26-6-4-6

DIGITAL SEISMIC SURVEY

CONDUCTED

ON THE BEHALF OF

CENTRAL-DEL RIO OILS LIMITED

FINA OIL BUILDING, (2nd FLOOR)

CALGARY, ALBERTA

BY

GEOPHYSICAL SERVICE INCORPORATED

1120 GUINNESS HOUSE

CALGARY, ALBERTA

PARTY 420

PARTY CHIEF ---- GAVIN EDWARDS

SEPTEMBER, 1967.

I. INTRODUCTION

The purpose of this report is to outline the recording and processing procedures employed by Geophysical Service Incorporated, Party 420, in a seismic survey conducted in the Northwest Territories.

This prospect is located in the Fort Providence Area, East of the 6th Meridian, West of 117° Longitude, North of 60° 50' Latitude and South of 61° 20' Latitude.

Work commenced on September 16, 1967 and was completed by September 27, 1967.

FIELD PROCEDURES

SURVEYING

Initial elevations were taken from a Department of Works Survey in the area and then later adjusted to the Geodetic elevations.

SHOOTING

Single holes were shot at a depth of 40 feet, using a charge size of 2 1/2 lbs. and remote radio detonation.

RECORDING

All data was recorded in digital form on magnetic tape using Series 9000 amplifiers in conjunction with Texas Instruments Digital Field System (D.F.S.). The Ganged Automatic gain control (GAGC) mode of operation with the gain recorded on tape in Channel 30 was used, making possible the recovery of true amplitude information.

Three second records were made using a 2 mil. sample rate. Both the uphole and the time break were recorded remotely by radio and the filters employed were 18 cps. on the low side and 112 cps. high cut with a 24 db/octave slope.

All data was shot single fold or 100% using a group interval of 110'. The shot point was usually between groups 12 and 13 of the spread, except in certain spots where a shot point had to be missed due to bad terrain etc., when endovers would be shot. Each group consisted of 9 Hall Sears 20 cycle geophones laid in line at intervals of 12 feet.

PERSONNEL AND EQUIPMENT

NAME	POSITION	UNIT
D. E. HILL	PARTY MANAGER	62151 U
E. DONALD	INSTRUMENT ENGINEER	4258 R
A. SCHINDLE	SHOOTER	62156 E
R. HOULDEN	CABLE MAN	52160 CT
K. MARSH	CABLE MAN	52161 CT
B. GEORGE	JUG HUSTLER	
D. TYSON	JUG HUSTLER	
B. JOHNSON	JUG HUSTLER	
F. NARROW	INSTRUMENT ENGINEER TRAINEE	
G. SHERMAN	DRILLER	3267 MD
R. GRIESBRECHT	DRILL HELPER	3270 W
J. SILBERNAGEL	DRILLER	3266 MD
P. CALLAHAN	DRILLER TRAINEE	3269 W
LANG WOO	SURVEYOR	3240 U
W. CHOMA	SURVEYOR	3240 U
N. HENNINGSGARD	RODMAN	

OFFICE PERSONNEL

G. EDWARDS	PARTY CHIEF
M. BOWER	GEOPHYSICAL ENGINEER
D. CAIRNS	GEOPHYSICAL ENGINEER
M. BENWICK	JR. COMPUTER

DIGITAL PROCESSING

GENERAL PROCEDURES:

The data was displayed on Dri-rite paper records which were sent in from the field. However, the quality of these field records and their rapid deterioration after a relatively short period of time, necessitated the playing back of the field tapes for office use.

RESAMPLING; SEIS EDIT; NMO; DCN; DGF;

These separate functions were performed sequentially and back-to-back, within the "300 Package", as follows:

Resampling

Before any processing was started the data was resampled from 2 ms. data to 4 ms. data.

Seis Edit:

This programme allows zeroing of bad traces or portions thereof that would interfere with an accurate interpretation of the results. It also enables polarity reversal and gain recovery. The gain applied in the field to obtain desirable tape-saturation levels of events must be altered to obtain true amplitude relationships.

