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## OEL 19

## OFFICER BASIN

## 1962 MABEL CREEK SEISMIC SURVEY SOUTH AUSTRALIA & WESTERN AUSTRALIA FINAL REPORT

Submitted by

Exoil Pty. Ltd.
1962



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# CONTENTS ENVELOPE 224

**TENEMENT:** Not Related

**TENEMENT HOLDER:** Exoil Pty. Ltd.

**REPORT:**



**PLANS:**

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SR 11/5/29 (1)

12 NOV 1962

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# SEISMIC SURVEY REPORT

on the

# MABEL CREEK AREA

South Australia
Western Australia
AUSTRALIA

Envelope No 224.

Submitted to

EXOIL PROPRIETARY, LTD.

by

NAMCO INTERNATIONAL, INC.

DALLAS

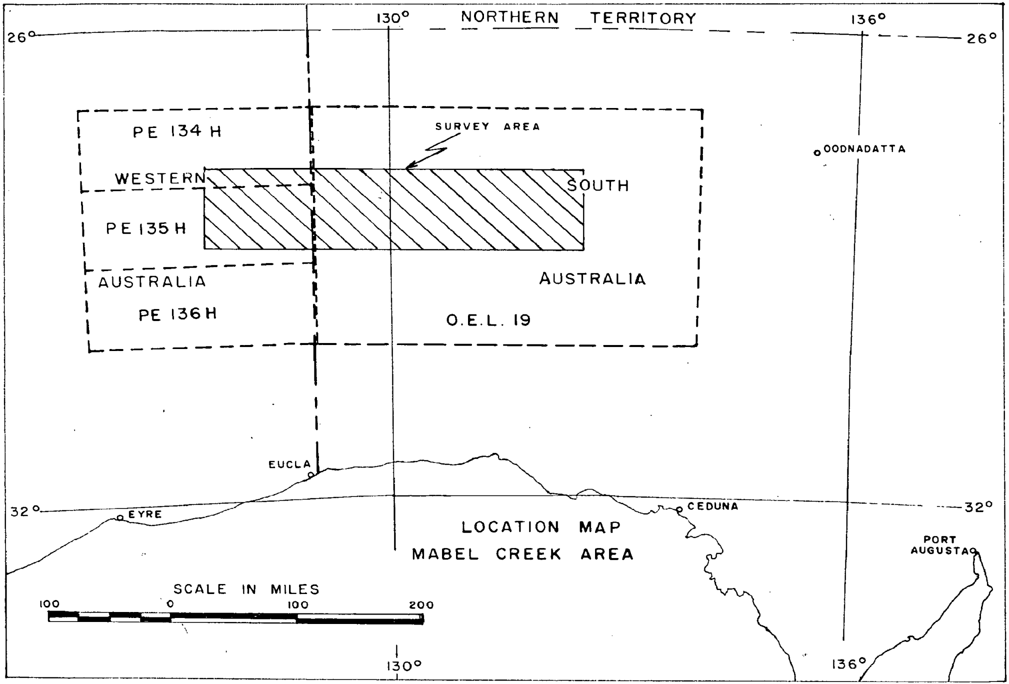
# CONTENTS

## ABSTRACT

A reflection and refraction seismic survey was conducted during four months of the year 1962 for Exoil Proprietary, Limited, by Party 84 of Namco International, Incorporated, in a project designated as the Mabel Creek Area, within Oil Exploration License 19 and Permit to Explore 135H, located in the Officer Basin portion of South Australia and Western Australia, respectively.

The purpose of the survey was to investigate the thickness and distribution of the sedimentary section in the area, to obtain reconnaissance structural information, and to provide some detail of the subsurface in zones with structural potentialities.

The results of the survey indicate the presence of a sedimentary section increasing from a minimum of 5000 feet at the eastern extremity of the survey to a possible maximum of 10000 feet to the west and north. West and northwest dip components of up to $7^{0}$ were observed in the eastern portion of the area, while for the remainder of the survey the structural relief in the sedimentary section is relatively gentle.




LOCATION MAP
MABEL CREEK AREA

# 1. INTRODUCTION

The Mabel Creek seismic survey was conducted for Exoil Proprietary, Limited, with registered office at Brisbane, Queensland, within Oil Exploration License 19 and Permit to Explore 135H, located in South Australia and Western Australia, respectively. Refer to the Location Map.

The geophysical contractor was Namco International, Inc., of Dallas, Texas, with Australia headquarters in Adelaide, South Australia. Details of Personnel, Equipment, and the Statistical Data are presented in Appendix I, Appendix II, and Appendix III.

The Mabel Creek Area is located in the Great Victoria Desert, where the surface is characterized by gently rolling sand ridges trending in a general east-west direction. These sand dunes are fixed in location by a cover of spinifex and stunted brush and trees. Apart from the sand ridges the area is generally flat, with a total elevation difference of only 500 feet over a distance of 200 miles. Due to the sparse rainfall there is no well-developed drainage pattern. Dry lake beds and clay pans are present here & there ~~occur intermittently~~. Outcrops are sparce ~~infrequent~~ and are generally limited to sandstones and limestones of Recent origin.

The climate of the Officer Basin is normally fine and clear. Temperatures during the winter months, when this survey was conducted, vary from slightly below freezing to about $85^{\circ}$ as a maximum. Rainfall was extremely light, as was the normal wind velocity, and working conditions were generally pleasant.

The survey covered by this report was preceded by another seismic project conducted by another contractor. The results of this earlier survey are presented in Appendix IV.

