
122°30'
122°15'
122°00'
61°45'
61°40'
61°35'
P-4400
P-4398
NW 61-40-22-I to 61-45
22-05-1 (LINE 63)
61-42-3 (LINE 56)
22-11-3
21-59-9 (LINE 55)
61-39-7 (LINE 66)
61-39-3 (LINE 57)
61-36-9 (LINE 58)
61-37-1
22-13-9 (LINE 62)
22-10-7 (LINE 61)
61-34-7 (LINE 60)
61-32-5 (LINE 65)
61-32-6
740'
730'
720'
710'
700'
690'
RIVER

1 OF 2

61°40'
61°35'
61°30'
122°30'
122°15'
122°00'

22-11-3
21-59-9 (LINE 55)
61-39-7 (LINE 66)
P-4398
61-39-5 (LINE 57)
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61-34-7 (LINE 60)
22-05-1 (LINE 63)
61-32-5 (LINE 65)
61-32-6
RIVER

740'
730'
720'
710'
700'
690'

Bluff

95-G-9

ANTOINE LAKE S.W.

SURFACE ELEVATION MAP

DATUM ELEVATION	CORRECTION VELOCITY	CONTOUR INTERVAL 10 Ft
DATE Dec, 1982	SCALE 2" = 1 MILE	INTERPRETED BY E. Matherne
REVISED	DRAFTED BY A.A.A.	FILE NO. N.W.T.-31-A-1

2 of 2

673-6-5-39
OH.

Abstracted for
Geo-Science Data Index
Date

ANTOINE LAKE AREA
NORTHWEST TERRITORIES

SEISMIC REFLECTION SURVEY
REPORT

DECEMBER, 1971

AQUITAINE COMPANY OF CANADA LTD.

Abstracted for
Geo-Science Data Index
Date

SEISMIC REFLECTION SURVEY REPORT

ANTOINE LAKE

NORTHWEST TERRITORIES

for

AQUITAINE COMPANY OF CANADA LTD.

OIL & GAS OPERATIONS UNIT
Oil and Mineral Division
FEB 14 1972
OTTAWA, CANADA
Dept. of Indian Affairs & Northern Development

contracted by

EXPLOR - ALTA LTD.

March - April 1971

Permit Number 4398

Project Number 673-6-5-71-1

Report by

E. Malterre

December 1971

TABLE OF CONTENTS

INTRODUCTION

The Antoine Lake prospect (Permit No. 4398) is located in the Northwest Territories approximately 45 miles by road south-west of Fort Simpson.

The permit area lies within the boundaries of latitudes 61°30' and 61°40' North, and longitudes 122°00' and 122°15' West (grid 95-G-9).

Field operations, conducted by Explor-Alta Ltd. on behalf of Aquitaine Company of Canada Ltd., commenced on March 15, 1971 and were completed on April 8, 1971.

The purpose of the survey was to further evaluate possible carbonate and/or reef build-up on the Nahanni limestone formation.

Approximately 10 miles of sixfold subsurface coverage was recorded using conventional seismic reflection techniques.

EXPLORATION PROCEDURE

1. Field Operations

Grading of the access road and bulldozing the seismic lines (carried out by Keen Industries) was started on April 15. Drilling of the single shot holes started a few days later and was completed on March 31. The recording crew started on March 25 and the prospect was finished on April 3, at which time line and camp clean-up was carried out(by Astronic Seismic Contracting) and completed by April 8. The drilling sub-contractors were Kunz, Miller and Alask (two conventionals, one auger, one top-drive).

Field operations were conducted from Fort Simpson until March 28, at which time a mobile trailer camp became available and

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located at the intersection of lines 61-34-7 and 22-03-2. Daily flights by Cessna (Arctic Air Ltd.) got the crews in and out of the prospect area.

The immediate prospect area lies just south of a plateau (Martin Hills) and is essentially flat and featureless, except for the crossing of the Liard river at the south end of line 22-03-2. The ground consisted of frozen muskeg patches, with sparse and occasionally dense spruce growth.

Drilling was exceptionally difficult below 50' where boulders were encountered, slowing operations considerably. Depth requirements were from 70' to 80' for shot holes. After 50', drillers were instructed to drill for an hour or 80', which ever came first.

No problems were encountered with bulldozing, except at the multiple crossing of the Liard river where ice bridges were built, and blown up at the end of the survey. The only new cut trail was line 22-03-2; line 61-34-7 was already cut (spring 1970) and used as an access trail.

