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NOTICE



MOBIL RESEARCH AND DEVELOPMENT CORPORATION

RESEARCH DEPARTMENT

TECHNICAL MEMORANDUM 67-43

# EVALUATION OF THE PERFORMANCE OF SHALE LOADING EQUIPMENT FOR OIL SHALE MINING

ANVIL POINTS OIL SHALE RESEARCH CENTER

Rifle, Colorado

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The primary object of the Anvil Points Oil Shale Research Center TECHNICAL MEMORANDUM is to advise authorized personnel employed by the Participating Parties(1) that various activities are in progress or that certain significant data have been obtained within the Research Center.

These TECHNICAL MEMORANDA have been prepared to provide rapid, on-the-spot reporting of research currently in progress at Anvil Points. The conclusions drawn by project personnel are tentative and may be subject to change as work progresses. The TECHNICAL MEMORANDA have not been edited in detail.

(1)Mobil Research and Development Corporation, Project Manager

Continental Oil Company
Humble Oil and Refining Company
Pan American Petroleum Corporation
Phillips Petroleum Company
Sinclair Research, Inc.

# EVALUATION OF THE PERFORMANCE OF SHALE LOADING EQUIPMENT FOR OIL SHALE MINING

## TABLE OF CONTENTS



## FIGURES

# EVALUATION OF THE PERFORMANCE OF SHALE LOADING EQUIPMENT FOR OIL SHALE MINING

## I. INTRODUCTION

During Stage I operations at Anvil Points it was necessary to load and transport small tonnages of oil shale from the mine to feed Retorts No. 1 and No. 2. For this purpose a 3-cubic yard Caterpillar 966 B Traxcavator was obtained, on a lease-purchase contract, to load four 20-ton Dart trucks left on the property by the U. S. Bureau of Mines.

To complete the planned mining research program and supply Retort No. 3 with shale during Stage II, it was necessary to rent a second machine to assure continuity of the operation. A decision was made to rent a Koehring 505 Skooper based on the following factors:

- The Skooper was capable of loading 20 to 40 ton dump trucks to be used for hauling shale.
- The rental price was competitive with other similar sized loaders.
- This was an opportunity to gain experience with a unit which had the advantages of; low capital cost, high capacity, crawler tracks which would eliminate high tire costs, and the fast cycle time of its swing mechanism.

## II. SUMMARY AND CONCLUSIONS

### A. Equipment Availability

The availability of the Caterpillar 966 B Traxcavator was good, very few maintenance problems were experienced with this unit. The Traxcavator was well designed and had a sufficiently rugged construction to withstand the rough usage normal in mine truck loading operations. On the other hand the availibility of the Koehring 505 Skooper was poor for a new piece of equipment. Most movements of the Skooper are hydraulically actuated and it is the hydraulic system which was the cause of excessive maintenance downtime on the machine.

### B. Equipment Performance

Both loaders performed satisfactorily with regard to output per operating hour. The Traxcavator did have the advantages of being versatile and having a high travel speed, which enabled it to do clean-up work, road leveling, and move rapidly from one working area to another . It was also a better machine from the operators point of view, thereby reducing operator training time.

In comparing the rubber tires of the Traxcavator versus the crawlers of the Skooper, there are advantages to both systems. Crawlers eliminate the high tire costs of the rubber tired loader, the high tire costs being due to the slicing action of the shale cutting tires beyond repair. The disadvantage of the crawlers is their tendency to slide on an undulating surface when crowding the bucket into a blasted shale pile. With both types of loader it was obvious that smooth, level floors improved their performance. The condition of the floor in an oil shale mine depends upon the bedding plane forming the floor. At Anvil Points the floor of the heading operation undulated whereas the floor of the benching operation was level.

## III. DISCUSSION

### A. Specifications

#### 1. Caterpillar 966 B Traxcavator (See Figure 1)

##### a. Dimensions and Stability

| | |
|---|---|
| Bucket capacity | 3 cubic yards |
| Bucket width | 9 feet 6 inches |
| Maximum height of bucket hinge pin | 12 feet 10 3/4 inches |
| Overall length | 22 feet 6 inches |
| Outside tire width | 8 feet 10 inches |
| Wheelbase | 10 feet 2 inches |
| Turning radius, outside bucket corner | 22 feet 0 inches |
| Ground clearance | 1 foot 3 5/8 inches |
| Overall height (including cab) | 11 feet 3 inches |
| Weight, empty | 31,220 lbs |
| Tipping load rating - straight ahead | 21,000 lbs |
| - in full turn | 18,900 lbs |

##### b. Engine

Caterpillar Turbocharged Diesel Engine Model No. D333.

##### c. Transmission

Caterpillar Transmission with power shift in all forward or reverse speeds between 1st and 2nd in work or travel range.

##### d. Tires

20.5 - 25, 12 PR Goodyear Rock Lug tires with shredded wire in the lugs on both front and rear wheels. Four in all.

##### e. Scrubber

National Mine Service Exhaust Conditioner Model No. C9-416.