## 2. GEOLOGY

There is a definite lack of any subsurface stratigraphic information for the Officer Basin, apart from what may be gained from a study of the outcrops around its perimeter. Except for water bores in the vicinity of the seismic traverse, other significant stratigraphic tests are located some distance from the prospect to the south and east.

Delineation of the Basin, prior to this survey, was based on projections of outcrops around the perimeter, the results of an airborne magnetometer survey, and a subsequent gravitimeter survey supplemented by a land magnetometer.

To the north and west, respectively, the Officer Basin is bounded in part by the Musgrave-Mann Archean complex and the Australian Pre-Cambrian shield or Yilgarn block. The relationship of this Basin with the Canning Basin, to the northwest, has not been established. Archean rocks are found again to the southeast and these, together with the northern limits of the Eucia Basin to the south, define the southern edges of the Basin. The east and northeast boundaries and the relationship to the Great Artesian Basin are very obscure due to the paucity of outcrops. On the surface the sand dune country of the Officer Basin gradually gives way to the gibber plains and mesas which characterize the western margin of the Great Artesian Basin.

The sedimentary deposits in the Officer Basin are thought to consist of beds of Proterozoic, Ordovician (?), Permian, Tertiary, and Pleistocene age. The thickness of the various members has not been ascertained, but the combined total of the deposits has been predicted to exceed possibly 10,000 feet.

Geological and geophysical studies of the Officer Basin suggest that the Basin is an arcuate structure with its deepest portion near the northern Pre-Cambrian block. The north flank is thought to be the steepest while the south flank is characterized by more gentle dip. North-south geophysical profiles suggest that the Basin was developed by faulting or down-folding along its northern edge and by hinging along the southern side.

Petroleum prospects of the Officer Basin are considered favorable due to the thickness of the deposits, the probability of a number of reservoir beds, and the fact that the gently folded structures observed adjacent to the Basin give promise of similar conditions within the Basin itself.

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After O. J. Shiels, Geologist, Exoil Proprietary, Ltd.

# 3. FIELD PROCEDURE



This survey was conducted using both the seismic reflection and refraction methods of interpretation. The refraction control consisted of one reversed profile in the extreme southeastern portion of the project. The objective of the refraction profile was to determine the thickness of the sedimentary section, to provide some information on vertical velocity distribution, and to supplement the structural results of the reflection program.

Using the encouraging knowledge of the section gained from analysis of the refraction data, the reflection survey was undertaken. The latter program was conducted along the two existing tracks leading to the western and northwestern portions of the area. The shooting plan consisted of segments of 8 shot points in continuous profile, separated by gaps of 4 miles. The distance between shot points was normally 1320 feet, with 110-foot linear offset and seismometer group intervals.

Recording was performed using 24 National 26-AA amplifiers and a National 4F oscillograph. A Techno tape and playback unit was used in conjunction with the National instruments for magnetic recording. A monitor oscillogram and a magnetic tape were recorded simultaneously on each shot, using a wide band filter setting with each seismometer group independently activating its respective galvonometer trace. The magnetic tapes were played back through the field unit with a CH-CH filter setting selected as optimum for the area, and with 50% mixing of adjacent traces. This filter combination features a low cutoff of 24 cycles per second and a high cutoff of 58 cycles per second at 50% response, with a peak frequency of 37 cycles per second.

Twelve seismometers per trace distributed in the line of profile were employed in the reflection program. This number was reached on a practical compromise after initial experimentation indicated 6 to be insufficient and greater numbers up to 36 per trace to yield insufficient improvement to justify reduction in production. An extra cable and a set of seismometers were used to keep a spread laid ahead of the recorders.

Shot holes were obtained by two combination air-water drills. The drilling conditions varied from good to poor, with the major limitations to production being associated with layers of hard sandstone and limestone, long water hauls, caving sand, and poor trail conditions. The water supply was insufficient for mud drilling to control the caving sand, but a system of water injection intermittently as required with the compressed air circulation proved effective. For maximum production during any future program in the area, three drilling rigs of this same type and better provisions for water are recommended.

All instrument spreads were chained, and horizontal and vertical control were obtained by alidade and plane table for reflection and theodolite for refraction profiles. No geodetic vertical control was available in the area, and all data are based on an assumed surface elevation of 500 feet above sea level at SP A-1. Horizontal control was enhanced by ties to several astro-fix stations established in the area by government and Namco surveyors. Permanent identification markers were left in each segment of line.

The quality of refraction data in the Mabel Creek Area is considered good, while reflection quality varied from poor to good. The better records were in the minority, and poor to fair quality seismograms were more normal. On the basis of an initial experimentation program including a variety of hole depths and patterns, charge sizes, and instrument settings, it was decided that the most practical procedure for the area was to fire moderate charges in single deep holes, preferably below the water table.

Reflection signals were commonly affected by noise and interference patterns generated by the shot. A noise analysis spread shot on Line B revealed a ground wave with a velocity of 2000 feet per second sweeping across the spread which at times completely masked reflected energy. The frequency of the wave varied with location, but it was usually within the range of reflection frequencies. Based on the noise analysis, experiments were made to improve record quality using 3 and 16 shallow hole patterns, a deep single hole, a 660-foot spread with 50% ground overlap of geophones, and a 1320-foot in-line offset. Only the latter procedure yielded any appreciable improvement.

Several patterns of up to 36 holes drilled into the low-velocity layer failed to produce results comparable with single deep holes. If more drill power is available for future operations in the area, it is recommended that a 3-hole pattern penetrating the subweathering be tried.

