

LOGISTICS REPORT

on a

MOVING COILS SURFACE PEM SURVEY

for

CHEVRON STANDARD LIMITED

MINERALS DIVISION

on

IRON MOUNTAIN, NICOLA PROVINCIAL FOREST  
BRITISH COLUMBIA

GEOTERREX LIMITED  
Project 85-907

OTTAWA, ONTARIO  
December 1981

A. SOON  
T. THOMPSON  
Geophysicists.

10,114  
PART  
2 of 2

**geotrex**  
M.

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I. INTRODUCTION

During the period from September 21, 1981 to October 19, 1981, a Moving Coils PEM survey was carried out on Iron Mountain, near Merritt British Columbia, by Geoterrex Limited of 2060 Walkley Road, Ottawa, Ontario for Chevron Standard Limited, Minerals Division, of Vancouver, British Columbia.

43E BASE LINE IS 070  
55E BASE LINE IS 070

The survey was conducted on two grids, A.N. and B.N., with a combined total of 50.6 line kilometres surveyed.

SEE SOIL MAPS BY G.W. LAFORNE

The purpose of the PEM survey was to locate any anomalous readings which may be indicative of possible mineralized zones.

Geoterrex supplied a four man crew consisting of two geophysicists, Mr. T.G. Thompson and Mr. A. Soon, plus two assistants.

## II. LOCATION AND ACCESS

Iron Mountain is located approximately 10 kilometres south of Merritt in the Nicola Provincial Forest area of British Columbia.

Access to the survey area was by gravel mountain road, leading to a microwave tower at the peak, off of the Coldwater River Road. Further access to the grid lines was by four wheel drive on a number of logging roads.

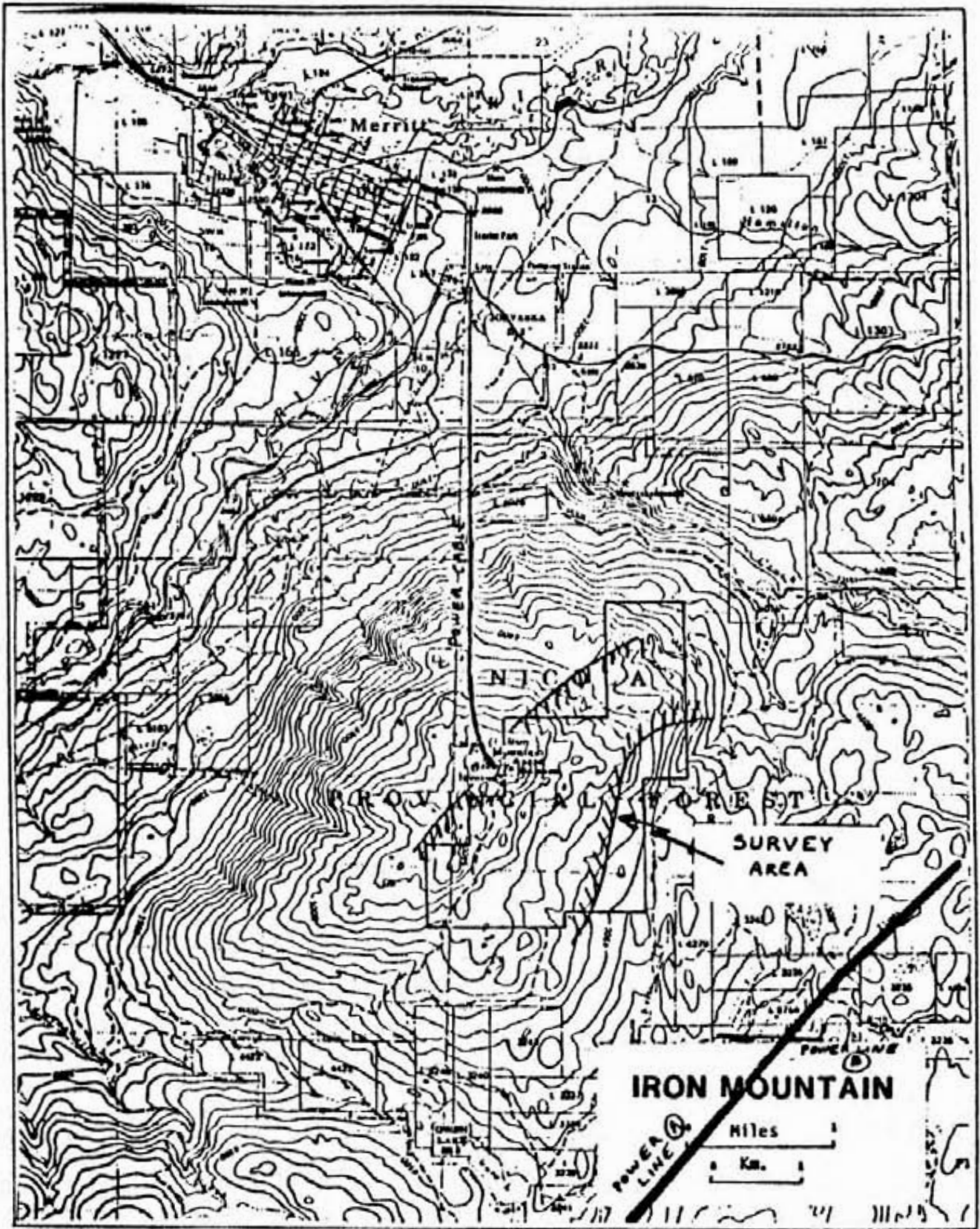


FIGURE 1  
Survey Area Location Map

### III. SURVEY STATISTICS

#### III.1 Personnel

The following personnel were directly involved in the completion of the survey:

Andy Soon  
Geophysicist  
c/o Geoterrex Limited  
2060 Walkley Road  
Ottawa, Ontario  
K1G 3P5

Trevor Thompson  
Geophysicist  
c/o Geoterrex Limited  
2060 Walkley Road  
Ottawa, Ontario  
K1G 3P5

Randall Steeds  
Field Assistant  
c/o Geoterrex Limited (Temporary)  
2060 Walkley Road  
Ottawa, Ontario  
K1G 3P5

Brian Fleming  
Field Assistant  
c/o Geoterrex Limited (Temporary)  
2060 Walkley Road  
Ottawa, Ontario  
K1G 3P5

All members were present during the entire survey from September 21 to October 19, 1981.

Interpretation is to be carried out by Geoterrex Ltd. after examination of the results by Chevron Standard Limited.

### III.2 Equipment

Geoterrex Limited provided the following equipment:

1. Vehicles: One 1981 Chevrolet Van rented and one 1981 Chevrolet Blazar four wheel drive rented.
2. One Crone Geophysics PEM system with specifications as follows:
  - a) Transmitter: output voltage: 24 volts  
 S/N 21            time base: 10.8 msec.  
                   powered by: 2-12 volt rechargable  
                   batteries mounted on a pack frame (2 sets)
  - b) Transmitter Loop: diameter: 15 metres closed coil
  - c) Receiver: measured quantities: Primary shut off  
                   voltage pulse (PP)  
                   S/N 9            Time derivative of the transient  
                   magnetic field by integrating sampling over  
                   eight contiguous time windows  
                   Time base: 10.8 msec.

<u>CHANNEL NO.</u>	<u>WINDOW</u>	<u>WIDTH</u>	<u>MID PT.</u>
PP	-100 to 0	100	-50
1	100 to 200	100	150
2	200 to 400	200	300
3	400 to 700	300	550
4	700 to 1100	400	900
5	1100 to 1800	700	1450
6	1800 to 3000	1200	2400
7	3000 to 5000	2000	4000
8	5000 to 7800	2800	6400

Timing - a telemetry link is maintained by radio signal or by direct cable link, between the transmitter and receiver.

Sampling - Sample and Hold: Receiver averages 512 readings for all channels and stores for display.

Continuous: Running average for all channels is stored, enabling operator to reject thunder-storm spikes and reject noise by visual inspection.

powered by: 2 internal 12 volt rechargeable gel batteries

d) Receiver coil: ferrite cored antenna, with preamplifier (20dB amplification) mounted on a tripod.

S/N 22 powered by: 2-9V disposable transistor batteries.



### III.3 Production

Overall production based on line kilometres per production day was 2.53 kilometres per day.

Total number of production days: 20  
Total number of line kilometres Grid A.N.: 17.95  
Total number of line kilometres Grid B.N.: 32.65  
Total number of PEM lines surveyed: 46

Several days were lost during the survey due to rain and snowfall in the grid area which was at elevations over 4500 ft A.S.L. The rough topography and nature of the lines cut slowed production somewhat, as it was difficult and sometimes dangerous to move the equipment along the lines and lay out the transmitter loop.

After consulting with the representative of the client and the line cutting contractor's party chief, it was agreed that lines would be chainsawed to improve them. This made the survey procedures safer and improved production considerably.

#### IV. MOVING COILS PEM SURVEY PROCEDURE

The Crone PEM system transmits an on-off-on negative-off type current waveform in the transmitter loop, which creates a primary magnetic field of the same shape. When the current is switched off or on there is a finite decay or rise ramp. This ramp induces eddy currents in a conductor through which the field passes. At the end of the transmitted ramp, these eddy currents decay at a finite rate, generating their own secondary magnetic field. This field will decay with time. The receiver coil picks up this magnetic field and it is measured by the receiver unit. The secondary field is measured over eight different time spans, or "windows", as an average of the field over each window and is displayed as a fraction of the primary field in parts per thousand (millivolts per volt).

This PEM survey utilized the moving coils configuration which is an in-line surface survey method. The transmitter loop was a 15 metre round loop which was moved along the grid lines at 50 metre intervals. The receiver was a

standard PEM survey receiving coil which was moved along the same line 100 metres behind the transmitter. The plotting point for survey reading measurements is midway between the transmitter and receiver.

## VI. CONCLUSIONS AND RECOMMENDATIONS

The survey data acquired from the Iron Mountain grid generally shows a very flat background response. This lack of a varying background conductivity was recognized in the field so that a test of the P.E.M. system was carried out. The survey crew proceeded to run a test line along a dirt road in the area which was known to cross a buried pipeline. The results of the test indicated that the equipment was indeed functioning properly.

The flat background response is considered to be a realistic view of the area. However, problems were encountered which may have affected some of the individual readings.