The prospect was tied horizontally and vertically (Wilde T1A theodolite) to a bench mark located near the Fort Simpson airstrip (barometric elevation bench mark). Two traverses were run, from the bench mark to the prospect and back, over the access road. All shot-points were surveyed.

The exploration method consisted of seismic reflection, coupled with refraction and uphole survey.

Four 120-foot holes were drilled and shots recorded every 10 feet up the hole (1/4 lb. and greased caps for shallow levels) along

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a spread with geophones located at 5', 10' and 15'.

Every mile a direct and reverse refraction shot was taken over a 1-mile spread with geophone stations every 110 feet. 20-lb. charges were loaded in the refraction holes. Direct and reverse shots were recorded one right after the other through a special arrangement of two blaster boxes, one up and the other down the spread, with the recorder located midway between two refraction sites.

The reflection spread was a quarter-mile layout (see attached plate) with 12 strings of geophones (9 per string) at 110' spacing between flags, making up a 24-trace split-spread technique. A sixfold subsurface coverage was accomplished by having a shot hole on every second group (220 feet between holes).

Holes were drilled 80' deep where feasible and pre-loaded with a 10-lb. charge. The source pattern was a single hole with the center of the nearest groups 110' away. EVS2 - 28-cycle geophones were used.

Data was recorded on 9-track 800BPI digital tapes using an SIE field digital recording system comprising a PT-800 digital binary gain set of amplifiers and PDR-89 tape transport and recording modules. Monitors and direct play-backs were obtained through a 52-channel dry-rite camera. Recording filters were OUT on the low side and the aliasing frequency (125 cps at 2 ms or 250 cps at 1 ms sampling rate) on the high side. Most of the prospect was recorded at 1 ms sampling rate to take full advantage of the up-ranging capabilities of the system (every 15 scans). Although the zone of interest was quite shallow (0.400 sec. and less, two-way time), 3 seconds of data was recorded.

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2. Data Processing

All computations and processing of the data was carried out by Aquitaine personnel, using the facilities of the IBM 360/44 computer and SIE analog plotter. Seismic markers were referred to a datum plane of +1000' above MSL; weathering and low-velocity-material layers were replaced with an artificial layer with a velocity of 10,500'/sec.

Velocities and NMO corrections were derived from the velocity survey of the Aquitaine Gulf M-34 well, velocity scans, $X^2 - T^2$ and $T - \Delta T$ analyses.

Considerable variations in thickness of the LVL were encountered, drastically modifying the velocity functions.

Deconvolution experiments were attempted, although the "final" sections were not deconvolved. Digital filtering with a passing band of 8-17-60-75 was performed on the data prior to sixfold horizontal stacking.

All intermediate and final documents were displayed as wiggly trace - variable area.

RESULTS, CONCLUSIONS AND RECOMMENDATIONS

Reflections identification was mainly based on correlations with previously recorded data, as can be observed on the submitted maps.

The "Nahanni Limestone" reflection stands out very well in this area, and occasionally a reflection believed to originate from the Cambrian and/or Pre-Cambrian is observed; this is particularly true at the north end of line 22-03-2, where this situation also coincides with the data showing a much higher content of high frequencies (50 cps and above). In general, though, it was not possible to map the €/P€ reflection

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(about 0.080 sec. two-way time below the Nahanni reflection at 0.400 sec.).

The data was in general of good quality, although locally diffractions cause strong interference patterns, but this situation can be exploited to our advantage for we can establish better velocity control.

Occasionally, throughout the general area, erosional features have been observed that might have affected the Nahanni formation, with subsequent low-velocity material infilling (established mainly by velocity studies and the physical behaviour of the Nahanni reflection).

Refraction profiling and velocity analyses on the reflection data place the Nahanni event at an approximate depth of 1700 feet below surface.

An interesting feature exists on line 61-34-7 between SP. X-37 and F-90, and on line 22-03-2 between SP. X-101 and X-141. This apparent "pull-up" on the Nahanni horizon is caused likely by a higher-velocity zone above the Nahanni, and, indeed, we can see another event (non-identified) over the area just described, featuring a time difference of some 0.100 sec. (two-way time) maximum with the Nahanni limestone. The validity of this anomalous zone remains to be established by a very shallow exploratory well (less than 2000'), and this is, at the present time, our recommendation.

