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NUMBER 8344

PEL 52

OTWAY BASIN

1991 MOUNT BRUCE SEISMIC SURVEY

REPORTS FOR THE PERIOD APRIL - JULY 1991

Submitted by

Irvin Weitzmann and Associates
1991

MINES AND ENERGY
SOUTH AUSTRALIA

Enquiries: Records Management
Mines and Energy South Australia
191 Greenhill Road, Parkside 5063
Telephone: (08) 274 7687
Facsimile: (08) 272 7597

ENVELOPE 8344

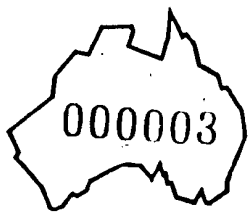
TENEMENT: PEL 52; Otway Basin

TENEMENT HOLDER: Irvin Weitzman and Associates (operator) and Lakes Oil NL

CONTENTS

END OF CONTENTS

Oil and Gas Exploration



IWA

P.O. Box 407
Okemos, Michigan 48805 USA
(517) 349-1330
FAX (517) 349-1508

Agent:
Mr Ray Willox
Exploration Field Services
RMB 8280
TIMBOON Vic 3268
Phone: 055 665173 Fax: 055 665193

2nd April, 1991

The Director General
S.A. Department of Mines & Energy
P O Box 151
EASTWOOD S.A. 5063

Dear Sir

APPLICATION FOR CONSENT TO CARRY OUT SEISMIC SURVEY IN PEL52 - 1991 MT BRUCE SEISMIC SURVEY

In accordance with the Petroleum Act (1940-1989), IWA as licensee of PEL52, hereby applies for permission to conduct a survey of approximately 21 kilometres within the permit area.

Survey Details

Name:	Mt Bruce Seismic Survey
Proposed Date of Commencement:	28 April, 1991
Expected Duration:	4 days
Contractor:	Western Geophysical Australia
Energy Source:	Vibroseis
Technique:	Multifold Seismic
Instruments:	Sercel SN 368 / 240 Channels
Permitting & Line Clearing:	Exploration Field Services (Ray Willox)
Line Kms:	21 Kms
Crew Size:	33 persons
Estimated Cost:	$100 000
Person in Charge:	Ray Willox (as agent for IWA)
If unavailable:	Paul W Marvin II, IWA

It is intended that Paul W Marvin II of IWA will be in attendance during the recording phase, in his absence Ray Willox of Exploration Field Services will be supervising and undertaking all permitting and line preparation.

Mr Lindsay Wilson of Millicent, S.A., will be contacted and a field inspection will be carried out with him with regard to any aspects of Aboriginal heritage or Aboriginal sites which may be affected by the survey, if any sites are known or identified these will naturally be avoided during the conduct of the survey.

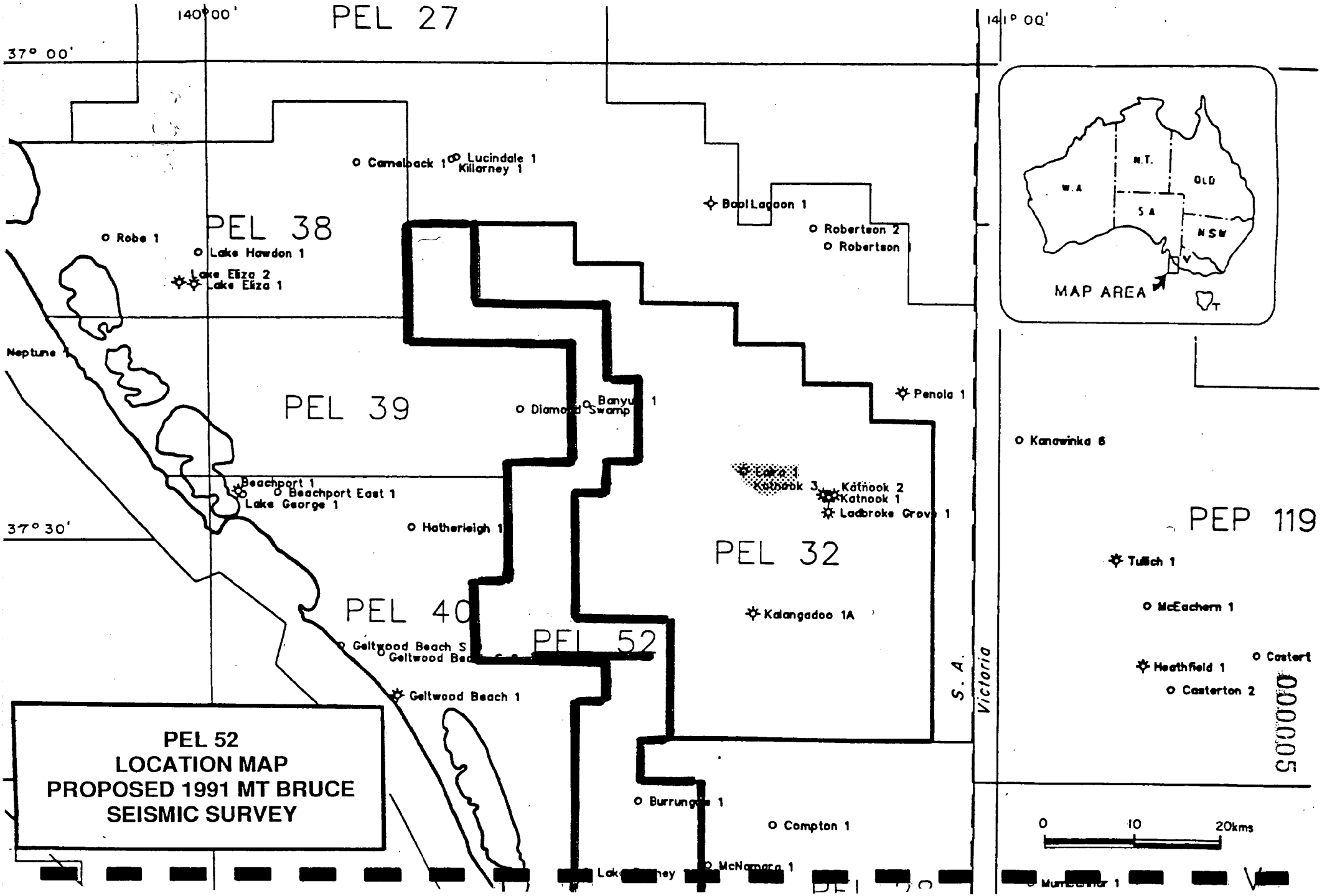
The Code of Environmental Management of seismic exploration operations in the S-E of South Australia as published by the Department of Mines and Energy September 1990 will be adopted and this survey will be carried out under that code.

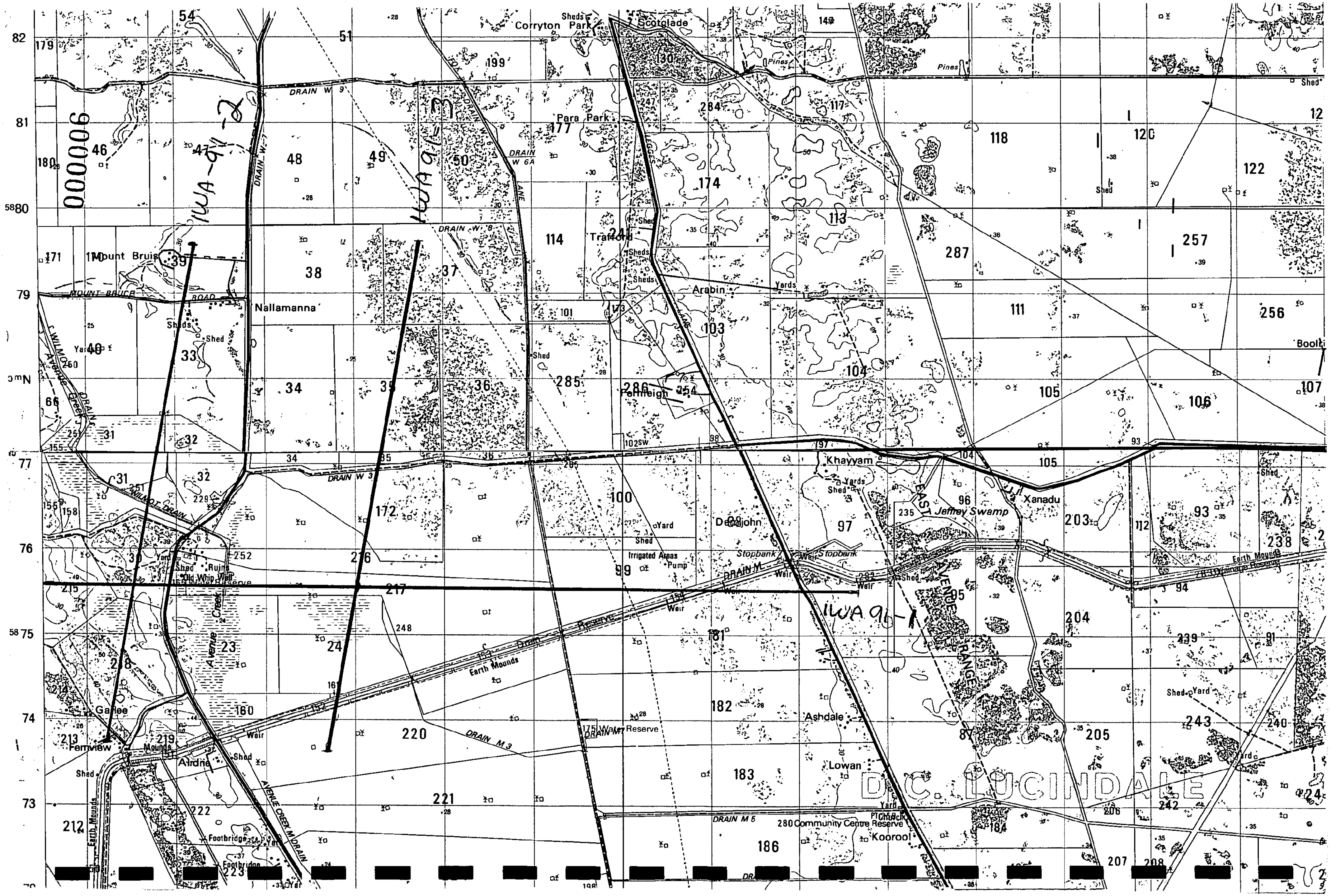
The location of the lines as detailed on the 1-50000 topographic map and the accompanying colour aerial photographs have been determined after re-processing of previously recorded seismic data. Due to the relevant short length of each line it is important that the recording take place as programmed and very little if any flexibility in movement of line locations is possible.

Some clearing of native vegetation will be required and it is intended to use a hydro-axe for this purpose with the minimal interference to vegetation to allow the survey to be conducted efficiently.

Yours faithfully
for and on behalf of IWA

R. Willox
Manager, Exploration Field Services


140° 00'
PEL 27
141° 00'
37° 00'
Camelback 1
Lucindale 1
Killarney 1
Bool Lagoon 1
Robertson 2
Robertson
PEL 38
Robe 1
Lake Hawdon 1
Lake Eliza 2
Lake Eliza 1
MAP AREA
N.T.
W.A
QLD
S.A
NSW
V
T
Neptune 1
PEL 39
Diamond Swamp
Banyu 1
Penola 1
Kanawinka 6
Beachport 1
Beachport East 1
Lake George 1
Katnook 3
Katnook 2
Katnook 1
Ladbroke Grove 1
37° 30'
Hatherleigh 1
PEL 32
PEP 119
Tullich 1
McEachern 1
PEL 40
PEL 52
Kalangadoo 1A
Geltwood Beach S
Geltwood Beach 1
Heathfield 1
Casterton
Casterton 2
S. A.
Victoria
Burrungule 1
Compton 1
McNamara 1
0
10
20kms
PEL 52
LOCATION MAP
PROPOSED 1991 MT BRUCE
SEISMIC SURVEY



000006
IWA-91-2
IWA 91-3
IWA 91-1
Corryton Park
Scotolade
Para Park
Mount Bruce
Mount Bruce Road
Nallamanna
Trafford
Arabin
Fernleigh
Khayyam
Xanadu
Jeffrey Swamp
East Avenue Range
Deeljohn
Drain W 9
Drain W 8
Drain W 6A
Drain W 3
Drain M
Drain M 3
Drain M 5
Avenue Creek
Avenue Creek M Drain
Wilmot Drain
Irrigated Areas Pump
Stopbank
Weir
Earth Mounds
Drain Reserve
Water Reserve
Galloe
Fernview
Airdrie
Footbridge
Ashdale
Lowan
Koorool
Community Centre Reserve
D.C. LUCINDALE
Old Whip Weir
Reserve
Sheds
Shed
Yards
Pines
82
81
5880
79
77
76
5875
74
73

DECLARATION OF ENVIRONMENTAL IMPACT FACTORS
MT BRUCE SEISMIC SURVEY, 1991
PEL 52, SOUTH AUSTRALIA

1 Introduction

This declaration is made in accordance with the requirements covered by the Petroleum Regulations, 1989 and follows procedures and practices set forth in "The Environmental Management of Seismic Exploration Operations in the South-East of South Australia", September 1990.

2 Name and Type of Activity

The Survey is called Mt Bruce Seismic Survey, 1991, and will be recorded using the Vibroseis technique.

3 Crew Size and Equipment

Full list of crew and equipment - see Schedule A

4 Description of the Natural Environment

The survey area is contained within the Southern Wetlands and Dune Ranges Environmental Region, and falls within the Redgum Swamp Environmental Association. This Association is defined as flat plain, often swampy in winter, drained and cleared to open parkland with pasture understory. Generally the area covered by the survey is flat or gently undulating land. It is naturally cleared, or cleared by man, having natural or improved pasture. Low areas are often crossed by artificial drains.

5 Environmentally Sensitive Areas

Individual line descriptions identify and describe the vegetation applicable to each location. There are no known parklands or reserves affected by the survey.

6 Liaison with Responsible Groups

Consultation with land holders, Aboriginal groups, local councils etc., will be conducted by the Land Manager/Permit Person (Ray Willox) whose duties will include early and ongoing contact with property owners and council as well as monitoring environmental impact.

7 Monitoring Impact on the Environment

The Land Manager/Permit Man will be responsible for monitoring impact on the environment and shall conduct an audit at the completion of the survey, as set forth in the Code.

Lines IWA 91-1

Orientation: E-W

Length: 9 ~~12~~ kms

Description:

This line starts approximately 750 m east of Legges Lane in close proximity to Drain M, it traverses sparsely timbered red gum country and agricultural grazing land for 7.5 kms proceeding west which will require preparation by means of an agricultural slasher, it then enters approximately .5 km of intermittent stands of native vegetation which may require the use of a hydro-axe. For the most westerly 600 m of this line it re-enters pasture land which will require slashing only. This line crosses both Drain M and Wilmot Drain. Existing bridges will allow the recording crew and associated machinery to cross these drains with no interference to embankments or drain formations.

Line IWA 91-2

Orientation: Approx. N-S

Length: 6 kms

Description:

This line starts in the North approximately 400 m N-W of the Mt Bruis Homestead and for first 3 km traverses open pasture land. It then passes through approx. 800 metres of native vegetation back into open pasture land, re-enters a further stand of native vegetation within which it intersects with line IWA 91-1, it crosses more open pasture land South of the intersection with the last km once again entering a stand of native vegetation. Some clearing has taken place within the 3 areas of native vegetation and it is envisaged that with a closer field inspection access through these vegetated areas will be available with very little impact. Some use of the dydro-axe will possibly be required.

Line IWA 91-3

Orientation: Approx N-S

Length: 6 kms

Description:

The Northern portion of this line is within stands of sparsely located red gum timber which will not require any form of clearing, the balance of the line is entirely within open pasture land and will require nothing further than slashing as a form of line preparation.

000009

SCHEDULE "A"

I. **PERSONNEL AND EQUIPMENT**

A. **PERSONNEL**

1. **FIELD BASED**

a) **Management**

One (1)	Party Manager
One (1)	Field Clerk

b) **Surveying**

One (1)	Chief Surveyor
One (1)	Field Surveyor
Three (3)	Rodmen/Chainmen

c) **Recording**

One (1)	Observer
One (1)	Assistant Observer/Technician
One (1)	Line Boss
Twelve (12)	Linemen
One (1)	Geophone/Cable Repair

d) **Vibrators**

One (1)	Vibrator Mechanic/Technician
Four (4)	Vibrator Operators

e) **Upholes**

One (1)	Seismologist/Geophysicist
One (1)	Uphole/Weathering Observer

f) **Field Base**

One (1)	Mechanic
Two (2)	Utility/Drivers

TOWN BASED

One (1)	Supervisor
One (1)	Expediter
Administration and secretarial staff	

Sufficient additional personnel will be provided for crew rotation on a 30 days on 10 days off basis.