The thin overburden was insufficient in numerous places to support the existing trees. This resulted in a lot of deadfall as the trees could not stand after dying. The line cutters were told that their job was to axe cut only, but after consultation with the client's representative and the Geoterrex crew, they began cutting with chainsaws on subsequent lines. This improved production of the P.E.M. survey but problems still existed with the 15m Tx loop. The bush was dense in some areas and other stations were located

on uneven rock faces making it difficult to lay out the loop in a circle even though a conscious effort was made to do so at all stations. Also, there was no means of communication between the Tx crew and the Rx operator except for coded signals given by whistle indicating, "sync", "pulse", and "move to next station". Therefore, it was impossible to insure that the Rx coil was oriented perpendicular to the same plane as the Tx loop to maximize the signal strength. A better means of communication may have improved the results somewhat as it would allow the survey crew to eliminate the orientation problem.

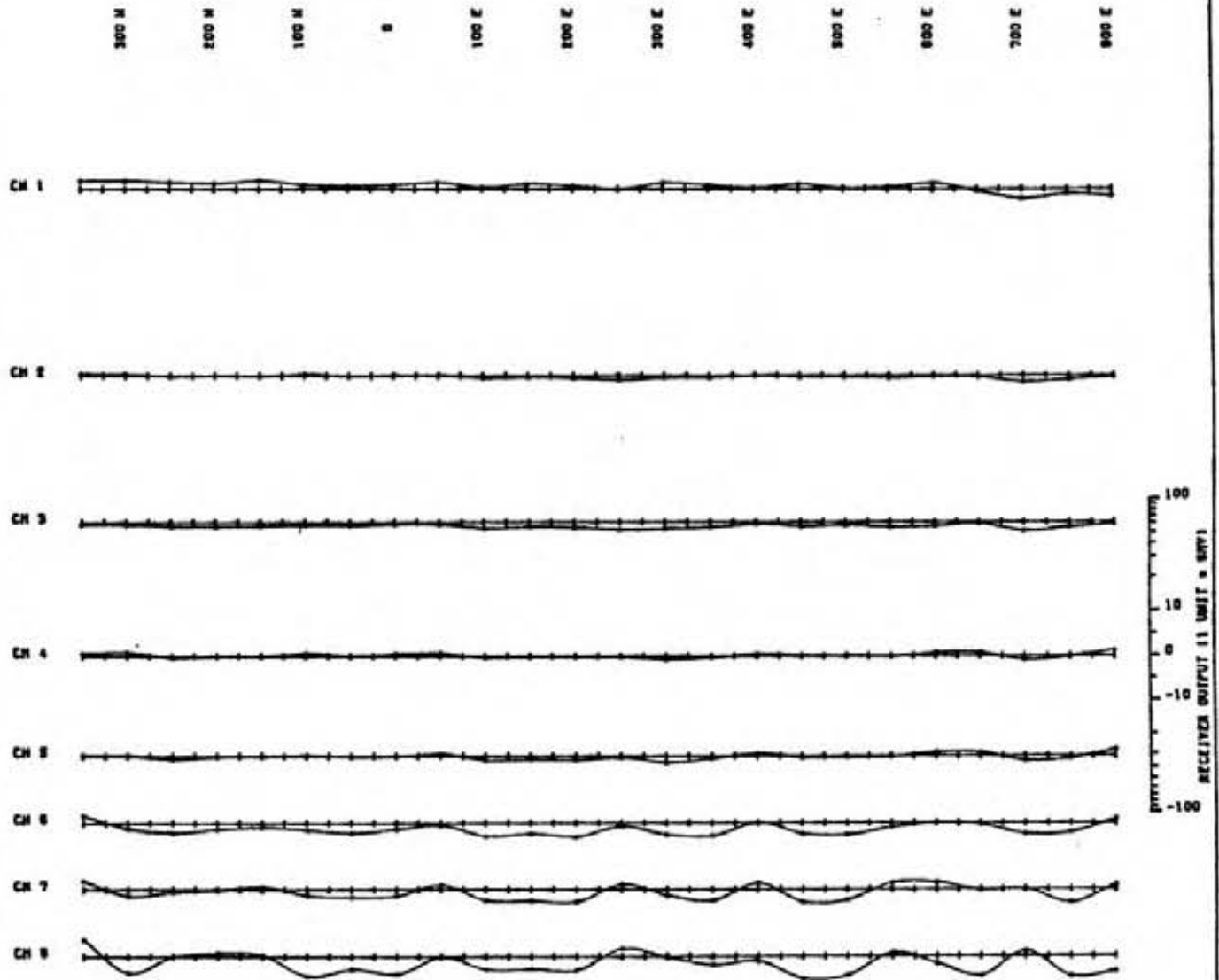
The survey could have been completed in less time had it been initiated earlier in the season. During the survey there were several days lost due to snowfall. Although the snow did not accumulate to any great depth, the nature of the terrain and slippery deadfall made operations hazardous when there was snow present. Operating on snow led to several falls resulting in minor injuries. A fall at the end of the survey badly damaged the P.E.M. transmitter so that the final 200 metres of line 54 of Grid B.N. could not be completed. It is of great advantage to initiate mountain surveys,

particularly those at higher elevations, early enough so that they can be completed well before the first snowfalls. This could be particularly advantageous in the Iron Mountain area because it is reportedly a normally dry climate area.


Respectfully submitted,

Trevor G. Thompson  
Geophysicist.

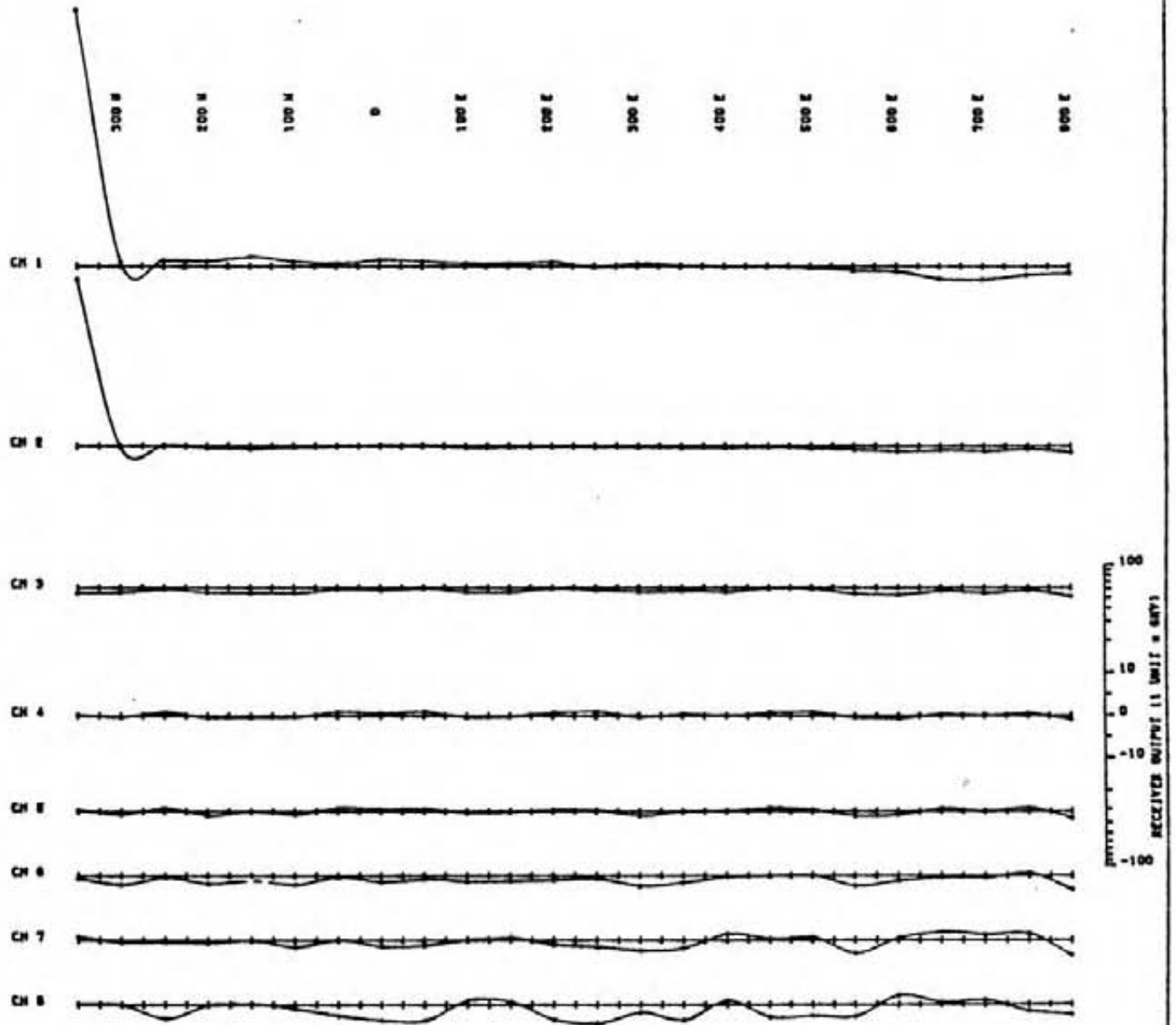
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MOVING COILS SURVEY  
RECEIVER OUTPUT VOLTAGE



COIL SPACING	: 100 M
TX LOOP SIZE	: 15.0 M DIAMETER
TIME BASE	: 10.8 MS
HORIZONTAL SCALE	: 1:7500
SURVEYED BY	: AS.TT.
DATE	: SEPT / 1981

	SURVEYED & COMPILED BY	PROJECT NO.
	GEOTERREX LTD.	85-907
CLIENT	: CHEVRON STANDARD LTD.	
AREA	: IRON MOUNTAIN PROJECT	
GRID CODE	: A.	
LINE	: 4200N	

PEM  
MOVING COILS SURVEY  
RECEIVER OUTPUT VOLTAGE



COIL SPACING : 100 M  
TX LOOP SIZE : 15.0 M DIAMETER  
TIME BASE : 10.8 MS  
HORIZONTAL SCALE : 1:7500  
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DATE : SEPT / 1981

