDD 7-21-53

J. H. Hedges
Member, Bureau of Mines (JHH)

A. R. Kinkel, Jr.
Member, Geological Survey (ARK)

Enclosures 4

LGHouk:gad 7/20/53
Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Chandler, 3520
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

FILE COPY
SURNAME:

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

JUL 21 1953

Mr. John Q. St. Clair
728 Hoover Street
Norman, Oklahoma

Re: Docket No. DMEA-[illegible]27 - Diamonds
Arkansas Diamond Mine
Pike County, Arkansas

Dear Mr. St. Clair:

Your application for assistance in exploring the subject property has been reviewed by the Nonmetallic Minerals Division of the Defense Minerals Exploration Administration and has been referred to Mr. William P. Williams, Executive Officer, DMEA Field Team, Region VI, 221 West 3rd Street, Joplin, Missouri, for further consideration and possibly a field examination.

The Regional Office will contact you at an early date, if an examination is to be made. Any assistance that you may give the members of the field team during the examination will be appreciated.

Sincerely yours,

C. O. Mittendorf

Administrator

LCHouk:gad 7/20/53

Copy to: Admr. R. File
Docket File
Operating Committee
Field Team, Region VI
Mr. Chandler, 3520
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
JUL 16 1953

July 16, 1953

Memorandum

To: Lawrence Houk, Chief, Nonmetallic Minerals Division, DMEA

From: Henry P. Chandler, Commodity Specialist

Subject: Application for aid in Exploration Project 3097, Arkansas Diamond Mine, by John Q. St. Clair.

For over 40 years this Arkansas diamond mine has attracted the attention of mining engineers, and it has been the subject of many careful studies and experimental mining operations. Aside from some surface concentrations of diamonds in the early years of its history, the record of operations is most unfavorable, and an extended study of the Bureau of Mines, described in R. I. 4549, indicated that the diamond content of the deposit was too low to be of any commercial value. Later the operations of the Diamond Corporation of America were unsuccessful.

The record to date therefore is discouraging. Mr. St. Clair in general analyzes the past efforts as having been well intentioned but erroneous in method. He believes that he can apply new techniquies that will reveal the existence of commercial quantities of diamonds in this deposit. He thinks that his plan of exploration and the application of certain African diamond concentration methods, particularly those used in the Premier Mine, will prove effective.

There is not enough information available in the Washington office to verify Mr. St. Clair's claims to technical competence and experience in this field nor to evaluate fully his contentions. Therefore, we suggest that this application be referred to the field team for review and that an inquiry be made into the record of Mr. St. Clair's experience. He has presented his views very well in the proposal. However, the past record of this deposit is so bad that very strong evidence of prospective success should be available before more Government money is spent on it.

Henry P. Chandler

Henry P. Chandler, Commodity Specialist
Construction and Chemical Materials Branch

TELEPHONES:
33-3264 / 43-8770
P.O. BOX 6846

LICENSED DIAMOND DEALER
FIFTH FLOOR
BARBICAN BUILDINGS
JOHANNESBURG
SOUTH AFRICA.

Supplement No. 1

JOHN Q. ST. CLAIR
MINING GEOLOGIST

RECEIVED
JUL 16 1953

708 Hoover Street
Norman, Oklahoma
July 16, 1953

Mr. L. G. Houk,
Defense Minerals Exploration Administration,
Department of Interior,
Room 4637,
Washington 25, D. C.

Reference: Docket No. DMEA-3097

Dear Mr. Houk:

As mentioned in our telephone conversation today, I am submitting five sample bottles of diamonds (Congo type) which have been weighed out to show the quantity of diamond material involved in recovery operations. These are as follows:

Sample Bottle No. 1 - 8.04 carats

This represents the quantity of diamond material recovered by the Bureau of Mines (refer to page 20, Report Accompanying Application, Arkansas Diamond Mine) in treating 112.15 cubic yards of rock material. As shown on page 20, this represents 0.0717 cts/cu.yd. By using the conversion figure given by the Bureau of Mines of 268.84 cubic yards representing 435 tons (see page 16, USBM Report of Investigations 4549), and assuming that "short" tons are indicated, the 112.15 cubic yards represents 181.5 short tons. The tenor per short ton, therefore, is:-

$$\frac{8.04}{181.5} = 0.044 \text{ cts/ton}$$

As indicated on page 16 of my report, the cut off for a major operation is estimated at 0.082 carats per ton, valued at $16.00 per carat. In order, therefore, to reach this cut-off figure, it

MT 500

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

REFERENCE SLIP

DATE 7/17/53

REFERRED TO:
1. Code 600, Rm. 4637
2.
3.
4.

FOR:

- ---------- Action
- ---------- Approval
- ---------- Comment
- ---------- Conference
- ---------- Consideration
- ---------- Filing
- ---------- Instructions
- ---------- Investigation
- ---------- Initials
- ---------- Mailing
- ---------- Previous correspondence
- ---------- Recommendation
- ---------- Record of ----------
- ---------- Referring to ----------
- ---------- Reply for signature of ----------
- ---------- Rewriting
- ---------- Signature
- ---------- Suggestions
- ---------- Your information

REMARKS:

Check (X) before the items needing attention.

ROBERT E. ADAMS
Initials of sender.

GPO 16—63815-1

Mr. Hauks –
The diamonds have been sent separately. I am sending four copies in case you require them.
John St Clair

John St. Clair
708 Hoover Street
Norman, Oklahoma

would be necessary to recover slightly less than double the quantity of diamond material contained in Sample Bottle No. 1.

Sample Bottle No. 2 - 0.15 carats

This quantity represents the amount of diamond which must be recovered in order to obtain an average tenor of 0.15 carats per ton. This caratage per ton is the basis of the estimate given on page 16 of my report.

Sample Bottle No. 3 - 0.05 carats

The amount of diamond in this bottle, and the approximate size range of the particles, represent the additional recovery anticipated per short ton by means of the HMS unit, electro-static separator, and the new type of grease table.

Sample Bottle No. 4 - 0.10 carats

This quantity of diamond material is the average recovery per short ton as calculated from previous operations. (See page 16, my report)

Sample Bottle No. 5 - 0.30 Carats

This is the quantity of diamond material recovered per short ton at the Premier Mine.

These samples are interesting because they indicate the small quantities of diamond material per ton which may be expected in diamond mining operations, and further illustrate that the recovery technique must be carefully controlled to achieve optimum results.

You may retain these samples for whatever length of time considered necessary.

1 Copy to:
Geological Survey
Bureau of Mines
Region VI

Cordially yours,

John St. Clair

JStC/ab

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
JUL 10 1953

IN REPLY REFER TO:
G-MD-CNM

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

Memorandum

July 9, 1953

REVIEW OF APPLICATION DMEA-3097 (diamonds)

To: L. G. Houk, Defense Minerals Exploration Administration
From: D. M. Larrabee, U. S. Geological Survey
Applicant's name and address: John Q. St. Clair, Norman, Oklahoma.
Name of property: Arkansas Diamond Mine.
Location of property: Near Murfreesboro, Arkansas.
Summary of applicant's proposal:
Sampling, beneficiation, and recovery tests costing $161,172.
Sources of information on applicant's property:
U.S.G.S. Bull. 540, p. 534-546
U.S.G.S. Bull. 735, p. 271-322
U.S.B.M. R.I. 4549
Personal conference with H. D. Miser, U. S. Geological Survey, the man most familiar with these diamond deposits, July 9, 1953.

Comments:

Page 20--Handpicking stones -20m+40m will be difficult.

Page 27--Doubtful if auger drill will be suitable in the very hard parts of the deposits.

Page 30--Applicant's salary of $1,000 for 30 days of Phase 1 is too high. Applicant should contribute his time during this initial stage, if acting in good faith, with Public funds providing the balance, or $1,750.

Since applicant is apparently familiar with diamond deposits and mining engineering, also, why is $3,000 set up for consultants in these matters?

Page 31--It would seem that less expensive sample containers could be used, costing less than the $10 each as specified.

Page 33--Total cost of $161,172 is far too high to be undertaken with Public funds on a deposit already proved over the years to have a very low diamond content.

I can find no explanation of applicant's participation (10%) in the proposal. Obviously, it is not in services for he has set up an extremely liberal salary of $12,000 per year for himself. He apparently has no equipment to contribute. This should be clarified before further action is taken.

RECEIVED
JUL 10 1953

RECOMMENDATION:

Complete denial in its present form.

However, we feel that a very modest exploration program might be justified, as follows:

Phase 1.--Be reduced to $1,750 by the elimination of salary to the applicant during the 30-day testing period.

Phase 2.--If Phase 1 indicates that an appreciable quantity of usable diamonds, including the finer sizes, is present, then Phase 2 be entirely revised to provide for sampling over a wider area and at considerable depth (ore reserves have been estimated to a depth of 1,000', although test holes have been put down to only a very small fraction of this depth). The samples can be tested by the same company in San Francisco, at a great reduction in cost below that of purchasing considerable equipment.

Only on the above premises can any exploration at all be justified.

D. M. Larrabee

June 30, 1953

Mr. John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

Subject: DMEA-3097
Re: Exploration Assistance
Arkansas Diamond Mine

My dear Mr. St. Clair:

The receipt of your application dated June 30, 1953, for exploration assistance under the Defense Production Act of 1950, as amended, is hereby acknowledged.

Your application has been assigned Docket Number DMEA-3097 and referred to the Nonmetallic Minerals Division.

Kindly refer to DMEA-3097 in any future correspondence relating to your application.

Sincerely yours,

ROBERT E. ADAMS
Robert E. Adams,
Chief, Operation's Control
and Statistics Division

MF-103
(Revised April 1952)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Form Approved.
Budget Bureau No. 42-R1035.2.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
JUN 30 1953

APPLICATION FOR AID IN AN EXPLORATION PROJECT, PURSUANT TO DMEA ORDER 1, UNDER THE DEFENSE PRODUCTION ACT OF 1950, AS AMENDED

Not to be filled in by applicant

Docket No. DMEA-3097
Metal or Mineral
Date Received 6/30/53
Estimated Cost
Participation (Government %)

INSTRUCTIONS

1. *Name of applicant.*—(*a*) State here your full legal name, in the form in which you will wish to contract, and your mailing address: John Q. St. Clair, 708 Hoover Street, Norman, Oklahoma

(*b*) If other than an individual, add to your name above whether a corporation, partnership, etc., and the name of the State in which incorporated or otherwise organized.

(*c*) If a corporation, add to above statement, titles, names and addresses of officers.

(*d*) If a partnership, add to the above statement the names and addresses of all partners.

2. *General.*—Read DMEA Order 1, "Government Aid in Defense Exploration Projects," before completing this application. Submit this application and all accompanying papers in quadruplicate (four copies), with your name and address on each sheet of the application and on all accompanying papers. Where sufficient space is not provided on the form for all required information, state it on an accompanying paper, with a reference in each case to the instruction to which it refers by number. Comply with all applicable instructions; or, if not applicable, so state. File the application with Defense Minerals Exploration Administration, Department of the Interior, Washington 25, D. C., or with the nearest field executive officer thereof.

3. *Applicant's property rights.*—(*a*) State the legal description of the land upon which you wish to explore, including all land which you possess or control that may be benefited by the exploration, and excluding any land or interest in land which is not to be included in the exploration project contract See page 1 of accompanying report

(*b*) State any mine name by which the property is known. Arkansas Diamond Mine

(*c*) State your interest in the land, whether owner, lessee, purchaser under contract, or otherwise Lessee

(*d*) If you are not the owner, submit with this application a copy of the lease, contract, or other document under which you control the property. See Appendix A

(*e*) If you own the land, describe any liens or encumbrances on it None

(*f*) If the land consists of unpatented claims, add to the description above, the book and page numbers for each recorded location notice.

4. *Physical description.*—(*a*) Describe in detail any mining or exploration operations which have been or now are being conducted upon the land, including existing mine workings and production facilities. State your interest, if any, in such operations. Also describe accessibility of mine workings for examination purposes. See page 2, accompanying report

(*b*) State past and current production, and ore reserves, if any, giving quantities and grades. See page 4 & 7, report

(*c*) Describe the geologic features of the property, including mineralization, type of deposit (vein, bedded, etc.), and your reasons for wishing to explore. Illustrate with maps or sketches. Send with your application (but not necessarily as a part of it) any geologic or engineering report, assay maps, or other technologic information you may have, indicating on each whether you require its return to you. See page 7 of report and appended maps

(*d*) State the facts with respect to the accessibility of the project: Access roads, distances to shipping, supply and residence points. See accompanying report, page 10.

(*e*) State the availability of manpower, materials, supplies, equipment, water, and power.

See accompanying report, page 11.

16—66551-1

5. *The exploration project.*—(*a*) State the mineral or minerals for which you will explore See page 25 in accompanying report

(*b*) Describe fully the proposed work, including a map or sketch of the property showing a plan (and cross sections if needed) of any present mine workings, and the location of the proposed exploration work as related to such features as contacts, veins, ore-bearing beds, etc.

(*c*) The work will start within 30 days and be completed within 12 months from the date of an exploration project contract.

(*d*) State the operating experience and background of the applicant with relation to the ability to carry out such exploration project, and also that of the person or persons who will supervise the operations.

6. *Estimate of costs.*—Furnish a detailed estimate of the costs of the proposed work (you will have to use a separate sheet), under the following headings. Add the totals under all headings to give the estimated total cost of the project:

(*a*) *Independent contracts.*—(Note.—If the applicant does not intend to let any of the work to contractors, write "none" after this item. To the extent that the work is to be contracted, do not repeat the cost of the contract-work in subsequent items.) State the cost of any proposed independent contracts for the performance of all or any part of the work, expressed in terms of units of work (such as per foot of drilling, per foot of drifting, per hour of bulldozer operations, per cubic yard of material moved, etc.). See page Section V, accompanying report.

(*b*) *Labor, supervision, consultants.*—Include an itemized schedule of numbers, classes and rates of wages, salaries or fees for necessary labor, supervision and engineering and geological consultants.

(*c*) *Operating materials and supplies.*—Furnish an itemized list, including items of equipment costing less than $50 each, and power, water and fuel.

(*d*) *Operating equipment.*—Furnish an itemized list of any operating equipment to be rented, purchased, or which is owned and will be furnished by the Operator, with the estimated rental, purchase price, or suggested use-allowance based on present value, as the case may be.

(*e*) *Rehabilitation and repairs.*—Furnish a detailed list showing the cost of any necessary initial rehabilitation or repairs of existing buildings, installations, fixtures, and movable operating equipment, now owned by the Operator and which will be devoted to the exploration project.

(*f*) *New buildings, improvements, installations.*—Furnish a detailed list showing the cost of any necessary buildings, fixed improvements, or installations to be purchased, installed or constructed for the benefit of the exploration project.

(*g*) *Miscellaneous.*—Furnish a detailed list showing the cost of repairs to and maintenance of operating equipment (not including initial rehabilitation or repairs of the Operator's equipment), analytical work, accounting, workmen's compensation and employers' liability insurance, and payroll taxes.

(*h*) *Contingencies.*—Give an estimate of any necessary allowances for contingencies not included in the costs stated above.

NOTE.—No items of general overhead, corporate management, interest, taxes (other than payroll and sales taxes), or any other indirect costs, or work performed or costs incurred before the date of the contract, should be included in the estimate of costs.

7. (*a*) Are you prepared to furnish your share of the cost of the proposed project in accordance with the regulations on Government participation (Sec. 7, DMEA No. 1)? Yes.

(*b*) How do you propose to furnish your share of the costs?

[x] Money [ ] Use of equipment owned by you [ ] Other

Explain in detail on acompanying paper. See Section V, accompanying report.

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.

Dated 30th June, 1953

(Applicant)

By

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

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P.O. BOX 6846

LICENSED DIAMOND DEALER
FIFTH FLOOR,
BARBICAN BUILDINGS,
JOHANNESBURG,
SOUTH AFRICA.

JOHN Q. ST. CLAIR
MINING GEOLOGIST

708 Hoover Street,
Norman, Oklahoma,
29th June 1953.

Defense Minerals Exploration Administration,
Department of Interior,
Washington 25, D.C.

Dear Sirs:

Please find attached an application for aid in an exploration project, pursuant to DMEA Order 1, under the Defense Production Act of 1950, as amended.

The application is accompanied by a report on the property and a separate folder of appendices relating to the project.

Yours truly,

John Q. St. Clair

JSTC/b

REPORT ACCOMPANYING APPLICATION

ARKANSAS DIAMOND MINE

PIKE COUNTY, ARKANSAS

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma
June 29th, 1953

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

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708 Hoover Street
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REPORT ACCOMPANYING APPLICATION

ARKANSAS DIAMOND MINE
NEAR MURFREESBORO, PIKE COUNTY, ARKANSAS

I. NAME OF APPLICANT

The applicant is John Q. St. Clair, 708 Hoover Street, Norman, Oklahoma.

II. PROPERTY RIGHTS

The Arkansas Diamond Mine property, located in the Prairie Creek Diamond Area, Pike County, Arkansas, consists of 828.3 acres and contains about 6/7 of the 73-acre area comprising the outcrop of the known kimberlite ground. The legal description is as follows:

All that part of the East half of Section Twenty (20) lying East of Prairie Creek, containing Ninety (90) acres, more or less,

The Northwest Quarter of the Northwest Quarter of Section Twenty One (21) containing Forty (40) acres, more or less,

The South Half of the Northwest Quarter of Section Twenty One (21), containing Eighty (80) acres, more or less,

The Southwest Quarter of Section Twenty One (21) containing One Hundred Sixty (160) acres, more or less,

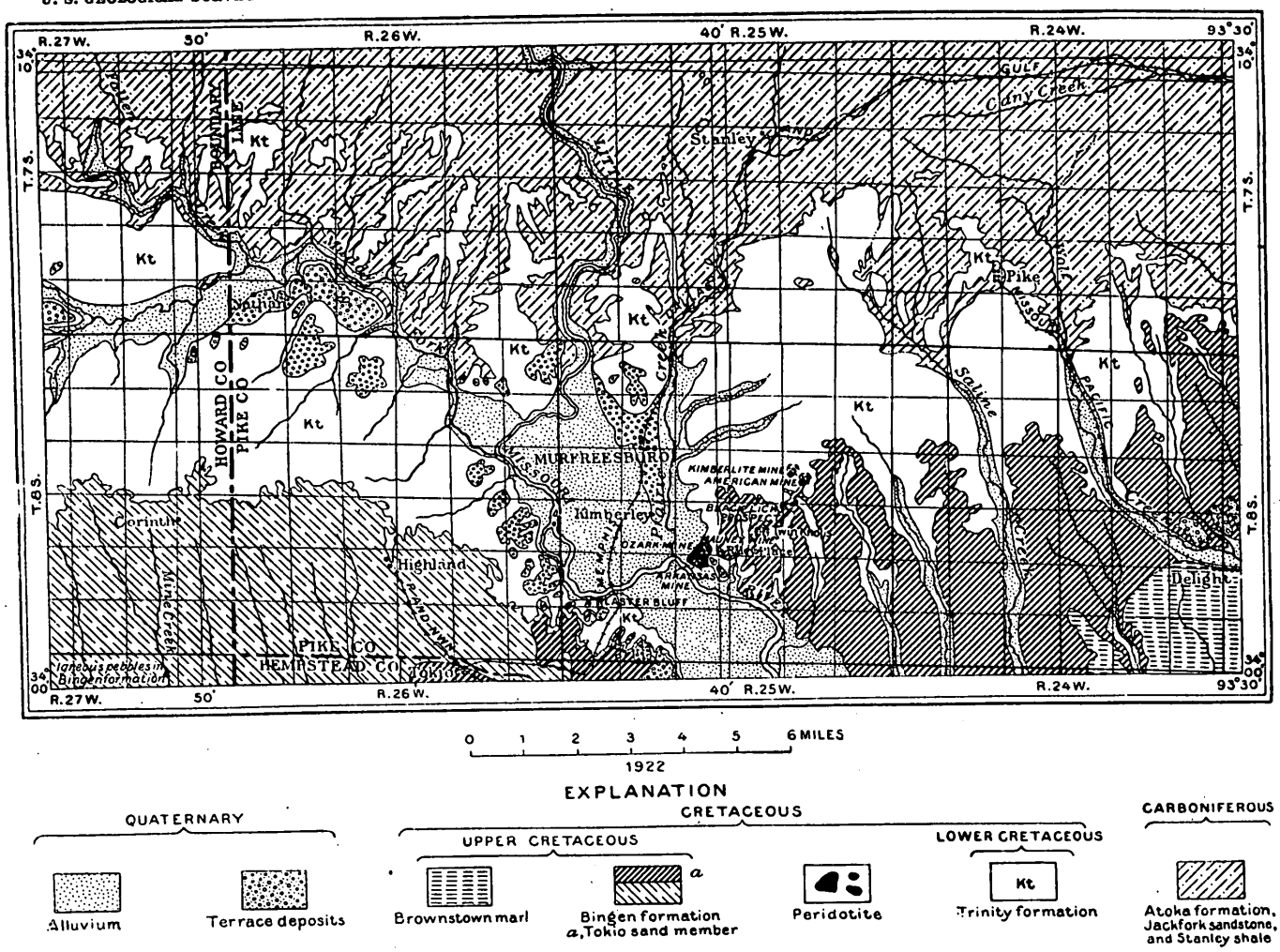
The Southwest Quarter of the Northwest Quarter of Section Twenty Seven (27), except one half (1/2) acre in the Southwest corner thereof, containing Thirty Nine and one half (39-1/2) acres, more or less,

All that part of Section Twenty Eight (28) lying North and East of the Little Missouri River, containing Three Hundred and fifty three and fifty three hundredths (353.53) acres, more or less,

All that part of the West half of Section Twenty eight (28) lying South of the Little Missouri River and North of Duncan Slough, containing sixty (60) acres more or less, and

All that part of the Northeast Quarter of the Northeast Quarter of Section Twenty Nine (29), bounded on the North, East and West by the Little Missouri River, and on the South by a certain Slough dividing said land from the McBrayer land sold to Stewart, containing Five (5) acres, more or less,

All in Township Eight (8) South of the Base Line in Range Twenty Five (25) West of the Fifth Principal Meridian in Arkansas, and containing, in the aggregate Eight Hundred Twenty eight and Three hundredths (828.03) acres, more or less.



GEOLOGIC MAP OF PARTS OF PIKE, HOWARD, AND HEMPSTEAD COUNTIES, IN SOUTHWESTERN ARKANSAS

Fig. 1

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

The above-described land is held by John Q. St. Clair as lessee under an agreement dated June 19, 1953 with the lessors, Edwin T. Schneberger and Joseph A. Noel, signing as Trustees for Trust No. A. Copy of the lease is attached.

III. PHYSICAL DESCRIPTION

A. History

The general history of the property is well known but, owing to the complexities arising out of an irregular series of promotional and stock-company operations, details regarding production, grade and the price paid for the product are conflicting and difficult to establish.

The early history of the property is described in USGS Bull. 735-1 by Miser and Ross. Some information on later activities is contained in the Bureau of Mines Report of Investigations No. 4549.

After the initial discovery in 1906, a small washing operation was begun by the Arkansas Diamond Company in 1908 and continued in a desultory fashion until about 1912. In 1919 the company was reorganized as the Arkansas Diamond Corporation, which built a larger washing plant and apparently operated more or less continuously from 1919 to July, 1920.

After some legal and organizational difficulties in the later twenties, the property was again put into operation on a small basis in 1929 and was worked until after the beginning of the depression period in 1930.

In 1943 and 1944, the Bureau of Mines conducted an investigation of the property, which included a sampling and testing program. The results, described in Report of Investigations No. 4549, were distinctly unfavorable.

In the early 1940's the property was taken over by the Diamond Corporation of America, a company financed by Mr. Glenn Martin. A 2000-ton washing and concentrating plant began operation in September 1948 and was shut down a year later. At this time the superintendent recommended numerous

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changes in the plant and a complete refinement of the milling system. However, because of the unsatisfactory results obtained to that date, the management decided to suspend operations.

Besides the published reports, a number of private reports on the property exist, written by apparently qualified engineers. Some of these reports, however, appear to have been prepared primarily for the purpose of obtaining investment capital.

The original report was a competent one written by H. S. Washington in 1907, in which the geological features of the deposit are described.

Between 1908 and 1931 several reports and comments were prepared by Mr. John T. Fuller, now deceased, who had had experience in the South African diamond mines and who in later years held responsible positions with Alcoa in this country. Fuller appears to have acted as a consultant, and in one period as general manager, for the Arkansas Diamond Company between 1909 and 1919. Most of the available data on past production were obtained by Fuller.

A detailed report on the property was written in 1940 by Mr. George N. Vitt, a consulting engineer (now editor of the "American Exporter" magazine in New York). This report was probably influential in the formation of the Diamond Corporation of America which operated the mine in 1948-1949. After the publication of the results of the Bureau of Mines investigation, Vitt wrote a second report criticizing the methods employed.

B. Past Mining and Milling Methods

Detailed information on the mining methods employed in the older operations is lacking. All extraction has been done from surface workings. It is known that the hydraulic method was used to a considerable extent, the ore being washed in sluices and the concentrates then either treated by hand or milled. Scrapers and hand- or cable-trammed cars were also used.

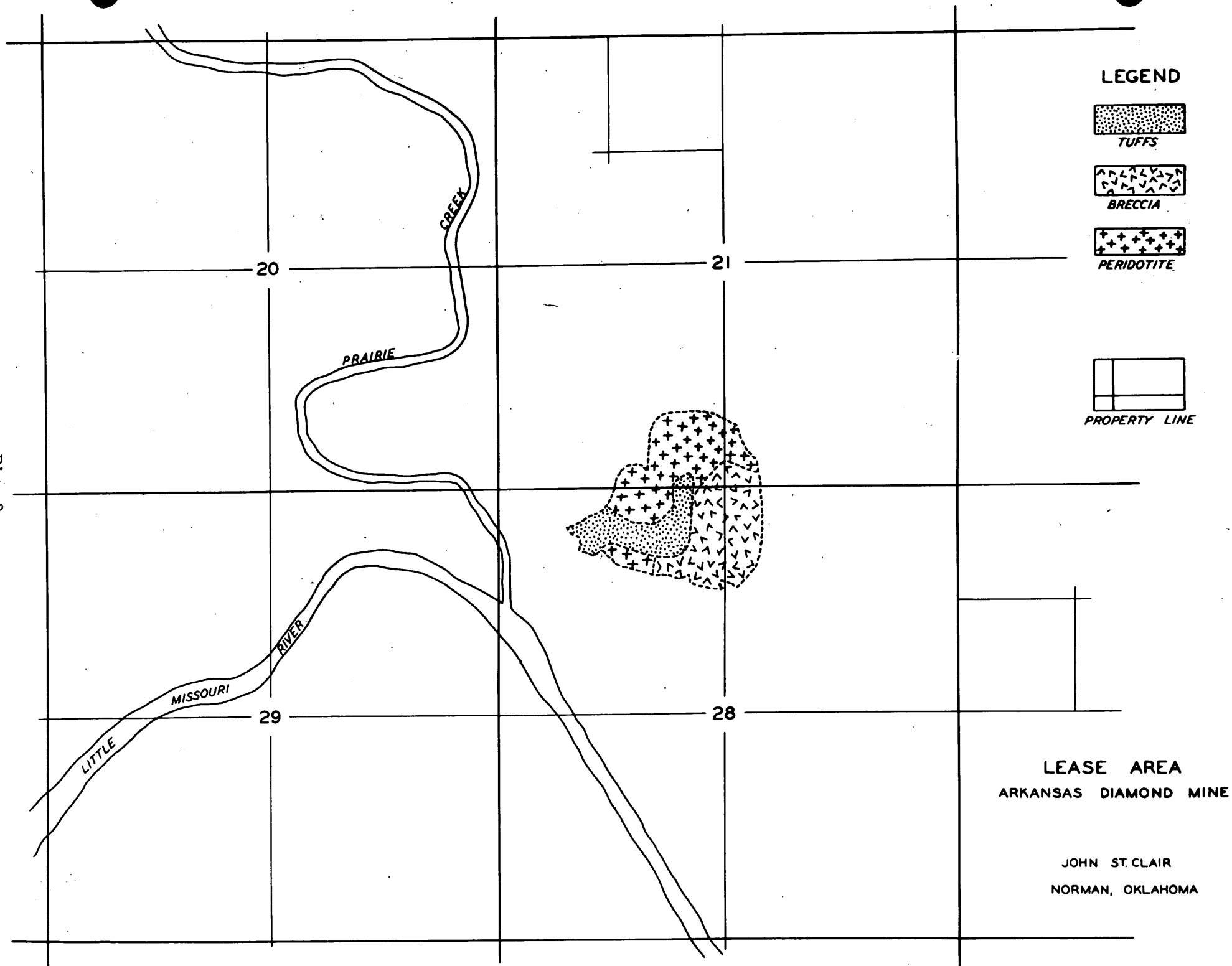
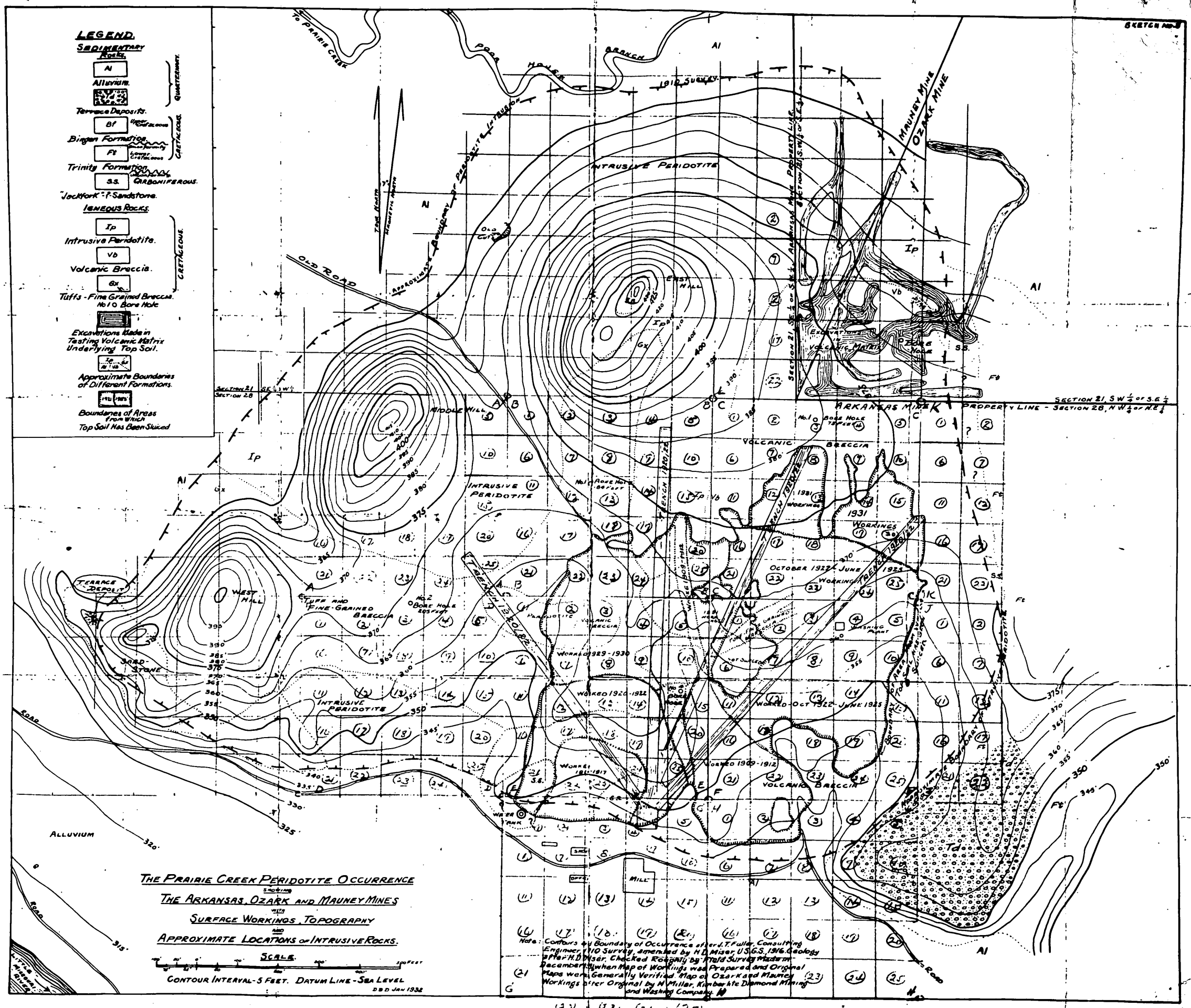

LEGEND
TUFFS
BRECCIA
PERIDOTITE
PROPERTY LINE
20
21
29
28
PRAIRIE
CREEK
LITTLE
MISSOURI
RIVER
LEASE AREA
ARKANSAS DIAMOND MINE
JOHN ST. CLAIR
NORMAN, OKLAHOMA

Fig. 2.


LEGEND.
SEDIMENTARY ROCKS.
Al
Alluvium.
QUATERNARY.
Terrace Deposits.
Bf
Upper Cretaceous
Bingen Formation.
Ft
Lower Cretaceous
CRETACEOUS.
Trinity Formation.
SS.
CARBONIFEROUS.
"Jackfork" & Sandstone.
IGNEOUS ROCKS.
Ip
Intrusive Peridotite.
Vb
Volcanic Breccia.
Gx
CRETACEOUS.
Tuffs - Fine Grained Breccia.
No 10 Bore Hole
Excavations Made in Testing Volcanic Matrix Underlying Top Soil.
Approximate Boundaries of Different Formations.
Boundaries of Areas from Which Top Soil Has Been Sluiced
SKETCH No. 3
To Prairie Creek
Poor House Branch
1910 Survey
Mauney Mine
Ozark Mine
Intrusive Peridotite
East Hill
Middle Hill
West Hill
Old Road
Approximate Boundary of Peridotite Intrusion
True North
Magnetic North
Section 21, SE¼ of SW¼ Arkansas Mine Property Line, Section 28, S.W¼ of S.E¼
Section 21, SW¼ of SE¼
Arkansas Mine Property Line - Section 28, NW¼ of NE¼
No. 1 Bore Hole 75 feet
No. 2 Bore Hole 205 feet
Volcanic Breccia
Trench 1920-22
Trench 1930-32
Trench 1931
1931 Workings
October 1922 - June 1925 Working
Worked 1929-1930
Worked 1920-1922
Worked Oct 1922 - June 1925
Worked 1909-1912
Worked 1911-1917
Tuff and Fine-Grained Breccia
Terrace Deposit
Sandstone
Intrusive Peridotite
Alluvium
Water Tank
Mill
Td
Ft
Little Missouri River
Road
THE PRAIRIE CREEK PERIDOTITE OCCURRENCE
SHOWING
THE ARKANSAS, OZARK AND MAUNEY MINES
WITH
SURFACE WORKINGS, TOPOGRAPHY
AND
APPROXIMATE LOCATIONS OF INTRUSIVE ROCKS.
SCALE.
CONTOUR INTERVAL - 5 FEET. DATUM LINE - SEA LEVEL
DBD Jan 1932
Note: Contours and Boundary of Occurrence after J. T. Fuller, Consulting Engineer, 1910 Survey, amended by H. D. Miser, U.S.G.S. 1916. Geology after H. D. Miser. Checked Roughly by Field Survey March-December when Map of Workings was Prepared and Original Maps were Generally Verified. Map of Ozark and Mauney Workings after Original by H. Miller, Kimberlite Diamond Mining and Washing Company.

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Norman, Oklahoma

Miser and Ross give some details of the early plants in Bull. 735-1, and the flow-sheet of the 1929-30 mill is given in Taggert's "Handbook of Ore Dressing".

The Diamond Corporation of America's operation in 1948-1949 employed a rooter and pan-and-tractor system in mining, with satisfactory results as regards cost. A report describing the mining and milling operation is appended.

C. Equipment

Present equipment on the property consists of the remains of the latest mill and comprises, besides the mill housing and foundation, two 14-foot washing pans and three grease tables. An office and laboratory stand close to the mill-site.

D. Past Production

Data on past production, with the exception of the most recent operation, have come largely from Fuller, who was connected with the property over a long period. However, Fuller himself notes that the information is not strictly accurate owing to the fact that proper records on weights, recoveries and sales were not consistently kept.

Both Fuller and Vitt criticize the methods used in past operations and refer to rumors of flagrant pilferage, theft and fraud in the recovery of the diamonds and to the influence of the Diamond Syndicate on past operations. Inasmuch as criticism of past operations is easy to make, and as rumors of this general type grow up wherever interested parties are concerned, it is felt that what cannot be substantiated should be discounted in an evaluation.

A partial record of the production was kept by the diamond firm of Schenck and Van Haelen of New York, which bought much of the production from 1910 onwards, but even here the evidence is conflicting. On the basis of

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sales records supplied by the firm to Mr. Vitt (through Mr. R. E. Blick) in 1940, it appears that of the diamonds purchased 54% by weight were gemstones and the remainder industrials. However, in 1943 Mr. Ernest Schenck, who made the original purchasing arrangement, wrote to the WPB to advise that about 80% of the purchases were industrial stones and the balance largely gems. In this same letter, Schenck reported that his firm had purchased to that date 14,716 stones that were entered in its permanent records, together with "a great many other stones, which we did not record". Vitt also quotes Schenck as saying that to his knowledge, a large part of the total diamond production was sold to other parties.

Vitt summarizes the figures on mine production compiled by Fuller for the period 1907-1930 as follows (conversion of "loads" to short tons is made by the writer using the accepted figure of one cubic foot of broken ore equals 100 pounds):

1.	Total no. of loads mined and washed @ 16 cu. ft. per load	79,722 (63,778 short tons)
2.	No. of stones recovered	14,026
3.	Weight in carats	7,844.635
4.	Carats per load	0.0984 (0.123/ton)
5.	Average price/carat paid by purchasers	$25.00
6.	Average price per load	$ 2.46 ($3.075/ton)

Using the above figures Fuller then proceeded to "correct" them on the basis of his opinion that fewer loads were actually treated than recorded and that losses in diamonds recovery were high. The correction thus made provided a much higher diamond content for the ore (0.177 carat per ton), but is not considered here because it was not made on a factual basis.

Vitt quotes a statement given to him by Schenck and Van Haelen on July 23, 1940 covering their recorded purchases of stones from 1910 to 1933, as follows:

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1.	Total number of stones purchased	14,716
2.	Total weight, carats	6,801.54
3.	Total price paid in cash	$109,412.43
4.	Over-all value per carat	$16.10

Vitt's analysis of the figures supplied by Schenck and Van Haelen is summarized as follows:

	Industrial	Gems	Total
Stones purchased	7,554	7,162	14,716
Carats	3,128.80	3,672.74	6,801.54
Price paid	$11,221.70	$98,190.73	$109,412.43
Carats per stone, average	0.415	0.514	0.463
Price paid per carat	$3.58	$26.80	$16.10
Percent of total, by carats	46%	54%	100%
Percent of total, by stones	51.5%	48.5%	100%
Percent of total, by value	10.4%	89.6%	100%

The above figures of Fuller and of Schenck and Van Haelen differ in several respects: (1) Schenck purchased more stones than were reported produced; (2) The carats reported produced exceed those purchased by Schenck; (3) The prices reported paid per carat differ materially.

According to Vitt, Fuller states that 1682 loads (1346 tons) were produced in the period 1907-1909, that is, before Schenck began the purchase of part of the production. Subtracting this amount in the Schenck column from the total loads given by Fuller, and using the price figure furnished by Schenck, we can compare the Fuller and Schenck data as follows:

	Schenck	Fuller
Total loads treated	78,040	79,722
Carats recovered	6,802	7,845
Carats per load	0.0872 (0.109/ton)	0.0984 (0.123/ton)
Average price per carat	$16.10	$16.10
Value per load	$ 1.403 ($1.75/ton)	$ 1.584 ($1.98/ton)

In addition to the data provided by the above sources, additional data are available as the result of the investigation by the Bureau of Mines and by the one-year operation in 1948-1949 by the Diamond Corporation of

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America. The Bureau of Mines estimated, on the basis of evidence not given, that past production at the property had averaged 0.07 to 0.09 carats per load (or 0.0875 - 0.1125 carats per short ton). However, the tests made by the Bureau, in which a total of 435 tons was treated, yielded only 8.4 carats or a content of 0.019 carats per short(?) ton.

Even less favorable results were obtained in the operation by the Diamond Corporation, which is reported to have treated 85,000 cubic yards or 125,000 short(?) tons, from which only 216.8 carats were recovered, for a content of under 0.002 carats per ton.

A summary of all the available information on the diamond content of the ore follows:

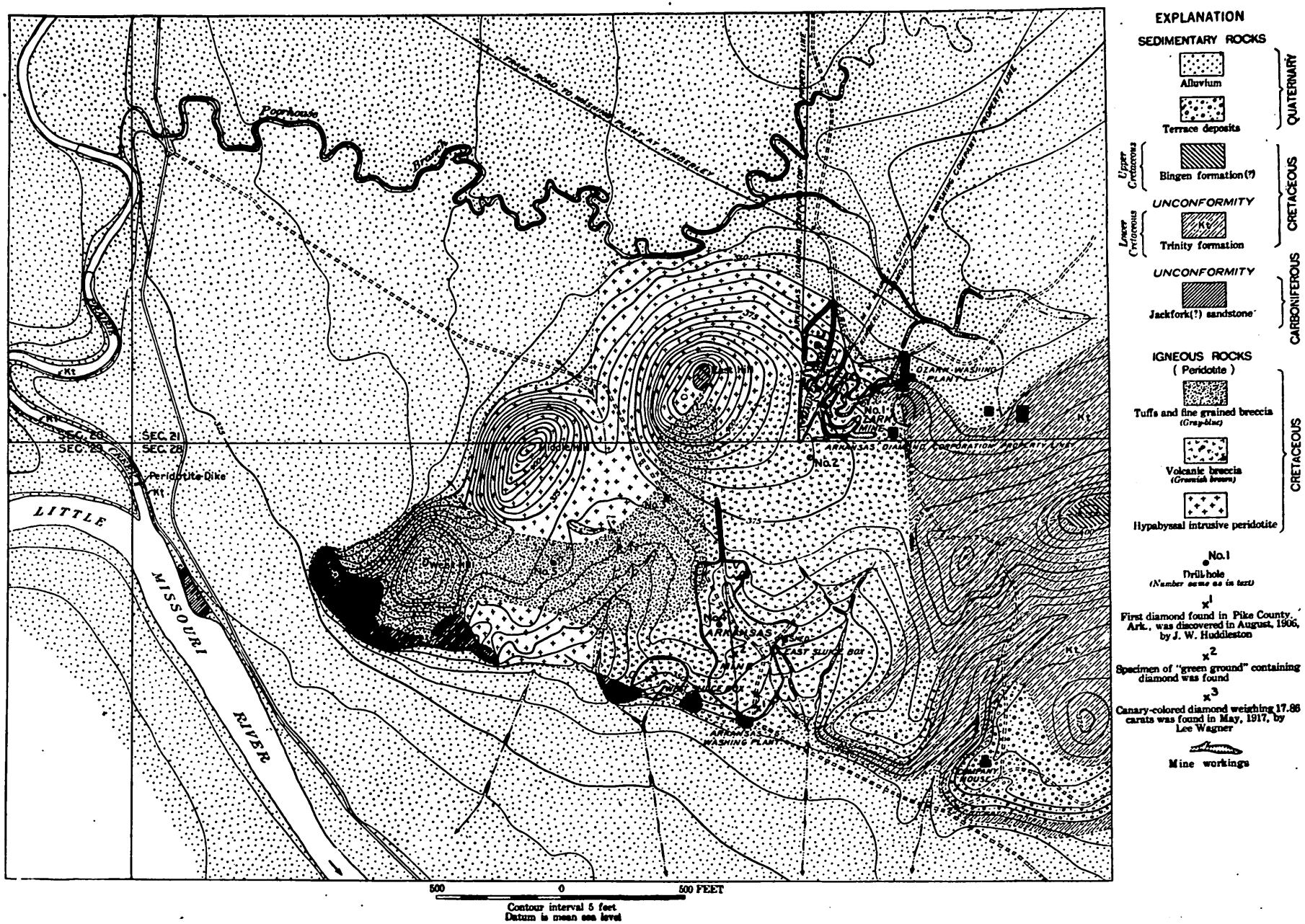
Source	Carats per Load	Per Yard^3	Per Short Ton
Fuller	0.0984	0.16	0.123
Schenck & Van Haelen	0.0872	0.147	0.109
Bureau of Mines Estimate of Past Production	0.07 to 0.09	0.118 to 0.152	0.0875 to 0.1125
Bureau of Mines Average Estimate	0.08	0.135	0.10
Bureau of Mines Test	-	-	0.019
Diamond Corporation of America	-	-	0.002

E. Development

Mining operations have been confined in the past to surface workings and small open-cuts, with the possible exception of a prospect shaft put down by Howard Millar before 1920. Some drilling was reportedly done in the past but no definite records now exist. In 1943-44 the Bureau of Mines put down 51 holes with a 30-inch bucket drill, the deepest of which was 43 feet, in connection with their testing program.

F. Geology and Ore Reserves

The detailed geology of the deposit and the general area has been adequately described by Miser and Ross. The kimberlite pipe outcropping on



GEOLOGIC MAP OF THE PRAIRIE CREEK AREA OF PERIDOTITE IN T. 8 S., R. 25 W., 2½ MILES SOUTH-SOUTHEAST OF MURFREESBORO, PIKE COUNTY, ARK.

Surveyed with plane table in 1916 by H. D. Miser.

Fig. 4

John Q. St. Clair
708 Hoover Street
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the property is very similar to the general type occurring in South Africa and is comparable in areal extent to some of the larger African pipes, the area being slightly less than that of the Premier Mine.

Three general rock types, also similar to those occurring in the African deposits, are exposed at the surface: (1) massive peridotite (called "hardebank" by the miners); (2) peridotite breccia; and (3) volcanic breccia and tuff. Diamonds have been recovered from the massive peridotite, but little of this type of rock has been mined in past operations and therefore little is known about the possible tenor. To date, most of the diamonds have been recovered from the peridotite breccia or, when operations were first begun, from the thin soil cover overlying this type of rock. No diamonds have as yet been reported found in the volcanic breccia and tuff.

In South Africa, the peridotite breccia forms the typical "yellow ground" characteristic of the upper, weathered portions of the pipe deposits. There, both the peridotite breccia and the massive peridotite or "hardebank" are mined for their diamond content.

The peridotite breccia, which to date has produced the majority of the diamonds recovered at the property, occurs in the east and southeast portions of the pipe and has an outcrop area of about 1,125,000 square feet, of which approximately 1,000,000 square feet lie within the Arkansas Diamond Mine property as a continuous outcrop. (See map by Miser and Ross). The outcrop of massive peridotite occupies a comparable area, and the remainder of the pipe area is taken up by the volcanic breccia and tuff.

The vertical extent of the kimberlite pipe is not known, but the similarity of the pipe to the African deposits suggests that it will have a comparable downward extent; and that, even though the relative proportions of the various rock types may change with depth, tonnage possibilities are essentially limited only by the depth to which the deposits can be profitably

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worked. Certain of the African mines are now working at depths of several thousand feet, the only noticeable change being that in some cases the diameter of the pipe diminishes somewhat.

The specific gravity of peridotite, which rock forms the greater part of the peridotite breccia, is 3.0 - 3.3, and that of its principal mineral constituent, olivine, is about 3.3. The breccia, however, has been subjected to surface weathering (the present average depth of yellow ground is about 15 feet), and to considerable hydrothermal alteration, so that its specific gravity is lower than the norm. If a specific gravity for the breccia is set at 2.5, one cubic yard of breccia will contain 2.1 short tons. For convenience in calculating, the figure of two tons per cubic yard or 13.5 cubic feet to the ton will be used in this report, except for the weathered yellow ground which will naturally weigh less.

Using the above figures, a rough calculation of the peridotite breccia area, which measures 1,000,000 square feet within the limits of the property, indicates a potential tonnage of 740,000 short tons for each one foot of depth. Extension of the deposit to 1000 feet in depth would therefore provide a potential 74,000,000 short tons of possible ore.

G. Price and Value

Since there are no parcels of Arkansas diamonds in existence which could be classified as "run of mine", it is impossible for the writer to determine the valuation of the stones on today's market prices. The stones which the writer has seen, which include those held by Howard Millar, Glenn L. Martin, and the collection at the Smithsonian Institute, may be considered very good quality industrial stones, although it is not known what proportion of the production these parcels represent.

In a recent letter from Mr. Harold L. Branch, who is with the firm of Schenck & Van Haelen, Inc., the average value per carat on a purported "run

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of mine" parcel was $20.60 in 1929; this price per carat, according to Branch, would represent the market value today.

In view of the uncertainty, and based on the parcels of diamonds which the writer has viewed, it is considered that a valuation of $16.00 per carat could be used in making calculations for mine valuation.

H. Geophysical Work

In 1946 a geophysical survey with the Hotchkiss Superdip was conducted by the firm of Sherwin F. Kelly in part of T. 8 S., R. 25 W. The survey covered more or less completely 27 sections in the township, and included the alluvial area adjacent to the Little Missouri River. The work revealed that the massive peridotite in the Arkansas Diamond Mine pipe was susceptible to discovery by magnetic means, and that its presence could probably be revealed even under fairly thick over-burden.

I. Accessibility

The property is located about 2.5 miles southeast of Murfreesboro, the seat of Pike County, Arkansas, in Township 8 South, Range 25 West. A graveled road extends from Murfreesboro to Prairie Creek, and a fair country road, a few hundred yards in length, leads to the deposit. The area is known as the "Prairie Creek Area" because of its location near the confluence of the Little Missouri River and Prairie Creek.

Murfreesboro is a station on the Memphis, Dallas and Gulf Railroad. The Missouri Pacific and the Prescott and Northwestern Railroads also serve the area.

Adjacent residence points are at Murfreesboro, 2.5 miles distant, and at Nashville, 13 miles southwest of the area on Highway 27. The city of Hot Springs is at a distance of 55 miles.

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J. General Conditions

Topographically, the kimberlite pipe area is the most prominent topographic feature in the vicinity of the property. That portion of the pipe underlain by massive peridotite forms a series of low hills rising about 100 feet above the general level. The rest of the pipe outcrop is at a lower elevation, but still remains somewhat above the surrounding region.

An ample supply of water is available in the Little Missouri River, which traverses the district at a distance of about 1200 feet south of the peridotite-breccia area. The river crosses a portion of the property, so that water rights are inherent in the ownership.

Power is available from the Southwestern Gas and Electric line which crosses the district.

It is understood that there is abundant timber in the district. Considerable timber exists on the property itself.

No investigation has been made of manpower. The area is a typical farming district and several large towns occur in the region. It is assumed that sufficient manpower would be available if a large operation were eventually contemplated.

K. Cost of a Major Operation

The purpose of this section is to determine the cost of a major operation and the cut-off or minimum ore value per ton necessary to break even in such an operation.