2.1.2 Field Units

Three (3)	Crossing station units (CSU)
Four hundred fifty (450)	Station units (SU)
Four (4)	Repeater units (RU)
Thirteen (13)	Power Supply units (PSU)

2.1.3 Associated Equipment

One (1)	Cable checker-line cables (manufactured by Western Geophysical)
One (1)	Line simulator unit for 368 boxes
One (1)	Oscilloscope Tektronix model 2445A
One (1)	Trouble Tracker III : Line/Box checker
One (1)	BTS - Box Test system for field units

2.2 FACE™ SYSTEM

i. Hardware
Compaq 386 20 Hz Desktop Computor

- 300 megabyte hard disk
- 4 megabyte memory card
- IBM VGA graphics card and VGA monitor
- Wyse high resolution monitor for plotting
- 80387 math compressor
- 3.5 inch high density (1.4 mb) drive
- 5.25 inch low density (360 kb) drive
- Backup power system

ii. Software
- Micromax Version 1.6

2.3 ENERGY SOURCE

Five (5) Vibrator LRS-311

Manufacturer	:	Litton Resource Group
Model	:	LRS-311
Vehicle Description	:	13.5 Ton Vibrator mounted on LRS AHV 12 Buggy with Detroit 6V71, 228 HP engine
Peak Force	:	27,240 lbs
Control Electronics	:	Pelton Mod.5 Advance I Electronic System with ground force phase locking and force amplitude control
Baseplate Geophones	:	Bell and Howell CEC-4102
Non Linear Sweeps	:	Pelton Frequency Pre-Emphasis Option

2.4 CABLES

Number of sections	:	450
Type	:	Telemetry
Manufacturer	:	LRS
Number of Pairs	:	3
Length	:	55 meters
Extenders/Jumpers	:	5 x 110 meters
Connectors	:	LRS 5348 P

2.5 GEOPHONES

Number of strings	:	440
Geophone per string	:	12 (6 series by 2 parallel)
Geophone Spacing	:	5 meters
Terminations	:	LRS 5517 at either end
Manufacturer	:	Geospace/LRS
Model	:	GSC 20D/LRS 1020
Base Type	:	Spike (3 inch)
Natural Frequency	:	10 Hz
Coil Resistance	:	395 ohms
Damping	:	70%
Box Adaptor Plug	:	LRS 5518

2.6 COMMUNICATIONS

2.6.1 SSB Radios

Five (5) 100 watt single side band radios Stingray 1208 equipped with 5 W.G.C. licenced frequencies in the 4, 6, 7, 9 and 13 KHz bands. In addition camp radios are fitted with relative R.F.D.S. frequencies
One (1) Codan 7727 radio interfaced with computer controlled teletype equipment for voice and teletype communications with Perth office.

2.6.2 UHF Radios

Twenty (20) GE Custom MVP for infield and vibrator to recorder communications.

2.6.3 C.B. Radios

3 x 40 Channel Citizen band radios for communication with local landowners and Fire Control officers.

2.7 SURVEY EQUIPMENT

Two (2)	Theodolites Wild T1
One (1)	AGA Geodimeters 122 (E.D.M.)
One (1)	HP 41CV calculator with printer
One (1)	HP 11C calculator
One (1)	Kern Total Station system with Psion data collector

FACE™ System - Seismic Land Surveying Package Data sets output in SEG-P1, SEG-P3 and UK00A-81/84 format on 5.25 inch (360KB) diskette for

transporting to client database.
Complete Survey/Drafting office is located in the Flycamp trailer complete with HP plotter.

2.8 VEHICLES

Four (4)	Isuzu 4WD Cable trucks (1 spare)
One (1)	Isuzu 4WD Supply truck with crane and 600 gallon water tank
One (1)	Isuzu 4 x 4 Vibrator Service truck with crane, welder, compressor, tools, fuel and water tanks
One (1)	Isuzu 6 x 6 Water truck 1500 gallon capacity - fire fighting unit
One (1)	Isuzu 6 x 6 Fuel truck 1500 gallon capacity
* NOTE	Isuzus fitted with front mounted winches
One (1)	Toyota Station Wagon
Three(3)	Toyota Personnel Carriers 4 x 4
Four (4)	Toyota Pickups 4 x 4
Five (5)	Vibrators (LRS-311) mounted on LRS AHR-3 Articulated buggy (1 spare)
One (1)	Recording Cab mounted on LRS AHV-3 Articulated buggy including A/C and generator
* NOTE	Buggies fitted with front mounted winches and 67 x 35 x 25 all terrain tyres

Vehicles equipped with knapsack fire fighting sprays.

FIELD REPORT

MT BRUCE SEISMIC SURVEY

P.E.L.52 SOUTH AUSTRALIA
OTWAY BASIN
1991

OPERATOR

I.W. International Inc.
148 East Grand River
Williamstown Michigan 48895
U.S.A.

ACQUISITION CONTRACTOR

Western Geophysical
447-449 Belmont Avenue
Kewdale W.A. 6105

PERMITTING, ACCESS AND PUBLIC RELATIONS

Exploration Field Services
RMB 8280
Timboon Vic 3268

Report prepared by:
Ray Willox
E.F.S.
RMB 8280
Timboon Vic 3268

CONTENTS

INTRODUCTION

Petroleum Exploration Licence 52 lies within the onshore area of the Otway Basin in the South East of South Australia. The Mount Bruce Seismic Survey was conducted during April/May 1991 by I.W.International Inc; contractors engaged for acquisition were Western Geophysical Australia.

Previous work in the area during recent years consists of regional surveys in 1981-87 This work was undertaken by several companies during that period, the results of which have been obtained and considered prior to the planning of the Mt Bruce Survey.

Comment within this report will deal with the logistics and field operations from a non-technical aspect; Mr Paul Marvin from I.W.International was in Australia for recording, and no doubt has information on the technical aspects of recording. Any reference to the crew will basically deal with their performance regarding efficiencies and standards which may have affected landowners or I.W.International as licence operators.

LOCATION AND TERRAIN

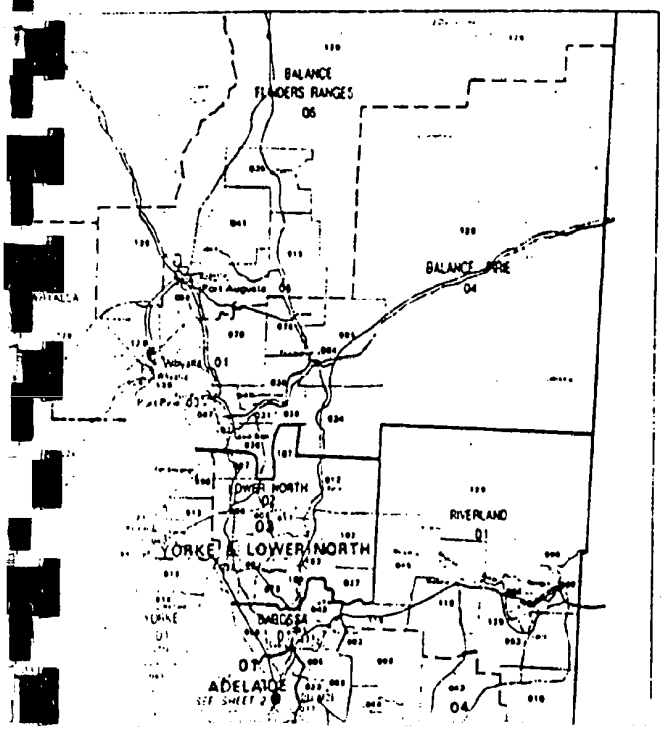
PEL 52, located in the south east of South Australia (refer to maps), is typically very flat country with little relief. There is one very low rise running approximately N/S through the prospect. These rises which run parallel to the coast at distances of 10-12 kilometres apart are identified as ranges even though they are only 10-40 metres above the surrounding country. West Avenue Range is the name given to the more prominent and only notable rise in the prospect area.

The area is more specifically described in the Environmental Associations of South Australia - Province 1 South East within the section Southern Wetlands and Dune Ranges Environmental region under reference 4-7; broadly described in these references as extensive low lying plain with low widely spaced calcarenite dunes, small sand dunes and swamps. Mostly cleared to parkland with pasture understory.

Due to partial inundation during winter months all seismic activity must be restricted to the summer-autumn period; during this timeframe, surface conditions lend themselves to relatively easy seismic access.

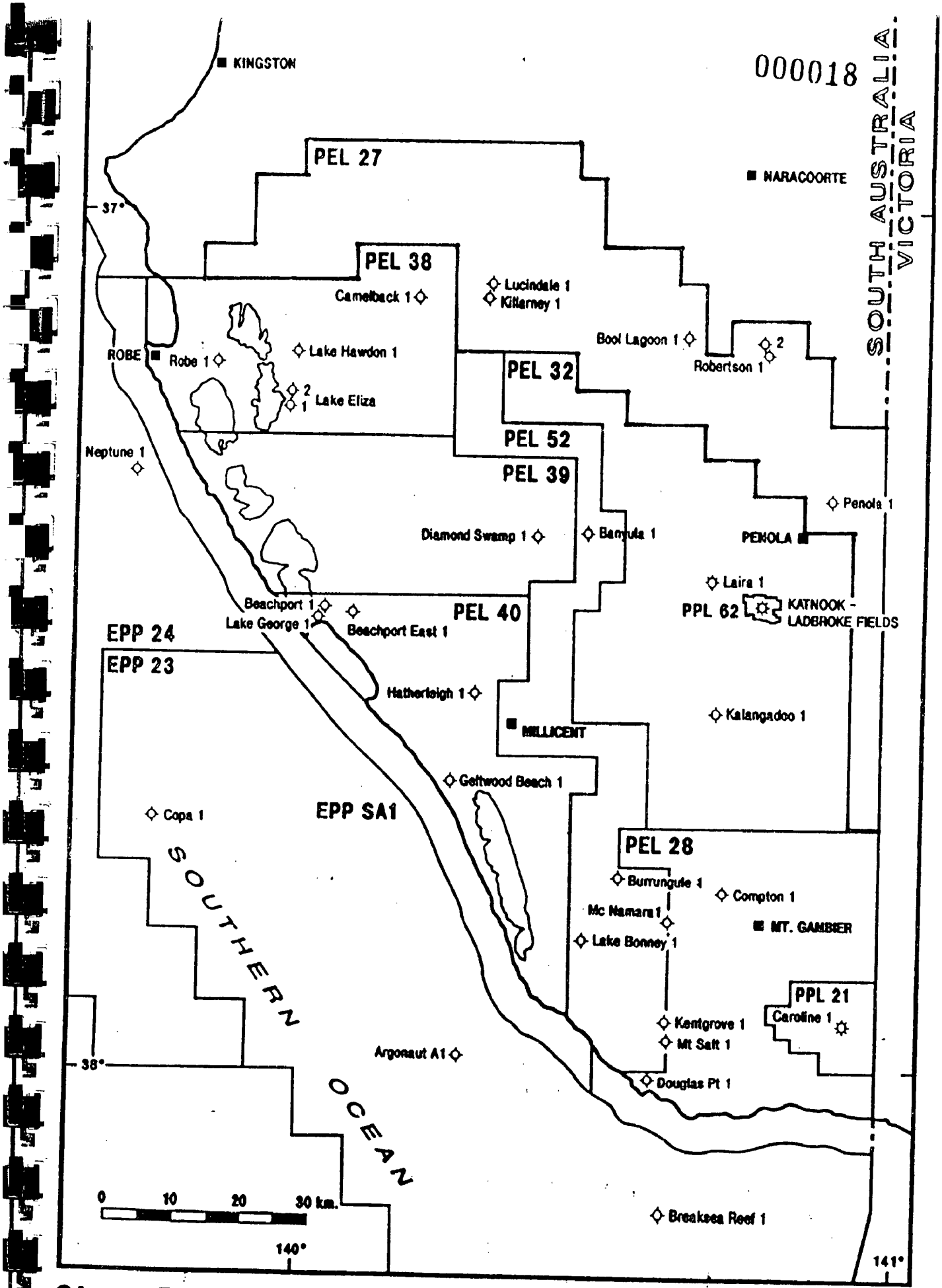
000017

ALIA



MUNICIPAL BOUNDARIES

SE OF SOUTH AUSTRALIA



Otway Basin Permit & Well Location

RECONNAISSANCE

An inspection of the area to be surveyed was undertaken on 7/3/91 to specifically note any surface features and what effect these would have on the conduct of the survey.

It was apparent that some clearing of native vegetation would be required and that one of the major drains which service the south east would require crossing on a couple of occasions. Surface rock was evident in the western portion of the proposed survey area, but generally the area lent to efficient seismic recording due to it being predominantly very flat and, with the exception of the area where Lines IWA-1 and IWA-2 intersected, free of timber.

Aerial photographs were obtained and used to assess distances through native timber for submission of the application to conduct the survey and associated environmental impact statements.

IWA

000020

P.O. Box 497
Okemos, Michigan 49[illegible] USA
(517) 349-1[illegible]
FAX (517) 349-[illegible]

Agent:
Mr Ray Willox
Exploration Field Services
RMB 8280
TIMBOON Vic 3268
Phone: 055 665173 Fax: 055 665193

To ABORIGINAL HERITAGE TRUST

Property ....

Being the owner/occupier of section MT BRUCE AREA

Address 17 PLUNKETT TCE

Hundred of FOX

Phone 333 602

IWA are the holders of a Petroleum Exploration Licence issued under the South Australian Petroleum Act which allows the company to conduct seismic surveys and other operations as necessary to test for petroleum on the land wich you own or occupy.

The company intends to conduct a seismic survey in the area during the months of APRIL/MAY. This survey will necessitate travelling across your land. Vehicles involved will include four-wheel drive trucks and a truck-mounted drilling rig. We seek your co-operation in allowing this survey to proceed. The installation of temporary gates will be necessary on most properties and in some cases clearing and slashing of the line will also be required. Any interference with improvements will be kept to a minimum to allow the survey to be done and will be reinstated to the owner's satisfaction as soon as practicable after the survey is complete; if any damage occurs to the property, restoration of such damage will be carried out to the owner's satisfaction. Any compensation in accordance with the Petroleum Act will be met by the company.

An extract of the relevant part of the Petroleum Act is reproduced on the reverse of this notice.

OWNER/OCCUPIER REQUIREMENTS TO BE OBSERVED DURING SURVEY

AN INSPECTION OF THE PROPOSED SURVEY AREA HAS NOT REVEALED ANYTHING OF INTEREST REGARDING ABORIGINAL HERITAGE.

During the survey a representative of the company will be available in the district should any problems occur.

Upon completion of the survey, you will be contacted to ensure that any restoration necessary has been identified and carried out to your satisfaction.

Thanking you,

R G Willox

For IWA

Date 24/4/91

I the undersigned consent to access to the above properties subject to the requirements of the Petroleum Act.

Signed G. G. Wilson
Owner/Occupier

Date 24/4/91

000021

IWA

P.O. Box 497
Okemos, Michigan 48805 USA
(517) 349-1309
FAX (517) 349-1580

Agent:
Mr Ray Willox
Exploration Field Services
RMB 8280
TIMBOON Vic 3268
Phone: 055 665173 Fax: 055 665193

To S. F[illegible]MAN.

Property Mr. [illegible]

Being the owner/~~occupier~~ of section 30, 39

Address PMB Lucindale

Hundred of Fox

Phone 667 062 PETER

IWA are the holders of a Petroleum Exploration Licence issued under the South Australian Petroleum Act which allows the company to conduct seismic surveys and other operations as necessary to test for petroleum on the land wich you own or occupy.

The company intends to conduct a seismic survey in the area during the months of April - May This survey will necessitate travelling across your land. Vehicles involved will include four-wheel drive trucks and a truck-mounted drilling rig. We seek your co-operation in allowing this survey to proceed. The installation of temporary gates will be necessary on most properties and in some cases clearing and slashing of the line will also be required. Any interference with improvements will be kept to a minimum to allow the survey to be done and will be reinstated to the owner's satisfaction as soon as practicable after the survey is complete; if any damage occurs to the property, restoration of such damage will be carried out to the owner's satisfaction. Any compensation in accordance with the Petroleum Act will be met by the company

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Upon completion of the survey, you will be contacted to ensure that any restoration necessary has been identified and carried out to your satisfaction.

Thanking you,

For IWA T. Davies.

Date 16-4-91

I the undersigned consent to access to the above properties subject to the requirements of the Petroleum Act.

Signed J.K Ryan. Date 16-4-91

Owner/Occupier

IWA

P.O. Box 487
Okemos, Michigan 49803 USA
(517) 349-1309
FAX (517) 349-1509

Agent:
Mr Ray Willox
Exploration Field Services
RMB 8280
TIMBOON Vic 3268
Phone: 055 665173 Fax: 055 665193

To MR G M GRIEVE........................

Property NALLAMANA

Being the ~~owner~~/occupier of section ...37, 31, 32, 33..

Address PMB 40 LUCINDALE.

Hundred of ... FOX...................................

Phone 667061
ANDY

IWA are the holders of a Petroleum Exploration Licence issued under the South Australian Petroleum Act which allows the company to conduct seismic surveys and other operations as necessary to test for petroleum on the land wich you own or occupy.

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OWNER/OCCUPIER REQUIREMENTS TO BE OBSERVED DURING SURVEY

TO CROSS DRAIN ON LINE 2 A FORD
CAN BE USED TO WEST OF LINE.

During the survey a representative of the company will be available in the district should any problems occur.

Upon completion of the survey, you will be contacted to ensure that any restoration necessary has been identified and carried out to your satisfaction.

Thanking you,

For IWA [signature]

Date 17-4-91

I the undersigned consent to access to the above properties subject to the requirements of the Petroleum Act.

Signed [signature: Andrew R Grieve]
~~Owner~~/Occupier

Date 17-4-91

IWA

000023

P.O. Box 467
Okemos, Michigan 48805 USA
(517) 349-1109
FAX (517) 349-1580

Agent:
Mr Ray Willox
Exploration Field Services
RMB 8280
TIMBOON Vic 3268
Phone: 055 665173 Fax: 055 665193

To T A + A M OAKLEY

Property Mt. BOGCE.

Being the owner/~~occupier~~ of section 217, 218

Address Box 468 MILDURA

Hundred of FOX

Phone 34 3054 IREVOR

IWA are the holders of a Petroleum Exploration Licence issued under the South Australian Petroleum Act which allows the company to conduct seismic surveys and other operations as necessary to test for petroleum on the land wich you own or occupy.

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OWNER/OCCUPIER REQUIREMENTS TO BE OBSERVED DURING SURVEY

FENCES NOTE :- USE EXISTING GATES
INTERNALLY WHERE EVER POSSIBLE ON
LINE 1 (ONE)
GATES SHOULD LINE UP
IN CLOSE PROXIMITY TO
SEISMIC LINE

During the survey a representative of the company will be available in the district should any problems occur.