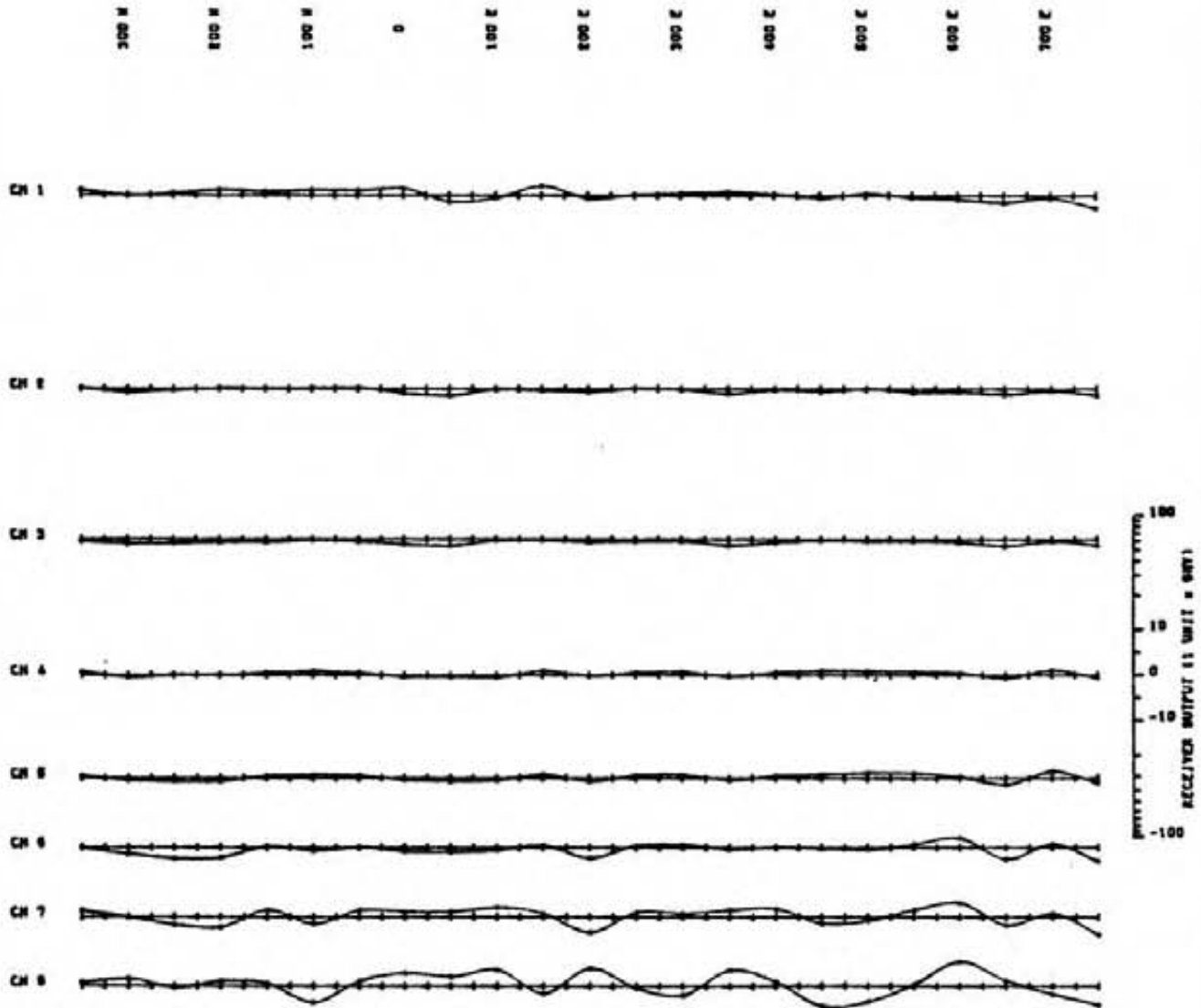


SURVEYED & COMPILED BY PROJECT NO.  
GEOTREX LTD. 85-907


CLIENT : CHEVRON STANDARD LTD.  
AREA : IRON MOUNTAIN PROJECT  
GRID CODE : A.  
LINE : 4300N



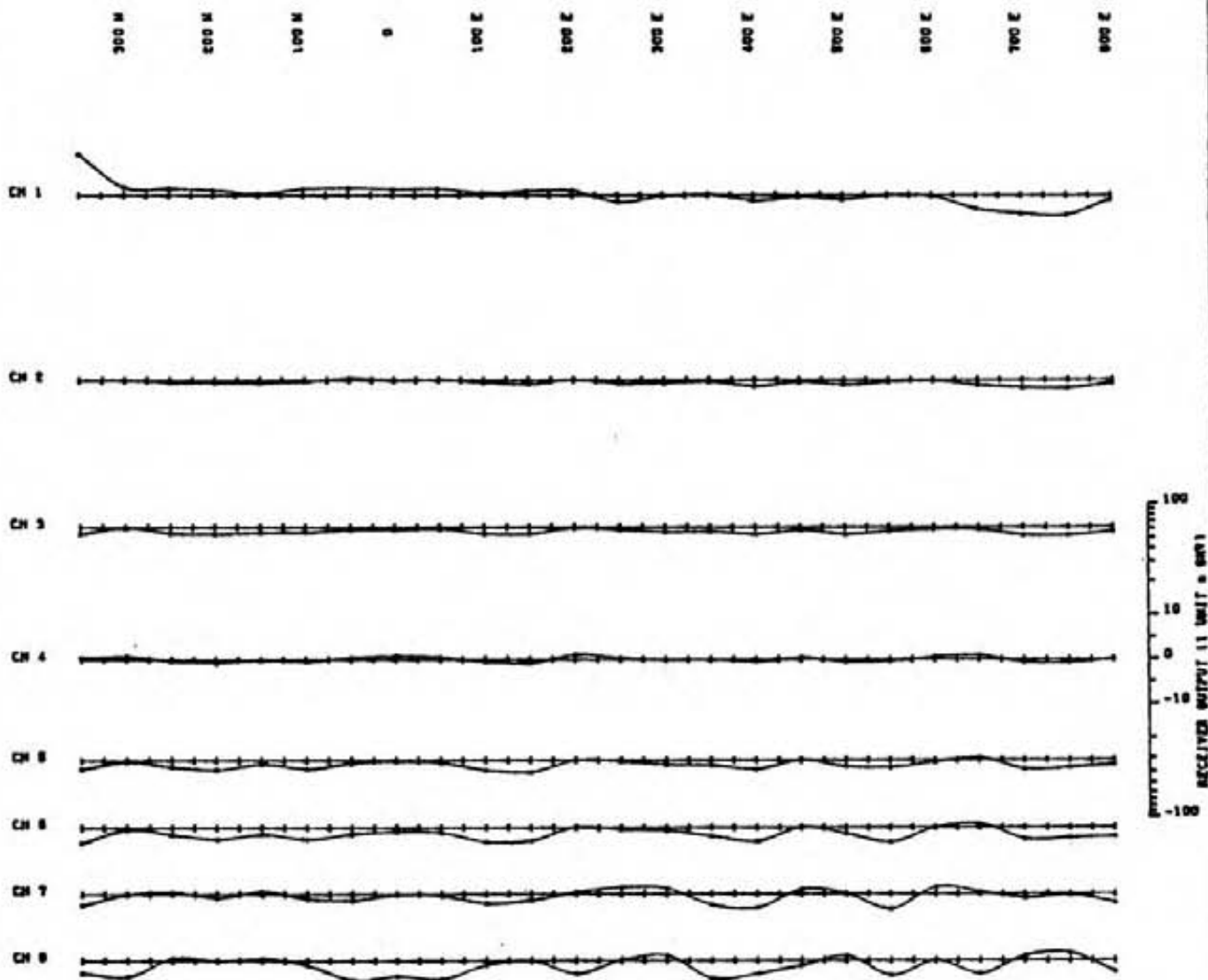
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RECEIVER OUTPUT VOLTAGE




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TIME BASE	: 10.8 MS
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SURVEYED BY	: AS.TT.
DATE	: SEPT / 1981

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AREA	: IRON MOUNTAIN PROJECT	
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LINE	: 4400N	

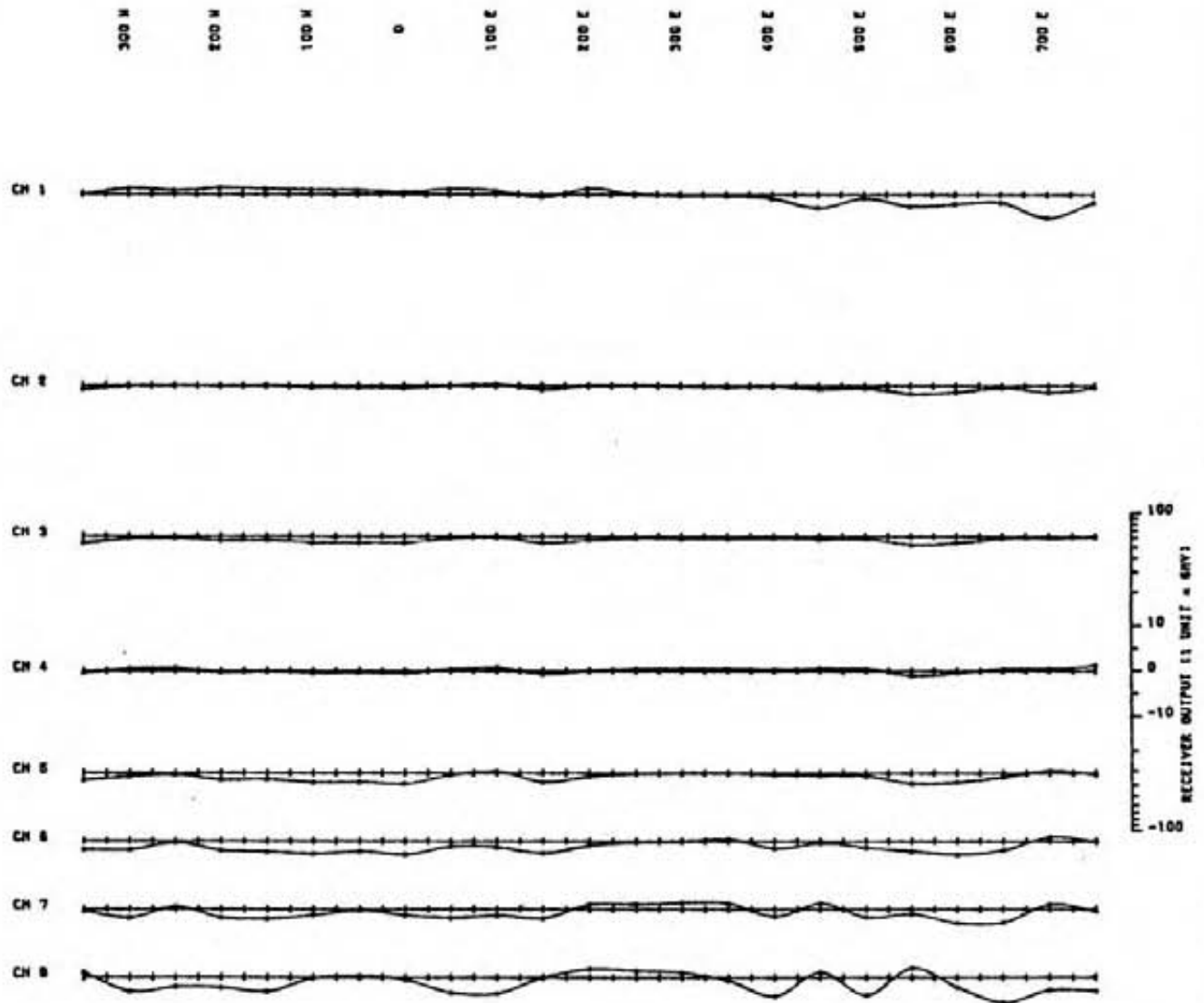
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DATE	: SEPT / 1981