This is accomplished by comparing the energy decay obtained from the velocity function in the area with the actual gain curve that was applied. From this, a resultant curve which gives more true amplitude relationships can be determined. Gain applied in the field is recorded on a

Seis Edit - cont'd.

separate Channel (Channel 30), whose voltage is obtained by averaging gain applied to 4 traces across a field record.

Trace amplitude equalization is also accomplished in the seis edit programme, and this compensates for unequal trace to trace amplitudes, and for differences in charge sizes from record to record.

NORMAL MOVE OUT CORRECTIONS:

This routine applies static and dynamic corrections to remove normal move out, a two-dimensional effect of the recording geometry, by calculating and applying a correction to each trace using group distances and a velocity function. These velocity functions were worked out individually for each area by a G.S.I. Velocity group who based their work on sonic logs etc., that were available in the area.

DECONVOLUTION:

In all instances the deconvolution operator was determined as a result of an Harmonic Analysis. A 9 point operator was used over a gate of from .200 to .700 seconds.

There are three basic purposes of deconvolution:

1) To remove periodic events - short or long, depending upon the length of operator employed, e.g. ring, short period multiples.

2) To equalize the power spectrum - all traces over one spread and from one spread to another are given a

DECONVOLUTION - cont'd.

nearly constant energy level over the same frequency range. This means that the shot pulse variability has been stabilized, thus effectively placing all of the shots for a given prospect in the same medium. Character continuity is much improved as the masking effects of variable, narrow and powerful frequency bands attendant to variable shot media are removed.

3) To increase resolution - the time function is collapsed by modified inverse filtering representing a "dividing out of the reflection process" in an attempt to simulate an impulsive sequence as would be given by an impulsive synthetic from an accoustic log of the earth. In this manner subtle changes of reflection character that may be geologically significant can be recovered and timed with a high degree of precision. Optimum statics can then be picked on the section.

STATICS

A static correction was employed to flatten the basement reflection to a time of .400 seconds. After the statics were applied, all records were displayed on film from which blue line prints were made.

ACKNOWLEDGMENTS

We extend our appreciation to Central-Del Rio Oils Limited, and their representative L. Stevens, for their co-operation in these surveys.

Respectfully submitted,

Geophysical Service Incorporated.

(signed) G. Edwards
Gavin Edwards -- Party Chief.

Frank Schweiger -- Supervisor.

