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## Auditor's Report

## State Inspector of Oils State of Colorado



DECEMBER 1st, 1924 то
NOVEMBER 30th, 1926


THE BRADFORD-ROBINSON PTG. CO., DENVER

## Auditor's Report

# State Inspector of Oils State of Colorado 



DECEMBER 1st, 1924 то
NOVEMBER 30th, 1926

MULLINS \& SCHRYVER
Accountants
DENVER

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To His Excellency,
GOVERNOR WM. H. ADAMS, Capitol Building, Denver.

## Dear Sir :

We beg leave to submit to you herewith a report of our audit of the accounts of the State Inspector of Oils of the State of Colorado for the biennial period ending November 30th, 1926.

Very respectfully,
MULLINS \& SCHRYVER, By James P. Mullins.

Denver, Colorado, February 8th, 1927.

## GENERAL CASH STATEMENT

The total cash receipts from Gasoline Taxes and Inspection Fees during the biennial period amounted to the sum of $\$ 4,233,614.43$, all of which was properly remitted to the State Treasurer, as evidenced by receipts on file.

An analysis of the Cash Book and General Ledger shows the source of such collections to be as follows:

1925
1 Cent Tax-.................................. $\$ 16,424.79$
2 Cent| Tax................................... 1,848,096.26
Inspection Fees ......................... 105,181.43
$\$ 1,969,702.48$
1926
1 Cent Tax................................... $\$$ 7,416.01
2 Cent Tax................................... 2,137,302.56
Inspection Fees ......................... 119,193.38
2,263,911.95
$\$ 4,233,614.43$
Full details of the collection and disposition of the amounts shown above will be found in Schedules "A" and "B."

Detailed receipts, of which a carbon copy is retained in the department, are issued for all cash received, such receipts being properly entered in the General Cash Book and posted therefrom to the Ledgers.

We have carefully checked and verified all such receipts and postings and find same to be correct.

## GASOLINE TAXES

The method of determining the amount of taxes due the State on gasoline is necessarily somewhat involved and our survey convinces us that every possible effort is being made to insure a complete and accurate assessment of such taxes. The adoption of a system of co-operation with the oil inspection departments of adjoining states whereby information concerning interstate shipments is exchanged, has aided materially in securing a more thorough recheck on oil and gasoline shipments into and out of the State.

The sources from which charges are made are mainly as follows:

1st. From samples sent in by dealers showing date of delivery, car numbers and gallonage.
$2 n$. From lists and statements of consignments submitted by dealers.

3rd. From a systematic and periodical recheck of deliveries and shipments through railroad offices.

4th. From reports received as a result of a system of co-operation with the oil inspection departments of adjoining states.

5th. From personal investigations by the Oil Inspector, his deputies and assistants.

Under these conditions it is inevitable that duplicate and erroneous charges will occur.

Such erroneous charges, when verified, are corrected either by a credit memorandum or by journal entry.

We have carefully examined all such credits and find same to be in proper form and duly approved by the Oil Inspector.

The present method of recording and entering charges appears to be working satisfactorily and is a noticeable improvement over the system formerly in use.

Complete statements of all charges and credits for gasoline taxes will be found in Schedules C, D, E and T.

## INSPECTION FEES

The method of determining the amount of fees due on oil and gasoline tested is similar to that employed for the assessment of taxes (more fully described in foregoing paragraphs) and credits, where due, are allowed in the same manner.

Detailed statements of all fees charged and credits allowed will be found in Schedules F and G.

## DELINQUENT TAXES

Prior to the amendment of the Gasoline Tax Law by the last Legislature, it was practically impossible for the department to enforce collection of delinquent taxes and fees except by civil suit, the result being that a number of dealers evaded payment of claims.

The imposition of fines and penalties for non-payment of claims, made possible under the amended law, has evidently been very effective, as the collection of current accounts is all that could be expected.

All old delinquent accounts and all current accounts that are
delinquent over thirty days have been turned over to the Attorney General for collection.

A letter from the Oil Inspector, in answer to our inquiry, explains more fully the reason for the large amount of unpaid taxes and fees in former periods. (See Exhibit " $E$ "'.)

The total of taxes and fees due the State as of November 30th, 1926, as shown by ledger statement was as follows (see Schedule "H"):

| Current Accounts | 294,153.23 |
| :---: | :---: |
| Suspense Accounts | 17,836.41 |
| Judgment Accounts | 44,918.52 |
|  | \$356,908.16 |

These unpaid balances consist mainly of charges accrued prior to the enactment of the last amendment to the law. An analysis of these accounts gives the following result:

$$
\begin{aligned}
& 1 \text { Cent Tax (Schedule C)....................................... } \$ 59,631.80 \\
& 2 \text { Cent Tax (Schedule E)..................................... 276,476.84 } \\
& \text { Inspection Fees (Schedule G).............................. 17,752.67 } \\
& \text { Interest (Schedule J)............................................ } 2,016.02 \\
& \text { Penalties (Schedule J)........................................... } 730.83 \\
& \$ 356,908.16
\end{aligned}
$$

## MISCELLANEOUS CREDITS

As we stated before, it is impossible to avoid a great many duplicate charges which have to be corrected either by credit memoranda or journal entry.

In addition to this, gasoline used for farm or cleaning purposes or sold to the United States Government or to railroads or used for any purpose other than as specified by law, is exempt from taxes and any taxes collected or assessed on such gasoline must be refunded or abated.

In a number of cases, gasoline shipped into the State and taxed, is later trans-shipped out of the State and credit must be given for any taxes or fees collected or assessed thereon.

As a number of dealers have gone out of business or have become bankrupt, thus making collections impossible, certain old claims have been written off on the advice of the Attorney General.

Under the circumstances, we believe that the miscellaneous credits that have been allowed are proper and legal and are fully substantiated by data on file in the department. A summary of credit allowances will be found in Schedule "T."

## INTEREST AND PENALTY

The present Gasoline Tax Law, as amended by the last Legislature, gives the Oil Inspector authority to assess certain penalties and interest on delinquent dealers for non-payment of taxes. A statement of the interest and penalties so imposed and the collection of such charges will be found in Schedule "J."

## INSPECTOR'S REVOLVING FUND

This fund, established by the State Auditing Board to enable the Oil Inspector to refund taxes erroneously collected on gasoline used for purposes other than those specified by law is, at the present time, intact.

The depletion of this fund by a former employe has been adjusted and the matter has been so thoroughly investigated and audited at considerable expense on other occasions that we do not see any necessity for further inquiry. A number of refund vouchers and cancelled checks seem to be still missing, but this fund is now being properly and carefully managed and all refunds appear to be made only after the most careful inquiry and investigation.

Complete detailed statements of this fund will be found in Schedules K, L, M, N and O.

## APPORTIONMENT OF GASOLINE TAX

All revenue arising from taxes collected on gasoline is apportioned to the State Road Fund and to the several counties in proportion to the mileage of State roads in each county.

A complete statement of such apportionment during the biennial period will be found in Schedules $R$ and $S$.

## OPERATING COST

All costs incurred in the testing and inspection of oil and gasoline, the assessment and collection of taxes (including salary of a member of the Attorney General's staff), and in oil shale investigations and geological surveys in co-operation with the Federal government, are paid from the Inspector's Fee Fund.

The unexpended balance remaining in the fund on November 30th of each year is transferred to the General Revenue Fund of the State.

Detailed statements showing the expense incurred by the department for the years 1925 and 1926 will be found in Schedules $P$ and $Q$.

## MISCELLANEOUS EXHIBITS

In addition to the financial statements dealing with the activities of the department during the past biennial period, we are submitting comparative tables and exhibits that we believe will be of general interest.

We also include a brochure summarizing the work of the department through the laboratory at the State University at Boulder in co-operation with the United States Bureau of Mines, which was submitted to us by the State Oil Inspector.

In conclusion, we wish to state that our examination of this department has been more complete than any ever made in the past and we find that the conditions of management and accounting at the present time are far better than at any time in the past and we are satisfied that everything possible is being done to conduct the department in an efficient and conscientious manner.

Respectfully submitted,
MULLINS \& SCHRYVER, By James P. Mullins.