Poor recordings were generally derived from areas where thick deposits of sand occurred on the surface and where a powdery gypsum material (kop~~ae~~i) was logged in the hole. Better quality was obtained where sand and shale were encountered by the drill.

The best records were obtained in the vicinity of dried lake beds and clay pans. It is suggested that future program be designed to take maximum advantage of lake beds south of Line B and along the border between South and Western Australia.

The normal working day was 10 hours, including driving time to and from the field. Twenty-two days, including holidays, constituted a normal month.

## 4. OPERATIONS

While this reconnaissance survey of the Mabel Creek Area was executed with dispatch, considering the nature of the assignment, there were several operating problems involved which can be reduced in future geophysical investigation of the area. These problems included remoteness from supply sources, scarcity of water, road conditions, driving time associated with scattered program, and restrictions imposed by government agencies.

All heavy supplies and materials were shipped by rail from Adelaide to Kingoonya, thence by commercial carrier truck to Mabel Creek stations, and to camp by contractor's trucks. The track west from Mabel Creek could be negotiated with facility only by heavy-duty trucks with all-wheel-drive, as employed on the seismic party. As the work progressed into Western Australia, the normal compliment of trucks on the crew was insufficient for adequate handling of supplies. For future operations in that remote sector, consideration should be given to the stockpiling of materials by contract carrier or to the addition of another supply truck to the crew.

The only accessible source of potable water for the entire area was located near Mabel Creek station, which involved a round-trip drive which varied from 300 to 900 miles. Saline water was found at depths of less than 150 feet at several locations in the area, and a water well pump and equipment was provided to alleviate the problem of drilling and wash water supply. For future work in the west, consideration might be given to a deep test for fresh water, the opening of a supply route southward to the railway line, or to a distillation process.

The condition of the tracks improved during the course of the survey, as the sand was packed and snags which ruined tires were cleared. The greatest difficulties occurred on initial trips over the newly graded track, especially when trailers were being towed to new camp locations. Any future program outside the skeleton pattern of tracks will require advance bulldozer service to clear vegetation.

Since the assignment called for skips for two-thirds of the traverse, progress along the line was fairly rapid. Four camp sites were occupied in the course of the survey, but there was still an unusual amount of time consumed in driving to and from the field. To reduce this non-productive time, fly camping was attempted at the extremities of lines, but its effectiveness was reduced by the problem of keeping a sufficient supply of drilling water on hand. It is expected that future assignments will involve more detailed program, and that the ratio of productive time can be improved.

Logistical problems could be reduced in the future by relaxation of restrictions on movement imposed by the Maralinga station of the Weapons Research Establishment. The supply route from Vokes Hill to Cook was forbidden, but its availability could shorten considerably the drive for water and supplies. More prompt approval of emergency flights is also desirable.

## 5. INTERPRETATION PROCEDURE

Observed reflection times were corrected to a plane established at 400 feet above sea level, using the standard uphole time procedure with a correctional velocity of 6500 feet per second within the zone from the shot position to the plane. This velocity was determined by an investigation of first-arrival times and several uphole surveys performed in the area.

In addition to the normal near-surface weathering, another low-velocity zone was apparent in some parts of the area. In such cases an additional correction to the data was derived from a rectilinear intercept method.

Corrected reflection times (two-way seismic times) were plotted on cross sections using a horizontal scale of 1 centimeter equal to 110 feet and a vertical scale of 1 centimeter equal to .020 second (or 110 feet of depth where the average vertical velocity is 11,000 feet per second). The sections display all data plotted vertically below the shot point, with connecting lines indicating the degree of reliability of continuity and correlation. Since observed dips rarely exceeded 10 degrees, the migration of data was not justified. Sample sections are presented in this report as Enclosures VI, VII, and VIII.

A sample variable density with superimposed galvanometer trace section is also presented (as Enclosure IX). These sections were produced for a portion of the area from magnetic tapes with application of static (template method) and dynamic corrections to reduce all traces to vertical time below the plane. The value of this program was reduced by the difficulty in applying a velocity function for dynamic corrections which would produce smooth reflections at all depths.

## 6. DISCUSSION OF RESULTS

The refraction portion of the survey was limited to one northwest and southeast reversed profile at the eastern extremity of the area (see Enclosure I), and the results are presented as a cross section (see Enclosure III) on which refraction times have been converted to depth using assumed average vertical velocities. The most significant refracting horizon has an average horizontal velocity of 20,000 feet per second and may be associated with basement. This horizon has an approximate depth of 5500 feet (computed with an average vertical velocity of 14,000 feet per second). This basement (?) horizon shows a 7% gradient of dip to the northwest, with some reversal to southeast dip near the southeast end of the subsurface coverage.

The reflection survey which extends to the west and northwest of the refraction profile (see Enclosures I and II) reveals a continuation of the west and northwest dips into the deeper portion of the Basin, with apparent divergence of some of the lower beds from those at shallow depth. For easier visual appreciation of the rapid increase in section, the results on Lines A and B have been condensed, with selected points displayed on Enclosures IV and V.

All reflection data for the Mabel Creek Area have been submitted previously in the form of cross sections. The lack of lateral control precludes a contoured interpretation, and none is submitted in this report.

Summarizing the results from east to west, the apparent thickness of sedimentary section increases from 5000 to 10000 feet in a distance of about 65 miles to the west-northwest along Line A. The rate of increase of section westward along Line B is more gradual, possibly indicating that this profile is aligned south of and more nearly parallel to the axis of the Basin.