PROCESSING FLOW CHART

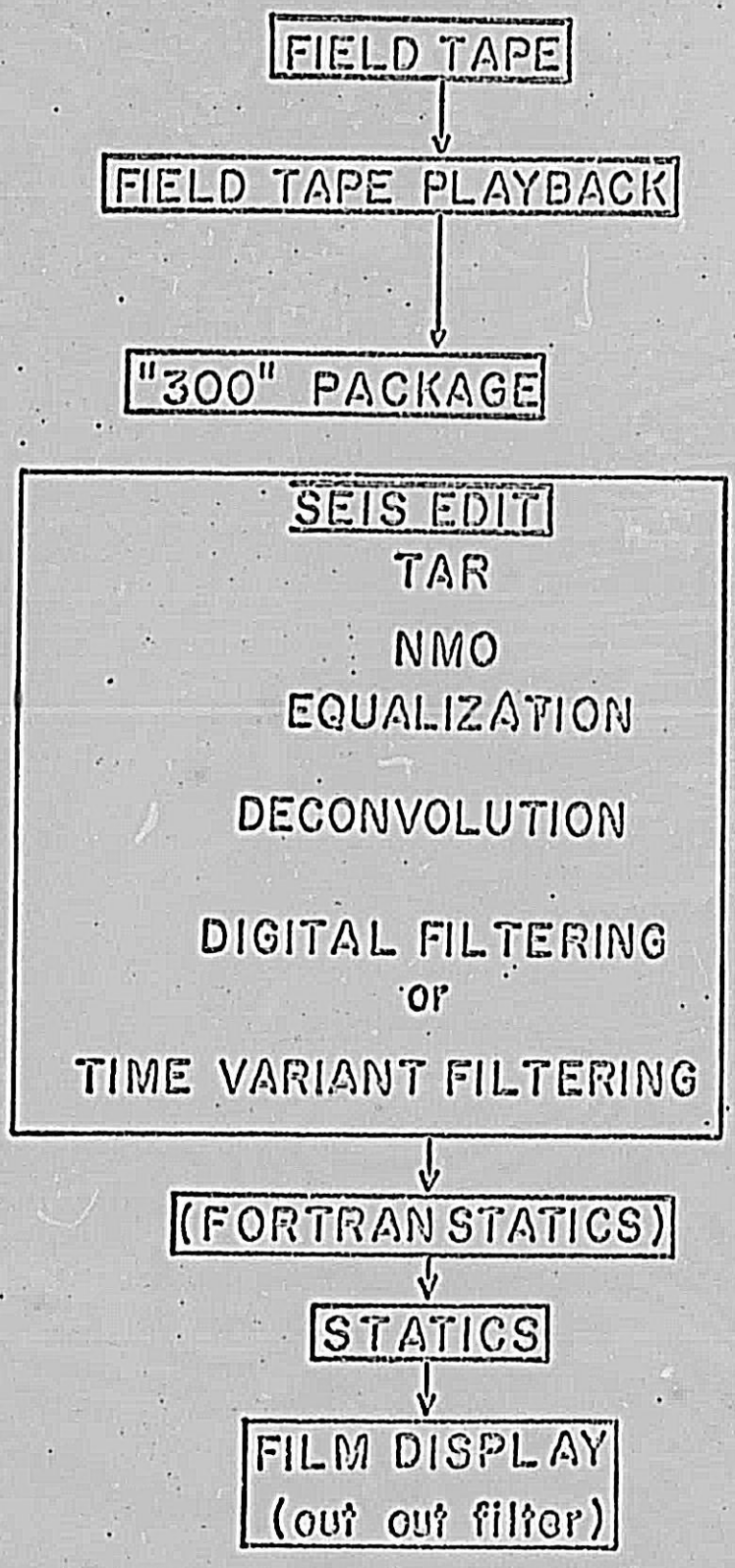

PLATE I

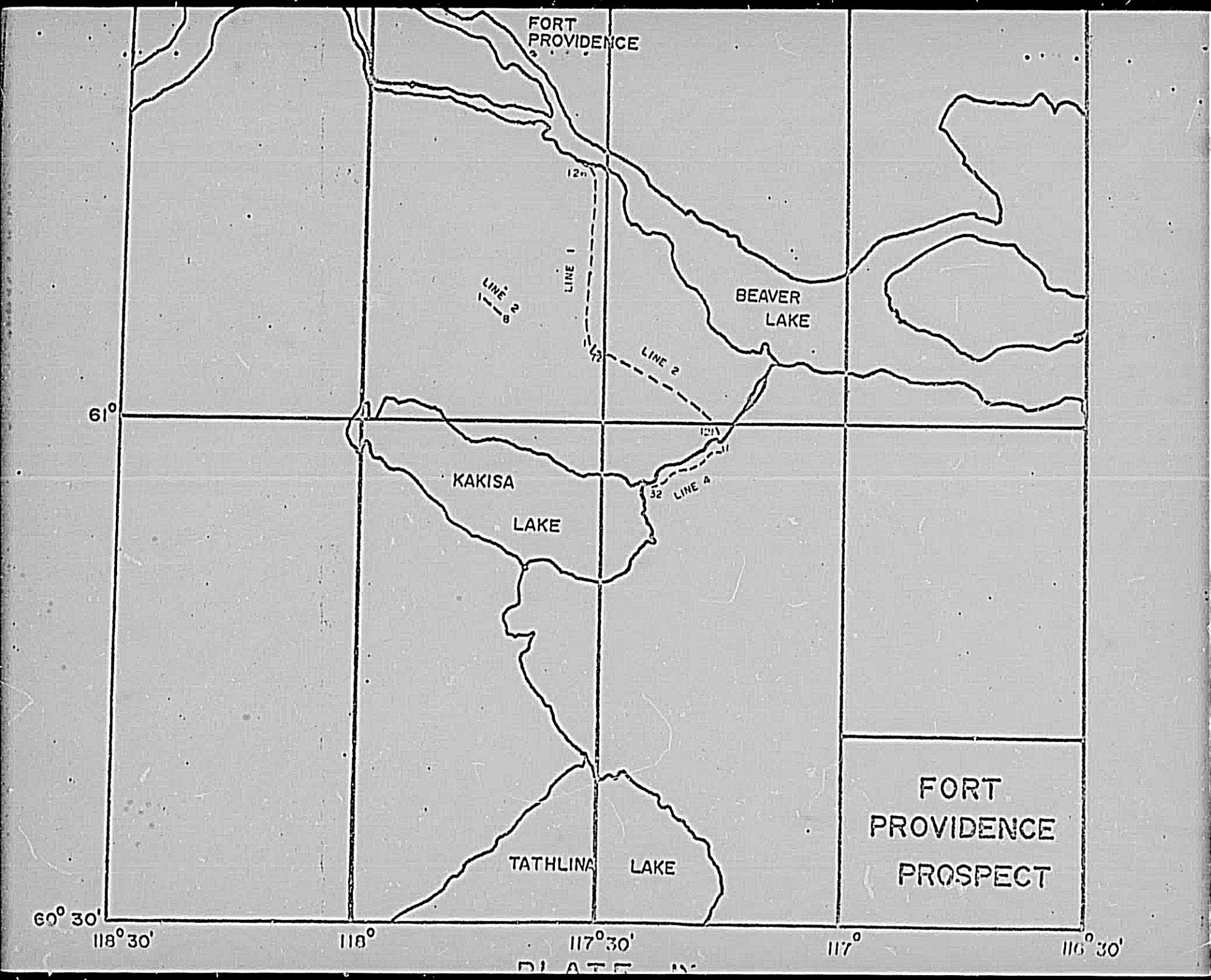
FORT
PROVIDENCE
12m
LINE 1
LINE 2
8
12
LINE 2
BEAVER
LAKE
61°
12
32
LINE 4
KAKISA
LAKE
TATHLINA
LAKE
FORT
PROVIDENCE
PROSPECT
60° 30'
118° 30'
118°
117° 30'
117°
116° 30'