## SCHEDULE A

## GENERAL CASH STATEMENT

December 1, 1924, to November 30, 1925

RECEIPTS


## DISBURSEMENTS

Paid to State Treasurer.
. $1,969,702.48$

## SCHEDULE B

GENERAL CASH STATEMENT
December 1, 1925, to November 30, 1926

RECEIPTS

| 1c Tax |  |  | 2c Tax | Insp. Fees |  | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| December, 1925 | 812.65 | \$ | 153,023.08 | \$ 13,434.82 | \$ | 167,270.55 |
| January, 1926 | 550.00 |  | 119,458.56 | 6,479.89 |  | 126,488.45 |
| February, 1926 | 244.00 |  | 127,827.83 | 6,382.63 |  | 134,454.46 |
| March, 1926 | 350.00 |  | 152,900.84 | 8,155.72 |  | 161,406.56 |
| April, 1926 | 400.00 |  | 133,026.34 | 6,919.65 |  | 140,345.99 |
| May, 1926 | 55.00 |  | 171,040.78 | 9,500.16 |  | 180,595.94 |
| June, 1926 | 350.00 |  | 207,524.60 | 10,358.19 |  | 218,232.79 |
| July, 1926 | 925.00 |  | 196,533.56 | 10,423.23 |  | 207,881.79 |
| August, 1926 | 604.80 |  | 208,132.10 | 11,485.22 |  | 220,222.12 |
| September, 1926 | 2,523.64 |  | 238,511.35 | 12,899.04 |  | 253,934.03 |
| October, 1926 | 50.00 |  | 232,892.55 | $12,355.55$ |  | 245,298.10 |
| November, 1926 | 550.92 |  | 196,430.97 | 10,799.28 |  | 207,781.17 |
| Totals | 7,416.01 |  | 137,302.56 | \$119,193.38 |  | ,263,911.95 |

## DISBURSEMENTS

## SCHEDULE C

## EARNINGS STATEMENT-ONE CENT TAX

December 1, 1924, to November 30, 1926
Balance due State under old one-cent Tax Law, Dec. 1, 1924....... \$176,247.37
CREDITS

|  | Cash | Miscellaneous | Total |
| :---: | :---: | :---: | :---: |
| December, 1924 | 2,457.96 |  | \$ 2,457.96 |
| January, 1925 | 3,375.00 | \$ 8,679.09 | 12,054.09 |
| February, 1925 | 500.00 |  | 500.00 |
| March, 1925 | 2,033.34 | 450.97 | 2,484.31 |
| April, 1925 | 3,211.20 | 11,103.06 | 14,314.26 |
| May, 1925 | 596.00 | 14.70 | 610.70 |
| June, 1925 | 1,134.02 | 2,130.07 | 3,264.09 |
| July, 1925 | 700.00 |  | 700.00 |
| August, 1925 | 537.39 |  | 537.39 |
| September, 1925 | 600.00 |  | 600.00 |
| October, 1925 | 227.87 | 5.08 | 232.95 |
| November, 1925 | 1,052.01 |  | 1,052.01 |
| Totals. | 6,424.79 | \$22,382.97 | \$38,807.76 |

Balance due State, Dec. 1st, 1925
$. \$ 137,439.61$
Miscellaneous Charges
15.14

Total
$\$ 137,454.75$


## SCHEDULE D

## EARNINGS STATEMENT-TWO CENT TAX

December 1, 1924, to November 30, 1925
Balance due State, December 1st, 1924................................. . . . $\$ 200,840.11$

TAXES ASSESSED

| December, 1924 | \$150,898.32 |
| :---: | :---: |
| January, 1925 | 129,522.18 |
| February, 1925 | 128,319.95 |
| March, 1925 | 123,748.06 |
| April, 1925 | 134,218.53 |
| May, 1925 | 165,853.71 |
| June, 1925 | 212,662.66 |
| July, 1925 | 195,815.33 |
| August, 1925 | 187,106.00 |
| September, 1925 | 287,678.16 |
| October, 1925 | 159,240.37 |
| November, 1925 | 157,685.32 |


|  | Cash M | Miscellaneous | Total |  |
| :---: | :---: | :---: | :---: | :---: |
| December, 1924 | 170,428.77 | \$ 6,155.81 | \$ 176,584.58 |  |
| January, 1925 | 111,652.97 | 4,298.65 | 115,951.62 |  |
| February, 1925 | 119,954.30 | 5,634.16 | 125,588.46 |  |
| March, 1925 | 122,410.67 | 7,985.71 | 130,396.38 |  |
| April, 1925 | 134,234.09 | 3,336.21 | 137,570.30 |  |
| May, 1925 | 112,122.96 | 4,228.95 | 116,351.91 |  |
| June, 1925 | 203,737.73 | 4,780.11 | 208,517.84 |  |
| July, 1925 | 201,793.29 | 1,992.85 | 203,786.14 |  |
| August, 1925 | 174,760.48 | 2,798.97 | 177,559.45 |  |
| September, 1925 | 186,525.43 | 12,483.08 | 199,008.51 |  |
| October, 1925 | 170,431.46 | 23,274.30 | 193,705.76 |  |
| November, 1925 | 140,044.11 | 31,122.10 | 171,166.21 |  |
| Totals. | ,848,096.26 | \$108,090.90 | \$1,956,187.16 | \$1,956,187.16 |
| Balance due Stat | er 30th, 19 |  |  | \$ 277,401.54 |

## SCHEDULE E

## EARNINGS STATEMENT-TWO CENT TAX

## December 1, 1925, to November 30, 1926



TAXES ASSESSED


CREDITS

|  | Cash | Miscellaneous |  | Total |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| December, 1925 | 153,023.08 | \$ | 5,295.86 | \$ 158,318.94 |  |
| January, 1926 | 119,458.56 |  | 4,791.35 | 124,249.91 |  |
| February, 1926 | 127,827.83 |  | 2,957.22 | 130,785.05 |  |
| March, 1926 | 152,900.84 |  | 5,652.93 | 158,553.77 |  |
| April, 1926 | 133,026.34 |  | 3,070.90 | 136,097.24 |  |
| May, 1926 | 171,040.78 |  | 3,186.90 | 174,227.68 |  |
| June, 1926 | 207,524.60 |  | 5,552.20 | 213,076.80 |  |
| July, 1926 | 196,533.56 |  | 3,316.67 | 199,850.23 |  |
| August, 1926 | 208,132.10 |  | 5,008.26 | $213,140.36$ |  |
| September, 1926 | 238,511.35 |  | 4,850.90 | 243,362.25 |  |
| October, 1926 | 232,892.55 |  | 3,943.51 | 236,836.06 |  |
| November, 1926 | 196,430.97 |  | $13,759.48$ | $210,190.45$ |  |
| Totals | ,137,302.56 | \$ | 61,386.18 | \$2,198,688.74 | \$2,198,688.74 |

## SCHEDULE F

## INSPECTION FEES

## December 1, 1924, to November 30, 1925

Balance due State, December 1st, 1924............................... \$24,977.53

## FEES CHARGED

| December, 1924 | 8,319.20 |
| :---: | :---: |
| January, 1925 | 7,314.95 |
| February, 1925 | 7,216.15 |
| March, 1925 | 7,113.21 |
| April, 1925 | 7,653.03 |
| May, 1925 | 9,291.74 |
| June, 1925 | 11,659.99 |
| July, 1925 | 10,745.14 |
| August, 1925 | 10,394.94 |
| September, 1925 | 15,887.83 |
| October, 1925 | 8,838.24 |
| November, 1925 | 8,728.32 |

## CREDITS

|  | Cash | Miscl. | Total |
| :---: | :---: | :---: | :---: |
| December, 1924 | 10,302.53 | \$ 360.03 | \$ 10,662.56 |
| January, 1925 | 6,334.05 | 1,054.49 | 7,388.54 |
| February, 1925 | 6,778.00 | 274.13 | 7,052.13 |
| March, 1925 | 6,693.30 | 1,159.98 | 7,853.28 |
| April, 1925 | 7,576.48 | 2,069.28 | 9,645.76 |
| May, 1925 | 6,154.80 | 194.98 | 6,349.78 |
| June, 1925 | 11,464.02 | 282.88 | 11,746.90 |
| July, 1925 | 11,041.40 | 109.99 | 11,151.39 |
| August, 1925 | 9,826.31 | 38.86 | 9,865.17 |
| September, 1925 | 10,803.71 | 626.93 | 11,430.64 |
| October, 1925 | 10,274.68 | 1,254.99 | 11,529.67 |
| November, 1925 | 7,932.15 | 1,672.88 | 9,605.03 |
| Totals | 105,181.43 | \$9,099.42 | \$114,280.85 |

## SCHEDULE G

## INSPECTION FEES

## December 1, 1925, to November 30, 1926

Balance due State, December 1st, 1925 . . . . . . . . . . . . . . . . . . . . . . . . . . \$ 23,859.42