An area of poor records on Line B extending for some distance between SP's 45 and 80 is probably the result of surface conditions. Within this zone only a few usable records were obtained, and on these the reflection energy appears to be limited to 1.1 seconds, which is slightly less than that observed to the east. This condition may be indicative of a major warp in the section.

Improved record quality was obtained in the vicinity of Vokes Hill, and here the reflection energy extends to 1.3 seconds. No positive correlation can be made from the Vokes Hill area to the better records to the east. Proceding westward, poor quality data suggest a slight increase in section thickness to the Western Australia border, where a good record displayed reflections to a depth of at least 10,000 feet. The continuation of the traverse into Western Australia encountered variable record quality, but little evidence of structural relief or reduction of the section.

Reflections recorded in the area seldom exhibited persistent character and continuity over long distances. This evidence, together with that from the refraction profile, may indicate the lack of massive bedding in the sedimentary section above the vicinity of the basement. Where a comparison between the magnetometer, gravitimeter, and seismic data can be made, it is felt that the three surveys are in relatively close agreement, and that the existence of an extensive basin has been substantiated.

While a substantial amount of additional seismic exploration would be required to delineate any structural traps in the Officer Basin, it would also be desirable to have a deep bore to evaluate the stratigraphy. To appraise the entire section would require some 10,000 feet of hole at a location as far northwest as about SP 80, on Line A, or as far west as the Western Australia border on Line B. A more practical location at this stage of exploration is suggested between SP's 33 and 40, near the eastern end of Line A. This zone might be considered to be on the flank of the Basin, where the depth to basement might be from 5000 to 7000 feet. In this vicinity there is more evidence of reverse dips and possible anticlinal development than commonly occurs in the deeper portions of the Basin. There is the additional attraction of divergent dips which might indicate stratigraphic on-lap, faulting, or even reef development. Such a location would have economic advantages, in that it is the most accessible of the entire area surveyed.

## APPENDIX I

### EQUIPMENT

RECORDING:

1 International Model 160 4-wheel-drive recording truck, complete with cable reels and recording cab

1 International Model 160 4-wheel-drive cable truck, complete with seismometer racks and cable reels

1 Complete set of 24-channel National Geophysical Type 26-AA seismic instruments capable of recording both reflections and refractions

1 Complete Model 401-A Techno magnetic recording system with Model TI-480B moveout corrector and reduced drum speed (approximately 11 seconds of recordable time per standard Techno tape optionally available for refractions).

3 Cables designed to accomodate one-third mile reflection spreads

480 Electro-Tech type EVS-20 cycle geophones in groups of six per string with 15-foot spacing between phones

100 National Geophysical 12-FL 5-cycle refraction seismometers

1 Set of refraction cables to accomodate 24 traces on 4-mile spread

1 Set of National Geophysical pre-amplifiers for refractions

1 Set of RCA FM refraction radio equipment, including antennae and telescoping towers

SHOOTING:

1 International Model 190 6-wheel-drive explosive truck complete with 1200-gallon flat-type water tank

1 Complete set of shooting equipment, including both conventional and multi-hole blasters and firing harnesses

2 Sets of RCA FM refraction radio equipment including antennae and towers

SURVEYING:

2 J-6 Jeep 4-wheel-drive trucks

1 Complete set of surveying equipment and instruments, including both theodolite and alidade

DRILLING:

2 Heavy-duty Mayhew 1000 combination air-water rigs, mounted on International 190 6-wheel-drive trucks. These rigs are equipped with 667 CFM air compressors, 5 x 6 Gardner-Denver mud pumps, and 300 feet of heavy-duty Mayhew drill stem per unit

2 International Model 190 6-wheel-drive heavy-duty water trucks with 1200-gallon flat-type tanks and stake bodies

1 J-5 Jeep 4-wheel-drive truck for drill supervisor

SUPPLY:

1 International Model A-160 4-wheel-drive supply truck with stake body

OFFICE:

1 Elder trailer office completely equipped with office machines, drafting equipment, radio, and air conditioner

1 J-5 Jeep 4-wheel-drive truck for camp use

SHOP:

1 Elder trailer machine shop complete with drill press, benches, vises, air compressor, and all necessary hand tools and equipment for all repairs

1 Welding trailer, complete with both arc and acetylene welding equipment and supplies

CAMP:

1 Elder trailer all-electric kitchen, air-conditioned, complete with all appliances and utensils

1 Elder trailer diner, with necessary furniture, fixtures, tableware, and air-conditioner

1 Elder trailer shower and utility unit

1 Elder Power Trailer, complete with two 25-KW diesel generators for camp power

1 1200-gallon camp water trailer, complete with pressure system

1 Complete complement of portable kitchen and diner equipment for fly camp, including generator and refrigerator

All trucks and trailers equipped with sand tires. All trucks equipped with front end winches. All International trucks equipped with power steering.

# APPENDIX II



## PERSONNEL

| | |
|---|---|
| Party Chief | H. E. Bowman<br>D. G. Mould |
| Seismologist | J. F. Homola |
| Observer | R. R. Kocian<br>W. Harrison |
| Surveyor | G. Cosby<br>C. B. Sloan |
| Drill Supervisor | L. L. Reeves<br>J. P. Snipes |
| Drillers | W. G. Pfau<br>J. Mackie |

The basic crew comprised a total of twenty-two men. Two men were added for the second survey party.

Technical and administrative supervision was provided by Mr. W. Jarrott Harkey.