Any operation to succeed would need to be on a large scale because of the low average grade of ore and the resultant necessity to compensate for overhead with large tonnage. The Premier mine in South Africa, which resumed operation in 1950 with a plant utilizing modern methods of diamond recovery,

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is the unique example of this type of operation. Preliminary testing of new processes was begun in mid-1945 and a 100-ton pilot plant was put into operation in January, 1947. In April, 1948 the first plans were laid for a large-scale operation, and in February, 1950 the first unit was put into production. The plant was completed in May, 1950 and since that time has treated an average of 12,800 tons per day. The capacity of the plant actually exceeds this figure in order to allow for any stoppages or breakdowns.

The Premier plant operates with four identical HMS units and produces a cone-sink concentrate equal to 5% of the total tonnage treated. This concentrate is then treated magnetically.

Prior to resumption of operations, the mine had been idle for many years, the last previous operation having been conducted by open-cast methods to a depth of about 500 feet. The grade of ore determined by former operations had been established at 0.16 carat per load or about 0.2 carat per ton.

The new Premier operation has increased diamond recovery by 50%, the average grade of ore now being established at 0.24 carat per load or 0.3 carat per ton (as of June, 1953). At the same time, the cost of mining operations has been considerably reduced by extensive mechanization and the introduction of the "slot" method of mining. Milling costs have also been greatly lowered by the more simplified methods used.

Initial capital cost of the Premier project was as follows:

Mill	£ 1,250,000	or	$ 3,500,000
Underground plant	1,200,000	or	3,360,000
Surface plant (except mill) including power, water, rail, consulting fees, etc.	1,500,000	or	4,200,000
	£ 3,950,000		$11,060,000

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Mining costs per ton (including development) at time of writing (June, 1953) are 40 d. or 46.64¢, at a depth of about 1000 feet. This cost compares with the mining cost at the Kimberley Mine in the pre-war period (1938) of 55¢, in which sub-level caving and shrinkage-stope methods were used and a comparable tonnage of ore was mined.

Milling costs at Premier are 25 d. or 29.15¢ per ton as of June, 1953.

All of the above data on Premier have been obtained in recent days directly from the manager of the Premier Mine.

Excluding from consideration the potential tonnage of the massive peridotite at the Arkansas Diamond Mine, possible ore to 1000 feet is estimated at 74,000,000 short tons. A 12,500-ton plant comparable to that at the Premier would process approximately 4,500,000 tons of ore per year (taking into consideration that the plant load-rating exceeds the stated capacity). Productive life at this rate is 16.4 years.

It is expected that open-cut and open-cast-plus-shaft operations can be conducted to a depth of 300 feet. (These methods have been used to depths of 500 feet in the Kimberley group of mines and to 780 feet at Jagersfontein.) Costs at such operations, which in the past have utilized hand-labor almost exclusively, have not exceeded 40¢ per ton. It is felt that operations with modern equipment can be conducted in the U. S. for about 25¢ per ton to 100 feet, 35¢ to 200 feet, and 45¢ to 300 feet, making an average mining cost to 300 feet of 35¢.

The "slot" type of large-scale mining used at Premier eliminates the excessive use of manual labor and thus may be considered comparable to United States conditions. It is estimated that underground mining costs at a comparable U. S. operation would be 50¢ as compared with the 46¢ cost

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existent at Premier. The weighted average of these estimated open-cast and underground costs for the U. S. is 45¢.

Milling at Premier costs 29.15¢ per ton. Use of hand-labor is limited in this plant and therefore it is felt that, in view of other factors such as lower power and fuel rates in the U. S., the comparable rate in the U. S. will not exceed 30¢.

Overhead and miscellaneous costs, plus occupation taxes in the United States are figured at 15¢ for open-cast ore and 20¢ for underground ore. These estimated costs are higher than some comparable U. S. large-scale operations.

Interest on working capital is calculated by taking 6% of the estimated two-month cost of mining, milling and miscellaneous and overhead charges. The total obtained was less then 1¢ average for combined open-cast and underground ore. Therefore, a straight 1¢-per-ton rate was taken and the total for the cost-per-year was derived from this rate.

A 10% provision for contingencies has been added. This will provide for plant maintenance and replacement in case the figures given for mining and milling costs do not include this item.

The construction cost of the Premier surface and underground plant, built in 1949-1950, was approximately $11,000,000 in the period 1949 - 1950. Although construction and material costs have risen somewhat since that time, any increase would be compensated for in Arkansas by the lower transportation costs involved in respect to materials and better conditions as regards water, power supply and roads. It is believed therefore that cost in the U. S. would be somewhat lower; but identical Premier cost is used in the calculation.

Amortization of the $11,000,000 plant cost is figured without taking into consideration any discounted values for irregular or deferred expenditures and without any provision for reinvestment of dividends for the

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return of the original capital expenditure, both of which factors would reduce the cost of amortizing the plant. The annual payment required is calculated as a diminishing annuity by the formula:

$$A = \frac{PR^n r}{(R^n - 1)}$$

where P is the principal, r the rate of interest, R is (1 plus r), A the annual payment and n the years required to extinguish the principal. Rate of interest is taken at 4.5% and n at 16 years.

On the above bases, operational costs of a plant at the Arkansas property, projected on a reserve of 74,000,000 short tons extracted at the rate of 4,500,000 tons per year over a period of 16 years, are as follows:

	Per Short Ton	Per Year
Direct Mining & Development	$ .50	$2,225,000
Milling	.30	1,350,000
Overhead, Misc., & Occupational Taxes	.185	830,000
Interest on Working Capital	.01	45,000
	$ .995	$4,450,000
Contingencies (Maintenance, etc.)	.0995	445,000
	$1.0945	$4,895,000
Amortization	.214	965,000
Total Cost	$1.3085	$5,860,000

In the above calculations, no allowance has been made for possible stripping. If the surface material cannot be immediately processed, but must be stock-piled, the estimated cost for stripping is 15 cents per ton, based on an average thickness of about 15 feet. Using the figure of 1,000,000 tons of material to be stripped at 15 cents, the cost would be $150,000, and this amount could be amortized in about four years on the tonnage basis proposed.

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The above figures suggest that, at the present estimated value of $16.00 per carat, a diamond content of .082 carats would represent the cut-off for a large-scale operation.

The actual grade of the Arkansas ore is not known. Fuller's data are quite certainly inaccurate and were also in part derived from operations that were treating the thin soil cover in which the diamonds are presumably more concentrated. The lowest estimate of past production is that made by the Bureau of Mines, which stated that recoveries were in the order of 0.07 to 0.09 carats per load, these figures averaging to 0.10 carats per short ton. If this estimate is accepted for purposes of evaluation, applications of the new methods initiated at Premier might result in a recovery of fine material that would increase recoverable carats by 50%; or in other words provide a grade of 0.150 carats per ton. This possible increase of 0.05 carats per ton would be represented principally by diamond material in the lowest price range of $3.00 per carat, since it is assumed that the size range would fall near the 10 Tyler screen size. An increase of this magnitude would result in an ore value of $1.75 per ton and in a net profit before income taxes of about $1,980,000 per year. Any increase in diamond price or the discovery that ore grade is actually higher than 0.10 carats would naturally provide a greater return.

It should be mentioned that the limitation of ore reserves to 1000 feet is an arbitrary matter. Many mines in the South African fields are operating below this depth. At Kimberley, for example, mining is carried below the 3,500 foot level. This means that if the Arkansas pipe resembles those of Africa, the ore may be expected to extend to greater depth and the amortization period may then be prolonged for a considerable time beyond the 16 years set in the calculations.

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A further point is that the Premier Mine is actively engaged in mining both the peridotite breccia and the massive peridotite. Crushing costs for the latter type of rock are high; hence the costs for milling given in the estimate for an Arkansas operation are possibly too high, in view of the fact that the softer peridotite breccia is the only rock type considered as ore in tonnage calculations for the Arkansas property.

The writer has obtained material assistance from Mr. David St. Clair, Consulting Geologist, in working out the estimates on the costs for a large-scale operation. Mr. Hugh Hodgson, Manager of the Premier Mine, Cullinan, Transvaal, South Africa, has kindly provided information on the present costs of mining and milling, and also on the original plant costs.

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L. The Bureau of Mines Report

The Report of Investigation 4549, issued by the Bureau of Mines in 1949, gave details of their investigation of the area which is under consideration in this application.

The work which the Bureau accomplished at the property, the concentration methods used at Rolla, Missouri, and the report itself have been severely criticized by a number of engineers, particularly George N. Vitt, and by the fee owners themselves. The writer does not fully concur with this general criticism. The Bureau undertook a most difficult task of sampling and testing a deposit which under ordinary circumstances requires considerably more time and more extensive sampling to arrive at even approximate tenor figures. The Bureau's work should be classified as a preliminary test, and, as such, provides data which may be used tentatively as a basis for the delineation of possible diamond-bearing zones within the margins of the area drilled. On this point it should be mentioned that it is well established in South African diamond mining practice that certain zones in the intrusive peridotite will be barren or too low in tenor for profitable mining. This same condition should be expected in the Arkansas deposit. While it is not the best mining practice to work out zonal concentrations on the small number of sample holes put down by the Bureau, as the interpretations may be misleading, it is interesting to note that there seems to be some evidence of zoning, as may be seen by reference to the accompanying plan. The data on carats per cubic yard have been extracted from Table I, of the Bureau's report, beginning on page 19. It must be understood that the precise position of the lines enclosing, or setting off, the barren zones are purely arbitrary, with the possible exception of the western dividing line which eliminates all of the holes drilled into the fine-grained breccia, a rock which has reportedly yielded no diamonds in the past. Hole No. G-10 which yielded 0.3705 carats is automatically eliminated

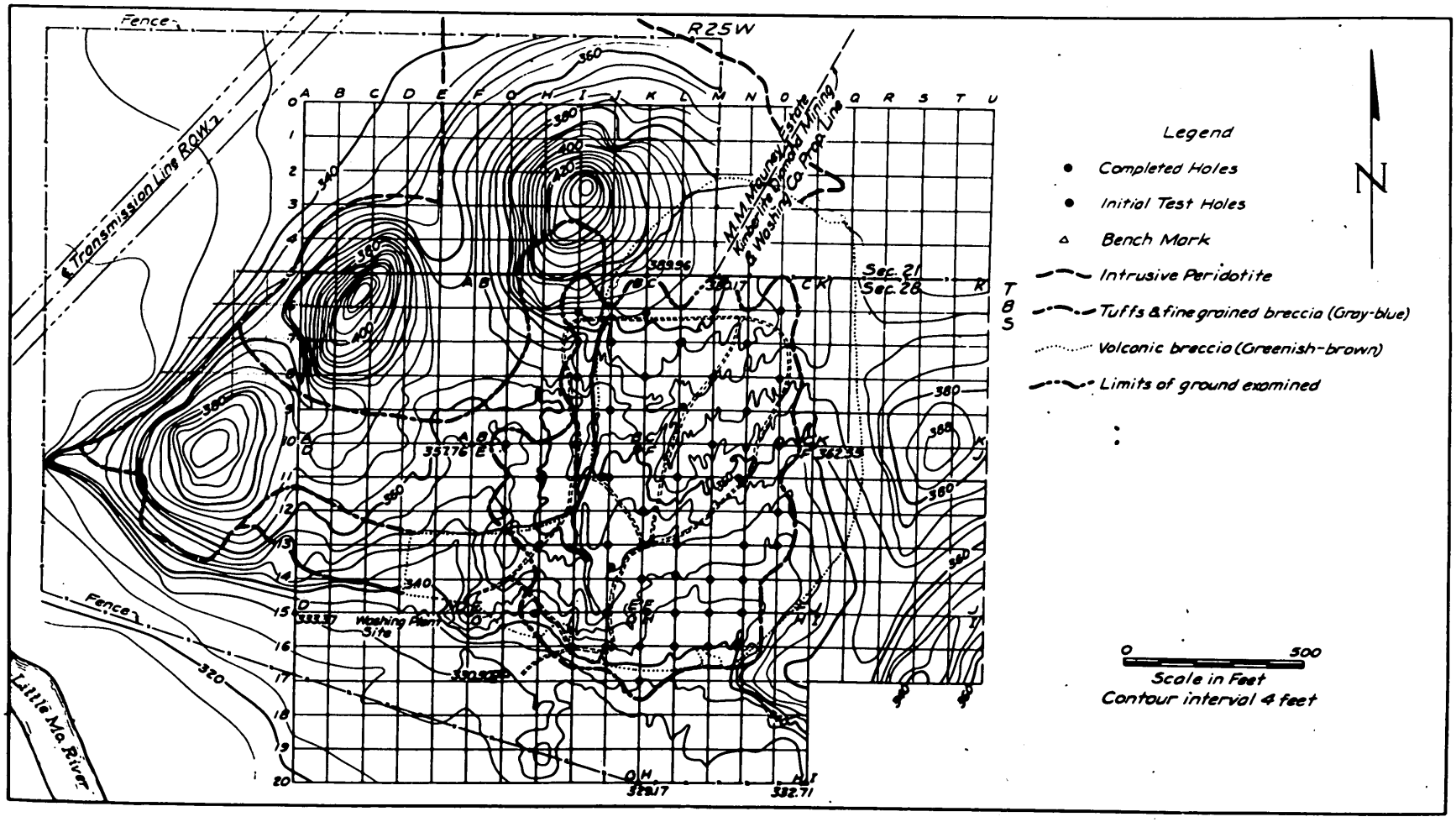

Figure 2. - Prairie Creek diamond area, topography.

Fig. 5

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on the basis of being in "fill". As pointed out by Miser and Ross in U.S.G.S. Bulletin No. 735, page 298: "Although the distribution of the breccia is shown on the accompanying map, the boundary line that represents the contact between it and the intrusive peridotite is not accurately located because of comparatively few exposures. When further exposures are made during mining operations the breccia may be found to have a larger or smaller surface distribution than is shown on the map". On a recent visit to the property, it appeared to the writer that the fine-grained tuffs and breccia probably extended to the south further than indicated on the geologic map. In any case, all of the holes within the margin of the volcanic breccia in the southwest portion were barren, and, as a consequence, this area has been set-off from the main orebody.

Two zones within the main body have been arbitrarily delimited on the basis of barren holes.

If the above is acceptable for purposes of analysis, we find that the balance of the holes indicate a tenor of 0.0717 carats per cubic yard to varying depths in the orebody. The individual holes are as follows:

Hole No.	Depth Feet	Cu.Yd.	Cts.
K-6	36	7.11	0.131
O-6	43	8.51	0.339
L-7	43	8.50	0.204
O-8	30	5.94	0.760
J-9	28	5.34	0.127
L-9	27	5.34	1.218
K-10	16	3.10	0.507
M-10	23	4.55	0.229
O-10	25	4.87	1.162
J-11	28	5.54	0.166
K-12	35	6.93	0.186
L-13	23	4.55	0.182
O-13	39	7.72	0.043
K-14	21	4.07	0.832
N-14	43	8.51	0.664
N-15	39	7.72	0.466

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Hole No.	Depth Feet	Cu.Yd.	Cts.
M-16	27	5.34	0.136
N-16	23	4.55	0.102
K-17	20	3.96	0.087
Clean up (Rolla and washing plant)			0.501
		112.15 Cu.Yds.	8.042 Cts.

$$\frac{8.042}{112.15} = 0.0717 \text{ Cts/Cu.Yd.}$$

NOTE: In Holes Nos. N-14, L-15, N-15, M-16 and K-17, a total of 57 feet of "fill" was recorded, or approximately 11.28 cubic yards. Since this occurred in the top sections of the holes where diamond was recovered, it is impossible to determine whether the carats reported were recovered from "fill" or the peridotite breccia.

As referred to earlier, the writer does not concur with others in a general condemnation of the Bureau's work, but there are certain features of the report, however, which I believe should be discussed at this stage in order to arrive at a fair basis of appraisal of the diamond property itself. These points are:

(1) There seems to be some lack of understanding on the Bureau's part regarding the importance of the finer mesh sizes, as on page 18 they state, "Although the test plant did not include hand sorting of sizes smaller than minus 8 plus 20-mesh, there seems to be no reason why, <u>if smaller stones could be used</u>, they could not be hand-picked down to plus 40-mesh." On page 17, it is mentioned that the "minus 20-mesh material was rejected". The only comment which the writer would like to make is that the minus 20-mesh material is the basis on which the diamond cut-off and lapping wheel business is organized.

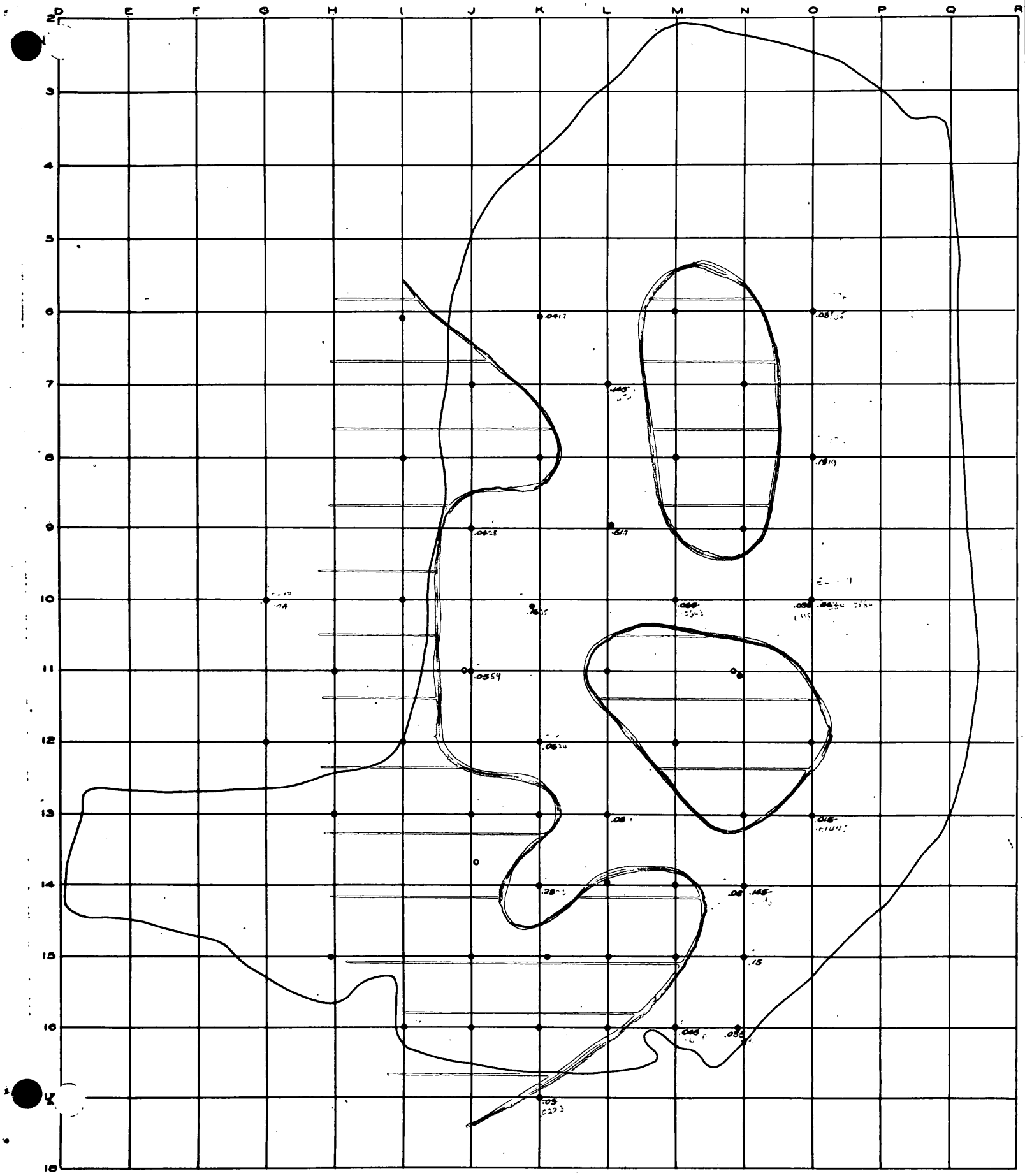

Fig. 6 - Volcanic breccia area with red lines indicating possible barren zones.

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(2) There is no record of using these fine sizes for salting.

(3) Although the report mentions that an improvised grease table was constructed to give a vibrating action, the photographs of the grease table in the report do not show this feature.

(4) It appears that the Bureau concentrated all the drill hole samples in the same manner regardless of the nature of the sample; that is, "fill", "yellow" ground, "black" ground, hard blue, etc., all received the same treatment. Hard blue peridotite, for example, is not amenable to pan treatment.

(5) On page 11 of the report, the footnote states, "The 'load' is the unit of volume used in diamond mining and contains 16 cubic feet of material weighing, roughly, 1600 pounds." The definition is incorrect, as the word "broken" is required to be inserted before the word "material". It appears that this error may have entered into some of the tonnage and grade calculations.

(6) Although the 32 stones recovered in this operation have not been seen by the writer at the date of writing, the photograph of the stones discloses no cleavage fragment, flats, broken crystals, or other material which is generally found in "run-of-mine" recoveries, and the report states that the appraisers who examined the parcel graded the entire lot "as excellent industrial diamonds". The writer mentions this because it is most unusual to obtain only the finer industrial stones in recovery operations. Recently the writer had the opportunity of examining the 240 carats recovered in the Glenn L. Martin operation, and this parcel contained a wide range of industrial diamond from the lowest to the highest grade. Is it possible that the sorters for the Bureau of Mines did not recognize the poorer quality, or was this material lost in the washing operation at the mine site, or both?

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(7) It is rather meaningless and misleading to describe a parcel of diamonds on the basis of "average" size. This has been done on page 19 of the report. It is preferable to screen to size and report the number of stones of "similar" screen size in a parcel.

(8) "Periodic" hand sorting of the minus 20-mesh, as stated on page 18 of the report, is inadequate to recover the fines.

(9) On page 18 it is also stated that "no diamonds were recovered on the grease table," and continues that "this is somewhat surprising." The writer would mention in this regard that the grease table operation for recovery of diamonds is of paramount importance. Since no diamonds were recovered in this process, some other factors were quite certainly involved such as, for example, the loss of diamonds in the preliminary operations of concentration at the property.

(10) The total "fill" reported on the cross-sections amounts to 57 feet of hole, or on the basis of 0.198 cubic yards per foot, the total "fill" treated amounts to 11.28 yards. This material should have been rejected in the processing.

In summary of this section, it should be pointed out that the work carried out by the Bureau of Mines was based on the South African practice of that date (prior to 1943-44), and it is considered that the new methods since developed by the Premier Mine in recent years may, if employed at the Arkansas deposit, favorably alter the recovery picture.

H. The Glenn L. Martin Operation

This operation, which was carried out in 1948-1949, treated 85,000 cubic yards of ore, or an estimated 125,000 tons, for a total recovery of 246 carats and an average grade of about 0.002 carat per short ton.

A report on the operation, written by Mr. Jan Porel, Vice-President, is appended in Section B, and observations on the data therein contained are set forth below. In addition, the writer has (a) recently discussed the project with Mr. Archer L. Schweitzer, who was superintendent at the property during the year's operation, and (b) examined the diamonds recovered, which are in the possession of Mr. Glenn L. Martin.

This operation has produced the lowest diamond recovery yet recorded, but because of the lack of detailed information on tonnages extracted from the various sections of the area mined, it is difficult to analyze the results. Neither the records of carats recovered from these separate areas (shown on the attached map, Section B), nor the recovery from individual batches of material treated at the mill, are now available.

Considering first the data given in the Jan Porel report (Section B, Appendices), the writer makes the following observations:

(1) The operation was considered an exploratory one in which an attempt was made with available funds to determine the diamond content of the ground at a great number of places within the area of the exposed volcanic pipe. As a consequence, it appears that a considerable tonnage of the material treated was obtained from the area of fine-grained tuffs and breccia, in which no diamonds have ever been reported. An additional tonnage was obtained from the massive peridotite, the tenor of which has not yet been established.

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(2) Porel's report states that the extraction methods used were not satisfactory and recommends numerous changes and alterations in mill design provided that additional money were forthcoming.

(3) A large proportion of the ground tested in the operation was unweathered peridotite and peridotite breccia sufficiently hard to require drilling and blasting. South African practice has indicated that material of these types is not amenable to pan treatment. (See Section K, Appendices.) The use of pans on this material at the Martin operation accounts at least in part for the low recoveries obtained.

(4) If the "barren" areas determined tentatively on the data supplied by the Bureau of Mines are used as a basis of interpretation, it will be noted that much of the mining in the Martin operation was carried out in these areas. (Refer to Section B and Figure 6 for comparison.)

(5) The writer did not have the opportunity to observe the mining and recovery operations and cannot, therefore, offer anything but general comments on the methods used: (a) It has already been suggested in (3) above that the pan treatment of the unweathered peridotite and peridotite breccia was inadequate to effect diamond concentration; (b) in addition, it may be observed that the type of greasetable employed at the operation, and still available for inspection at the property, is of a design radically different from that now in use at the Premier Mine; (c) further details of the greasetable operation obtained from Mr. Schweitzer indicate that only a one-eighth inch thickness of grease was used in contrast to the very considerable thickness utilized with success in South Africa. It is felt that the new design of table developed and now in use at the Premier Mine is responsible in large part for the better recoveries being obtained from the HMS concentrates produced; (d) another factor which should have materially

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influenced recovery is that the treatment of the fine material was entirely overlooked, all such material having been discarded as tails. The very considerable recovery obtained by Premier in jigging the minus 10 mesh fines has contributed materially to the success of that operation.

Taking the above factors into consideration, it seems to the writer that, although it is easy to criticise past operators, their lack of experience in diamond-recovery methods may have contributed to the low recoveries obtained.

(6) The report by Farel (Refer to Section B, appendices) states that "experts who have examined the stones are curious to know why 90% are fragmented and deeply etched." A recent examination by the writer of this parcel indicated that this classification is in error. A tentative appraisal of the parcel by the writer indicated the following classification:

	Carat Weight
1. Large stones (unclassified)	35.65
2. 1st Dressers (some tool stones)	14.30
3. 2nd Dressers (large)	61.11
4. 3rd Dressers (?)	25.72
5. Crushing	79.07
6. Small rounds (drilling and/or multi-stone dressers)	17.85
Total carats	233.70

In summary, it must not be overlooked that much of the above analysis of the Martin operation is made with a minimum of factual information, and should be treated accordingly.

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IV. THE EXPLORATION PROJECT

A. Objective

The principal objective in the proposed program is the recovery of diamond material in all categories from the diamond-bearing peridotite, in order to ascertain the true tenor of the ore. Of particular interest is the recovery of any fine-mesh material which was not recovered by previous concentrating methods. A secondary objective is the determination of the tenor of the alluvial deposits situated west and south of the kimberlite pipe.

A mineral which may have importance with regard to the total assay value of the ore is the calcium titanate, perovskite, which may reportedly contain up to four per cent of columbium oxide. It is understood that tests are now being conducted by the Federal Geological Survey to determine the columbium content of samples obtained at the property by Survey representatives. The peridotite in the deposit is reported by Miser to carry one per cent perovskite. On this basis the value of the contained columbium oxide, if recoverable, would approximate $1.00 per ton, according to the Arkansas Geological Survey.

B. Proposed Work

It is proposed to divide the work into two phases, the first being a preliminary test of typical peridotite breccia in the laboratories of the Western Machinery Company, San Francisco, utilizing about three tons of material to be obtained by an auger drill; and the second being a more comprehensive assaying and testing program which would be undertaken provided the preliminary tests of Phase 1 gave satisfactory results. The two phases in the proposed program are as follows:

Phase 1 - (Preliminary Testing Program)

The objective of this program is to determine whether the unweathered peridotite breccia occurring in Arkansas is amenable to the same type of concentra-

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tion and diamond-recovery methods as that employed on similar material at the Premier Mine. The sample for this phase will be obtained by use of an auger drill, which will be provided free of charge by the Arkansas Geological Survey. It is intended to locate the drill holes required for this sample in the area designated "Proposed Location of Sampling Holes" on the attached map (Figure 7), where especially good results were obtained in the sampling program previously undertaken by the Bureau of Mines. The three-ton sample will then be shipped to San Francisco where the tests will be supervised by the writer. In addition to the determination of the amenability of typical unweathered breccia ("blue ground") to HMS concentration, tests will be run using diamonds introduced by intentional "salting". If possible, the stones used in the salting tests will be Arkansas diamonds, since it is possible that these will have physical characteristics dissimilar from those encountered elsewhere. (It is pertinent to note here that special processing of diamonds from the Tanganyika fields is required in order that they may be concentrated by electro-static and grease-table methods; in view of such possible variations, the use of stones from the deposit actually being tested has some importance.)

The time required for Phase 1 is estimated at about 30 days, of which a maximum of one week would be spent in securing the sample, and the remaining three weeks in its shipment to and testing at San Francisco.

Phase 2 - Determination of Values by Modern Recovery Methods

This phase would consist of a detailed sampling program by auger-drill and trenching in selected portions of the peridotite-breccia area; and of the testing of the samples in a laboratory testing unit.

The drilling would be done by an auger-type drill if the tests conducted in Phase 1 indicated that use of this type of drill is practicable.

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Otherwise the sampling would probably be done by other drilling means.

It is estimated by the manufacturers that a six-inch auger-drill can drill about 240 feet in an eight-hour day, producing approximately one cubic foot of material from each five feet of hole, or approximately 3.5 tons of the unweathered breccia in the given period. It is proposed to concentrate the drilling in a selected area (see map, Fig. 7) where the results of the Bureau of Mines sampling were especially favorable. The holes would be spaced on a 10-foot grid system and would be drilled probably to an average depth of between 50 and 60 feet, this depth being probably necessary in order to obtain satisfactory quantities of the unaltered breccia beneath the overburden of "yellow ground" and fill. By employing a grid system of the above dimensions, a ratio of sample-to-ore of 1:500 can be obtained, as compared to the 1:3000 ratio obtained by the Bureau of Mines.

If the stated drilling capacity of 240 feet per eight-hour shift can be maintained, approximately 3.5 tons of samples will be made available per shift. Since the testing program planned for Phase 2 requires, as will be described below, a total daily sample of eight tons, the auger-drill samples will be supplemented by samples obtained by trenching and pitting at other areas, yet to be selected, in the breccia zone. Additional auger-hole samples could also, of course, be obtained by putting the drilling program on a two-shift basis, if this were considered necessary.

In all cases it is proposed to eliminate the weathered peridotite-breccia ("yellow ground") from consideration because, first, this type of surface material is not amenable to the concentration process contemplated, and second, the proportion of "yellow ground" is small as compared to the assumed available tonnage of unweathered breccia.

Assuming that Phase 2 will take one year to complete, the drilling done in this period will total approximately 72,000 feet.

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The recovery methods contemplated for use in the determination of the tenor of the Arkansas deposit have all been tested and proved in South African operations. Heavy-media separation is now in use both at the Premier and at Kimberley, and grease-tables of new design, with approximately ten times the capacity of former tables and of much greater efficiency in the recovery of fine material, have been installed at the Premier. The electro-static method for the treatment of the HMS concentrates has been tested by Premier and is now being used at diamond-recovery operations in western South Africa. A still further development in the recovery of fine diamond material is the use of air-flotation methods, but these have not yet been applied commercially on a large scale in South Africa.

The writer, as Manager of Boart Products, Limited, an Oppenheimer industrial diamond company, had the opportunity of observing the results obtained by these new methods.

It is proposed that our recovery units for determining the average value of the breccia in Phase 2 would comprise the following:

(1) One HMS unit, with 3-foot cone, capable of processing one ton of material per hour. (See appended photograph of Wemco laboratory unit.)

(2) One Electro-static Separator. (This unit will be used to recover the diamonds from the HMS concentrate and also to perform possible testing of alluvial ground associated with the kimberlite pipe.)

(3) Accelerated Grease-table. (The design of this unit must be obtained through contacts in South Africa.)

As already mentioned, it is planned to conduct some small-scale tests of adjacent alluvial ground for the purpose of determining if surface deposits of this type have any appreciable diamond content. Such tests can be made from time to time as the program progresses.

Cost estimates for both Phase 1 and Phase 2 are given in a following section.

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V. ESTIMATE OF COSTS

Phase 1 of Project (Based on one-month period)	Estimated Cost
(1) Auger-drilling for sample	No charge
(2) Test work by Western Machinery Co., San Francisco (including cost of freight shipment of sample)	$ 1,250.
(3) Supervision	1,000.
(4) Expenses	500.
TOTAL COST FOR PHASE 1	$ 2,750.

Phase 2 of Project (Based on operation of one year)

(a) Independent Contracts	
(1) Mechanical trenching @ 50 cents/lineal foot. (4000')	$ 2,000. for samples
TOTAL	$ 2,000
(b) Labor, Supervision and Consultants	
(1) For Heavy Media Plant & Trenge table	
2 operators @ $400.00 per month ($800)	$ 9,600
(2) Electro-Static Separator Unit	
1 operator @ $500.00 per month	6,000
(3) Office	
1 Recording clerk @ $300.00 per month	3,600
(4) Geologist ($400.00 per month)	4,800
(5) Superintendent	12,000
(6) Consultants	
Mining Engineering and geology	3,000
Heavy Media Plant	1,500
SUB-TOTAL	$40,500

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V. ESTIMATE OF COSTS (cont'd)

Phase 2 of Project (cont'd)

(b) Labor, Supervision and Consultants (cont'd) Br. Fwd. $10,500

(7) Analytical Work (petrographic, chemical, etc.) 2,000

(8) Current Labor

2 men @ $175.00 per month each ($350) 4,200

TOTAL $16,700

(c) Operating Materials and Supplies

(1) Sample containers (Detroiter Samples Cans)

150 @ $10.00 $ 1,500

(2) Fencing (6' high with angle top) 2,800

(3) Jackhammer with equipment (gasoline driven) bits, etc. 2,000

(4) Small tools 500

(5) Miscellaneous 1,000

(6) Ferro-silicon Media 500

TOTAL $ 8,300

(d) Operating Equipment

(A) Heavy Media Testing

(1) Portable washing plant with 9 x 16 jaw crusher, hopper, screen, dewatering equipment, etc. 18,400 lbs. 40 H.P. $14,000

(2) Heavy Media Unit with 3-ft. cone, 18 x 48 washing screen, magnetic separator (less air compressor) 15,000 lbs. 14,000

(3) Water pump and tank (4500 lbs, 7 H.P.) 2,000

(4) Air Compressor (G.P., 20 H.P.) 2,200

(5) Secondary Crushing with rolls, 8 x 12 Baldwin Jigs and conveyor 4,[illegible]

SUB-TOTAL $36,400

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

V. ESTIMATE OF COSTS (cont'd)

Phase 2 of Project (cont'd)

(d) Operating Equipment (cont'd)

(A) Heavy Media Section (cont'd). Mr. Fed. $36,400

(6) Operating Costs @ 30 cents/ton (200 tons/year) 500

$37,000

Add freight and installation $10,000

Total for Heavy Media Section $47,000

(B) Grease table and equipment, hoses, valves, etc. (To be designed and manufactured) 6,000

(C) Electro-Static Unit (and equipment)

1/2 ton per hour unit 5,000

(D) Drilling Equipment

Mobile Drill No. X-52 with equipment 9,000
Operating Costs @ $4.50 per hour (3000 hrs.) - including operators 13,500

(E) Truck (1/2 ton vehicle) 3,000

TOTAL $83,500

(e) Rehabilitation and Repairs

Repairs and alterations to existing laboratory and office building on the site. 1,000

TOTAL

(f) New Buildings, Improvements, and Installations none

(g) Miscellaneous (not itemized) TOTAL $ 5,000

Total Cost of Phase 2 $[illegible],770

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

V. ESTIMATE OF COSTS (cont'd)

SUMMARY OF ESTIMATED COSTS

Phase 1:	$ 2,750
Phase 2:	
(a) Independent Contracts	2,000
(b) Labour, Supervision and Consultants	46,700
(c) Operating Materials and Supplies	8,300
(d) Operating Equipment	83,520
(e) Rehabilitation and Repairs	1,000
(f) New Buildings, etc. (none)	-
(g) Miscellaneous	5,000
	$146,520
Add 10% Contingencies	14,652
TOTAL ESTIMATED COSTS	$161,172

John G. St. Clair
708 Hoover Street
Norman, Oklahoma

VI. OPERATING EXPERIENCE AND BACKGROUND OF APPLICANT

Education: University of Minnesota
University of Oklahoma - B.S., 1934

1924 - 1934: Experience as diamond-drill runner, setter and superintendent of drilling operations.

1934 - 1935: Superintendent of Diamond Drilling, Saza Gold Mines, Lupa Gold Field, Tanganyika, East Africa.

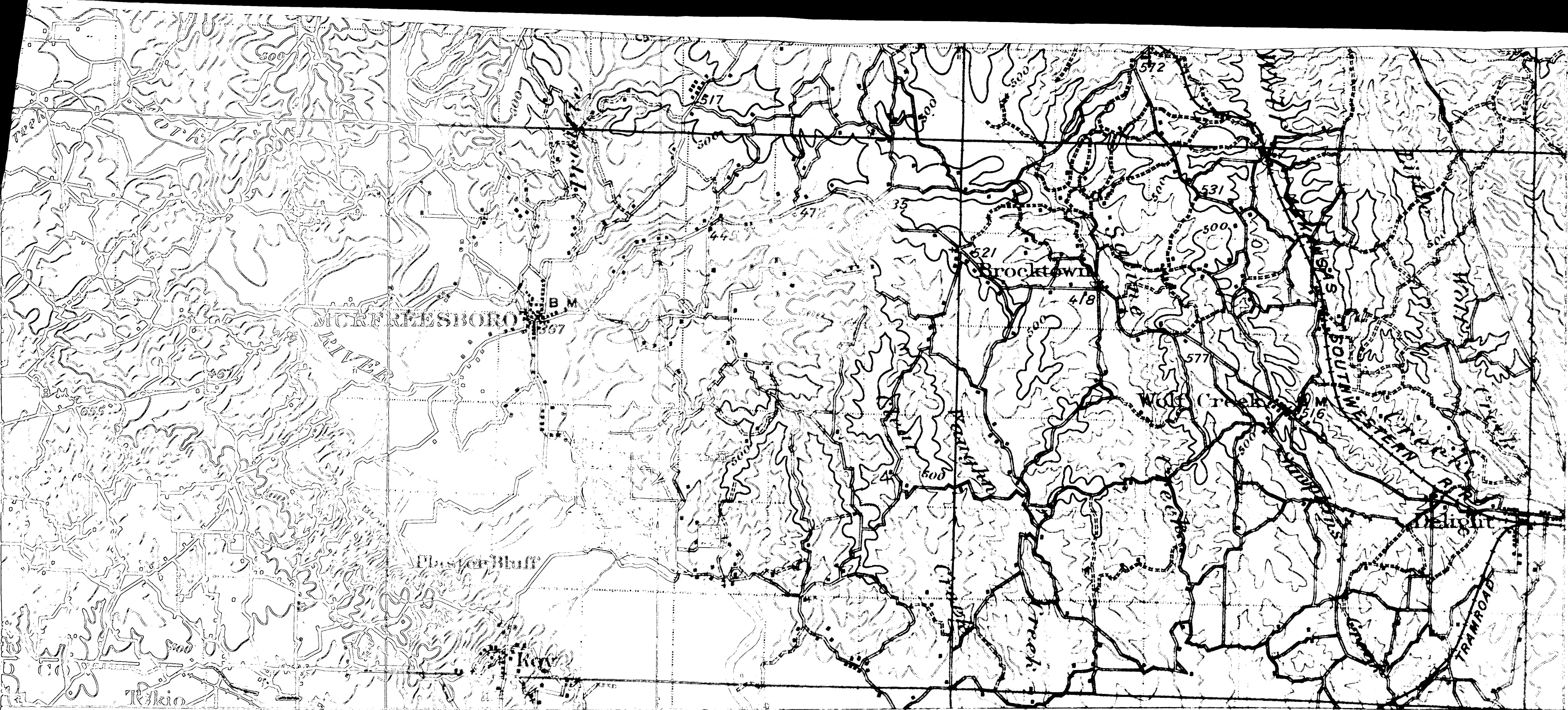
1936 - 1939: Consultant on Exploration and Diamond Drilling for New Consolidated Goldfields, Nigel Gold Mining Co., South Roodepoort Main Reef Areas, and other companies on the Rand, South Africa.

1939 - 1945: (Except one and one-half years in armed forces): Director of Research, New Consolidated Goldfields - Boart Products Research Laboratory, an organization devoted to the development and utilization of diamond tools and products; also, Superintendent of Diamond Drilling Operations, New Consolidated Goldfields, Johannesburg.

1945 - 1948: Manager, Boart Products, South Africa, Limited, Johannesburg.

1948 - 1951: Independent Diamond Dealer.

1951 - 1953: Consulting Mining Geologist.



Scale 1/125000

2 3 4 5 6 7 8 9 Miles

3000 6000 9000 12000 Yards

0 5000 10000 15000 20000 25000 Feet

1 0 1 2 3 4 5 6 Kilometers

Contour interval 50 feet.

Datum is mean sea level.

St. CLAIR LEASE

Maps of the Glenwood and Athens quadrangles, scale 1:62 500, from later and more detailed surveys covering the north half of this area, is available

DOCKET DMEA 3007 - DIAMONDS
JOHN Q. ST. CLAIR
PIKE COUNTY, ARKANSAS

Polyconic projection.

FIG. I

CADDO GAP ARK.
Edition of July 1908, reprinted 1946
N3400-W9330/30

DMEA-3097
Diamonds
Region VI

JOHN Q. ST. CLAIR, NORMAN, OKLAHOMA. Arkansas Diamond Mines, Pike County, Arkansas. 7-20-53 #244

Letter to the Field requesting a review of the application, a field examination if necessary, and report and enclosing copies of memoranda from the Bureau of Mines and the Geological Survey. Letter to the Applicant.

Summary of Docket

application received — 6-30-53
Application Purposes.
Phase I

(1) auger sampling	no charge
(2) Test work at Western Machinery	$1250
(3) Supervision	$1000
(4) other expense	$500
	$2750

Phase II

(1) Independent contractors	$2000
(2) Labor & Supervision	$46.700
(3) Operating vehicles & supplies	$8.300
(4) operating equipment	$83.520
(5) Rehabilitation & Repairs	$1000
(6) New Buildings	none
(7) Misc	$5000
	$146.520
10% contingencies	14 652
	$161.172

@ 90% probability

application
Determine true tenor of ore. (diamonds & percentage)
Build pilot plant and test large sample.

Fixed Item for process.

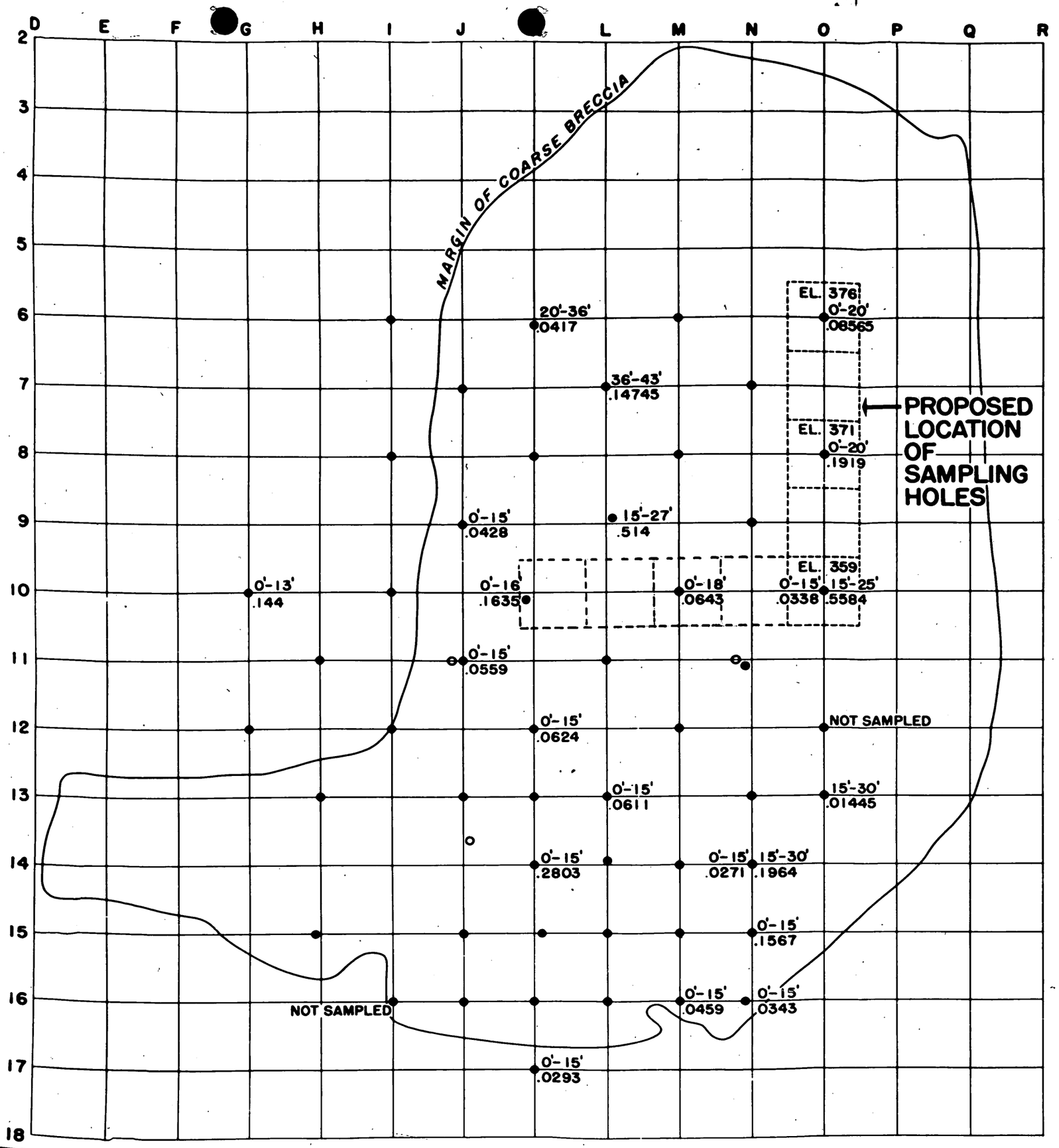
Sampling labor 20 days @ $16.00/day	$320
Test work at Nestor Machinery.	$1250
Supervision	$600
Misc. expenses	$500
	$2670.00

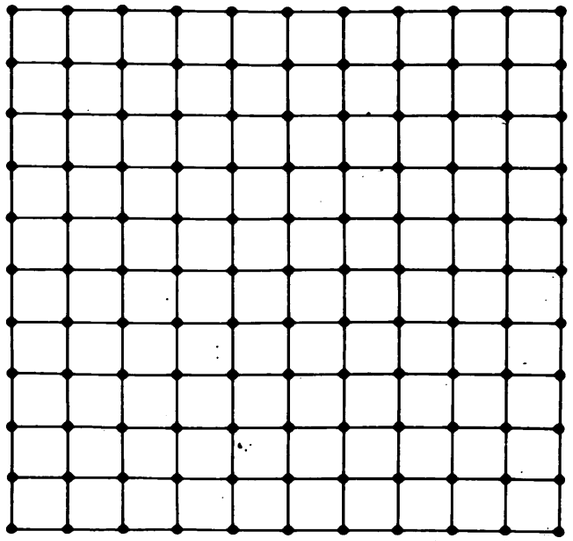
Confirmation and Stage II if stage I is successful.

Bureau of Mines recommends work
Survey recommends work.

Status of pending application
Waiting for owners consent to bill
& information on Tarsi & agreement

Analysis of application
Phase I ① Prove presence of small deposits
Phase II ① Prove Permanente ~~Prove~~ metallurgical recovery possible.





Suggested plan of holes for each 100' X 100' area

LEGEND

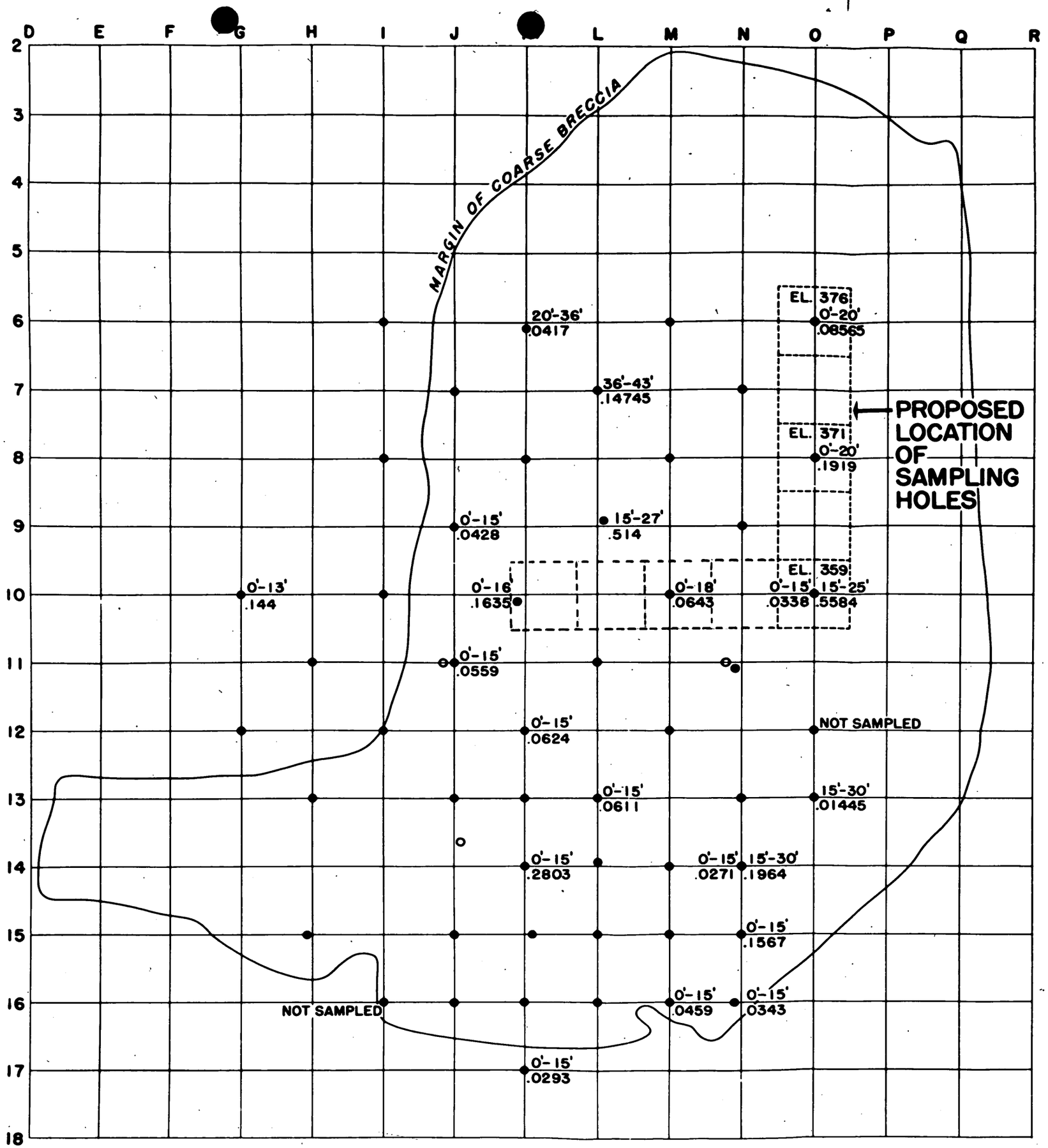
- Holes drilled by Bureau of Mines
- 20' X 36' .0417 cts./cu. yd.