FEES CHARGED

| December, 1925 | \$ 9,147.64 |  |
| :---: | :---: | :---: |
| January, 1926 | 7,113.47 |  |
| February, 1926 | 7,195.42 |  |
| March, 1926 | 8,848.01 |  |
| April, 1926 | 9,628.29 |  |
| May, 1926 | 10,731.84 |  |
| June, 1926 | 10,949.49 |  |
| July, 1926 | 12,483.52 |  |
| August, 1926 | 13,678.56 |  |
| September, 1926 | 12,566.99 |  |
| October, 1926 | 10,512.86 |  |
| November, 1926 | 9,660.34 | \$122,516.43 |


|  | Cash | Miscl. | Total |
| :---: | :---: | :---: | :---: |
| December, 1925 | 13,434.82 | \$ 193.34 | \$ 13,628.16 |
| January, 1926 | 6,479.89 | 95.43 | 6,575.32 |
| February, 1926 | 6,382.63 | 158.00 | 6,540.63 |
| March, 1926 | 8,155.72 | 715.87 | 8,871.59 |
| April, 1926 | 6,919.65 | 597.47 | 7,517.12 |
| May, 1926 | 9,500.16 | 117.64 | 9,617.80 |
| June, 1926 | 10,358.19 | 204.06 | 10,562.25 |
| July, 1926 | 10,423.23 | 122.53 | 10,545.76 |
| August, 1926 | 11,485.22 | 187.49 | 11,672.71 |
| September, 1926 | 12,899.04 | 168.66 | 13,067.70 |
| October, 1926 | 12,355.55 | 110.83 | 12,466.38 |
| November, 1926 | 10,799.28 | 6,758.48 | 17,557.76 |
| Totals. | 119,193.38 | \$9,429.80 | \$128,623.18 |

Balance due State, November 30th, 1926
$17,752.67$

## SCHEDULE H

## GENERAL LEDGER STATEMENT

Balances Due State November 30, 1926





## GENERAL LEDGER STATEMENT

SUSPENSE ACCOUNTS


JUDGMENT ACCOUNTS

| V. S. Al | 1,778.08 | \$ 12,560.47 | \$ 14,338.55 |
| :---: | :---: | :---: | :---: |
| Northern Garage | 835.75 | 6,840.77 | 7,676.52 |
| Triangle O. \& S. Co. | 323.98 | 2,425.29 | 2,749.27 |
| Starkey Filling Station |  | 20,154.18 | 20,154.18 |
| Totals. | 2,937.81 | \$ $41,980.71$ | \$ $44,918.52$ |




## SCHEDULE J

## INTEREST AND PENALTY ON DELINQUENT TAXES

INTEREST

PENALTYPenalties Assessed-
March, 1926 ..... \$1,314.12
September, 1926 ..... 79.80
October, 1926 ..... 434.55
November, 1926281.43 \$2,109.90
Cancellation of Charge .....  79.80
*Cash Collections-
March, 1926 ..... $\$ 583.29$
September, 1926 ..... 79.80
October, 1926 ..... 354.75
November, 1926 281.43 \$1,299.27 \$1,379.07Balance due State, November 30th, 1926$\$ 730.83$
*Transferred to two cent road tax fund and cash collections shown above are included in Schedule E.

## SCHEDULE K

## GASOLINE TAX REFUND ACCOUNT (INSPECTOR'S REVOLVING FUND)

## RECEIPTS

Cash Balance in Fund, December 1st, 1924, as per report of Public Examiner ..... 57.51
Outstanding checks of Nov. 30th, 1924, cancelled ..... 216.24
Reimbursements by State Auditing Board as per schedule L. ..... 88,765.55
Miscellaneous Collections-
January, 1925 .....  24.78
January, 1925 ..... 2.40
March, 1925 ..... 1.28
September, 1925 ..... 20.00
October, 1925 ..... 19.66
November, 1926 ..... 152.36
November, 1926 ..... 69.21\$ 289.69$\$ 89.328 .99$
DISBURSEMENTS
Cash Refunds by Inspector (Schedule M) ..... \$87,631.28
*Balance Chargeable, Nov. 30th, 1926 ..... 1,697.71
Total ..... \$89,328.99
RECONCILIATION
*Balance as shown above ..... \$ 1,697.71
Reimbursements due from State Auditing Board for checks paid by bank in Nov., 1926, as per Schedule N ..... 2,881.97
Outstanding checks to be reimbursed when returned by bank Sched- ule 0 . ..... 420.32
Total of Revolving Fund ..... $\$ 5,000.00$
*Balance in bank as per bank statement ..... \$2,118.03
Checks outstanding, Schedule 0 . ..... 420.32
True Bank Balance as shown above $\$ 1,697.71$

## SCHEDULE L

## REIMBURSEMENTS OF INSPECTOR＇S REVOLVING FUND

 （C．BY STATE AUDITING BOARD| 261251 | ．．．．．．．\＄2，610．85 |
| :---: | :---: |
| 263557 | ．．．．．． $2,524.74$ |
| 264774 |  |
| โป．รc266499． |  |
| เ¢ 267832 | 2，891．30 |
| 269256 | － 284.58 |
| CL． 89269810. |  |
| 271169 | 1，714．79 |
| 273619 |  |
| 273620 | $\cdots \cdots \cdots \cdots \cdots \cdots \cdot . .$. |
| 273621 |  |
| 275109 | $\cdots \cdots \cdots \cdots \cdots \cdots$ ．．． 1,130055 |
| 275110 | 人 17308.52 |
| 276682 |  |
| 276683 | \％\％ํ．1 ．．．．．．．．．．．．．．．．．．．．．．．．．．．．$\%$ ．．．．．．． $1,236.96$ |
| 2878359 |  |
| 278360 | 2，683．00 |
| 280749 | $\cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots 2,905.94$ |
| 280750 | 138.71 |
| 282566 |  |
| 282567 | ．．．．．．．．．．．．．．．．．．．．．．．．．． $2,749.52$ |
| 82．． 284634. |  |
| － 284635 | $\therefore ¢ 1 \%$ \％${ }^{261.67}$ |
| $285260^{\circ}$ | 340.41 |
| －20285583 | 1.342 .99 |
| － 287254 | 2，388．88 |
| 287255 | 952.21 |
| 288590 | 边込．．．．．．．．．．．．．．．．．．．．．．．．． $1,846.45$ |
| 289135 | ．．．1，002．13 |
| ． $289888{ }^{\circ}$ |  |
| 290393 |  |
| TC．r 291348 |  |
| 291879 |  |
| 292186 |  |
| ． 05296877 | ：．．．：：：．．．：．：：：：：：：：：：：：：：：：：：：：：：：：：：：：：：$\cdot 3$ 3；783．24 |
| － 29626 | 457.46 |
| ， 2988035 | ：：．．：：：：：．．．．．．：：：：：．：：：：：．：：：\％．．．．．．．．． |
| 299386 |  |
| 299538 | 63.00 |
| 301010 |  |
| 301363 | ．1，766．60 |
| 303120 |  |
| 304016 | ．3，273，96 |
| 305000 | ．． 973.93 |
|  | otal．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．\＄88，765．55 |

## SCHEDULE M <br> CASH REFUNDS OF TAXES BY OIL INSPECTOR

| ecember, 1924 | 2,568.51 |
| :---: | :---: |
| January, 1925 | 2,735.74 |
| February, 1925 | 1,189.30 |
| March, 1925 | 2,966.23 |
| April, 1925 | 2,911.94 |
| May, 1925 | 2,779.71 |
| June, 1925 | 1,703.70 |
| July, 1925 | 2,746.14 |
| August, 1925 | 1,518.33 |
| September, 1925 | 2,705.16 |
| October, 1925 | 3,430.74 |
| November, 1925 | 3,047.30 |
| December, 1925 | 3,156.12 |
| January, 1926 | 3,027.27 |
| February, 1926 | 1,818.76 |
| March, 1926 | 3,205.36 |
| April, 1926 | 4,323.15 |
| May, 1926 | 22,897.04 |
| June, 1926 . |  |
| July, 1926 | 3,499.47 |
| August, 1926 | 3,788.70 |
| September, 1926 | 2,973.69 |
| October, 1926 | 5,389.98 |
| November, 1926 | 3,24,8.94 |

Total.
$. \$ 87,631.28$

SCHEDULE N
REIMBURSEMENTS DUE FROM STATE AUDITING BOARD (Paid in December, 1926)

| Claim Num | ok Nu | Amount ${ }^{\text {a }}$ |
| :---: | :---: | :---: |
| 24704 | 24792 | 8.58 |
| 24759 | 24847 | 23.30 |
| 24937 | 25022 | . 60 |
| 25039 | 25123 | 39.38 |
| 25054 | '25138 | $2.00^{\circ}$ |
| 25062 。 | 25146 | 3.00 |
| 25063 | 25147 | $1,00^{\circ}$ |
| 25066 | 25150 | 1,00 |
| 25067 | 25151 | 1,00 |
| 25069 | 25153 | 6,40 |
| 25072 | 25156 | 2.68 |
| 25073 | 25157 | 3.20 |
| 25075 | 25159 | 6,30 |
| 25081 | 25165 | 2.40 |
| 25083 | 25167 | 17.30 |
| 25086 | 25170 | 13.50 |
| 25087 | 25171 | 2.98 |
| 25088 | 25172 | - 60 |
| 25089 | 25173 | 2.80 |
| 25095 | 25179 | 3.10 |
| 25103 | 25187 | 2.00 |
| 25107 | 25191 | 8.20 |
| 25108 | 25192 | 1.10 |