PLATE IV

26-6-4-6

DIGITAL SEISMIC SURVEY

CONDUCTED

ON THE BEHALF OF

CENTRAL-DEL RIO OILS LIMITED

FINA OIL BUILDING, (2nd FLOOR)

CALGARY, ALBERTA

BY

GEOPHYSICAL SERVICE INCORPORATED

1120 GUINNESS HOUSE

CALGARY, ALBERTA

PARTY 420

PARTY CHIEF ---- GAVIN EDWARDS

SEPTEMBER, 1967.

I. INTRODUCTION

The purpose of this report is to outline the recording and processing procedures employed by Geophysical Service Incorporated, Party 420, in a seismic survey conducted in the Northwest Territories.

This prospect is located in the Fort Providence Area, East of the 6th Meridian, West of 117° Longitude, North of 60° 50' Latitude and South of 61° 20' Latitude.

Work commenced on September 16, 1967 and was completed by September 27, 1967.

FIELD PROCEDURES

SURVEYING

Initial elevations were taken from a Department of Works Survey in the area and then later adjusted to the Geodetic elevations.

SHOOTING

Single holes were shot at a depth of 40 feet, using a charge size of 2 1/2 lbs. and remote radio detonation.

RECORDING

All data was recorded in digital form on magnetic tape using Series 9000 amplifiers in conjunction with Texas Instruments Digital Field System (D.F.S.). The Ganged Automatic gain control (GAGC) mode of operation with the gain recorded on tape in Channel 30 was used, making possible the recovery of true amplitude information.

Three second records were made using a 2 mil. sample rate. Both the uphole and the time break were recorded remotely by radio and the filters employed were 18 cps. on the low side and 112 cps. high cut with a 24 db/octave slope.

All data was shot single fold or 100% using a group interval of 110'. The shot point was usually between groups 12 and 13 of the spread, except in certain spots where a shot point had to be missed due to bad terrain etc., when endovers would be shot. Each group consisted of 9 Hall Sears 20 cycle geophones laid in line at intervals of 12 feet.