Upon completion of the survey, you will be contacted to ensure that any restoration necessary has been identified and carried out to your satisfaction.

Thanking you,

For IWA

Date 16-4-91

I the undersigned consent to access to the above properties subject to the requirements of the Petroleum Act.

Signed _____ Date 16-4-91
Owner/Occupier

000024

IWA

P.O. Box 487
Okemos, Michigan 49805 USA
(517) 349-1309
FAX (517) 349-1606

Agent:
Mr Ray Willox
Exploration Field Services
RMB 8280
TIMBOON Vic 3268
Phone: 055 665173 Fax: 055 665193

To R. M. White .... Property Dennisohn

Being the owner/occupier of section 99, 35 .... Address RMB 51 Millicent

Hundred of ..... Fox .... Phone 667065 Richard.

IWA are the holders of a Petroleum Exploration Licence issued under the South Australian Petroleum Act which allows the company to conduct seismic surveys and other operations as necessary to test for petroleum on the land wich you own or occupy.

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Upon completion of the survey, you will be contacted to ensure that any restoration necessary has been identified and carried out to your satisfaction.

Thanking you,

For IWA [signature]

Date 16-4-91

I the undersigned consent to access to the above properties subject to the requirements of the Petroleum Act.

Signed [signature] Owner/Occupier Date 16. 4. 91

000025

IWA

P.O. Box 407
Okemos, Michigan 49805 USA
(517) 349-1300
FAX (517) 349-[illegible]

Agent:
Mr Ray Willox
Exploration Field Services
RMB 8280
TIMBOON Vic 3268
Phone: 055 665173 Fax: 055 665193

To B G & G C Sheer ....

Property ....

Being the owner/~~occupier~~ of section ....172....................

Address RMB 49 Millicent

Hundred of ....Fox........................

Phone 343081 Gary

IWA are the holders of a Petroleum Exploration Licence issued under the South Australian Petroleum Act which allows the company to conduct seismic surveys and other operations as necessary to test for petroleum on the land wich you own or occupy.

The company intends to conduct a seismic survey in the area during the months of April-May. This survey will necessitate travelling across your land. Vehicles involved will include four-wheel drive trucks and a truck-mounted drilling rig. We seek your co-operation in allowing this survey to proceed. The installation of temporary gates will be necessary on most properties and in some cases clearing and slashing of the line will also be required. Any interference with improvements will be kept to a minimum to allow the survey to be done and will be reinstated to the owner's satisfaction as soon as practicable after the survey is complete; if any damage occurs to the property, restoration of such damage will be carried out to the owner's satisfaction. Any compensation in accordance with the Petroleum Act will be met by the company.

An extract of the relevant part of the Petroleum Act is reproduced on the reverse of this notice.

OWNER/OCCUPIER REQUIREMENTS TO BE OBSERVED DURING SURVEY

During the survey a representative of the company will be available in the district should any problems occur.

Upon completion of the survey, you will be contacted to ensure that any restoration necessary has been identified and carried out to your satisfaction.

Thanking you,

For IWA [signature]

Date 17-4-91

I the undersigned consent to access to the above properties subject to the requirements of the Petroleum Act.

Signed [signature] Date 17-4-91
Owner/~~Occupier~~

IWA

000026

P.O. Box 467
Okemos, Michigan 48805 USA
(517) 349-1339
FAX (517) 349-1580

Agent:
Mr Ray Willox
Exploration Field Services
RMB 8280
TIMBOON Vic 3268
Phone: 055 665173 Fax: 055 665193

To T & M ANDRE & CO

Property CERES.

Being the owner/~~occupier~~ of section 24 160

Address BOX 76 MILLICENT

Hundred of FOX

Phone 343 041 JOHN

IWA are the holders of a Petroleum Exploration Licence issued under the South Australian Petroleum Act which allows the company to conduct seismic surveys and other operations as necessary to test for petroleum on the land wich you own or occupy.

The company intends to conduct a seismic survey in the area during the months of APRIL-MAY 7th. This survey will necessitate travelling across your land. Vehicles involved will include four-wheel drive trucks and a truck-mounted drilling rig. We seek your co-operation in allowing this survey to proceed. The installation of temporary gates will be necessary on most properties and in some cases clearing and slashing of the line will also be required. Any interference with improvements will be kept to a minimum to allow the survey to be done and will be reinstated to the owner's satisfaction as soon as practicable after the survey is complete; if any damage occurs to the property, restoration of such damage will be carried out to the owner's satisfaction. Any compensation in accordance with the Petroleum Act will be met by the company.

An extract of the relevant part of the Petroleum Act is reproduced on the reverse of this notice.

OWNER/OCCUPIER REQUIREMENTS TO BE OBSERVED DURING SURVEY

* MAIN RECORDING CREW IS TO BE FINISHED BY MAY 7th. IF NOT FURTHER NEGOTIATIONS ARE TO BE MADE WITH OWNER DEPENDING ON WEATHER
* CONTACT OWNER PRIOR TO SURVEYING TO HAVE GATE UNLOCKED ON MT BRUCE RD BOUNDARY

During the survey a representative of the company will be available in the district should any problems occur.

Upon completion of the survey, you will be contacted to ensure that any restoration necessary has been identified and carried out to your satisfaction.

Thanking you,

For IWA J. Willox.

Date 16-4-91

I the undersigned consent to access to the above properties subject to the requirements of the Petroleum Act.

Signed J. O. Andre
Owner/~~Occupier~~

Date 16-4-91

IWA

000027

P.O. Box 497
Okemos, Michigan 48805 USA
(517) 349-1190
FAX (517) 349-1580

Agent:
Mr Ray Willox
Exploration Field Services
RMB 8280
TIMBOON Vic 3268
Phone: 055 665173 Fax: 055 665193

To LANCE SKINNER

Property

Being the owner/~~occupier~~ of section 220

Address Box 26, MILLICENT

Hundred of FOX

Phone 358021 LANCE

IWA are the holders of a Petroleum Exploration Licence issued under the South Australian Petroleum Act which allows the company to conduct seismic surveys and other operations as necessary to test for petroleum on the land wich you own or occupy.

The company intends to conduct a seismic survey in the area during the months of APRIL - MAY. This survey will necessitate travelling across your land. Vehicles involved will include four-wheel drive trucks and a truck-mounted drilling rig. We seek your co-operation in allowing this survey to proceed. The installation of temporary gates will be necessary on most properties and in some cases clearing and slashing of the line will also be required. Any interference with improvements will be kept to a minimum to allow the survey to be done and will be reinstated to the owner's satisfaction as soon as practicable after the survey is complete; if any damage occurs to the property, restoration of such damage will be carried out to the owner's satisfaction. Any compensation in accordance with the Petroleum Act will be met by the company.

An extract of the relevant part of the Petroleum Act is reproduced on the reverse of this notice.

OWNER/OCCUPIER REQUIREMENTS TO BE OBSERVED DURING SURVEY

DO NOT CUT ANY FENCES.
USE EXISTING GATES AT ALL TIMES.

During the survey a representative of the company will be available in the district should any problems occur.

Upon completion of the survey, you will be contacted to ensure that any restoration necessary has been identified and carried out to your satisfaction.

Thanking you,

For IWA

Date 17-4-91

I the undersigned consent to access to the above properties subject to the requirements of the Petroleum Act.

Signed ..... Owner/~~Occupier~~ Date 17-4-91

000028

IWA

P.O. Box 407
Okemos, Michigan [illegible] USA
(517) 349-1[illegible]
FAX (517) 349-[illegible]

Agent:
Mr Ray Willox
Exploration Field Services
RMB 8280
TIMBOON Vic 3268
Phone: 055 665173 Fax: 055 665193

To FORNER NOMS. [illegible] MURRAY Property ....

Being the owner/occupier of section 181 Address [illegible] 235 MILLICENT

Hundred of FOX Phone 343 876. Fill

IWA are the holders of a **Petroleum Exploration Licence issued** under the South Australian Petroleum Act which allows the company to conduct **seismic surveys and other operations** as necessary to test for petroleum on the land wich you own or occupy.

The company intends to conduct a seismic survey in the area during the months of April-May. This survey will necessitate travelling across your land. Vehicles involved will include four-wheel drive trucks and a truck-mounted drilling rig. We seek your co-operation in allowing this survey to proceed. The installation of temporary gates will be necessary on most properties and in some cases clearing and slashing of the line will also be required. Any interference with improvements will be kept to a minimum to allow the survey to be done and will be reinstated to the owner's satisfaction as soon as practicable after the survey is complete; if any damage occurs to the property, restoration of such damage will be carried out to the owner's satisfaction. Any compensation in accordance with the Petroleum Act will be met by the company.

An extract of the relevant part of the Petroleum Act is reproduced on the reverse of this notice.

OWNER/OCCUPIER REQUIREMENTS TO BE OBSERVED DURING SURVEY

PROPERTY TO BE LEFT AS FOUND.

During the survey a representative of the company will be available in the district should any problems occur.

Upon completion of the survey, you will be contacted to ensure that any restoration necessary has been identified and carried out to your satisfaction.

Thanking you,

For IWA [signature]

Date 16-4-91

I the undersigned consent to access to the above properties subject to the requirements of the Petroleum Act.

Signed [signature] Date 16/4/91

Oil and Gas Exploration

10

000029

IWA

P.O. Box 4?7
Okemos, Michigan 49??? USA
(517) 349-1???
FAX (517) 349-????

Agent:
Mr Ray Willox
Exploration Field Services
RMB 8280
TIMBOON Vic 3268
Phone: 055 665173 Fax: 055 665193

To KHAYYAM ....

Property KHAYYAM

Being the ~~owner~~/occupier of section .. 97 ....

Address Via ....

Hundred of .... Fox ....

Phone 696073
Phil

IWA are the holders of a Petroleum Exploration Licence issued under the South Australian Petroleum Act which allows the company to conduct seismic surveys and other operations as necessary to test for petroleum on the land wich you own or occupy.

The company intends to conduct a seismic survey in the area during the months of April - May. This survey will necessitate travelling across your land. Vehicles involved will include four-wheel drive trucks and a truck-mounted drilling rig. We seek your co-operation in allowing this survey to proceed. The installation of temporary gates will be necessary on most properties and in some cases clearing and slashing of the line will also be required. Any interference with improvements will be kept to a minimum to allow the survey to be done and will be reinstated to the owner's satisfaction as soon as practicable after the survey is complete; if any damage occurs to the property, restoration of such damage will be carried out to the owner's satisfaction. Any compensation in accordance with the Petroleum Act will be met by the company.

An extract of the relevant part of the Petroleum Act is reproduced on the reverse of this notice.

OWNER/OCCUPIER REQUIREMENTS TO BE OBSERVED DURING SURVEY

During the survey a representative of the company will be available in the district should any problems occur.

Upon completion of the survey, you will be contacted to ensure that any restoration necessary has been identified and carried out to your satisfaction.

Thanking you,

For IWA [signature]

Date 16-4-91

I the undersigned consent to access to the above properties subject to the requirements of the Petroleum Act.

[signature] 16-4-91

000030

IWA

P.O. Box 4??
Okemos, Michigan 4???? USA
(517) 349-1???
FAX (517) 349-????

Agent:
Mr Ray Willox
Exploration Field Services
RMB 8280
TIMBOON Vic 3268
Phone: 055 665173 Fax: 055 665193

To DAVID ANDERSON .... Property ....

Being the owner/occupier of section 215, 216 .... Address FARNER RD LUCINDALE

Hundred of FOX .... Phone 343139

IWA are the holders of a Petroleum Exploration Licence issued under the South Australian Petroleum Act which allows the company to conduct seismic surveys and other operations as necessary to test for petroleum on the land wich you own or occupy.

The company intends to conduct a seismic survey in the area during the months of APRIL/MAY. This survey will necessitate travelling across your land. Vehicles involved will include four-wheel drive trucks and a truck-mounted drilling rig. We seek your co-operation in allowing this survey to proceed. The installation of temporary gates will be necessary on most properties and in some cases clearing and slashing of the line will also be required. Any interference with improvements will be kept to a minimum to allow the survey to be done and will be reinstated to the owner's satisfaction as soon as practicable after the survey is complete; if any damage occurs to the property, restoration of such damage will be carried out to the owner's satisfaction. Any compensation in accordance with the Petroleum Act will be met by the company.

An extract of the relevant part of the Petroleum Act is reproduced on the reverse of this notice.

OWNER/OCCUPIER REQUIREMENTS TO BE OBSERVED DURING SURVEY

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During the survey a representative of the company will be available in the district should any problems occur.

Upon completion of the survey, you will be contacted to ensure that any restoration necessary has been identified and carried out to your satisfaction.

Thanking you,

R Willox

For IWA

Date 29/4/91

I the undersigned consent to access to the above properties subject to the requirements of the Petroleum Act.

[signature] Owner/Occupier Date 29/4/91

LINE PREPARATION AND CLEARING AUDIT

Preparation of lines for crew access commenced simultaneously with the laying out of seismic lines by the surveyor.

Where possible the fences were laid down to allow access along the survey lines; this technique is preferred by landowners as it eliminates the need to cut wires and the fence is ultimately left in its original condition. Fences are clipped back up after each vehicle passes through to maintain stock security. If fence construction did not allow access by laying the fence over, then temporary gates were installed to permit access where necessary. Gate construction consisted of a "cocky's gap" utilising the existing fence wires and a lever to tension the gap when closed. Additional to the tensioning lever, a safety clip and a security wire are fitted to ensure that stock security is maintained at all times.

Detours in excess of 100 metres were normally eliminated by installation of temporary access, however this varied considerably depending upon conditions such as paddock size, road drains, etc.

Slashing of the line started as soon as fencing was completed and continued as required through to completion. Three passes of the slasher giving a 5 metre cut in total were normally done, however if foliage and vegetation permitted, this was reduced, or if little grass was present, slashing was eliminated altogether. Being able to lay cables onto clear ground and clear vision for drivers to see any stumps, depressions etc governed the requirement of slashing.

A Hydro-Axe was engaged to slash any areas of scrub or foliage too dense or heavy for the agricultural slasher. Details

of line clearing are contained on the remaining pages of this section.

A field inspection involving all interest groups which took place in the south east on 23/1/91 was most beneficial, and a clear understanding of the requirements of each department resulted. The use of hydro axe seems to be well accepted and it is undoubtedly the best known means of establishing access through stands of native scrub. Regeneration is rapid, and without any earth mounds from dozers or graders, the signs of exploration activity rapidly disappear.

000033

EXPLORATION FIELD SERVICES

LINE PREPERATION / CLEARING AUDIT

SURVEY: MT BRUCE

LINE NO.: 1 **TOTAL Km.** 9

VEGETATION TYPES: PASTURE, BRACKEN, NATIVE SCRUB

NATIVE VEGETATION

HUNDRED/ FOX

SECTION/ 30

APPROX DISTANCE/ 500 M

AUTHORITY IN CHARGE/ FREEHOLD LAND

CLEARING METHOD

SLASHER	☑
HYDRO AXE	☑
STICK RAKE	☐
DOZER	☐

COMMENTS: HYDRO AXE USED TO CLEAR MEANDERING TRACK THROUGH NATIVE SCRUB AT INTERSECTION OF LINES 1 & L

BALANCE OF LINE SLASHED - SOME BRACKEN ON WESTERN END OF LINE

PREPARED BY: RAY WILLOX

ON BEHALF OF: L.W.A.

A Dr | A:

000034

EXPLORATION FIELD SERVICES

LINE PREPERATION / CLEARING AUDIT

SURVEY: MT BRUCE

LINE NO.: 2 **TOTAL Km.** 6

VEGETATION TYPES: PASTURE + NATIVE SCRUB

NATIVE VEGETATION

HUNDRED/ FOX

SECTION/ 30 + 218

APPROX DISTANCE/ 1.3 K.

AUTHORITY IN CHARGE/ FREEHOLD LAND

CLEARING METHOD

SLASHER	☑
HYDRO AXE	☑
STICK RAKE	☐
DOZER	☐

COMMENTS: HYDRO AXE USED TO CLEAR NATIVE SCRUB AT INTERSECTION OF LINES 2 & 1. ALSO APPROX 400 M OF SPARCE SCRUB ON SEC 218 SUBJECTED TO USE OF HYDRO AXE - REMOVAL OF DEAD TIMBER & BRACKEN

BALANCE OF LINE SLASHED

PREPARED BY: RAY WILLOX

ON BEHALF OF: IWA

APR. 1 M.

000035

EXPLORATION FIELD SERVICES

LINE PREPERATION / CLEARING AUDIT

SURVEY: MT BRUCE

LINE NO.: 3 **TOTAL Km.** 6

VEGETATION TYPES: PASTURE

NATIVE VEGETATION

HUNDRED/ FOX

SECTION/

APPROX DISTANCE/

AUTHORITY IN CHARGE/ FREEHOLD LAND

CLEARING METHOD

SLASHER	☑
HYDRO AXE	☐
STICK RAKE	☐
DOZER	☐

COMMENTS: LINE 3 ENTIRELY WITHIN OPEN PASTURE LAND. AGRICULTURAL SLASHER ONLY

PREPARED BY: R G WILLOX

ON BEHALF OF: ICWA

R G Willox

SURVEYING AND RECORDING

Line layout and surveying of the prospect started on 20/4/91. No problems were encountered during line layout and the only inconvenience to the survey crew was experienced due to the density of the scrub and native timber at the intersection of Lines IWA-1 and IWA-2.

There appeared to be no convenient survey control in the immediate area; details of a control point established per satellite in 1981 were obtained and passed to the surveyors, and permanent markers from 1981 seismic recording were located. A South Australian Lands and Survey permanent marker was located giving sufficient survey points to tie into. Permanent markers placed during surveying were not cemented in as is normal practice; this was brought to the notice of field management and I arranged for the fencing crew to carry out the necessary work during restoration.