## SCHEDULE 0 <br> (CM17) OMA OUTSTANDING CHECKS

CR25 November 30, 1926


## SCHEDULE P

# OPERATING STATEMENT (INSPECTION FEE FUND) December 1, 1924, to November 30, 1925 



SCHEDULE Q<br>OPERATING STATEMENT (INSPECTION FEE FUND)<br>December 1, 1925, to November 30, 1926

| INCOME |  |
| :---: | :---: |
| Inspection Fees collected by Inspector and remitted to State |  |
| Treasurer ..................................................... ${ }^{\text {. }}$ 119,193.38 |  |
| Less outstanding Vouchers of 1925 | 1,554.99 |
|  |  |
| EXPENSE |  |
| Salary of Oil Inspector. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . $\$ 3,000.00$ |  |
| Salaries of Deputies. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 4,200.00 |  |
| Salaries of Assistant Inspectors. . . . . . . . . . . . . . . . . . . . . . 5,475.00 |  |
| Salary of Bookkeeper . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . $2,300.00$ |  |
| Salary of Auditor . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 700.00 |  |
| Salary of Collector. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 1,875.00 |  |
| Salaries of Stenographers............................. $4,970.00$ |  |
| Oil Shale Investigators.................................. . $8,417.50$ |  |
| Salary and Expense Legal Assistance................. 2 , 2,539.30 |  |
| Travel Expenses . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . $7,763.27$ |  |
| Office Supplies and Equipment........................ 4 . 2 . 251.17 |  |
| Telephone, Telegraph, etc................................ ${ }^{\text {. }} 502.08$ |  |
| Laboratory Expense and Equipment..................... 898.82 |  |
| Geological Survey . .................................... 4,234.93 \$ 51,127.07 |  |
| Transferred to General Revenue........................ $\quad$ 66,556.26 |  |
| Total. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . <br> Vouchers Outstanding, November 30th, 1926. |  |
|  |  |
| Total. | \$117,638.39 |
| Outstanding Vouchers, Nov. 30th, 1926: |  |
| No. 592 | \$ 44.94 |

## SCHEDULE R

## GASOLINE TAX FUND (STATE AUDITOR'S ACCOUNT) <br> December 1, 1924, to November 30, 1926



[^0]
## SCHEDULE S

## DISTRIBUTION OF ROAD TAX TO COUNTIES

| Counties | Jan., 1925 | July, 1 | Jan., 1926 | July, 1926 | Jan., 1927 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Adams | 5,534.84 | \$ 4,322.84 | \$ 5,484.95 | \$ 4,747.31 | \$ 6,634.56 |
| Alamosa | 3,252.13 | 2,481.63 | 3,156.97 | 2,732.40 | 3,819.34 |
| Arapahoe | 5,410.84 | 4,202.76 | 5,343,00 | 4,624.45 | 6,468.24 |
| Archuleta | 5,822.30 | 4,603.02 | 5,865.37 | 5,076.57 | 7,096.58 |
| Baca | 12,907.10 | 10,246.72 | 12,860,67 | 11,131.12 | 15,560.73 |
| Bent | 4,114.49 | 3,282.15 | 4,173.33 | 3,612.08 | 5,051.38 |
| Boulder | 6,763.55 | 5,363.52 | 6,813.60 | 5,897.28 | 8,242.38 |
| Chaffee | 5,275.56 | 4,202.76 | 5,314:61 | 4,599.88 | 6,431.28 |
| Cheyenne | 7,383.52 | 5,843:83 | 7,335.98 | 6,349,40 | 8,876.89 |
| Clear Creek | 5,410.84 | 4,282.81 | 5,621.22 | 4,865.25 | 7,318.35 |
| Conejos | 5,974.47 | 5,403.55 | 6,870.38 | 5,946.42 | 8,310.15 |
| Costilla | 6,425.37 | 5,083.33 | 6,472.92 | 5,602.42 | 7,829.65 |
| Crowley | 3,832,67 | 3,042,00 | 3,719,09 | 3,218.93 | 4,503.12 |
| Custer | 5,410.84 | 4,2.82.81 | 5,45,0,88 | 4,717.82 | 6,597.60 |
| Delta | 6,763.55 | 5,363.52 | 6,813.60 | 5,897.28 | 8,248.54 |
| Dolores | 4,249.76 | 3,202.10 | 4,082.48 | 3,533.45 | 4,940.50 |
| Douglas | 8,736.24 | 6,924.54 | 8,630.56 | 7,469.89 | 10,447:75 |
| Eagle | 7,214.45 | 5,803.81 | 7,404.11 | 6,408.37 | 8,956.97 |
| Elbert | 6,143.55 | 5,683.74 | 7,239.45 | 6,265.86 | 8,759.84 |
| El Paso | 13,865.20 | 11,207.35 | 14,115.51 | 12,217.20 | 17,076.15 |
| Fremont | 9,694.42 | 7,685.04 | 9,766.16 | 8,452.77 | 11,815.32 |
| Garfield | 8,623.52 | 6,844.49 | 8,687.34 | 7,519.03 | 10,509.35 |
| Gilpin | 1,972.70 | 1,561.03 | 1,987.30 | 1,720.04 | 2,402,49 |
| Grand | 10,596.20 | 8,405.52 | 11,100.49 | 9,607.65 | 13,429.30 |
| Gunnison | 12,738.00 | 10,126.65 | 12,906.09 | 11,170.43 | 15,616.17 |
| Hinsdale | 3,152.82 | 2,161.42 | 2,759.51 | 2,388.40 | 3,338.84 |
| Huerfano | 6,910:10 | 5,483:60 | 6,847.67 | 5,926.76 | 8,149.98 |
| Jackson | 7,890.80 | 6,244.10 | 7,807.25 | 6,757.30 | 9,449.79 |
| Jefferson | 12,118.00 | 9,486.22 | 12,145.24 | 10,511.90 | 14,679.82 |
| Kiowa | 8,341.70 | 6,604.33 | 8,289.88 | 7,175.02 | 10,028.85 |
| Kit Carson | 9,807.14 | 7,765.10 | 9,879.72 | 8,551.05 | 11,950.84 |
| Lake | 4,509.02 | 3,562.34 | 4,457.23 | 3,857.80 | 5,390.20 |
| La Plata | 5,630.65 | 4,643.05 | 5,899.44. | 5,106.06 | 7,139.70 |
| Larimer | 14,485.20 | 11,767.72 | 14,734.31 | 12,752.87 | 17,704.49 |
| La's Animas | 14,220.30 | 11,247.38 | 14,325.56 | 12,399.03 | 17,470.42 |
| Lincoln | 18,092.40 | 14,329.40 | 18,226.28 | 15,775.22 | 22,053.62 |
| Logan | 8,792.60. | 6,964.57 | 8,857.68 | 7,666.46. | 10,718.80 |
| Mesa | 12,399.84 | 9,806.43 | 12,491.60 | 10,811.68 | 15,117.20 |
| Mineral | 3,838.31. | 3,001.97. | 3,866.72 | 3,346.70 | 4,681.87 |
| Moffat | 10,427.10 | 8;245.41 | 10,504.30 | 9,091.64 | 12,708.55 |
| Montezuma | 7,964.08 | 6,324.15 | 8,023.01 | 6,944.05 | 9,825.56 |
| Montrose | 12,118.00 | 9,526.25 | 12,094.14 | 10,467.67 | 16,398.53 |
| Morgan | 7,721.70 | 5,963.90 | 7,284.87 | 6,305.17 | '8,193.10 |
| Otero | 4,813.39 | 3,802.50 | 4,701:38 | 4,069.12 | 5,685.89 |
| Ouray | 2,818.15 | 2,241.47 | 2,839.00 | 2,457.20. | 3,400.44 |
| Park | 13,019,80 | 10,326.77 | 13,116.18 | 11,352.26 | 14,839.99 |
| Phillips | 4,790.83 | 3,802.50 | 3,747.48 | 4,177.24 | 5,839,89 |
| Pitkin | 3,040.30 | 4,082.68 | 5,166.98 | 4,472.10 | 6,252.63 |
| Prowers | 11,441.65 | $9,005.92$ | 11,111.85 | 9,617.48 | 13,447.78 |
| Pueblo | 11,216.20 | 8,885.83 | 11,253.80 | 9,740.34 | 13,614.10 |
| Rio Blanco | 13,868.60 | 9,406.17 | 11,980.58 | 10,369.38 | 14,495.02 |
| Rio Grande | 4,993.75 | 3,962.60 | 4,922.83 | 4,260.78 | 5,956.94 |
| Routt | 9,863.50 | 7,805.12 | 9,822.94 | 8,501.91 | 11,784.51 |
| Saguache | 9,733.87 | 7,725.07 | 9.805 .91 | 8,487.17 | 11,864.60 |

## SCHEDULE S-Continued

## DISTRIBUTION OF ROAD TAX TO COUNTIES




> NOTE: The above items cover Miscellaneous Credits as shdwnl on Sched- ules $C, D, E, F$ and $G$.