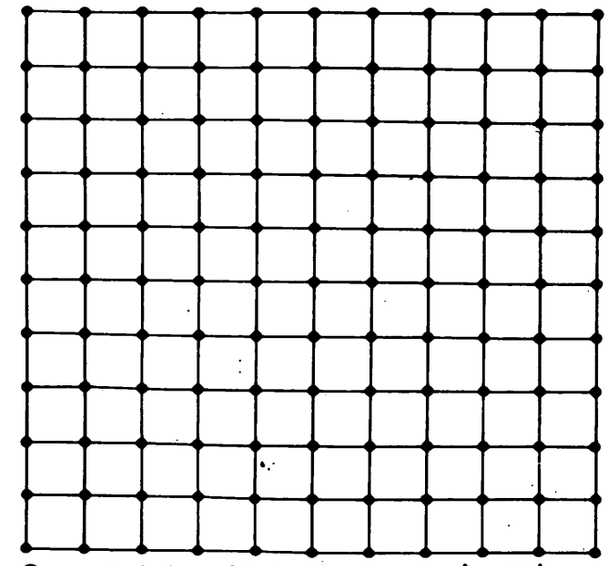
EXPLORATION PROGRAM

ARKANSAS DIAMOND MINES

PIKE COUNTY, ARKANSAS

22nd June, 1953





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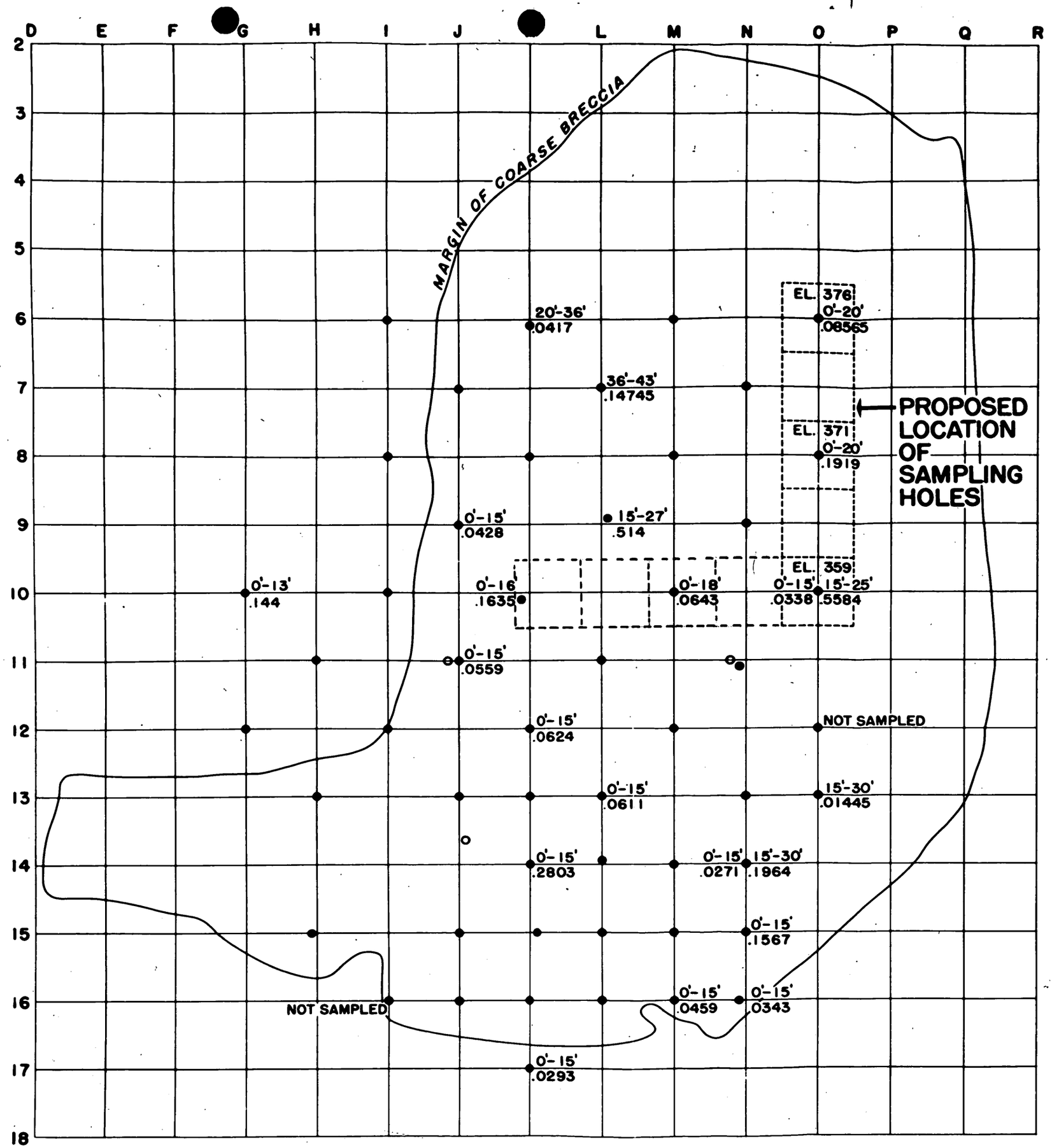
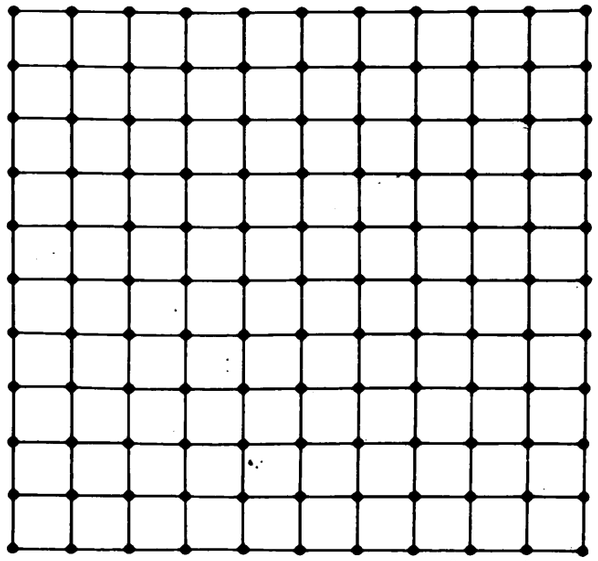
EXPLORATION PROGRAM

ARKANSAS DIAMOND MINES

PIKE COUNTY, ARKANSAS

22nd June, 1953





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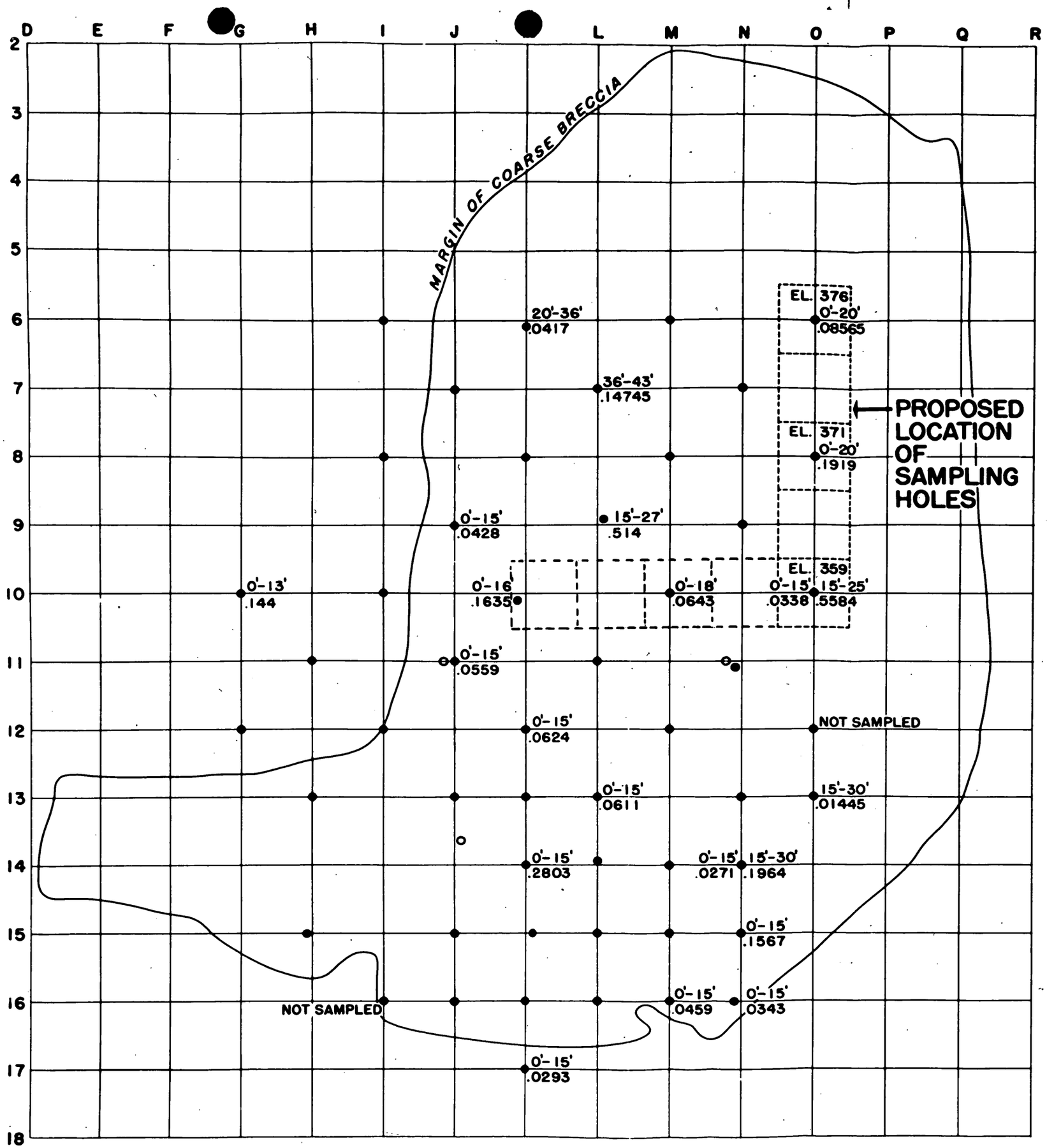
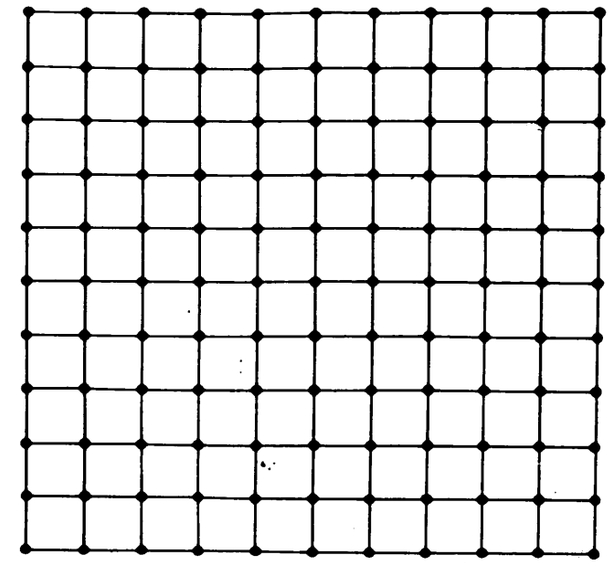
EXPLORATION PROGRAM

ARKANSAS DIAMOND MINES

PIKE COUNTY, ARKANSAS

22nd June, 1953





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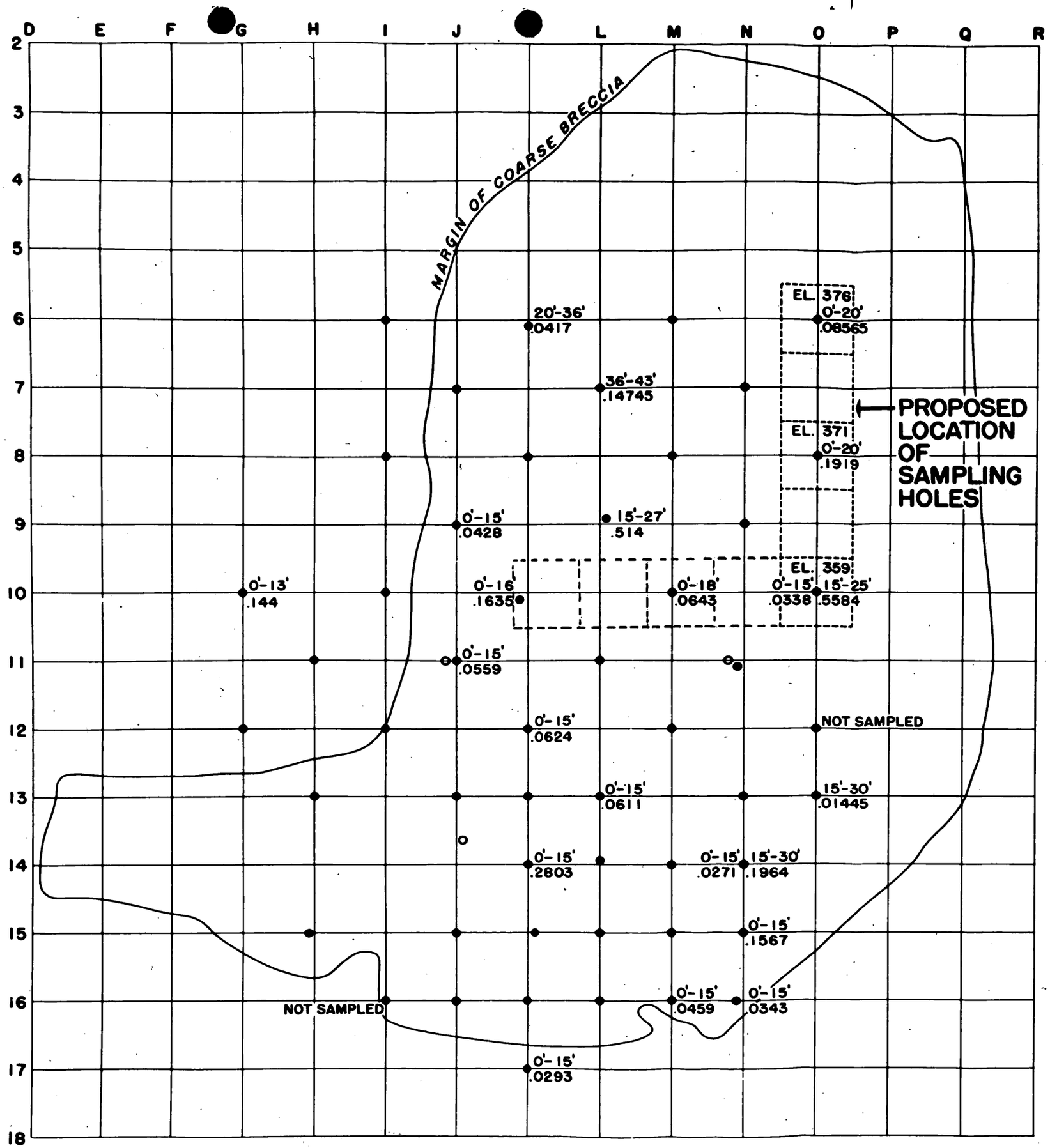
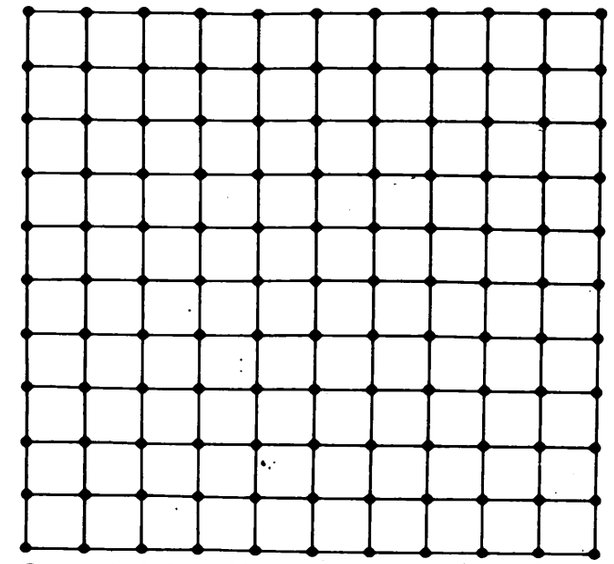
EXPLORATION PROGRAM

ARKANSAS DIAMOND MINES

PIKE COUNTY, ARKANSAS

22nd June, 1953





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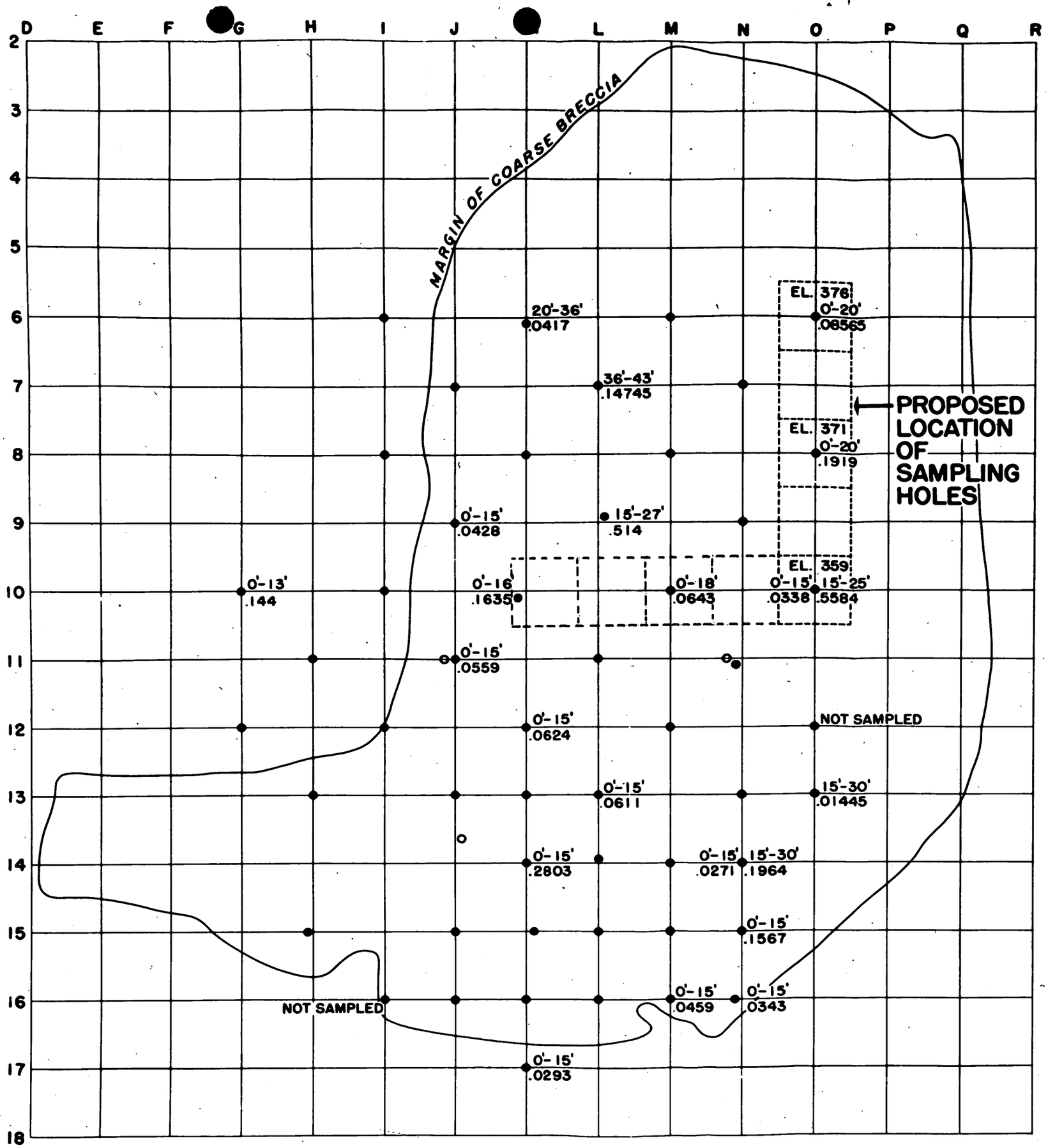
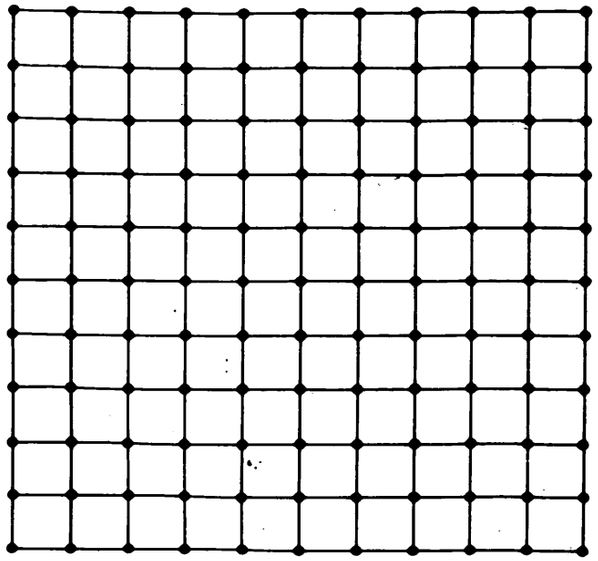
EXPLORATION PROGRAM

ARKANSAS DIAMOND MINES

PIKE COUNTY, ARKANSAS

22nd June, 1953





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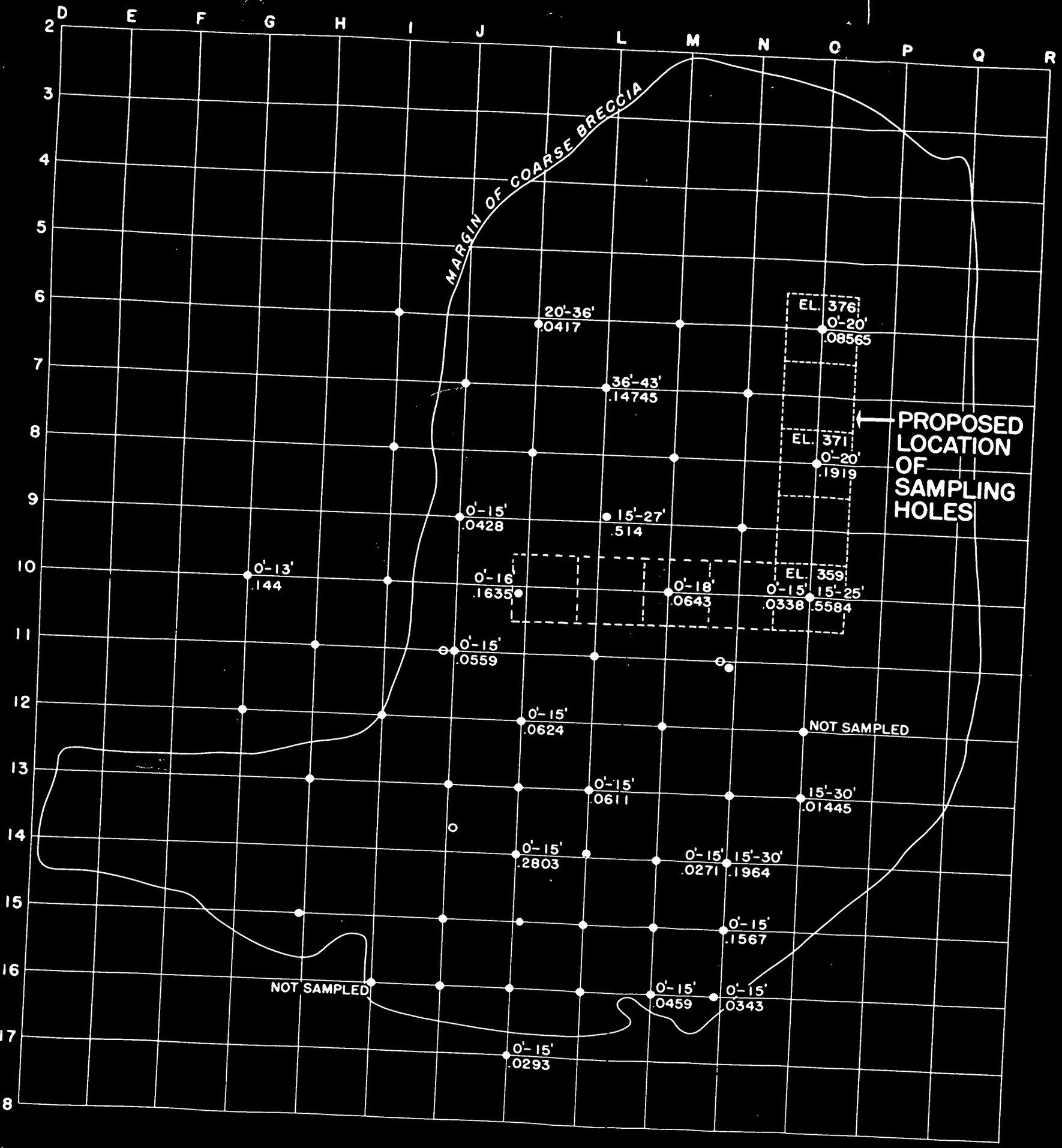
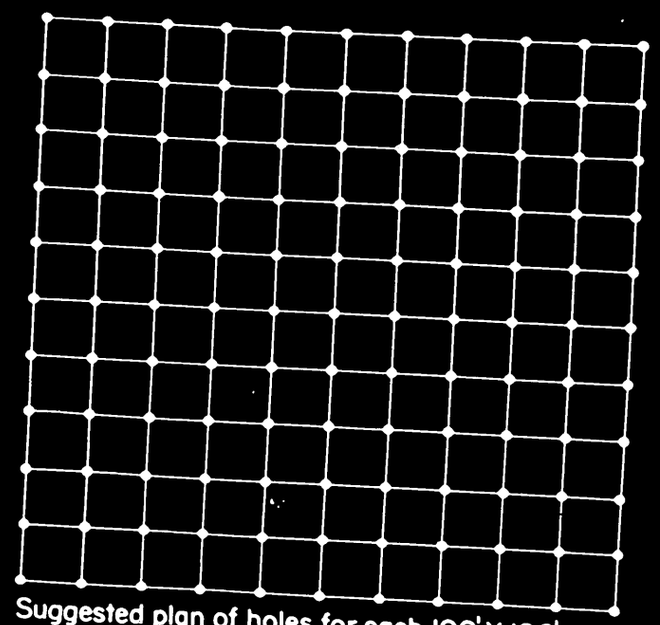
EXPLORATION PROGRAM

ARKANSAS DIAMOND MINES

PIKE COUNTY, ARKANSAS

22nd June, 1953





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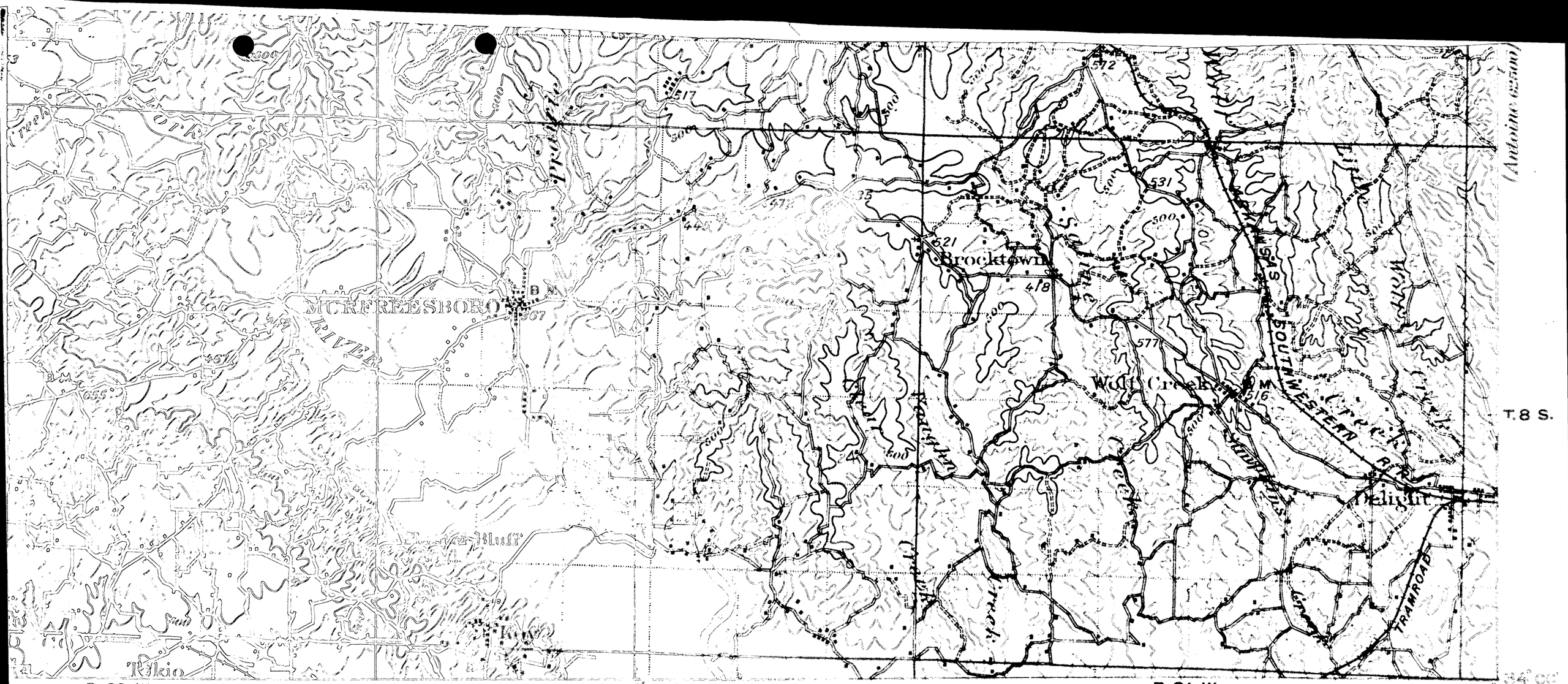
EXPLORATION PROGRAM

ARKANSAS DIAMOND MINES

PIKE COUNTY, ARKANSAS

22nd June, 1953



Scale 1:250000

2 3 4 5 6 7 8 9 Miles

3000 6000 9000 12000 Yards

0 5000 10000 15000 20000 25000 Feet

1 0 1 2 3 4 5 6 Kilometers

Contour interval 50 feet.

Datum is mean sea level.

Maps of the Glenwood and Athens quadrangles, scale 1:62 500, from later and more detailed surveys covering the north half of this area, is available

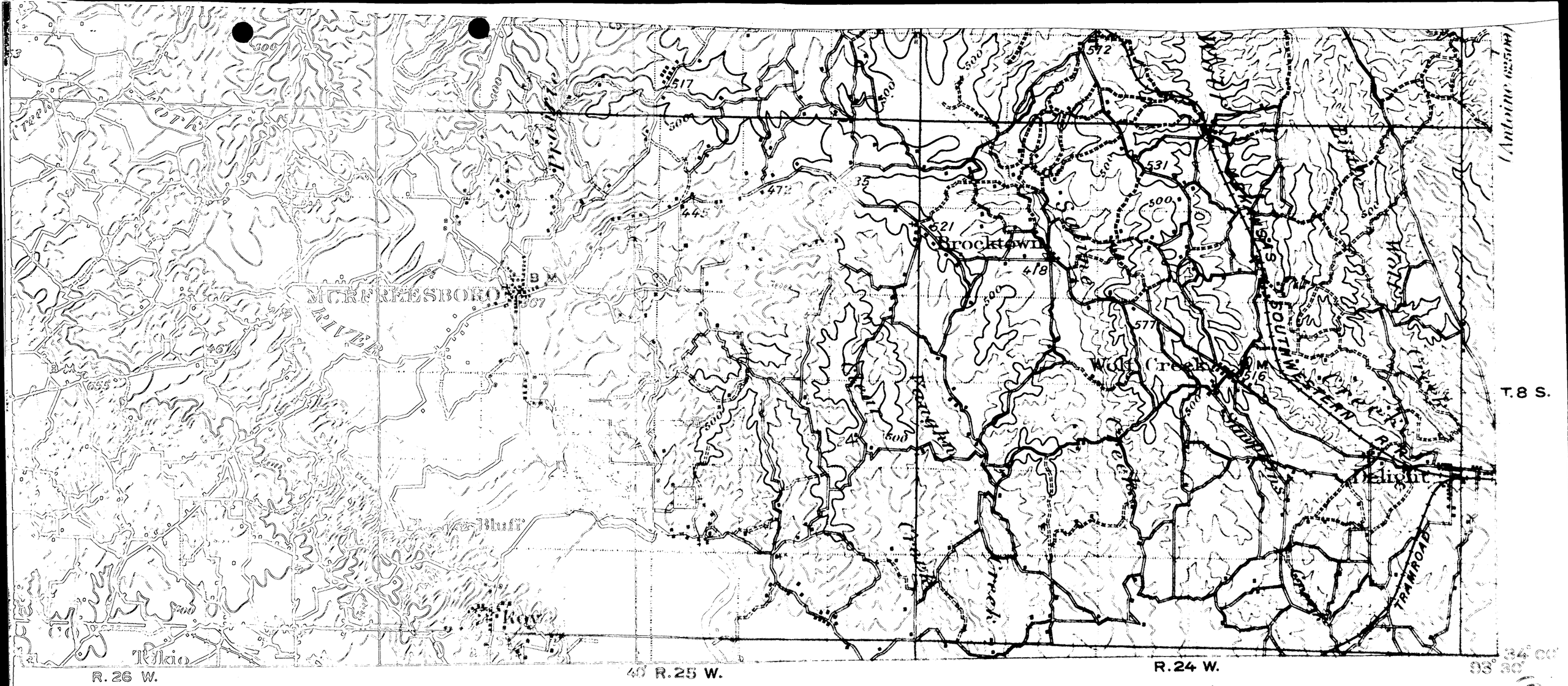
Polyconic projection.

FIG. I

CADDO GAP ARK.

Edition of July 1906, reprinted 1946

N3400 W9330/30



Scale 1:62500

2 3 4 5 6 7 8 9 Miles

0 3000 6000 9000 12000 Yards

0 5000 10000 15000 20000 25000 Feet

1 0 1 2 3 4 5 6 Kilometers

Contour interval 50 feet.

St. Clair Lease

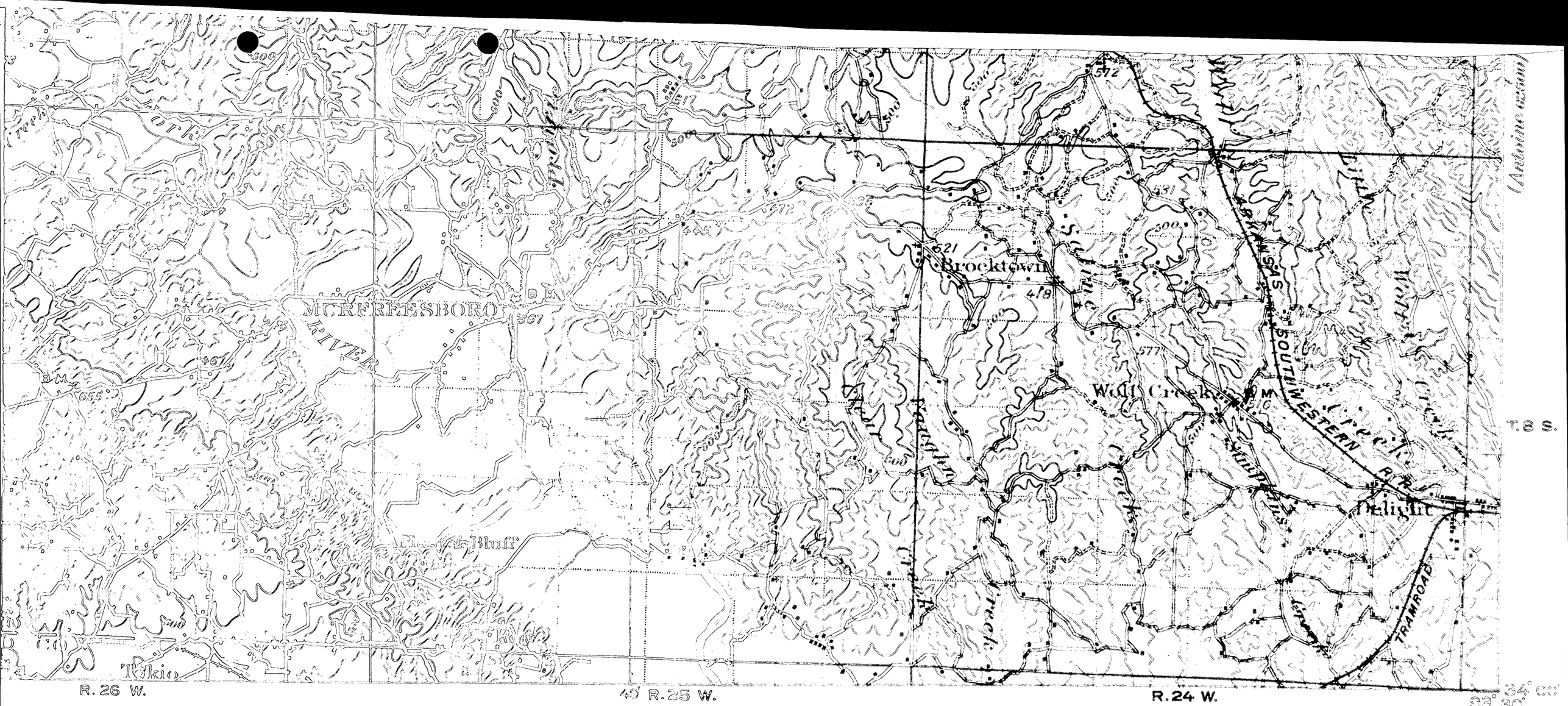
Maps of the Glenwood and Athens quadrangles, scale 1:62 500, from later and more detailed surveys covering the north half of this area, is available

Polyconic projection.

FIG. I

DOCKET DMEA 3097 - DIAMONDS
JOHN Q. ST. CLAIR
PIKE COUNTY, ARKANSAS

CADDO GAP, ARK.
Edition of July 1906, reprinted 1946
N3400 W9400/30



Scale 1:25000

2 3 4 5 6 7 8 9 Miles

3000 6000 9000 12000 Yards

0 5000 10000 15000 20000 25000 Feet

1 0 1 2 3 4 5 6 Kilometers

Contour interval 50 feet.

Datum is mean sea level.

Maps of the Glenwood and Athens quadrangles, scale 1:62 500, from later and more detailed surveys covering the north half of this area, is available

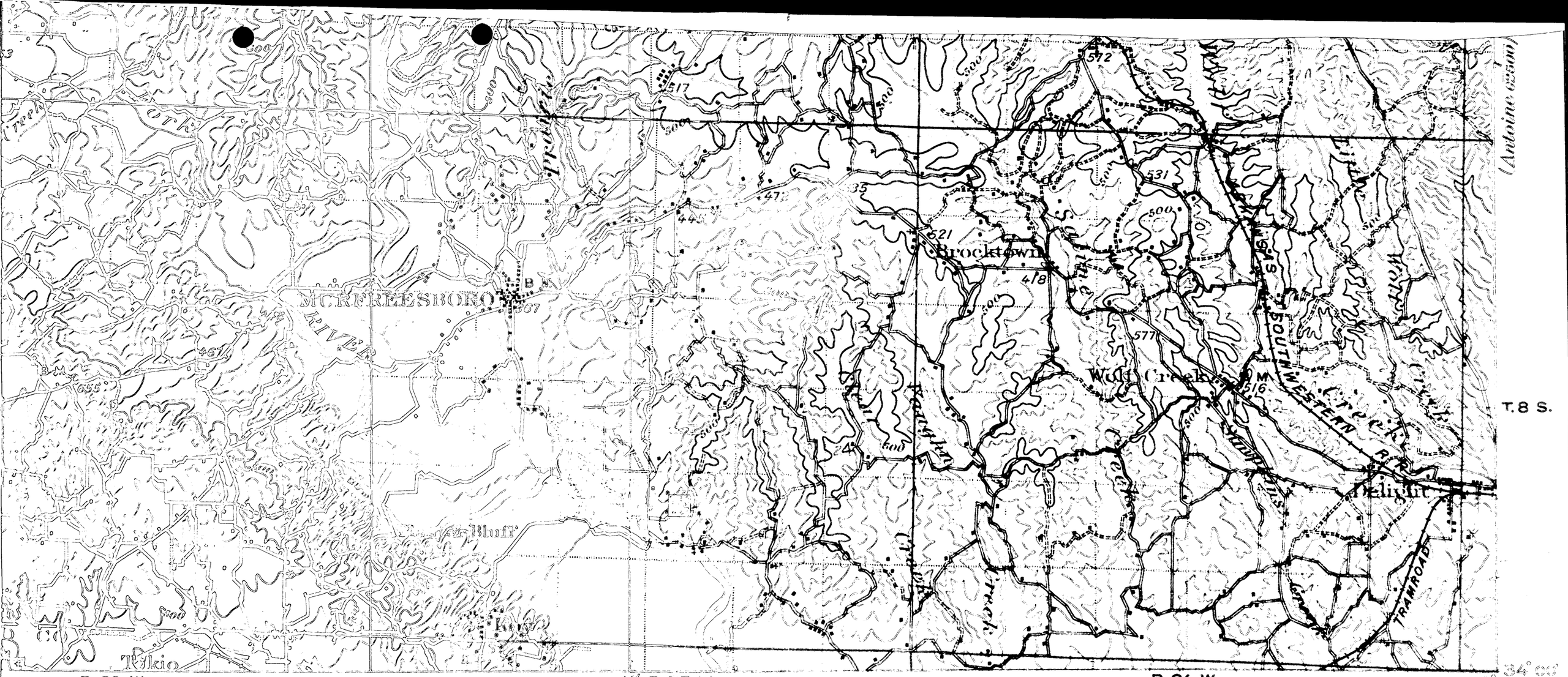
Polyconic projection.

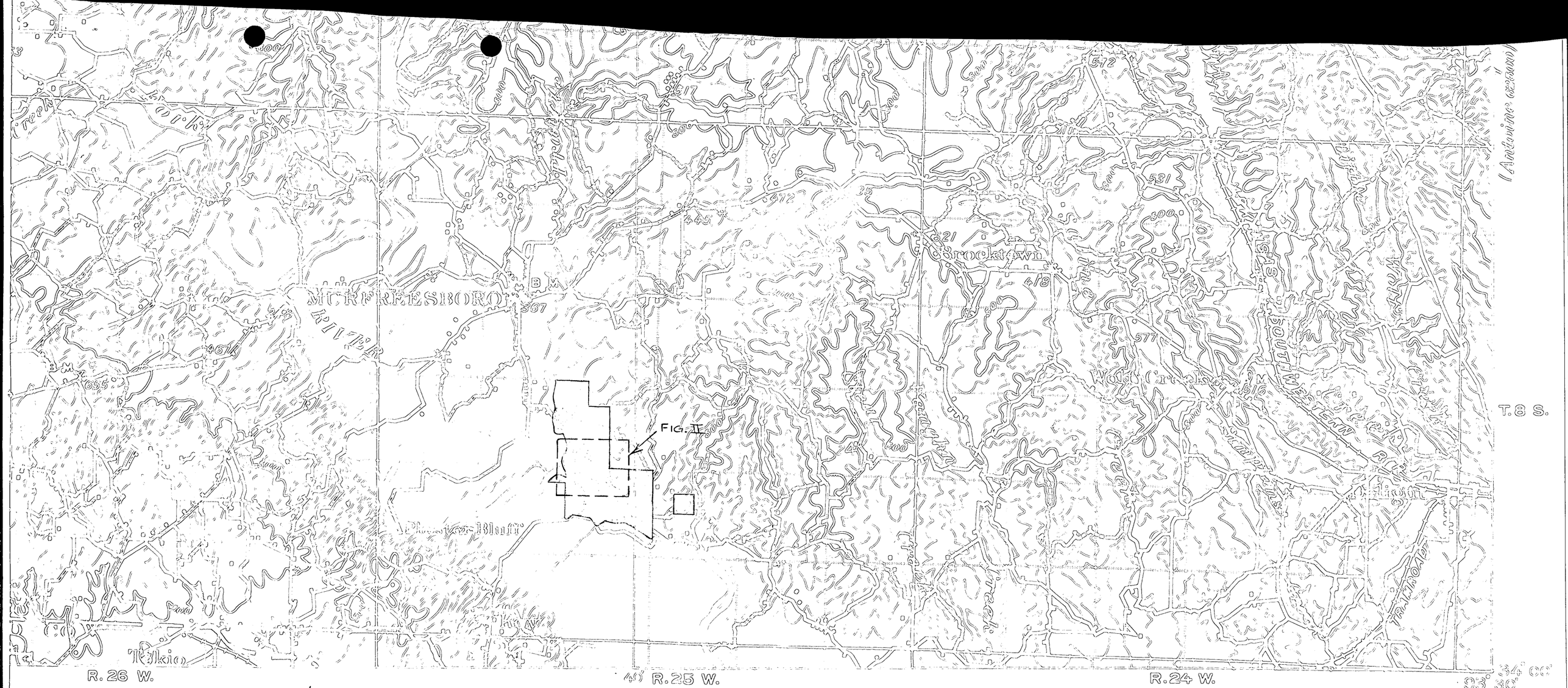
FIG. I

CADDO GAP, ARK.

Edition of July 1906, reprinted 1946

N3400 W9330/20


Antoine 6300
T. 8 S.
Prairie
Creek
McFRIESBORO
RIVER
Brocktown
Wolf Creek
Kanatia
Creek
Prairie
Creek
Delight
Bluff
Tokio
TRAMROAD
R. 26 W.
40' R. 25 W.
R. 24 W.
34° 00'
93° 30'
Scale 1:62500
Miles
Yards
Feet
Kilometers
Contour interval 50 feet
above mean sea level.
Polyconic projection.
Maps of the Glenwood and Athens quadrangles, scale 1:62 500, from later and more detailed surveys covering the north half of this area, is available
FIG. I
GADDO GAP, ARK.
Edition of July 1906, reprinted 1946
N3400 W9330/30



Scale 1/125,000 1/63360 ±

2 3 4 5 6 7 8 9 Miles

30000 60000 90000 120000 Yards

0 5000 10000 15000 20000 25000 Feet.

1 0 1 2 3 4 5 6 Kilometers

Contour interval 50 feet.

Datum is mean sea level.

ST. CLAIR LEASE

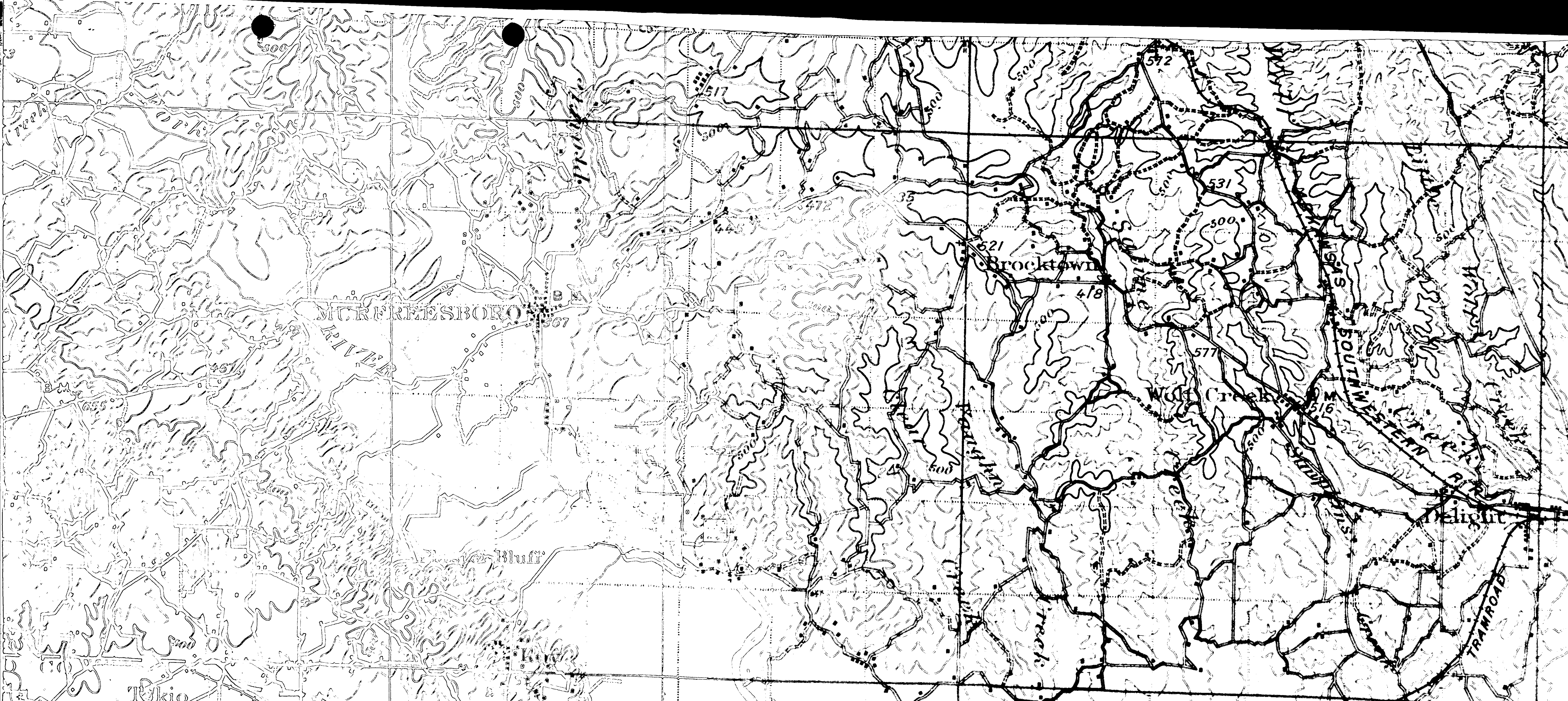
Maps of the Glenwood and Athens quadrangles, scale 1:62 500, from later and more detailed surveys covering the north half of this area, is available

DOCKET DMEA 3097 - DIAMONDS
JOHN Q. ST. CLAIR
PIKE COUNTY, ARKANSAS

Polyconic projection.