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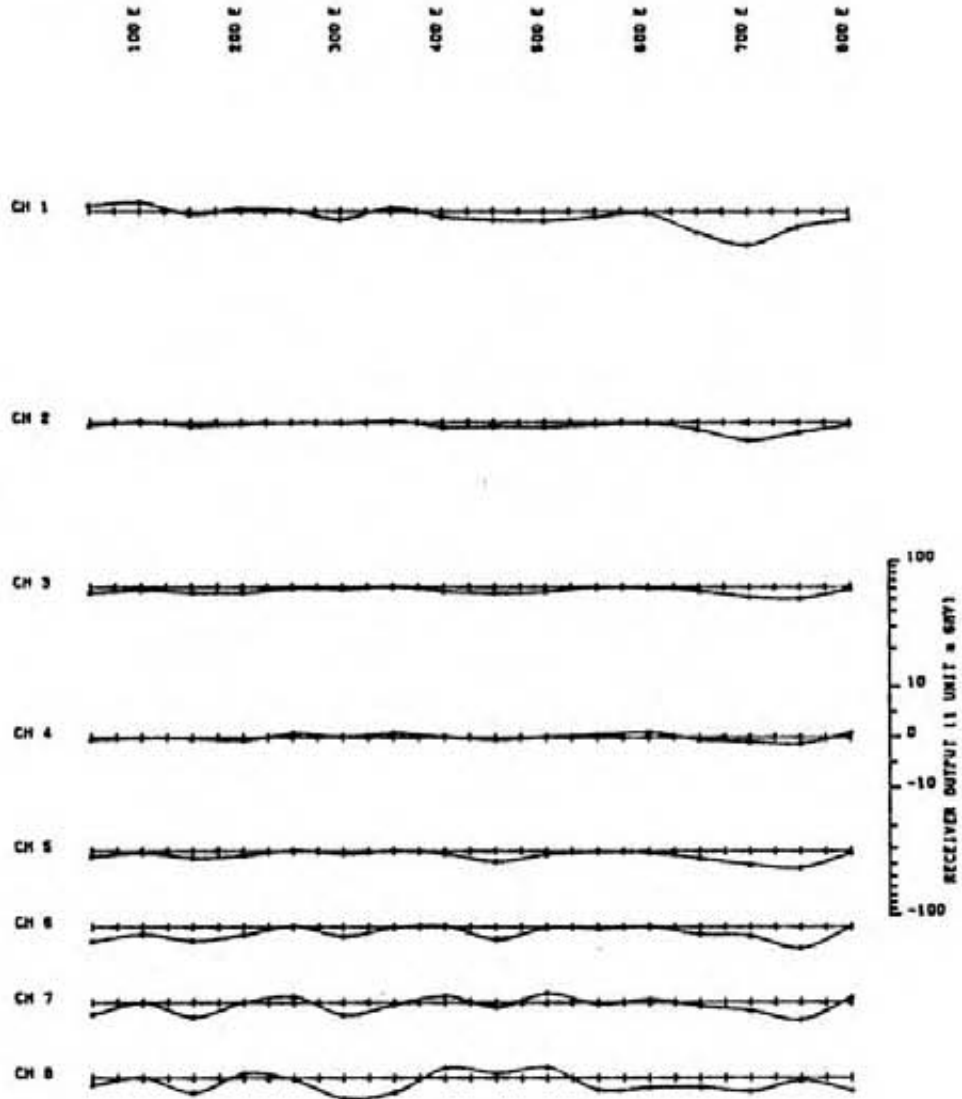
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RECEIVER OUTPUT VOLTAGE




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DATE	: SEPT / 1981

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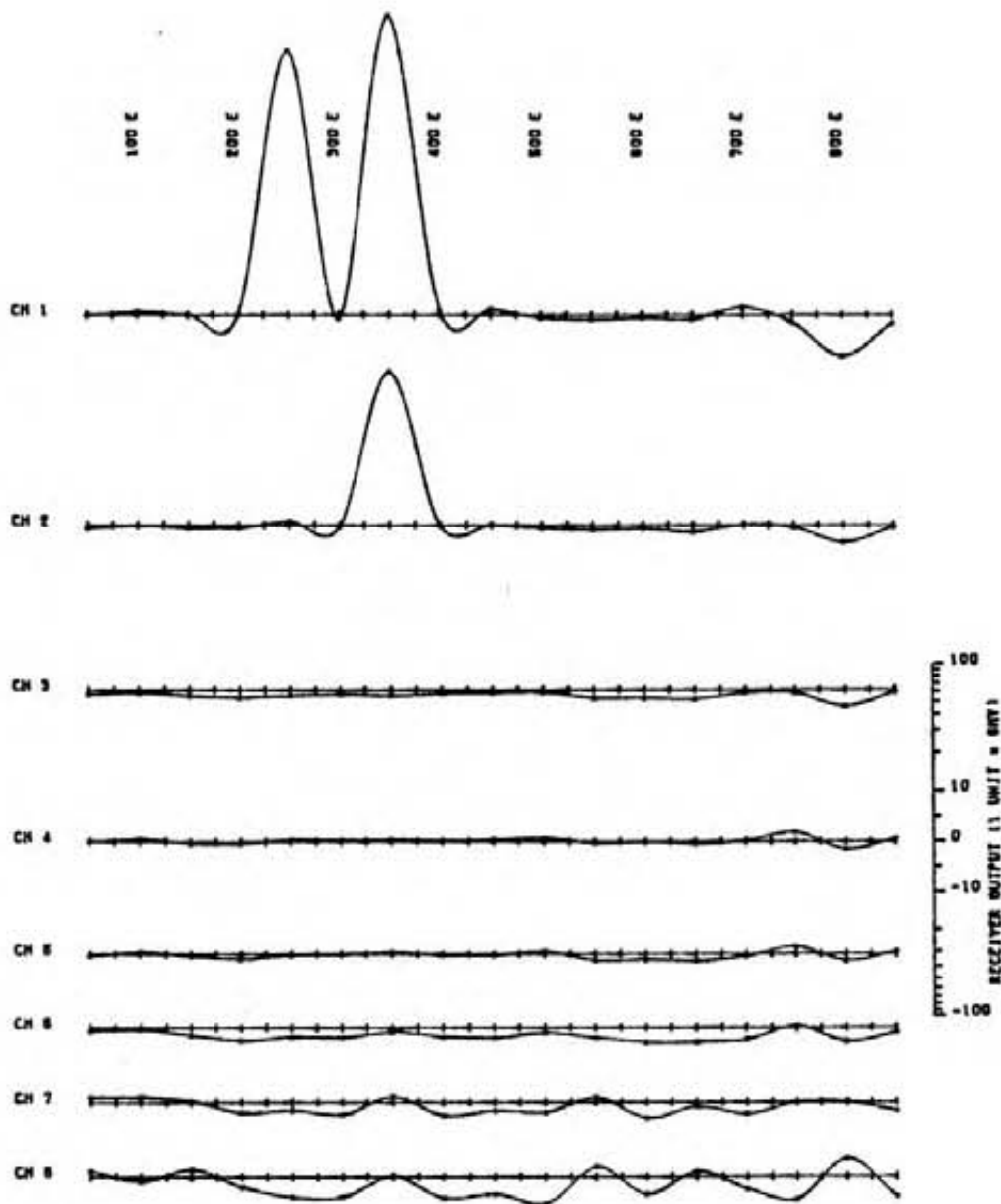
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DATE	: SEPT / 1981