## EXHIBIT B

## COMPARATIVE STATEMENT OF INSPECTION COSTS 1913 TO 1926



NOTE: The above statement includes all costs incurred incident to the collection of Gasoline Taxes subsequent to 1919.

## EXHIBIT 0

## SOURCE OF GASOLINE SUPPLY

For the Years 1913 to 1926

|  | 1.913 |
| :---: | :---: |
| California | 29,849 |
| Colorado | 407,622 |
| Kansas | 1,089,356 |
| Missouri. | 318,586 |
| Nebraska |  |
| New Mexico |  |
| Oklahoma | 1,252,925 |
| Texas | 85,367 |
| Utah |  |
| Wyoming | 2,677,150 |
|  | 5,860,855 |
|  | 1920 |
| California |  |
| Colorado | 6,610,291 |
| Kansas | 10,528,273 |
| Missouri | 79,505 |
| Nebraska | 49,111 |
| New Mexico |  |
| Oklahoma | 14,175,711 |
| Texas | 130,323 |
| Utah |  |
| Wyoming | 20,343,884 |
|  | 51,917,098 |


| 1914 | 1915 | 1916 | 1917 | 1918 | 1919 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| ......... | .... | 14,736 | ....... | ...... | ....... |
| 416,560 | 332,168 | 395,035 | 3,546,823 | 5,701,883 | 6,454,277 |
| 2,573,449 | 2,255,127 | 2,494,058 | 4,641,656 | 4,486,988 | 6,132,237 |
| 12,199 |  |  | 49,144 | 75,015 | 12,974 |
| 37,645 | 26,470 | 36,058 | 42,494 | 29,935 | 182,754 |
| 615,280 | -1,439,072 | 2,430,933 | 4,021,819 | 6,900,589 | 10,432,605 |
| 5,300 | 1,500 | 2,319 |  |  | 58,661 |
| -6,711,805 | 10,428,292 | 14,614,862 | 17,577,217 | 15,606,500 | 19,088,042 |
| 10,372,238 | 14,482,629 | 19,988,001 | 29,879,153 | 32,800,910 | 42,361,550 |
| 1921 | 1922 | 1923 | 1924 | 1925 | 1926 |
|  |  | 58,217 | 215,050 | 269,749 | 187,409 |
| 5,222,884 | 7,019,477 | 7,010,704 | 10,282,726 | 5,659,669 - | 9,555,417 |
| 14,942,981 | 7,065,370 | 7,391,348 | 5,953,767 | 9,819,345 | 6,844,453 |
| 391,526 | ......... | ......... |  | 16,002 |  |
| 36,819 | 32,075 | 90,315 | 53,577 | 21,698 | 35,539 |
|  |  |  |  | 1,350,223 | 2,014,429 |
| 16,442,353 | 6,485,613 | 14,964,480 | 19,068,947 | 18,986,618 | 19,276,048 |
| 3,480,976 | 2,450,740 | 1,334,482 | 676,155 | 801,184 | 945,848 |
|  |  |  |  | 86,139 | 101,459 |
| 19,873,153 | 42,837,945 | 44,408,857 | 57,781,544 | 61,730,674 | 73,419,707 |
| 60,390,692 | 65,891,200 | 75,258,403 | 94,031,766 | 98,741,301 | 112,380,309 |

## EXHIBIT D

## GASOEINE CONSUMPTION IN COMPARISON TO NUMBER OF REGISTERED MOTOR VEHICLES

|  | Motor Vehicles <br> Registered | Per Cent <br> Increase | Gasoline <br> Consumption | Per Cent Av. Gallonage <br> Increase |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Per Machine |  |  |  |  |

Mr. James Mullins,
Denver, Colorado.
Dear Sir:
Replying to your requestifor a reason for the apparent fluetuation of the amount of gasoline used per car in the State.

The years 1918, 1919 and 1920 represent years of considerable financial depression, owing to war conditions. $\qquad$
The increase the years $1924 ; 1925$ and 1926 arose from four causes:

1st. The better financial condition of the State.
2nd. The greater facilities for travel provided by improved roads. This is especially true in the mountain, distriets.

Brd: The introduction of the closed ear, which is fast becoming general and enables the owners to use them during the winter season with a minimum of discomfort.

4th. : The increasing number of heavier and more powerful cars.

Faithfully yours,

(Signed) 年AMES DUCE,令 State Inspector of Oils.


## EXHIBIT E

February 4, 1927.
Mr. James Mullins,
Denver, Colorado.

## Dear Sir:

The original act levying the one cent tax gave this department no powers to enforce collection other than those relating to common debts.

The constitutionality of this act was contested and we went three times to the State Supreme Court and once to the United States Supreme Court and won all cases.

During this time we had forty-seven suits pending which, owing to a constitutional question being involved, the attorneys were unable to bring to an issue.

While these cases were pending in the courts, dealers continued to receive shipments of gasoline and we had no power to prevent them, and as a result, the claims of the State continued to increase.

By the time these matters were settled by the Supreme Court many of the dealers who had been repeatedly advised by their attorneys that the tax was undoubtedly unconstitutional and could never be collected, were unable to pay and we were confronted with either forcing them into bankruptcy or accepting payments in installments.

This is the explanation of the accounts now carried under the heading "Suspense Accounts."

Faithfully yours,
(Signed) JAMES DUCE, State Inspector of Oils.

## EXHIBIT F

February 2, 1927.
Mr. James Duce, State Oil Inspector, Capitol Building, Denver.

## Dear Sir :

Below is a report showing the number of tests made in the Oil Laboratory for the year 1926.

> Gasoline tested ................................................................ 15,340

Check tests on gasoline................................................. 822
Fractional distillations ................................................ 115
Gasoline improvers tested............................................ 20
Heat determination on fuel oils.................................. 25
Lubricating oils tested.................................................. 150
Linseed oil ..................................................................... 40
Turpentine ..................................................................... 12
Paint ................................................................................ 27
Yours very truly,
J. A. HUNTER.

SUMMARIZED WORK REPORT OF THE BOULDER LABORATORY IN CO-OPERATION WITH TH゙E UNITED STATES BUREAU OF MINES

JOSEPH W. HORNE,
Associate Chemist in Charge

## INVESTIGATION OF OIL SHALE RETORTS AND REFINERIES

M. J. Gavin, Refinery Engineer.

Jos. W. Horne, Associate Oil Shale Chemist.
Purpose of the Investigation:
The purpose of this work is the investigation of retorts and processes in the United States and foreign countries used for the extraction of oil from shale. Reports of various shale companies are collected and when possible a personal inspection is made. All data is filed for reference. The problem is continuous.


Experimental Shale Oil Refinery. Twin separatory and measuring tanks. The system is always closed to forced uncondensed gases through auxiliary ice water condenser.

## Progress of the Investigation:

1925. During the past year three retorts were investigated, viz. : the retort designed by Mr. O. S. Bowman of the Heliopore Engineering Laboratories, Colorado Springs, Colo.; the Lamb re-
tort operated in Denver, Colo. ; and the N-T-U retort operated by the N-T-U Company near Casmalia, Calif. Mr. Gavin has reported favorably on the N-T-U retort, and developments on the Bowman and Lamb retorts are being observed. This work continues from year to year.
1926. Personal inspections were made of the Scottish and French retorting plants and refineries, also of an American retort operating in California. Valuable data was secured for use of the Government engineers constructing the shale retorts in the Naval Reserve in Colorado. Two refining processes were investigated and tested in the laboratory.

Two retorting plants, the Washington and the Index, on properties joining the Naval Reserve in western Colorado were inspected and found to be of such an experimental type as to have no commercial value.

The notorious Hartman Shale Company holdings were examined by the Bureau and found to be valueless except for the timber growing on their land.

Many requests for information concerning oil shale and allied subjects were answered during the period.

## REFINING OF SHALE OIL AND ITS PRODUCTS

J. W. Horne, Chemist. W. L. Finley, Chemist.<br>J. M. Davidson, Chemist.

Purpose of the Investigation:
The problem consists of a comparative study of the methods of refining to determine the most efficient process for commercial practice and also to determine the physical and chemical properties of the crude oil and refined products. Experiments were made to develop and improve refining methods.