FIG. I

CADDO GAP ARK.
Edition of May 1906, reprinted 1946
N3400 W9330/30



Scale 1/125000

2 3 4 5 6 7 8 9 Miles

3000 6000 8000 12000 Yards

0 5000 10000 15000 20000 25000 Feet

1 0 1 2 3 4 5 6 Kilometers

Contour interval 50 feet.

Datum is mean sea level.

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DOCKET DMEA 3097 - DIAMONDS
JOHN Q. ST. CLAIR
PIKE COUNTY, ARKANSAS

Polyconic projection.

FIG. I

CADDO GAP, ARK.

Edition of July 1906, reprinted 1946

N3400 W9330/30

In Hand
S-4637

FEB - 9 1954

Mr. John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

Re: Docket No. DMA-3097 (Diamonds)
Arkansas Diamond Mine
Pike County, Arkansas

Dear Mr. St. Clair:

Reference is made to your telephone conversation of January 20 and 24, 1954, with Mr. L. T. Hook, concerning the captioned application which has been held in an inactive status due to your inability to furnish a new Owner's Consent to Lien in accordance with the instructions in our letter dated September 15, 1953. Mr. Hook in his recent conversations with you expressed some doubt as to the ultimate approval of your application and questioned the advisability of spending more time in securing an acceptable Consent until the factual aspects of the application were first reviewed by the DMA to determine if the proposed work met the requirements of the exploration regulations. You concurred in that procedure.

Our review indicates that the objective of your project is to first determine whether known sources of diamond-bearing peridotite breccia are amenable to recovery methods employed in Africa and, if so, to construct a beneficiation plant of sufficient capacity to conduct a more comprehensive program with a view of justifying a large-scale commercial operation. It is proposed to select sample material by core drilling and mechanical trenching in areas where previous exploration has delineated the most favorable mineralization. You estimate the cost of such a program to be $161,172, of which 90% would be furnished by the DMA.

It is our opinion that your project is designed to demonstrate the feasibility of commercial recovery of fine-mesh gem and industrial diamonds from presently known sources and therefore cannot be approved as an exploration project as defined under Section 2(a) of our regulations. Your request for exploration funds for that stated purpose is accordingly denied.

Your interest in this difficult recovery problem is greatly appreciated, and it is regretted that our decision in this instance was not made and conveyed to you in the early consideration of your application.

Sincerely yours,

O. O. Mittendorf

Administrator

LCHouk/OOMittendorf/wih
2/5/54
Copy to: Docket
Adm. Reading File
Field Team, Region VI (2)
Operating Committee
Messrs. Hedges - 4604
Chandler - 3520
Larrabee - G-232 GSA Bldg.
Houk _____

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

January 27, 1954

Memorandum

To: Mr. Lawrence G. Houk, Chief, Nonmetallic Minerals Division, Defense Minerals Exploration Administration

From: Commodity Specialist, Construction and Chemical Materials Branch

Subject: Review of report by Mr. W. P. Williams, Region VI, on Docket No. DMEA-3097, Arkansas Diamond Mine

On August 13 and 14, 1953, Mr. W. P. Williams and Mr. Norman F. Williams, Arkansas State Geologist, made a field examination of the Arkansas Diamond Mine, Pike County, Arkansas.

The recommendation was that a DMEA contract be approved allowing the applicant, Mr. John Q. St. Clair of Norman, Oklahoma, to perform exploration and testing work in stages.

As it is the only prospective source of diamonds in North America we concur with Mr. Williams that this deposit should be investigated with sufficient thoroughness to determine whether or not it contains enough additional small diamonds to warrant commercial development.

Henry P. Chandler, Commodity Specialist
Construction and Chemical Materials Branch

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

January 27, 1954

Memorandum

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From: Commodity Specialist, Construction and Chemical Materials Branch

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Construction and Chemical Materials Branch

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Henry P. Chandler, Commodity Specialist
Construction and Chemical Materials Branch

FILE COPY
SURNAME:

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

Houk
Hedges
Thuth
Selbridge
Johnson

Mr. John G. St. Clair
708 Hoover Street
Norman, Oklahoma

Re: Docket No. DMEA-3097 - Diamonds
Arkansas Diamond Mine
Pike County, Arkansas

Dear Mr. St. Clair:

Your application for aid for an exploration project and other data available to us in Washington concerning your application have been reviewed.

Projects approved by the Defense Minerals Exploration Administration must, in its judgment, show definite promise of yielding materials of acceptable grade in quantities that will significantly improve the mineral supply position for the National Defense Program.

Careful study of all our information, although noting a small amount of industrial diamonds (bort) on your property, indicates to us that the probability of disclosing minable reserves of diamond bearing material is not sufficiently promising to justify Government participation. We regret to advise you, under these circumstances, that your application for exploration assistance is denied.

We wish to thank you for your interest in the Defense Minerals Program and for bringing your property to our attention.

Sincerely yours,

Administrator

Not sent

LGHouk:gad 1/26/54

Copy to: Admr. R. File
Docket File
Field Team, Region VI
Operating Committee
Mr. Chandler, 3520
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

January 25, 1954

Mr. John Q. St. Clair calling Mr. L. G. Houk re: Docket No. DMEA-3097.

Mr. St.Clair: I am calling to ask if you have received that information from Noel?

Mr. Houk: No it has not come through yet.

Mr.St.Clair: He said he would get it to you the next day. I thought you would have it by now.

Mr. Houk: No, we have not received it. The Operating Committee thinks this work is more in the nature of metallurgical testing in which we would be unable to participate under an exploration program. It does not look very encouraging at the present time. I wonder if you want to go to the trouble of having the owner's rights defined until we can get a decision. We can get a decision without the Owner's Consent to Lien.

Mr. St.Clair: We have not sent in the Owner's Consent to Lien yet.

Mr. Houk: That is right. I don't think it encouraging as it is principally metallurgical testing.

Mr. St.Clair: Write me a letter to that effect.

Mr. Houk: I will try to get a final determination within the next week.

Mr.St.Clair: If you don't think you can go ahead I will pull that equipment out of there. I would like to know as soon as possible.

Mr. Houk: I will get busy on it and hope to get it to you within a week.

Mr. St.Clair: I will appreciate that.

DEFENSE MINERALS ADMINISTRATION

97023

PRODUCTION EXPANSION DIVISION

PROCUREMENT APPLICATIONS

Name of Company and Address _____

Name of Mine and Location _____

Docket No. DMA - _____ Date received by P.E.D. _____

Metals or Minerals involved _____

Length of Contract (preproduction plus production) _____

Amount of Metals or Minerals in tons, units or pounds _____

Floor price or Guaranteed price and whether or not escalated _____

Maximum Government Commitment _____

Comments on Contract: _____

_____

_____

_____

_____

_____

Date sent to Legal Division _____

Date of Recommendation to D.P.A. for Certification _____

Date Certification sent to G.S.A. by D.P.A. _____

Date signed into Contract by G.S.A. _____

Additional Remarks: _____

_____

_____

_____

_____

NOTE: If application is denied, or if it is recommended for change into exploration, etc., please state under additional remarks.

Interior—Duplicating Section, Washington, D. C.

Signed _____

January 20, 1954

Mr. John Q. St. Clair calling Mr. Houk from Norman, Oklahoma.
Re: Docket No. DMEA-3097 - Diamonds
Arkansas Diamond Mine
Pike County, Arkansas

Mr. St.Clair: Mr. Noel said he would give you a ring.

Mr. Houk: ~~He has and assured me that he~~ would provide us with the "A" ~~trust agreement~~. The request contained in our letter of Sept. 15, 1953: "It is noted that the lease is executed by two trustees, jointly, as lessors. However, the settler of the trust (that is the creator of the trust) is not identified except by reference to a "Trust Number 'A'" created in an agreement dated July 1, 1941, which is unrecorded, and the nature of the trust is undisclosed. Therefore, we require that the Trust Agreement be further identified in execution of the Owner's Consent to Lien, that is, that the name of the creator of the trust be disclosed; and also that the nature of the trust be disclosed, that is, whether under a will or otherwise."

Mr.St.Clair: They have been very lax in getting that in there to you. You made a deadline until the 15th of January, 1954.

Mr. Houk: No. Our letter read unless we hear from you.

Mr.St.Clair: That is the main point.

Mr. Houk: I was preparing a letter for you, when you wrote back to me that the question of the recovery of the minus 10 mesh would not be left to the Western Machinery Company. I wonder if we would be getting into difficulty.

Mr.St.Clair: I have not written because I did not know not if you would accept the information. I will do all my testing at the mine and send the samples to California.

Mr. Houk: You better give us some information on your equipment.

Mr.St.Clair: I went to California in October and we would be better off to do it right here.

Mr. Houk: I think that is wise.

Mr.St.Clair: We can run whatever we want then. It will give you a better picture and I will write you a note on it. Also, I have put a drill on the property.

Mr. Houk: You get that question of the rights of the Owner's Consent to Lien straightened out and whatever you decide to do on the metallurgical tests let us know.

Mr. Houk talked with Mr. Noel owner of the Arkansas Diamond Mine and he asked for an
1/20/54. explanation of the 5% royalty provision and promised to send the details asked for in our letter of September 15, 1953.

DEFENSE MINERALS ADMINISTRATION

97023

PRODUCTION EXPANSION DIVISION

PROCUREMENT APPLICATIONS

Name of Company and Address _____

Name of Mine and Location _____

Docket No. DMA - _____ Date received by P.E.D. _____

Metals or Minerals involved _____

Length of Contract (preproduction plus production) _____

Amount of Metals or Minerals in tons, units or pounds _____

Floor price or Guaranteed price and whether or not escalated _____

Maximum Government Commitment _____

Comments on Contract: _____

_____

_____

_____

_____

_____

Date sent to Legal Division _____

Date of Recommendation to D.P.A. for Certification _____

Date Certification sent to G.S.A. by D.P.A. _____

Date signed into Contract by G.S.A. _____

Additional Remarks: _____

_____

_____

_____

_____

NOTE: If application is denied, or if it is recommended for change into exploration, etc., please state under additional remarks.

Signed _____

Interior—Duplicating Section, Washington, D. C.

600

DEC 8 - 1953

Mr. John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

Re: Docket No. DMEA-3097 - Diamonds
Arkansas Diamond Mine
Pike County, Arkansas

Dear Mr. St. Clair:

Reference is made to our letters of September 15, and 16, 1953, requesting additional information necessary to further process your application for exploration assistance on industrial diamonds in Arkansas.

Inasmuch as we have received no reply we wish to inquire if you desire to proceed with the application. We wish to cooperate with you in the matter of allowing ample time to prepare this information but if we do not hear from you by January 15, 1954, we will then consider the docket closed.

On November 3, 1953, Amendment No. 3 to DMEA Order-1 eliminated industrial diamonds from the list of minerals eligible for exploration assistance. Your application will be processed under the criteria previously in effect. However, this office is making an effort to complete the processing of the deleted minerals at an early date.

Sincerely yours,

SIGNED

Lawrence G. Houk, Chief
Nonmetallic Minerals Division

LGHouk:gad 12/8/53
Copy to: Admr. R. File
Docket File
Field Team, Region VI
Mr. Chandler, 3520
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

600

SEP 1 6 1953

Mr. John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

Re: Docket No. DMEA-3097 - Diamonds
Arkansas Diamond Mine
Pike County, Arkansas

Dear Mr. St. Clair:

Reference is made to the air mail letter from the Western Machinery Company, dated September 14, 1953, on the subject of testing diamond bearing material from Pike County, Arkansas, particularly to the latter portion of the fourth paragraph which recommends sample preparation at the property before shipment to the laboratory in San Francisco. Any type of treatment that will eliminate the minus 10 mesh from the sample is objectionable, inasmuch as the principal thesis of your application is that the minus 20 mesh material contains appreciable quantities of diamonds.

The Western Machinery Company make no mention of method of treating the minus 20 mesh material and this is the area of our particular interest. Under no circumstances is the minus 10 mesh material to be eliminated from the sample. We wish to be provided with a statement from you or the Western Machinery Company on how separation of the minus 10 mesh diamonds from the gangue is to be accomplished.

Sincerely yours,

SIGNED

Lawrence G. Houk, Chief
Nonmetallic Minerals Division

LGHouk:gad 9/16/53
Copy to: Admr. R. File
Docket File
Field Team, Region VI
Mr. Chandler, 3520
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

UNITED STATES
DEPARTMENT OF THE INTERIOR 140
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

September 15, 1953

Memorandum

To: The Administrator
Through: L. Q. Houk

From: Chief Counsel

Subject: John Q. St. Clair - Docket No. DMEA-3097
(Industrial diamonds - bort)

There is attached, in satisfactory legal form for execution, a contract covering the above-identified project, subject to the attachment of the property map (Fig. 1) and the work map referred to in the contract; and subject to the attachment of the Owner's Consent to Lien.

It is noted that the lease is executed by two trustees, jointly, as lessors. However, the settlor of the trust (that is the creator of the trust) is not identified except by reference to a Trust Number 'A' created in an agreement dated July 1, 1941, which is unrecorded, and the nature of the trust is undisclosed. Therefore, we require that the Trust Agreement be further identified in execution of the Owner's Consent to Lien, that is, that the name of the creator of the trust be disclosed; and also that the nature of the trust be disclosed, that is, whether under a will or otherwise.

Albert E. Kane

for J. L. Hofflund
Chief Counsel

Attachments

HCRubin/ema
cc: Mails & Files
L. G. Houk
H. C. Rubin
J. L. Hofflund
Chron.

600

SEP 1 5 1953

Mr. John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

Re: Docket No. DMEA-3097 - Diamonds
Arkansas Diamond Mine
Pike County, Arkansas

Dear Mr. St. Clair:

Reference is made to the new Owner's Consent to Lien forms forwarded to you on September 10, 1953, for execution.

It is noted that the lease is executed by two trustees, jointly, as lessors. However, the settlor of the trust (that is the creator of the trust) is not identified except by reference to a "Trust Number 'A'" created in an agreement dated July 1, 1941, which is unrecorded, and the nature of the trust is undisclosed. Therefore, we require that the Trust Agreement be further identified in execution of the Owner's Consent to Lien, that is, that the name of the creator of the trust be disclosed; and also that the nature of the trust be disclosed, that is, whether under a will or otherwise.

Under separate cover the diamonds are being returned by registered mail.

Sincerely yours,

SIGNED

Lawrence G. Houk, Chief
Nonmetallic Minerals Division

LGHouk:gad 9/15/53
Copy to: Admr. R. File
Docket File
Field Team, Region VI
Mr. Chandler, 3520
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

600

SEP 10 1953

Mr. John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

Re: Docket No. DMEA-3097 - Diamonds
Arkansas Diamond Mine
Pike County, Arkansas

Dear Mr. St. Clair:

Reference is made to our telephone conversation of September 10, 1953, covering your application for exploration assistance.

We are enclosing seven copies of our new form of Owner's Consent to Lien to be signed by the lessor. It will be necessary to execute six copies of this new Owner's Consent to Lien form and forward them to this office.

Sincerely yours,

SIGNED
Lawrence G. Houk, Chief
Nonmetallic Minerals Division

Enclosures 7

LGHouk:gad 9/10/53

Copy to: Admr. R. File
Docket File
Field Team, Region VI
Mr. Chandler, 3520
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

IN REPLY REFER TO:

G-M-Cl

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

September 8, 1953

Memorandum

REVIEW OF FIELD TEAM REPORT ON APPLICATION DMFA-3097 (diamonds)

To: L. G. Houk, Defense Minerals Exploration Administration
From: D. M. Larrabee, U. S. Geological Survey
Applicant: John Q. St. Clair
Name of property: Arkansas diamond mine.
Location of property: Near Murfreesboro, Arkansas.
Date of field team report: August 26, 1953.
Authorship of field team report: W. P. Williams
Field team's recommendation:
Approval of Stage 1.
Approval of Stage 2 if Stage 1 is successful.

Comments:

1. Dr. Miser was unable to pan out any of the small size diamonds which are being sought, although he tried many times.

2. The Martin and Bureau of Mines explorations were unsuccessful.

3. Stage 2 should be entirely eliminated. If sufficient diamonds are found in Stage 1, the applicant should take over on his own.

ACTION SUGGESTED:

Approval of Stage 1, with duplicate samples provided for later work if desired, for a total cost of $3,000 - $,500, including person to check results of milling tests in California.

D. M. Larrabee

Larrabee:jch
9/8/53
cc: Director's reading file 4212
[redacted]
Branch reading 4212
DMFA 3
Larrabee G-230

IN REPLY REFER TO:

C-MD-CNM

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

September 8, 1953

Memorandum

REVIEW OF FIELD TEAM REPORT ON APPLICATION DMFA-3097 (diamonds)

To: L. G. Houk, Defense Minerals Exploration Administration
From: D. M. Larrabee, U. S. Geological Survey
Applicant: John Q. St. Clair
Name of property: Arkansas diamond mine.
Location of property: Near Murfreesboro, Arkansas.
Date of field team report: August 26, 1953.
Authorship of field team report: W. P. Williams
Field team's recommendation:
Approval of Stage 1.
Approval of Stage 2 if Stage 1 is successful.

Comments:

1. Dr. Miser was unable to pan out any of the small size diamonds which are being sought, although he tried many times.

2. The Martin and Bureau of Mines explorations were unsuccessful.

3. Stage 2 should be entirely eliminated. If sufficient diamonds are found in Stage 1, the applicant should take over on his own.

ACTION SUGGESTED:

Approval of Stage 1, with duplicate samples provided for later work if desired, for a total cost of $3,000 - $,500, including person to check results of milling tests in California.

D. M. Larrabee

Larrabee:jeh
9/8/53
cc: Director's reading file 4212
~~Division 4210~~
Branch reading 4212
DMFA 3
Larrabee G-230

IN REPLY REFER TO:

G-MC-CNT

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

September 8, 1953

Memorandum

REVIEW OF FIELD TEAM REPORT ON APPLICATION DMEA-3097 (diamonds)

To: L. G. Houk, Defense Minerals Exploration Administration
From: D. M. Larrabee, U. S. Geological Survey
Applicant: John Q. St. Clair
Name of property: Arkansas diamond mine.
Location of property: Near Murfreesboro, Arkansas.
Date of field team report: August 26, 1953.
Authorship of field team report: W. P. Williams
Field team's recommendation:
Approval of Stage 1.
Approval of Stage 2 if Stage 1 is successful.

Comments:

1. Dr. Miser was unable to pan out any of the small size diamonds which are being sought, although he tried many times.

2. The Martin and Bureau of Mines explorations were unsuccessful.

3. Stage 2 should be entirely eliminated. If sufficient diamonds are found in Stage 1, the applicant should take over on his own.

ACTION SUGGESTED:

Approval of Stage 1, with duplicate samples provided for later work if desired, for a total cost of $3,000-$[illegible],500, including person to check results of milling tests in California.

D. M. Larrabee

Larrabee:jeh
9/8/53
cc: Director's reading file 4212
~~Director's file~~
Branch reading 4212
DMEA 3
Larrabee G-230

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

Joplin, Missouri
July 27, 1953

Memo

To: Operating Committee

From: W. P. Williams, Executive Officer, Field Team, Region VI

Subject: Request for Field Examination - Docket No. DMEA-3097(Diamonds)
John Q. St. Clair
Arkansas Diamond Mine
Pike County, Arkansas

We have received the subject application and take this means to notify you that the application will be studied carefully, a field examination will be made, and full report submitted as soon as possible.

W. P. Williams
Executive Officer, DMEA
Field Team, Region VI

WPW:jd

Jul 21 1953

Mr. John [illegible]. St. Clair
708 Hoover Street
Norman, Oklahoma

Re: Docket No. [illegible]-3397 - Diamonds
Arkansas Diamond Mine
Pike County, Arkansas

Dear Mr. St. Clair:

Your application for assistance in exploring the subject property has been reviewed by the Nonmetallic Minerals Division of the Defense Minerals Exploration Administration and has been referred to Mr. William [illegible]. Williams, Executive Officer, DMEA Field Team, Region VI, 221 West 3rd Street, Joplin, Missouri, for further consideration and possibly a field examination.

The Regional Office will contact you at an early date, if an examination is to be made. Any assistance that you may give the members of the field team during the examination will be appreciated.

Sincerely yours,

C. O. Mittendorf

Administrator

LCHouk:gad 7/20/53

Copy to: Admr. R. File
Docket File
Operating Committee
Field Team, Region VI
Mr. Chandler, 3520
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

600

JUL 2 1 1953

Mr. William T. Williams
Executive Officer, DMEA
Field Team, Region VI
221 West 3rd Street
Joplin, Missouri

Subject: Docket No. DMEA-3097 - Diamonds
John Q. St. Clair
Arkansas Diamond Mine
Pike County, Arkansas

Dear Mr. Williams:

Please review the subject application and arrange for a field examination if you deem it advisable.

Copies of memoranda from the Geological Survey and the Bureau of Mines are enclosed for your information.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee

Approved:

J. H. Hedges

Member, Bureau of Mines

A. R. Kinkel, Jr.

Member, Geological Survey

Enclosures 4

LGHouk:cad 7/20/53
Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Chandler, 3520
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

600

JUL 20 1953

Mr. William P. Williams
Executive Officer, DMEA
Field Team, Region VI
221 West 3rd Street
Joplin, Missouri

Dear Mr. Williams:

Reference is made to a letter of September 17, 1952, from Mr. R. G. Knickerbocker of the Bureau of Mines to Mr. Tom Lyon of the Defense Materials Procurement Agency, on the proposed sampling of a diamond-bearing area in Arkansas.

This office would be pleased to receive any information you may have with regard to the sampling. We would be particularly interested in a screen analysis of the recovered diamonds and the method of beneficiating the ore.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee

Approved:

J. H. Hedges

Member, Bureau of Mines

A. R. Kinkel, Jr.

Member, Geological Survey

LGHouk:gad 7/17/53

Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Chandler, 3520
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

R. G. Knickerbocker

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
JUL 16 1953

July 16, 1953

Memorandum

To: Lawrence Houk, Chief, Nonmetallic Minerals Division, DMEA

From: Henry P. Chandler, Commodity Specialist

Subject: Application for aid in Exploration Project 3097, Arkansas Diamond Mine, by John Q. St. Clair.

For over 40 years this Arkansas diamond mine has attracted the attention of mining engineers, and it has been the subject of many careful studies and experimental mining operations. Aside from some surface concentrations of diamonds in the early years of its history, the record of operations is most unfavorable, and an extended study of the Bureau of Mines, described in R. I. 4549, indicated that the diamond content of the deposit was too low to be of any commercial value. Later the operations of the Diamond Corporation of America were unsuccessful.

The record to date therefore is discouraging. Mr. St. Clair in general analyzes the past efforts as having been well intentioned but erroneous in method. He believes that he can apply new techniquies that will reveal the existence of commercial quantities of diamonds in this deposit. He thinks that his plan of exploration and the application of certain African diamond concentration methods, particularly those used in the Premier Mine, will prove effective.

There is not enough information available in the Washington office to verify Mr. St. Clair's claims to technical competence and experience in this field nor to evaluate fully his contentions. Therefore, we suggest that this application be referred to the field team for review and that an inquiry be made into the record of Mr. St. Clair's experience. He has presented his views very well in the proposal. However, the past record of this deposit is so bad that very strong evidence of prospective success should be available before more Government money is spent on it.

Henry P. Chandler, Commodity Specialist
Construction and Chemical Materials Branch

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

Memorandum

July 9, 1953

REVIEW OF APPLICATION DMEA-3097 (diamonds)

To: L. G. Houk, Defense Minerals Exploration Administration
From: D. A. Larrabee, U. S. Geological Survey
Applicant's name and address: John W. St. Clair, Norman, Oklahoma.
Name of property: Arkansas Diamond Mine.
Location of property: Near Murfreesboro, Arkansas.
Summary of applicant's proposal:
Sampling, beneficiation, and recovery tests costing $161,172.
Sources of information on applicant's property:
U.S.G.S. Bull. 540, p. 534-546
U.S.G.S. Bull. 735, p. 271-322
U.S.B.M. R.I. 4549
Personal conference with H. D. Miser, U. S. Geological Survey, the man most familiar with these diamond deposits, July 9, 1953.

Comments:

Page 20—Hand picking stones -20m 40m will be difficult.

Page 27—Doubtful if auger drill will be suitable in the very hard parts of the deposits.

Page 30—Applicant's salary of $1,000 for 30 days of Phase 1 is too high. Applicant should contribute his time during this initial stage, if acting in good faith, with Public funds providing the balance, or $1,750.

Since applicant is apparently familiar with diamond deposits and mining engineering, also, why is $3,000 set up for consultants in these matters?

Page 31—It would seem that less expensive sample containers could be used, costing less than the $10 each as specified.

Page 33—Total cost of $161,172 is far too high to be undertaken with Public funds on a deposit already proved over the years to have a very low diamond content.

I can find no explanation of applicant's participation (10%) in the proposal. Obviously, it is not in services for he has set up an extremely liberal salary of $12,000 per year for himself. He apparently has no equipment to contribute. This should be clarified before further action is taken.

RECOMMENDATION:

Complete denial in its present form.

However, we feel that a very modest exploration program might be justified, as follows:

Phase 1.--Be reduced to $1,750 by the elimination of salary to the applicant during the 30-day testing period.

Phase 2.--If Phase 1 indicates that an appreciable quantity of usable diamonds, including the finer sizes, is present, then Phase 2 be entirely revised to provide for sampling over a wider area and at considerable depth (ore reserves have been estimated to a depth of 1,000', although test holes have been put down to only a very small fraction of this depth). The samples can be tested by the same company in San Francisco, at a great reduction in cost below that of purchasing considerable equipment.

Only on the above premises can any exploration at all be justified.

D. N. Larrabee

Larrabee:jeh
G-7/9/53
cc: Director's reading 4212
Branch reading 4212
DMBA 3
files G-232

MINING AGREEMENT

THIS INDENTURE, Made in the City of Kokomo, State of Indiana, on the 19th day of June, 1953, between Joseph A. Noel and Edwin T. Schneberger, not individually but as Trustees under the provisions of a Trust Agreement dated the 1st day of July, 1941, and known as Trust Number "A" (hereinafter for convenience referred to as "Lessors"), and John Q. St. Clair, his executors or assigns, of the City of Norman, State of Oklahoma, hereinafter referred to as "Lessee".

W I T N E S S E T H:

WHEREAS, the Lessors are the owners of the following described lands all located in Pike County, State of Arkansas, to-wit:

> All that part of the East half of Section Twenty (20) lying East of Prairie Creek, containing Ninety (90) acres, more or less,
>
> The Northwest Quarter of the Northwest Quarter of Section Twenty One (21) containing Forty (40) acres, more or less,
>
> The South Half of the Northwest Quarter of Section Twenty One (21), containing Eighty (80) acres, more or less,
>
> The Southwest Quarter of Section Twenty One (21) containing One Hundred Sixty (160) acres, more or less,
>
> The Southwest Quarter of the Northwest Quarter of Section Twenty Seven (27), except one half (1/2) acre in the Southwest corner thereof, containing Thirty Nine and one half (39-1/2) acres, more or less,
>
> All that part of Section Twenty Eighty (28) lying North and East of the Little Missouri River, containing Three Hundred and fifty three and fifty three hundredths (353.53) acres, more or less,
>
> All that part of the West half of Section Twenty eight (28) lying South of the Little Missouri River and North of Duncan Slough, containing sixty (60) acres more or less, and

All that part of the Northeast Quarter of the Northeast Quarter of Section Twenty Nine (29), bounded on the North, East and West by the Little Missouri River, and on the South by a certain Slough dividing said land from the McBrayer land sold to Stewart, containing Five (5) acres, more or less,

All in Township Eight (8) South of the Base Line in Range Twenty Five (25) West of the Fifth Principal Meridian in Arkansas and containing, in the aggregate Eight Hundred Twenty eight and three hundredths (828.03) acres, more or less.

Subject, however, to the right reserved to the Lessors to use such surplus of the aforementioned land as is not necessary for the mining operations of the Lessee and to all legal highways, to any and all rights of way for highways and railroads, and to any and all other easements previously granted or acquired by others on, over or across the surface only of said premises or any part thereof, and now of record, but including each, all and singular the rights, title, and interest and estate of the Lessors under, by virtue of, or in connection with each and all such surface conveyances, legal highways, rights of way, licenses and easements, and

The Lessors do hereby covenant with the Lessee that the said Lessors are at the time of sealing and delivery of this Lease lawfully seized in fee simple of all of the said premises, that the same are free from all encumbrances and rights in others except as aforesaid, and that the Lessee keeping, performing and observing each and every of the covenants, promises, agreements and conditions in this Lease on the part of the Lessee made or to be kept, performed or observed said Lessors will, the said Lessee in peaceful and quiet exercise and enjoyment of the rights, privileges and easements herein granted, leased and demised during the term aforesaid, or until with respect to each tract and parcel the termination of said lease thereof as herein provided, warrant and

defend against the lawful interference, claims and demands of all persons under or by force of any right or title in or to said premises or any part thereof, the said surface conveyances, legal highways, rights of way, licenses and easements with respect thereto, hereinbefore referred to, excepted.

WHEREAS, the Lessors are ready to lease such lands with the limitations above specified to the Lessee and the latter is prepared to take the same in lease,

NOW, THEREFORE, in consideration of the premises, of the sum of ten dollars ($10.00) to the Lessors in hand paid by the Lessee, the receipt whereof is hereby acknowledged, and in further consideration of the covenants and agreements herein stipulated to be respectively kept and performed by the Lessors and Lessee, it is hereby agreed as follows:

1. The Lessors do hereby grant, demise and lease unto the Lessee, his successors and assigns, all the tracts and parcels of land above described in the first "WHEREAS" clause, hereinafter collectively referred to as "premises" for and during a term of fifty (50) years from the date hereof, unless sooner terminated by the Lessee, or forfeited due to the violation of any of the covenants, terms or conditions hereof.

Said premises are leased to the Lessee for the purpose of giving and granting to the Lessee, its successors, assigns and sub-lessees, the exclusive right and privilege of entering into and upon said premises and each and every part thereof so long as this lease shall remain in effect with respect thereto and to explore for, develop, mine and remove and ship all ores which are or may be found therein or thereon together with the full right, privilege and authority of constructing, erecting, maintaining and/or removing, except as hereinafter modified, any and all such buildings, structures, machinery, excavations, openings, ditches,

drains, water pipes, railroads, wagon roads, tramways, and other improvements, property and/or fixtures as may be reasonably necessary, convenient or suitable for mining, removing, beneficiating, concentrating, smelting, extracting, refining and/or shipping of such ores or materials or products thereof or for any activities incidental thereto, or to any of the rights or privileges of the Lessee hereunder, including the full right and authority to divert streams and to remove lateral and/or subjacent supports, and to cave, subside or destroy the surfaces or any part thereof, and to dump earth, rocks, waste and/or lean ores or material on any part of such surface where it will not interfere with mining, and to commit waste to the extent necessary, usual or customary in the carrying out of any and/or all of such purposes, rights, privileges or authorities. Granting the further right and privilege of cutting and using such timber growing on the leased premises from time to time as the Lessee may require in his operations upon such premises.

2. That in consideration of the said leasing, the Lessee covenants and agrees that said Lessee shall with due diligence prepare an exploration program for said area and lands adjacent thereto and shall thereafter explore, conduct geological and geophysical investigations, map, drill and otherwise seek to locate and develop minerals, metals and ores in commercial quantities. Lessee will cause to be expended for such work on the lands herein described and lands adjacent thereto in the following calendar years the following minimum amounts:

1953	$25,000.00
1954	$75,000.00
1955	$50,000.00

If this lease is terminated during the term of years for which such expenditures are hereinabove provided the amount to be ex-

pended in the year of termination shall be that portion of the sum above set forth that the number of full calendar months during which this lease shall have been in force during such year of termination bears to twelve.

If in any one year a sum in excess of the amount required to be expended is expended, then the amount in excess thereof can be carried forward as a credit.

It is contemplated that the Lessee may enter into a contract with the Defense Minerals Exploration Administration and such sums as are spent as a result thereof shall apply on the work requirement set forth herein.

Before any such contract shall act as a lien upon the production of the Lessors from said land said contract must be approved by Lessors.

3. Prior to the end of 1956 Lessee shall have procured and done such engineering and research as is necessary to determine an adequate and scientifically sound flow sheet for the recovery of diamonds from the leased premises and lands adjacent thereto and thereafter shall procure and erect and prepare ready for operation a mill and excavating and processing equipment having a capacity of 1000 cubic yards per day or 300,000 cubic yards per year. Mining operation shall be commenced and be in production during 1957.

4. Lessee shall steadily and continuously work the said property to bring production as rapidly as possible to a minimum rate of 300,000 cubic yards per year, commencing one year from the commencement of mining operations, and thereafter during the entire period of this lease, using the best diamond equipment and engineering resources available to it to reach and take out the greatest amount of diamonds and other minerals possible with due regard to the operation and development of the property as a workable mine. It being understood, however, that any stoppage

of work caused by strike, riots, legal process or unavoidable accidents or conditions or Acts of God shall not be regarded as a breach of the requirements contained in this or the preceding paragraph hereof, so long as such cause or causes shall make stoppage unavoidable, and it being further understood that in the event in the opinion of the Lessee it is not feasible to further mine and sell the diamonds and other minerals and ores derived therefrom during any period of distress or market instability, then upon written notice to that effect to the Lessors herein and until written objections thereto by the Lessors, this lease and all provisions hereunder shall abate for any such period of distress. Said objections shall be made only upon good reason and shall be a matter for arbitration.

5. Lessee covenants and agrees to keep full, complete and accurate books, papers, accounts and records connected in any way with his operation upon said property, and the recovery thereof, and sale prices obtained therefor, and that the Lessors and their agents shall have full and complete access to all of his said books and records at all reasonable times and places during business hours. It being understood and agreed, however, that Lessors, whenever exercising any of their rights and privileges of examination hereunder granted, upon the premises herein demised, shall at all times subject themselves to the same rules, regulations and requirements of the Lessee and his management regarding any and all other persons who may enter the premises demised herein. Lessee further agrees to furnish to Lessors proper written reports quarterly during the exploration period, of the exploration work performed.

6. This lease is made upon the express condition that the Lessee shall, so long as this lease continues in force, pay royalty on account of ore mined from the premises to the Lessors

at the address shown herein on the 20th day of February, May, August and November of each and every year, or on the last business day. Such royalty payments shall apply to all ores treated by the Lessee during the calendar quarter next preceding the first day of the month in which payment is to be made as above specified in amounts computed at the rate and in the manner set forth and shall be calculated as follows:

(A) Definitions.

1. Average value is the average value of the diamonds, ores or metals which have been recovered during the quarter and shall be determined as follows:

(a) All ores being treated for recovery shall be weighed prior to said treatment and the weight thereof shall be reduced by the moisture content to arrive at the "dry weight" and shall be expressed in tons.

(b) The total weight of such ores treated during the calendar quarter shall be computed.

(c) The total value of diamonds, ores or metals shall be computed as follows:

(1) The net sales of all diamonds, ores or metals recovered during the quarter shall be ascertained. (It is understood that the net sales shall be the gross sales less such customary deductions as cash discounts, quantity discounts, etc. so that the net sales will represent the actual amount of cash received by the Lessee from the marketing of recovered products from the leased premises.

(2) The value of all diamonds, ores or metals which have been recovered but not sold at the time of computation shall be agreed upon between the parties using the net sales value thereof as the basis. In the event of disagreement between the parties the value shall be a matter for arbitration.

(3) The total value is the sum of the net sales and of the agreed value.

(d) The average value is secured by dividing the total value by the total weight.

2. The escalator factor shall be the weighted average value of one carat of all gems below one-fourth (1/4) carat in size and all industrial diamonds recovered during the quarter divided by the average weighted value thus recovered during the first quarter of operations.

3. The standard royalty is the royalty payable when the escalator factor is one. It is set forth in Exhibits A & B attached hereto.

4. A ton shall mean 2000 pounds.

(B) Quarterly royalty calculation. Use table A for open pit ore and table B for underground ore. Secure the average value per ton, divide this by the escalator factor and secure the standard royalty per ton by reading directly from the chart. Multiply the standard royalty payable per ton by the escalator factor to determine the royalty payable per ton of ore treated during the quarter. Multiply this amount by the total number of tons treated during the quarter to secure

the royalty payable for said quarter.

7. It is mutually agreed that the said Lessors, Lessors' agents and servants, may at all reasonable times enter upon said premises, or any part thereof peaceably, and view the same and take all reasonable means to ascertain the conditions thereof and the kind, qualities and quantities of ore therein or removed therefrom, provided they shall not thereby unreasonably or unnecessarily hinder or interrupt the proper business or operation of the Lessee; provided, however, that the said Lessors agree to save the Lessee harmless from all claims for damages arising out of any death or personal injury sustained by any such agents or servants of the Lessors while in or upon said premises as herein permitted unless the death of injury arises as a result of negligence of the Lessee.

8. Lessee will at the time of making each quarterly payment of royalty during the term aforesaid (or until the termination of this lease) make and render to the said Lessors a true report stating therein such information as will permit the Lessors to accurately determine the royalty due from Lessee. If the Lessors shall dispute any of the facts therein or conclusions therefrom, the royalty as determined by the Lessee shall nevertheless be paid. The Lessors may file with the Lessee a protest specifying the matter in dispute and refer the matter to arbitration as hereinafter set forth. Upon the taking effect of the final determination by the arbitrators, the value determined thereby shall supersede the value determined by the Lessee for the purposes hereof and adjustments and amount paid or payable for royalty shall be made accordingly. In addition thereto Lessee shall furnish a monthly report as soon after the end of the month as is practical, setting forth the same information as required above.

9. All mines on said premises shall be opened, used and worked in such manner only as is usual and customary in skillful

and proper mining operations of similar character when conducted by the proprietors or other prudent operators, and so as not to do, cause or permit any unnecessary and unusual permanent injury to the same or any improper interference or hindrance in the subsequent operation of said mine or mines. Provided, that subject to the above requirements, the Lessee may, from time to time, use and employ such methods of mining as to the whole or any part of the ore upon said premises or under any portion thereof, as it may desire or find most profitable and economical, or may when it deems it necessary or desirable, discontinue or suspend operations in whole or in part so long as it shall well and truly meet its obligations hereunder to pay taxes and the minimum royalty, if any. And, provided further that nothing contained in this lease shall require the Lessee to develop a separate shaft or shafts on said premises or any part thereof, or prevent said Lessee from developing any mine or operations on said premises or any part thereof solely through or in connection with its operations on or in any adjoining or nearby property or properties as to it may seem most desirable, taking into account its developments and operations on any or all adjoining or nearby properties, or require the Lessee to mine, preserve or protect in its mining operations, any ore which under good mining practice cannot be mined and shipped at a profit to the Lessee at the time encountered. ~~Nothing herein contained shall require the Lessee to open a mine or to operate the same or to conduct any mining operations save in its discretionary judgment.~~

10. The Lessee further agrees that it will not permit or suffer to be made any waste of said premises (except such waste as may be necessarily or customarily incidental to the conduct of the mining operations herein contemplated or the full and

proper exercise of any of the rights and privileges hereby granted); that at the end of said term, or the termination of this lease in whole or in part, whether by forfeiture, expiration of time, surrender by the Lessee, or otherwise, he will peaceably surrender said premises or the tract or parcel affected thereby, as the case may be, to the Lessors with all caves and openings properly fenced, filled or protected as may be required by any law or proper regulation of any duly constituted governmental authority then in effect, and with all stopes, shafts, and underground openings that may be made by the Lessee thereon in good order and condition, ordinary wear and tear and use and deterioration from and damage by the elements excepted.

11. Lessee shall maintain and keep in good repair all such buildings and equipment erected or placed upon said property or used in connection therewith, and to keep amply insured at his own expense all of the said buildings and equipment, and to comply with all insurance requirements prescribed by the State of Arkansas relative to the employees used in connection with said mining operations, and any and all other state and federal requirements.

12. Lessee shall pay or cause to be paid, as and when the same shall become due and payable, all taxes and assessments of every kind and nature upon the improvements erected on said property, all personal property placed thereon, and including all severance taxes.

13. That the Lessors shall at all times have, possess, and hold a lien upon all ores mined but not shipped from said premises and upon all machinery, personal property and improvements placed upon said premises by the Lessee, as security for any unpaid balance of money due hereunder and as security for the performance by the Lessee of each and all of the covenants and

conditions hereof obligatory upon the Lessee, which lien may be enforced against any such property in like manner as liens conferred by chattel mortgages, or as any other lien security may be entitled to be enforced under the laws of Arkansas. Nothing herein contained, however, is intended or shall be construed to prevent the sale, shipment and removal of said ore or concentrated products in the usual course of business, nor to prevent the removal of tools, machinery, equipment or other property at any time when said Lessee shall not be in default; and the above; referred to lien shall not, in case of sales of ore or concentrated products to third parties, be deemed to follow the same as against third parties.

14. All rights and privileges of the Lessors and Lessee as set forth in this lease shall continue uninterrupted notwithstanding the existence of any controversy between the parties until such time as such controversy shall have been finally settled by arbitration or by judicial determination.

15. In case any disagreement or controversy shall arise between the parties hereto relative to the observance or fulfillment of the terms and obligations hereof, then such controversy or disagreement may, on notice duly given, be determined by arbitration. Either party may within a reasonable time after such disagreement arises demand arbitration thereof and the party making such demand shall give notice in writing specifying the matter to be submitted to arbitration and at the same time choose or nominate some disinterested competent person to act as an arbitrator; thereupon, within ten (10) days after the receipt of such written notice, the other party to this lease shall in writing choose or nominate a disinterested and competent arbitrator and the two arbitrators so chosen shall promptly select a third arbitrator, giving written notice to both parties of their choice so made and fixing a place and time for meeting not later than

thirty (30) days thereafter, at which both parties may appear and be heard touching such controversy. The decision of said arbitrators shall be made in writing within thirty (30) days after the completion of hearings thereon and when signed by a majority of them shall be final and conclusive upon both parties, and the award so made shall be forthwith complied with. In case the notified parties shall neglect or refuse to choose and nominate an arbitrator within the time herein specified or in case the two chosen by either method herein provided shall fail to agree upon the third arbitrator, then such arbitrator shall in each case upon application of either party be named by the person (or) any one of the persons) who may then be holding the office of Senior Judge of the United States District Court in and for the District in which the mine is located or the person holding an office which corresponds to such office as now extant, if it shall then have been abolished. Each party shall pay one-half of the fees and expenses of such arbitration and all the fees and expenses of their own witnesses and counsel.

16. Acts of God, the elements, strikes, war, governmental action, and all causes of interference, whether or not they shall be of the same or similar class or kind as those hereinbefore mentioned, which are beyond the control of the parties hereto, shall release the parties from the obligation to perform or carry out the terms hereof as long as the cause of prevention exists.

17. The word "Lessors" wherever herein used shall mean one or more persons giving mineral lands in lease hereunder who shall have a joint or indivisible interest in such lands. Wherever election or objection is authorized to be made by the "Lessors" such election or objection must represent that of at least the majority in interest of such persons who fall within the term "Lessors" as herein defined.

18. Any notice required or permitted to be given or served upon either party pursuant hereto, shall be sufficiently given, served or made if sent to such party by registered mail addressed to it at the address set forth below, or to such other address as the parties shall designate by written notice given to the other party, as follows: in the case of a notice to Lessors:

Joseph A. Noel
308 Union Bank Building
Kokomo, Indiana

and in the case of a notice to Lessee:

John Q. St. Clair

Norman, Oklahoma

Routine or regular periodical reports and statements hereunder may, however, be sent by regular mail addressed as above; and, if so addressed and mailed in due season, then, if any of the same shall not be received when due, the addressee will notify the addressor in accordance with the provisions for notice hereinabove of such failure of receipt and give the addressor a reasonable time to follow up and secure the delivery of the statement and report or a duplicate thereof, before claiming any default on account thereof.

Payment of royalty, whether minimum or otherwise, and any other payment due hereunder from Lessee to Lessors shall be made by check of the Lessee to the order of Lessors and transmitted by regular mail to:

National Bank of Logansport,
at Logansport, Indiana.

19. Lessors will promptly notify Lessee in writing of any and all changes in the ownership in the premises leased or of Lessors' rights and interest under this lease and any and all payments by Lessee of any of the required rents and/or royalties hereunder to Lessors or Lessors' successors as last named in such

a written notice shall be and constitute full compliance with the terms of this lease in relation thereto, and the Lessee shall in no event be required to duplicate the same to any owner or holder as to whose interest Lessee shall not have been so notified in writing at the time the payment is made.

It is further covenanted, agreed and understood between the parties hereto that this lease and the covenants, agreements and conditions herein contained shall run with the land and shall inure to the benefit of and be binding upon the successors and assigns of the parties hereto, respectively, as if mentioned throughout by words of appropriate designations.

20. It is mutually agreed that if the royalty hereby reserved, or minimum royalty herein agreed to be paid by the Lessee, or any part of either thereof be and remain unpaid after the days and times above specified, or if the Lessee shall fail to keep any of the other conditions herein expressed to be kept, performed, or observed, by the Lessee, and if any or either such failure shall continue for sixty (60) days after the receipt by the Lessee of written notice from the Lessors specifying any such default, neglect or failure, or should the Lessee be adjudged a bankrupt, then and from thence forward it shall be lawful for the Lessors with or without any process of law or judgment to enter upon and take possession of said premises or any part thereof, and the said premises together with all ores, machinery, fixtures, improvements and personal property thereon; to possess and hold the same and to exclude forcibly, if necessary, without being guilty of any trespass or other wrongful act, the Lessee and any and all persons claiming under it; and at the election of the Lessors to declare this lease terminated and the rights of the Lessee hereinunder forfeited; and any such re-entry on the part of the Lessors shall be without prejudice to any other remedy or proceedings which the Lessors might have in law, equity, or otherwise by reason of any

breach of any covenant agreement or promise to the Lessee herein contained or for the recovery or possession of said premises; and provided that if the Lessee shall deny the failure alleged by the Lessors and shall demand arbitration thereof in the manner hereinafter provided the period required for the hearings and determination of said matter by the arbitrators shall not be deemed a part of said sixty (60) days hereinbefore referred to and if the contention of the Lessors be sustained by the arbitrators in whole or in part, the Lessee shall have sixty (60) days after the filing of the decision of the arbitrators in which to correct the failure complained of.

21. In the event that this lease is forfeited as above set forth or terminated, then and in that event Lessors shall have the option of purchasing and acquiring of the Lessee all of the buildings, machinery and equipment of the Lessee located upon the premises herein demised at an agreed price or upon a price fixed by arbitration, which said option shall be exercised by the Lessors by giving written notice thereof to the Lessee within thirty (30) days after the final date of termination or forfeiture and payment for which shall be made by Lessors on or before ninety (90) days after the amount due therefor shall have been determined. In the event that the Lessors elect not to acquire said buildings, machinery and equipment then the Lessee shall within the period hereinafter provided after the expiration of said time within which Lessors have the right to elect as hereinbefore described, remove all of said buildings, machinery and equipment from the premises herein demised as hereinafter provided. It is further mutually agreed that the Lessee shall have ninety (90) days after the option period above set forth or after failure of the Lessors to make payment as provided, or ninety (90) days after notice of election not to purchase in which to remove all

engines, tools, machinery, railway tracks, shaft houses, buildings dwellings and structures, and all other property of every nature and description erected, placed or situated upon the tract or parcel as to which this lease is being terminated or surrendered, except any and all supports placed in any shafts, drifts, or openings thereon, or any timber or framework necessary to the use and maintenance of shafts or approaches to mines or tramways within mines, none of which shall be removed or destroyed by the Lessee; provided, always, however, that none of said property may be removed by the Lessee unless all royalties then due and other dues shall have been made and all other covenants, agreements and conditions hereof obligatory upon the Lessee shall have been properly and faithfully observed and performed. Upon the failure of the Lessee to remove any such permitted property within said period of ninety (90) days the same shall belong to and become the absolute property of the Lessors. In the event of force majeure, the terms and provisions of this clause shall be appropriately extended.

22. It is further hereby covenanted, agreed and understood by and between the said parties hereto that the Lessee may at any time terminate at the term aforesaid in the foregoing lease upon sixty (60) days notice provided that all covenants, agreements and conditions hereof obligatory upon the Lessee shall have been properly kept and performed by the Lessee and the Lessee must and will upon any such termination or surrender, as the case may be, and upon the request thereof by the Lessors, forthwith execute and record in any public office where this instrument may have been filed and recorded a formal release and discharge evidencing such termination or surrender, as the case may be.

It is further provided that upon giving of said notice the Lessee shall be relieved during said sixty (60) day period, as well as thereafter, from the obligations of doing exploration work

or continuing production of mining as above set forth.

IN WITNESS WHEREOF, the parties hereto have hereunto set their hands and seals in duplicate this 19th day of June, 1953.

Joseph A. Noel
JOSEPH A. NOEL

Edwin T. Schneberger
EDWIN T. SCHNEBERGER,
AS TRUSTEES

John Q. St. Clair
JOHN Q. ST. CLAIR

STATE OF INDIANA
SS:
COUNTY OF HOWARD

Before me, a Notary Public, in and for Howard County, Indiana, personally appeared Joseph A. Noel to me known and known by me to be the person who executed the foregoing agreement and acknowledged the same to be his voluntary act and deed.

Witness my notarial seal this 19th day of June, 1953.

LeRoy M. Tacy, Jr.
Notary Public

My Commission Expires: 9/3/53

STATE OF ILLINOIS
SS:
COUNTY OF COOK

Before me, a Notary Public, in and for Cook County, Illinois, personally appeared Edwin T. Schneberger to me known and known by me to be the person who executed the foregoing agreement and acknowledged the same to be his voluntary act and deed.

Witness my notarial seal this 19 day of June, 1953.