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PEM  
MOVING COILS SURVEY  
RECEIVER OUTPUT VOLTAGE



COIL SPACING : 100 M  
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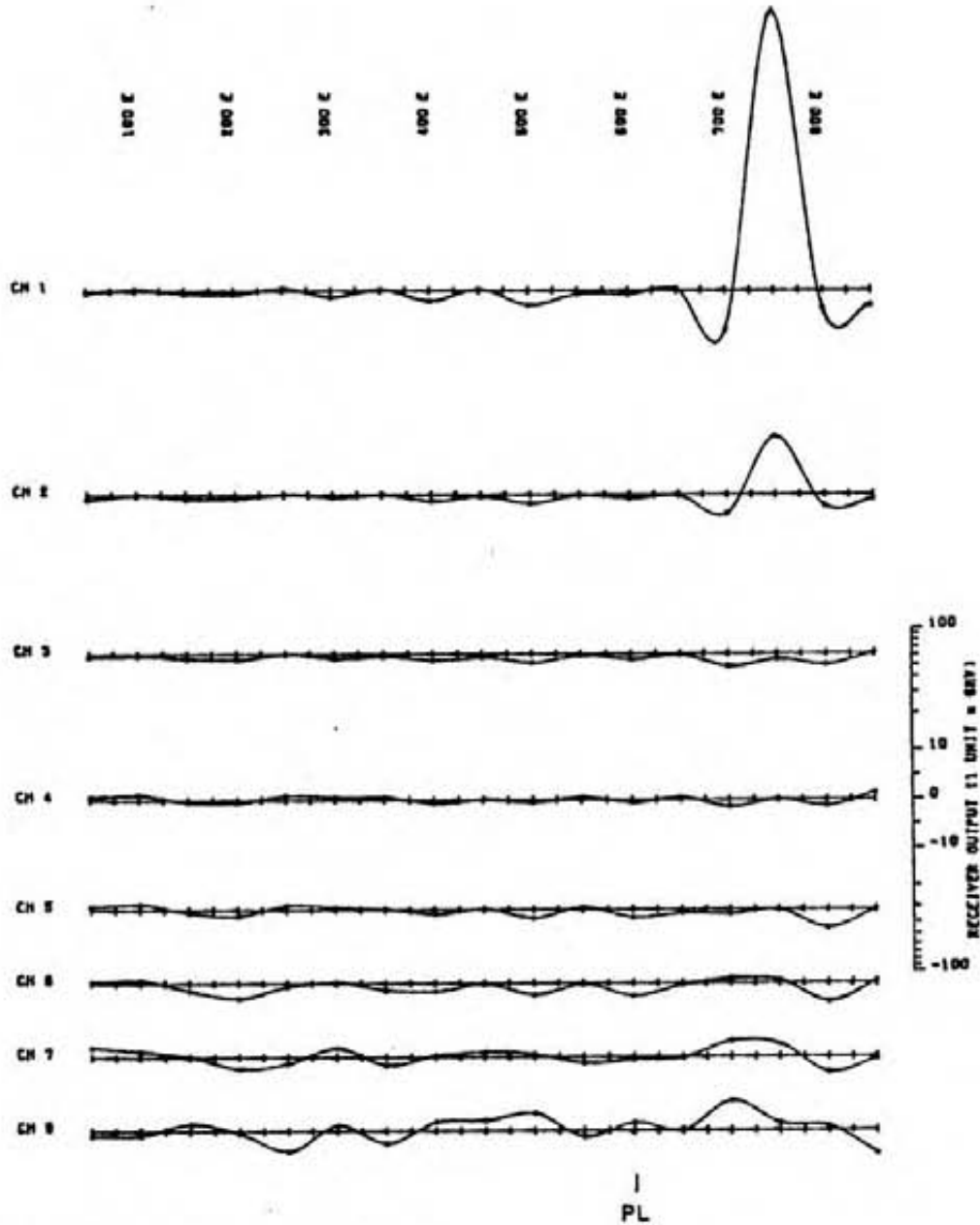


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 GEOTREX LTD.

PROJECT NO.  
 85-907

CLIENT : CHEVRON STANDARD LTD.  
 AREA : IRON MOUNTAIN PROJECT  
 GRID CODE : A.  
 LINE : 4800N

**PEM  
MOVING COILS SURVEY  
RECEIVER OUTPUT VOLTAGE**



**CULTURE LEGEND  
PL - POWER LINE**

COIL SPACING : 100 M  
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 TIME BASE : 10.8 MS  
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 SURVEYED BY : AS.TT.  
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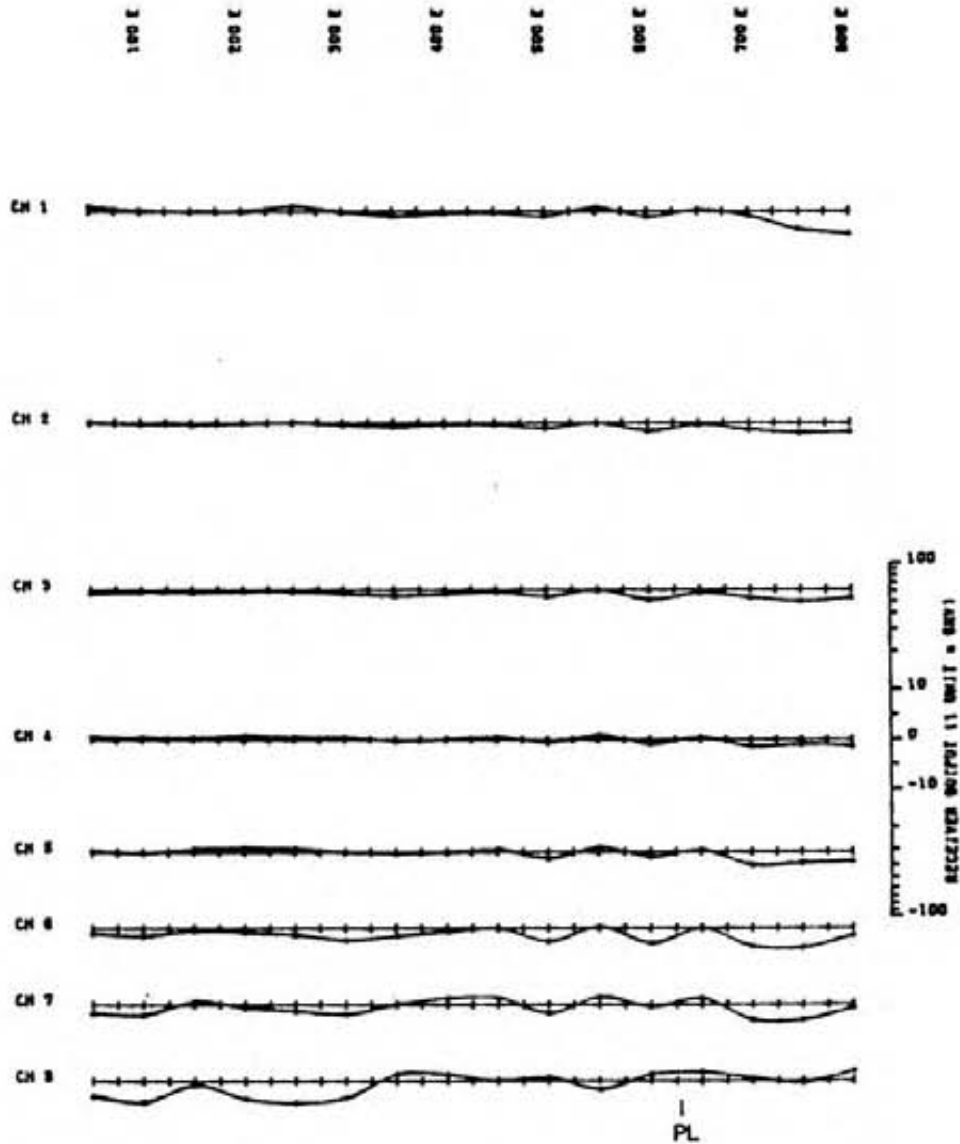


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GEOTREX LTD.**


**PROJECT NO.  
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 AREA : IRON MOUNTAIN PROJECT  
 GRID CODE : A.  
 LINE : 4900N

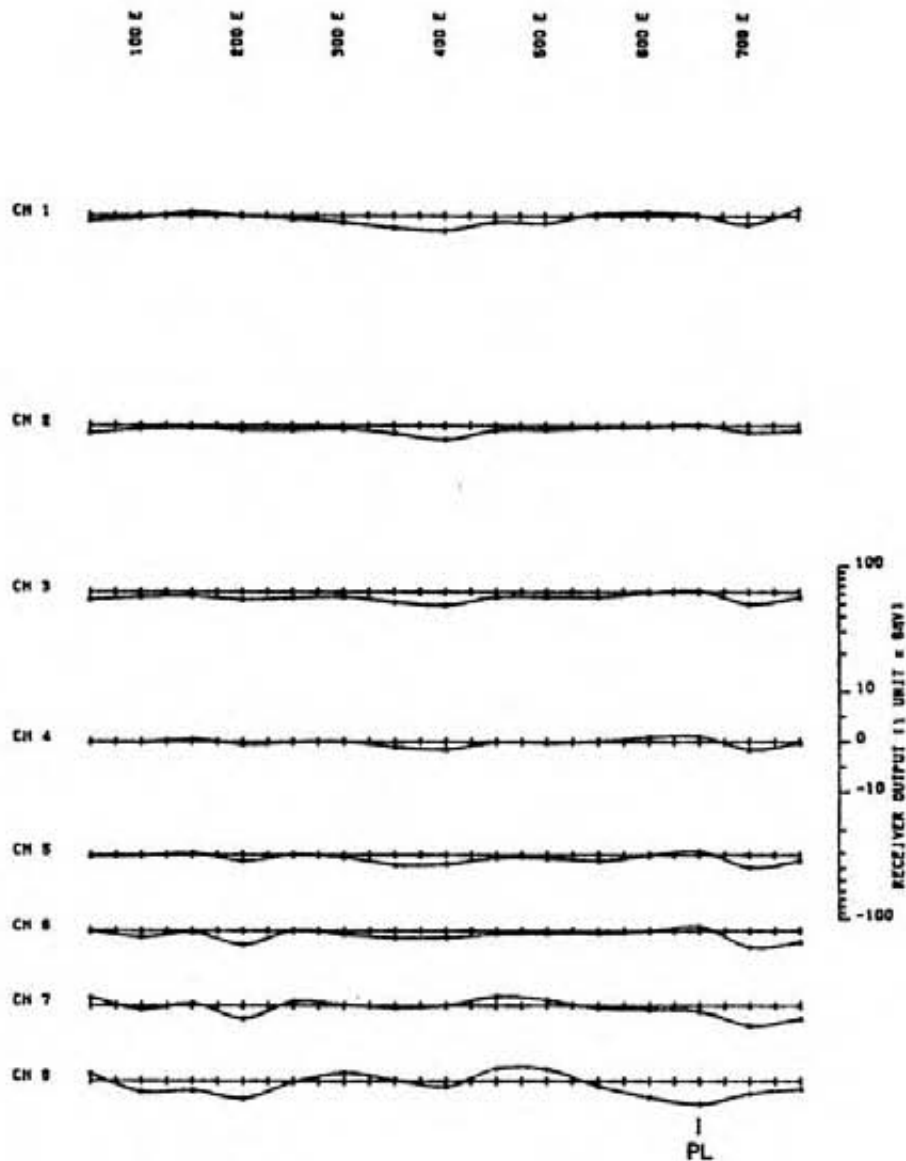
PEM  
MOVING COILS SURVEY  
RECEIVER OUTPUT VOLTAGE



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TX LOOP SIZE	: 15.0 M DIAMETER
TIME BASE	: 10.8 MS
HORIZONTAL SCALE	: 1:7500
SURVEYED BY	: AS.TT.
DATE	: SEPT / 1981