Progress of the Investigation:
Standard American petroleum and Scottish shale ail methods of refining were tried. A great many experiments were made with refining agents in search of improved processes. An improvement on the Scottish treatment was made. Some of the experiments indicated that further improvements could be made.

Blends of the separated fractions obtained by distillation were made which conformed to the Government specifications for motor fuel.

These blends were refined, producing a gasoline of a market-
able character. The losses in refining were about $50 \%$ less than by the Scottish methods.

It was found that refined gasoline contained about $27 \%$ unsaturated compounds which was valuable for the "anti-knock" quality they possess.

A short study was made of the effects of ultra-violet rays on refined gasoline and a brief report was written on this experiment.

A complete summary of all the work done prior to the operation of the refinery is being prepared for publication.

## DISTRIBUTION OF NITROGEN AND SULPHUR IN OIL SHALE AND SHALE OIL

## W. L. Finley, Assistant Organic Chemist.

D. W. Gould, Assistant Oil Shale Chemist.

## Purpose of the Investigation:

The object of these investigations was to determine the comparative percentage of nitrogen and sulphur in representative American oil shales and the oil produced from them.


Experimental Shale Oil Refinery. Side view of assay still, and end view of 3,5 , and 10 bbl. stills.

## Progress of the Investigation:

1925. Some compounds were separated but their identity was not definitely established nor an accurate estimate of their quantity determined. The percentage of completion is indefinite. Further work is outlined for the ensuing year.
1926. After a year's experimentations with various types of retorts, a small electrically heated rotary retort was selected for the work. The nitrogen and sulphur content of the shales and oils was then accurately determined.

A report of this work has been prepared for publication.

## STUDY OF NITROGEN COMPOUNDS

J. M. Fulmer, Assistant Organic Chemist.

Purpose of the Investigation:
Shale oils were examined for the presence of nitrogen compounds which would have commercial value.

## Progress of the Investigation:

Little work has been done on this problem. It has been found that the nitrogen compounds in shale oil were different or more numerous than those in petroleum, and may exist in commercial quantities. Pyridine, which has a market value as an insecticide, was isolated. Owing to an insufficient quantity of oil to use, work on the problem was postponed until such time as a greater supply of crude oil and condenser water could be obtained.

## DISTRIBUTION OF NITROGEN IN SHALE OIL AND ITS PRODUCTS

W. L. Finlev, Chemist.<br>W. W. Purdy, Chemist.

## Purpose of the Investigation:

The purpose of the investigation is the determination of the per cent nitrogen and sulphur in shale oil and its products. Methods and rates of evolving the oil are varied and the oils so produced are then tested. Both nitrogen and sulphur interfere in refining so that the estimation of these elements and their compounds is necessary.

## Progress of the Investigation:

Oils from typical shales in the West have been tested. Definite relations between per cents nitrogen and sulphur in the oil according to the rates of retorting have been established. Effort is being made to isolate as many of the organic forms of nitrogen and sulphur as possible. The work is far from complete.

## EXTRACTION OF KEROGEN WITH SOLVENTS

J. M. Fulmer, Chemist.
J. M. Davidson, Chemist.

## Purpose of the Investigation:

An attempt was made to discover a solvent which would remove the kerogen from the shale without destroying its valuable properties.


Experimental Shale Oil Refinery. Rear view of plant, continuous filters with burners on the right.

Progress of the Investigation:
Alcohols, carbon tetrachloride, carbon bisulphide were used. Shales were digested with each respective solvent for four consecutive weeks without dissolving any appreciable amount of the kerogen. Acetic acid, however, removed $40 \%$ of the organic matter, but altered the composition of the hydrocarbons. Pyridine has a solvent action, removing some of the hydrocarbons without destroy-
ing them. A study of these compounds is now being made. As soon as this work is completed the report will be published.

## ANALYSIS OF KEROGEN

J. W. Horne, Chemist.
B. A. Landry, Chemist.
J. M. Davidson, Chemist.

Purpose of the Investigation:
The purpose of the investigation was to determine by chemical and combustion analysis the elements of which kerogen is composed and as far as possible to establish the manner in which these elements are combined with each other. (Kerogen is the organic substance which when heated is converted into oil.)

## Progress of the Investigation:

Successful combustion analyses were made on the kerogens from Scottish, Australian, Nevada, Utah, Colorado, Kentucky and Indiana shales. Conclusions of this work are being prepared for publication.

## SEPARATION OF KEROGEN

J. M. Fulmer, Chemist.
J. M. Davidson, Chemist. W. W. Purdy, Chemist.

## Purpose of the Investigation:

Purpose of the investigation was to discover solvent or some other means of removing the kerogen from the shale without changing its composition. Analysis of the pure kerogen will then be made.

## Progress of the Investigation:

A satisfactory method using hydrochloric and hydrofluoric acids as a solvent for the mineral and siliceous constituents of the shale apparently freed the kerogen, leaving it in its natural state. Conclusions of the work are being prepared for publication.

Kerogen is the organic substance which when heated becomes oil.

## WEATHERING TESTS ON OIL SHALES

W. L. Finley, Assistant Organic Chemist.

Purpose of the Investigation:
The purpose of this investigation was to determine the effect of atmospheric weathering on the yield and quality of oil from shale crushed to definite sizes and exposed for stated periods of time. Also to estimate any change in the oil content, due to weathering, in the shale beds which would effect their commercial value.


Experimental Shale Oil Refinery. Side view of plant showing towers, vapor lines, condensers, pyrometers and steam lines.

Progress of the Investigation:
Tests for yield and analysis of the oil were made at intervals of six months for a period of four years.

This work has been concluded and a report prepared for publication.

## EXPERIMENTAL RETORTING

Jos. W. Horne, Associate Oil Shale Chemist. D. W. Gould, Assistant Organic Chemist. W. L. Finley, Assistant Organic Chemist.

## Purpose of the Investigation:

These experiments were conducted to determine the action of non-combustible or non-oxidizing gases on the oil during the retorting period.

## Progress of the Investigation:

1925. The original problem with this retort is practically complete and a paper giving results of these experiments is being prepared. However, it is planned to continue the use of the vertical retort on a similar problem using shale from the Pilot plant.
1926. An electrically heated retort, the operation of which could be accurately controlled, was used in making these experiments. The gases used in the tests were hydrogen, nitrogen, carbon dioxide, water gas from the city main and steam. Excellent samples of oil were secured and analyzed.

The results of this work are being prepared for publication.

## ASSAY RETORTING STUDIES

## W. L. Finley, Assistant Organic Chemist.

## Purpose of the Investigation:

This problem is continuous and consists of accurately testing samples of oil shales and coal for oil and gas yield. Many of the samples come from newly located shale beds. Coals are also tested for their heat value.

## Progress of the Investigation:

1925. This investigation is continuous, the assay retort being used whenever it is desired to determine the oil and gas yield of a shale or coal. The assay will be extensively used in connection with the shales used at the Pilot plant.
1926. A great many assays were made during the year. Samples from shale beds not previously tested were received from Kentucky, Texas, Oklahoma, Ohio, Montana and Utah. Also foreign shales and oil from Manchuria and Esthonia.

## STEAM RETORTING

J. W. Horne, Associate Oil Shale Chemist.
B. S. Landry, Assistant Organic Chemist.
L. C. Karrick, Associate Refinery Engineer.
A. D. Bauer, Associate Scientist.
D. W. Gould, Assistant Oil Shale Chemist.

## Purpose of the Investigation:

The object of this investigation was to determine the efficiency of using superheated steam in a specially designed retort, for retorting shale, and to study the character of the oil produced by it.


Experimental Shale Oil Refinery.
Control Laboratory.
Progress of the Investigation:
1925. It has been demonstrated that superheated steam will evolve oil from oil shale. The experiments required the design of a special retort which will have to be altered to determine the efficiency of superheated steam. The problem is about 75 per cent completed. A paper will be prepared discussing the work.
1926. The original design of the superheater was altered to increase the flow of superheated steam and to give a more uniform and higher temperature in the retort. A small quantity of excellent oil was secured. The shale being used clinkered in the retort, making operation impossible, and it was decided to discontinue the experiment until a shale entirely free of that coking quality could be secured. A retort of similar design was made to produce low temperature coke and coal tar suitable for motor fuel.

## COKING PROPERTIES OF OIL SHALES

W. L. Finley, Chemist.

## Purpose of the Investigation:

The purpose of the investigation was to determine the extent to which shales will coke during retorting operations, and the best ways of retorting to prevent the shale clinkering in the retort.

## Progress of the Investigation:

1925-26. The problem has been completed and a paper on the subject published.