Notary Public

My Commission Expires: 1/9/54

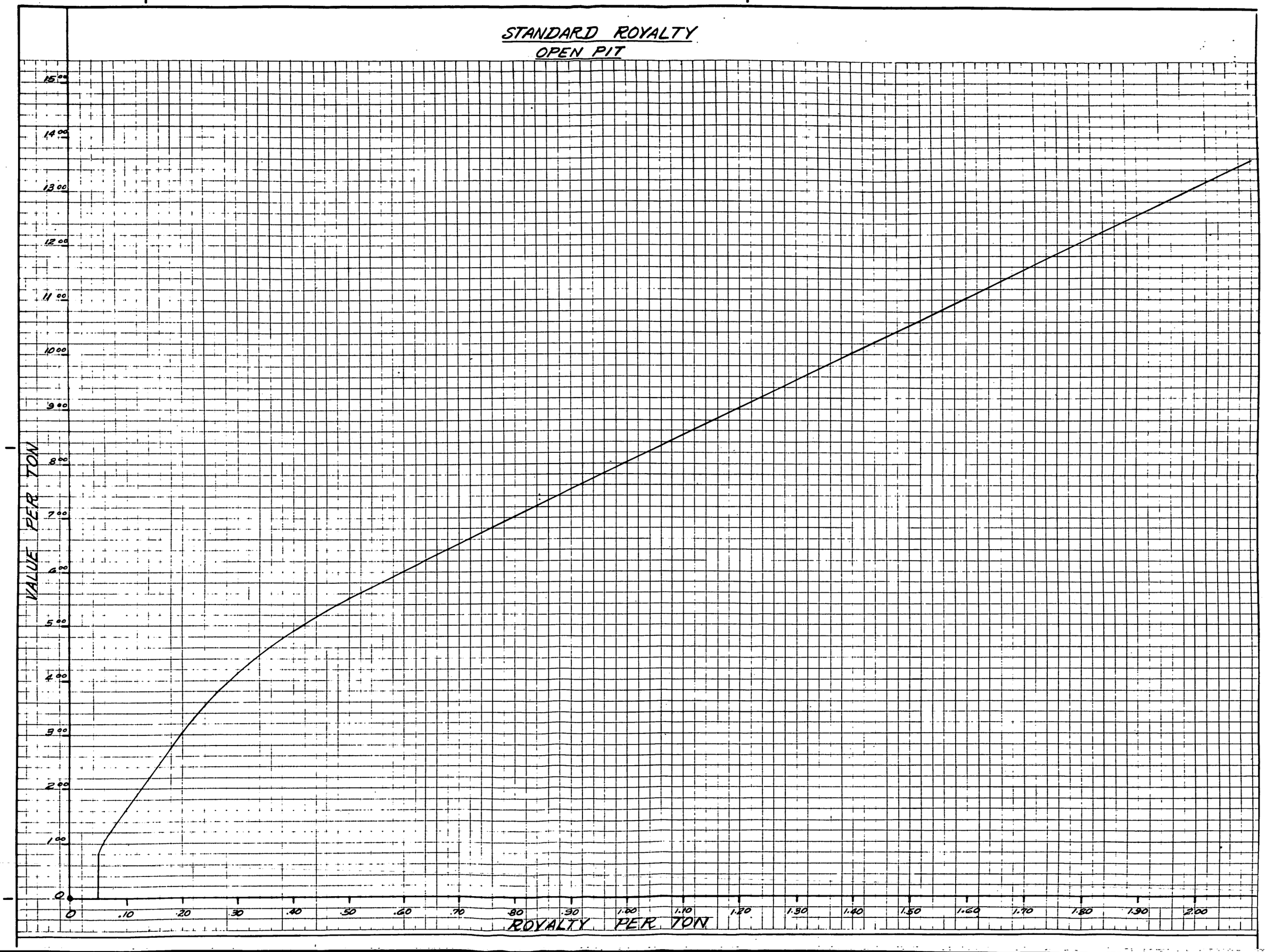
STATE OF OKLAHOMA
COUNTY OF CLEVELAND

Before me, a Notary Public, in and for said county and state, personally appeared John Q. St. Clair to me known and known by me to be the person who executed the foregoing agreement and acknowledged the same to be his voluntary act and deed.

Witness my notarial seal this 26th day of June, 1953.

Notary Public

My Commission Expires: July 10, 1955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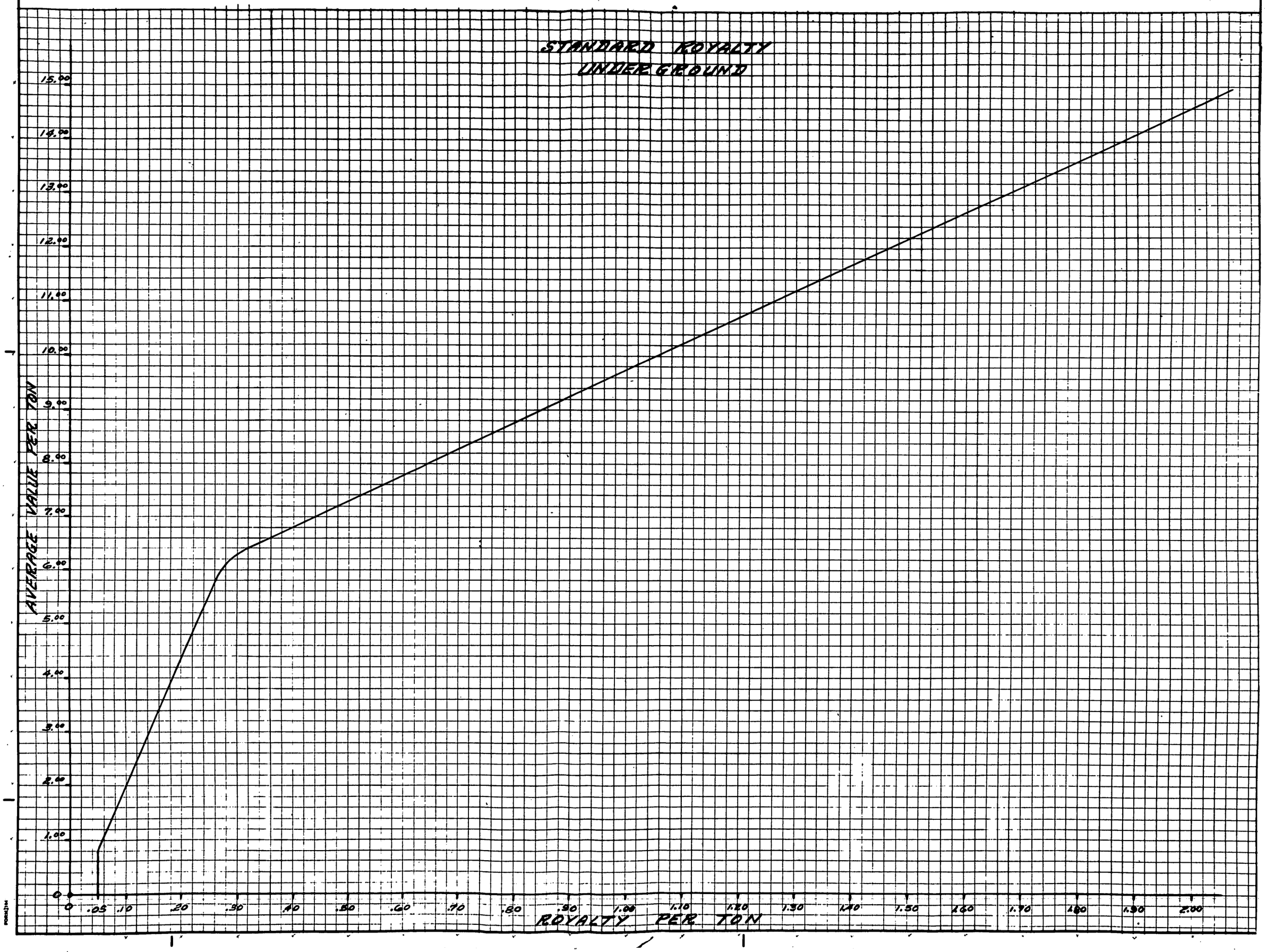
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1.00
1.10
1.20
1.30
1.40
1.50
1.60
1.70
1.80
1.90
2.00
ROYALTY PER TON

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

APPENDICES

Section

A. Copy of lease

B. Report of Operations of the Diamond Corporation of America by Jan Porel, September 8, 1949.

C. Criticism of Bureau of Mines Report on the Murfreesboro Diamond Property of April 20, 1944, by George N. Vitt.

D. Statement of certification from Schenck & Van Haelen on Arkansas Diamonds, dated February 1, 1943.

E. Progress Report on Arkansas Diamond Mine by Jan Porel, dated September 20, 1948.

F. Report on Diamond Mine, Murfreesboro, Arkansas by Geo. W. Roddewig, dated February 16, 1945.

G. Letter to George E. Tobias and Edwin T. Schneberger re mining lease, by Jan Porel, dated April 6, 1949.

H. Letter from Schenck & Van Haelen regarding estimated price of Arkansas Diamonds on present market, dated June 15, 1953.

I. Report on a Geophysical Survey in Pike County, Arkansas, by Sherwin F. Kelly Geophysical Services, Inc., dated April-August 1946.

J. Memorandum on Diamond Content in the Murfreesboro Diamondiferous Peridotite Pipe, by George N. Vitt, dated March 3, 1943.

K. Photostatic copy of article in E & MJ on the heavy media separation at Premier Mine, South Africa, dated September 1950.

L. Details of Electro-static separators, prices, etc.

M. Data on Heavy Media Separation from Western Machinery Company, San Francisco, California.

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REPORT OF OPERATIONS OF THE DIAMOND CORPORATION OF AMERICA

The following report is a summary of the development and construction of the mill and the first phase of the mining operations. The mill was designed and operated upon a pilot basis, and the mining is considered an exploratory and ore-evaluating run.

In August and September of 1947 the service road leading from the County road to the mill site was constructed. The mill and mining equipment and machinery was ordered in the latter part of 1947, marked for delivery in the early spring of 1948. Construction was started in the field on April 1, 1948 for the building of the mill and all other facilities.

The project consisted of a water supply system with suitable capacity to supply approximately 500 gal. per minute for the processing of ore. The ore field drainage, clearing and removing of tramp materials in preparation for ore-moving roads, etc. was undertaken at the same time. The building of the power house as a separate building from the mill to house the generators and diesels and office space was started. The excavation for the disposal of tailings and run-off of processing slurry was an important part. The building of the mill grizzly and the installation of all the equipment and machinery, together with the installation of electrical and water utilities, started shortly thereafter.

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The machinery required for the flow sheet of ore processing consists primarily of the following: The unloading grizzly with apron feeder, depositing the ore on a conveyor belt which lifts the material to the first-stage crusher. From this crusher (set at 1½ in. opening) the ore passes to a vibrating screen which separates the sizes. All sizes above 1½ in. are passed to a bucket elevator which elevates the material to the secondary crusher, set at 3/4 in., which also passes the material to the vibrating screen. All materials from the vibrating screen are passed to the classifier or de-waterer, which washes off much of the slime and light material. From here it is conveyed into a bin, thence is fed through veins into the two 14-ft. washing pans. The wash-over slurry from the de-waterer is carried to a sump through underground pipes which collect the slime, and a sand pump lifts the slime to a tank at the top of the mill, from which it is fed into the washing pans as required. The tails from the two pans and the rough-off material are thrown off by the action of the pans into the launder, from which they are deposited in the prepared ravine back of the plant. The pan-washing process leaves a concentrate in the pan of the heavy gravity materials which is raked off periodically and carried by screw conveyors into a bucket elevator which elevates the concentrate into a rotary trammel separating the sizes into the collecting bins. The concentrate from the bins is discharged onto jigs for a final washing. The overflow wash is carried to the tails launder, and the washed concentrate is passed to the bins immediately ahead of the grease tables for recovery.

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The water from the grease tables is taken through trenches in the floor to the tails area, and the concentrate is caught and retained for inspection after it has passed over the tables. Thisconcentrate is then inspected by hand and hand-screened or panned before it is taken to the tails area.

The power equipment consists of two caterpillar 13,000 diesels belted to two 85 H.P. synchronized generators, which are set up for tandem or single operation. This supplies the electrical energy to move the mill machinery. The ore-moving equipment consists of one caterpillar D-8 tractor and bulldozer blade, one three-pronged, heavy-duty rooter, and a 12-yd. pan and tractor caterpillar No. DW-10. The water system consists of a pumping station at the river in which is installed a 60 H.P. International diesel belted to a centrifugal pump which lifts approximately 500 gal. per minute through a 6-in. line 2,100 ft. long to a 30,000-gal. storage tank. From this tank the water leads off through a system of pipes to the various units. The power house and water supply system were substantially completed the latter part of July, 1948, and in the latter part of September, 1948 the mill and grizzly were substantially completed, and a small amount of ore was processed on the 28th of September. During this trial run it was found necessary to shut down and adjust the machinery as well as rearrange certain units to set up the proper operation. After many starts and changes we accomplished a reasonable processing of ore along the lines required by the flow sheet. About November 1, 1948, continuous mining operations started, and from September, 1948 to September 1, 1949 we processed approximately 85,000 cu. yds. of ore, or an indicated 125,000 tons.

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The ore was taken from numerous surface areas. The method of moving the ore is as follows: It was necessary to root and cross-root the hard ore area to a depth of approximately 18 in. and allow it to stand and slacken or loosen up for about thirty days, during which time it breaks up and can be easily picked up by the DW-10 which operates similar to a stripper. The bulldozer is used to windrow the ores and maintain proper drainage in the roadways in and about the mine, together with many other duties, as required.

The depths to which ore has been taken in various areas ranges between 2 ft. and 4 ft., and in some areas from 4 ft. to 8 ft., and in others from 8 ft. and 12 ft. The areas were selected according to the various types and textures in our plan to investigate each variety and location. In the latter stages of the work we blasted and removed very hard ores to a depth of 25 ft., in some locations.

The amount of ore that can be processed daily on the eight-hour basis is governed, first by the weather, and, second, by the type of ore and the required adjustments in the mill to dress it. After exploring and mining numerous varieties of ore, we were able to quickly adjust the mill in accordance with the type that was being run. The principal difficulty in running any surface-stripped ores is caused by the content of overburdened material, i.e., "mud", which forms into balls. It is a difficult proposition to break up and wash off this gumbo and keep it from clogging the entire system. It has been a constant trouble, and no satisfactory means has been found to properly handle it in our process,

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as well as any other ore-dressing system that we investigated. Our average eight-hour run handled about 350 cu. yds., and on a twenty-four hour basis which was tried, the mill proved capable of dressing over 1,000 cu. yds. a day.

In restudying the flow sheet and processing, recommendations are to be made for substantial changes which may be worthy of consideration, whether the next phase of operation is to continue in the dressing of ore taken from the surface, or from an underground mining operation.

During the first stage of our management (the early part of 1947) and again in 1948, we carried on a research program of analyzing the ores and obtaining professional opinions about the various types of ores in the mine. The findings have not altered the general opinion about the ore which has been set forth in detail by numerous geologists and mining engineers who have operated in the field or made laboratory investigations of the ore.

In the spring of 1947 we brought about ten tons of various textured ores from the property and set up a small crusher, screen, washing pan and grease table in our laboratory. We then experimented with numerous phases of dressing and recovery. The grease for recovery was developed and proven by repeatedly feeding in diamonds which came from the mine. The pan-washing speed and reactions were studied to obtain a manageable system of trapping the heavy concentrates. All of this investigation was made to qualify the flow sheet and equipment to be purchased, etc.

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The mill equipment throughout as finally obtained was considered crude insofar as a refined dressing process was concerned, but as a pilot plant was considered satisfactory because all the essential mill equipment was included to handle the ore to be dressed.

The funds allocated for plant and operations had to be carefully used to make it serve our plan to process a sizeable quantity of ore during a one-year exploratory and pilot run. The records of operations show that the ore can be taken to the mill and dressed at a cost of approximately $.55 a cu. yd., not including amortization of capital investment.

We have mined and processed ore and surface overburden from the areas as shown on the attached map. During the last stages in July and August, we went into the West Hill, the Central Hill, the East Hill and the Mauney tract. This mining required blasting equipment to break out the hardibank kimberlite to the depths indicated. Some of this work was done after removing all surface deposits. These ores were carefully crushed to the smallest size possible in our system and carefully milled and observed on through to recovery. We blasted out to a depth of 25 ft. in the approximate center of the crater until encountering water; this ore was carefully milled and examined for values. All of this material was processed without first flooring, so as to allow it to slack or decompose. Any underground operations will make necessary a suitable flooring arrangement for the ore to weather for approximately a year.

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Our operation experience has opened up many ideas regarding mining methods, milling systems and a variety of suggestions as to what to do and how. All of them have been considered and some tried. After serious study and evaluating the exploration for the past year, we recommend that before going into phase two of mixing operations, that numerous changes in the milling equipment and additions of machinery be made to bring about a complete refinement of the system.

It is recommended that the mining operation go underground with a plan to select ores for further examination of the property. Also recommended are a substantial number of miscellaneous changes, such as a water supply system, power-generating equipment, etc. It is also recommended that sufficient money be available to accomplish an exhaustive investigation of the ore body. To program all requirements that may be recommended for Phase two, it is conservatively estimated to require a sum of not less than $650,000 and three years of time.

We believe that a yield of values may be found in such a program, if it can be undertaken.

An interesting laboratory examination of samples taken from the various piles of concentrates was made during June, 1949. The testing involved fluxing in molten sodium carbonate to remove solublized minerals, and x-ray refraction patterns of powdered diamond were made as standard for examining the powdered tails to determine if diamond was present. Agreement of the lines indicated the presence of diamond in some black particles. Samples were subjected to oxygen in a furnace

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at 2500° F. to determine carbon content. It was found to be less than 1%. Spectographic analysis showed presence of Fe, Mg, Si, Al, Ti, Mn, and Ca. The major content was reported to be barite. The black particles before mentioned have a density of 4.7, identified as ilmenite (FeTi O3). Diamonds, but of no significant value, were present. Microscopic particles of gold were observed. This is recited here because our attempt to find values has not ceased.

We reprocessed our mill tails, that is, the rough-off ore which had been washed and reduced to about a 33 1/3% concentration of the original ore put into the mill. For the run of 200 cu. yds. we obtained eight small stones, or about 1.2 kt. We are satisfied that our dressing to concentrate has not lost, in tails, more than this very small amount of value. We reran about 1,000 cu. yds. of previous operation tails and recovered eight stones, all small sizes about 1/3 kt. each.

Our recovery to date is 680 diamonds, a total of 216.8 kt. The largest is 4/2 kt. Experts who have examined the stones are curious to know why 90% are fragments and deeply etched. Thirty of our stones are over 1 kt.

We have studied many previous reports of recovery, including Mr. Wagner's personal diary - claiming 1,071 stones in 1917-18-19, totaling 475 kt., one of which was 6 11/16 kt. -, the United States Geological Survey Bulletin 808, Plate 17 - showing seven stones over 2 kt. -, the War Minerals Report, April, 1944, etc.

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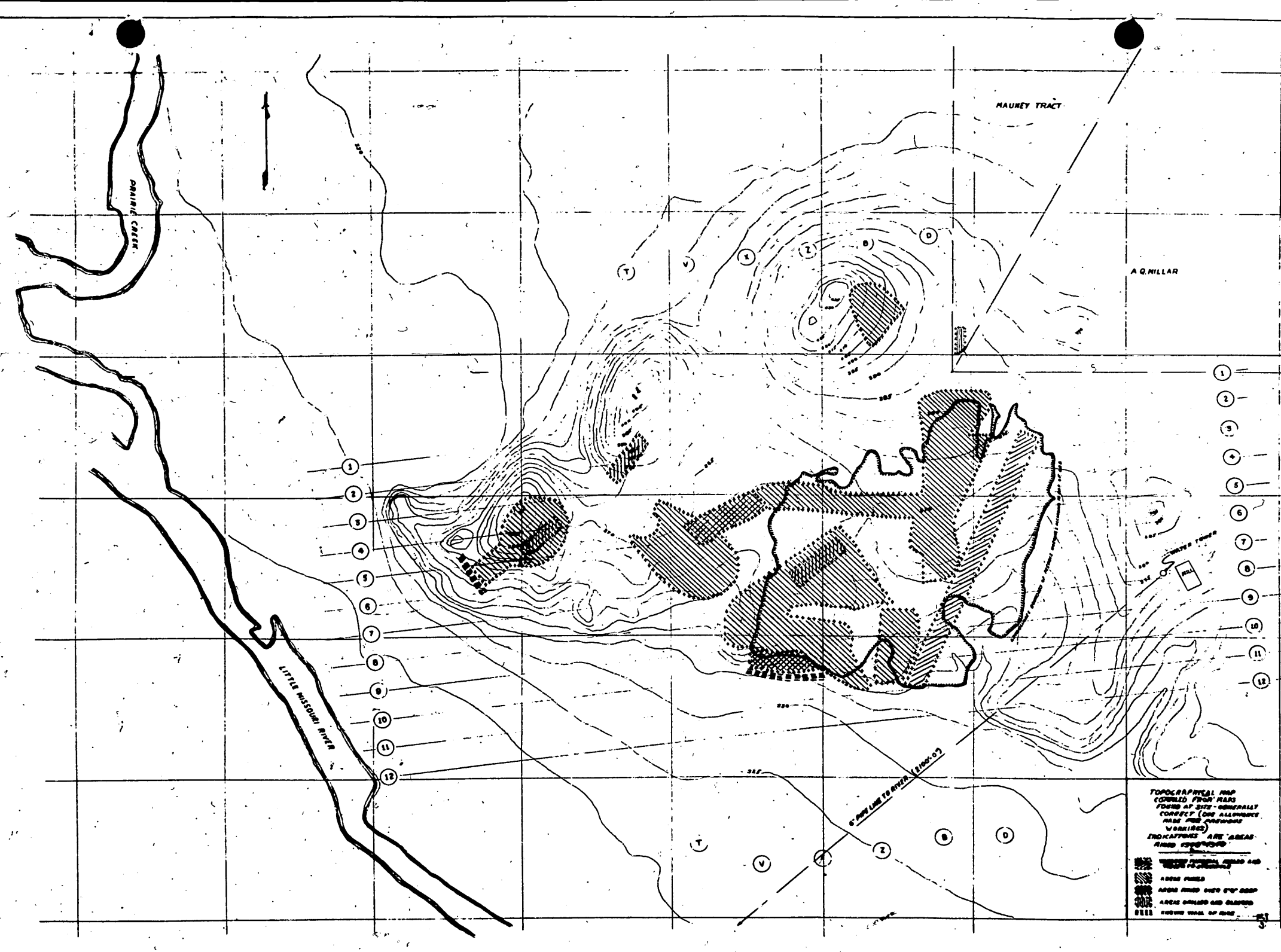
We attempted to open up the lower southeast alluvium bed next to the crater, cut down to 16 ft., but water came in so fast we were unable to go further without suitable equipment. We cut to an indication of an ancient river bed. The Little Missouri River is about 8 ft. below the depth of our cut and approximately 1,000 ft. away.

We have a complete group of ore samples that have been run which are available for examination. Photographs of the mill and mine are attached with the map of explorations, etc.

Signed

Jan Porel
Vice President and Treasurer

September 8, 1949
RH


MAUNEY TRACT
A.Q. MILLAR
PRAIRIE CREEK
LITTLE MISSOURI RIVER
6" PIPE LINE TO RIVER
WATER TOWER
MILL
TOPOGRAPHICAL MAP
COMPILED FROM MAPS
FOUND AT SITE - GENERALLY
CORRECT (USE ALLOWANCE
MADE FOR PROPOSED
WORKING)
INDICATIONS ARE AREAS
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AREAS DRILLED AND SHAFTED

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CRITICISM OF BUREAU OF MINES REPORT ON THE MURFREESBORO DIAMOND PROPERTY OF APRIL 20, 1944

1. WORK IN 1943 - THREE PRELIMINARY HOLES.

In accordance with the statements in the report, instead of treating each hole individually, the three were pooled into one "pile", and, to make things worse, the reported results are subject to doubt because the details of reduction of the ore and of the recovery work were not fully reported in detail. In view of the well known controversial position of this property omission of such details casts a discount on the report, which should not and cannot be cancelled by the so-called reputation of the Bureau of Mines. Obviously, if the sample from these three holes was adequately and properly treated, then one of the holes could or should have been a blank. Common treatment, as it was done, thus needlessly casts a doubt on the other holes, when it was just as easy to be certain about it by individual treatment. The statement, therefore, that the result "could not be called encouraging" is professionally unethical and not warranted. Personnel making such statements on the basis of the kind of data alleged and reported, should not be allowed to undertake responsible work, where precision and care are paramount.

II. BASIC BUREAU OF MINES REPORT OF APRIL 20, 1944.

1. Sampling Ratios.

In a new field, and specially one subject to controversial and prejudiced opinions, and areal ratio of holes to the total area judged should be not smaller 1:625 to 1:750 in accordance with long published and practiced work in South Africa, where several now rich fields, were for years condemned because of poor exploratory work at the start. In an extension of a known deposit, closely related to already proven ground, a ratio of

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1:1250 could be allowed.

The Bureau of Mines, by comparison, used the following ratios:

Areal, with respect to entire crater.....1:6400
Areal, with respect to ground delineated by holes dug.....1:3109
Volumetric ratio " " " 1:2975

Comments on the use of such small ratios and making them a basis for judgment, can be very harsh and critical. One is at least free to question the competence of the men who planned and conducted the work, if not their integrity. If, as was alleged in Washington, the Bureau of Mines did not possess sufficient funds in its budget that could be spared for a proper test, the Bureau was morally obliged to state so and qualify its decision to go ahead with the further statement that results to be obtained under such circumstances cannot be expected to be indicative of any quantitative possibilities.

The writer previously made an analysis and criticism of the "hole digging" proposal, when it was first made in 1943 by the W.P.B. who screened the actual author of the plan - Mr. Evans, who had some experience in Africa, If it were honestly and competently intended to secure a fair representation of the property, either the number of the 26" diameter holes should have been quadrupled, or the diameter of the 49 holes dug should have been about 5,25 ft.

2. Primary Reduction Plant in the Field.

To begin with, it has been established in South Africa for at least forty years, that:

1) The old traditional pans are wasteful and inefficient for concentration of diamonds from "pipe" ore due to angularity of the particles, difficulty of sliming it and other related factors.

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2) The 5 ft. size of pan has been found to be particularly inefficient even under working conditions.

3) Optimum speed for the 5 ft. pan has been established at about 21.5 r.p.m. Actually this pan was run at 17 r.p.m. Correct speed for a 6 ft. pan is 17.7 r.p.m. This difference of 4.5 r.p.m. on the slow side alone is sufficient to change good results into bad ones through unpredictably large losses in the overflow tailings.

In this particular case, and in addition to the wrong speed used, the report fails to give the location, length and relative height of the tailings weir. If these dimensions were wrong it would also contribute to losses. The number of stirring bars or knives and their shape was not mentioned. For example - if the bar at the perimeter was more than 1 inch from the inside perimeter of the pan, recoveries can drop as much as 30%. The knives should have been sharpened at least every 20-30 working hours. While it is stated that 96 samples were so washed, no adequate statement was made as to the rate of feed to the pan. This is critically important because with all conditions being perfect, and they were not, even a slight over feeding can cause as much as 50% loss in recovery by shoving the diamonds over into the tailings dump. If the reports trickling from the field are to be given credence, this dangerous over-feeding condition was conspicuous by its presence.

3. The General Flow Sheet.

1) Size of screen openings of the scrubber trommel was not reported. Since this is a critical point, why was it not mentioned? Was this point overlooked through lack of appreciation of its importance caused by incompetence, or was it negligence or what?

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2) At least 95% of the total sample was eliminated as "barren tailings" in the field. Since this was an important step, why were no test diamonds introduced into this crucially critical phase of the work? Such omission lays the entire job and report open to suspicion and discount as of little or no value, on top of being misleading.

3) The Bureau called the remaining 5% a "concentrate", which was given elaborate and almost public handling including the much publicized introduction of known test diamonds, of which even Dr. Sayers personally and emphatically spoke about.

Yet - there is no evidence in the report to show and prove that this 5% was a true concentrate. The significance of this cannot be over-emphasized. When we speak of a pan concentrate, we must firmly bear in mind that actually all the pan is capable of doing is to collect only the free diamonds and the associated free heavy minerals. The other accompanying material in the pan is exactly the same as the pan tailings, which are not a concentrate. Just before these tests were made I voluntarily suggested that the Bureau of Mines should be obligated to turn over samples of concentrates, certified to be true average samples, to the owners. I further suggested that I would be willing to examine these samples and render my analytical opinion. However, this suggestion was overlooked.

Figure 16 of the report should have been accompanied with a similar diagram which should have been certified as to volumes treated and values recovered for each successive stage of the entire process.

If any of the 5% "concentrates" required crushing to free matrix-bound diamonds, then certainly the 95% "tailings", dumped as refuse, should also have merited crushing, and not mere log-washing. A better first-stage treatment

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would have been 1/2 "crushing with rolls before pan treatment, then 1/4" with rolls and a second pan treatment. Feeding of the ore to the pan in both cases should habe been assuredly "too slow" for certainty of results. The best proof of adequate concentration in the pan would habe been an accumulation of the heavy satellite minerals such as garnet, zircon etc. Such minerals were certified to be present in the ore in-situ in relatively large amounts by Dr. Miser and other previous and reliable investigators. Yet no such satellites are mentioned in the report, and this omission again is a significant gap. They should have been sorted out at Rolla together with diamonds, classified and reported in detail.

If any matrix-bound diamonds were recovered at Rolla, and it seems they were, then a multiplying factor of 20 would approximate those kicked out in the pan tailings in the field work.

III. PRELIMINARY VS. THE MAJOR TESTS.

Taking the findings from the preliminary three holes on 1 stone per 8.574 cu. yd. and applying this ratio to the volume of the major test of 268.63 cu. yd., we get:

Calculated expectancy= 268.63 : 8.574= 31.33 stones.

"Actually" recovered from major test =32 stones.

This remarkable result can have one of the following interpretations:

1. An amazing case of coincidence with normal chances of occuring of one in a billion cases.
2. Amazing super-accuracy of the tests.
3. The results of the preliminary test were deliberately applied to the major test as a limiting factor calculated to be a condemning factor for the property.

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The above are very serious and dangerous statements to make, but they cannot be avoided in the face of the B. of M. report.

IV. A CERTAIN TEST FOR ABSOLUTE TRUTH.

As certain statements on page 17 of the report allege, no attempt was made to report on the quality of the diamonds recovered. It further appears that no equipment and facilities were made available for carrying out the investigation in a proper manner. The stationary grease table at the improper angle and no controls is merely one example.

In view of this it appears that:

1. The men in charge of the tests should have gone on record refusing to make an elaborate test with inadequate equipment without an unequivocal clear qualification with respect to the gaps, possible sources of errors, and unreliability of results.
2. In view of this, the test could be construed to have only on purpose, legitimately, and that is - to merely prove that there are diamonds there, However, since this point was proved many times before more reliably, and with better results, was this test merely a farce-like procedure carried out by the Bureau of Mines in official satisfaction of the request to do so by Mr. Harold Ickes following the owners' interview with President F. D. Roosevelt in early 1943? And did certain sinister forces take advantage of such easy and perfect setting to exert their adverse influence at first opportunity, with probably no direct suspicion of such influence in Dr. Sayers' mind? Did not Mr. H. DeWitt-Smith, vice president of the Newmont Mining Corp. and director of the Metal Reserve Co. during the war, state to the writer in 1942 that Ernest Oppenheimer made his headquarters in the Newmont offices and would not hesitate in spending a million pound sterling to quell such possible competition as may originate in Arkansas?

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3. The Bureau could have used an alternative and simple method to get the absolute answer, which could NOT yield anything but the exactly true and accurate results. This method would have also been more compatible with the Bureau's then alleged lack of extra funds and proper equipment. This simple method should occur even to the layman, leave alone Bureau of Mines engineers with diamond mining experience from South Africa and Belgian Congo. That it did not occur leaves one free to draw his own conclusions.

This simple method consists in complete elutriation or wet grinding of the entire virgin sample (only 265 cu. yd.) in a ball mill charged with 1.5" to 2" steel balls or 3" pebbles. The whole sample should then be slimed in a closed circuit through a mesh screen of 14 to 20 mesh. As a result all contained diamonds would be found on the screen. True - some of them could be chipped or even broken, but none would be lost - and the absolute answer would be had.

If the Bureau failed to judge the quality of the stones, could its men be concerned over breaking a few stones, if the original proclaimed purpose of its test from the start was to find out the truth?

Even at this late date the tailings remaining in the field could be cheaply run through this absolute test with a good chance of coming closer to the truth than the "answer" secured from the work which served as a basis for the Bureau's report, provided the tailings dump was not unduly disturbed since the test. To be frank, The B. of M. report is full of holes and has a distinctly bad flavor in the light of circumstances surrounding the case during the last forty years, specially to

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one familiar with both sides of the picture. A complete written analysis and criticism of the report would occupy more time and space than the report itself, and such non-constructive effort is a great deal more than the B. of M. report merits.

V. CONCLUSION.

It is as much the fault of the property owners for permitting such work to be done in the field and at Rolla without competent and critical observers with the power of veto, as it was the fault of the Bureau of Mines in conducting the test in the manner described in the report. Lack of acumen, appreciation, foresight and judgment on the part of one party was fully matched by negligence, apparent lack of proper planning, engineering and execution, as well as perhaps other less apparent adverse factors and motives, on the part of the other party.

The above represents the quint-essence of the writer's analysis of the Bureau's report based on protracted thinking, reference and calculations. The owners of the property must depend upon themselves to estimate their position as a result of the procedure followed since 1943 in the light of the Bureau of Mines report and the actual significance it may have.

George N. Vitt
Consulting Engineer

March 15, 1946
New Haven, Conn.

D

John Q. St. Clair
708 Hoover Street
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Schenck & Van Haelen
228 East 45th Street
New York

February 1, 1943

Mr. George O. Scarfe,
Facilities Review Committee,
War Production Board,
Room 3036,
Social Security Building,
Washington, D.C.

ARKANSAS DIAMONDS.
NORTH AMERICAN DIAMOND CORP.

Dear Sir:

This statement is certification of the following facts which came to light in our experience over a number of years in handling and cutting many thousands of diamonds originating and produced from what is known as the Arkansas Diamond Mine, situated near Murfreesboro, Pike County, Arkansas, now owned by the North American Diamond Corporation:

1. Our company handled diamonds from this property from 1911 to the present time. The writer made his first personal examination of the mine in 1911. As a matter of interest the writer personally found a diamond in the ore on his first visit, which is a rare thing to happen.

2. In that period we handled 14716 stones of various sizes from 40.23 carats down, that were entered into our permanent records, and a great many other stones, which we did not record, all coming from the mine under discussion.

3. During that period we had an opportunity to cut thousands of these stones in our own shops under the writer's personal supervision.

4. In cutting these Arkansas diamonds we noticed early in our experience that they required the use of crushed diamonds powder derived from same Arkansas diamonds in order to perform the cutting operations economically efficient and expediently. Subsequent repetition of this observation finally established the definite fact that the general cutting hardness and toughness of the Arkansas diamonds from the above mentioned property caused from 30% to 50% more time to be spent on all necessary operations connected with their shaping and cutting in comparison with stones from other sources.

5. In the course of our experience we came to recognize a definite association between the peculiar habit and shape of Arkansas diamonds and their superior hardness and toughness. In fact we learned to recognize Arkansas diamonds by their peculiar shape and thus foretell their superior hardness before starting cutting operations, permitting us to adjust the working conditions in advance.

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Schenck & Van Haelen
228 East 45th Street
New York

6. In handling the large quantity of the run-of-the-mine diamonds from Arkansas we came to believe that the deposit runs to so-called "high grade" stones with few so-called borts, and we observed that about two thirds of production consisted of whites and yellows, and the balance was various shades of smoky and brown.

7. Having sold a great many of these Arkansas diamonds for industrial purposes, some of the parcels containing several thousand carats, we learned that, generally, the peculiar and diversified shapes of these stones was advantageous from the stand-point of industrial tool uses.

8. We have records showing that some of the reliable re-sellers and users came back to us a number of times after their first purchase insisting on industrial diamonds of the same quality, even though they were not aware that they were Arkansas stones.

9. One of the most interesting observations we made was the fact that the property under discussion contains true carbonados. To our best knowledge, this Arkansas pipe is the only one in the world to contain this very valuable variety of industrial stones, the other only known source being the ancient alluvial deposits of Brazil. We still have a number of these Arkansas carbonados on our hands.

In conclusion we can state from our practical and business experience that the property under discussion speaks favorably for itself, and that about 80% of its production can be classified as industrial stones, the balance being largely gems. We regard these Arkansas diamonds as particularly promising for use as cutting edges in various diamond tools, to our best knowledge, due to the peculiarity and variety of their shapes.

We wish to point out that, during the last two years or so, we personally testified and displayed these diamonds to various high officials of our Government in Washington, D.C. and of the War Production Board on a number of occasions.

Trusting that this information will prove of value to you in your task of furthering our war efforts and national security, we are

Very truly yours,

SCHENCK & VAN HAELEN,

By_____
Ernest Schenck.

Copy to: North American Diamond Corp.

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

PROGRESS REPORT

September 20, 1948

The following outline reports the progress of the construction of the mill and installation of equipment and the development in the ore body of the property:

I arrived on the cite September 7th and remained until the 18th.

The mill building and the grissly are complete and all the equipment received to date is in place. The ore conveyor and feeder from the grissly to the crushers, the crushers, screens, classifier, elevators, jigs, slime tank and under-floor lines, screw conveyors, etc., are ready for operation.

We have pressed for delivery of the remaining equipment through Western-Knapp Engineering Company and sent our expeditor to the various manufacturers to obtain delivery of the remaining items ordered as early as October 1947. We are assured by these manufacturers that all of the equipment has been shipped and will arrive sometime the last of this month. We have been waiting for the washing pans and drives, special screen, and grease tables and a few miscellaneous items. As soon as they are received they will be installed and hooked up to the system by ore chutes, cribs, etc.

We plan to move a few loads of ore into the crushers for trial adjustments sometime next week. This ore will be crushed and screened and possibly classified. However, at this point we are dependent upon the pans before we proceed any further.

The water supply system is completed and operates as estimated, supplying about 50,000 gallons an hour to a 35,000 gallon receiving tank.

The power house and the generators, as previously reported, are completed and have been operated for several construction requirements.

The roads from the mine to the grissly are completed, including a system of drainage pipes and channels necessary to the mine and mill site.

The ore field has been worked to prepare the ore for milling. About 40,000 yards have been stripped and moved into stockpiles and an additional 35,000 yards have been rooted and weathered ready for loading into the mill. It was found necessary to remove about 2,000 tons of rock and debris from the ore body before the work was started. The first ore to be taken to the mill is mixed with a sizable quantity of overburden

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DIAMOND CORPORATION OF AMERICA

September 20, 1948

PROGRESS REPORT

which is too difficult and costly to remove. However, it can be handled through the mill for the trial runs without serious consequences. This condition will occur as we work additional top surface.

Our mine clean-up included removal of trees, stumps and brush from about four and one-half additional acres of area into which we will move for the surface ore in the future.

In summary of the entire project, we are reasonably certain that ore will be partially handled in the mill before September 30th and through the entire system by the 15th of October. I shall be happy to report when the mill is adjusted and brought up to full production as experimental runs are completed.

Jan Porel

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

St. Louis, Missouri
February 16, 1945

REPORT ON DIAMOND MINE

MURFREESBORO, ARK.

During the past year and a half I have made a careful study of a mass of historical and technical data, which has come to my attention from various sources, all pertaining to the diamond deposit located in Section 21 and 28, Township 8 South, Range 25 West, southeast of Murfreesboro, Pike County, Arkansas. I have visited the property and verified my findings in the field. The following are some of my observations and conclusions:

The deposit is a volcanic pipe of peridotite surrounded by sedimentary rocks. It is roughly circular or semi-elliptical in cross-section, and has an area about seventy acres. Except that it is slightly larger in area, the deposit is similar in its structual and geological characteristics to the diamond-bearing pipes of South Africa. Three types of peridotite occur within the pipes, one of which--the volcanic breccia (covering an area of twenty-seven acres)--is recognized by most authorities to have been the matrix rock of the diamonds found on the property.

The first diamonds found in Arkansas were picked up on August 1, 1906, near Murfreesboro on the Prairie Creek area of peridotite by John W. Huddleston, the owner of most of the area. He showed them to Horace Bemis, of Prescott, Arkansas, who, suspecting that they were diamonds, took one to the Mermod, Jaccard & King Jewelry Company, of St. Louis, for identification.

A little later one or more stones were sent to Charles S. Stifft, jeweler of Little Rock, Arkansas, who submitted them to George F. Kunz, a gem expert at New York City. After the stones had been identified as diamonds, Mr. Stifft, A. L. Cohn and S. W. Reyburn of Little Rock, and J. C. Pennix of Murfreesboro, secured an option on the Huddleston property and later organized the Arkansas Diamond Company, which purchased the property.

The Arkansas Diamond Company cleared the timber, put down numerous pits and a few drill holes to determine the extent and depth of the soft, decomposed peridotite that could be treated for the recovery of diamonds. The mine thus opened was called the "Arkansas Mine".

Through the recommendation of Mr. George F. Kunz, Tiffany's gem expert, Mr. S. W. Reyburn engaged Dr. Henry S. Washington in 1907 to investigate and report on the property. In 1908 Mr. L. F. Loree, President of the Delaware and Hudson Railroad, became interested and employed Mr. John T. Fuller, a consulting engineer and then a recent manager of the De Beers Diamond Mines near Kimerly, South Africa, to investigate the property. However, Mr. Loree did not acquire it because the Arkansas group would not

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February 16, 1945

surrender control. Somewhat later a De Beers representative visited the property and a series of negotiations took place in London between De Beers and the Arkansas group headed by Reyburn and Stifft. British participation in the development of the Arkansas field was the objective of these negotiations but nothing resulted, as the unwillingness to deliver control again proved the deterrent.

In May, 1908, the company erected a small washing plant. In January, 1909, John T. Fuller, this time employed by the Arkansas Diamond Company wrote a second report addressed to Mr. S. W. Reyburn, President. In August, 1909, the washing plant was remodeled, whence it consisted of a revolving screen, an 8 foot rotary washing pan, a Herz jig, and a 20 horsepower boiler and engine. This plant was operated intermittently until 1912, but very little thereafter. In 1910 additional washing tests were made and test holes sunk under Fuller's supervision. Although diamonds were produced, the company was greatly hampered by lack of adequate funds. In 1911 Mr. Thomas Cochran, later a J. P. Morgan & Company partner, became interested in the company, and Mr. Fuller resigned as managing engineer. The property was idle until 1919 when the company was reorganized as the Arkansas Diamond Corporation of Virginia with an authorized capital of $10,000,000 (1,000,000 shares $10 par value), but only $300,000 was paid in and not over $180,000 was actually used for mining and salaries.

In 1920 a larger washing plant was erected, which was described by S. W. Reyburn and S. H. Zimmerman to contain a No. 3 gyratory crusher, an 8 foot Hardinge mill, a rotary drier, two washing pans, jigs, and a grease table.

While most of the diamonds produced from the Arkansas Mine were recovered by the washing plants, many were picked up by chance on the surface or were recovered in sluice boxes when treating the soft decomposed peridotite which was mined hydraulically for a short period. The mine workings about December, 1917, consisted of trenches and cuts not over ten feet deep and covering an aggregate area of not over several acres.

While the work performed between 1919 and 1929 under the supervision of Mr. S. H. Zimmerman was uncommercial, due to many factors but mainly to failure to properly apply known methods of testing to the diamond-bearing area, the facts shown by the following summary clearly prove that, during 1925, in spite of all operating difficulties and inefficiencies, the largest cubic yardage was treated--44,407 cubic yards--recovering 10,794 stones weighing 6,316.6 carats, resulting in .143 carats per cubic yard, which at $25 per carat had a value per cubic yard of $3.57.

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

February 16, 1945

Period	Cubic Yards	Number Stones Recovered	Weight in Carats	Carats Per Cubic Yard	Value per Cubic Yard at $25 Per Carat
1907-1919	1,326	673	254.6	.192	$ 4.80
1925	44,407	10,794	6,316.6	.143	3.57
1929-1930	2,100	2,559	1,273.4	.606	15.15
Total 1907-1930	47,833	14,026	7,844.6	.164	$ 4.10

Mr. John T. Fuller in 1930 corrected these totals for inaccuracies, which he believed existed resulting in recovery of .237 carats and a value at $25 per carat of $5.92 per cubic yard. He does not believe however that this recovery and value will hold in depth. In this I concur and believe that the 1925 recovery and value is probably a pretty safe guide, as lower actual content will probably be offset by less loss through more careful application of improved South African methods.

In 1926, 4,615 stones recovered from this property (the largest weighing 40.23 carats and valued at $57,400) were in the custody of Schenck and Van Haelen, diamond cutters of New York. Mr. Ernest Schenck, a gem expert of international reputation, visited the property and handled about 40,000 stones produced from this field. He states the hardness and brillancy of the Arkansas stones have no equal, surpassing in these essential qualities stones coming from South Africa and Brazil.

In 1927 Mr. Cochran, who held a mortgage on the property for money advanced, foreclosed. In 1928 a group of the Arkansas stockholders took it over and operated it during 1929-30 on a small scale. These operations were suspended in 1931 because of the depression and no further activity resulted until an option to purchase the controlling interest in the company was granted to Mr. Ray E. Blick, of Chicago, through whose activities the control has passed to the present owners.

I have seen the large Uncle Sam diamond, 14.34 carats after cutting, and a number of other stones in the custody of Schenck and Van Haelen. I have also carefully examined over 2,000 stones now in the custody of Austin Q. Millar. These stones were the remnants after having sold the more select stones. The stones I saw were all colors, classifications, and shapes. Most of them were small, as the larger ones had been sold. They were said to have been produced from a very small area of the pipe and the worked-over ground was very limited and appeared to bear out this statement. As a result of these observations on the ground one can only conclude that many other stones would be produced from the pipe if proper mining and washing methods were applied. The results of seven tests made on the Ozark ground indicated a recovery, from 407 cubic yards, of 433 stones averaging .21 carats each and .22 carats per cubic yard.

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

February 16, 1945

Because of the relationship which a quarter of a carat bears to a cubic yard or rock, i.e., 1:53,000,000, it is impossible to sample the deposit by any of the methods applicable to spotty gold or precious metal deposits. The only practical procedure for sampling it that is recommendable is a pilot plant operation of sufficient size that average recoveries will result after the diamond bearing area has been worked to a reasonable depth, and the diamonds therefrom extracted in a washing plant built and operated after the best South African practice. This is the only way to obtain dependable figures upon which to base, with any degree of safety, future estimates of recoveries, costs, and economics.

The size and physical condition of the deposit are such that the operation may be visualized in the early years as an open-pit direct moving operation, requiring little or no drilling and blasting, using rooters, carryalls, caterpillars, tractors, and the most modern equipment to place the rock in the washing plant; and in the later years, after a depth of 150 to 200 feet may have been reached, to be worked by one of the modern underground caving or slicing methods, extracting the rock through shafts, located in the rim rock surrounding the pipe.

It has been estimated that a washing plant capable of treating 750 to 1000 cubic yards per day and mining equipment capable of cheaply digging the diamond-bearing peridotite and transporting it to the washer, as outlined above, can be acquired and placed in operation for $150,000 to $200,000. It can be kept in operation for $25,000 per month, and provisions should be made to operate it six to twelve months on a profitless basis, requiring $150,000 to $300,000 working capital. This will permit testing the ground over its entire 27 acres to a depth of 2-1/3 yards, or, if selected rectangles are worked, checkerboard-fashion, a depth of 10 yards may be tested.

It is estimated that the rock can be mined and washed for 75 cents per cubic yard during the earlier operating period with a very good chance that this can be reduced to 50 cents as the operation becomes established. There are not likely to be unsurmountable mining or water problems that will affect these estimates to any considerable degree.

If the result of a year's testing indicates recoveries somewhere between .12 and .24 carats per cubic yard, which I would say is reasonably expectable, a recent statement from a diamond buyer indicates a long-term future price of $2 to $5 per carat for industrials, and $50 per uncut carat for gems. The ratio of industrials to gems based on past experience in this pipe seems to be 2 to 1. From these facts the average realization should be between $15 and $30 per carat. The following table indicates a range of expectable results. Columns B and D are the extremes. The actual will probably fall between, although the occasional discovery of a large gem stone will upset all average figures.

John Q. St. Clair
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February 16, 1945

	A	B	C	D
Daily production cu. yds.	1,000	1,000	1,000	1,000
Annual production cu. yds.	300,000	300,000	300,000	300,000
Recovery in carats per cu. yds.	.24	.24	.12	.12
Av. Price per carat	$20.00	$30.00	$20.00	$15.00
Carats recovered per year	72,000	72,000	36,000	36,000
Revenue per cu. yd.	$4.80	$7.20	$2.40	$1.80
Cost production per cu. yd.	.75	.75	.75	.75
Gross profit per cu. yd.	$4.05	$6.45	$1.65	$1.05
Gross profit per year	$1,215,000	$1,935,000	$495,000	$315,000

Besides the production of diamonds in the rough, the venture has possibilities which may develop into substantial sources of additional revenue from the marketing, cutting, and manufacture of diamond tools.

We should encounter no insurmountable difficulties in the recovery of the stones from the peridotite. The possibility of improving recovery of diamonds, especially in the very small sizes now in growing demand by the various industrial users, presents an interesting research problem which may add to the revenue.

With recovery, costs, and resultant profits proven, the property may be expected to have a very long productive life ahead of it. At 1,000-5,000 cubic yards per day the work will proceed downward at a rate of 7 to 35 feet per year. Since the South African pipes have been productive to depths of 2,000 feet or more and since there is every reason to believe that this pipe has the same possibilities, a life of at least 50 years is expectable.

I believe the project warrants the expenditure necessary to definitely prove its economic possibilities as above outlined.

Submitted herewith is a colored map of the Prairie Creek Peridotite area showing in colors the three types of rock in the pipe. The yellowish color indicates the peridotite generally thought to be diamond bearing. There is a possibility that the material colored reddish may also carry diamonds. Since there is some difference of opinion on this, however, it has not been included as having ore possibilities in any of the preceding estimates. The property lines are shown on the map and a table attached to the may shows respective areas. The North American Diamond Corporation holdings are shown on the map as the Arkansas Diamond Corporation.

Geo. W. Roddewig

Consulting Engineer

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

April 6, 1949

George E. Tobias and Edwin T. Schneberger,
Trustees under Trust Agreement dated July 1,
1941, and known as Trust No. A, as amended.

Re: Mining Lease dated September 28, 1945, as amended on May 13, 1947 on Property which is the Subject of Trust No. 2

Gentlemen:

Diamond Corporation of America, Lessee under the above-named Mining Lease, as Amended, makes the following report of its operations for the year 1948:

During the year the mill building and grizzly were completed and the equipment installed. The water system (built to supply about 50,000 gallons an hour to a 35,000 gallon receiving tank), power house and generators, and roads leading from the mine to the grizzly were also completed.

Deliveries of new items of equipment were slow, delaying somewhat the start of milling operations beyond the time we had originally set for commencement. In preparing for milling it was necessary to remove about 2,000 tons of rock and debris from the ore body.

In the latter part of September ore was moved into the mill and there then followed a period of adjustment and readjustment of equipment (some of which had been only recently received) and of observation of processes. This period lasted until December.

The mining of ore through the months of December, January and February was difficult because of severe seasonal weather and four floods of the Little Missouri River. The water rose from 18 to 24 feet above normal causing complete stoppage of field operations.

From December 1, 1948, to March 15, 1949, we milled approximately 60,000 cubic yards of surface ore, overburden, and tramp material. The plan of operation for the coming year is to take ore from selected hardibank areas as far as possible and observe and check the yield of varieties of the ore (they are numerous) in an effort to obtain a comprehensive record.