RESPECTFULLY SUBMITTED,

AQUITAINE COMPANY OF CANADA LTD.

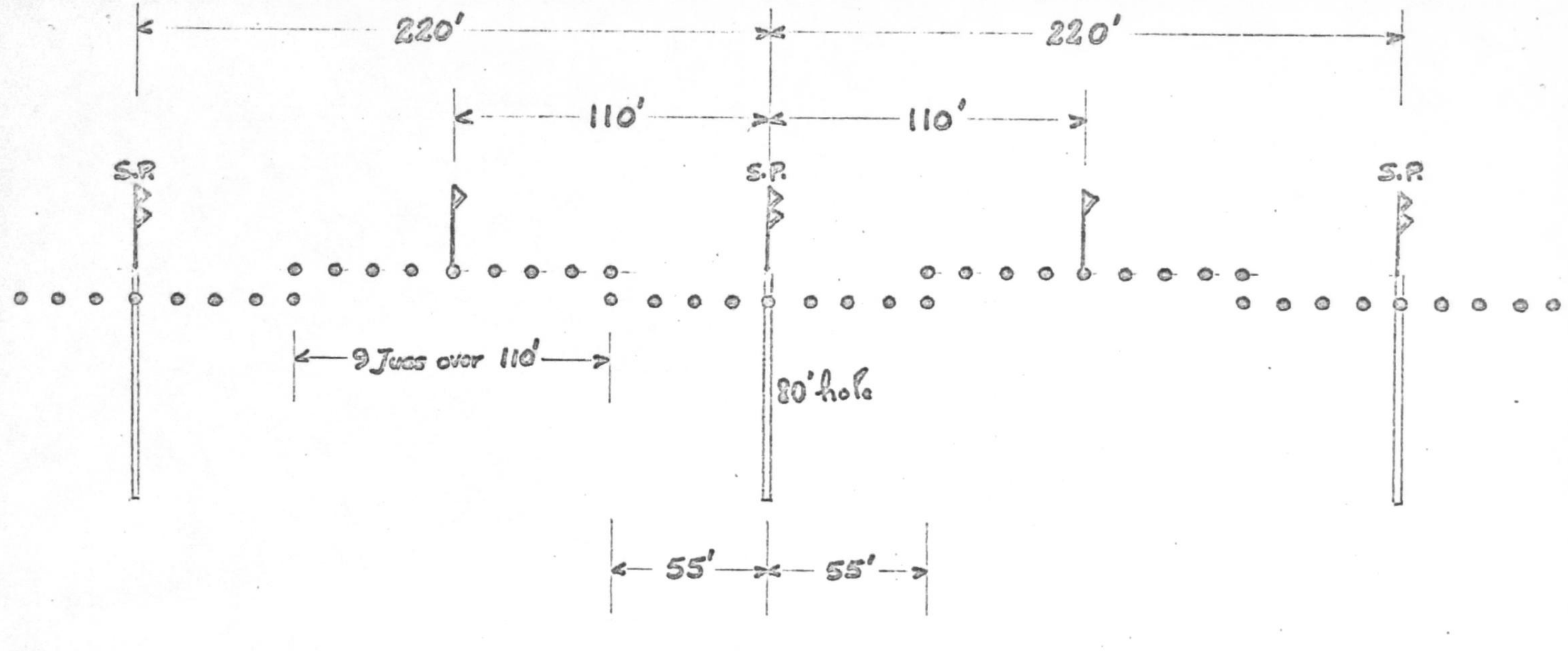
E. Malterre, Senior Geophysicist.

REVIEWED AND APPROVED:

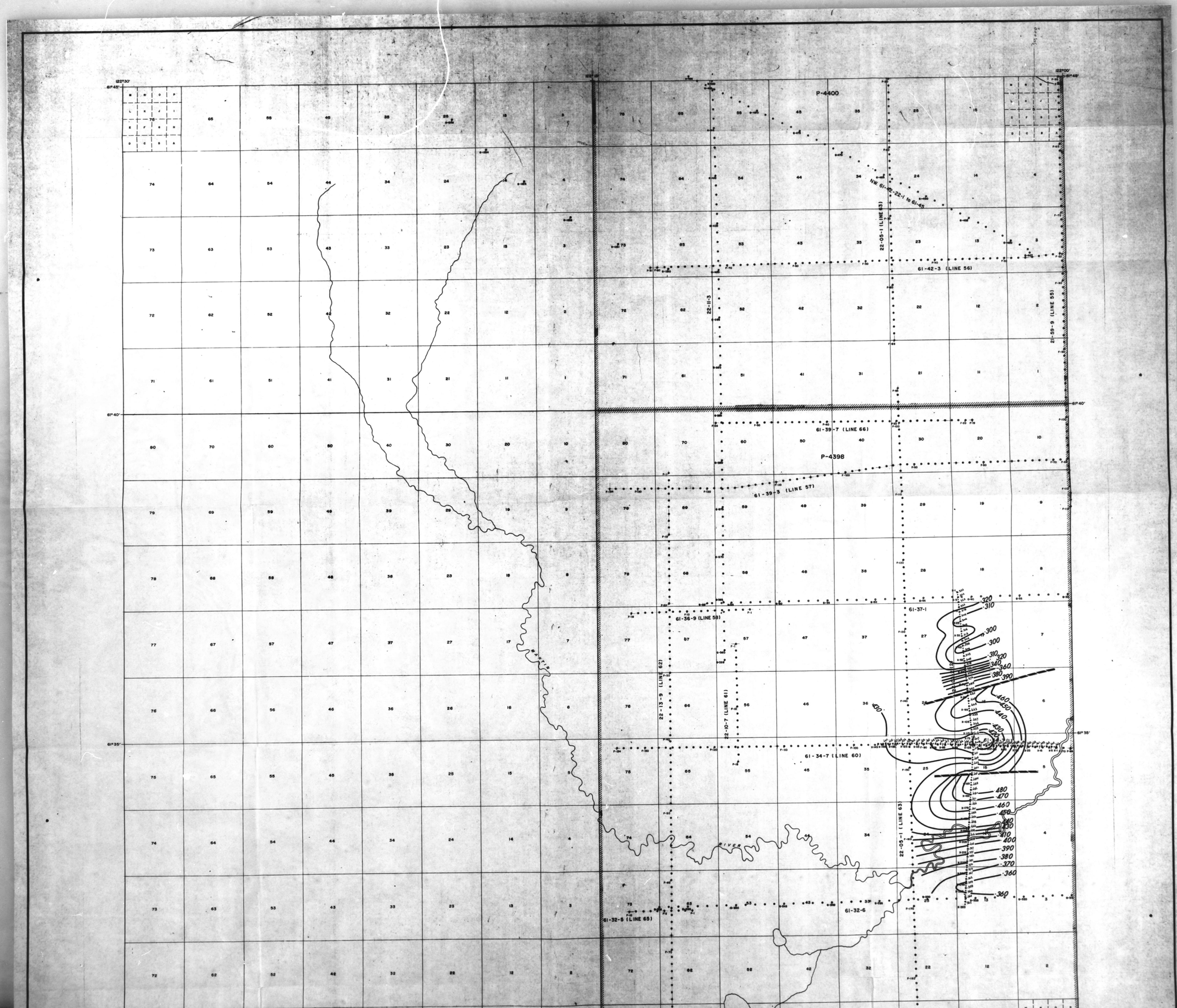
D.G. Aubin, Chief Geophysicist.

STATISTICAL SUMMARY

Operating days in area	8
Total Field Recording Hours	84
Total Coverage (miles)	9.6
Total Number of shots taken	303
Number of shots/Recording Hour	3.6
Coverage/Day (miles)	1.2
Total Number of Caps used	315
Total Dynamite used (lbs.)	2750
Average Dynamite/Shot (lbs.)	9.1
Total Field Drilling Hours	529
Total Drilling Footage	17,751
Total Number of Holes Drilled	218
Drilling Footage/Hour	33.6
Average Hole Depth (feet)	81.5



West or South ← Progression of Recording → East or North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P-4398

320 310 300 300 310 320 340 360 380 390 400 460 450 440 420 400 480 470 460 450 440 430 410 400 390 380 370 360 360

95-G-9

ANTOINE LAKE S.W.

NAHANNI STRUCTURE

DATUM ELEVATION:	CONTOUR VELOCITY:	CONTOUR INTERVAL:
DATE: DEC, 1987	SCALE: 2" = 1 MILE	DRAWING BY: T. Mathews
REVISED:	CHECKED BY: A.A.A.	N.A. 83

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