## REPORTS OF INVESTIGATION

The following reports of investigation for the years 1925-1926 have been prepared for publication:

Explosibility of Oil Shale Dust..............................................Published
Coking of Oil Shale..................................................................Published
Comparison of Midnight Coal and Oil Shale as
Sources of Oil.............................................................Being printed
Distribution of Nitrogen and Sulphur in Oil Shale....Being printed
Atmospheric Weathering of Oil Shales...........................Being printed
Kerogen Separation ...........................................................Being written
Extraction of Kerogen with Solvents.............................Being written
Effect of Inert Gases on the Oil During Retorting......Being written
Summary of Colorado Shale Oil Refining Studies........Being written
Oil Shales of the United States and Foreign Countries
Tested in the Colorado Laboratory
Being written
Manual of Testing Methods for Oil Shále and Shale Oil..Published

## PROGRESS OF THE SHALE OIL REFINING SECTION

Work was begun on the construction of a semi-commercial refinery for shale oil under an agreement of November 1, 1926, signed by the Secretary of Commerce and the Governor of Colorado. This refinery is to be located at the State University at Boulder. By this agreement the State is to provide $\$ 10,000$ for installed equipment, and the United States Bureau of Mines is to undertake the supervision of all work in connection with this investigation, the general method to be employed and the manner in which the results are to be published. All records of expenditures of funds, progress,
status and results, including all reports and papers, are to be accessible to both parties at all times. The technical personnel of this section consists of I. N. Beall, Engineer in Charge ; H. M. Thorne and H. C. Long, Assistant Engineer and Chemist, respectively. With a few minor details this refinery is practically complete at the present time. Stills, towers, condensers and all of the equipment necessary for the refining and treating of shale oil have been installed. This refinery is capable of handling ten barrels of shale oil per day, and is so hooked up that it is possible at a minimum expense to convert it into a continuous refinery capable of handling 75 barrels per day. The attached photographs will serve to give an idea of the construction details.


Experimental Shale Oil Refinery. Side view of 10 gallon charge assay still, and 2 gallon analytical still.

## Purpose of the Investigation:

The purpose of this investigation is to study the refining property of oil obtained from Pumpherston and N-T-U retorts located
at the Government Plant at Rulison, Colorado; to determine the proper procedure in order to assign the maximum commercial value to a barrel of shale oil and to gather systematic data concerning the chemical and physical properties of the material. The oil is shipped in 50 -barrel lots of 25 barrels each from the two different types of retorts. The work of refining the oil was started on January 26, 1927. Although the primary purpose of this investigation was to determine maximum gasoline, Diesel and fuel oil percentage of shale oil and other products such as are from petroleum, yet at the present time the investigation serves a duofold purpose inasmuch as it is located at the State University, where the students who are interested can have an opportunity to obtain information first-hand of this embryo industry which has such great potential possibilities for the State of Colorado. Should shale refining become an industry in this State there would be a scarcity of trained men, and unless some steps are taken to provide for such an emergency it would be necessary to import foreigners to do the work. In addition to the aforementioned, this experimental, semi-commercial refinery can be used for the study of crude oils and coal tars. The State of Colorado evidently has a wealth of coal of many varieties and apparently has her petroleum reserves untouched. It is an advantage to Colorado to know the value of her undeveloped resources.

TECHNICAL STAFF OF THE CO-OPERATIVE OIL SHALE RESEARCH LABORATORIES, BOULDER, COLORADO,

1925-1926
A. D. Bauer, Engineer in Charge, 1925. U. S. Bureau of Mines. Transferred.
J. W. Horne, Engineer in Charge, 1925-27. U. S. Bureau of Mines.
W. L. Finley, Organic Chemist, 1925-26. State of Colorado. Resigned.
B. A. Landry, Assistant Chemist, 1925. State of Colorado. Transferred to Bureau.
J. M. Fulmer, Organic Chemist, 1926. State of Colorado. Resigned.
J. M. Davidson, Organic Chemist, 1926-27. State of Colorado.
W. W. Purdy, Organic Chemist, 1926-27. State of Colorado.
D. W. Gould, Organic Chemist, 1925-27. State of Colorado. State representative at the Government Retorting Plant.

TECHNICAL STAFF OF THE CO-OPERATIVE SHALE OIL REFINERY, BOULDER, COLORADO, 1926
I. N. Beall, Refinery Engineer in Charge, U. S. Bureau of Mines.

Harold Thorne, Assistant Engineer, U. S. Bureau of Mines. H. C. Long, Assistant Engineer, U. S. Bureau of Mines.


Experimental Shale Oil Refinery.
View of Stills, Towers, and Condenser Lines.

## GOVERNMENT OIL SHALE PLANT <br> Rulison, Colorado

M. J. Gavin, Refinery Engineer.
J. S. Desmond, Associate Chemical Engineer.
D. W. Gould, Organic Chemist, State Representative.

In the spring of 1925 an appropriation was made for the building of a semi-commercial oil shale retorting plant on the Naval

Reserve in Colorado. The purpose of this plant is to put into practical use information gained during the past five years in the co-operative laboratory at Boulder.

A single unit of the Pumpherston retort was imported from Scotland and an American retort known as the N-T-U with a capacity of 20 tons per day have been erected. A mine has been opened and a tramway constructed for use of the retorts between the mines and the retorting plant.

Both retorts are now in operation and oil is being produced for the refining operations to be conducted at the co-operative refinery at Boulder.

The congressional appropriation was for $\$ 180,000$ to cover a two-year program which closes June 30, 1927.

To assist the work the State arranged for the building of a trail between the retorts and the shale mine and the county in which the work is being done constructed a road from the highway to the plant.