The recording crew arrived on site on 29/4/91 as planned, and immediately began laying out cables and phones in preparation for recording. All necessary equipment testing was completed and vibrators were located at the start of Line IWA-1 in readiness for recording the following day. The performance and conduct of the crew during recording was most satisfactory. Being a small survey, recording took less than 3 days to complete.

All of Line 1 was recorded on 30 April with all Line 2 and part of Line 3 on 1 May; 2 May saw recording finalised and the crew left the field. Western Geophysical have a practice of completing all surveying prior to a line being recorded and the back crew clear all signs and indications of the field activities; this allows fencing restoration to be implemented

immediately and completion of all field activities at an early date.

Detours over drains and line changes were carried out quickly and efficiently with minimum recording time being lost; manoeuvring through the narrow and meandering track cleared through the timber caused no time loss. In all, a very well conducted and efficient survey.

FIRE PREVENTION

Recording of the prospect in April/May presented no fire risk as a reasonable autumn break had occurred with rains giving the entire area a green tinge.

The following points should be noted and adhered to if any future surveys are conducted. The summer months in South East of S.A. present a fire risk as great as anywhere in the world and consequently extreme caution is needed with the operation of vehicles and heavy equipment in any off-road situations. Prior to any field operation commencing, all vehicles must be equipped with approved fire-fighting knapsacks and a fire tanker equipped with motor and pump maintained in the field and accompany the recording crew at all times.

Prior to field work commencing, contact should be made with the appropriate fire officers to both make them aware of the start of operations and to invite them to inspect the standard of fire suppression equipment if they so desire; contact should be maintained during conduct of the survey to ensure compliance with any restrictions due to total fire bans etc.

Instructions should be issued to all personnel employed on the prospect that smoking of cigarettes is not allowed in the open.

Slashing is an operation with a high fire risk due to the possibility of the blades striking stones and the resulting friction and sparks which can occur.

A small fire unit accompanies the slasher at all times to ensure no fires result from this part of the line preparation; slashing is not done on days of high fire risk.

It is imperative that a high standard of fire prevention and a full appreciation of the volatility of the area be maintained for any future surveys.

STOCK DISEASE AND NOXIOUS WEED CONTROL

The major potential problems which present themselves in this area are the spread of footrot in sheep and the spread of any undesirable weed or seed.

Prior to commencing line preparation a list of properties was obtained from the Department of Agriculture, identifying any section numbers which are under quarantine due to footrot being identified in the sheep grazed on those properties. Fortunately, no properties were listed which were traversed by the seismic lines and subsequently no action was required.

Similarly there is no abundance of noxious weed of any particular type; in fact not one landowner raised the issue; no extra precautions were needed to be implemented.

CORRESPONDENCE

All relative correspondence relating to the survey is included in the remaining pages of this section.

Oil and Gas Exploration

000041

IWA

P.O. Box 407
Okemos, Michigan 48805 USA
(517) 349-1330
FAX (517) 349-1508

Agent:
Mr Ray Willox
Exploration Field Services
RMB 8280
TIMBOON Vic 3268
Phone: 055 665173 Fax: 055 665193

2nd April 1991

The Director General
S.A. Department of Mines & Energy
P O Box 151
EASTWOOD S.A. 5063

Attention Mr R Laws

Dear Sir

Re: PEL52 - Application to Conduct a Seismic Survey

During late April of 1991, IWA intend to conduct a seismic survey in PEL52 as the initial stage of their work program for this area.

This survey is to be called the Mt Bruce Survey and will be conducted in accordance with the maps and aerial photographs enclosed herewith.

Please find enclosed an Application to Conduct a Seismic Survey and Declaration of Environmental Impact Factors. The contractor selected for seismic acquisition is Western Geophysical and a relevant summary of field crew personnel and equipment is also enclosed.

It is envisaged that Western Geophysical will have completed their contractual commitments in other areas and will be available to commence recording in PEL52 in late April.

All necessary permitting and approval from relevant local authorities will be in hand prior to commencement.

As I have been appointed as agent for IWA with regards to this initial phase of their operations, please direct any queries regarding this work to myself.

Yours faithfully
for and on behalf of IWS

R. Willox,
Manager, Exploration Field Services

encs.

000042

Oil and Gas Exploration

IWA

P.O. Box 407
Okemos, Michigan 48805 USA
(517) 349-1330
FAX (517) 349-1508

March 12, 1991

Department of Mines and Energy
191 Greenhill Rd.
Parkside, S.A. 5063
Australia

Gentlemen:

We would like to inform you that Ray Willox of Exploration Field Services, PTY, Ltd. has been hired as an agent of IW Partnership, PTY, Ltd.

He is authorized to act on behalf of IW Partnership in putting together our permit program

If you have any questions regarding the above information, or wish to contact us, please write or fax us at the above listed numbers.

Yours truly,

Paul W. Marvin II

Oil and Gas Exploration

000043

IWA

P.O. Box 407
Okemos, Michigan 48805 USA
(517) 349-1330
FAX (517) 349-1508

Agent:
Mr Ray Willox
Exploration Field Services
RMB 8280
TIMBOON Vic 3268
Phone: 055 665173 Fax: 055 665193

2nd April, 1991

The Director General
S.A. Department of Mines & Energy
P O Box 151
EASTWOOD S.A. 5063

Dear Sir

APPLICATION FOR CONSENT TO CARRY OUT SEISMIC SURVEY IN PEL52 - 1991 MT BRUCE SEISMIC SURVEY

In accordance with the Petroleum Act (1940-1989), IWA as licensee of PEL52, hereby applies for permission to conduct a survey of approximately 21 kilometres within the permit area.

Survey Details

Name:	Mt Bruce Seismic Survey
Proposed Date of Commencement:	28 April, 1991
Expected Duration:	4 days
Contractor:	Western Geophysical Australia
Energy Source:	Vibroseis
Technique:	Multifold Seismic
Instruments:	Sercel SN 368 / 240 Channels
Permitting & Line Clearing:	Exploration Field Services (Ray Willox)
Line Kms:	21 Kms
Crew Size:	33 persons
Estimated Cost:	$100 000
Person in Charge:	Ray Willox (as agent for IWA)
If unavailable:	Paul W Marvin II, IWA

It is intended that Paul W Marvin II of IWA will be in attendance during the recording phase, in his absence Ray Willox of Exploration Field Services will be supervising and undertaking all permitting and line preparation.

Mr Lindsay Wilson of Millicent, S.A., will be contacted and a field inspection will be carried out with him with regard to any aspects of Aboriginal heritage or Aboriginal sites which may be affected by the survey, if any sites are known or identified these will naturally be avoided during the conduct of the survey.

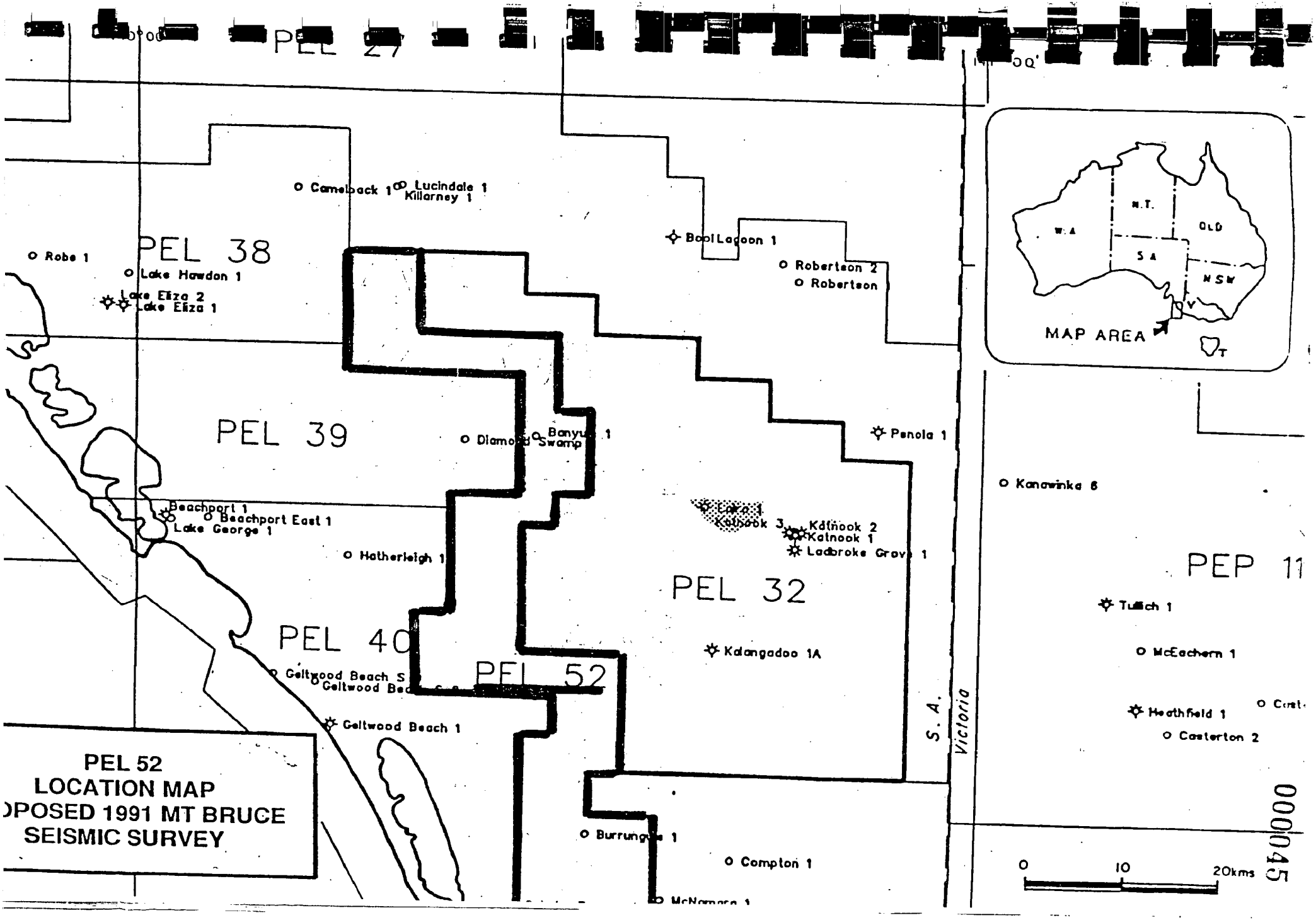
The Code of Environmental Management of seismic exploration operations in the S-E of South Australia as published by the Department of Mines and Energy September 1990 will be adopted and this survey will be carried out under that code.

The location of the lines as detailed on the 1-50000 topographic map and the accompanying colour aerial photographs have been determined after re-processing of previously recorded seismic data. Due to the relevant short length of each line it is important that the recording take place as programmed and very little if any flexibility in movement of line locations is possible.

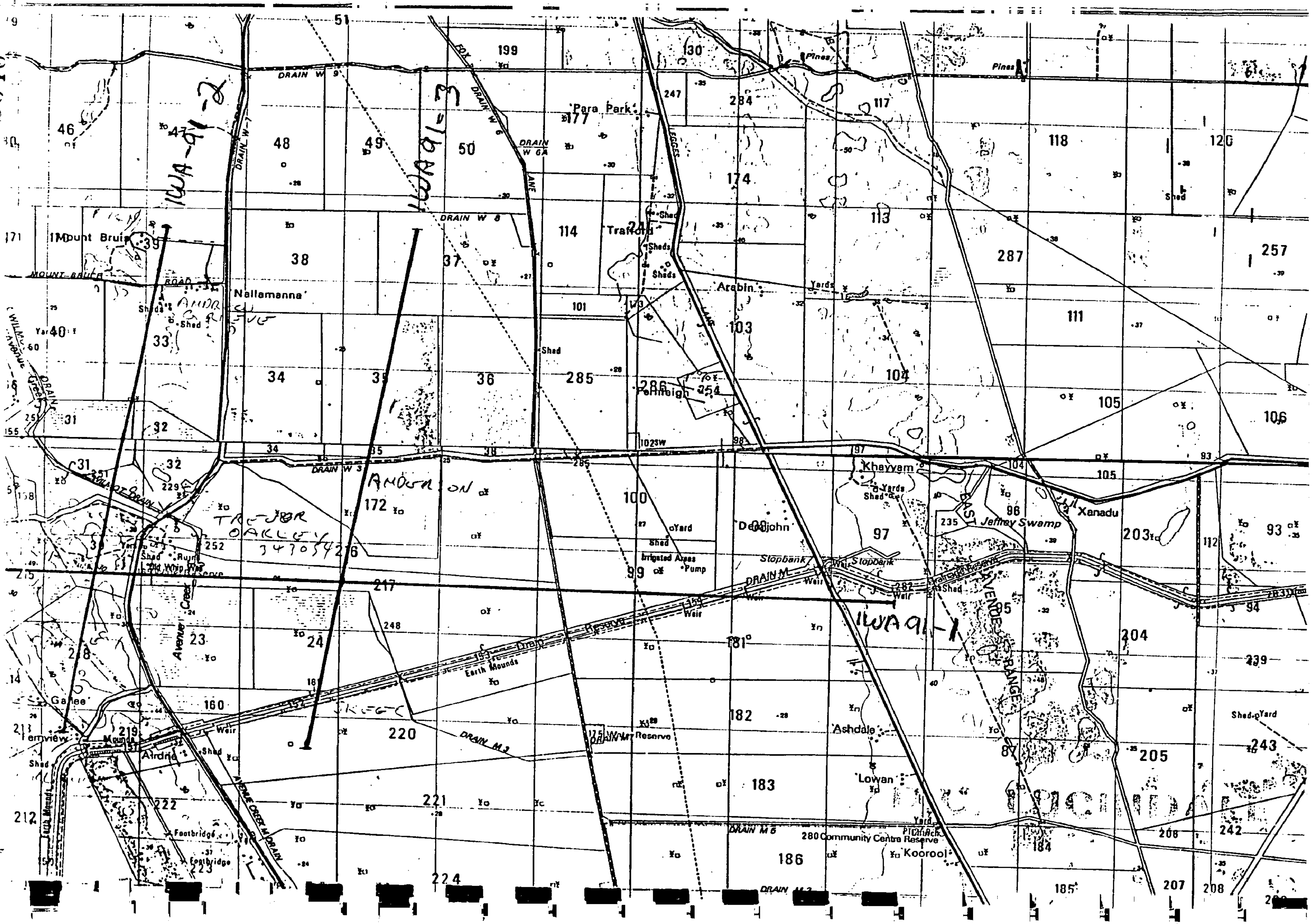
Some clearing of native vegetation will be required and it is intended to use a hydro-axe for this purpose with the minimal interference to vegetation to allow the survey to be conducted efficiently.

Yours faithfully
for and on behalf of IWA

R. Willox
Manager, Exploration Field Services


PEL 27
PEL 38
PEL 39
PEL 40
PEL 52
PEL 32
PEP 11
Camelback 1
Lucindale 1
Killarney 1
Robe 1
Lake Hawdon 1
Lake Eliza 2
Lake Eliza 1
Bool Lagoon 1
Robertson 2
Robertson
Penola 1
Kanawinka 6
Beachport 1
Beachport East 1
Lake George 1
Hatherleigh 1
Kalangadoo 1A
Tullich 1
McEachern 1
Heathfield 1
Casterton 2
Geltwood Beach 1
Burrungule 1
Compton 1
S.A.
Victoria
MAP AREA
N.T.
W.A.
QLD
S.A.
NSW
V
T
0
10
20kms
PEL 52
LOCATION MAP
OPOSED 1991 MT BRUCE
SEISMIC SURVEY
000045

000046



IWA-91-2
IWA 91-3
IWA 91-1
ANDERSON
DRAIN W 9
DRAIN W 8
DRAIN W 6
DRAIN W 6A
DRAIN W 7
DRAIN W 3
DRAIN M
DRAIN M 3
DRAIN M 5
Para Park
Mount Bruce
MOUNT BRUCE ROAD
Nallamanna
Trafford
Arabin
Pennleigh
Khayyam
Xanadu
Jeffrey Swamp
Dennjohn
Stopbank
Weir
Reserve
Irrigated Areas
Pump
Earth Mounds
Avenue Creek
AVENUE CREEK M DRAIN
EAST AVENUE RANGE
Old Whip Well
Galee
Fernview
Airdrie
Footbridge
Ashdale
Lowan
Koorool
Community Centre Reserve
Yards
Shed
Sheds
Pines

3
2

000048

DECLARATION OF ENVIRONMENTAL IMPACT FACTORS
MT BRUCE SEISMIC SURVEY, 1991
PEL 52, SOUTH AUSTRALIA

1 Introduction

This declaration is made in accordance with the requirements covered by the Petroleum Regulations, 1989 and follows procedures and practices set forth in "The Environmental Management of Seismic Exploration Operations in the South-East of South Australia", September 1990.

2 Name and Type of Activity

The Survey is called Mt Bruce Seismic Survey, 1991, and will be recorded using the Vibroseis technique.

3 Crew Size and Equipment

Full list of crew and equipment - see Schedule A

4 Description of the Natural Environment

The survey area is contained within the Southern Wetlands and Dune Ranges Environmental Region, and falls within the Redgum Swamp Environmental Association. This Association is defined as flat plain, often swampy in winter, drained and cleared to open parkland with pasture understory. Generally the area covered by the survey is flat or gently undulating land. It is naturally cleared, or cleared by man, having natural or improved pasture. Low areas are often crossed by artificial drains.

5 Environmentally Sensitive Areas

Individual line descriptions identify and describe the vegetation applicable to each location. There are no known parklands or reserves affected by the survey.

6 Liaison with Responsible Groups

Consultation with land holders, Aboriginal groups, local councils etc., will be conducted by the Land Manager/Permit Person (Ray Willox) whose duties will include early and ongoing contact with property owners and council as well as monitoring environmental impact.