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	GEOTREX LTD.	85-807
CLIENT	: CHEVRON STANDARD LTD.	
AREA	: IRON MOUNTAIN PROJECT	
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LINE	: 5000N	

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MOVING COILS SURVEY  
RECEIVER OUTPUT VOLTAGE

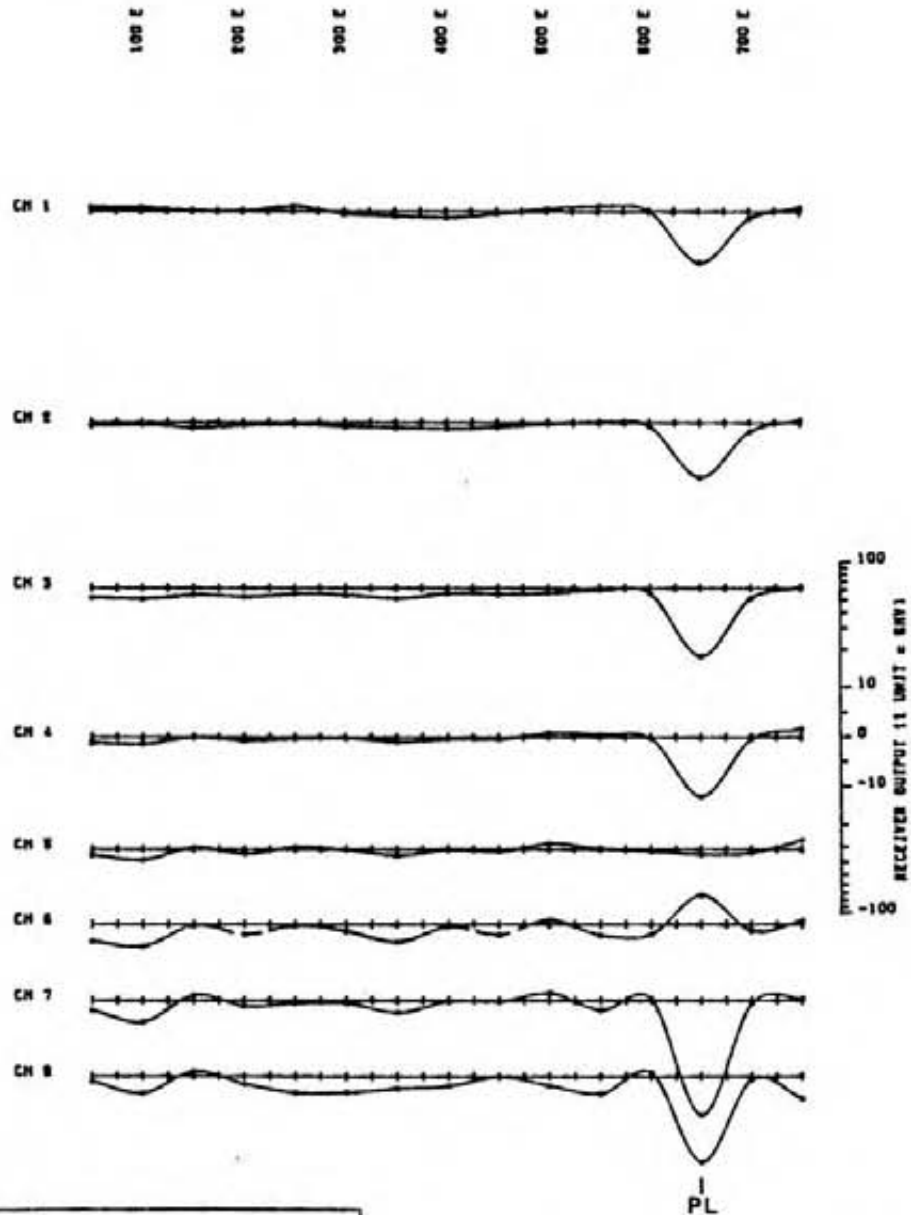


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TX LOOP SIZE	: 15.0 M DIAMETER
TIME BASE	: 10.8 MS
HORIZONTAL SCALE	: 1:7500
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DATE	: SEPT / 1981


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CLIENT	: CHEVRON STANDARD LTD.	
AREA	: IRON MOUNTAIN PROJECT	
GRID CODE	: A.	
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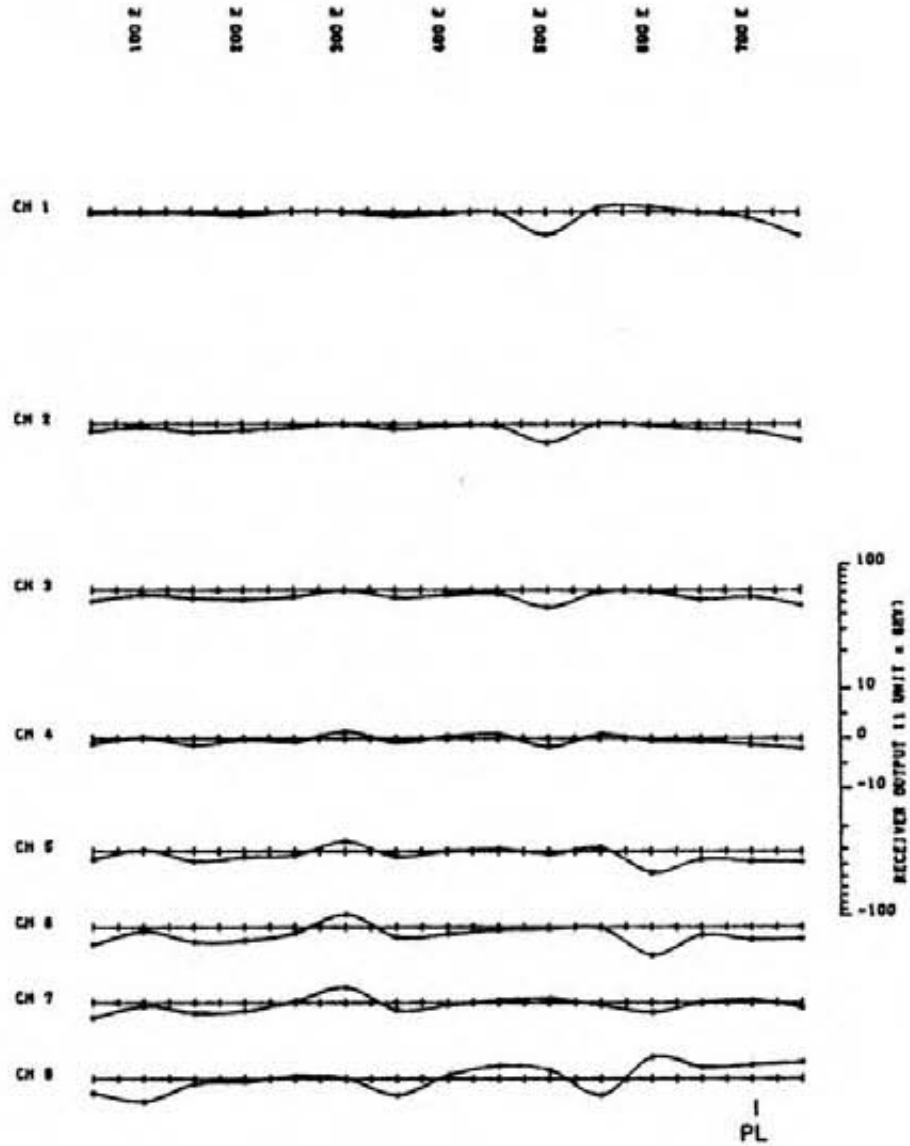
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**MOVING COILS SURVEY**  
**RECEIVER OUTPUT VOLTAGE**