# APPENDIX III

## STATISTICAL DATA

| | |
|---|---|
| Starting date, first shot | May 25, 1962 |
| Completion date, last shot | August 27, 1962 |
| Total number of holes shot | 544 |
| Total number of shots | 594 |
| Average number of holes shot per day | 7.6 |

| | |
|---|---|
| Total miles of subsurface coverage | 139.77 |
| Total miles of traverse coverage | 410 |
| Total number of moving days | 15.75 |
| Days lost due to weather | 0 |
| Days lost due to equipment failure | 0 |
| Days lost due to holidays | 1.0 |
| Total number of field days, recording | 71.25 |
| Total number of field hours, recording | 521.3 |
| Total hours driving time, recording | 191.2 |
| Total pounds of dynamite used | 12,927 |
| Average pounds of dynamite per shot | 21.8 |
| Total number of detonators used | 817 |
| Total number of drill shifts in field | 124.44 |
| Total number of drill shifts, water well and stand-by | 12.00 |
| Total hours field time, drills | 898.6 |
| Total hours driving time, drills | 478.6 |
| Rock bits used | 59 |
| Insert bits used | 65 |
| Total footage drilled | 61980 |
| Total number of holes drilled | 550 |
| Average number of holes drilled per field shift | 5.0 |
| Average depth of holes, including patterns | 113 |

Note: Driving time includes setting up fly camps and returning to base.

# APPENDIX IV



## PRIOR SEISMIC SURVEY IN AREA

The seismic survey of the Mabel Creek Area covered by this report was preceded in April 1962 by a short pilot project conducted for Exoil Proprietary, Ltd., by Geosurveys (Aust.), Ltd. That seismic survey consisted of 42 shots at 31 locations between Longitude 132° 10' East and the eastern boundary of the concession, distributed along the track from Mabel Creek Station and Emu airstrip.

Six seismometers per trace at 10-foot intervals were used on 24 traces. The shot points were at 1320-foot intervals for split spreads or 2640-foot intervals for double-ended spreads. The average hole depth was 68 feet. Charge sizes varied from $2\frac{1}{2}$ to 100 pounds, with an average of 24.4 pounds. A wide-band filter (20 to 92 cycles per second) was used for all recordings.

The basic program consisted of segments of 8 points shot continuously, separated by 4-mile gaps. The first, second, fifth, and sixth segments of the 8 scheduled segments proceeding eastward from the Tallaringa water well to the eastern boundary yielded no reflections. Some 2640-foot end-on spreads were shot for evaluation of the stratigraphy from the refraction evidence of the first arrivals. The typical maximum velocity observed was 17,000 feet per second, which might correspond to "billy rock" or other hard near-surface stringers. One spread between SP's 42 and 44, some 36 miles east of the Tallaringa well, yielded a refraction velocity which appears to be of the order of 20,000 feet per second, and which appears to come from an interface within 300 feet of the surface. A longer refraction profile would be required to evaluate the speculation that a shallow basement occurs in this vicinity. From the Tallaringa well 66 miles westward to the extremity of the survey at SP 152 (see Enclosure I), 5 scattered recordings were made without reflections and without evidence of basement refraction velocities.

This pilot survey does not provide sufficient evidence for condemnation of the area covered. With deeper shot holes and with better instruments and techniques, seismic evidence of the subsurface structure and stratigraphy might be obtained. This is based on a direct comparison of records obtained from the same hole at comparable depth (Geosurveys SP 152), where the second survey produced reflections of fair quality for the full thickness of the sedimentary section.

No accurate location map for the Geosurveys project is available for presentation, and it is presumed that surveying was incomplete.

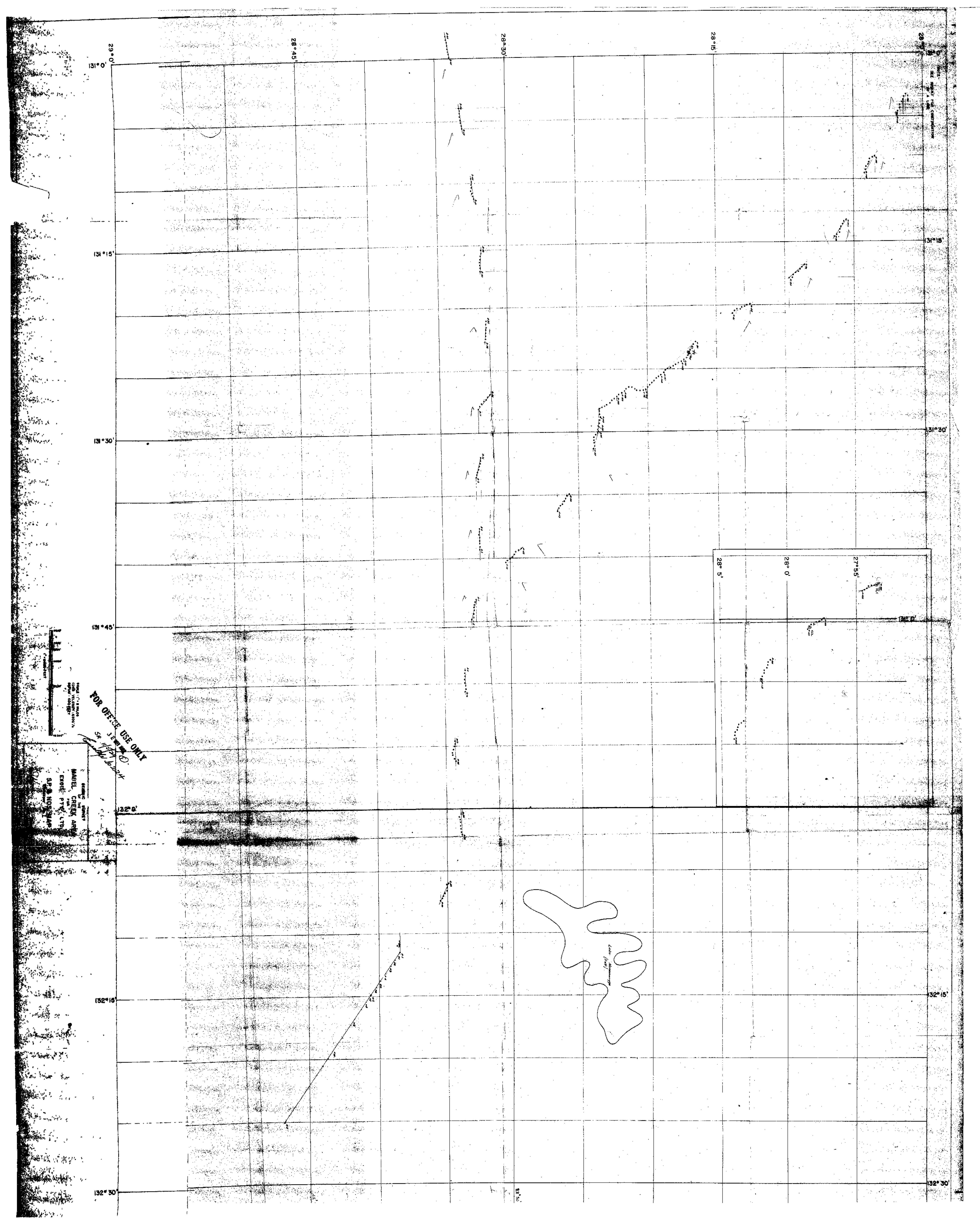
NAMCO INTERNATIONAL, INC.