7 Monitoring Impact on the Environment

The Land Manager/Permit Man will be responsible for monitoring impact on the environment and shall conduct an audit at the completion of the survey, as set forth in the Code.

Lines IWA 91-1

Orientation: E-W

Length: 9 ~~12~~ kms

Description:

This line starts approximately 750 m east of Legges Lane in close proximity to Drain M, it traverses sparsely timbered red gum country and agricultural grazing land for 7.5 kms proceeding west which will require preparation by means of an agricultural slasher, it then enters approximately .5 km of intermittent stands of native vegetation which may require the use of a hydro-axe. For the most westerly 600 m of this line it re-enters pasture land which will require slashing only. This line crosses both Drain M and Wilmot Drain. Existing bridges will allow the recording crew and associated machinery to cross these drains with no interference to embankments or drain formations.

Line IWA 91-2

Orientation: Approx. N-S

Length: 6 kms

Description:

This line starts in the North approximately 400 m N-W of the Mt Bruis Homestead and for first 3 km traverses open pasture land. It then passes through approx. 800 metres of native vegetation back into open pasture land, re-enters a further stand of native vegetation within which it intersects with line IWA 91-1, it crosses more open pasture land South of the intersection with the last km once again entering a stand of native vegetation. Some clearing has taken place within the 3 areas of native vegetation and it is envisaged that with a closer field inspection access through these vegetated areas will be available with very little impact. Some use of the dydro-axe will possibly be required.

Line IWA 91-3

Orientation: Approx N-S

Length: 6 kms

Description:

The Northern portion of this line is within stands of sparsely located red gum timber which will not require any form of clearing, the balance of the line is entirely within open pasture land and will require nothing further than slashing as a form of line preparation.

SCHEDULE "A"

I. PERSONNEL AND EQUIPMENT

A. PERSONNEL

1. FIELD BASED

a) **Management**

One (1)	Party Manager
One (1)	Field Clerk

b) **Surveying**

One (1)	Chief Surveyor
One (1)	Field Surveyor
Three (3)	Rodmen/Chainmen

c) **Recording**

One (1)	Observer
One (1)	Assistant Observer/Technician
One (1)	Line Boss
Twelve (12)	Linemen
One (1)	Geophone/Cable Repair

d) **Vibrators**

One (1)	Vibrator Mechanic/Technician
Four (4)	Vibrator Operators

e) **Upholes**

One (1)	Seismologist/Geophysicist
One (1)	Uphole/Weathering Observer

f) **Field Base**

One (1)	Mechanic
Two (2)	Utility/Drivers

TOWN BASED

One (1)	Supervisor
One (1)	Expediter
Administration and secretarial staff	

Sufficient additional personnel will be provided for crew rotation on a 30 days on 10 days off basis.

2.1.2 Field Units

Three (3)	Crossing station units (CSU)
Four hundred fifty (450)	Station units (SU)
Four (4)	Repeater units (RU)
Thirteen (13)	Power Supply units (PSU)

2.1.3 Associated Equipment

One (1)	Cable checker-line cables (manufactured by Western Geophysical)
One (1)	Line simulator unit for 368 boxes
One (1)	Oscilloscope Tektronix model 2445A
One (1)	Trouble Tracker III : Line/Box checker
One (1)	BTS - Box Test system for field units

2.2 FACE™ SYSTEM

i. Hardware
Compaq 386 20 Hz Desktop Computor

- 300 megabyte hard disk
- 4 megabyte memory card
- IBM VGA graphics card and VGA monitor
- Wyse high resolution monitor for plotting
- 80387 math compressor
- 3.5 inch high density (1.4 mb) drive
- 5.25 inch low density (360 kb) drive
- Backup power system

ii. Software
- Micromax Version 1.6

2.3 ENERGY SOURCE

Five (5) Vibrator LRS-311

Manufacturer	:	Litton Resource Group
Model	:	LRS-311
Vehicle Description	:	13.5 Ton Vibrator mounted on LRS AHV 12 Buggy with Detroit 6V71, 228 HP engine
Peak Force	:	27,240 lbs
Control Electronics	:	Pelton Mod.5 Advance I Electronic System with ground force phase locking and force amplitude control
Baseplate Geophones	:	Bell and Howell CEC-4102
Non Linear Sweeps	:	Pelton Frequency Pre-Emphasis Option

2.4 CABLES

Number of sections	:	450
Type	:	Telemetry
Manufacturer	:	LRS
Number of Pairs	:	3
Length	:	55 meters
Extenders/Jumpers	:	5 x 110 meters
Connectors	:	LRS 5348 P

2.5 GEOPHONES

Number of strings	:	440
Geophone per string	:	12 (6 series by 2 parallel)
Geophone Spacing	:	5 meters
Terminations	:	LRS 5517 at either end
Manufacturer	:	Geospace/LRS
Model	:	GSC 20D/LRS 1020
Base Type	:	Spike (3 inch)
Natural Frequency	:	10 Hz
Coil Resistance	:	395 ohms
Damping	:	70%
Box Adaptor Plug	:	LRS 5518

2.6 COMMUNICATIONS

2.6.1 SSB Radios

Five (5) 100 watt single side band radios Stingray 120B equipped with 5 W.G.C. licenced frequencies in the 4, 6, 7, 9 and 13 KHz bands. In addition camp radios are fitted with relative R.F.D.S. frequencies

One (1) Codan 7727 radio interfaced with computer controlled teletype equipment for voice and teletype communications with Perth office.

2.6.2 UHF Radios

Twenty (20) GE Custom MVP for infield and vibrator to recorder communications.

2.6.3 C.B. Radios

3 x 40 Channel Citizen band radios for communication with local landowners and Fire Control officers.

2.7 SURVEY EQUIPMENT

Two (2)	Theodolites Wild T1
One (1)	AGA Geodimeters 122 (E.D.M.)
One (1)	HP 41CV calculator with printer
One (1)	HP 11C calculator
One (1)	Kern Total Station system with Psion data collector

FACE™ System - Seismic Land Surveying Package Data sets output in SEG-P1, SEG-P3 and UK00A-81/84 format on 5.25 inch (360KB) diskette for

transporting to client database.
Complete Survey/Drafting office is located in the Flycamp trailer complete with HP plotter.

2.8 VEHICLES

Four (4)	Isuzu 4WD Cable trucks (1 spare)
One (1)	Isuzu 4WD Supply truck with crane and 600 gallon water tank
One (1)	Isuzu 4 x 4 Vibrator Service truck with crane, welder, compressor, tools, fuel and water tanks
One (1)	Isuzu 6 x 6 Water truck 1500 gallon capacity - fire fighting unit
One (1)	Isuzu 6 x 6 Fuel truck 1500 gallon capacity
* NOTE	Isuzus fitted with front mounted winches
One (1)	Toyota Station Wagon
Three(3)	Toyota Personnel Carriers 4 x 4
Four (4)	Toyota Pickups 4 x 4
Five (5)	Vibrators (LRS-311) mounted on LRS AHR-3 Articulated buggy (1 spare)
One (1)	Recording Cab mounted on LRS AHV-3 Articulated buggy including A/C and generator
* NOTE	Buggies fitted with front mounted winches and 67 x 35 x 25 all terrain tyres

Vehicles equipped with knapsack fire fighting sprays.

000055

DEPARTMENT OF MINES AND ENERGY

SOUTH AUSTRALIA

191 Greenhill Road, Parkside

TELEPHONE: (08) 274 7500
TELEGRAMS: Domex
TELEX: AA88692
FACSIMILE No. 272 7597
PLEASE ADDRESS ALL CORRESPONDENCE TO:
The Director-General
PO Box 151
Eastwood, S.A. 5063

In reply, please quote

SR 27/4/744

CDC:JLB

5 April 1991

Mr R Willox
Exploration Field Services Pty Ltd
RMB 8280
TIMBOON VIC 3268

Dear Sir

Re: Mt Bruce Seismic Survey, PEL 52

Your application to carry out this survey is herewith approved subject to the following conditions:

1. All field personnel are issued and comply with your adopted Code of Environmental Practice.

2. Particular care is taken to site upholes away from public utilities such as powerlines (above and below ground) telephone lines and pipelines. This follows a recent uphole driller's accident in the district involving powerlines.

3. Hydro-ax clearing on lines IWA91-1 and 2 is approved provided

   (a) maximum use is made of tracks and clear ground in the vicinity of the intersection of the two lines to minimise clearing

   (b) the southern end of line IWA91-2 is moved eastward to avoid thick native scrub. Operations as per (a) then will apply to this part of the line. Where narrow stands of thick scrub still occur along the rerouted line, cables should be hand carried through with minimal clearing.

...2/

It is understood that further permitting and line reconnaissance is currently being undertaken. Should these activities precipitate significant changes to line location or clearing technique, they must be approved by this Department.

Yours faithfully

R K JOHNS
DIRECTOR-GENERAL

DEPERMITTING AND COMPENSATION

Depermitting has been conducted only to the stage of contacting all landowners per telephone and having them confirm verbally that there are no problems resulting from the survey and no compensatable claims are forthcoming.

I have had no necessity to be in the area recently and feel it is an unjustifiable expense to travel over simply to gain 10 signatures; I will however be travelling into the area at some time in the near future and will then contact all landowners personally and complete release forms for each property.

000058

FIELD OPERATION REPORT
1991 OTWAY BASIN SEISMIC SURVEY
FOR
IWA
PERMIT PEL-52
SOUTH AUSTRLIA
BY
WESTERN GEOPHYSICAL COMPANY
PARTY 785
FROM
30TH APRIL 1991
TO
02ND MAY 1991

000059

FIELD OPERATION REPORT

1991 OTWAY BASIN SEISMIC SURVEY

FOR

IWA

PERMIT PEL-52

SOUTH AUSTRALIA

BY

WESTERN GEOPHYSICAL AUSTRALIA

PARTY 785

FROM

30th APRIL 1991

TO

2nd MAY 1991

APPENDICES **PAGE**

1. INTRODUCTION

Western Geophysical Australia was contracted by **IWA** to conduct the **1991 PEL-52 Otway Basin Seismic survey** in **South Australia.** Party 785 commenced production on the 30th of April and completed the survey on the 2nd of May.

The purpose of the survey was to delineate structures favourable to the accumulation of hydrocarbons. Vibrator points were recorded with a receiver interval of 40 metres. A total of 21.42 kilometres of surface coverage was obtained with an average of .63 kilometres per production hour. For the purposes of this report "production hours", included recorder moves and line changes, detours, drive time to and from camp but not experimental time or down time.

Seismic data reels (6250 BPI SEG D code 15, correlated stacks) and monitor records, observers reports, intersection diagrams, survey elevation listing and discs were sent to Perth for forwarding to IWA.

A statistical report was submitted together with updated survey progress map at completion of survey.

PERSONNEL

OFFICE PERSONNEL

Western's office personnel consisted of an Area Manager, Field Supervisor and administrative staff based in Perth.

FIELD PERSONNEL

ONE (1)	FIELD SUPERVISOR	: B. WILLIAMS
ONE (1)	PARTY MANAGER	: I. RYAN
ONE (1)	I.E./SEISMOLOGIST	: D. GODDARD
ONE (1)	SEISMOLOGIST	: G. ASSER
TWO (1)	MECHANICS	: A. MURCHA : L. WOMERSLEY
TWO (2)	UTILITY/DRIVER	: A. BRETT : D. VINEY
TWO (2)	OBSERVERS	: D. MCPHERSON : H. FRANCIS
ONE (1)	SURVEYOR/APM	: I. BEATTIE
THREE (3)	SURVEYORS	: N. HELDER : G. BANKS : D. DEROON
THREE (3)	SURVEY HELPERS	: D. WILLIS : M. FEATHERBY : J. MURCHA
TWO (2)	HEAD LINESMEN	: M. BARKER : M. KNIGHT
ONE (1)	CABLE REPAIRER	: H. MAWDESLEY (SNR)
TWO (2)	VIBRATOR TECHNICIAN	: J. PHILIPSON : A. SMYLIE

FIVE (5)	VIBRATOR OPERATORS	: T. WILLIAMS : L. FINCH : L. SAMBELL : E. KERPE : R. SMITH
TWELVE (12)	LINEPERSONS	

EQUIPMENT

3.1 SEISMIC DATA ACQUISITION SYSTEM:

The main crew data acquisition system consisted of a Sercel SN368 telemetry system configured for 240 channels, interfaced with a Input/Output Inc. full precision correlator/stacker. The system used up to 420 type 368E single channel station units. These interfaced to the recording truck via a crossing station unit on the receiver line. Line Cables used were 55m long and manufactured by LRS. Five 110 m cables and 4 repeater units were available to allow the recorder to set up as far as 550 m from a line. Four hundred and forty two geophone strings were used with twelve phones in a six by two series-parallel configuration. The elements contained a vertical element, which is either a GSC-20D or LRS-1020. These are 10Hz natural frequency with a coil resistance of 395 Ohms. Both geophones have the same response.

Correlated stacks were recorded at 6250 BPI on a Sercel MS8TT tape drive. Quality control monitors were plotted on an OYO DFM-250 digital camera. Continuous data monitoring was provided by Tektronix Oscilloscope. An Epson printer provided an observers log and results of instrument or geophone tests. The recording acquisition system was housed in a Frazer recording lab which is mounted on a Litton AHR-3 articulated recording buggy. Instrument power was supplied by a John Deere generator, which outputs 115 and 230 volts AC. Twelve volts DC for instruments was

provided by Lambda and AC/DC power supplies.

The station units were powered by a Sercel power supply unit which receives its power from a 12 volt car battery. Power units and batteries were placed every 30 to 40 stations along the line. Eleven Sercel power units and 24, 12 volt car batteries were used on the crew. Six batteries per day were changed out in rotation for re-charging.

3.2 TEST EQUIPMENT:

LINE UNITS

A sercel BTS (box testing system) housed in a Frazer air-conditioned recording lab mounted on a 6x6 International Paystar 500 truck, along with other associated equipment, allowed full calibration, repairing and testing of the Sercel 368E station units, power supply units, repeater units and crossing station units. A full complement of spare parts for these units was on hand.

GEOPHONES and CABLES

Part of the workshop rented in Millicent was utilized as a geophone and cable repair shop. Full repairs to geophones and cables was carried out on the crew including geophone re-strings and cable rebuilding. Cables were tested with a Sercel cable checking system and the geophones with a shaker table. Geophones and cables were rotated through the cable shop for routine maintenance and repairs.

A LRS trouble-tracker II unit which is able to fully check the line, including geophones, was used by the line-boss to check and repair the spread ahead of the recorder. This

prevented any down time on line changes as all faults in the line were repaired prior to the recorder set up.

VIBRATORS:

Sufficient spare parts and a complete spare Pelton vibrator electronics unit were carried by the crew for the vibrators. Two hydraulic simulators and two Pelton "vibro" test units were also available.

3.3 SEISMIC DATA PROCESSING:

Experimental test evaluation, acquisition system instrument tests, vibrator hardwire similarity evaluation and infield data processing were conducted using Advance Geophysics "Micromax" infield data processing system, with Western Geophysical's "FACE" software. Field acquisition/test tapes were read via the Telex 9251 1600/6250 BPI tape transport. A 300 MB hard disk was used to store system software and data prior to processing by the Compaq 386/20 portable computer and Weitek 7210 array processor. Two floppy disk drives were in-corporated to provide input for system software backups and additional storage. Completed tests and seismic sections were displayed on either a "Benson B-90" thermal transfer plotter, the Hewlett Packard "paint jet" printer or the "Epson LQ-2500" printer.

The field processing unit was housed in the Frazer recording lab, along with the BTS system, mounted on a 6x6 International Paystar 500 truck.

3.4 SURVEY DATA ACQUISITION SYSTEM:

Survey data was acquired using a Kern E12T Electronic Theodolite and a Kern DM 504 EDM, linked to a Psion II data collector. Field data was entered into a Compaq 386/20 portable computer interfaced to an Epson FX-286E printer and a Hewlett Packard Draftpro plotter. Computations were performed using Western Geophysical's "FACE" survey software package. Printouts of elevation, northings and eastings, sunshots and other data was archived on high density 1.4 MB 3.5inch diskettes and copied to 5.25inch floppy disk in the UK00A-pl/84 format.

Printouts of elevation, northing, easting, sunshots and other data were made available as necessary. Data was recorded on 5.25" 360KB diskette or 3.5" IBM diskette.

3.5 ENERGY SOURCE

Five LRS AHV 311-12 articulated hydrostatic buggy vibrators with a peak force of 27,240 pounds were used. The data was acquired using four (4) vibrators with the fifth on standby. This allowed the organisation of vibrator service and maintenance on a rotational basis so that no production was lost in the form of service days. Vibrator electronics were Pelton Advance 1 model 5 with ground force phase locking and automatic or manual force control. During the survey only manual force control was used.

3.6 RADIO COMMUNICATIONS

Inter-camp, vibrator and recorder communications were facilitated with the installation of twenty-four (24) General Electric custom MVP UHF radios, operating on three frequencies of 485.050Mhz. (channel 1 vib-recorder communication), 485.100Mhz (channel 2 general communication) and 485.278Mhz (channel 3 survey communication). Long distance communications were via five (5) 100W Stingray 120B SSB radios, fitted with Flying Doctor and Telecom allocated frequencies of 4460, 5560, 5300, 6902, 9310 and 13915 KHz. SSB radios were in camp office, supply vehicle, survey vehicle, and the Party Manager's vehicle.

Telephone communication was used for voice and teletype communications with Perth office.