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

George E. Tobias and
Edwin T. Schneberger, Trustees

April 6, 1949

The recovery of diamonds has been insignificant and we hope does not represent a measurement of yield. The diamonds thus far recovered have not been sufficient to warrant any sale of them. Since we had no sales during 1948, we deem it unnecessary under Section 5 of the Mining Lease to have a report for 1948 certified by a certified public accountant. If, however, you take a different view of the matter, please let us know.

Very truly yours,

DIAMOND CORPORATION OF AMERICA

By_____
Jan Porel
Vice President and Treasurer

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

Schenck & Van Haelen, Inc.

56 West 45th Street

New York 17, N. Y.

June 15, 1953.

Geological Exploration Company,

Norman,

Oklahoma.

Dear Sirs:-

As per instructions of Mr. John St. Clair we are enclosing a break down price wise of an original lot of diamonds taken from the Arkansas Mine during 1929. We feel that the prices will be comparable with the present market. It is a typical find representative of early finds and you will find that it differs in assortment greatly with the "Martin" lot which we feel was not truly representative.

Very truly yours,

SCHENCK & VAN HAELEN, INC.

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

Lot of December 31, 1929.

Cuttables

No. 1	Fine Blue White	1 St.	8.71 Kts.	@	$250.00 P. Kt.
2	Golden Fancy	1	7.85		125.00
3	Cape & Bywaters	9	24.22		60.00
4	Dark Brown	6	9.00		18.00
5	Blue White Fine	8	11.00		88.00
6	White Sil. Cape	6	6.56		50.00
7	Fancy Canary	6	6.43		28.00
8	Fine White	22	12.22		45.00
9	Fancy Canary	7	2.76		18.00
10	Dark Brown	22	11.47		7.00
11	Light Brown	10	14.98		55.00

Borts and Industrials

No. 1	Borts	44	63.55	3.00
2	Smaller Borts	443	127.65	2.00
3	Crushing Borts	78	63.69	5.00
4	Light Brown	55	25.91	8.00
5	Cape & Bywaters	61	19.32	10.00
6	White & Sil. Cape	67	22.30	12.00
7	Fine Light Brown	85	28.40	12.00
8	Special Indust.	1	0.95	9.00
9	Other material not diamond	1.		

Total 933 sts. 467.67 Kts. $9,634.79

Industrial	Average	$ 5.06 P. Kt.
Cuttable	"	67.75 "

Total Average Price $20.60

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

REPORT ON A GEOPHYSICAL SURVEY

FOR

JAN POREL

IN

PIKE COUNTY

ARKANSAS

BY

SHERWIN F. KELLY GEOPHYSICAL SERVICES. INC.

WILMINGTON DELAWARE

APRIL - AUGUST

1946

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

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John Q. St. Clair
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Norman, Oklahoma

REPORT ON A GEOPHYSICAL SURVEY

FOR

JAN POREL

IN

PIKE COUNTY ARKANSAS

INTRODUCTION

According to a contract submitted by Sherwin F. Kelly Geophysical Services, Inc. on April 3rd, 1946 to Jan Porel, and signed by him on April 4th, 1946, the geophysical company undertook to make a magnetic survey of areas in Arkansas to be designated by him. Progress reports under this contract were to be submitted to Ali Hassan, but upon his death were rendered directly to Jan Porel.

The area first outlined for the magnetic survey consisted of T. 8 S., R. 25 W. in Pike County, Arkansas, plus one square mile in the adjacent township to the west, section 24, T. 8 S., R. 26 W. The area was later reduced by omitting a large part of the observations which would otherwise have been taken in sections 1, 2, 3, 4, 5, 6, 9, 10, 24, 25, 30, 33, 34 and 36. A few observations were nevertheless made in most of these sections, principally along roads.

The plan of the survey envisaged readings on approximately quarter-mile coordinates, with a few areas picked for closer readings, principally in sections 11, 12, 13 and 14

and in sections 20, 21, 28 and 29.

The highway maps were found to be inaccurate and totally inadequate as a basis for the network of measurements. Aerial photographs of the area were therefore purchased from the U.S. Dept. of Agriculture. On the scale of 8 in. to the mile, these proved highly informative, and essential for mapping the locations of the stations; they reveal the paucity of roads in the area, and show that much of the work had to be done in forested areas, difficult of access and lacking in survey controls. Because of the difficulty of operating over such terrain, the magnetic survey of the area designated required much longer than had been anticipated. Measurements along the roads at quarter-mile intervals were speedily carried out, but after that stations had to be reached by pace and compass through the bush, with only occasional controls provided by the aerial photographs.

The field work was carried out by Joseph E. Griffin, field engineer for Sherwin F. Kelly Geophysical Services, Inc. The survey commenced on April 22nd with a visit by J.E. Griffin and Sherwin F. Kelly to A.B. Foxhall, Assistant State Geologist, and Howard Millar of the Ozark Mine, in Little Rock, Arkansas. The magnetic observations were completed on July 21st, 1946, but the geophysical company offered to continue for a few days without fee if the actual out-of-pocket expenses were met, in order to clarify some details in areas that looked as though they might be promising.

Detailed work was done in the neighborhood of the Ozark and Arkansas Mines to demonstrate the magnitude of the magnetic reactions typical of the peridotite formation in that area. This showed that a very close network of detail readings would be needed to discover and outline such occurrences. The magnetic readings over the balance of the area serveyed, revealed no reactions which could be ascribed to another peridotite formation comparable in size to that in the area of diamond mining operations.

At the beginning of the work we received cordial help from A.B. Foxhall, Assistant State Geologist, and the kind permission of Howard Millar to conduct tests on the property of the Ozark Mines. From his father, Austin Millar, our J.E. Griffin received a great deal of useful information about diamond mining in Arkansas. From Hugh D. Miser of the U.S. Geological Survey, a specialist on the area, we received much interesting data and useful advice.

This introduction is followed by a section describing the magnetic method employed. Following this is a chapter setting forth the results obtained. Maps are bound in the back of the report. The aerial photographs, referred to above, on which the station numbers and readings have been recorded, are submitted separately.

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DESCRIPTION OF MAGNETIC METHOD

Magnetic methods of geophysical exploration rely upon delicate measurements, at the earth's surface, of slight variations in the strength of the earth's magnetic field. Where the subsurface formations contain appreciable amounts of such naturally magnetic minerals as magnetite or pyrrhotite, the resulting increase in the strength of the magnetic field, observable at the surface, may be quite pronounced. The effect will not be strong, however, where these minerals are present in only scattered amounts, but different rock formations nevertheless have their characteristic influence upon the earth's magnetic field. In general, the basic rocks and ferrugineous sediments, characterized by high magnetic permeability, produce an apparent increase in magnetic attraction in their vicinity. Such formations are called paramagnetic. On the other hand, rocks high in silica or calcite usually have the reverse effect, and produce a decrease in the strength of the surrounding magnetic field. Such formations are called diamagnetic.

By taking suitable observations, systematically arranged, it is possible to measure the variations in the strength of the earth's magnetic field from place to place. The resultant picture is purely of how the earth's magnetic field varies within the area explored, and it then becomes necessary to correlate these variations with what is known of the geology of the area, and with the formations which

may be expected beneath the overburden. The application of the principles described above must be made with discrimination, however, because conditions may arise which will upset pre-conceived judgements as to the effect of a given formation.

Formations which exert but a feeble magnetic effect, whether they be paramagnetic or diamagnetic, must be present in larger volume to give an appreciable instrument reading, than is the case for those formations whose effect is more pronounced. In general, however, it may be said that the magnetic technique is efficaceous for tracing igneous sedimentary contacts, igneous intrusions, and for following faults where the fault has displaced rocks of differing magnetic characteristics.

There are two principal types of instruments available for taking geophysical observations of the earth's magnetic field. These are the Askania Magnetic Balance type, and the Hotchkiss Superdip. The two instruments are comparable in sensitivity, but the Hotchkiss Superdip has a considerable advantage in portability and ruggedness. This was the instrument used in the present survey.

The Hotchkiss Superdip consists of a needle mounted to swing in the vertical plane, with a pivot riding on quartz knife edges. A movable auxiliary arm, with balancing counterweights, is attached to the magnetic needle for setting the sensitivity of the instrument to any pre-determined value. The instrument is tripod-mounted, on a levelling head, and must be carefully levelled and oriented before taking a

reading. The needle is allowed to swing from a vertical, zero position, and the magnitude of the swing is read against a circular scale divided into 360°. These degrees are called scale divisions, and the readings recorded are the number of degrees which the needle swings clockwise from its vertical position (0°). A strong magnetic field produces a larger swing, and therefore higher readings in scale divisions, than does a weak magnetic attraction. The field technique consists of taking observations spaced at suitable intervals for the problem in hand.

When the observations are laid out in the form of a grid, the results may be plotted as profiles, or the values may be contoured on a plan map. The latter manner of presentation has been adopted in the present report. The magnetic contours will thus depict the variations in magnetic intensity, as influenced by the formations beneath the points of observation. As a rule, igneous rocks will produce higher readings than sedimentary ones, and amongst the igneous rocks the more basic ones produce the stronger effect.

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DISCUSSION OF RESULTS

The objective of the magnetic survey in Pike County, Arkansas was to determine whether or not there was a possibility of other peridotite plugs occurring in that area, similar to the one which had yielded large quantities of high grade diamonds in the course of operations at the Ozark Mine, the Mauney Mine and the Arkansas Mine. The diamond occurrences here are similar to those in South Africa, the stones being found in a volcanic breccia which has been formed as a result of explosive action associated with the intrusion of a porphyritic peridotite.

For detailed information on the geology of the diamond occurrences, and of the area in general, reference should be made to the following reports. United States Geological Survey Bulletin 735-I, "Diamond-Bearing Peridotite in Pike County, Arkansas", by Hugh D. Miser and Clarence S. Ross, 1923; and United States Geological Survey Bulletin 808, "Geology of the De Queen and Caddo Gap Quadrangles, Arkansas", by Hugh D. Miser and A. N. Purdue, 1929. The above bulletins have been used in preparing the present report, and the geological data given below have been drawn therefrom.

The Arkansas peridotite was apparently intruded in the period of time between the deposition of the Trinity formation, of Lower Cretaceous age and the Tokio formation of Upper Cretaceous age. In the area studied (Twp. 8 s,

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R. 25 W) the Tokio and Trinity beds above mentioned constitute most of the surface formations, except for some gravel terrace deposits and river bottom gravel and alluvium, of Quaternary age. The Trinity consists of clay, sand and gravel with two interbedded limestone lentils. The gravels are composed largely of pebbles of novaculite, quartz, quartzite and sandstone. In place, these beds of gravel are cemented by iron oxide. In the township mentioned, the Tokio rests directly on the Trinity, and the intervening Woodbine formation is absent. The latter occurs immediately west of this township, and consists of gravels and clays, together with much volcanic tuff. The gravels contain novaculite pebbles, along with some of quartz, quartzite and sandstone. In addition, there are in places extensive beds of igneous pebbles. The presence of volcanic tuffs and igneous pebbles is of importance in connection with the terrace deposits and the river gravel and alluvium, as the drainage is such that some of this igneous material may have found its way into the alluvium and gravel of the Little Missouri River valley.

The Tokio formation, overlying the Trinity, consists largely of sand and gravel, and again, the gravel deposits are largely quartz and novaculite pebbles. Iron oxide occasionally cements some of the gravel beds. In places, the lower beds of the Tokio formation consist in large part of altered serpentine grains and fragments of peridotite. This material may have been ejected into the

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air from the nearby volcanic vents at the diamond mines, or it may have been derived by erosion from exposures of the peridotite.

The surficial formations in the area studied may therefore be enumerated as follows. The oldest is the Trinity formation, of Lower Cretaceous age, consisting largely of gravels and limestone. The peridotite was then intruded into this formation. Subsequently, the Tokio formation of Upper Cretaceous age, was laid down, consisting largely of sands, clays and gravels, and in places containing igneous material derived by explosion or erosion from the nearby peridotite. Quaternary deposits are present in the form of terrace gravels, and river bottom gravels and alluvium which might, in places, contain igneous material derived from exposures to the west of the Woodbine formation which there lies between the Trinity and the Tokio.

The intrusive peridotite contains as much as 2% of magnetite, which would render it definitely paramagnetic with respect to the intruded sediments. It is interesting to note, however, that the volcanic breccia and tuffs, formed by explosive action at the time of the intrusion or immediately thereafter, seem to contain less magnetite, which would make them less magnetic than the peridotite. The intrusive peridotite could be expected to give a strong magnetic reaction, as was verified by Noel H. Stearn, who carried out a magnetic survey some fifteen years ago in Arkansas, reported by him in an article "Practical Geo-

magnetic Exploration with the Hotchkiss Superdip" published in the Transactions of the American Institute of Mining and Metallurgical Engineers, Geophysical Prospecting Volume, 1932. This paper makes only brief mention of the fact that strong reactions were recorded on the Pike County peridotite, and that evidence was obtained of other basic, igneous bodies elsewhere in the state, but covered by deep deposits of later sediments. In a personal communication, he informed me that his results except for the published information referred to, were still confidential.

The present magnetic survey of the designated area in Pike County was to be carried out on approximately quarter-mile coordinates. Readings were first taken at quarter mile intervals along roads readily traversable by car. With the network of roads thus covered, the grid of measurements was then pushed into the back country, on farm land and in forest.

A network of base stations was gradually built up in the course of the survey, these base stations being used for check readings at intervals during the day, to determine the magnitude of the diurnal variation in the earth's magnetic field. Corrections for this diurnal variation must be made, plus corrections for temperature variation, and also a correction for latitude. The first base station (B. 1, shown on Fig. 1) was established just east of the bridge on the Murfreesboro road where it crosses Prairie Creek in section 20. After corrections,

the value of 129.5 scale divisions was established at this point, which seems to be approximately the normal value over most of the area studied. This base is at a considerable distance from the peridotite intrusive, and would therefore be unaffected by that igneous body. The effect of the peridotite then needed to be determined.

The first task set for the present survey was therefore to check the reactions given by the known peridotite occurrence, and thus to provide a basis of comparison for the reactions obtained elsewhere in the district. Permission to work on the property of the Ozark Mine was very kindly given by the Millars, but permission to take test readings on the property known as the Arkansas Mine was refused by the present owners. Part of their property was unfenced and not posted, so we were able to get a few check readings in the vicinity of East Hill, but could not go on the fenced area where the actual diamond mining had been carried out, nor on Middle Hill or West Hill. These diamond mining operations are in sections 21 and 28, of T. 8 S, R. 25 W. The locations of this area, and of other areas also studied by detail measurements, and of nearly all the stations at which observations were taken, are all on Fig. 1 "Plan of Survey". The station numbers, and the readings obtained are shown on this map, except that some of the closely spaced stations in the detailed areas are not given; they are entered on the individual, detail maps. In Fig. 2, the area

surveyed is again mapped, but the station numbers and readings have been omitted to avoid confusion because this map gives the isomagnetic contours; each contour passes through the points of equal deflection of the Superdip needle. In drawing these contours through the areas where detail work was done, their shapes have been generalized, because the detail maps (Figs. 3 to 6) suffice to show their configuration more precisely.

The results of the magnetic investigation on the peridotite exposures in the vicinity of the diamond mines (sections 21 and 28) are shown in Fig. 3. The intrusive mass of peridotite which forms East Hill is responsible for a pronounced increase in magnetic intensity (162.5 scale divisions) and a striking crowding of the magnetic contours. The immediate borders of the peridotite mass tend to show a somewhat reduced magnetic intensity (circa 125 scale divisions), a phenomenon commonly observed on bodies of this type. It is worthy of notice that the volcanic breccia and tuffs yield magnetic reactions hardly to be distinguished from the normal intensity (about 129 scale divisions) throughout this area. Towards the south-eastern corner of the Ozark property the magnetic values tend to fall off (below 127 scale divisions) where the readings were taken on the Trinity formation.

Due to the lack of sufficient detailed observations in the vicinity of the Arkansas Mine, it is difficult to draw definite conclusions as to the area

over which the peridotite mass would produce magnetic readings of markedly increased intensity. The readings on East Hill nevertheless provide a rough basis of comparison, from which two conclusions may tentatively be drawn. First, were a peridotite mass to be no larger than that portion of the intrusive underlying East Hill, it could possibly escape magnetic detection if it happened to be centered in the middle of a 40 acre lot, and the readings taken only at the corners of that lot. It might give a slightly increased intensity on one or more of these stations, however, for which reason it became advisable to make a few additional observations wherever a slight increase in intensity was observed. The second conclusion is, that a peridotite mass as large as the one which forms East Hill, Middle Hill and presumably West Hill, would definitely be indicated on the basis of the quarter mile coordinate system of magnetic readings.

The lack of a clearly distinguishable magnetic reaction from the volcanic breccia indicates that a deposit consisting solely of such breccia might escape detection by geophysical means. It seems most unlikely, however, that a volcanic breccia of this type would occur except in conjunction with its parent, intrusive peridotite, the manner in which it occurs here on the Ozark and Arkansas Mines. The finding of another body of intrusive peridotite would not guarantee the presence of diamond-bearing breccia, but it would be the only hopeful place

to look, as a breccia would hardly occur without the intrusive. This, then is the basis for conducting a magnetic survey as the first step in the search for additional diamond deposits.

Peridotite has been observed at three other localities in Pike County, the so-called American Mine, Kimberlite Mine and Black Lick prospect, all in section 14. Some detail work was carried out on each of these localities, but was halted at the suggestion of Jan Perel, who felt that his possible interest in the areas was not such as to justify any further work there. The detail work is therefore incomplete and definite conclusions can not be drawn therefrom; a few comments may nevertheless be made. The three properties above mentioned are all shown on Fig.4.

At the Kimberlite Mine, peridotite was exposed at the juncture of the two westernmost trenches, and also in the two small trenches at the north edge of the map. This had lead to the supposition that the peridotite was present in the form of a crescent shaped dike. Its exposure in the trench north of the old warehouse is as only a narrow dike, evidently too small to affect the magnetic readings, a phenomenon furthermore noted in connection with the narrow dike on Prairie Creek (Fig.3). The main exposure in the westernmost trenches is evidently responsible for the moderately increased magnetic intensity, with readings up to 135 scale divisions. The low

reading at station 403 (127.5 scale divisions) is probably due to the interference of some scrap iron noted nearby. Further magnetic work in the vicinity might have yielded data upon which to base a firmer conclusion as to the shape and extent of the peridotite body here.

At the American Mine, the magnetic intensity evinces only a slight increase (reading of 132 scale divisions), as far as the limited amount of detail work shows. The distribution of peridotite here is uncertain, and as far as known it is composed largely of volcanic breccia which has already been observed to yield only slightly increased magnetic readings. Breccia was encountered in drill holes 1 to 5, in the trenches near holes 1 and 2, and in the shaft. The shape and extent of the peridotite mass are not known, and it may consist either of dikes extending outwards from a main mass, or the main body may include large bodies of Trinity formation, through which it was intruded. Further magnetic work would probably cast light on this situation, and pick up the main intrusive.

Little is known of the peridotite at Black Lick, which was encountered in the two pits on either side of the ridge, and the few magnetic readings on this prospect yield no data upon which to base any conclusions as to its extent.

As far as the observations go at these three prospects, there is no indication of any mass of perid-

etite comparable in size with that in the main diamond mining area. It is worthy of note that the American Mine is reported to have produced only 24 diamonds, the Kimberlite several and Black Lick none.

It may well be that the area described above has not yet been adequately prospected, since isomagnetic contours as high as 133 scale divisions are shown on Fig. 2, in this vicinity of sections 14 and 15. A small peridotite intrusive may therefore exist in or near the American-Kimberlite areas.

Careful examination of Fig. 2 reveals a difference in the magnetic pattern in the southeast portion of the map area, compared with the northwest one. The dividing line seems to extend more or less parallel to the power line, from section 11 to the southwest corner of section 31. Southeast of this line the magnetic reactions show a slight tendency to greater irregularity than they do northwest of it, and to rise more frequently to a value of 130 scale divisions or higher. This dividing line marks roughly the northwest limit of the Tokio formation, leading to the supposition that these beds probably exhibit a slightly higher magnetic intensity than the underlying Trinity beds. Tokio formations here cap north-south ridges, separated by shallow stream valleys cut into the Trinity formation. One such ridge, capped by Tokio, follows the boundary line between sections 21 and 22, with a slight extension westward into the south-

east corner of section 16, most of which is marked by readings of 129 to 130 scale divisions. Another is followed by the road extending northward from the Little Missouri River through the middle of sections 27 and 22; a tongue of magnetic highs corresponds with this ridge. The road running northerly through sections 26 and 23 is also on a ridge capped by Tokio and is marked by a slight increase in magnetic intensity. Between it and the ridge previously mentioned is a stream valley cut into the Trinity formation, although the actual stream bed lies a little west of the zone of magnetic depressions on the border between sections 26 and 27. The pronounced low in the northwest corner of section 25 extendsacross both Trinity and Tokio formations, and another Tokio capped ridge lies east of it extending from the northwest corner of section 13, southeasterly to the eastern border of section 24. The Tokio beds capping this ridge and the one previously mentioned come together in the northeastern portion of section 14, an area characterized by readings of 130 scale divisions, a value somewhat higher than those observed to the north and east. Detail work was carried out in that vicinity (Fig.5) because readings of 131 scale divisions had been obtained there. Detail work revealed nothing higher, so it seems probable that the slightly increased magnetic intensity first recorded is ascribable to the presence of material of igneous origin in the Tokio beds which here constitute the surface formations.

Exact correspondence between the slightly increased magnetic intensities and the presence of Tokio beds can not be expected, because the magnetic readings will depend on two factors. The first is whether or not the Tokio contains material (magnetic) of igneous origin, and the amount contained, and the second is the remaining thickness of such beds. Where erosion has thinned them, the magnetic reaction will be weakened, and anomalies may even be absent. The topography also has its effect in accentuating the magnetic relief. For example, if a reading is taken in a stream bed cut into the Trinity formation, and a nearby ridge is capped by Tokio beds containing magnetic igneous material, the effect of such magnetic material lying above the line of the instrument, will be to create a slight upward magnetic pull, and thus to decrease the reading. This effect would be produced even where the station is on the Tokio beds, if it is on a hillside and near the base of the Tokio, so that the adjacent ridge causes a greater thickness of Tokio to lie above the station level than below it. Erratic distribution of igneous material in Tokio beds would also produce erratic distribution of highs and lows.

Some Tokio beds also appear in the southwest corner of section 31, and correspond roughly with the slightly increased magnetic intensity observed along the southern and western borders of that section.

Some detail work was done in sections 29 and 30

(Fig.6) because of the reported occurrence of peridotite boulders in the Little Missouri River, just above its confluence with Prairie Creek. The thought was that such boulders may have had their origin in an intrusive peridotite upstream on the Little Missouri River, or possibly upstream on Prairie Creek at a time when the point of confluence might have been west of the present one. The magnetic readings were taken on a 300 ft. coordinate system, which would certainly have located any intrusive body of peridotite other than a very small plug or dike. The highest readings obtained in this detail work were 132.5 scale divisions, but at no place was the area of high readings strong enough or large enough to warrant the expectation of a major intrusive peridotite.

Practically the entire section is covered by river bottom alluvium and gravel, and the erratic readings recorded are probably due to scattered igneous material in the alluvium and gravel, derived from the Woodbine and Tokio formations to the south and west. It is even possible that peridotite boulders are present, but if so, they must have come from very small plugs or dikes.

Somewhat erratic readings are recorded on the terrace gravels in the vicinity of Murfreesboro, as well as on the alluvium in the Little Missouri valley bottom. The possible presence of igneous material derived from

the Woodbine and Tokio formations has been referred to, and may well account for these erratic readings. When iron oxide has cemented the gravels, slightly higher magnetic readings might also be obtained.

East of Murfreesboro in sections 16 and 17, there is an east-west band wherein the magnetic intensity seems to have increased very slightly (131 scale divisions). This appears to correspond with a tongue of the Trinity formation, consisting of gravels and limestone, but is probably due to undetected remnants of Tokio; or it may be caused by the presence of erosional material derived from the Tokio formation, or from the peridotite in the Kimberlie and American Mines, and carried towards Prairie Creek by the small stream having its headwaters in the Kimberlite and American area.

The two northern tiers of sections in this area, underlain by the Trinity formation, in general show a weaker magnetic reaction than obtained to the south where the Tokio occurs. A prominent case in point is the zone of low readings in section 5, north of Murfreesboro, which corresponds roughly with a nearly circular exposure of the Trinity formation limestone.

On the road running southwest out of Murfreesboro a very slightly increased magnetic intensity (130 scale divisions) is observed in the southern and western portion of section 24 of the adjacent township to the west. This corresponds roughly with a terrace gravel,

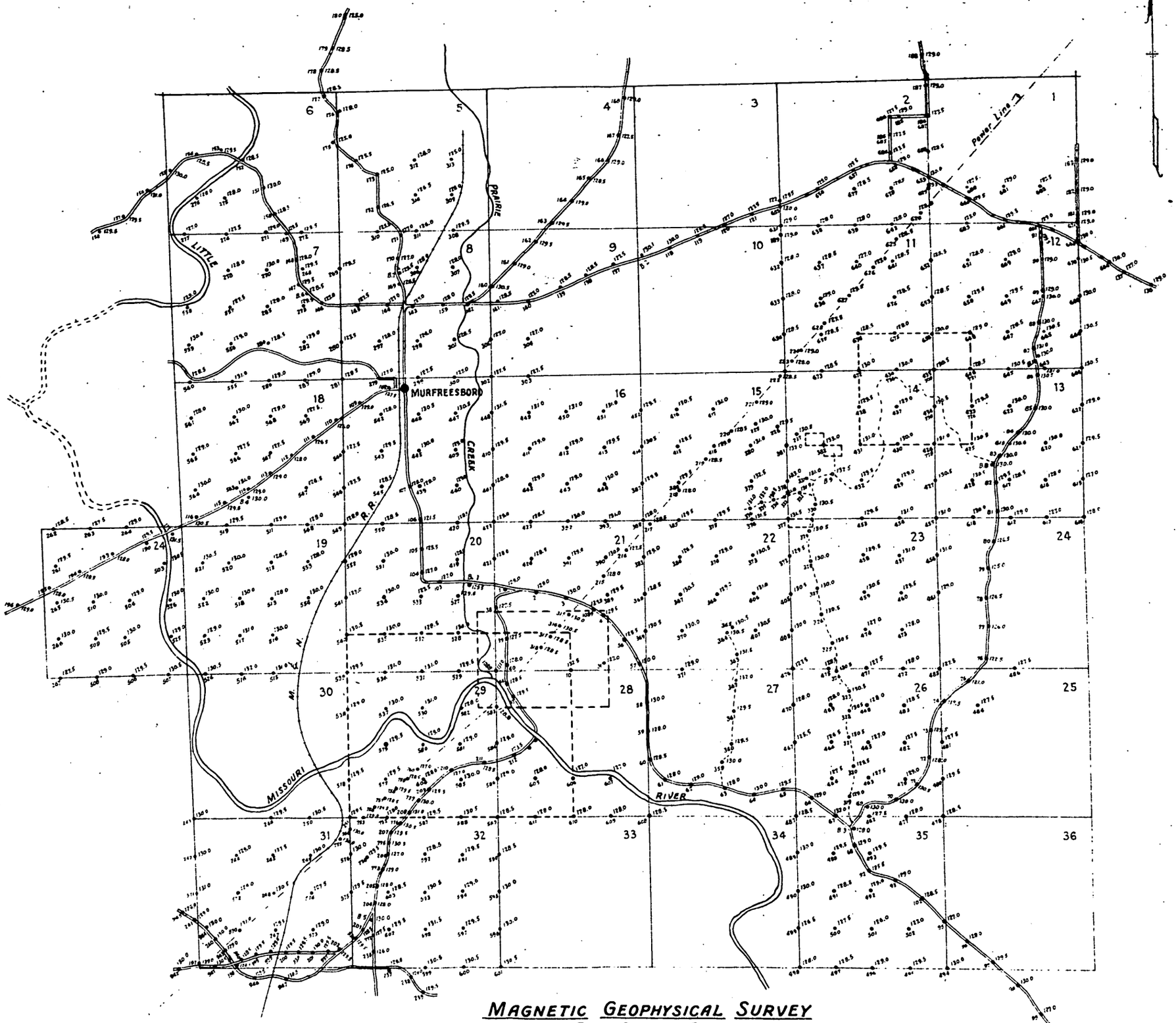
which may here contain igneous material derived from the Woodbine or Tokio fromations west of it.

Aside from the details of correspondence between the magnetic readings and stratigraphy described above, which are of purely geological interest, no magnetic indications were obtained on this area which would lead to the expectation of another peridotite intrusive similar in size to that of the main diamond mining area. In the vicinity of the Kimberlite and American Mines, however, some slightly increased magnetic readings were noted which would warrant further study in that area, in the hopes that an intrusive, smaller than the one above referred to, might exist in that vicinity. The fact that some diamonds have been obtained there reinforces this conclusion.

Respectfully submitted

SHERWIN F. KELLY GEOPHYSICAL SERVICES, INC.

December 23rd, 1946 Sherwin F. Kelly, President



MAGNETIC GEOPHYSICAL SURVEY

PIKE COUNTY, ARK.
T8S., R25W.
for
Jan Porel
Baltimore, Md.
by
Sherwin F. Kelly Geophysical Services, Inc.
Wilmington, Del.
April - August, 1946

LEGEND

- Station Numbers.
- 245 / 0 / 125.5 — Readings in Hotchkiss Superdip scale divisions.
- Areas shown on detail maps.
- B.S. — Base Stations

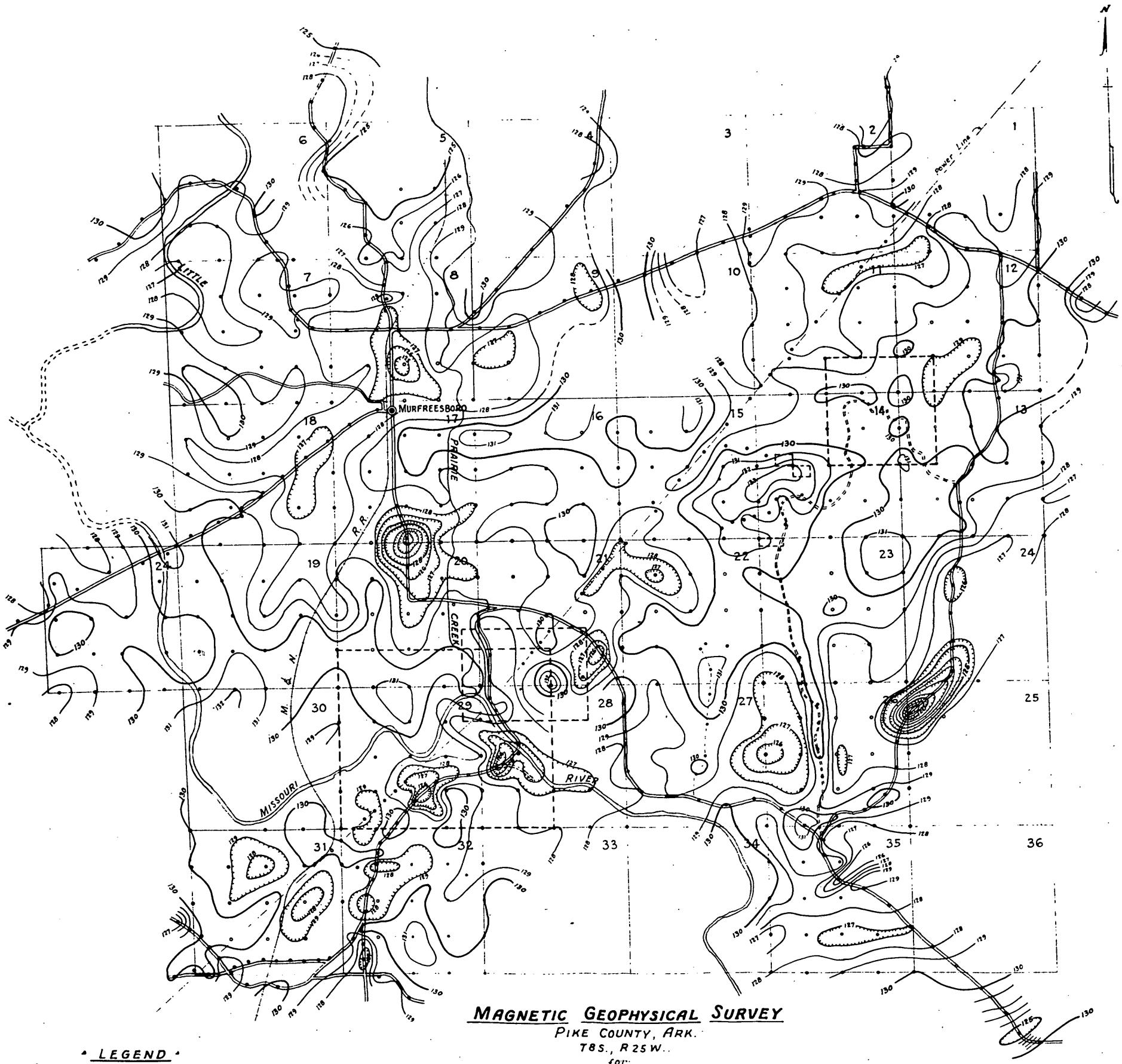
Hotchkiss Superdip #336, I = 1°

FIG. 1

PLAN OF SURVEY

Scale: 1" = 1/2 mile.

0 1/4 1/2 3/4 1 2 miles



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LEGEND

130 — Isomagnetic Contours. (Contour interval = 1 scale division, Hotchkiss Superdip.)

Areas shown on detail maps.

Depression Contours.

FIG. 2

ISOMAGNETIC CONTOURS

Scale: 1" = 1/2 mile.

0 1/16 1/8 1/4 1/2 1 2 miles

Hotchkiss Superdip #336, Σ = 1°

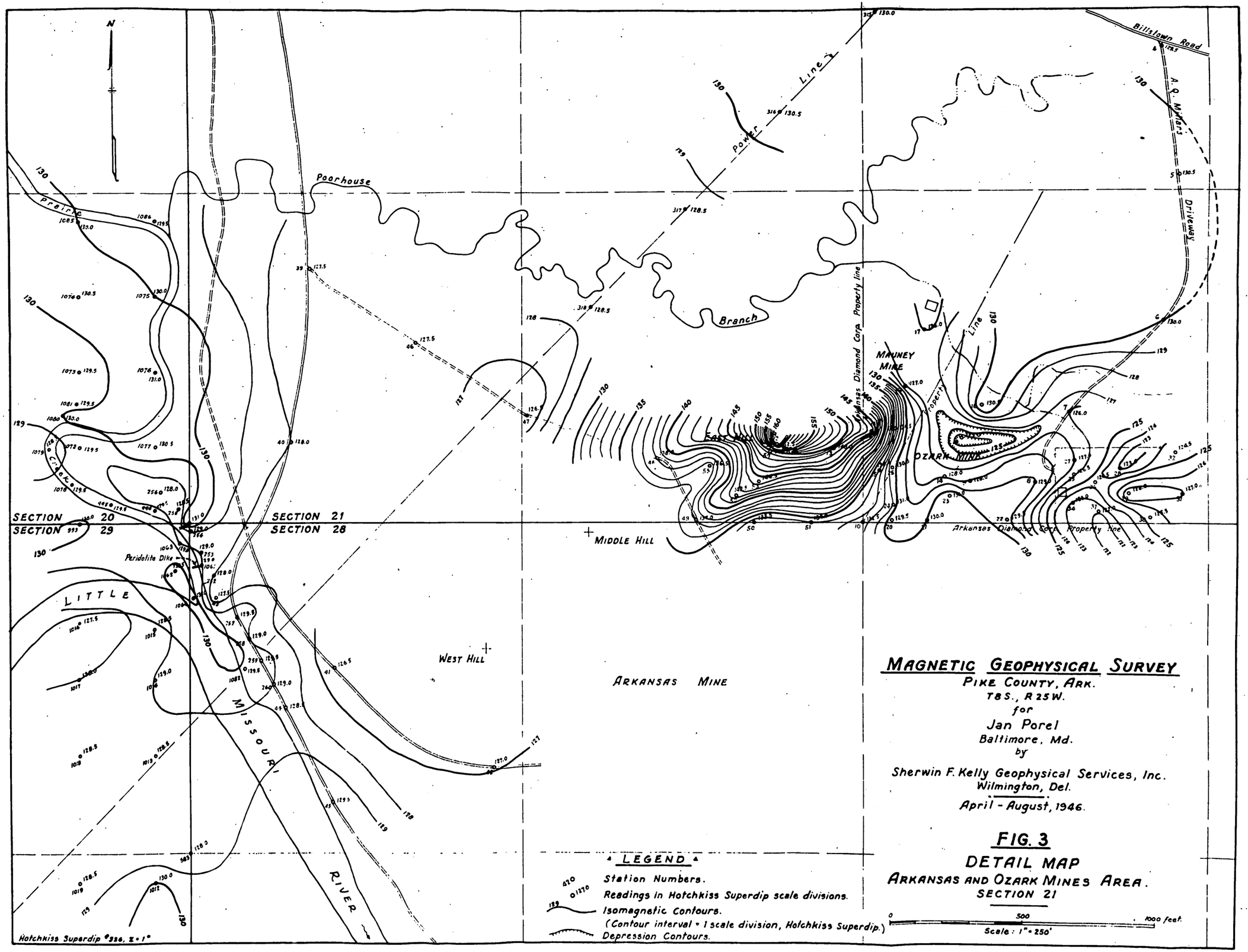

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FIG. 3

DETAIL MAP

ARKANSAS AND OZARK MINES AREA.
SECTION 21

MAGNETIC GEOPHYSICAL SURVEY

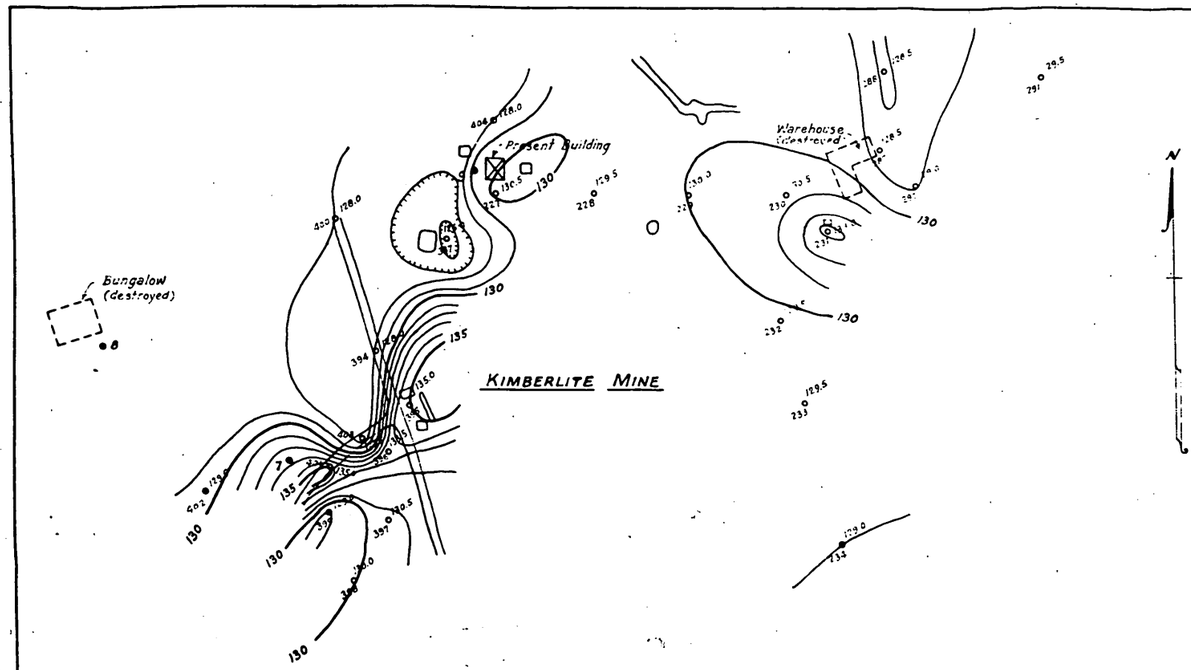
PIKE COUNTY, ARK.
T8S., R25W.
for
Jan Porel
Baltimore, Md
by

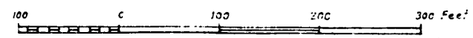
Sherwin F. Kelly Geophysical Services, Inc.
Wilmington, Del.

April - August, 1946

FIG. 4
DETAIL MAP

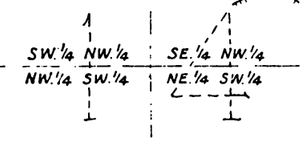
KIMBERLITE, AMERICAN & BLACK LICK MINES AREA.
Sections 14 & 23

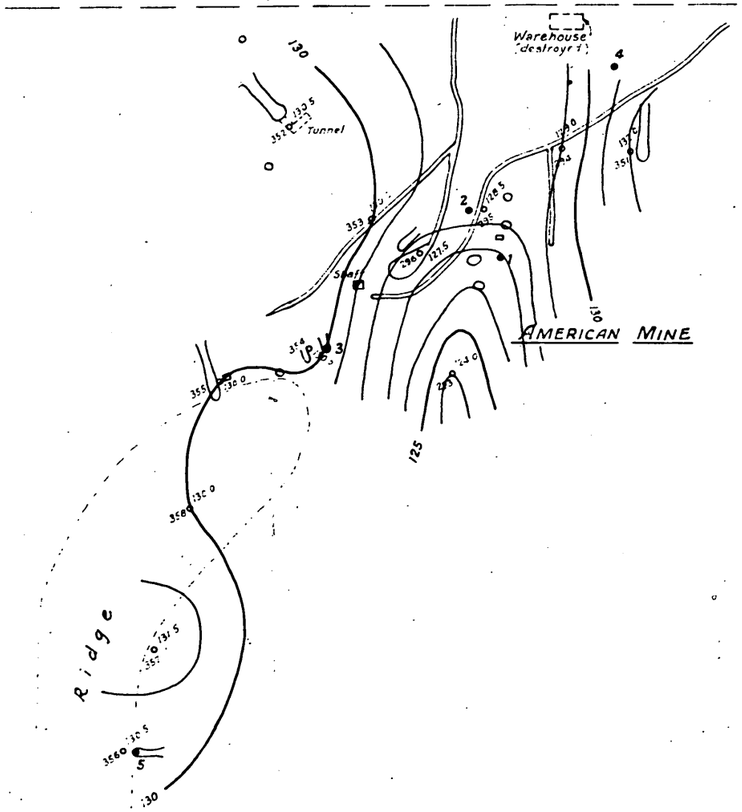


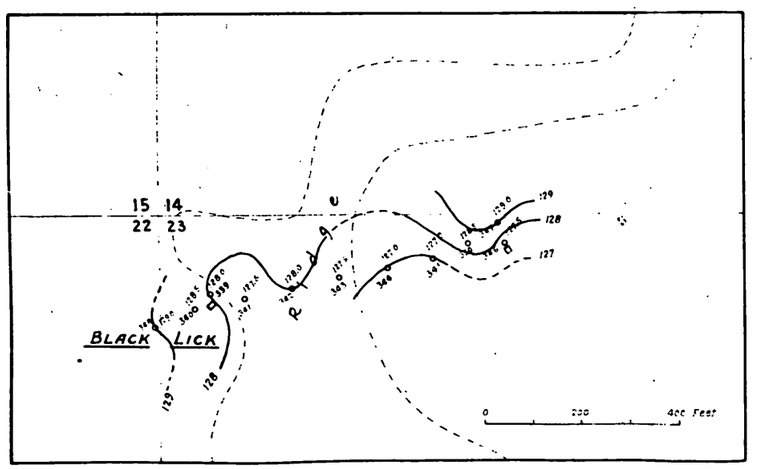


LEGEND

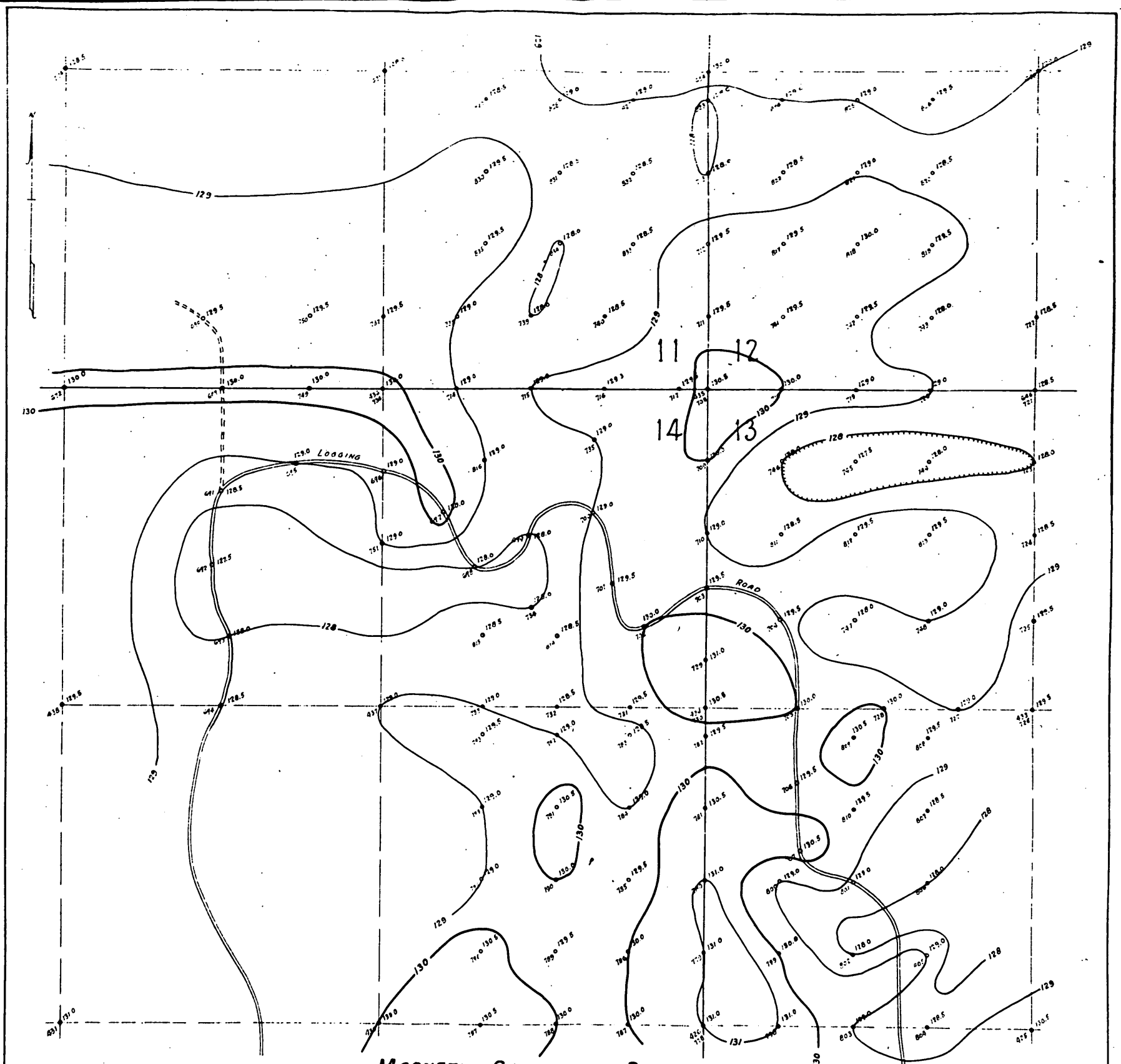
- Station Numbers.
- Readings in Hotchkiss Superdip scale divisions.
- Isomagnetic Contours. (Contour interval = 1 scale division, Hotchkiss Superdip)
- Depression Contours.
- Drill Hole.
- Pits.
- Cuts and Trenches.







Hotchkiss Superdip #336 X-1°



MAGNETIC GEOPHYSICAL SURVEY

PIKE COUNTY, ARK.
T8S., R25W.
for
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April - August, 1946

LEGEND

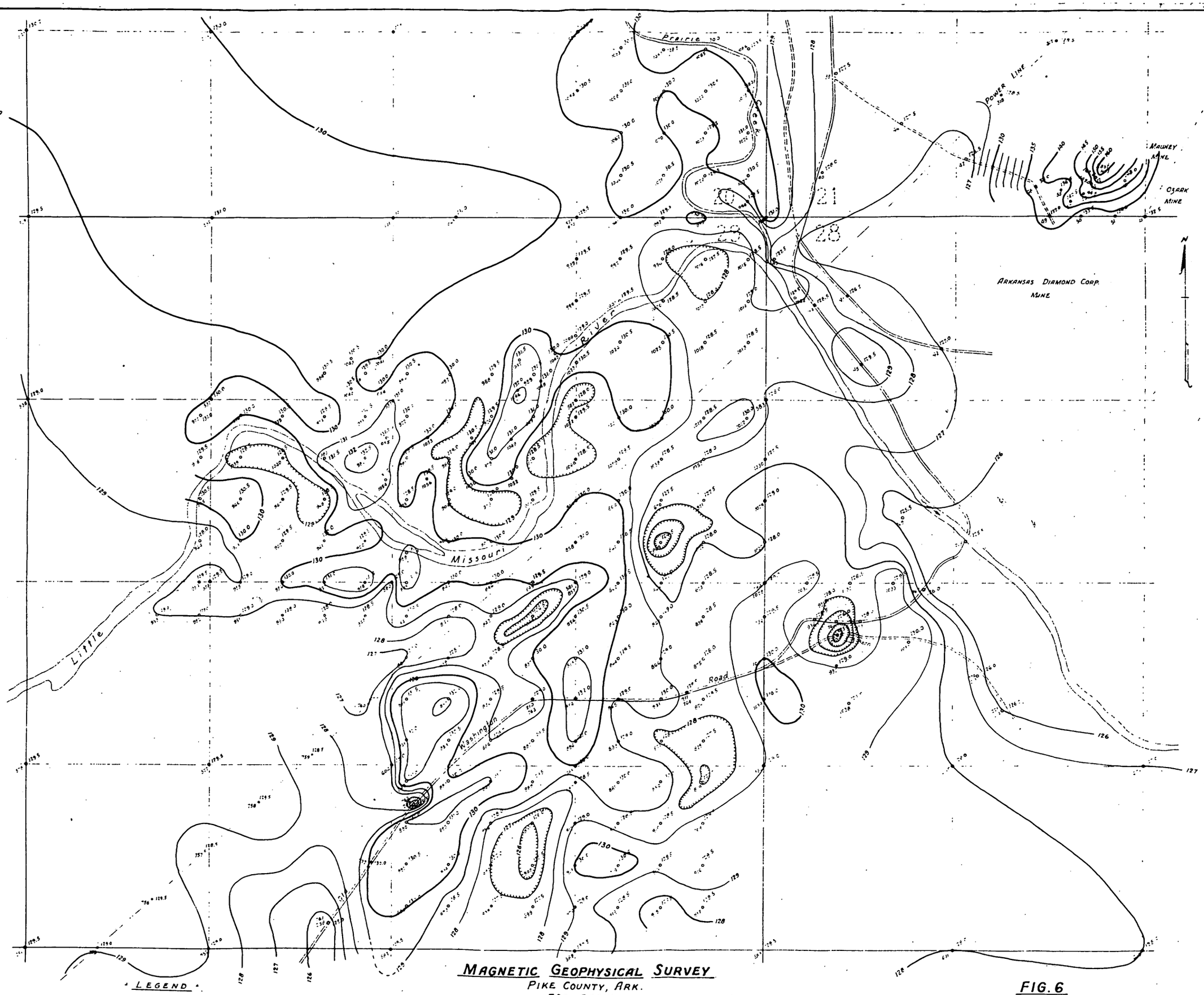
- Station Numbers.
- Readings in Hotchkiss Superdip scale divisions.
- Isomagnetic Contours. (Contour interval = 1 scale division, Hotchkiss Superdip.)
- Depression Contour

Hotchkiss Superdip #336, Z = 1°

FIG. 5

DETAIL MAP
EAST OF KIMBERLITE & AMERICAN MINES
Sections 11, 12, 13 & 14

0 100 200 300 400 500 1000
Scale : 1" = 300'



LEGEND

- Station Numbers.
- Readings in Hotchkiss Superdip scale divisions
- Isomagnetic Contours. (Contour interval = 1 scale division, Hotchkiss Superdip)
- Depression Contours

MAGNETIC GEOPHYSICAL SURVEY

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April - August, 1946

FIG. 6

DETAIL MAP
S.W. OF ARKANSAS & OZARK MINES
Sections 20 & 29

Scale: 1" = 400'

Hotchkiss Superdip

NORTH AMERICAN DIAMOND CORPORATION

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

Ref. No. GNV - 164
Sheet No. One
Date March 3, 1943

MEMORANDUM ON DIAMOND CONTENT IN THE MURFREESBORO DIAMONDIFEROUS PERIDOTITE PIPE.