|  |  |  |  |  |  | RECAPITU | LATION 0 | STATIST | S 1926 |  | $\underset{\text { Refund }}{\substack{\text { Cash } \\ \text { Ren }}}$ Refund |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\begin{gathered} \text { Gross } \\ \text { Inspected } \\ \text { Inspls } \end{gathered}$ | Duplicate Charges of Gal | $\begin{gathered} \text { Hate } \\ \text { Hnspected } \\ \text { Hale } \end{gathered}$ | $\begin{aligned} & \text { Gallons } \\ & \text { Exempted } \\ & \text { From Tax } \end{aligned}$ | Gallons Exempted by Cash Refunds | $\begin{gathered} \text { Total } \\ \text { Gefals. } \\ \text { Refunded } \end{gathered}$ | Net Gals Gasoline Taxed | $\begin{aligned} & \text { Net Gals. } \\ & \text { R...O. } \\ & \text { Inspected } \end{aligned}$ |  | $\begin{aligned} & \text { onlections } \\ & \text { te Treasurer } \\ & \text { Tax } \end{aligned}$ | $\begin{aligned} & \text { Aud. Board } \\ & \text { Tax } \end{aligned}$ | $\mathrm{Fee}^{\text {Net Coll }}$ | ${ }_{\text {ctions }}$ | Expense | 1,000 \%er ${ }_{\text {\%als. }}^{\text {\% }}$ | $\begin{gathered} \text { Expense } \\ \text { S1.0e } \\ \text { Spor } \end{gathered}$ |
|  | $7,824,396$ $6,549,536$ | 155,679 32,713 | $7,668,717$ $6,516,823$ | 84,261 203,562 | 153,729 84,170 | 237,990 | 7,430,727 | ${ }^{641,426}$ | \$ 13,434.82 | \$ 153,835.73 | \$ 3,074.59 | \$ 13,434.82 | \$ 150,761.14 | \$ 3,475.62 | $41 / 10$ | $28 / 10$ |
| $\underset{\substack{\text { February } \\ \text { March }}}{ }$ | ${ }^{6,535,747}$ | ${ }^{73,471}$ | ${ }_{7}^{6,4652,276}$ | 48,615 | 167,055 | 287,732 215,670 | ${ }_{6,2296,606}^{6}$ |  | 6,479.89 | 120,008.56 | 1,683.40 | 6,479.89 | 118,325.16 | 3,030.11 | $42 / 10$ | $24 / 10$ |
|  |  |  |  | 140,308 | 164,607 | 304,915 | $\underset{7,147,329}{6,246,606}$ | ${ }_{\substack{\text { che } \\ 743,799}}^{68,769}$ | ${ }_{\substack{6,155.72}}^{6,382.63}$ | ${ }_{153,250,84}^{128,071.83}$ | ${ }_{\substack{3,292.15 \\ 3,291.09}}$ | ${ }_{\substack{6,156.72}}^{6,382.63}$ | 124,7538.74 | ${ }_{3,464.00}^{3,44.35}$ | ${ }_{4}^{4} 8$ \%/10 | $28 / 10$ $28 / 10$ |
| April | 8,719,431 | 86,070 | 8,633,361 | 70,019 | 20,180 | 290,179 | 8,343,182 | 90, ${ }^{12,186}$ | 6,919.65 | 133,426.34 | 4,403.20 | 6,919.65 | 129,023.14 | 3,284.41 | 3 4/10 | $23 / 10$ |
| ay | 9,831,433 | 51,704 | 9,779,729 | 97,730 | 850,658 | 948,388 | 8,831,341 | ${ }^{1658,328}$ | 9,500.16 | 171,095.78 | 17,013.07 | 9,500.16 | 154,082.71 | 3,233.98 | 3\% | $18 / 10$ |
| June | 10,170,456 | 133,645 | 10,036,811 | 139,538 | 308,612 | 448,150 | 9,588,661 | 768, 137 | 10,358.19 | 207,874.60 | 6,172.24 | 10,358.19 | 201,702.36 | 3,742.53 | 3 4/10 | 7/10 |
| July | 11,460,238 | 72,190 | 11,388,048 | 111,388 | 1,838 | 113,226 | 11,274,822 | 671,561 | 10,423.23 | 197,458.56 | 36.76 | 10,423.23 | 197,421.80 | 3,523.15 |  |  |
| August | 12,612,084 | 94,945 | 12,517,139 | 144,725 | 279,428 | 424,153 | 12,092,986 |  |  |  | 5.588 .55 |  |  | 3,533.15 | $28 / 10$ | /10 |
| September | 11,839,313 | 101,963 | ${ }_{9}^{11,737,350}$ |  |  |  | 395 | 802,678 | 11,485.22 | 208,736.90 |  | 11,485.22 | 203,148.35 | 3,469.12 | 2 6/10 | 5/10 |
|  | 9,937,554 | ${ }_{53,583}$ | ${ }^{9,883,971}$ | 141,178 | ${ }_{289,994}^{16,756}$ | 313,955 43,272 | ${ }_{9}^{11,453,699}$ | ${ }_{5726} 72,299$ 572,618 | 12,899.04 | ${ }_{232,942.55}^{24,0349}$ | $\begin{aligned} & 3,255.13 \\ & 5,781.88 \end{aligned}$ | $\begin{aligned} & 12,899.04 \\ & 12,355.55 \end{aligned}$ | ${ }_{227,160.67}^{237,779.86}$ | ${ }_{\substack{3,480.02 \\ 3,256.91}}$ | ${ }_{3 \%}^{2} 7 / 10$ | $14 / 10$ 1 1 |
| November | 9,083,051 | 144,126 | 8,938,925 | 242,263 | 192,795 | 435,058 | 8,503,867 | 575,043 | 10,799.28 | 197,134.25 | 3,855.90 | 10,799.28 | 193,278.35 | 3,480.15 | 6/10 |  |
| Total, Fiscal Year 19 | 112,102,959 | 1,087,565 | 111,015,394 | $\frac{1,574,786}{}$ | 2,874,902 | 4,449,688 | $\overline{106,565,706}$ | 8,392,946 | $\overline{\$ 119,193.38}$ | \$2,144,870.93 | \$57,497.96 | \$119,193.38 | $\overline{\$ 2,087,372.97}$ | \$4,914.35 | 34/10 | $\frac{16 / 10}{18 / 10}$ |
| December | 8,101,746 | 80,678 | 8,021,038 | 121,356 | 237,958 | 359,314 | 7,661,754 | 574,874 | 9,389.30 | 178,420.87 | 4,759.16 | 9,389.30 | 173,661.71 | 3,614.62 | $45 / 10$ | $19 / 10$ |
| Total, Calendar Year | 112,380,309 | 1,012,564 | 111,367,745 | 1,611,881 | 2,959,131 | 4,571,012 | $\overline{106,796,733}$ | $\overline{8,306,649}$ | $\overline{\text { \$115,147.86 }}$ | \$2,169,456.07 | $\widetilde{\text { \$59,182.53 }}$ | \$115,147.86 | \$2,110,273.54 | \$41,053.35 | $37 / 10$ | $18 / 10$ |
|  |  |  |  |  |  |  | Expex |  |  |  |  |  |  |  |  |  |
|  | Inspectors |  |  |  |  | 䢒ses |  |  |  | Less |  |  |  |  |  |  |
|  | Deputies | Office | Laboratory | Total | Geogogical Laboratory | Office | travel | Equipment | $\mathrm{c}_{\text {Gross Total }}^{\text {Expense }}$ | Geological <br> Expense | Net Total Expenses | ${ }_{\text {Total Fees }}^{\text {Coilectea }}$ | $\underset{\text { Expensses }}{\text { Gres }}$ | Transferred to Greneral |  |  |
| ${ }_{\text {December }}^{\text {Diab }}$ | 900.00 | \$ 1,260.00 | 680.00 | \$ 2,840.00 | 213.62 | \$ 373.93 | \$ 494.88 |  | \$ 3,922.43 | \$ 446.81. | \$ 3,475.62 | \$ 13,434.82 | \$ 3,922.43 | \$ 9,512.39 |  |  |
| ${ }_{\text {Prebanary }}^{\text {January }}$ | 900.00 90000 | $1,260.00$ <br> $1,260.00$ | 880.00 880.00 | $2,8,840.00$ $2,840.00$ | 4.38 |  |  | \$ 40.00 |  |  |  |  |  |  |  |  |
| ${ }_{\text {Mapril }}^{\text {March }}$ | ${ }^{9900.00}$ | li, $\substack{1,260.00 \\ 1,11000}$ | ${ }_{7}^{742.50}$ | ${ }_{2}^{2,902.50}$ | 139.01 | ${ }_{267.29}^{259.21}$ | ${ }_{595.95}^{70.41}$ |  |  | - 349.74 | 3,474.35 | ${ }_{\text {c, }}^{6,1535.72}$ | 3,824.09 3,904.75 |  |  |  |
| may | ${ }_{900.00}$ | 1,110.00 | 750.00 | $2,760.00$ $2,760.00$ | ${ }_{8.71}^{64.15}$ | ${ }_{263.71}^{176.51}$ |  | 553.17 | $\underbrace{\text { a }}_{\substack{3,696.51 \\ 4,169}}$ |  | 3,284.41 $3,233.98$ | $\underset{\substack{6,9919.65 \\ 9,500.16}}{\text { c, }}$ | ${ }_{\substack{3,1691.49 \\ 4,16.51}}$ |  |  |  |
| June | soo.00 |  |  |  | $* 4,234.93$ 160.94 |  |  |  |  |  |  |  |  |  |  |  |
| Nuly | 900.00 | 1,110.00 | 750.00 8 8550.00 | ${ }_{\substack{2,7860.00 \\ 2,815.00}}^{2,00}$ | cick $\begin{aligned} & 66.87 \\ & 109.15\end{aligned}$ |  |  | ${ }_{173.83}^{424.50}$ |  | 5,114.90. |  |  | ciser |  |  |  |
| September | 992.00 925.00 | li,$1,135.00$ <br> $1,135.00$ | 540.00 540.00 | 2, 2130.00 $2,600.00$ | ${ }^{177.31}$ | 322.04 | ${ }_{774}^{83.35}$ |  | ${ }_{3}^{3,8926.26}$ | ${ }_{383}^{457.65}$ | 边, | 112,899.04 |  | ${ }_{\text {l }}^{\text {7,035.3. }}$ |  |  |
| - | ${ }_{925.00}$ | 1,135.00 | ${ }_{540.00}$ | ${ }^{2,660.00}$ | 27.04 116.38 | 411.19 175.76 | ( $\begin{gathered}502.20 \\ 906.25\end{gathered}$ | $\underset{10.00}{70.53}$ |  |  |  | cer |  |  |  |  |
| Total, Fiscal Year 1926 December | $\$ 10,875.00$ 925.00 | \$14,045.00 1 | $\begin{array}{r} \$ 8,417.50 \\ 740.00 \end{array}$ |  | $\overline{\$ 5,181.96}$ | $\overline{\$ 3,572.31}$ 261.42 | $\overline{\$ 7,763.27}$ | $\stackrel{\text { \$1,272.03 }}{\substack{\text { +151.90 }}}$ | $\stackrel{\text { \$51,127.07 }}{4,15.7}$ | ${ }^{212.72}$ | $\stackrel{\text { \$40,914.35 }}{\text { 3,914.32 }}$ | $\stackrel{\text { \$119,193.38 }}{9898}$ | \$51,127.07 | 8,066.31 |  |  |
| Total, Calendar Year | . $810,900.00$ | $\overline{\text { \$14,005.00 }}$ | \$8,477.50 | \$33,382.50 | \$5,012.71 | \$3,459.80 |  |  |  |  |  | 9,389.30 | 4,158.71 | 0.59 |  |  |
|  |  |  |  |  |  |  | \$8,084.41 | \$1,423.93 | \$51,363.35 | \$10,310.00 | \$41,053.35 | \$115,147.86 | \$51,363.35 | \$63,784.51 |  |  |

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[^0]:    *The sum of $\$ 616,022.82$ was distributed to Counties in January, 1927. For details see Schedule $S$ on next page.