3.7 VEHICLES - SEISMIC

1 ARTICULATED RECORDING BUGGY AHR-4788

1 6X6 INTERNATIONAL PAYSTAR 500
FIELD PROCESSOR AND BTS SYSTEMS

5 ARTICULATED VIBRATOR BUGGIES AVH12LRS 311-4780-4784

1 SERVICE TRUCK ISUZU 4 X 4 MODEL TSD45 WITH 2500LT FUEL AND 500LT WATER CAPACITY.

4 CABLE TRUCKS ISUZU 4 X 4 MODEL TSD45

1 SUPPLY TRUCK ISUZU 4 X 4 MODEL TSD45 WITH 2000LT WATER CAPACITY CONFIGURED AS FIRE FIGHTING UNIT.

1 WATER TRUCK ISUZU 6 X 6 MODEL TWD25 6000LT CAPACITY CONFIGURED AS FIRE FIGHTING UNIT.

1 FUEL TRUCK ISUZU 6 X 6 MODEL TWD25 6000LT CAPACITY

1 PARTY MANAGER TOYOTA P.C. 4 X 4 MODEL HJ75

2 TOYOTA P.C. 4 X 4 MODEL HJ47

5 TOYOTA P.U. 4 X 4 MODEL HJ75

1 TOYOTA P.C. 4 X 4 MODEL HJ47 (WX RECORDER)

GENERAL

1 NISSAN PATROL 4X4 (SUPERVISOR)

1 NISSAN NAVARA (EXPEDITER)

1 MITSUBISHI PAJERO 4X4 (AREA MANAGER)

3.8 CAMP EQUIPMENT

Crew personnel were accommodated at either the Somerset Motel, or the Diplomat Motel, Millicent.

FIELD OPERATIONS

4.1 WEATHER

No time was lost to weather throughout the survey.

4.2 PERMITTING

Permitting was conducted by Exploration Field Services representative Mr Ray Willox.

4.3 FOOD SUPPLIES

Meals were provided by the Somerset motel.

4.4 FUEL SUPPLIES

Fuel was supplied by K & S Freighters depot in Millicent.

4.5 SPARE PARTS

All vibrator/recorder spare parts were purchased in America by Western and air freighted to Perth, then sent by air and road transport to crew.

SURVEY REPORT

5.1 INTRODUCTION

The survey crew arrived in Millicent on 20th April 1991 and began reconnaissance and line set off.

The prospect was located approximately 45km's north of Millicent in the Furner area.

5.2 LINE CLEARING

The only areas which required clearing were on the west end of line 1 and the south end of line 2. These two lines ran through a patch of very thick vegetation consisting of trees and scrub. The lines were cleared using a Hydro axe. The remainder of the lines were slashed to remove the tall grass.

5.3 FENCING

Fencing was carried out by Exploration field Services under the supervision of Ray Willox.

Temporary gates were constructed as near as practically possible to the line if existing gates were not within a reasonable distance of the line.

After completion of the contract, all fences were restored to their origional condition.

5.4 SURVEY EQUIPMENT

1 KERN E12T ELECTRONIC THEODOLITE

1 KERN DM504 EDM

1 PSION ORGANISER II DATA COLLECTOR

2 WILD T1 THEODOLITES

1 AGA 122 GEODIMETER

1 ROELOFF PRISM (FOR SOLAR OBSERVATIONS)

1 50 METER STANDARD FIBREGLASS TAPE

NECESSARY TRIPODS, PRISMS, BATTERIES AND ACCESSORIES.

5.5 LINE SET OUT

All lines were set out as per the programme shown on the 1 : 50000 Topographic maps supplied by the client.

Line bearings and set-off points were scaled from 1 : 50000 Topographic maps and established by sunshot or by turning angles from known roads or fence lines. Once setoff, line bearing was maintained during poling by compass and position checked against features as shown on the topographic maps.

5.6 CHAINING

The line station pegs were chained using a calibrated wire "chain" which was checked regularly by comparing the measured EDM distances against the chained distances. Adjustments were made when necessary.

5.7 PERMANENT MARKERS

Permanent markers consist of a galvanised iron dumpy at ground level with co-ords and elevation and an adjacent galvanised iron post with an aluminium tag for identification.

Permanent markers were placed as near as possible to the start and ends of lines on roads and boundary fence lines.

5.8 SURVEY METHOD

Instrument set-ups were established at vantage points along the line and sights were kept to a maximum of 3 kilometres. Vertical control was maintained by reciprocal trigonometric levelling procedure. This involves the reading of the face left and right vertical angles observed from each direction with a time lapse of not more than 20 minutes. Horizontal control was achieved by observing face left and right horizontal angles between backsights and foresights with solar observations taken at take off points and convenient instrument points not more than 10 kilometres apart.

Distances were measured with the E.D.M. and compared against the chained distances at every 10th V.P., at changes of grade or other notable features including permanent markers. With the exception of the permanent markers these observations were heights only as these points were assumed to be on line and at the chained distances from the preceding instrument points.

Double face vertical and horizontal angles and distances were observed to the "Dumpy" at the base of the PM.

5.9 COMPUTATIONS

The following hardware and software was used for the survey computations.

HARDWARE: COMPAQ 386/20 PORTABLE DESKTOP COMPUTER SETUP AS FOLLOWS-

300 MEGABYTE HARD DISK

4 MEG MEMORY CARD

IBM VGA GRAPHICS CARD AND VGA MONITOR

HP DRAFTPRO PLOTTER FOR PLOTTING CHECKS AND FINAL OUTPUTS

80387 MATH COPROCESSOR

ONE 3.5" LOW DENSITY (360KB) DRIVE

ONE TOPAZ BACKUP POWER SUPPLY

SOFTWARE: SOFTWARE USED FOR THE COMPUTATIONS WAS WESTERNS PROPRIETARY FIELD ANCILLARY COMPUTING EFFORT (F.A.C.E.) PROGRAM, VERSION 3.10.

Raw field notes were input by PSION II data collector. Takeoff and tie information was input to the control file, and the line calculated by reconstructing the traverse.

Once the traverse had been checked for input or observational errors the intermediate points are then processed. Quality Control was done on screen in graphics or in the form of a printout listing azimuths and distances from station to station.

Application of scale factor, curvature and refraction corrections are an integral part of the processing. Once processed a horizontal check plot was plotted to an appropriate scale, and text was interactively added.

Once finalized the data was written to UKOOA-P1/84 format

on a 5.25" 1.4MB diskette for transporting to the processing centre and the client database. Other utilities used were the sunshot, grid to geographic conversions, line intersection calculation and plot.

5.10 CONTROL

All lines were established from South Australian Lands and Surveys permanent marker:

PM6923/5016 :	E	435783.329
	N	5876891.081
	HGT	26.75

Several other permanent markers and BM's were tied to throughout the survey to serve as checks.

Ends of lines were tied off to one another and the resulting loops, along with all other ties closed to within seismic standards.

A satellite receiver station established in 1981 was also tied to:

MT BRUCE OT SA81/A;	E	435004.9
	N	5874521.3
	HGT	35.3

Horizontal Datum was based on Australian Geodetic Datum 1966 and elevations on the Australian Height Datum.

5.11 DISCUSSION

Overcast conditions for the duration of the line survey limited the number of sunshots that could be observed.

The resulting ties and loops closed well within the specified requirements.

The survey was completed on the 28th April.

WEATHERING

6.1 INTRODUCTION:

No weathering survey was conducted for this seismic survey.

RECORDING SYSTEMS

7.1 VIBROSEIS RECORDING

Parameter and instrument settings were established as shown under Appendix "C".

Details of lines recorded are enclosed in this report. Refer to "section eight".

7.2 RECORDING POLARITY

An upward movement of the geophone produced a negative number on the tape. A negative number on the tape produced a down break on the paper record.

System polarity was checked by reproducing a Western Geophysical scribe tape which has stepped negative pulses recorded on it. Trace sequence and polarity proved correct. A tap on the top of a geophone resulted in an up-break on the camera monitor confirming the system was set to S.E.G standards.

7.3 EXPERIMENTAL

No experimental program was conducted.

7.4 DATA QUALITY:

Data quality appeared to be dependant on the surface conditions. In the south eastern section of the prospect where the topography was hilly the data was poor, however in the remainder of the prospect where the topography was flat the data quality improved. Brute stacks were produced

for lines IWA91-01 and IWA91-02 in order to check the quality of the data recorded.

7.5 SYSTEM TESTS:

Daily tests were run on the Sercel 368-E station units on line. The units were tested for noise, noise-offset, and pulse tested. These tests were recorded on the production tape and results printed on the Epson printer. Station units were also regularly rotated through base camp to be tested on the Sercel BTS (box testing system) for AD linearity accuracy.

The Input\Output correlator/stacker has an in-built self testing system which was run every morning as part of the daily test.

Sixty line box's, picked at random, were tested with an external oscillator signal in base camp before production started. No faults were found during this test.

Files from field tapes picked at random were checked on the MICRO-MAX field processing system as a further quality control measure.

GEOPHONE TESTING:

The Sercel SN 368 system has a geophone response model stored in its memory, geophone strings were pulsed throughout the day and the results compared to the model. This method of testing geophones will detect any geophone faults including poor plants. Geophone strings were rotated through the cable repair shop in base camp for routine maintenance and testing on the shaker table.

7.6 VIBRATOR POLARITY:

Vibrator polarity is the SEG standard -90 degrees (plus or minus 22.5 degrees) with initial movement of the base plate being down or compression. Polarity was checked by mounting a Bell and Howell CEC 4-102 velocity phone with the same polarity as the line geophones on the base plate. The output of the velocity phone was recorded with the hardwire sim test and processed on the FACE/MICRO-MAX. Results of the test confirmed the vibrator polarity to be within the SEG standard range.

7.7 VIBRATOR TESTING

A hardwire similarity was conducted prior to the commencement of the survey and once per line thereafter. Results were processed on the MICRO-MAX system to ensure the vibrators were within specifications. A Bell and Howell CEC 4-102 velocity phone with the same polarity as the line geophones was attached to each vibrators base plate to check vibrator polarity was correct.

Radio sims were run before the start of production each day and approximately every two hours during the day to check vibrator performance.

7.8 DOWN TIME

No major break downs occurred to any equipment during the survey.

7.9 DISCUSSION

The prospect area consisted of fenced farm land with numerous fences, roads and drains. The topography was generally flat except for the south eastern section of the prospect. Line clearing and access was good, as was the physical condition of the lines with very few boggy or soft patches of ground.

Every effort was made to ensure as little damage as possible was done to farm land and the environment. A junior observer and line boss were used full time scouting routes for the line trucks and ensuring vehicles or crew personnel did not stray from permitted areas.

8.1 SHOOTING ORDER

IWA OTWAY BASIN SEISMIC SURVEY

LINE NUM.	SP to SP	DATE START-END	STATIONS	KMS	ACC.KMS	DIR
IWA91-01	659-200	30 APR.-30 APR.	460	9.18	9.18	E->W
IWA91-02	200-503	01 MAY.-01 MAY.	304	6.06	15.24	S->N
IWA91-03	509-200	01 MAY.-02 MAY	310	6.18	21.42	N->S

8.2 REEL NUMBER/VIBRATING POINT LISTING

LINE IWA91-01

LINE NO.	REEL NO	V.P.-V.P.	FILE-FILE
IWA91-01	W 3090	HARDWIRE	9901-9905
	W 3091	658 to 542	002-058
	W 3092	540 to 402	060-128
	W 3093	400 to 275	129-189
	W 3094	267 to 200	191-326

LINE IWA91-02

LINE NO.	REEL NO	V.P.-V.P.	FILE-FILE
IWA91-02	W 3095	200 to 326	002-063
	W 3096	328 to 449	064-125
	W 3097	464 to 502	127-150

LINE IWA91-03

LINE NO.	REEL NO.	V.P.-V.P.	FILE-FILE
	W 3098	508 to 372	002-070
	W 3099	366 to 300	072-104
	W 3100	298 to 200	106-157

8.3 VIBRATOR POINTS SKIPPED

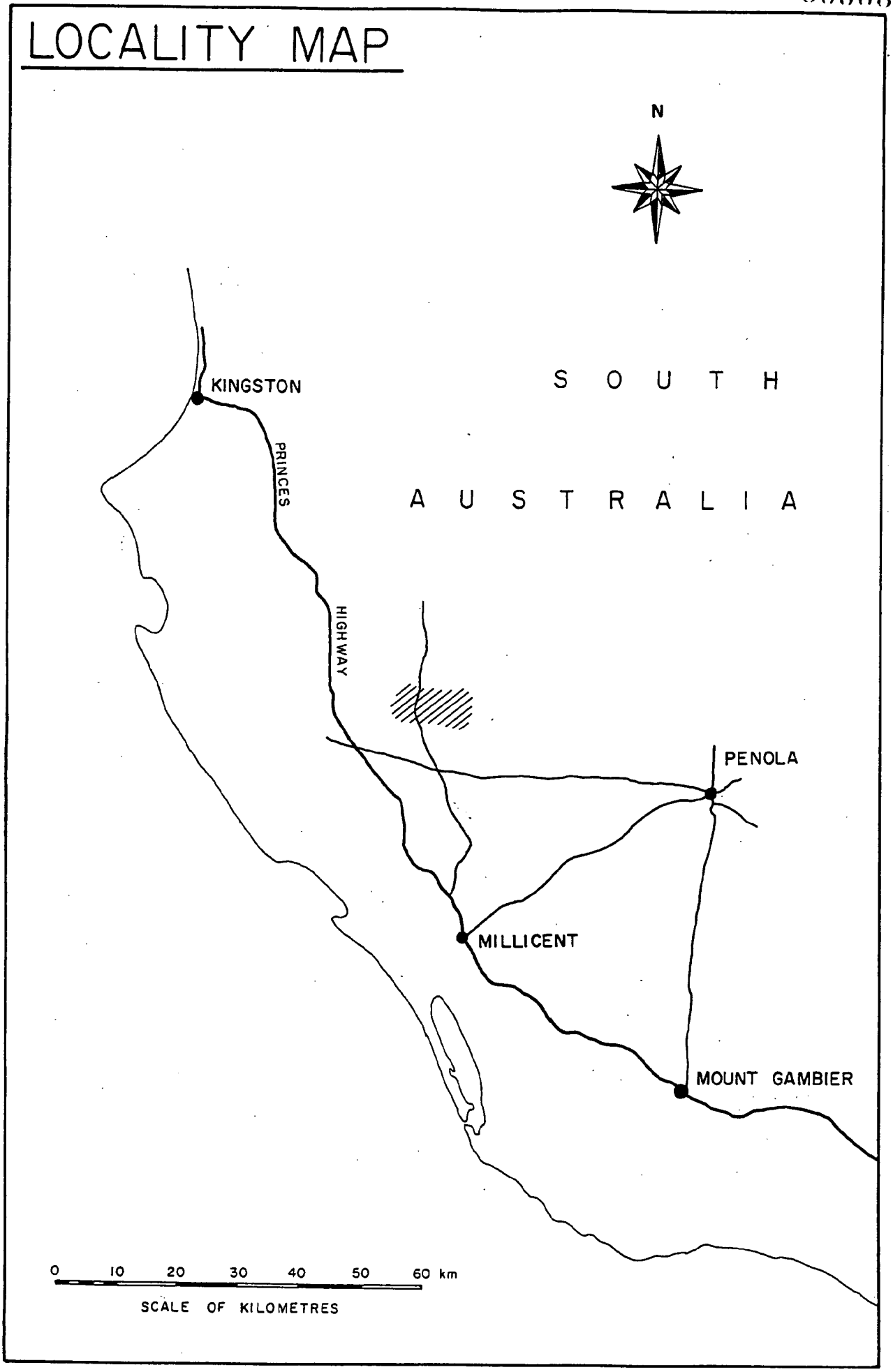
LINE NUMBER IWA91-01		
VP NUMBERS SKIPPED	REASON FOR SKIP	RECOVERY VP NUMBERS
636,634	ROAD	NOT RECOVERED
632,630,628,626,624	ROAD	641,639,637,623,621
596	FENCE	NOT RECOVERED
578,576,574,572,570	FENCES AND DRAIN	589,587,585,583,581
568,566,564,562,560	FENCES AND DRAIN	579,553,551,549,547
558,556	FENCES AND DRAIN	545,543
448,446	FENCE	NOT RECOVERED
424	FENCE	NOT RECOVERED
390	FENCE	NOT RECOVERED
354	FENCE	NOT RECOVERED
312,310	FENCE	NOT RECOVERED
274,272,270,268	ROAD	277,275,267,265

LINE NUMBER IWA91-02		
VP NUMBERS SKIPPED	REASON FOR SKIP	RECOVERY VP NUMBERS
238,240,242,244	FENCE AND SCRUB	235,237,245,247
254	FENCE	NOT RECOVERED
280,282	FENCE	NOT RECOVERED
336,338	DRAIN	NOT RECOVERED
356	FENCE	NOT RECOVERED
436,438	FENCE	NOT RECOVERED
450,452,454,456,458	SHEDS AND SILO	445,447,449,465,467
460,462	SHEDS AND SILO	469,471