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DATE	: SEPT / 1981

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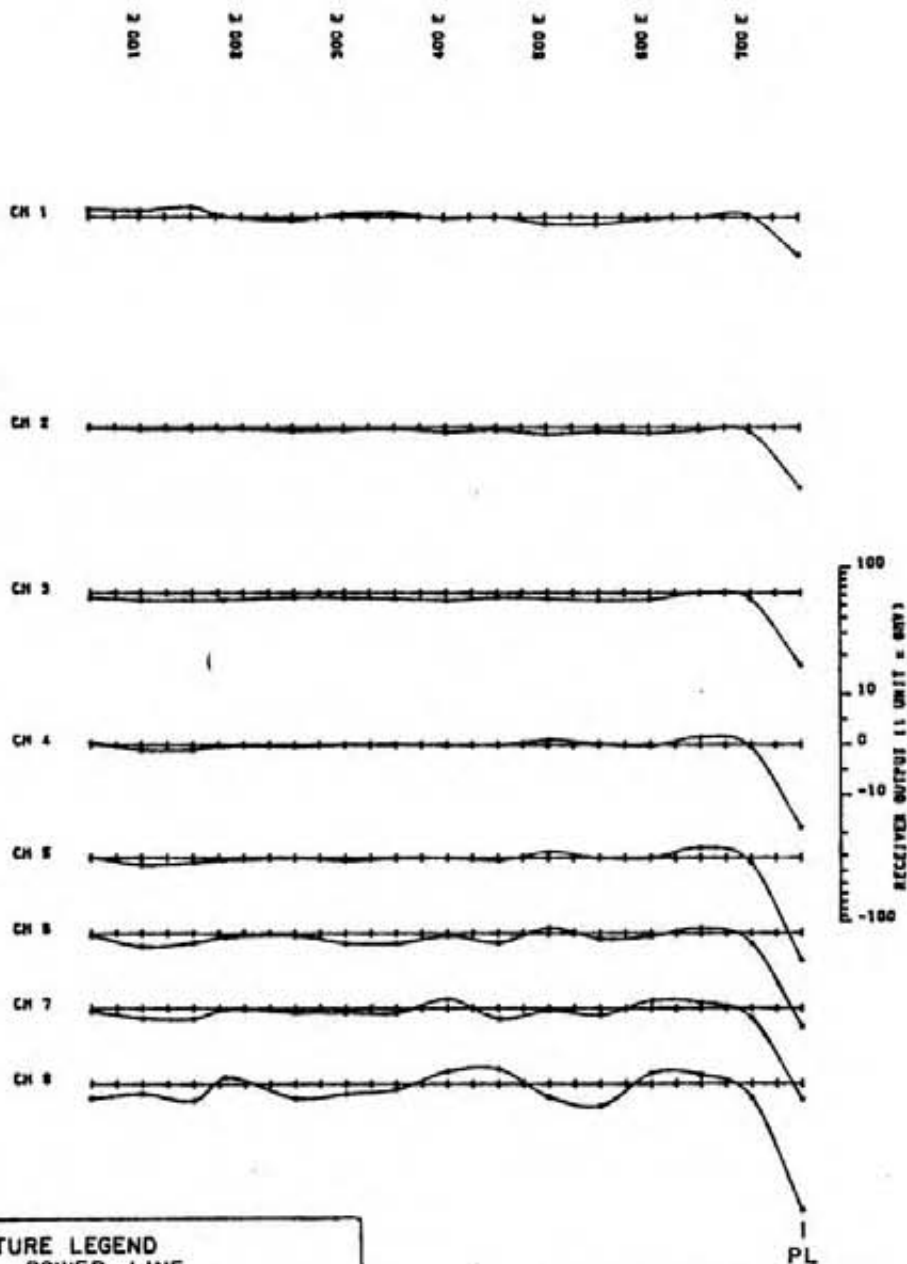
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TIME BASE	: 10.8 MS
HORIZONTAL SCALE	: 1:7500
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AREA	: IRON MOUNTAIN PROJECT	
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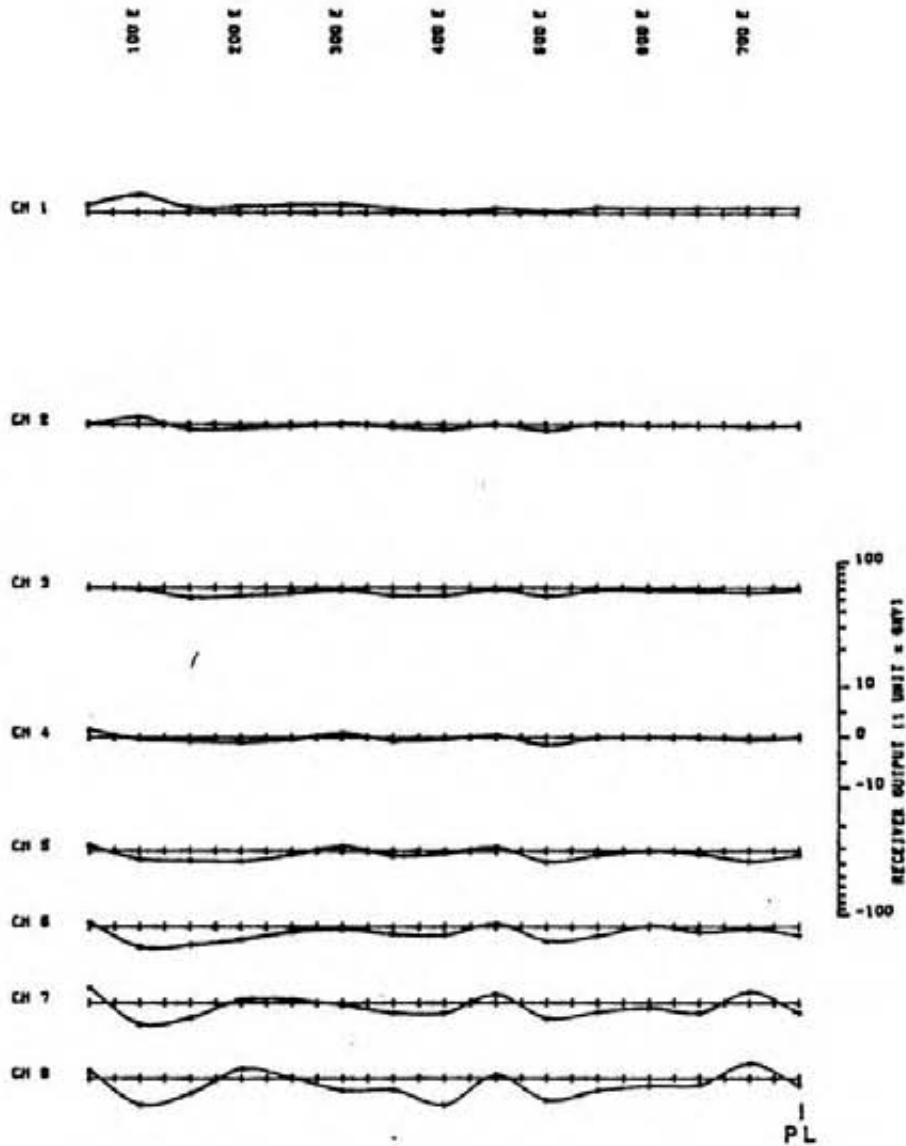
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RECEIVER OUTPUT VOLTAGE




CULTURE LEGEND	
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TIME BASE	: 10.8 MS
HORIZONTAL SCALE	: 1:7500
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AREA	: IRON MOUNTAIN PROJECT	
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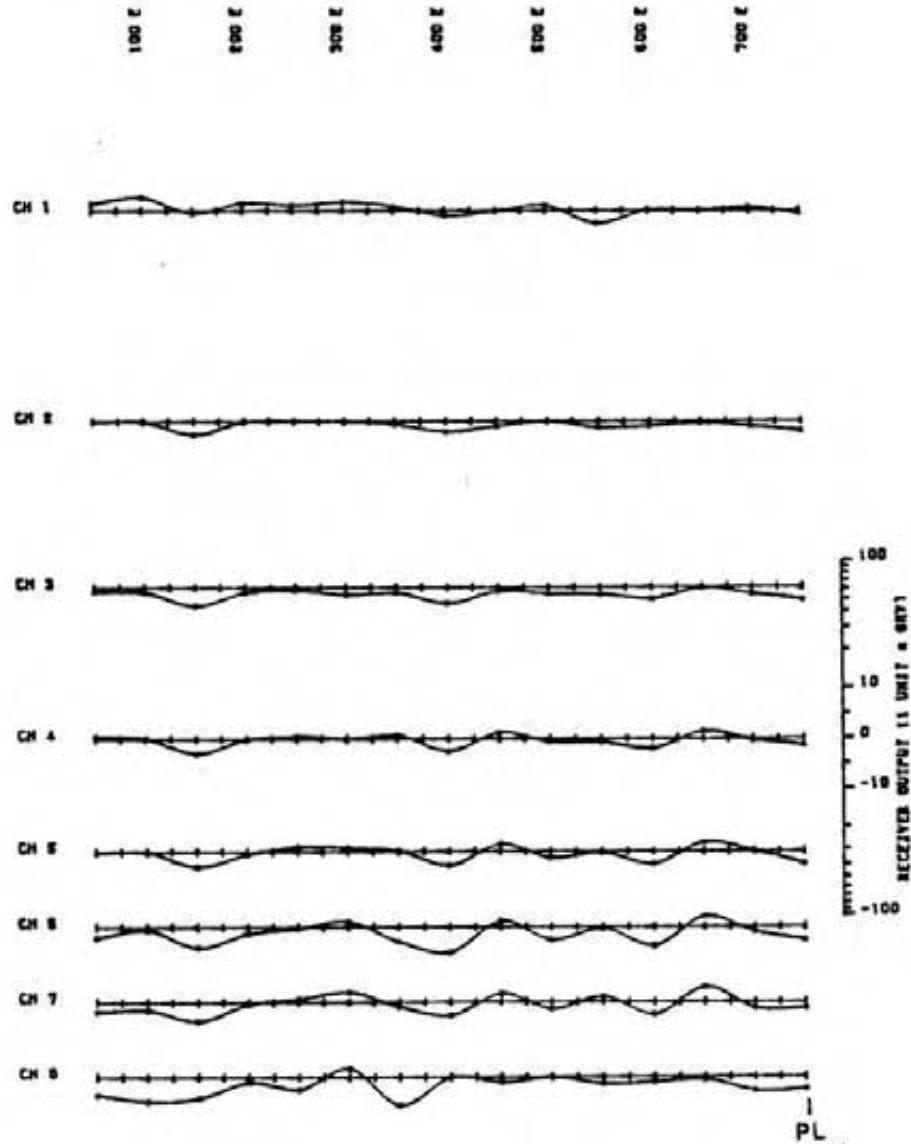
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RECEIVER OUTPUT VOLTAGE



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TIME BASE	: 10.8 MS
HORIZONTAL SCALE	: 1:7500
SURVEYED BY	: AS.TT.
DATE	: SEPT / 1981