PERSONNEL AND EQUIPMENT

NAME	POSITION	UNIT
D. E. HILL	PARTY MANAGER	62151 U
E. DONALD	INSTRUMENT ENGINEER	4258 R
A. SCHINDLE	SHOOTER	62156 E
R. HOULDEN	CABLE MAN	52160 CT
K. MARSH	CABLE MAN	52161 CT
B. GEORGE	JUG HUSTLER	
D. TYSON	JUG HUSTLER	
B. JOHNSON	JUG HUSTLER	
F. NARROW	INSTRUMENT ENGINEER TRAINEE	
G. SHERMAN	DRILLER	3267 MD
R. GRIESBRECHT	DRILL HELPER	3270 W
J. SILBERNAGEL	DRILLER	3266 MD
P. CALLAHAN	DRILLER TRAINEE	3269 W
LANG WOO	SURVEYOR	3240 U
W. CHOMA	SURVEYOR	3240 U
N. HENNINGSGARD	RODMAN	

OFFICE PERSONNEL

G. EDWARDS	PARTY CHIEF
M. BOWER	GEOPHYSICAL ENGINEER
D. CAIRNS	GEOPHYSICAL ENGINEER
M. BENWICK	JR. COMPUTER

DIGITAL PROCESSING

GENERAL PROCEDURES:

The data was displayed on Dri-rite paper records which were sent in from the field. However, the quality of these field records and their rapid deterioration after a relatively short period of time, necessitated the playing back of the field tapes for office use.

RESAMPLING; SEIS EDIT; NMO; DCN; DGF;

These separate functions were performed sequentially and back-to-back, within the "300 Package", as follows:

Resampling

Before any processing was started the data was resampled from 2 ms. data to 4 ms. data.

Seis Edit:

This programme allows zeroing of bad traces or portions thereof that would interfere with an accurate interpretation of the results. It also enables polarity reversal and gain recovery. The gain applied in the field to obtain desirable tape-saturation levels of events must be altered to obtain true amplitude relationships.

This is accomplished by comparing the energy decay obtained from the velocity function in the area with the actual gain curve that was applied. From this, a resultant curve which gives more true amplitude relationships can be determined. Gain applied in the field is recorded on a

Seis Edit - cont'd.

separate Channel (Channel 30), whose voltage is obtained by averaging gain applied to 4 traces across a field record.

Trace amplitude equalization is also accomplished in the seis edit programme, and this compensates for unequal trace to trace amplitudes, and for differences in charge sizes from record to record.

NORMAL MOVE OUT CORRECTIONS:

This routine applies static and dynamic corrections to remove normal move out, a two-dimensional effect of the recording geometry, by calculating and applying a correction to each trace using group distances and a velocity function. These velocity functions were worked out individually for each area by a G.S.I. Velocity group who based their work on sonic logs etc., that were available in the area.

DECONVOLUTION:

In all instances the deconvolution operator was determined as a result of an Harmonic Analysis. A 9 point operator was used over a gate of from .200 to .700 seconds.

There are three basic purposes of deconvolution:

1) To remove periodic events - short or long, depending upon the length of operator employed, e.g. ring, short period multiples.

2) To equalize the power spectrum - all traces over one spread and from one spread to another are given a

DECONVOLUTION - cont'd.

nearly constant energy level over the same frequency range. This means that the shot pulse variability has been stabilized, thus effectively placing all of the shots for a given prospect in the same medium. Character continuity is much improved as the masking effects of variable, narrow and powerful frequency bands attendant to variable shot media are removed.

3) To increase resolution - the time function is collapsed by modified inverse filtering representing a "dividing out of the reflection process" in an attempt to simulate an impulsive sequence as would be given by an impulsive synthetic from an accoustic log of the earth. In this manner subtle changes of reflection character that may be geologically significant can be recovered and timed with a high degree of precision. Optimum statics can then be picked on the section.

STATICS

A static correction was employed to flatten the basement reflection to a time of .400 seconds. After the statics were applied, all records were displayed on film from which blue line prints were made.

ACKNOWLEDGMENTS

We extend our appreciation to Central-Del Rio Oils Limited, and their representative L. Stevens, for their co-operation in these surveys.