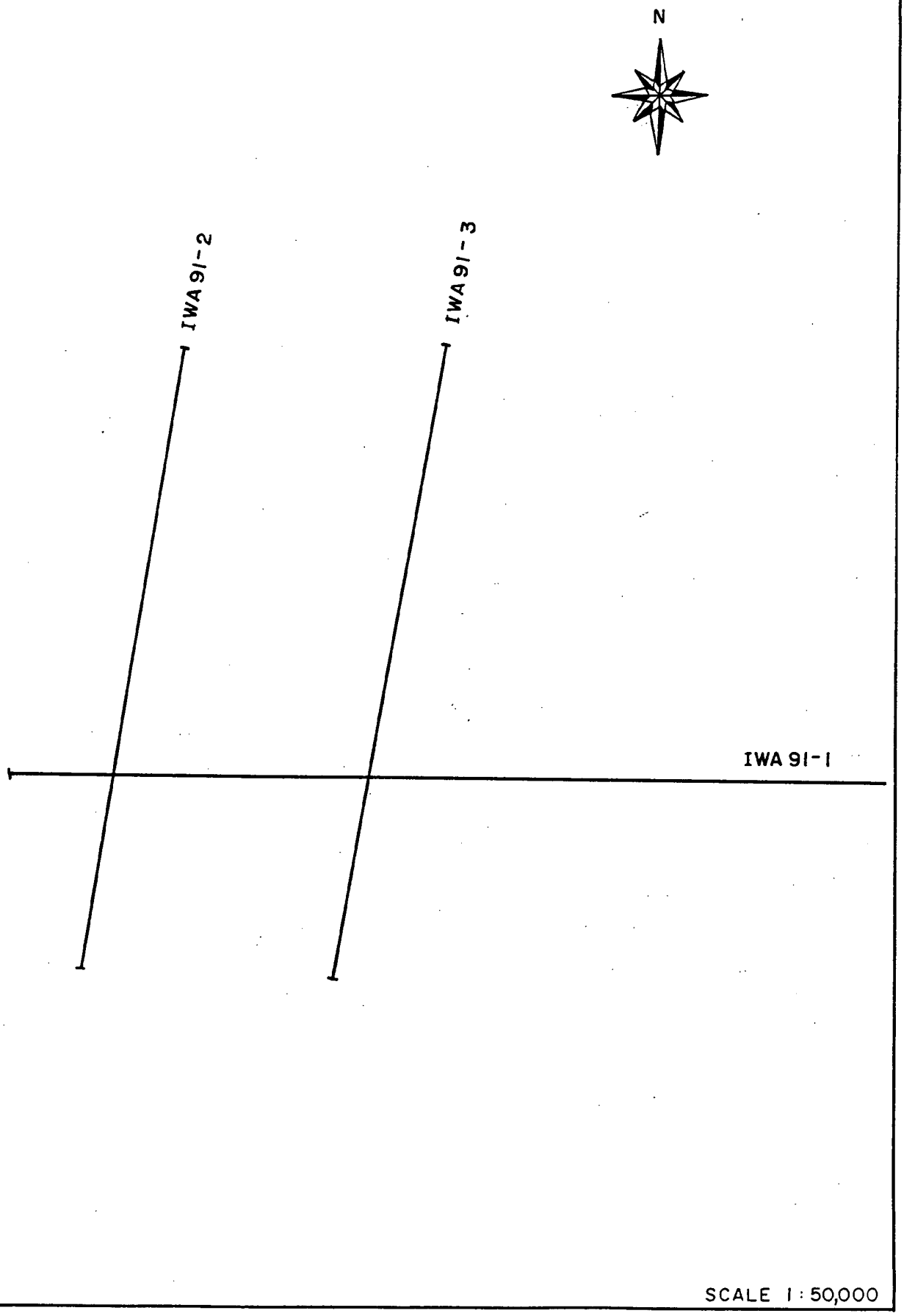
8.3 VIBRATOR POINTS SKIPPED

LINE NUMBER IWA91-03		
VP NUMBERS SKIPPED	REASON FOR SKIP	RECOVERY VP NUMBERS
418,416,414	SCRUB	421,419,413
370,368	FENCE	NOT RECOVERED
342,340,338	BORE	345,343,335
328	FENCE	NOT RECOVERED
234,232,230,228,226	DRAIN AND FENCES	241,239,237,225,223
208	FENCE	NOT RECOVERED

LOCALITY MAP



PROGRAM MAP



APPENDIX "C"

000090

FIELD RECORDING PARAMETERS

AREA	: PEL-52 SOUTH AUSTRALIA OTWAY BASIN SEISMIC SURVEY 1991		
SPREAD	: SPREAD GEOMETRY	:	2430-50-VP-50-2430
	FOLD	:	60
INSTRUMENT	: INSTRUMENT TYPE	:	SERCEL SN368 AND I/O FPCS
	NO. OF CHANNELS	:	240
	SAMPLE RATE	:	2 ms
	RECORD LENGTH	:	11 seconds
	SWEEP LENGTH	:	6 seconds
		:	5 sec. listening TIME
	TAPE FORMAT	:	5 second CORRELATED STACKS
		:	SEGD CODE 15 6250 BPI
	LO-CUT FILTERS	:	OUT
	HI-CUT FILTERS	:	178 Hz.
	STACK TYPE	:	INPUT/OUTPUT VERTICAL
	NOISE EDIT	:	INPUT/OUTPUT DNA
	PRE-AMP GAIN	:	128 dB (2^7)
SOURCE	: SOURCE TYPE	:	VIBRATORS
	VIBRATOR TYPE	:	LITTON LRS 311 BUGGY MOUNT
	ELECTRONICS	:	PELTON MOD 5 ADVANCE 1
	PHASE LOCK	:	GROUND FORCE PHASE LOCK
	AMPLITUDE CONTROL	:	MANUAL
	AMPLITUDE LEVEL	:	MAXIMUM
	SOURCE PATTERN	:	IN LINE
	SOURCE LENGTH	:	56 metres
	PAD SPACING	:	12 metres
	MOVE UP	:	4 metres
	NO. OF VIBRATORS	:	4
	NO. OF SWEEPS	:	6 per VP
	SWEEP START	:	12 Hz.
	SWEEP END	:	96 Hz.
	SWEEP LENGTH	:	6 seconds
	SWEEP LOG/LINEAR	:	LINEAR
RECEIVER	: RECEIVER TYPE	:	GSC 20D / LRS 1020
	STATION INTERVAL	:	20 metres
	RECEIVER PATTERN	:	LINEAR IN LINE
	ARRAY LENGTH	:	40 metres
	ELEMENT SPACING	:	3.64 metres
	NO. GEOPHONES/GROUP	:	12
	GEOPHONE FREQUENCY	:	10 Hz.
	COIL RESISTANCE	:	395 OHMS
	ELEMENT DAMPING	:	70%
	DAMPING RESISTER	:	1,000 OHMS
	STRING CONFIGURATION	:	6X2 SERIES PARALLEL

VIBRATOR PARAMETER REPORT

WESTERN GEOPHYSICAL COMP. CREW NUMBER 785 **DATE**:APRIL & MAY 1991

CLIENT: IWA **SURVEY NAME**: OTWAY BASIN

LINE NUMBERS: IWA91-01 to 03 **PROSPECT**: PEL-52

VIBRATOR TYPE: LITTON LRS-311 **NUMBER OF VIBRATORS**: FOUR

GROUND FORCE PHASE LOCKING: YES **PEAK FORCE**: 27,240 lbs.

AUTOMATIC GROUND FORCE AMPLITUDE CONTROL: OFF DRIVE LEVEL MAXIMUM

SWEEP LENGTH: 6 seconds. **START FREQUENCY**: 12Hz.

STOP FREQUENCY: 96 Hz. **SWEEP RATE**: 14-0

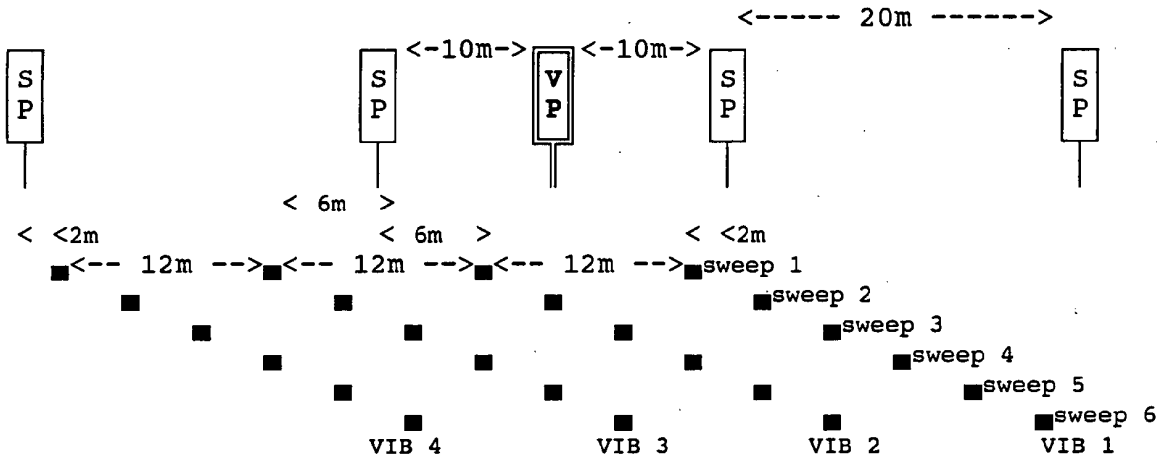
SWEEP TYPE: LINEAR **TAPER LENGTH**: 250 ms

VIBRATOR ELECTRONICS: PELTON MODEL 5 ADVANCE I WITH GROUND FORCE : PHASE LOCKING AND AMPLITUDE CONTROL

VIBRATOR ARRAY LENGTH: 56 metres **PAD to PAD DISTANCE**: 12 metres

MOVE-UP DISTANCE: 4 metres **NUMBER of SWEEPS per VP**: 6

VIBRATOR POINT INTERVAL: 40 metres.



VIBRATOR ARRAY CENTRED BETWEEN SURVEY PEGS
GEOPHONE ARRAY CENTRED ON SURVEY PEGS

<---------- array length = 56.0 metres ---------->

< > Move up distance = 4 metres

DIRECTION OF PROGRESS -------->>>>>>

REMARKS: 56 metre array used for all lines.

RECEIVER PARAMETER REPORT

000092

WESTERN GEOPHYSICAL **CREW NUMBER: 785** **CLIENT:** IWA

LINE NUMBERS: IWA91-01 to 03 **PROSPECT:** PEL-52 **DATE:** APRIL & MAY 1991

AREAS: OTWAY BASIN SOUTH AUSTRALIA

GEOPHONE TYPE: GEOSPACE GSC 20D **GEOPHONE FREQUENCY:** 10 Hz.

COIL RESISTANCE: 395 Ohms. **NUMBER PER STRING:** 12

ELEMENT DAMPING: 70% **DAMPING RESISTER:** 1,000 Ohms.

STRING CONFIGURATION: 6 X 2 SERIES PARALLEL

GROUP INTERVAL: 20 mtrs. **NUMBER OF GEOPHONES PER GROUP:** 12

GEOPHONE INTERVAL: 3.64 mtrs. **ARRAY LENGTH:** 40 mtrs.

ARRAY TYPE: LINEAR IN LINE

SPREAD PARAMETERS:

SPREAD TYPE: 300 TRACE CENTRE SPLIT. **GROUP INTERVAL:** 20 metres

CENTRE GAP: 4 TRACE **LOW VP NUMBERS ARE TO THE:** WEST

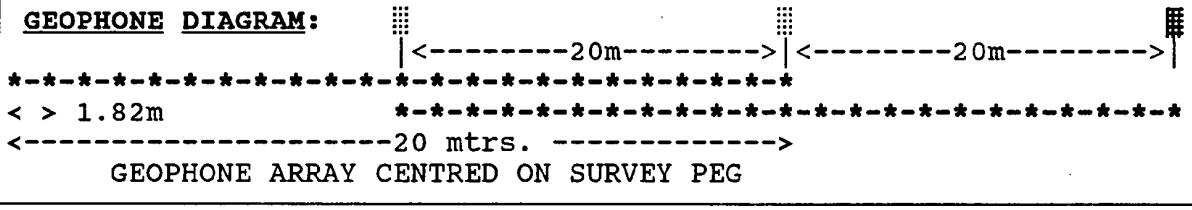
DISTANCE FROM VP TO CENTRE OF TRACE 1: 2430 mtrs.

DISTANCE FROM VP TO CENTRE OF TRACE 120: 50 mtrs.

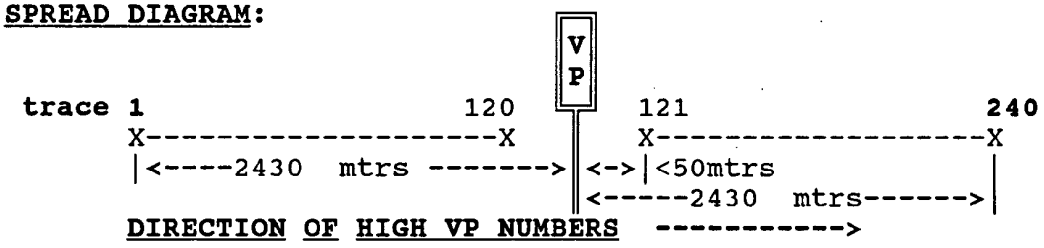
DISTANCE FROM VP TO CENTRE OF TRACE 121: 50 mtrs.

DISTANCE FROM VP TO CENTRE OF TRACE 240: 2430 mtrs.

GEOPHONE DIAGRAM:



SPREAD DIAGRAM:



REMARKS:

INSTRUMENT PARAMETER REPORT

CLIENT:IWA **PROSPECT**:PEL-52 **LINE No**:IWA91-01 to 03 **DATE**:APRIL & MAY 1991

WESTERN GEOPHYSICAL CREW NUMBER:785 **AREA**: OTWAY BASIN

INSTRUMENT TYPE: SERCEL SN-368 WITH I/O CORRELATOR

SAMPLE RATE: 2 ms **NUMBER of CHANNELS**: 240 plus 5 auxilary

Lo-CUT FILTER: OUT **SLOPE**: **Hi-CUT FILTER**:178 Hz. **SLOPE**:70 db

PRE-AMP GAIN: 2^7 **RECORDING FORMAT**: S.E.G:D Code 15

SEG-D CHANNEL ASSIGNMENTS:

Aux. CHANNEL 1: TIMING WORD **Aux. CHANNEL 2**: TRUE PILOT
Aux. CHANNEL 3: HARDWIRE REF. **Aux. CHANNEL 4**: RADIO SIM REF.
Aux. CHANNEL 5: RADIO SIM or 50 Hz.
CHANNELS 1 to 240: DATA CHANNELS.

RECORD LENGTH: 11 secs. **SWEEP TIME**: 6 seconds **LISTENING TIME**: 5 sec.

SWEEP PARAMETERS:
START FREQUENCY:12 Hz. **STOP FREQUENCY**: 96 Hz.
SWEEP TYPE :LINEAR **TAPER LENGTH** : .25 secs.

TAPE FORMAT: S.E.G:D Code 15 6250 BPI

STACKING AND CORRELATION PARAMETERS:

DUAL NOISE ALGORITHM (DNA) - BURST ALGORITHM - SCALER ALGORITHM

AUTO. NOISE ATTACK TIME CONSTANT: 2048 ms **DNA DYNAMIC RANGE**: 60db

AUTO. NOISE RELEASE TIME CONSTANT:4096 ms **MANUAL SCALE VALUE**: 2

SENSITIVITY LEVEL: 2 **AUX. DATA DELAY TIME**: 500 ms

CORRELATED DIVERSITY STACKS ARE RECORDED ON TAPE

EXTENDED HEADER INFORMATION ON TAPE REGARDING VP NUMBER AND SPREAD NUMBERS ARE INCORRECT AND SHOULD NOT BE USED FOR PROCESSING.

LINE CONDITIONS: Light to medium timbered country
Farm land
Line cutting fair
Line access good

APPENDIX "D"

PERMANENT MARKER & INTERSECTION LISTING

Line IWA91-01

633	442136.851	5875459.596	31.080
Description	PM E.O.L. VO 659,520m EAST. LEGGES ROAD		
273+10	434950.887	5875555.070	27.220
Description	PM S.O.L. VP200,147m WEST LUCINDALE ROAD EAST		

Line IWA91-02

462+1	435085.015	5878904.316	26.484
Description	PM NTHN.FENCE LINE MT BRUCE RD E.O.L. VO 503,819m NTH		
PM/SOL	434432.048	5873700.901	32.794
Description	PM S.O.L. VP 200, 43m NTH FERNVIEW-GARLEE ROAD		

Line IWA91-03

PM/E.O.L.	437756.656	5879814.496	26.794
Description	PM E.O.L. VP 509,181m STH.PM ON CORNER BDRY FENCE LINES.		
234+14	436752.284	5874242.304	27.289
Description	PM NTH SIDE DRAIN RESERVE S.O.L. VP200,694m STH		

APPENDIX "E"