INTRODUCTION.

Soon after discovery of diamonds in South Africa in 1869 a group of important people in London, England, despatched a learned geologist of established good reputation to that country to study the deposits for the purpose of determining if they are of true value, and if so, if they could serve as a basis for good business. The geologist's name was Gregory. He spent considerable time in South Africa completing what to him and his clients appeared to be a very thorough, exhaustive and conclusive report.

His conclusion, based on his findings, was that the South African diamond deposits were a mere "flash in the pan". He condemned even such pipes of peridotite (locally known as kimberlite) that were discovered at the time.

Developments during the next two generations disproved Gregory's findings to an extent where, were he alive, he could probably never find employment in his field of work. It is common knowledge that both the pipes and the alluvial deposits of diamonds in South Africa developed into a group of mining ventures unequalled for interest, profit and production of power and influence in human affairs. These ventures, after some seventy years, are now stronger than ever with no predictable end of their useful economic life in view during the next few generations.

Similarly, there were a great many opinions passed on the diamondiferous pipe near Murfreesboro, Arkansas in the last 35 years. Many were very authoritative and positive, both "for" and "against" this deposit. Some of these opinions are obviously biased and prejudiced, but some are based on honest study and sound knowledge and experience.

To speak with assurance about the content of diamonds in the orebody and their distribution within it is at present a mere speculation, until a sufficient amount of ore is treated for diamond concentration and recovery in a properly designed pilot mill of a properly sufficient capacity. However, there is a mass of indicative and favorable data in existence, derived from reliable reports that can be used to form a fairly definite opinion. This opinion is that the property warrants exploration and development to confirm prior data, and even possibly better it.

These data, coupled with the actual excavation work performed on the property in the past, if true, as it is believed to be, place this property in the class of a proven prospect - a prospect far more certain than the great majority of the usual mining prospects, a great many of which turned out to be great mines in this and other countries.

The following represents a summary of the data mentioned.

A. DATA AVAILABLE IN JULY, 1940.

This information represents a summary of studies and investigations conducted by Mr. John T. Fuller over a period of some thirty years of direct contact with the Murfreesboro property. Mr. Fuller, now dead, was an experienced diamond mining engineer, having been in important executive capacities in the South African pipe mines. He also was a superintendent and consultant for the Arkansas property in later years.

NORTH AMERICAN DIAMOND CORPORATION

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

Ref. No. GNV - 164
Sheet No. Two
Date 3/3/1943

I. Summary of figures furnished by Mr. John T. Fuller covering the period of 1907 to 1930, during which several sporadic operations were carried on.

1.	Total number of "loads" mined and washed @ 16 cu.ft. each	79,722
2.	Number of stones recovered in the mill, sluice boxes etc.	14,026
3.	Weight of these stones in carats.	7,844.635
4.	Carats of diamonds per 16 cu.ft. "load"	0.0984
5.	Average price per carat paid by purchasers.	$25.00
6.	Average value per 16 cu.ft. "load".	$ 2.46
7.	Average content - carats per CUBIC YARD OF ORE.	0.162

In 1931 Mr. J. T. Fuller, with his experience in South Africa and Arkansas, saw fit to make corrections and remarks, summarized as follows (see his original reports):

1.	Total number of 16 cu.ft. "loads" mined and washed from 1907 to 1930, corrected for estimated errors in measurement and judgment.	64,478
2.	Weight of stones recovered, corrected for observed and estimated losses in the washing operations, carats . . .	9,158
3.	Carats per 16 cu.ft. load, on this basis	0.142
4.	Average price per carat.	$25.16
5.	Average value per 16 cu.ft. "load"	$ 3.55
6.	Average size of diamonds, carats	0.47
7.	Average carats per CUBIC YARD OF ORE	0.24

NOTE: It must be noted that actual and witnessed recoveries of diamonds were made from the old tailings of the old mill by simple hand methods, indicating that Mr. Fuller's observations on losses must have been correct.

II. Summary of statement by Schenck & Van Haelen of New York City of July 23, 1940, covering actual operations from 1910 to 1930.

1.	Period covered - January 1, 1910 to January 16, 1933.	
2.	Total number of stones purchased from the mine.	14,716
3.	Total weight of these stones in carats.	6,801.54
4.	Total cash paid for these stones.	$109,412.43
5.	Average price paid per carat, both gem and industrials	$16.10

Since Mr. Fuller's factual information shows total carats as 7844.635, or 1043.095 carats more than Mr. Schenck records as having purchased, and, since Mr. Schenck states elsewhere that:

a. his firm handled additional stones of which no record was kept;
b. he personally knows of a large number of stones, some from 7.53 to 18.75 carats each, as having been handled by other firms and individuals;

it is felt, therefore, that the total weight of diamonds produced is safely beyond and above not only Mr. Schenck's own purchase record, but also the record Mr. J. T. Fuller compiled from actual operators.

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

III. Unrecorded production.

The following information coming from Mr. Ernest Schenck, Dr. Hugh D. Miser of the United States Geological Survey, Mr. Lee Wagner of Murfreesboro, and other equally trustworthy persons, was discounted by the writer for evaluation purposes:

a. Mr. Schenck positively knows of about 25,000 stones mined in Arkansas and disposed of in a clandestine manner in New York City during the same period of time.

b. Dr. Miser knows that at least 48,000 diamonds were actually produced from the peridotite pipe in question. The same figure is officially recorded in the Murfreesboro court house and was confirmed by others.

c. It is persistently rumored that upward of 100,000 diamonds have been recovered from the property and handled in a clandestine manner.

IV. Values in the Ore.

Study of individual production records for various "spurts" of activity reported by Mr. J. T. Fuller clearly shows that diamond content per load varied not so much from place to place on the ore-body or with depth of excavation, as from period to period, and operator to operator. This suggests that in addition to normal possible variation in the ore-body (horizontally and vertically) there was a far greater variation in efficiency of recovery during various washing operations, which was also strongly pointed out and criticised by Mr. J. T. Fuller and others. It must be further remembered that at no time did any operators on the pipe in question employ adequate and proper means for liberating and concentrating diamonds from their matrix by "direct treatment", while on the other hand there is no evidence that any appreciable portion of the ore was ever "floored".

Therefore, over-all averages were used for estimating a guiding figure for contents of diamonds in a unit volume of ore, as follows:

		1	2	3	4
1.	Total 16 cu.ft. loads washed	78040	62796	79722	64478
2.	Carats of diamonds	6802	6802	7845	9158
3.	Carats per load of 16 cu.ft.	0.0872	0.1083	0.0984	0.142
4.	Ave. price paid by Mr. Schenck/car.	$16.10	$16.10	$16.10	$16.10
5.	Value per 16 cu.ft. load	$ 1.403	$ 1.743	$1.584	$ 2.284
6.	Ave. price after So. African approx. ave. up to 1933	$18.00	$18.10	$18.10	$18.00
7.	Value per 16 cu.ft. load	$ 1.57	$ 1.95	$ 1.77	$ 2.56
8.	Average price recorded by Fuller	$25.16	$25.16	$25.16	$25.16
9.	Value per 16 cu.ft. load	$ 2.20	$ 2.74	$ 2.50	$ 3.57

NOTE: Explanation of above figures follows - for each column:

1. Carats total purchased by Schenck & Van Haelen from 1910 to 1933; number

of loads is diminished by 1682 loads mined in 1907, 1908 and 1909, when Schenck did not buy diamonds from the Arkansas property.

2. Carats total purchased by Schenck & Van Haelen; number of loads in the Fuller's figure corrected by him, less the same 1682 loads for 1907, 1908 and 1909.

3. J. T. Fuller's total uncorrected loads and factual reported caratage.

4. Total loads and carats, corrected by J. T. Fuller for losses and inefficiency in operation.

ADDITIONAL REMARKS.

1. Average carats per load from surface soil by crudest sluic washing (without the use of the mill) in 1929-1930 period, but apparently under good supervision, was 0.3638 for the entire run, confirmed by Roy L. Thompson, president of the defunct Arkansas Diamond Corp. of August 30, 1940.

2. Carats per load for one single short run in 1925 was 0.2585.

3. In 1919 a larger quantity of same ore was washed by S. H. Zimmerman and carats per load reported was only 0.0038. The mill was secretly found to be defective and not able to recover the diamonds by "direct treatment" - see Dr. H. D. Miser's report (U.S.G.S.) and J. T. Fuller's reports.

B. DATA OBTAINED IN OCTOBER 1940.

In the beginning of October 1940 further records disclosed additional diamond sales by S. H. Zimmerman in 1922-23. These sales were scattered among a number of firms in New York and middle west, and are summarized as follows:

a. Sales to several firms in Chicago, Detroit and to Tiffany's in New York.	$ 23,605.12
b. One sale to Tiffany's in New York.	6,150.12
Total sales uncovered on October 8, 1940	$ 29,755.12
Sales to Schenck & Van Haelen, already shown above	$109,412.43
Total registered sales as of October 8, 1940	$139,167.55

NOTE: This additional sales record for $29,755.12 would mean about 1860 carats assuming that they were sold at the same average price of $16.10 per carat.

C. DR. HUGH D. MISER'S REPORTS UP TO February 25, 1942, SUMMARIZED.

Dr. Hugh D. Miser of the United States Geological Survey made a number of published and unpublished reports on the property in question and their summary, bearing on the subject of this paper, is as follows:

1. Production from the Murfreesboro pipe up to 1932 was not less than 48,000 diamonds authentically recovered. This figure is corroborated by records

at the Murfreesboro County Court House; professors Kraus Hunt and Ramsdell of the University of Michigan; and Garrett Whiteside, formerly Court Clerk in Murfreesboro and now secretary to Senator Hatty Caraway in Washington, D.C.

2. Black surface soil contains in places a larger content of diamonds than the sub-surface ore in place. This is a distinct discredit to critical and biased statements frequently made by Richard J. Lund to the effect that all diamonds "are concentrated in the top soil and there are too few down below", alleging without basis of fact and knowledge a very high concentration in the top soil, which in logical fact could not be true, and has not been found to be true by all such operations that were conducted up to date, some of them judged reliable.

4. Actual run of 1637 "loads" of sub-surface material equal to 970 cu.yd. gave an yield of 0.15 carat per "load" or 0.253 carat per cubic yard.

5. Combined surface and sub-surface ore, apparently equally proportioned, averaged 0.175 carat per cubic yard (10.3 carats per 100 loads). Ore from pits as deep as 44 ft. in original rock in place was tested.

6. The 1919-1922 mill was suspected to be defectively designed, and a number of easily recognizable stones were fed into it and not one of them was recovered. This was done secretly with reliable witnesses present.

7. In 1924-25 Henry Ford purchased several hundred Arkansas diamonds and paid from $36 to $38 per carat, which included a 28% premium because the efficiency of the Arkansas diamonds proved to be higher in industrial uses.

B. CONCLUSIONS.

I. Surface Concentration (on basis of reports by Dr. H.D. Miser of U.S.G.S.)

This subject is specially and separately treated because of biased and baseless allegations made by Richard J. Lund of the Miscellaneous Minerals Division of the WPB in his apparent effort to run the property down. He attempted to allege that the surface soil concentration of diamonds, as compared to the ore-in-place below runs on the order of 50 to 1 or 100 to 1. No such evidence was ever discovered on the Murfreesboro pipe, nor in case of any diamondiferous pipes in So. Africa, where, according to published reports and descriptions, the chance for surface concentration to a high degree was more favorable than in Arkansas.

Assuming 0.118 to 0.152 carat per cubic yard (0.07 to 0.09 carat per load) for sub-surface ore (the lowest figures reported by Dr. H.D. Miser), and 0.175 carat per cubic yard (10.3 carats per 100 loads) for combined equal quantities of surface and sub-surface ore, the content of surface ore was as follows:

1 load = 16 cubic feet; 1 cu.yd. = 27 cubic feet; 1 load (=) 1600 lb.

Therefore: 0.07 carat per load = 0.118 carat per 1 cubic yard
0.09 carat per load = 0.152 carat per cubic yard
0.103 car. per load = 0.175 carat per cubic yard

John Q. St. Clair
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a. With sub-surface content of 0.118 carat per cubic yard

surface ore contained: 2(0.175 - 0.118/2) = 0.332 carat/cu.yd.

b. With sub-surface content of 0.152 carat per cubic yard

surface ore contained: 2(0.175 - 0.152/2) = 0.198 carat/cu.yd.

On the basis of above figures the surface (residual) concentration ratios appear to be as follows:

1. 0.332 : 0.118 = 2.82 *
2. 0.332 : 0.152 = 2.20
3. 0.198 : 0.118 = 1.68
4. 0.198 : 0.152 = 1.32
5. 0.435 : 0.118 = 3.78
6. 0.435 : 0.152 = 2.88
7. 0.613 : 0.118 = 5.20
8. 0.613 : 0.152 = 4.06

In other words the greatest concentration of diamonds in the top soil as compared to sub-surface content is in a ratio of 5.2 to 1; the smallest is in a ratio of 1.32 to 1; and perhaps the most reliable figure, based on Dr. H.D. Miser's data, and in the light of the information so far obtained, is in a ratio of 2.82 to 1. In round figures this concentration can be expressed as "3 to 1".

As stated above, this discredits Richard J. Lund's previous arbitrary allegations that concentration runs in ratios as high as 100 to 1. Factual data so far made available shows that this residual surface concentration runs approximately on the same order as it was found to be in South Africa. It must be noted, however, that the South African pipes were developed in 1880's by riff-raff who kept few scientific records and cared less (see Gardner Williams' "Diamond Mines of So. Africa").

II. ESTIMATED CONTENT OF DIAMONDS IN THE ORE.

The original guiding estimate of carats per cubic yard was made on Sept. 1, 1940 on the following basis:

SUB-SURFACE ORE. (Important).

1. It was recognized that residual surface concentration took place on the property, and that the general character of several pipes in South Africa was almost identical in mineralogical and petrographic characteristics. Therefore suitable discounts were made of all records for sub-surface content.

2. To arrive at a fair content estimate for sub-surface ore the maximum of excavated material equal to 79722 loads (47,250 cu.yd.) was deliberately increased to 97,170 loads (57,250 cubic yards) - an even figure in cu.yd. It was ascertained that major part of yardage actually came from the sub-surface ore in place.

3. Only the caratage purchased by Schenck & Van Haelen was taken for total recovered value - 6802 carats.

4. Thus the content per unit volume of ore became:

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Norman, Oklahoma

6802 : 97170 = 0.07 carat per load of 16 cu.ft.

OR = 0.118 carat per 1 cubic yard.

AND at $16.10 per carat it came to $1.90 per cubic yard.

NOTE: Actual excavation was measured in the field in the summer of 1942 through accurate survey, and the maximum volume that could have been excavated prior to 1940 was found to be about 45,000 cu.yd.

SURFACE ORE (Not important).

1. To arrive at a content estimate for surface ore, in addition to factual reports, the J. T. Fuller's corrected figures were used, as follows:

   64,478 loads (38.200 cu.yd) and 9158 carats.

2. Thus the surface content became:

   9158 : 64478 = 0.142 carat per load.

   OR = 0.240 carat per cubic yard.

REMARKS.

In connection with these figures it is important to take cognizance of the following:

1. When the above content estimate was made, the data of October 8, 1940 was not yet discovered.

2. Dr. H.D. Miser's report of February 25, 1942 was not yet made, and its highly significant and favorable figures and results were not known.

3. Authentically reported recovery of 48,000 stones was deliberately disregarded, and only 14,716 stones weighing 68-2 carats were used to evaluate the probable content of the sub-surface ore in place. This was a deliberately large cut-down, as the report by Dr. H.D. Miser of Feb. 25, 1942 shows that nearly one diamond has been recovered for each cubic yard of ore washed near Murfreesboro, thus checking the 48,000 reported stones against approximately the same number of cubic yards actually excavated.

4. Primary and exclusive importance was given to sub-surface ore-in-place to determine its probable commercial feasibility, because any long-life mining venture would have to depend on it, and not on the top soil.

5. Actual excavation of ore in past operations has been checked on the ground, which showed that not over 45,000 cubic yards of ore has ever been moved in all prior operations. Major part of this ore must have come from the "sub-surface" material, which required proper "direct treatment" for satisfactory assurance of recovery of diamonds in washing. Such proper means were never available.

6. Value of the top soil, in which some residual concentration took place, was

disregarded when estimating probable commercial feasibility of a possible operation.

7. A deliberately low price per carat was assumed to furnish further safety and to take care of the surface concentration - $16.10 per carat as paid by Schenck & Van Haelen, while actually prices paid by others for industrial stones ranged around $35 per carat as far back as 1925.

8. A careful research into statistics of similar pipes and their production in South Africa was made, corroborating all calculations and thoughts for the Murfreesboro pipe.

III. SUMMARY OF CONTENTS OF DIAMONDS IN THE ORE USING ADDITIONAL FIGURES.

While 0.118 carat per cubic yard at $1.90 per yard based on deliberately low figures is considered a satisfactory starting basis, the following figures are of interest:

		Carats/ Cu.Yd.	Value/cu.yd. @ $16.10/car.
1.	Original calculations of Sept. 1, 1940	0.118	$1.90
2.	Considering additional 1922-23 sales	?	$3.09
3.	On basis of H.D. Miser's report of 2/25/42	0.152	$2.44
4.	On basis of J.T. Fuller's factual figures	0.162	$2.61
5.	On basis of J.T. Fuller's corrected figures	0.240	$3.86
6.	On basis of Ark.Diam.Corp's reports for 1925	0.435	$7.03
7.	On basis of Ark.Diam.Corp's reports for 1929	0.613	$9.90

Thus, for the purpose of a preliminary guiding estimate, the figure of 0.119 carat per cubic yard, is deemed sufficiently conservative and safe. In addition, the mass of authentic and reliable data, apart from chaff and rumor, is so great that it warrants expenditure of money and effort on a proper larger scale pilot operation for further exploration, so conducted that it would lend itself to simultaneous small scale development and streamlined further expansion or a least painful liquidation, as the case may be at the end of washing at least 100,000 cubic yards of samples from some 225 hundred-foot squares marked on the ore-body.

In view of the fact that, judging from careful study of the past, one can expect to produce at least 0.118 to 0.152 carat per cubic yard with a proper "direct treatment" mill with a possibility of greater production, it would be speculative to think of any annual productions. The owners of the property specifically wish to carry out a well engineered scientifically correct large pilot test precisely for the purpose of determining the content of diamonds in the ore and particularly their horizontal distribution through the mass of the ore-body.

However, and only as a speculation, the following annual production figures based on 0.15 car./cu.yd. are offered to save calculation:

	Cubic yards per 24 hours	Carats per year	Years of surface excavation methods in work.
1.	500	22,500	66 to 106
2.	1000	45,000	33 to 53
3.	2000	90,000	16 to 26

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4.	3000	135,000	11 to 18
5.	4000	180,000	8 to 13
6.	5000	225,000	6 to 10
7.	10000	450,000	4 to 5

In consideration of the above it must be remembered at all times that at no time in any of the past Arkansas operations has a real "direct treatment" mill been used; the 1919-22 mill was not only wrongly designed but also poorly operated; a major part of the diamonds recovered disappeared without record. Thus, no one can tell what the losses were and how much greater the recovery may be over the conservative figures used above.

To give character to J.T. Fuller's reports and figures it should be stated that he was a well known and successful mining engineer, who worked in managerial capacities in South African diamond mines for some ten years, was the operator for a time and consultant on many occasions for the now defunct Arkansas Diamond Corp. up to his death in 1938, and was the explorer and creator of the large bauxite mining operations in U.S.A. and South America, making possible the original production of aluminum in this country. His always sound advice to the old Arkansas Diamond Corp. was conspicuously disregarded, although it was well paid for.

George N. Vitt
Managing Engineer.

NORTH AMERICAN DIAMOND CORPORATION

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Ref. No. GNV - 164
Sheet No. Ten
Date 3/3/1943

SUPPLEMENT - KIND OF DIAMONDS IN ARKANSAS.

Summary of Special Tests on Sub-Surface Peridotite - per Dr. H.D. Miser's Report of February 25, 1942.

Total quantity of sub-surface ore excavated as deep as 44 ft., treated for recovery of diamond. . .	1637 "loads" 970 cubic yards
Total number of diamonds recovered by crude manual methods.	705 stones
Total caratage of these stones	145.52
Stones per carat	4.85
Carats per stone	0.2065
Stones per "load" of 16 cu.ft.	0.432
Stones per cubic yard.	0.727
Carats per load.	0.89
Carats per cubic yard.	0.15

This sample of 705 diamonds, weighing 145,52 carats was classified into general kinds of diamonds as follows:

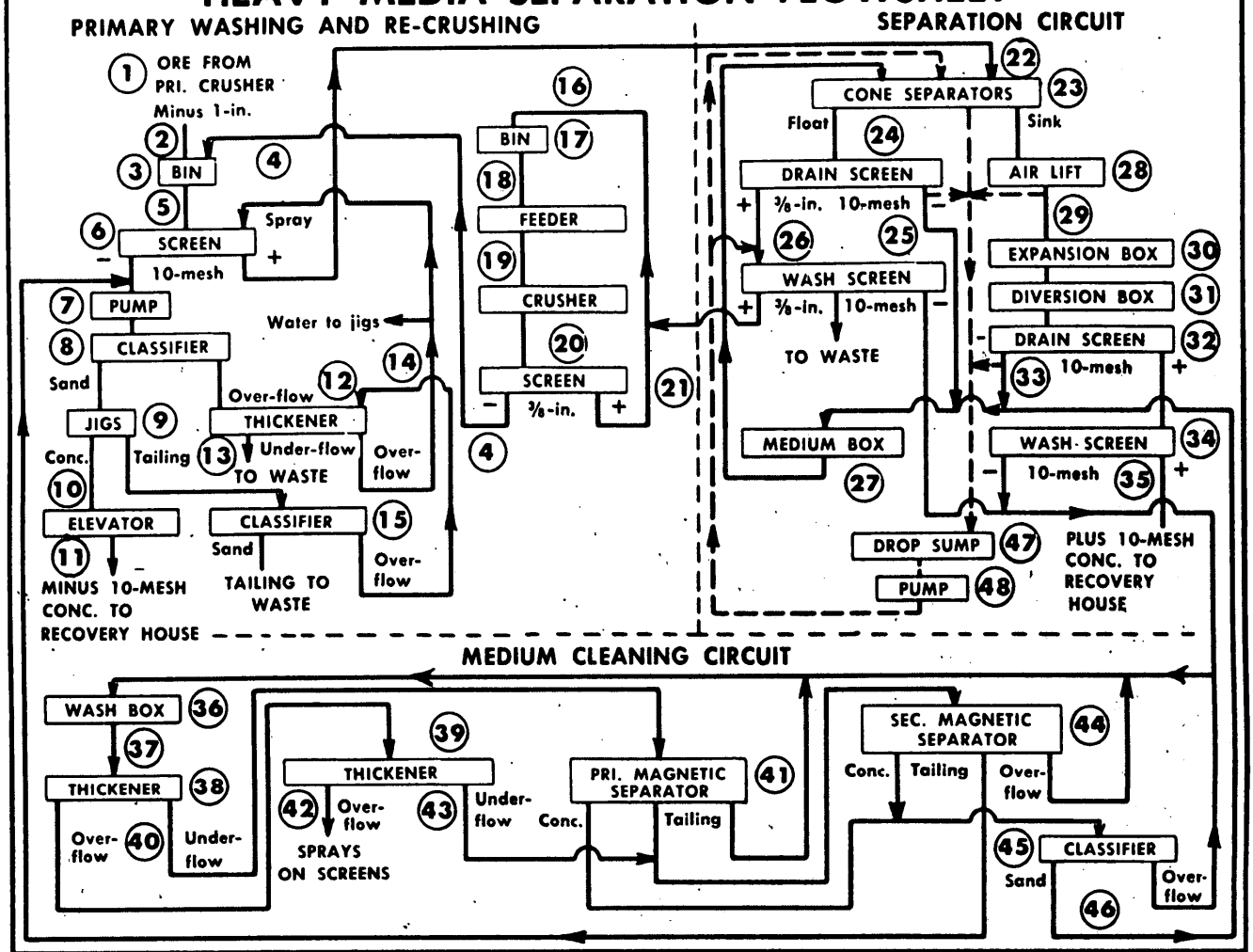
White of different shades	69.58 carats	= 47.70%
Yellows " "	22.97 "	= 15.80%
Browns " "	46.14 "	= 31.70%
Other kinds	6.83 "	= 4.7 %

NOTES:

1. The above study was reported in greater detail by Dr. Hugh D. Miser of the U.S.G.S. on February 25, 1942 to the War Production Board.
2. Average carats per stone, as seen from Mr. Schenck's purchases, ran about 0.46, as compared with the above figures.
3. Mr. Schenck's old classification into "industrials" and "gems" was not quoted in this paper for the simple reason that such classification is more or less arbitrary, and it changes with variation or growth of demand of the industry.
4. Generally speaking tool diamonds should be of high quality, with no weakening flaws. In some applications so called gem stones serve the best purpose, for example in fine wire-drawing dies. Crushing "bort" is usually the lowest quality diamonds in which structural qualities of strength and toughness is not considered.
5. The most important diamonds in the future industrial applications will undoubtedly be high quality crystals and other suitable shapes amenable to uses for cutting, shaping and dressing edges, in forms which now seem to be in their rudimentary stage of development.
6. Arkansas diamonds, judging from their actual qualities, fall into the "tool stones" classification of higher qualities, and thus may play a role in the industry far more important than their probable quantity of production may superficially indicate.

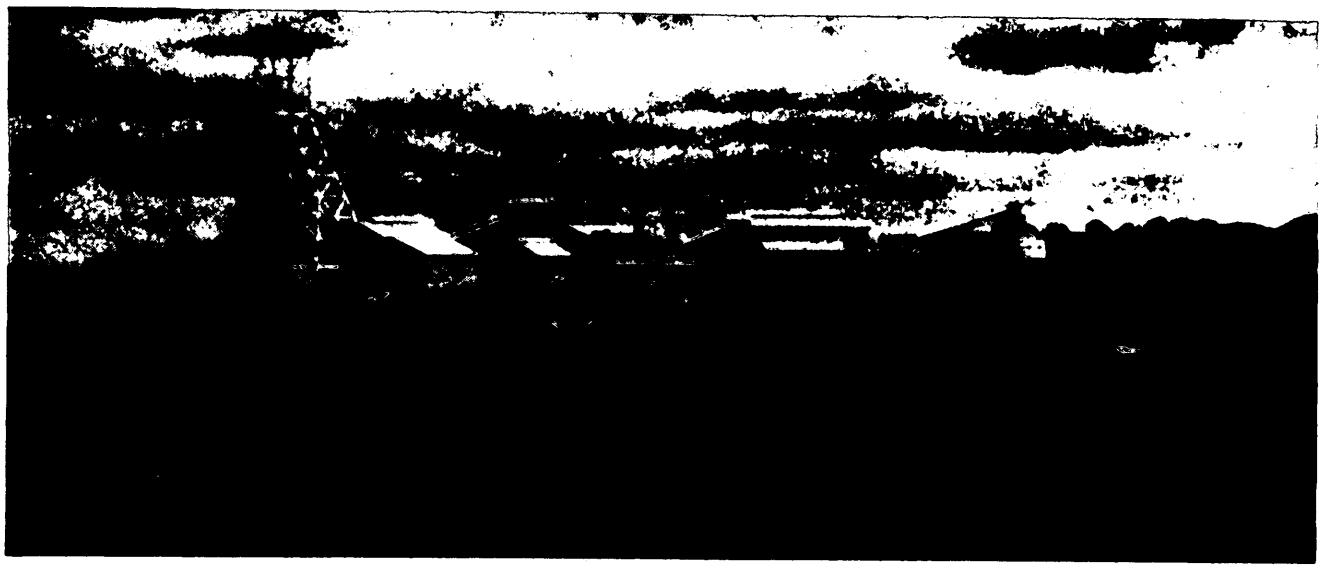
George N. Vitt

PREMIER (TVL) DIAMOND MINING CO. LTD.
HEAVY MEDIA SEPARATION FLOWSHEET



LEGEND

1. Ore crushed underground to minus 6-in.; then crushed on surface to minus 1-in. in Symons cones.
2. "Adequate" weighers and belt tripper.
3. Surge bin, 1,500 tons.
4. Conveyor brings re-crushed product (minus ⅜-in.) over weigher.
5. Eight Syntron vibrating feeders.
6. Eight Allis-Chalmers low-head screens, 5x16-ft., double-deck, ⅜-in. and 10-mesh.
7. Eight ERG sand pumps, 6-in.; four are standby.
8. Four duplex rake classifiers for de-sliming, 8x18-ft.
9. Eight Denver 2-cell jigs, 24x36-in.
10. Four bucket elevators.
11. Conveyor to recovery house, grease tables used to recover diamonds.
12. Two traction thickeners, 100-ft.
13. Four Dorrco Triplex diaphragm pumps, 4-in., delivering to one 5-in. Spargo rubber-lined sand pump, one standby.
14. Pulsometer spray pump, 3,000 gpm.; one standby.
15. Four dewatering rake classifiers, 8x18-ft.
16. Two-way reversible belt tripper.
17. Re-crush feed bin, 600-ton.
18. Three retractable belt feeders.
19. Three 5½-ft. Symons Short-head crushers.
20. Three Symons rod-deck screens, ⅜-in.
21. Belt conveyor joins conveyor from float wash screen.
22. Four cone feed conveyors, 30-in. Also four "Adequate" weighers.
23. Four 16-ft. diameter separating cones.
24. Medium drainage screens for float; eight Allis-Chalmers lowhead, 5x16-ft.; top decks are ⅜-in. square mesh, lower decks are 10-mesh stainless steel cloth.
25. Four Wilfley medium return pumps, 5-in.
26. Medium wash screens for float; eight Allis-Chalmers lowhead, 5x16-ft.; top decks are ⅜x1¼-in. slotted wire mesh, bottom decks are 10-mesh stainless steel wire cloth.
27. Four steady-head medium return boxes draining directly into cones.
28. Four 8-in. external airlifts for sink. Pressure is 55 psi., using 220 cfm., from three ½-in. jets in airlift pipe. Possible to use ⅜-in. jets, however.
29. Milliken blow-back valves, 8-in.
30. Four expansion boxes for airlift to release air.
31. Four diversion boxes to permit returning sink to cone if necessary.
32. Four sink drainage screens; Symons single deck, 3x10-ft., 10-mesh stainless steel cloth, short protection deck at feed end, ½-in. wire mesh.
33. Four medium return pumps, 5-in. Wilfley.
34. Four sink wash screens; Symons single-deck, 3x10-ft., 10-mesh stainless steel cloth.
35. Conveyor and weigher, to concentrate recovery house.
36. Wash collection boxes, screen protected.
37. Magnetizing blocks, 12-in.
38. Four primary thickeners, 6x20-ft.
39. Two secondary thickeners, 6x40-ft.
40. Eight 4-in. ERG sand pumps, four standby.
41. Five 48-in. Dings primary magnetic separators.
42. Two Pulsometer spray pumps, 10-in.
43. Four 2-in. ERG sand pumps, two standby.
44. Four 48-in. Dings secondary magnetic separators.
45. Four Akins densifiers, 48-in.
46. Four de-magnetizing coils.
47. Four conical drop sumps, built into concrete foundation of building. Each holds one cone charge.
48. Two 4-in. ERG sand pumps.



SURFACE PLANT of Premier Diamond Mining Co., Ltd., at Cullinan, Transvaal, South Africa, now treating 12,800 tons daily of diamond-bearing "blue ground." Operation started earlier this year.

How Heavy-Media Separation Recovers African Diamonds

IAN F. CAIRNS*

Johannesburg, South Africa

IN FEBRUARY OF THIS YEAR, Premier mine's 12,800-ton-per-day heavy-density separation plant went into production at Cullinan, Transvaal, some 22 miles east of Pretoria.

The successful start of this plant was the climax of five years' laboratory and pilot plant research on the part of the Anglo American Corporation of S. A. Ltd., consulting engineers to De Beers Corporation, who control Premier mine. The 100-tons-per-hour pilot plant which went into production in June, 1947, was the first plant of its kind in Africa, and was the first commercial application of heavy-density separation to the concentration of diamonds.

Established practice in diamond concentration in this country has been confined to two methods, namely:

1. Treatment of the crushed "blue ground" in one or two diamond pans in series, often with a recrush step between primary and secondary pans. Pan concentrates are closely sized on screens and further concentrated in jigs. The diamonds in the jig concentrates are then recovered by passing the concentrates over grease tables. The diamonds stick to the grease, and are recovered by scraping the surface grease off the tables and melting this in hot water.

2. The crushed ore, or diamond bearing gravels, are sent direct, or after sizing, to jigs of the Hartz or Pleitz types. Jig concentrates are then treated as described.

The method employing diamond pans is probably the more efficient, but its use is dependent on the existence in the crushed ore of sufficient primary slime to form a "puddle" with water in the pans. This "puddle" might be likened to an autogenous dense medium, but operating density is only of the order of 1.3. It is possible, of course, to produce an artificial puddle by grinding a fraction of the blue ground, or other rock, to give sufficient fine slime.

The ground in the upper or weathered zone of most kimberlite pipes is eminently suitable for treatment in diamond pans. Prior to the shutdown of the Premier mine in 1932, during the depression, the orebody had been worked to a depth of over 500 ft. by opencast methods. The blue ground below the weathered zone was not amenable to pan treatment, and recovery was by jigs.

In 1944, the consulting metallurgist for Anglo American Corporation became interested in the possibility of using HMS for diamond concentration. By mid-1945, a 20-in. laboratory cone plant had been obtained and a long and exhaustive test program was initiated, using ferrosilicon medium. The work was carried out on various blue ground ores at the De Beers Consolidated Mines, Kimberly, Cape Province, which mines were then in production.

It should be appreciated that any small scale testing of diamond blue ground is unique in several respects, e.g., the diamond content of the original ore represents a concentration of the order of 12 million to one. Moreover, there is no analytical process whereby values of products may be readily determined. As a result, head samples have to be salted with diamonds or other minerals of similar specific gravity, and to determine the efficiency of any concentration process, products have either to be passed over grease tables or laboriously hand-sorted.

The laboratory test program posed many problems and headaches, but results provided sufficient encouragement to test the process on a commercial scale. The

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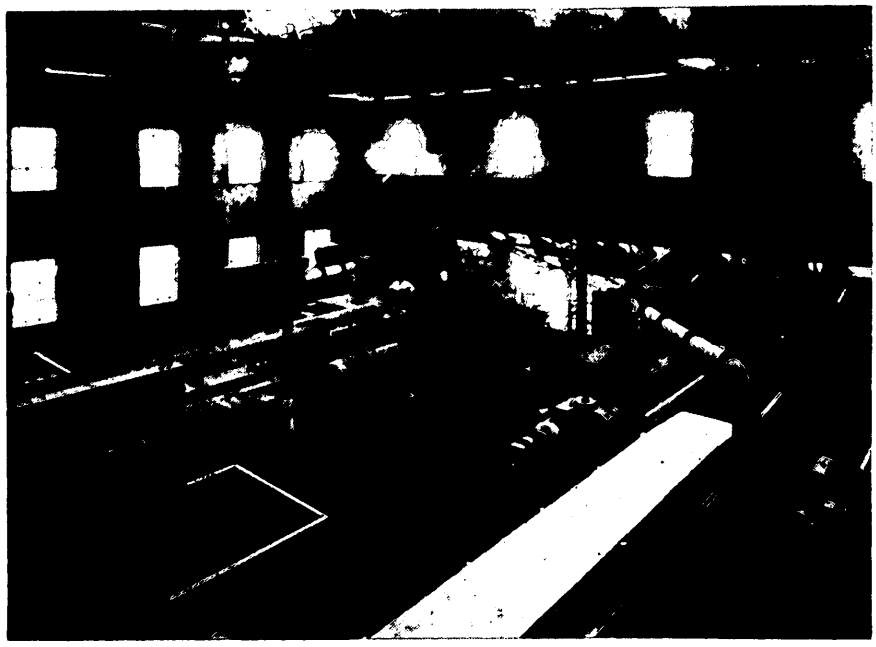
FEED IS WASHED on battery of Allis-Chalmers double-deck screens fed by Syntron vibrators. Minus 10-mesh material goes to jigs.



CAREFUL DESIGN is evident in this layout of two cone units. Belts feed cones underneath grating floor. Two boxes beyond the belts are provided for returning the medium to the cone.

design of a 100-ton-per-hour pilot plant for Premier mine was begun in 1946, and the plant, a 12-ft. cone unit, went into production in January, 1947. No one in South Africa knew much at the time about operating a plant of this sort, and it was a tribute to all concerned that within a few months "teething troubles" were ironed out, an operating crew was trained, and the plant was going at full capacity.

By April, 1948, the economics and results of heavy-density separation as applied to Premier mine ground had proved attractive, and a decision was made to install the 12,800-ton-per-day plant.

Plant design was started in May, 1948. Erection on prepared foundations started towards the end of June, 1949.

The first unit went into production on Feb. 25, 1950, and the completed plant was handed over to the mining company on May 10, 1950. Complete design and fabrication was done locally.

Ore is crushed underground to a minus 6-in. product and delivered via a shaft to a surface stockpile.

Crushing is done in Symons crushers to a nominal minus 1-in. product, closed circuit crushing being avoided to minimize the chance of an occasional large diamond being shattered.

Crushed ore is sent via a 1,500-ton surge bin to a battery of double-deck primary wash screens, on which the minus 10-mesh product is removed. The minus 10-mesh product is deslimed and the sands concentrated on Denver mineral jigs. The slimes gravitate to traction thickeners from which the underflow is pumped to a slimes dam and the overflow is returned as wash water to the screens.

Size of Feed

Cone feed is thus minus 1-in. plus 10 mesh. Float screens are fitted with ⅜-in. top decks and 10-mesh bottom decks. Float oversize, plus ⅜-in. material, is sent to the recrush plant where Symons crushers operating in closed circuit with rod deck screens reduce the product to minus ⅜ in. This product is returned to the surge bin ahead of the primary washing screens. Feed to the cone is thus original minus 1-in. plus 10 mesh, plus a circulating load amounting to some 40% of new feed.

Plant tailings are therefore all minus ⅜-in. Original feed could, of course, all be crushed to minus ⅜ in. before feeding to the cone, but as stated earlier, this is avoided as valuable diamonds would be shattered. By feeding minus 1-in. ground to the cones, all free diamonds report as sink, and small diamonds that remain locked in the minus 1-in., plus ⅜-in. material, amounting to some 8-10% of output, are released in the recrush circuit and returned to the cone.

Sink screens have single decks dressed with 10 mesh stainless cloth. It should be appreciated that all diamonds in the sink product are "free" and that the heavy minerals reporting with the diamonds are not diamond bearing. In other words, there is no necessity to recrush coarse sink and all sink product goes by conveyors to sizing screens and vibrating grease tables in the recovery house.

Sink averages around 5% of cone feed, but varies up to around 10% with ore from some sections of the pipe. Medium is ferrosilicon, and cone gravities are maintained around 2.90 top and 3.05 bottom.

Normal plant operation is on a three shift basis, six days per week.

To allow for normal stoppages, plant maintenance, etc., design of the heavy-density plant was based on a peak load rating calculated on a 20-hr. operating day.

The primary washing and heavy-density sections of the plant comprise four identical units.

On this basis, design of the various units was based on the figures shown in Table I.

TABLE I—Designed peak tonnages at various points in Premier's heavy-density flowsheet. In tons per hour.

	Per Unit	Total Plant
New feed to 1,500-ton surge bin	160	640
Recrush product to surge bin	64	256
Minus 10-mesh product removed on wash screens	32	128
Tonnage to cones	192	768

Nominal minus 1-in. feed from the crusher plant is fed to a 1,500-ton bin by means of conveyors and a Stephens-Adamson two-way traveling belt tripper.

Washing is done on eight double-decked low-head screens fed from the bin by eight Syntron heavy-duty vibrating feeders. Top decks are dressed with ⅜-in. square wire mesh and bottom decks with 10-mesh stainless steel cloth.

The minus 10-mesh product from each pair of screens is deslimed, and the sands are sent to two 24x36-in. Denver mineral jigs. Jig concentrate carrying minus 10-mesh diamonds is continuously removed by bucket elevator and sent to the diamond recovery house by means of a series of conveyors.

The Cone Circuit

The heavy-density plant comprises four identical 16-ft. diameter cone units, each with its own ancillary equipment. The cones are fitted with 8-in. external air lifts. Diving rings have been retained. Their diameter is 6 ft. 6 in. To overcome any possibility of rafting within the diving ring, the center line of the feed belt head pulley is some 12 ft. above the pulp level in the cone.

Cone feed is prewetted in the feed chute by medium bypassed from a circulating medium line. Cone rakes are reversible and operate at 3.75 rpm. The airlift elbow has three ½-in. air jets, two of which are in use during normal operation. Air lift pressure is 55 psi., at which pressure some 220 cfm. of free air is used. This is more air than is required, and ⅜-in. air jets have been supplied and will be substituted. Two 1-in. boiling valves are fitted near the apex of the cone for use when required. Maximum available pressure from the mine compressors is 75-80 psi.

Medium return pumps deliver to a steady head box, the top of which is 12 ft. above the cone overflow level. This entails the use of some additional power for the pumps but gives a positive head on the "organ pipe" distribution lines. The 8-in. air-lift upcomer has an isolating valve on the cone floor level to permit blowing back into the cone. This valve has a circular 8-in. port. Delivery of the air lift is through an expansion box fitted with air release, to a diverting box feeding the sink screen or back into the cone when necessary.

Float and sink screens are described in the flowsheet. All screen hoppers are fitted with ½-in. thick punched plate with ¼-in. holes, as protection against screen breakage. Hopper sides have detachable side plates above the protection plates. All hoppers are lined with Linatex rubber.

Medium return pumps are 5-in. Wilfley model "CB." Float pumps operate with a double suction intake, the pumps being located centrally between the two float drain hoppers. This allows a considerable saving in height over bringing the two float drain hoppers into a common sump and feeding the pumps through a single suction intake.

Under normal operating conditions little, if any, medium is cut to the cleaning circuit by means of the medium deflecting trays. The surface character of the ore is such that sufficient medium is carried over by the float and sink products, to be washed off on the wash screens and thence to the cleaning circuit, to keep the medium sufficiently clean to obviate viscosity troubles in the cone. Medium through the cleaning circuit is around 15% of ore feed rate to the cone.

Medium Cleaning Circuit

The cleaning circuit for each unit comprises a 20x6-ft. primary thickener, 4-in. ERG underflow pumps, one 48-in. primary Crockett magnetic separator, a 48-in. secondary separator and a 48-in. densifier. Overflow from the primary thickener is further settled in a 40-ft. secondary thickener. There are only two 40-ft. thickeners, each taking the overflow from two 20-ft. thickeners.

Underflow from the primary thickener is pumped to the primary magnetic separator and that from the secondary is pumped by a 2-in. ERG sand pump to the secondary magnetic separators of two units. Secondary Crockett tails gravitate to the minus 10-mesh pump sumps in the primary wash circuit. Feed to the primary thickeners from the wash screens is by launders to two collection boxes, with punch plate protection screens, positioned above and on either side of the thickener. From these boxes, medium for cleaning gravitates through 12-in. magnetizing blocks to the thickener feed well. Magnetizing blocks are electrically excited, but these will probably be changed to permanent magnetic type.

Densifiers were set at 3 in. per ft. slope before startup, and concrete false bottoms were run in. The latter prevents needless lockup of settled ferrosilicon and prevents side scour. Densifier rake product passes through a demagnetizing coil before entering the sink medium return hopper.

In No. 1 unit, two primary Crocketts were installed in parallel and medium loss in this circuit will be compared with that of the other units. Space for a second primary Crockett was provided for if necessary in the other circuits.

Secondary thickeners overflow to a concrete sump. Overflow is pumped by 10-in. solution pumps to the float and sink screen sprays. Pump suction is protected from floating trash by large area fine mesh screens. The last few sprays on each wash screen have alternative fresh water connections. The type of spray used was developed at the mine and consists of a 2-in. pipe with holes at 3-in. centers. Water from the holes hits a deflecting plate welded to the pipe and gives a straight line spray which is set against the flow of material over the screen. The sprays work well so long as the pump suction is protected against wood chips, etc.

Novel conical drop sumps were provided in this plant, one for each cone. The sumps are in concrete, 60-deg. sides, and were built in as

part of the plant foundations. Each has the capacity of one cone charge. Sumps have a protection grid of 1¼-in. square egg-crate flooring with ¾-in. square wire mesh welded over it. This grid is secured to a supporting steel framework 4 ft. from the top of the sump and keeps coarse material out of the pump when a charge is dropped. Agitation for the dropped charge is provided by a 1-in. high pressure air connection in the bottom casting of the sump and when charge is being pumped out by a 1-in. air line running down the side of the sump and terminating in a ring main with punched holes some 18 in. above the sump apex.

One 4-in. ERG sand pump serves two drop sumps and delivers the charge either back to its respective cone direct or over its float wash screen. After use, pump delivery line must be thoroughly flushed out. With ferrosilicon only, the total charge can be returned to the cone in about 20 minutes.

Plant Control

Each cone unit has its "A" electrical control panel, from which the total circuit can be started or stopped by push button control. Control panels are located on the operating floor above the cones and opposite air control manifolds. Panels are fitted with red and green indicator lights for each motor and, in addition, any motor cutting out sounds a klaxon horn. The panels also carry the Syntron feeder rheostats, cone feed indicator dial and float and sink medium pump ammeters. Individual motor starters are grouped in convenient panels adjacent to their driven units.

One "B" control panel situated on the operating floor between Nos. 3 and 4 units provides remote control for all items of equipment common to all four units, e.g., dirty and fresh water spray pumps, tailings, concentrates and recrush circuit belts, etc.

Direct current at 250 v. is generated in a 35-kw. motor generator with standby located on the primary Crockett floor. An adjacent control panel for the magnetizing blocks of all units is provided. Crocketts have individual control panels. Direct current cutting out on a Crockett gives audible warning on a buzzer, and with the secondary machines, tailings are diverted to the medium thickener by means of a solenoid control. Belt stoppage on a Crockett gives warning through the "A" control panel. Demagnetizing coils are interlocked with the densifiers and the latter cannot be started until the demagnetizing coils are energized. Electric failure of a demagnetizing coil operates an electric bell.

Expanded Metal Floors

All floors throughout the plant are made of prefabricated egg-crate panels attached to the floor girders. This assists natural lighting of the plant and any spill drops to the bottom concrete floor. This type of flooring has the disadvantage that any unattended or persistent drip or spill tends to deposit on equipment directly below on the lower floors. Cones and primary thickeners are also covered with crating.

Cone density control is manual at present but an automatic recording density meter will be tried out on one unit shortly.

Float oversize is carried by belt conveyor system with tripper to a 600-ton crusher surge bin. Three 5½-ft. fine bowl Symons Short-Head crushers were installed, with provision for a fourth, if required. Each crusher is in closed circuit with a 5x8-ft. rod deck screen with ⅜-in. rod spacing. Oversize is returned to the surge bin and undersize is sent to the 1,500-ton bin in the primary wash circuit. Crushers are fed by means of retractable carriage, horizontal belt feeders. Crusher discharges onto a short inclined belt feeder delivering to the rod deck screens. The moisture in the crusher feed tends to form pancakes of agglomerated fines, but the proportion is small and there is no build up of these.

Crushers are directly connected through flexible couplings to slow speed motors, and are protected against a drop in oil pressure or cutting out of the oil pumps by Mercoid relays. The whole circuit is interlocked so that in the event of a stoppage of equipment after the crusher, feed to the crusher stops first and the crusher runs 60 sec. to clear itself before shutting down automatically. Remote control, indicator lights and aural warning of a cutout are all provided.

Tailings Disposal

Plant tailings, minus ⅜-in., are delivered by 36-in. conveyor to a 300-ton surge bin situated at the base of an old tailings dump some 130 ft. high, close to the plant. Minus 10-mesh tailings and diamond recovery house tailings join the HMS tailings for disposal. The 36-in. conveyors, 2,000 ft. in length, carry the tailings up and along the top of the dump to a transfer point from which transverse conveyors deliver the product to two conveyors spaced at 400-ft. centers as alternate disposal systems.

All conveyors up to this point are 36-in. belts running at 300 ft. per min. The last mentioned conveyors each deliver to a 30-in. hump-backed conveyor on rails, operating at 430 ft. per min., and this, in turn, delivers to a 30-in. shuttle conveyor on rails operating at 550 fpm.

Final disposal is through Stephens-Adamson-type belt throwers hung on the end of the shuttle. The short thrower belt has a speed of 2,400 ft. per min. and has a trajectory of some 50-60 ft. Throwers have a rated capacity of 700 tons per hour each. As the dump face advances, the conveyor preceding the hump backs is extended.

At the transfer point, a third and central disposal system is now being installed. This incorporates some modification on the other two systems. Instead of extending the conveyor preceding the hump backs by 38-ft. length sections as at present, additional belts will be interposed in 250-ft. lengths.