Respectfully submitted,

Geophysical Service Incorporated.

(signed) G. Edwards
Gavin Edwards -- Party Chief.

Frank Schweiger -- Supervisor.

PROCESSING FLOW CHART

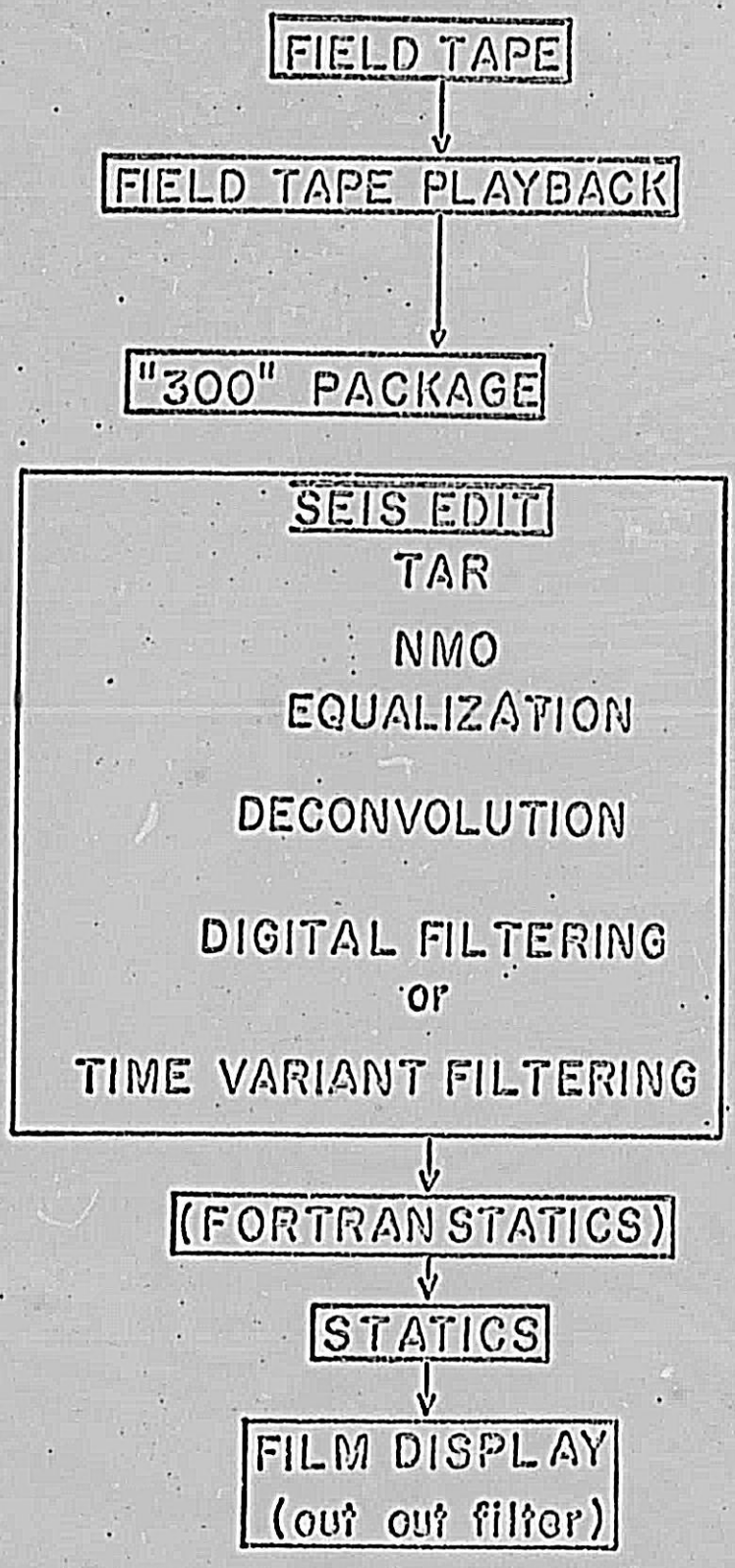

PLATE I