H. E. Bowman
Party Chief Party No. 84

W. Jarrott Harkey
Supervisor



August 27, 1962



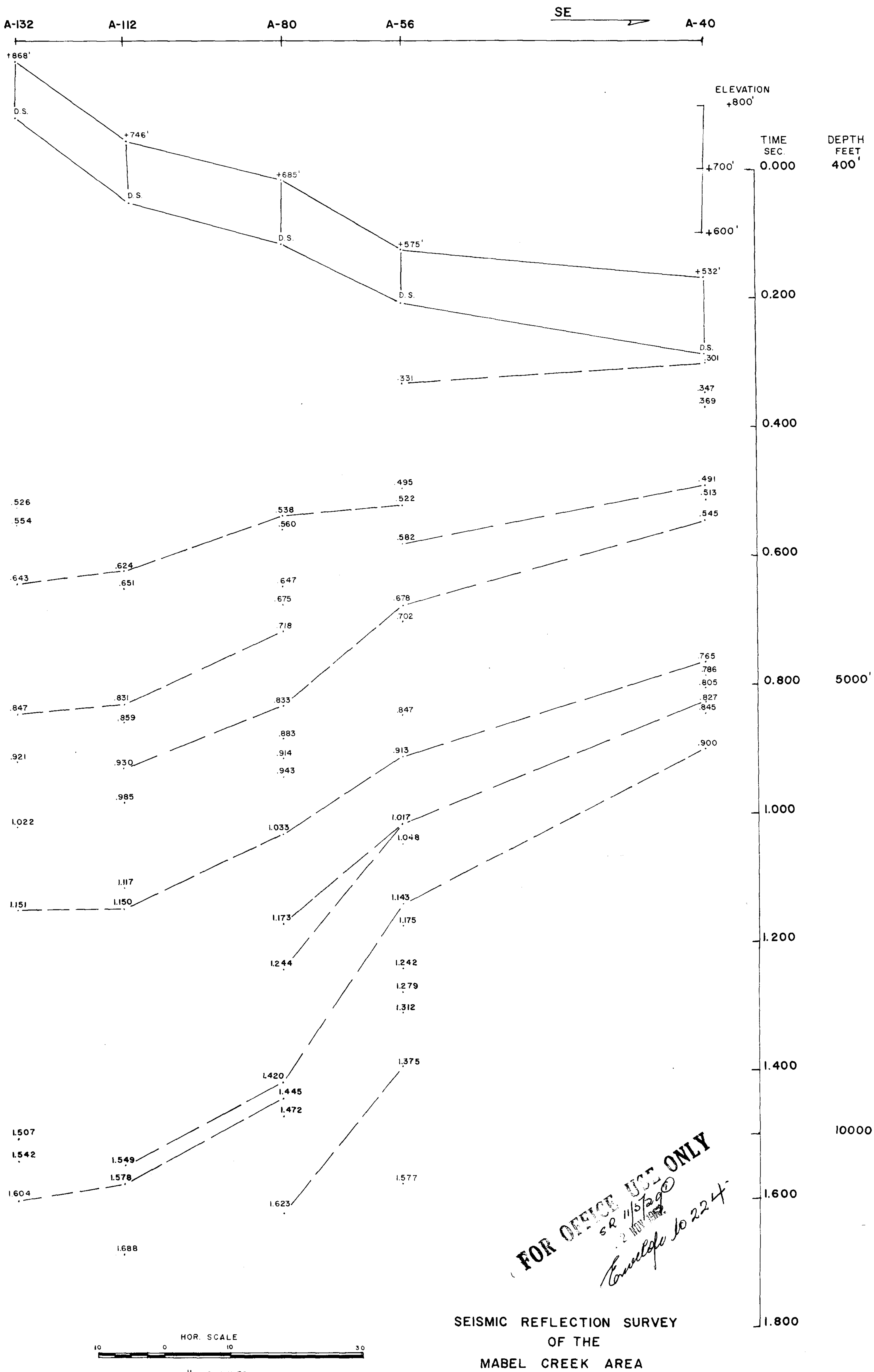
29°0'
28°45'
28°30'
28°15'
131°0'
131°15'
131°30'
131°45'
132°0'
132°15'
132°30'
28° 5'
28° 0'
27°55'
FOR OFFICE USE ONLY
MABEL CREEK AREA
EXOIL PTY. LTD.