Plant Start-Up

The plant was brought into production in units, as and when they were completed. Blue ground was fed to the first unit during the last week of February and the completed plant was handed over by the contractors, Fraser & Chalmers (S. A.) Ltd., to the company on May 10, 1950.

The pilot plant was shut down just before operations started on the big plant, so a nucleus of trained HMS operators was available.

One interesting point was that the first cone and densifiers were charged with the full ferrosilicon charges, approximately 85 tons, in less than two hours. About 25 tons were charged directly from bags dumped on the operating levels and the balance was fed on to the cone feed belt at ground level.

Apart from the usual small mechanical adjustments, no major design changes were made in the layout and only two pump speeds were increased by 10%.

The ferrosilicon used is a locally manufactured product produced by African Metals Corporation and has proved very satisfactory. Local manufacture of ferrosilicon has been a considerable saving to the mining company.

Edw. L. Bateman (Pty.) Ltd. 22nd June, 1948

PREMIER (TRANSVAAL) DIAMOND MINING CO. LTD.

FLOW SHEET.

SINK - FLOAT PLANT

CRUSHING PLANT

744 TPH Average, 896 TPH Maximum, Including Closed Circuit.

- 1" 100%
-10 Mesh 14%

8 / 5' x 16' D.D. Low-Head Primary Wash Screens
Feed each Average 93 TPH. Max 112 TPH

10 Mesh — 3/8"

- -10 Mesh+0" → TAILS
- -3/8"+10 M.
- -1" +3/8"

4 - Cones

- Float
- Sink → CONCENTRATES PLANT

8 / 5' x 14' D.D. Low-Head Float Drain Screens
Feed each Average 78 TPH. Max. 93 TPH.

10 Mesh — 3/8" sq.

- - 10 Mesh
- -3/8"+10 M. → Bottom Deck Float Wash Screen
- -1" +3/8" → Top Deck Float Wash Screen.

8 / 5' x 14' D.D. Low-Head Float Wash Screens

10 Mesh — 3/8" x 1¼" slot

- -10 Mesh
- -3/8"+10 M. → TAILS
- -1" +3/8" → ROLLS OR SYMONS CRUSHERS

DINGS CROCKETT MAGNETIC SEPARATOR

- Non Magnetic → Thickener
  - Under-flow → TAILINGS
  - Over-flow → WATER [illegible]
- Magnetic (Ferro Silicon) → Circulating Media

DINGS CROCKETT MAGNETIC SEPARATOR

- Magnetic (Ferro Silicon) → Densifier
  - Under-flow → [illegible]
  - Over-flow → WATER [illegible]
- Non Magnetic → Thickener
  - Under-flow → TAILINGS
  - Over-flow → WATER [illegible]

Geological Exploration Company

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

SPECIFICATION OF SUPPLIES

(1) ONE - STURTEVANT ELECTROSTATIC MINERAL SEPARATOR, as shown on our drawing No. 6798 E.P., capable of handling approximately 1 ton of material such as Alluvial Sands per hour, consisting of:-

1 - Five-Roll Separator Unit complete.

1 - Vibratory Feeder Unit.

1 - 4-Hopper Unit complete with electric motor, reduction unit, reversing unit and drive.

1 - Standard Sturtevant Power Pack for Providing the H.T. D.C. voltage.

PRICE:- £2,300. 0. 0. Sterling Nett Cash C.I.F. New Orleans.

(Two thousand, three hundred Pounds Sterling).

Approximate Shipping Specification:-

Nett : 28 cwts. Gross : 39 cwts.
Measurement : 360 cub. ft.

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

SPECIFICATION OF SUPPLIES (cont'd)

(2) ONE - STURTEVANT ELECTROSTATIC MINERAL SEPARATOR, as shown on our drawing No. 6784 E.P., capable of handling up to ½-ton of material such as Alluvial Sands per hour, consisting of:-

1 - Double roll 48" Separator Unit complete.

1 - Vibratory Feeder Unit.

1 - Hopper Unit complete.

1 - Standard Power Pack.

PRICE:- £1,410. 0. 0. Sterling Nett Cash. C.I.F. New Orleans.

(One thousand, four hundred and ten Pounds Sterling)

Approximate Shipping Specification:-

Nett : 15 cwts. Gross : 21 cwts.
Measurement : 180 cub.ft.

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

SPECIFICATION OF SUPPLIES (Cont'd)

(3) ONE - STURTEVANT MINERAL ELECTROSTATIC SEPARATOR, as shown on our drawing No. 6785 E.P., capable of handling up to 5 cwts. of material such as alluvial sands per hour, consisting of:-

1 - Double Roll 24" Separator Unit complete.

1 - Vibratory Feeder Unit.

1 - Hopper Unit complete.

1 - Standard Power Pack.

PRICE:- £1,110. 0. 0. Sterling Nett Cash. C.I.F. New Orleans.

(One thousand, one hundred and ten Pounds Sterling)

Approximate Shipping Specification:-

Nett : 11 cwts. Gross : 16½ cwts.
Measurement : 120 cub.ft.

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

(4) ONE - STURTEVANT LABORATORY TYPE ELECTROSTATIC SEPARATOR, as shown on drawing No. 6444 E.P., consisting of:-

1 - Single roll Separator Unit complete.

1 - Vibratory Feeder Unit.

1 - Hopper Unit complete.

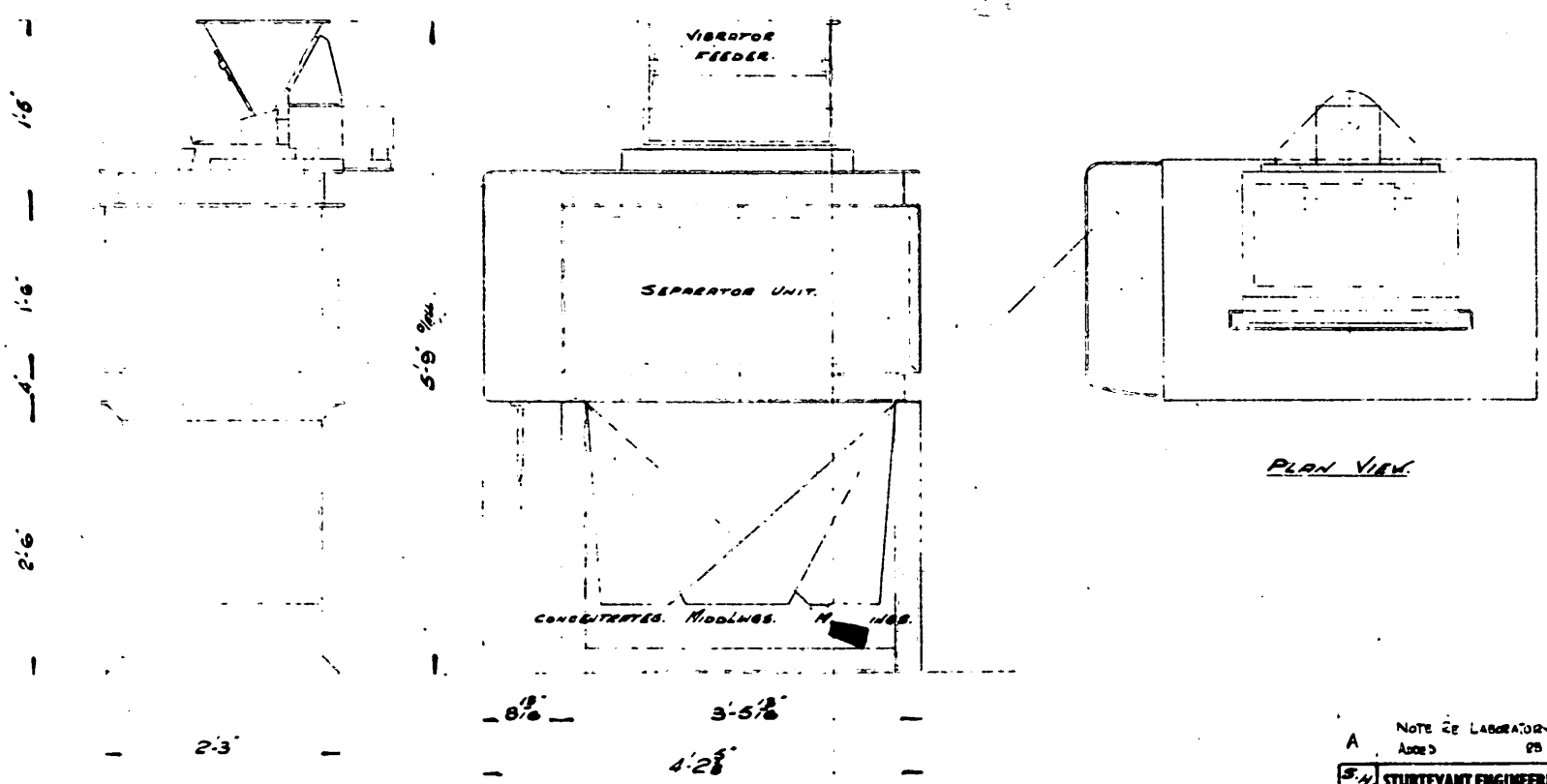
1 - Standard Power Pack.

PRICE:- £1,050. 0. 0. Nett Cash Sterling. C.I.F. New Orleans.

(One thousand and fifty Pounds Sterling).

Approximate Shipping Specification:-

Nett : 10½ cwts. Gross 15½ cwts.
Measurement : 120 ft.



A NOTE RE LABORATORY PLANT ADDED 28 10 52.

S.H.

STURTEVANT ENGINEERING Co LTD
SOUTHERN HOUSE, CANNON STREET,
LONDON, E.C.4.

SCALE 1" = 1'-0" DATE 17: 9: 52

DRG. No. 6444 L.P.

P.O.

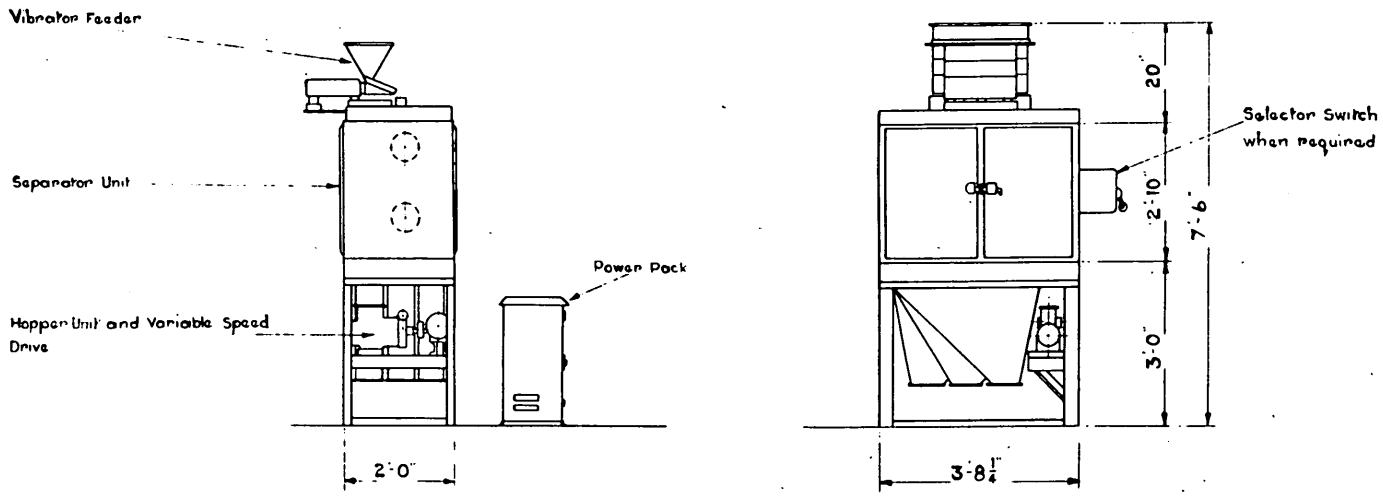
REQ.

OUTLINE DRG OF 24" SEPARATOR UNIT.

SINGLE PASS LABORATORY PLANT

DESIGN & DIMENSIONS APPROX: ONLY.

6785EP



OUTLINE ARRANGEMENT OF 24" 2-ROLL ELECTROSTATIC SEPARATOR.

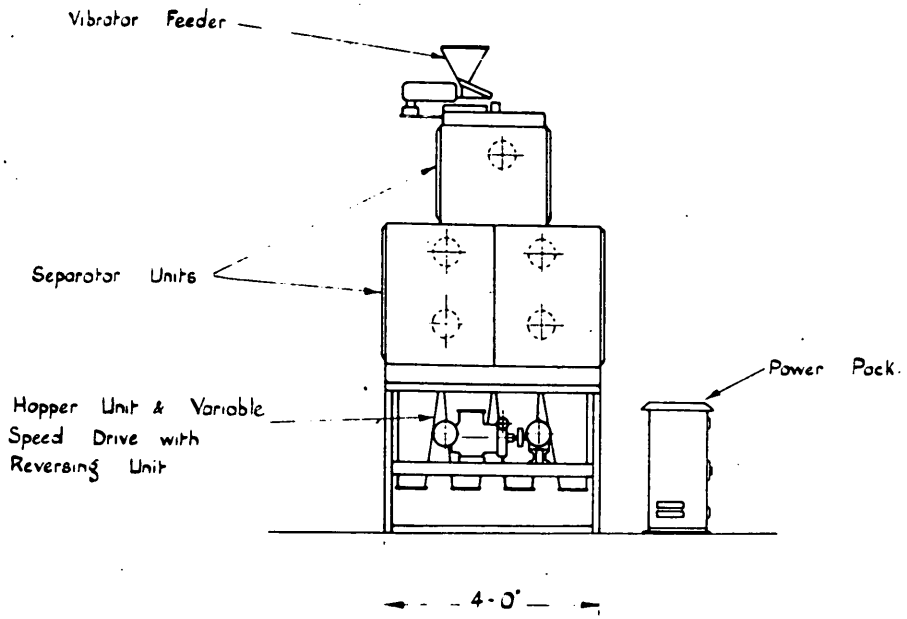
THIS DESIGN IS THE PROPERTY OF THE STURTEVANT ENGINEERING CO LTD AND IS SUBMITTED ON THE CONDITION THAT IT IS NOT TO BE DISCLOSED TO OTHERS AND THAT IF MADE USE OF IN ANY WAY THE CARRYING OUT OF THE WORK IS TO FALL TO THE COMPANY

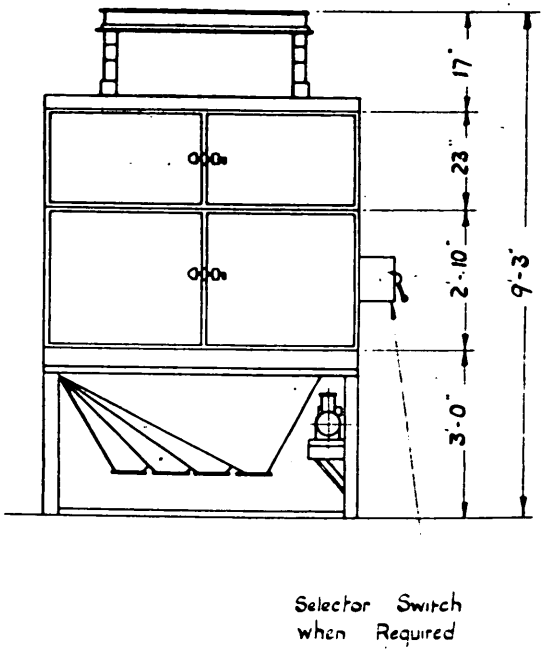
DESIGN & DIMENSIONS APPROXIMATE ONLY.

This Drg Supersedes Drg No 6357EP

P.C.	STURTEVANT ENGINEERING CO. LTD. SOUTHERN HOUSE, CANNON STREET LONDON E.C.4.
	SCALE ½" = 1 FT. DATE 15-4-53.
	DRG No 6785EP

6798 E.P.





OUTLINE ARRANGEMENT OF DUPLEX 48" ELECTROSTATIC SEPARATOR.

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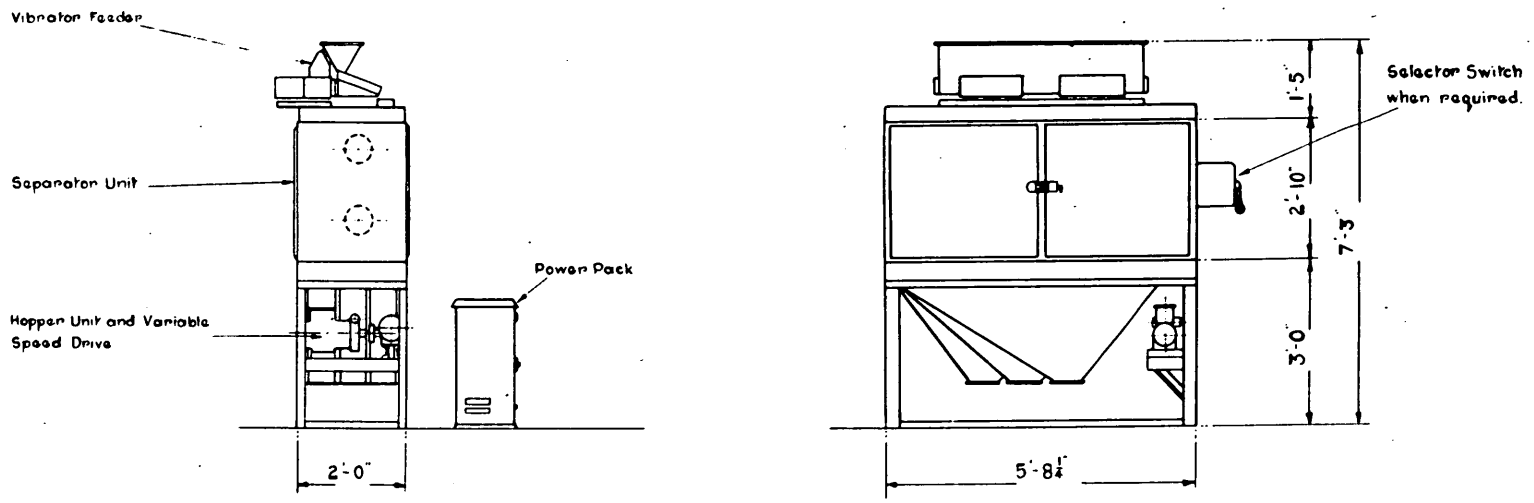
DESIGN & DIMENSIONS APPROXIMATE ONLY

	STURTEVANT ENGINEERING Co LTD. SOUTHERN HOUSE. CANNON STREET LONDON. E C 4.
	SCALE 1" = 1'-0" DATE 23.4.63
	DRG. No 6798 E.P

6784 E.P.



OUTLINE ARRANGEMENT OF 48" 2-ROLL ELECTROSTATIC SEPARATOR.

THIS DESIGN IS THE PROPERTY OF THE STURTEVANT ENGINEERING CO. LTD AND IS SUBMITTED ON THE CONDITION THAT IT IS NOT TO BE DISCLOSED TO OTHERS AND THAT IF MADE USE OF IN ANY WAY THE CARRYING OUT OF THE WORK IS TO FALL TO THE COMPANY.

DESIGN & DIMENSIONS APPROXIMATE ONLY.

This Drg. Supersedes, Drg. No 6471 E.P.

R.E.	STURTEVANT ENGINEERING CO LTD SOUTHERN HOUSE CANNON STREET LONDON E.C. 4.
	SCALE ½" - 1FT / DATE 15-4-53
	DRG. No 6784 E.P.

W

John Q. St. Clair
708 Heever Street
Norman, Oklahoma

WESTERN MACHINERY COMPANY

SAN FRANCISCO OFFICE COMMUNICATION

March 17, 1950

TO: WEMCO Equipment Division Sales Personnel

FROM: Ben Beaten

SUBJECT: Information on Operating Costs for the Mobil-Mill

Dear Fellows:

Recently we were called upon to supply a lead-zinc arsenic pyrite producer with approximate operating costs on the #1 and #2 Mobil-Mills. Lacking operating cost data from the field covering Mobil-Mills in which ferrosilicon is used as the medium, we checked the available operating data on hand and came up with the following information which we think you will find useful:

Approximate Operating Costs

No. 1-M Mobil-Mill - 15 TPH Capacity

1.	Labor: 1 operator @ $1.75/hr.	$0.118
2.	Power: 25.5 KW @ 1.0¢/KWH	0.017
3.	Media Consumption: 0.67 lbs./ton @ 7.0¢/lb (delivered)	0.047
4.	Maintenance: Labor, repair parts, operating supplies	0.05
Cost/Ton:	Exclusive of feed preparation and water supply-	$0.232

No. 2-M Mobil-Mill - 25 TPH Capacity

1.	Labor: 1 operator @ $1.75/hr.	$0.07
2.	Power: 41.7 KW @ 1¢/KWH	0.017
3.	Media Consumption: 0.67 lbs./ton @ 7.0¢/lb. (delivered)	0.047
4.	Maintenance: Labor, repair parts, operating supplies	0.04
Cost/Ton:	Exclusive of feed preparation and water supply-	$0.174

No. 3-M Mobil-Mill - 48 TPH Capacity

1.	Labor: 1 operator @ $1.75/hr.	$0.037
2.	Power: 55.75 KW @ 1¢/KWH	0.012
3.	Media Consumption: 0.67 lbs./ton @ 7.0¢/lb. (delivered)	0.047
4.	Maintenance: Labor, repair parts, operating supplies	0.03
Cost/Ton:	Exclusive of feed preparation and water supply -	$0.126

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708 Hoover Street
Norman, Oklahoma

No. 4-M Mobil-Mill - 105 TPH Capacity

1.	Labor: 1 operator @ $1.75/hr.	$0.017
2.	Power: 98.5 KW @ 1¢ KWH	0.0094
3.	Media Consumption: 0.67 lbs./ton @ 7¢lb.(delivered)	0.047
4.	Maintenance: Labor, repair parts, operating supplies	0.02
Cost/Ton:	Exclusive of feed preparation and water supply -	$ 0.0934

Your opinions regarding these approximate costs will be appreciated and, of course, we would appreciate any operating data you can send in.

Best regards,

Dan Beaton

DFB mm

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

Telephone 138

Cables: Geolex

GEOLOGICAL EXPLORATION COMPANY
INCORPORATED

NORMAN, OKLAHOMA

May 2, 1953

DETAILS OF WEMCO HMS LABORATORY UNIT

One (1) only Wemco HMS Laboratory Unit as generally illustrated on Drawing No. 20388, enclosed, including a 20" dia. separatory cone with ½ HP gearmotor drive, 12" x 30" lo-head vibrating screen with divided deck, screen cloth, discharge lips, sprays and piping and 1/3HP motor and drive. The unit also includes product hoppers, air lift, valves and fittings, steel framework and motor starting switches. Electrical characteristics for single phase, 60 cycle, 110 volt service.

Approximate shipping weight.....	1,485 lbs.
Price, FOB Sacramento, Calif.....	$1,512.00
Shipment.....	2 to 3 weeks

One (1) only No. 1B Jeffry Vibrating Feeder with bracket and special hopper for mounting on heavy-media laboratory separation unit.

Approximate shipping weight.....	110 lbs.
Price, FOB Sacramento, Calif.....	$231.00
Shipment.....	2 to 3 weeks

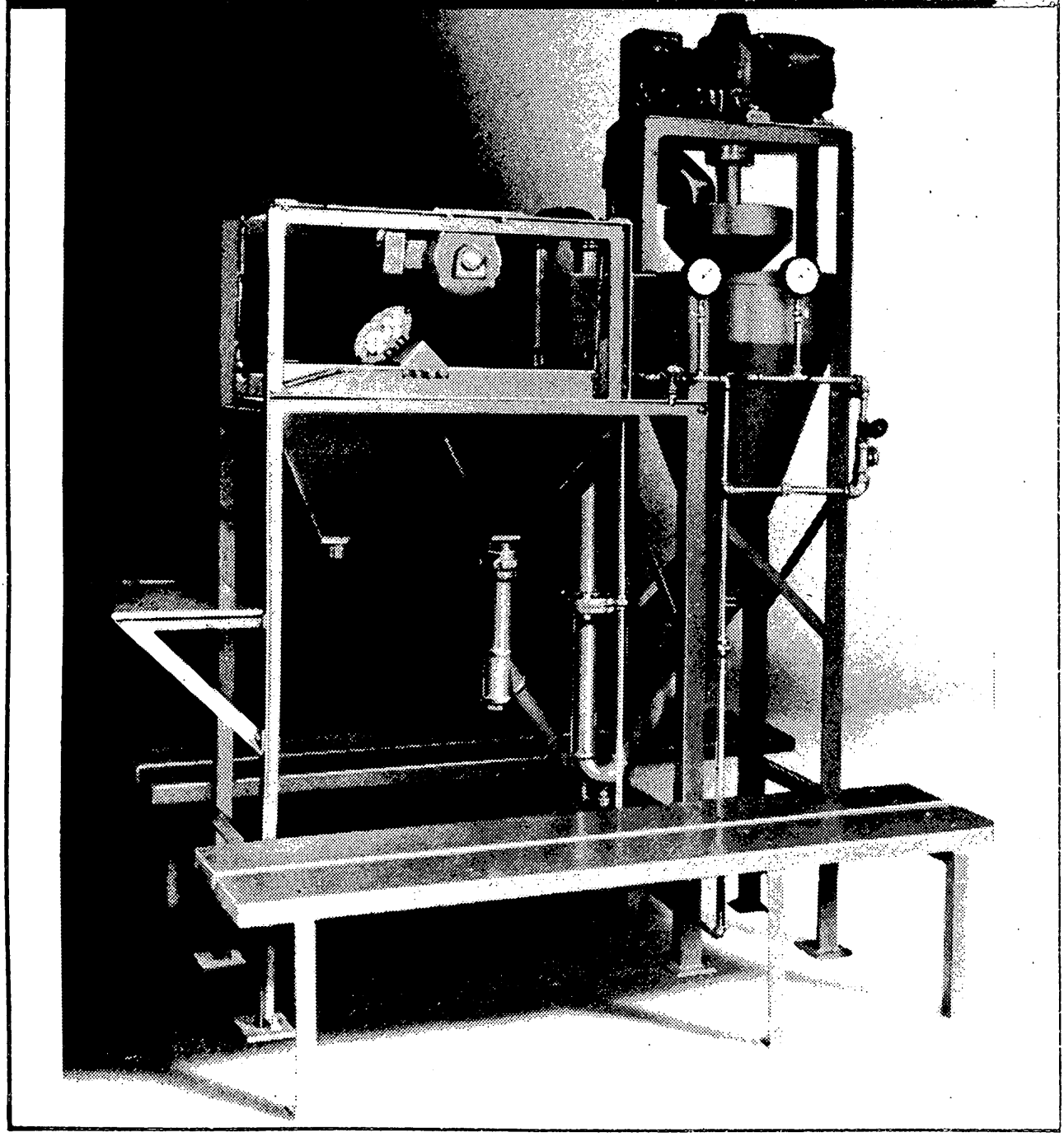
The Wemco Laboratory HMS Unit with 20" dia. cone separator will handle approximately 200 pounds of feed per hour. Media cleaning will not be needed for some time because the media will not become contaminated quickly unless continuous testing is done for a considerable length of time. However, under the operation proposed for Wilkinson, media cleaning will be required, and the magnetic separation unit for this purpose with all accessories will cost approximately $1000.00.

In addition to the above, an air compressor will be required to operate the air lift on the 20" cone unit. Approximately 25 cfm of air at 15 to 25 p.s.i. is needed.

Ferrosilicon is required as the media, and it is recommended that 50% of each of minus 100 mesh and minus 65 mesh ground ferrosilicon be used. To start the plant, about 500 lbs. is required.

Top gravity and bottom gravity in the cone is maintained at 2.6 and 2.9, respectively.

WEMCO (HMS) LABORATORY UNIT



John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

W E M C O

HEAVY-MEDIA SEPARATION

20 INCH LABORATORY UNIT

DESCRIPTION AND OPERATING INSTRUCTIONS

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

Introduction

This bulletin describes the recommended procedure for the operation of the Wemco 20 inch Continuous Heavy-Media Separation Test Unit. The information is based on data obtained with fifty-seven units licensed at present to commercial operating companies and universities throughout the world.

The test unit is designed for continuous testing up to 500 pounds per hour or batch testing in a size range of minus one inch plus ten mesh. However, materials in a size range larger than one inch can be processed in this unit by following the special procedure described in this bulletin. Ferrous media, such as magnetite and ferrosilicon, are recommended and media in a specific gravity range of from 1.25 to 3.4 and higher can be obtained.

American Cyanamid Company is the technical and sale representative for Heavy-Media Separation Processes in all countries of the world and negotiates licenses for the use of these processes on an experimental as well as a commercial scale. Over 50 commercial Heavy-Media Separation plants are now in operation for the beneficiation of fifteen materials: Bituminous and anthracite coal, iron ore, lead-zinc ore, diamond-bearing ground, magnesite, gravel, spodumene, andalusite, lead ore, zinc ore, barite, garnet, fluorspar, and tin ore.

Test work has shown promising results on: Scheelite, wolframite, sylvanite, kyanite, chromite, sea shells, manganese ore, copper-tungsten ore, gold ore, topaz, silver ore, gypsum, nickel ore, brucite, phosphatic minerals, beryl, pitchblende, langbeinite, arsenopyrite, native copper, oil shale, slate, flint, talc, ilmenite, olivine, feldspars, stibnite, bauxite, sulphur, pyrite, oxidized lead minerals, celestite, corundum, vermiculite, halite, graphite, and cement rock. The list of minerals amenable to treatment by Heavy-Media Separation is constantly being expanded.

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

WEMCO HEAVY-MEDIA SEPARATION TEST UNIT

DESCRIPTION

The separatory cone (1) consists of a cylinder 20 inches in diameter by 6 inches deep surmounting an inverted 70 degree cone of 20 inch base. This cone is truncated at a point where it is 2 inches in diameter and a flange is welded at that point (2). From the companion of this flange, a 2-inch airlift feed pipe slopes down at an angle of 60 degrees to a point where a 150 degree bend will allow an airlift (3) to rise vertically outside the cone. The airlift rises to a point somewhat above the top of the cone and then discharges through an airlift head (4) onto one side of vibrating screen (5) which is divided longitudinally. This longitudinally divided screen not only receives the discharge product of the airlift (3) but also the discharge product from the weir (7) at the top of the cone. The medium which flows with these products is for the most part drained through the screen (5) into the first compartment of the divided hopper (6). That medium remaining on the products is washed by water sprays (14) through the screen into the remaining compartment of the hopper. The drained undiluted medium from the first compartment of the hopper is returned to the cone through the 2-inch airlift (8). The highly diluted medium which is washed from the sink and float products into the second compartment of the hopper (6) is discharged from the hopper through the pipe (9) into any suitable vessel placed below. The feed line to the airlift (8) is made of standard 2-inch pipe and fittings, the angle made by the member (10) being 45 degrees. The airlift head (11) is of particular importance because it has an air escape at its top which makes possible a comparatively quiet discharge of the airlift to the medium intake funnel (12) of the cone.

The medium intake funnel is welded as shown in Figure 1 to the medium intake column which also serves as the shaft for a pair of sweeps which continually scrape the sidewalls of the cone in order to prevent the settling of medium on the walls. The medium intake column extends almost to the bottom of the cone. This assembly of medium intake funnel, medium intake column and cone sweeps is rotated at the rate of 13 or 14 revolutions per minute by the small gear head motor (15).

Inside the medium intake funnel, the medium intake column is perforated with two oval shaped openings which together are somewhat greater in area than the inside area of the 2-inch medium intake column. The medium intake column is further perforated below the funnel with 1/2 inch holes. These 1/2 inch holes are spaced evenly over the entire length of the column and are sufficient in number that their aggregate area is slightly less than the inside area of the 2-inch medium intake column. The medium intake column is also open at the bottom.

Air is supplied to the airlifts (3) through a reducing valve (13) and needle valves (14). The pressure through these airlifts is variable dependent upon the requirements of particular problems. Generally, air pressures will run between 5 and 10 pounds.

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

The reducing valve is incorporated in the design because such low pressure air is seldom available, and, when high pressure air is to be used, the reducing valve will give much smoother operation than simple valve control. Approximately two cubic feet per minute are required for the sink airlift (3) and forty cubic feet per minute for the medium return airlift (8).

The sample to be tested is placed in feed hopper (16). The hopper rests on a bracket fastened to the frame work of the cone and the ore or coal is delivered to the cone by means of an electrically vibrated feeder (21). Also shown in Figure 1 is a partitioned chute (18) which is attached to the screen for conveyance of the products of the screen into receptacles.

OPERATION

Media Used in the Cone

Various media may be used in the cone. The laboratory cone should use whatever medium is being used or will be used in the plant. Inasmuch as most plants using Heavy-Media Separation Processes use either ferrosilicon or a mixture of ferrosilicon and magnetite, these media are most often used in the laboratory cone. For low gravities (1.25-2.45) it is feasible to use magnetite alone.

Ferrosilicon

The ferrosilicon commonly used in these processes is designated as 15 per cent ferrosilicon, meaning a 15 per cent silicon content. Ferrosilicon may be obtained from the Electro-Metallurgical Sales Corporation, 30 East 42nd Street, New York, N. Y. or from Keokuk Electrometals Company, Keokuk, Iowa. The standard products best suited for small-scale testing are designated as 65 Mesh and 100 Mesh. Either may be used in the laboratory cone dependent upon the specific gravity desired in the medium suspension. In general, 65 Mesh will be used for working at specific gravities above 3.00 and 100 Mesh for working at lower specific gravities. Either grade may be made finer by grinding in a ball mill if a special grind is desired.

Table I

Approximate Screen Analyses of Ferrosilicon Media

Mesh Tyler	65 MxD % Wt.	Cum. % Wt.	100 MxD % Wt.	Cum. % Wt.
+48	Nil	Nil	Nil	Nil
+65	5.5	5.5	2.42	2.42
+100	14.2	19.7	4.08	6.50
+150	13.1	32.8	4.23	10.73
+200	13.6	46.4	9.16	19.89
-200	53.6	53.6	80.11	100.00

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

The specific gravity of ferrosilicon is 6.7 to 6.8. A rough rule in practice has been that heavy media may be used in suspensions having specific gravities up to half of the specific gravity of the solid material. Actually in practice it is possible to use ferrosilicon suspensions having specific gravities somewhat greater than 3.4 or half the specific gravity of ferrosilicon. If the medium is clean, a specific gravity of around 3.47 may be maintained without excessive difficulty.

Magnetite

Magnetite may be used either alone or mixed with ferrosilicon in whatever proportions are required to maintain a medium of the necessary specific gravity. When a medium of specific gravity lower than 2.45 is required, it is usually desirable to use magnetite alone. The specific gravities of magnetites as procured on the market vary considerably and care should be exercised to obtain a magnetite of high specific gravity and consequent high degree of purity. Magnetite may be obtained from the Foote Mineral Company, Philadelphia, Pa. For general testing, magnetite is ground to size specifications as shown below:

Magnetite

(Approximate Screen Analyses)

Grade "B" (Bituminous Coal)	Grade "A" (Anthracite Coal)	Grade "C" (Low Gravity Ores)
#65 -	-	10.9
#100 - 0.3	1.3	5.8
#150 - 0.4	1.2	7.3
#200 - 1.6	19.1	12.7
#325 - 5.3	11.2	14.9
-325 - 90.7	67.2	46.4
Approximate Gravity Range 1.25-1.60	1.60-2.10	2.10-2.45

Preparation and Cleaning of Ferrous Media

Ferrosilicon and magnetite as obtained on the market contain some impurities and it is necessary to clean them before use in the laboratory cone.

Ferrosilicon as purchased must be wet for several days before any attempt is made to clean it. The most practical means of wetting ferrosilicon is to make a slurry of it with water. In this slurry, if allowed to stand for several days, the ferrosilicon will become thoroughly wet and will be easily cleaned in a magnetic separator. Pouring of water into a drum of ferrosilicon is not satisfactory as the water will not penetrate down through the bed of small particles and the material will not become wet.

John Q. St. Clair
708 Hoover Street
Norman, Oklahoma

If ferrosilicon is cleaned before it is thoroughly wet a considerable loss of material will be unavoidable. Medium thus cleaned does not behave well in the cone. This is probably due to disproportionate losses in certain sizes during cleaning.

Magnetite does not require pre-wetting. A slurry is necessarily made in order that it may be fed to the magnetic cleaner but this slurry is made immediately before cleaning.

Cleaning Ferrosilicon and Magnetite

In the laboratory it is considered good practice to start each day with a clean lot of medium. Two types of magnetic separators are generally used for cleaning medium: one manufactured by the Dings Magnetic Separator Company is of the "Crockett" type and is equipped with a permanent magnet bed; the "Counter Flow", manufactured by the Jeffrey Manufacturing Company is of the drum type, and is fitted with a permanent or electro-magnetic bed, with a variable field. The control of the field strength and capacity of the Counter Flow Separator gives greater latitude in the type of material handled and allows for some additional control on the ultimate concentrate produced. When the Counter Flow Separator is used, care must be taken that the field strength is not too great, for if it is, non-magnetic material will be trapped in the magnetic concentrate and little or no cleaning will result. A little experimenting will soon determine what field strength is best.

Ferrosilicon or magnetite, new or dirty, may be cleaned as follows: Place 50 to 100 pounds of the medium in a 50 gallon drum containing about 40 gallons of water. This open drum should be equipped with a suitable stirring device so that the medium is kept in complete suspension at all times (see Fig.2). A valve near the bottom of the drum allows the medium suspension to be drawn off into a centrifugal pump. A screen at this point to remove coarse rock particles is desirable. The pump line carries the medium suspension up to and past the magnetic separator where a portion is bled off for feed to the separator and the remainder is returned to the drum. A 1-inch pump is adequate and the feed to the separator may be bled off through a 1/8-inch pipe from a tee in the pump line. The supply of ferrosilicon or magnetite in the drum may be replenished from time to time as the medium is drawn off through the magnetic separator. The medium discharged from the magnetic separator must pass through a demagnetizing coil (see Fig.2) before it is used. The demagnetizing coil is of utmost importance and no attempt should be made to operate without it. If the magnetized medium from the magnetic separator is not demagnetized before use in the cone, flocculation and consequent poor operation and inefficient separation will result.

After demagnetizing, the medium must be dewatered by decantation before it can be used.

It is best to have at least two batches of medium for the cone in order that the cone may be operated every day with clean

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medium. Dirty medium has a high viscosity, and, generally, when the viscosity of a batch of medium starts to rise, it rises rapidly. In the treatment of some ores, the second day of operation on the same batch of medium may have to be stopped as a failure.

Charging the Cone

The first step in charging the cone is to open the valves to both airlifts in order that the first bucket of medium will start to circulate at once. The rakes are then started and the apparatus is ready to receive medium.

The medium is prepared for the cone by making a slurry with water. Forqmaking this slurry the use of a suitable stirring device with adjustable shaft is advisable. As each bucket of slurry is prepared it should be placed in the cone. After the first bucket of medium is placed in the cone, it is desirable to work rapidly in order that an overflow may be obtained quickly and thereby prevent the underflow from becoming too thick, by settling, for easy circulation.

As soon as an overflow is obtained, the specific gravity of the medium should be determined. If the specific gravity of the medium is lower than desired, heavy, dewatered medium should be added slowly until the desired specific gravity has been obtained. If the specific gravity of the medium is higher than desired, it can be lowered readily by addition of water. Regardless of whether medium or water is added to the cone in order to alter the specific gravity of the medium in the cone, an equal volume of material should be subsequently removed from the circuit. The cone operates best when it contains just enough medium to maintain an overflow when both airlifts are operating smoothly. If the circuit contains too much medium, the excess will remain relatively static in the hopper (6 - Figure 1) beneath the screen (5). This will result in settling and consequently poor control of specific gravity in the circuit. It is best to charge the cone with slurry of greater specific gravity than is ultimately desired. The cone thus charged can be ready for operation in a minimum amount of time.

Specific gravities may be determined with any calibrated vessel and balance. A 1000 cc flask and a beam balance is suggested. After the flask is tared on the balance it is filled with medium from the cone, weighed and the weight is read directly as the specific gravity. For example, a weight of 2850 grams net would indicate a specific gravity of 2.85. The flask should be filled from the top of the cone for the top specific gravity using a small metal cup. The overflow should not be taken directly as it includes a water film and will give erroneous results. The water film should be gently splashed away from the surface of the medium and a cupful of medium should then be rapidly dipped. This should be repeated until the flask is filled. The specific gravity of medium from the bottom of the cone may be taken directly from the discharge of the airlift.

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A more efficient method of taking samples of top medium may be used. A 1/2-inch pipe nipple (19) is mounted about 2 inches below the normal medium overflow level. Whenever a sample is required, the plug in the nipple is removed and the flask if filled. In order to prevent the nipple from filling with medium when not being used, a solid screw plug, long enough to extend slightly beyond the nipple into the cone and tight enough to prevent medium from entering, is used. The entrance to this nipple is protected by screen to prevent plugging by any float material.

Preparation of the Feed

For continuous operation of the cone, the ore or coal should be crushed to pass 1-inch square mesh screen. Some ores, of course, may require finer crushing in order to effect adequate liberation of the mineral or coal. The crushed material should then be wet screened in order to eliminate most of the slime and other fine material. At the present time it appears that the second screening should be done at 10 mesh as the finest, thereby eliminating nearly all of the minus 10 mesh material from the cone test. Slime will foul the medium and the fouled medium will generally become too viscous for use. In case the second screening is done dry, the screened material should then be thoroughly washed. It is not necessary to dry the cone feed. The cone feed should be drained of all water that will drain off readily; but beyond draining, no drying is necessary.

Operating the Cone

Good operation of the laboratory cone consists of running all tests of a series under the same conditions. Media used in two tests of a series should be as nearly the same as possible even though the tests are made a week apart. This is easily accomplished by having enough of any type of medium to charge the cone twice and by starting each day with a clean charge.

A characteristic of the cone, in fact one of the principles of the cone, is that the medium suspension at the bottom of the cone will have a higher specific gravity than the medium suspension at the top of the cone. By regulating the amount of medium overflowing the weir (7 - Figure 1) the differential will be decreased or increased. In various other ways the differential in the cone may be altered. The normal overflow height over the weir should be approximately 5/16-inch. In most cases neither the bottom hole nor the side holes of the medium intake column are plugged. If the ore contains an appreciable amount of teeter (near gravity) material it proves advantageous to plug the bottom hole in the medium intake column. This will result in forcing the return medium out of the holes in the sides of the intake column which creates a down draft in the cone. It should also be borne in mind that a finely ground medium will have a lower differential than a coarsely ground medium.

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Difficulty may be experienced in obtaining the correct differential in specific gravity between the float overflow and the sink underflow medium; especially when beginning a test with clean mediu. After operating for a short period, this difficulty may be overcome more or less automatically by the introduction of fine ore with the feed since it is impractical to remove absolutely all of the minus 10 mesh material. However, if an exceptionally clean ore or coal (free from slimes) is being tested, a small amount of slimes may be added to the circuit to assist in arriving at the correct differential. This is a method to be used only as a last resort and with caution because too much slime will result in excessive viscosity.

When a series of tests is started, a flow through the airlift (3) adequate for the removal of sink product from the cone should be established. At the same time, a flow over the weir (7) adequate for removal of the float product from the cone, but not so great as to cause sink particles to be carried over the weir, should be established. When the desired flow through the airlift (3) is obtained, establishing the flow over the weir (7) is mainly a matter of having the proper amount of medium in the cone. The flow over the weir should always be great enough so that medium is actually overflowing, not simply the water film which is generally present at the top of the cone. After the airlift and weir flows are established, the operator should determine the differential in the cone and in all future tests of that series he should operate with that same differential.

The specific gravity of the medium suspension should be determined at frequent intervals. Certainly it should be determined before each separate test, however short the test may be. If a test is long, a rough determination may be made during the test. The feed need not be shut off for determination of the specific gravity during a test. The use of a wire screen cover for the cup will prevent interference of ore or coal particles.

During the test, medium is continually being removed from the circuit. This is the medium washed off the sink and float products on the washing screen. It is sometimes necessary, in the case of a test lasting over a long period of time, for the operator to add medium to replace the amount carried out of the cone circuit, in order to maintain the correct amount of overflow and specific gravity. It is best to add media frequently and in small quantities rather than in large quantities less frequently.

The 2-inch airlift (3) according to the law of passing particles is generally too small for handling 1-inch particles. An airlift of this diameter is used partly because the cone is used on many ores and coal which are crushed finer than one inch and partly because a larger airlift would be disproportionate to the size of the cone. Because the airlift is small, it will jam with 1-inch particles

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if it is fed too rapidly. If, for instance, the operator is treating an ore or coal which contains a large fraction of sink material, he must govern his feed rate more or less according to the capacity of the sink airlift. If the ore or coal contains a very small fraction of sink the operator can use a greatly increased feed rate governed mainly by the speed at which the separation occurs in the cone.

In the event of stoppage of the sink airlift the operator can usually clear it by closing the airlift discharge, either by hand or with a stopper, causing the air pressure to force contents of the airlift feed pipe back into the cone.

When all of the material for a test has been fed to the cone, it will generally be necessary to wait 2 or 3 minutes for the machine to clear itself before starting another test. After 2 or 3 minutes have elapsed there may still be a few particles in the machine. Most of these may be removed with a wire mesh dipper. These few particles in teeter toward the bottom of the cone will not materially affect the results of the test.

When ferrosilicon medium is to be stored for more than a few days, lime should be added in the ratio of one pound of lime to 500 lbs. of mediu. If lime is not added the ferrosilicon will form a hard cake and extreme difficulty will be experienced in preparing it for reuse. Magnetite does not harden and may be stored without lime.

Batch Testing for Feed Coarser than 1 inch

In the event that a cone feed coarser than 1 inch is to be treated, the cone should be equipped with a wire basket built of 3/4-inch opening screen to fit into the cone with no more than 1/2-inch of clearance at a level about 9 inches below the overflow weir. This basket is fastened to the cone sweeps in such a manner that it may be easily installed or removed while the cone is filled with medium. Using this basket, the operator may treat 6-inch material or larger if he desires. However, he must remove the sink and float products by hand. The operator should remove the sink product frequently; because, if allowed to accumulate in the basket, it will stop circulation in the cone. This basket is not offered as one of the better features of the cone. This unit is designed for treatment of material in a size range of minus one inch plus 10 mesh. The basket, however, is a very satisfactory means of avoiding the laborious and unreliable alternative of bucket tests for small scale testing of coarse material.

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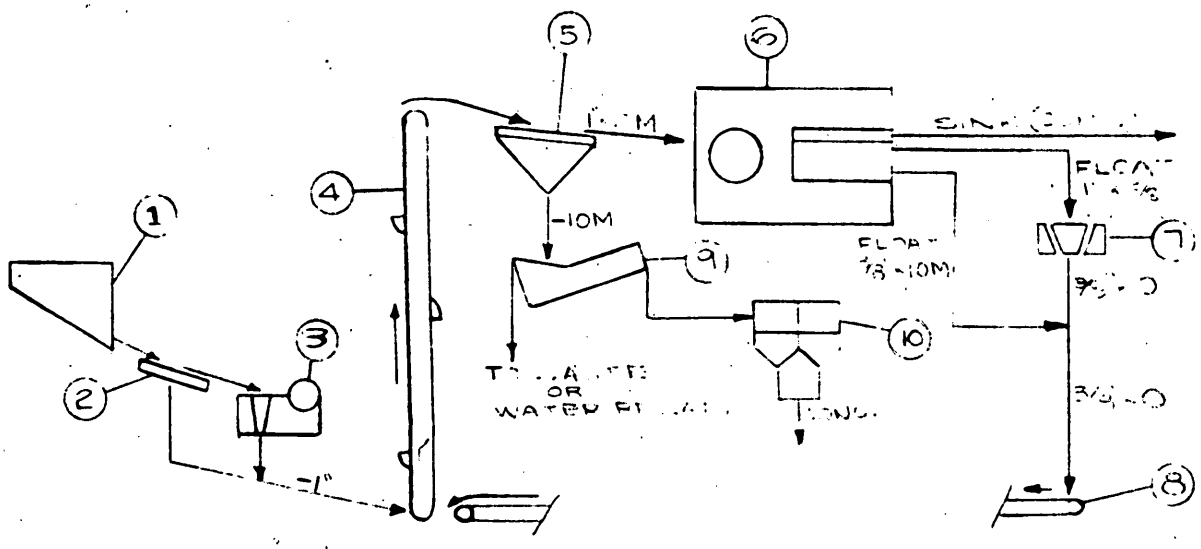
Test units may be purchased complete from the Western Machinery Company of San Francisco, California. Inquiries for the purchase of a test unit or of cleaning equipment should be addressed to:

Western Machinery Company
760 Folsom Street
San Francisco 7, California



1	TRUCK HOPPER
2	GRIZZLY
3	10 x 20 JAW CRUSHER
4	8" x 5' BUCKET ELEVATOR
5	3' x 10' WET SCREEN
6	#1M MOBIL MILL W/5' CONE SEPARATOR
7	18" GYRATORY CRUSHER
8	BELT CONVEYOR
9	24" CLASSIFIER
10	TWO CELL FINES JIG

APPROX. TOTAL CONNECTED HP = 120

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DATE	5/29/53	MACHINE	ORDER	
SCALE		SIZE TYPE		
DRAWN		PARTS SUGGESTED FLOWSHEET	ISSUED	
CHK'D		DIAMOND RECOVERY PLANT		
APPR.			LIST	

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PRELIMINARY ESTIMATE

Diamond Washing Plant

Item	Description	Equipment Wt.	Equipment Pr.	Estimated Installation Cost	Total
	FEED PREPARATION SECTION				
2 & 3	10 x 20 Jaw Crusher & Grizzly	10,560#	$ 5,000.00		
4	8" x 5" Bucket Elevator	3,700#	2,380.00		
5	3 x 10 Screen	3,200#	2,000.00		
	SUB TOTAL	17,460#	9,380.00	$ 9,000.00	$18,380.00
	HMS SECTION				
6	#1M Wemco Mobil-Mill and Elevator	41,200#	30,400.00		
	Compressor	3,800#	2,900.00		
	SUB TOTAL	45,000#	33,300.00	$ 5,000.00	$38,300.00
	FINES TREATMENT				
7	18" Dia. Secondary Crusher	4,200#	4,380.00		
9	24" Dewatering Classifier	3,160#	2,155.00		
10	12" x 18" Jig	1,800#	1,310.00		5,810.00
	SUB TOTAL	9,160#	7,845.00	$ 4,500.00	$12,345.00
	ACCESSORIES				
	1 Lot Chutes Hoppers, Conveyors and bins.			$ 5,000.00	$ 5,000.00
	Freight			7,200.00	7,200.00
	Water Pump & Tank			2,000.00	2,000.00
	SUB TOTAL			$14,200.00	$14,200.00
	GRAND TOTAL		$50,525.00	$32,700.00	$83,225.00

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