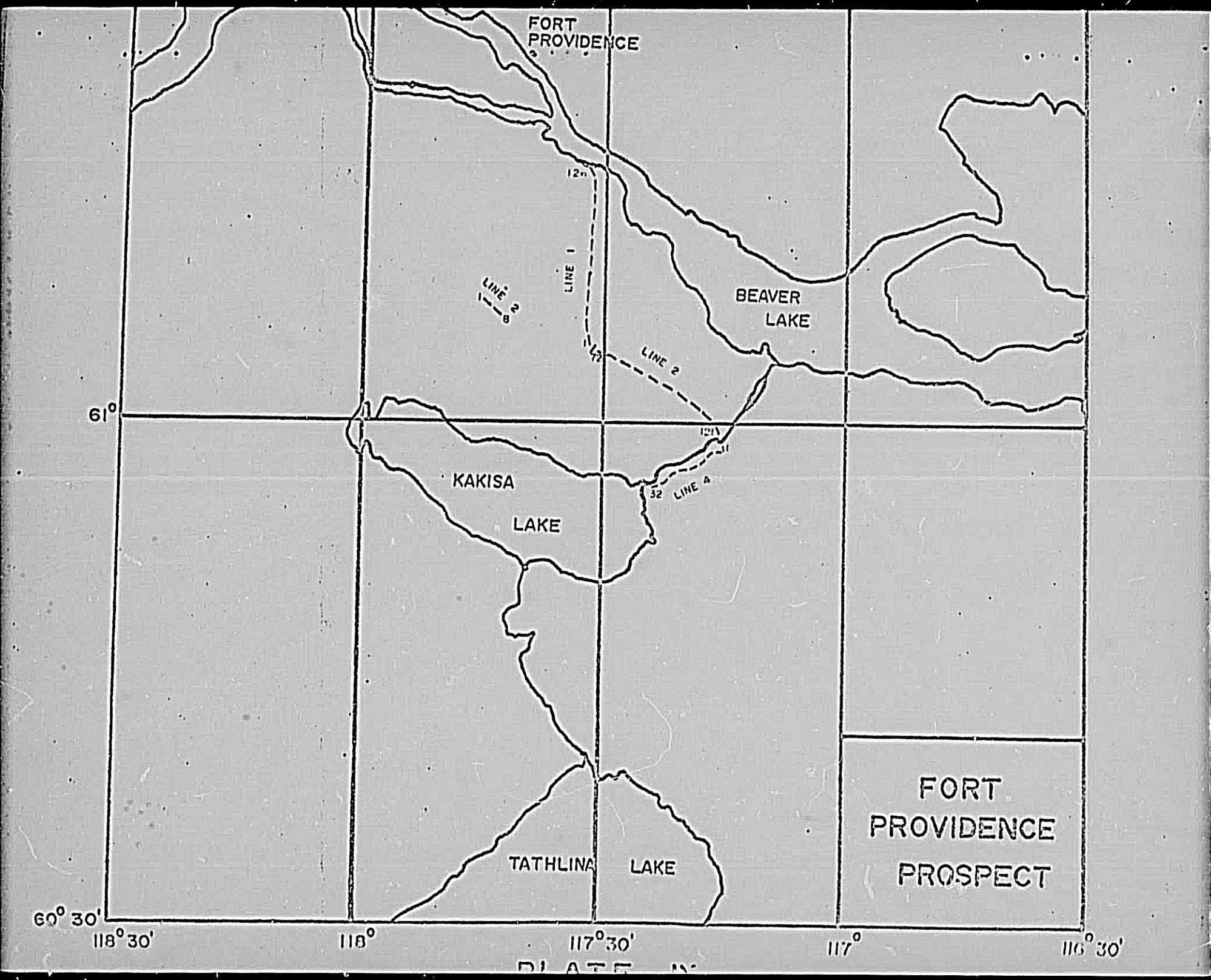
FORT
PROVIDENCE
12m
LINE 1
LINE 2
8
12
LINE 2
BEAVER
LAKE
61°
12
32
LINE 4
KAKISA
LAKE
TATHLINA
LAKE
FORT
PROVIDENCE
PROSPECT
60° 30'
118° 30'
118°
117° 30'
117°
116° 30'

PLATE IV