WESTERN AUSTRALIA
SOUTH AUSTRALIA
FOR OFFICE USE ONLY
SCALE : 1" = 2 MILES
CORR. VELOCITY : 6500'/s
DATUM : 400 FEET
1" = 10560 FEET
SEISMIC SURVEY
OF THE
MABEL CREEK AREA
FOR
EXOIL PTY. LTD.
S.P. & NOS. MAP
Enclosure No. II
SUPERVISOR
PARTY CHIEF
PARTY NO. 84
DATE AUGUST, 1962
NAMCO INTERNATIONAL, INC.
ENV 224-2

FOR OFFICE USE ONLY
Refraction Survey
of the
OFFICER BASIN
S. A.
by
Namco International Inc.
Party 84
for
Exoil Pty LTD
June 1962
Note:
S.P. R3 is located 5.6 miles southeast
from end trace position. Elevation 621.0 ft
Scale:
Verticle: 1cm = .05 sec
Horizontal: 1cm = 320'
DISTANCE
TIME


ENV 224-3

## LINE A






SEISMIC REFLECTION SURVEY
OF THE
MABEL CREEK AREA
SOUTH AUSTRALIA
CONDENSED REFLECTION CORRELATION PROFILE

Enclosure No. IV

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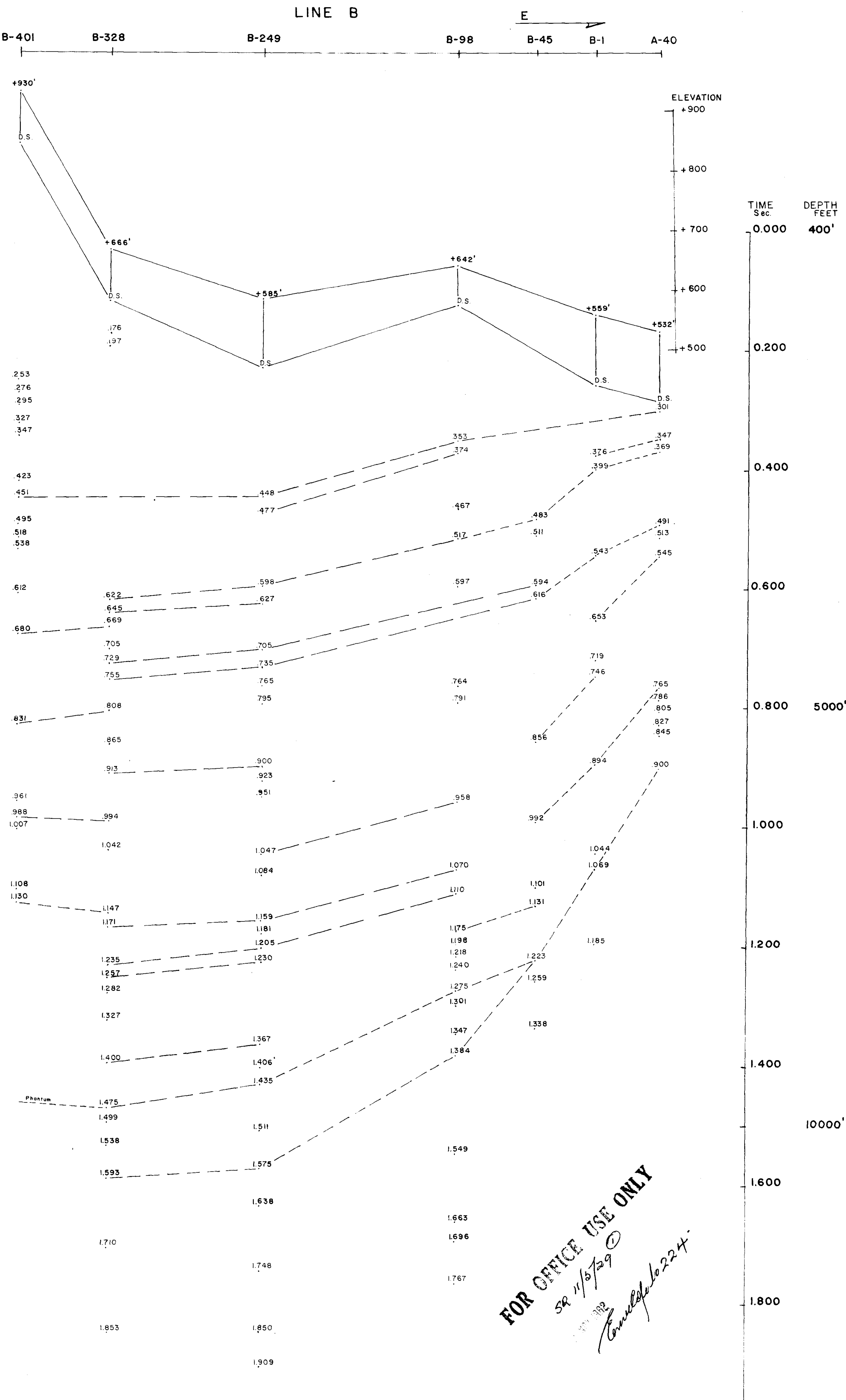