SCHEDULE OF MISTIES/LOOP CLOSURES

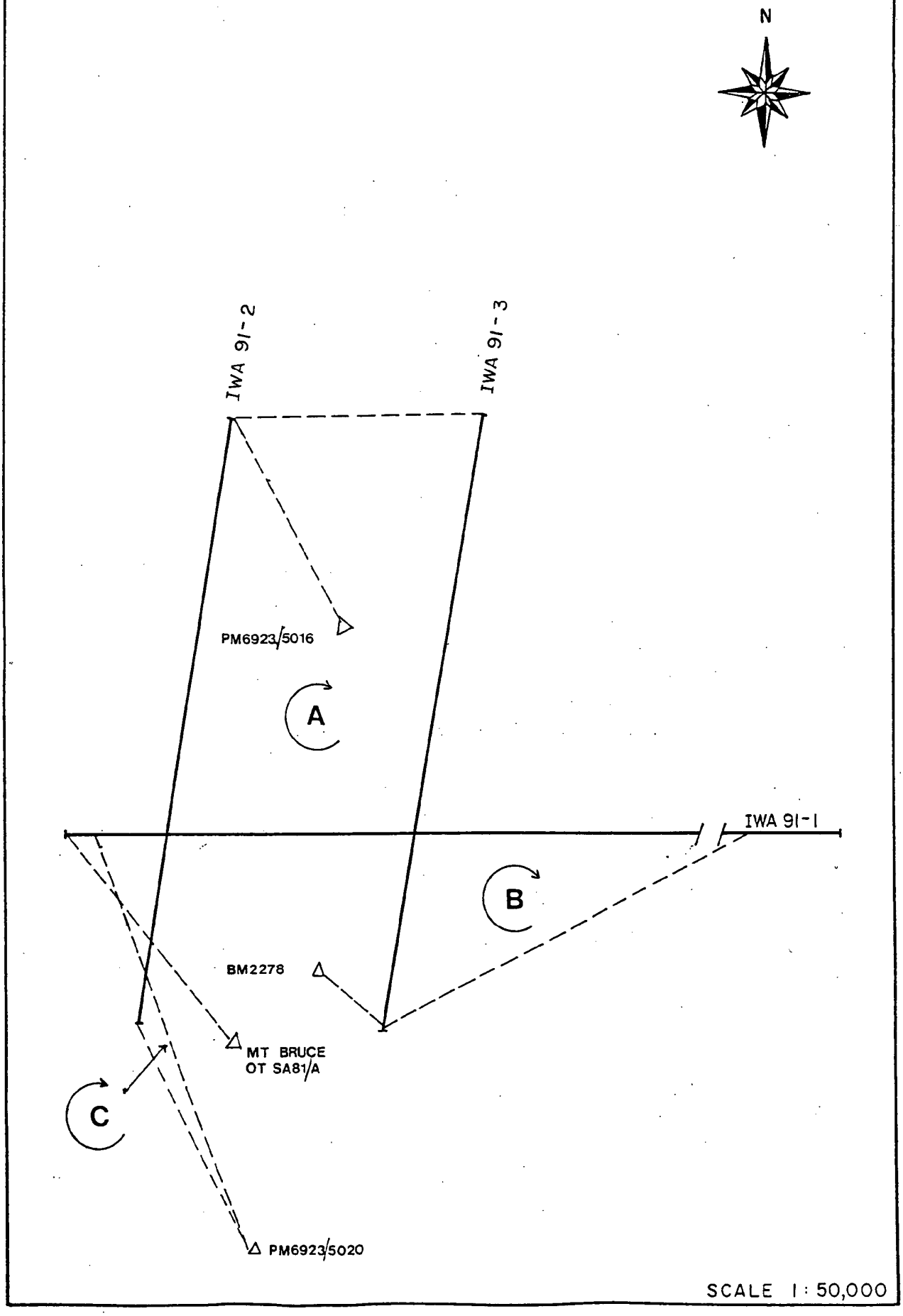
LOOP	EASTING	NORTHING	ELEVATION
A	-0.574	0.558	-0.390
B	0.085	0.316	-0.271
C	-1.313	-0.207	-0.067

	EASTING	NORTHING	ELEVATION
PM6923/5016	(HORIZONTAL & VERTICAL TAKEOFF)		
PM6923/5020 (FROM LINE IWA91-2)	-1.176	+0.044	-0.187
PM 6923/5020 (FROM LINE IWA91-1)	0.711	-0.307	+0.270
MT.BRUCE OT SA81/A	-0.657	-0.757	+0.719
BM 2278	N/A	N/A	-0.049

CO-ORDS:	EASTING	NORTHING	ELEVATION
PM6923/5016	435783.329	5876891.081	26.75
PM6923/5020	435097.783	5874020.786	44.21
MT BRUCE OT SA81/A	435004.9	5874521.3	35.3

000096

LOOP CLOSURE MAP



000097

FIELD OPERATIONS REPORT

PEL 52
OTWAY BASIN
SOUTH AUSTRALIA

HOSKING GEOPHYSICAL CORPORATION

Alvin R. Hosking
July, 1991

Introduction

The seismic reflection data in PEL 52 comprises a number of different surveys conducted between 1980 to the recent survey conducted in 1991. Each survey represents the "state of the art" for that particular time period. The energy source for all surveys was Vibroseis, with a range of different sweep frequencies as indicated in the accompanying recording and field details.

Recording and Field Parameters

Surveys	*RM-80*
	OT-SA-81
	BU-85
	ULT-85
	ULT-86
	IWA-91

FIELD PARAMETERS

SURVEY	*	RM
YEAR	*	1980
CONTRACTOR	*	SSL
NUMBER OF CHANNELS	*	48
FOLD	*	24
GROUP SPACING	*	80 m
SOURCE SPACING	*	80 m
NEAR OFFSET	*	240 m
FAR OFFSET	*	2080 m
NUMBER OF GEOPHONES	*	24
GEOPHONE ARRAY	*	112233332211
GEOPHONE ARRAY LENGTH	*	97 m
SOURCE	*	Vibroseis (linear)
NUMBER OF VIBRATORS	*	3
NUMBER OF SWEEPS	*	8
VIBRATOR PAD SPACING	*	14
VIBRATOR MOVE/SWEEP	*	10 m
VIBRATOR PATTERN LENGTH	*	80 m
SOURCE POSITION	*	centred
RECORD LENGTH	*	20 sec
SWEEP LENGTH	*	12 sec
SWEEP FREQUENCY	*	15 - 60 Hz
SAMPLE RATE	*	4 ms
INSTRUMENT TYPE	*	SERCEL 338 HR
GEOPHONE TYPE	*	N/A

FIELD PARAMETERS

SURVEY	*	OT-SA
YEAR	*	1981
CONTRACTOR	*	SSL
NUMBER OF CHANNELS	*	48
FOLD	*	24
GROUP SPACING	*	60 m
SOURCE SPACING	*	60 m
NEAR OFFSET	*	180 m
FAR OFFSET	*	1560 m
NUMBER OF GEOPHONES	*	24
GEOPHONE ARRAY	*	In line
GEOPHONE ARRAY LENGTH	*	76
SOURCE	*	Vibroseis (linear)
NUMBER OF VIBRATORS	*	3
NUMBER OF SWEEPS	*	6
VIBRATOR PAD SPACING	*	16 m (tandem)
VIBRATOR MOVE/SWEEP	*	10 m
VIBRATOR PATTERN LENGTH	*	60 m
SOURCE POSITION	*	centred
RECORD LENGTH	*	20 sec
SWEEP LENGTH	*	16 sec
SWEEP FREQUENCY	*	14 - 80 Hz
SAMPLE RATE	*	2 ms
INSTRUMENT TYPE	*	SERCEL 3388
GEOPHONE TYPE	*	N/A

FIELD PARAMETERS

SURVEY	*	BU
YEAR	*	1985
CONTRACTOR	*	Geosource
NUMBER OF CHANNELS	*	96
FOLD	*	12
GROUP SPACING	*	15 m
SOURCE SPACING	*	60 m
NEAR OFFSET	*	135 m
FAR OFFSET	*	840 m
NUMBER OF GEOPHONES	*	12
GEOPHONE ARRAY	*	In line
GEOPHONE ARRAY LENGTH	*	30 m
SOURCE	*	Vibroseis (non-linear)
NUMBER OF VIBRATORS	*	3
NUMBER OF SWEEPS	*	N/A
VIBRATOR PAD SPACING	*	12 m
VIBRATOR MOVE/SWEEP	*	5 m
VIBRATOR PATTERN LENGTH	*	N/A
SOURCE POSITION	*	centred
RECORD LENGTH	*	20 sec
SWEEP LENGTH	*	16 sec
SWEEP FREQUENCY	*	16 - 96 Hz
SAMPLE RATE	*	2 ms
INSTRUMENT TYPE	*	MDS 10
GEOPHONE TYPE	*	SM 4

FIELD PARAMETERS

SURVEY	*	ULT
YEAR	*	1985
CONTRACTOR	*	GSI
NUMBER OF CHANNELS	*	120
FOLD	*	20
GROUP SPACING	*	25 m
SOURCE SPACING	*	75 m
NEAR OFFSET	*	62.5 m
FAR OFFSET	*	1537.5 m
NUMBER OF GEOPHONES	*	12
GEOPHONE ARRAY	*	In line
GEOPHONE ARRAY LENGTH	*	25 m
SOURCE	*	Vibroseis (linear)
NUMBER OF VIBRATORS	*	3
NUMBER OF SWEEPS	*	5
VIBRATOR PAD SPACING	*	12.5 m
VIBRATOR MOVE/SWEEP	*	6.25 m
VIBRATOR PATTERN LENGTH	*	50 m
SOURCE POSITION	*	between
RECORD LENGTH	*	15 sec
SWEEP LENGTH	*	10 sec
SWEEP FREQUENCY	*	12 - 96 Hz
SAMPLE RATE	*	2 ms
INSTRUMENT TYPE	*	DFS V
GEOPHONE TYPE	*	GSC-20D 10 Hz

FIELD PARAMETERS

SURVEY	*	ULT
YEAR	*	1986
CONTRACTOR	*	GSI
NUMBER OF CHANNELS	*	120
FOLD	*	60
GROUP SPACING	*	25 m
SOURCE SPACING	*	25 m
NEAR OFFSET	*	62.5 m
FAR OFFSET	*	1537.5 m
NUMBER OF GEOPHONES	*	12
GEOPHONE ARRAY	*	In line
GEOPHONE ARRAY LENGTH	*	50 m
SOURCE	*	Vibroseis (linear)
NUMBER OF VIBRATORS	*	3
NUMBER OF SWEEPS	*	2
VIBRATOR PAD SPACING	*	12.5 m
VIBRATOR MOVE/SWEEP	*	12.5 m
VIBRATOR PATTERN LENGTH	*	37.5 m
SOURCE POSITION	*	between
RECORD LENGTH	*	16 sec
SWEEP LENGTH	*	12 sec
SWEEP FREQUENCY	*	12 - 96 Hz
SAMPLE RATE	*	2 ms
INSTRUMENT TYPE	*	DFS V
GEOPHONE TYPE	*	GSC - 20D 10 Hz

FIELD PARAMETERS

SURVEY	*	IWA
YEAR	*	1991
CONTRACTOR	*	WESTERN GEOPHYSICAL
NUMBER OF CHANNELS	*	240
FOLD	*	60
GROUP SPACING	*	20 m
SOURCE SPACING	*	40 m
NEAR OFFSET	*	50 m
FAR OFFSET	*	2430 m
NUMBER OF GEOPHONES	*	12
GEOPHONE ARRAY	*	In line
GEOPHONE ARRAY LENGTH	*	40 m
SOURCE	*	Vibroseis (linear)
NUMBER OF VIBRATORS	*	4
NUMBER OF SWEEPS	*	6
VIBRATOR PAD SPACING	*	12 m
VIBRATOR MOVE/SWEEP	*	4 m
VIBRATOR PATTERN LENGTH	*	56 m
SOURCE POSITION	*	between
RECORD LENGTH	*	11 sec
SWEEP LENGTH	*	6 sec
SWEEP FREQUENCY	*	12 - 96 Hz
SAMPLE RATE	*	2 ms
INSTRUMENT TYPE	*	SERCEL SN-368
GEOPHONE TYPE	*	Geospace GSC 20D

Data Quality

In general the recorded data quality must be considered reasonable although several surveys RM-80 and OT-SA-81 initially presented concern. Considerable noise was evident before the first breaks and the first breaks were poor. It was also found, during data processing, that a considerable number of geometry problems existed. It was evident that field procedures quality control and supervision were less than should be expected. These geometry problems were corrected during data processing. From the appearance of the data, such as the poor first-breaks, it is suspected that the field equipment were not well maintained and may have been slightly out of phase. Additionally several significant survey errors were found in the horizontal control and were subsequently corrected. In contrast were the surveys BU-85 and IWA-91 where it would appear that field procedures and supervision were optimal. Data quality was excellent with no geometry problems being encountered and where they were encountered they were sufficiently documented in the Observers Report. First-break for both these surveys were excellent.

The recording distances for BU-85 while being designed for shallow prospects were totally inadequate for deeper formations.

DATA PROCESSING

OTWAY BASIN
South Australia
PEL 52

Data Processing

The following is the general sequence used in the data processing. This sequence was maintained for all surveys with the exception of IWA-91 where Dip Move Out was included in the processing sequence prior to Final Velocity Analysis.

Datum Plane = Mean Sea Level
Correction Velocity = 2200 m/s

a. *Cross correlation*

b. *Refraction derived static calculation*

c. *Spherical Divergence*

d. *Deconvolution*

e. *Refraction derived static application*

f. *Correct data to Floating Datum Plane*

g. *Velocity Analysis*

h. *Automatic statics*

i. *Dip Move Out (Kirchoff Summation algorithm) - IWA-91 Survey only.*

j. *Velocity Analysis*

k. *Normal Move Out*

l. *Filter*

m. *Trace Equalization*

n. *Datum Statics - corrected to Mean Sea Level*

o. *Automatic Residual Statics - surface consistent*

p. *Stack (see recording details for fold)*

q. *Post Stack Filter*

r. *Trace Equalization*

s. *Migration - Finite Difference*

Refraction Statics

Refraction Static derived correction were derived from the first-breaks using the Delay-Time method. The refraction marker at the base of the weathered layer was consistently in the 2250 m/s range. The weathering velocity control was provided by a limited number of up-hole surveys and by several short interval refraction profiles. The average velocity for the weathered layer appears to be in the range of 600 m/s.

An exception to the marker velocity was an area in the vicinity of Mt. Burr where some volcanics were encountered at the surface.

Static corrections were consistently very small with only minor problems being encountered. It would appear that the main contribution of the static derivation was in the identification and correction of geometry errors in the field recording. These corrections has undoubtably contributed significantly to the improvement in data quality.

Velocity Analysis

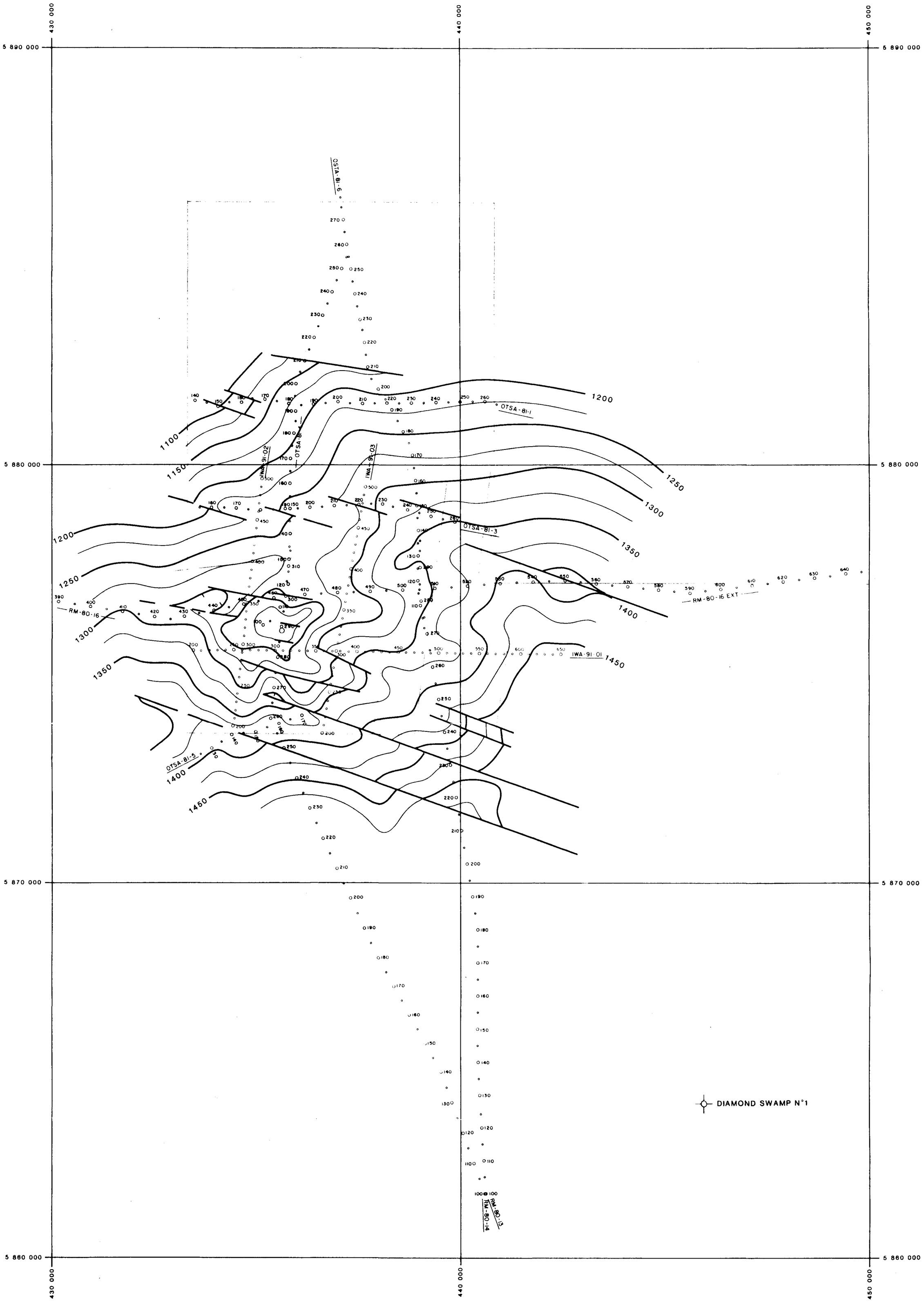
Several iterations of Velocity Analysis were routinely run for all lines. The first iteration were established at 5 kilometre intervals with a closer spacing depending on group spacing, for the final analysis. The first Velocity Analysis was followed by automatic statics and statics applied before the second iteration.

Dip Move Out

This procedure has been applied to the IWA-91 Survey as it is expected that an improvement in Velocity Analysis could be achieved by applying a prestack partial migration. This procedure is especially effective in the shallow portion of the section where velocities encountered are slower. The final sections derived exhibit a significantly improved shallow section especially in the vicinity of faulting.

Migration

A steep-dip implicit finite-difference migration technique was employed and is based on a 45 degree approximation to the scalar wave-equation. This method while handling steep dips is not restricted by lateral velocity variations.



LOWER CRETACEOUS UNCONFORMITY

0 1 2 3 KM

0 500 1000 2000 3000 M

1 : 50,000

CONTOUR INTERVAL = 25 MILLISECONDS

IWA

OTWAY BASIN, AUSTRALIA

RENDELSHAM AREA

8344-4

HOSKING GEOPHYSICAL CORPORATION