SEISMIC REFLECTION SURVEY
OF THE
MABEL CREEK AREA
WESTERN AUSTRALIA
SOUTH AUSTRALIA
CONDENSED REFLECTION CORRELATION PROFILE

HOR. SCALE
1" = 30 MILES

Enclosure No. V

ENV 224-5


LINE A
SP'S 41-64, 137-152, 65-72, 153-168, 73-80
MABEL CREEK AREA
FOR
EXOIL PTY. LTD.
BY
NAMCO INTERNATIONAL, INC.
PARTY 84 JUNE, 1962

ENV 224-6


FOR OFFICE USE ONLY

12 NOV 1962

ENV 224-7

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22,400' BREAK IN LINE
ELEVATION +700'
+600'
0.00
0.200
0.400
0.600
0.800
1.000
1.200
1.400
1.600
1.800
2.000
FOR OFFICE USE ONLY
LEGEND
GOOD
FAIR
POOR
QUESTIONABLE
LINE B
SP'S 306 TO 345
MABEL CREEK AREA
FOR
EXOIL PTY. LTD.
BY
NAMCO INTERNATIONAL, INC.
PARTY 84 AUGUST, 1962
1CM = 110 FEET
HORIZONTAL SCALE
1CM = .020 SECONDS
VERTICAL SCALE

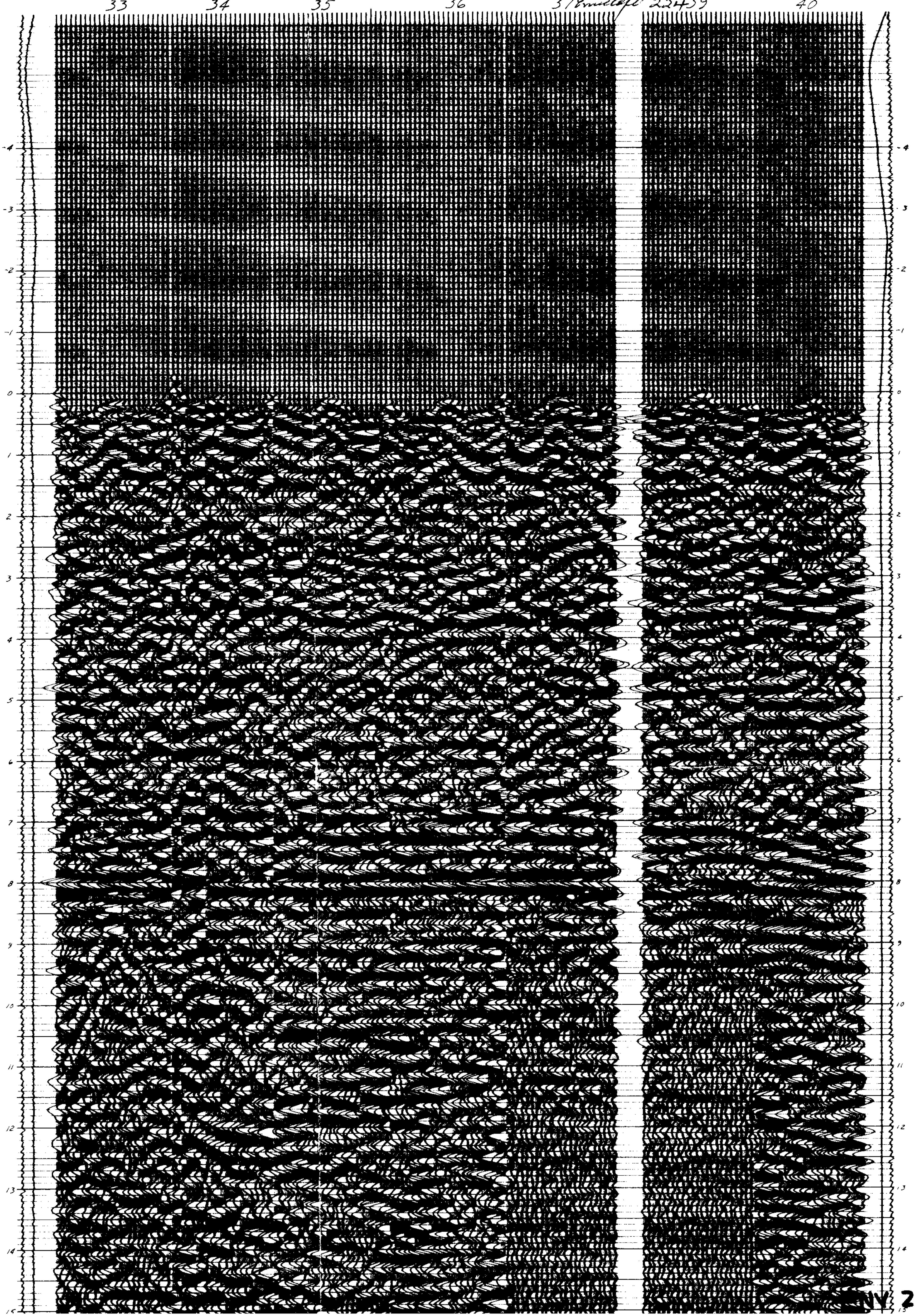
ENV 224-8

Enclosure No. IX

5R11/5/29

MABEL CREEK AREA

Exoil Pty Ltd
Emu Project, Line A
Filter 1/27-1/47 A.V.C-Fast
Mix 25-50-25%




224-9