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AREA	: IRON MOUNTAIN PROJECT	
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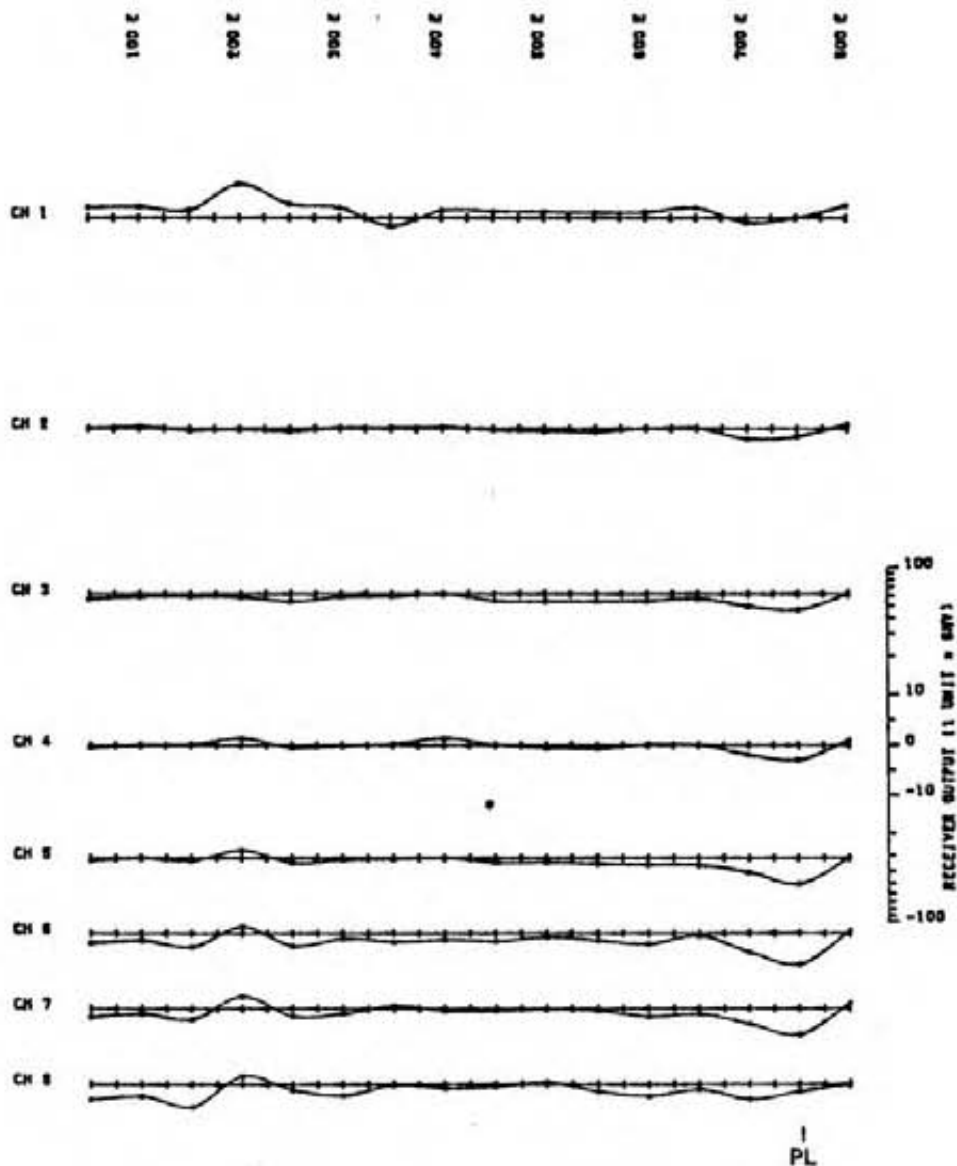
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MOVING COILS SURVEY  
RECEIVER OUTPUT VOLTAGE



CULTURE LEGEND	
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TX LOOP SIZE	: 15.0 M DIAMETER
TIME BASE	: 10.8 MS
HORIZONTAL SCALE	: 1:7500
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DATE	: SEPT / 1981

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AREA	: IRON MOUNTAIN PROJECT	
GRID CODE	: A.	
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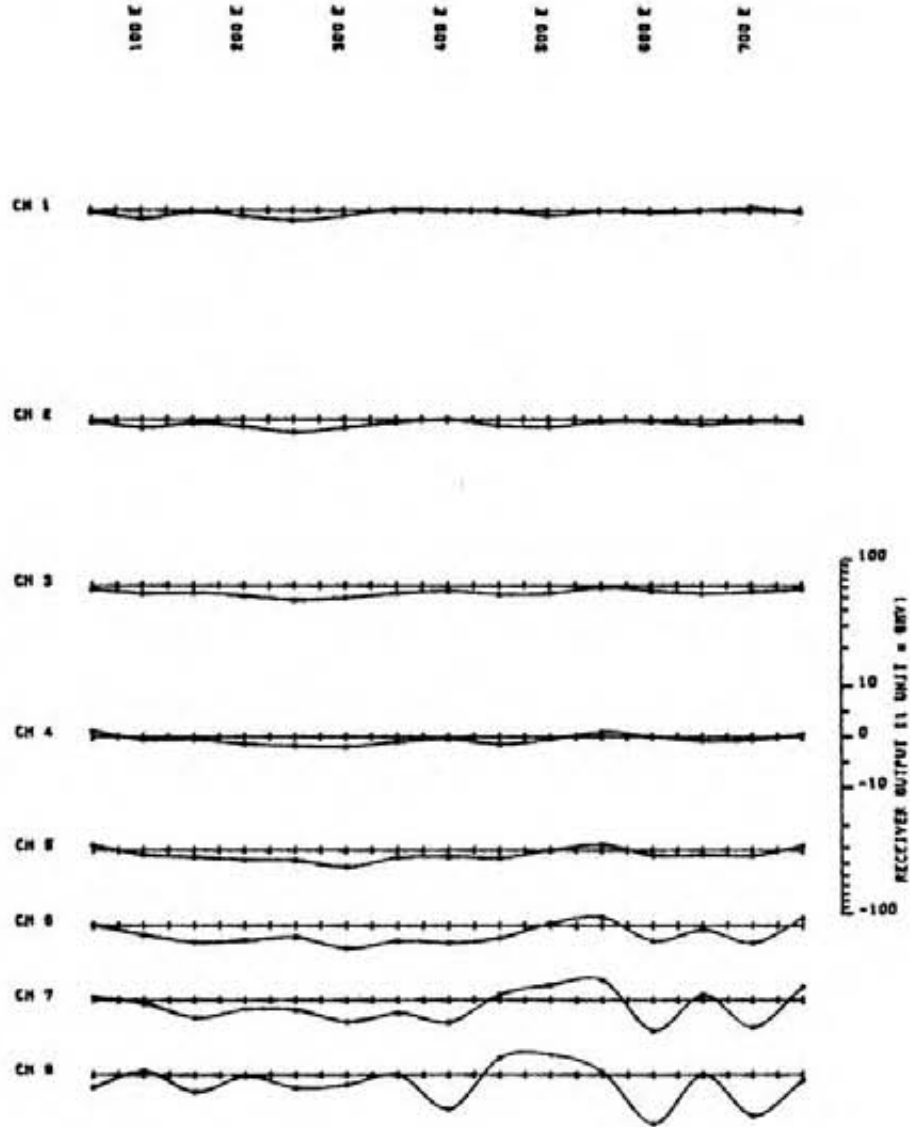
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RECEIVER OUTPUT VOLTAGE




CULTURE LEGEND	
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COIL SPACING	: 100 M
TX LOOP SIZE	: 15.0 M DIAMETER
TIME BASE	: 10.8 MS
HORIZONTAL SCALE	: 1:7500
SURVEYED BY	: AS.TT.
DATE	: OCT / 1981

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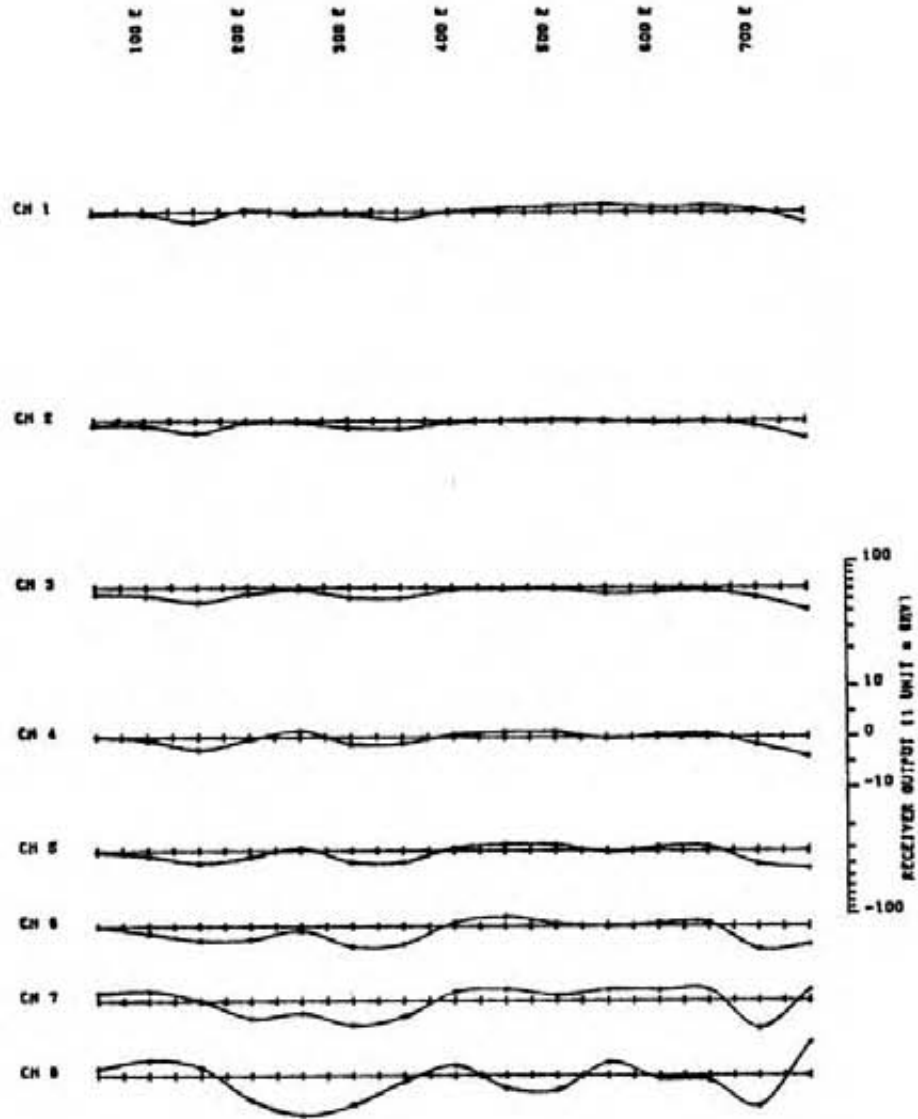
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RECEIVER OUTPUT VOLTAGE




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TIME BASE	: 10.8 MS
HORIZONTAL SCALE	: 1:7500
SURVEYED BY	: AS.IT.
DATE	: OCT / 1981

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	GEOTREX LTD.	85-907
CLIENT	: CHEVRON STANDARD LTD.	
AREA	: IRON MOUNTAIN PROJECT	
GRID CODE	: B.	
LINE	: 3800N	

**PEM**  
**MOVING COILS SURVEY**  
**RECEIVER OUTPUT VOLTAGE**

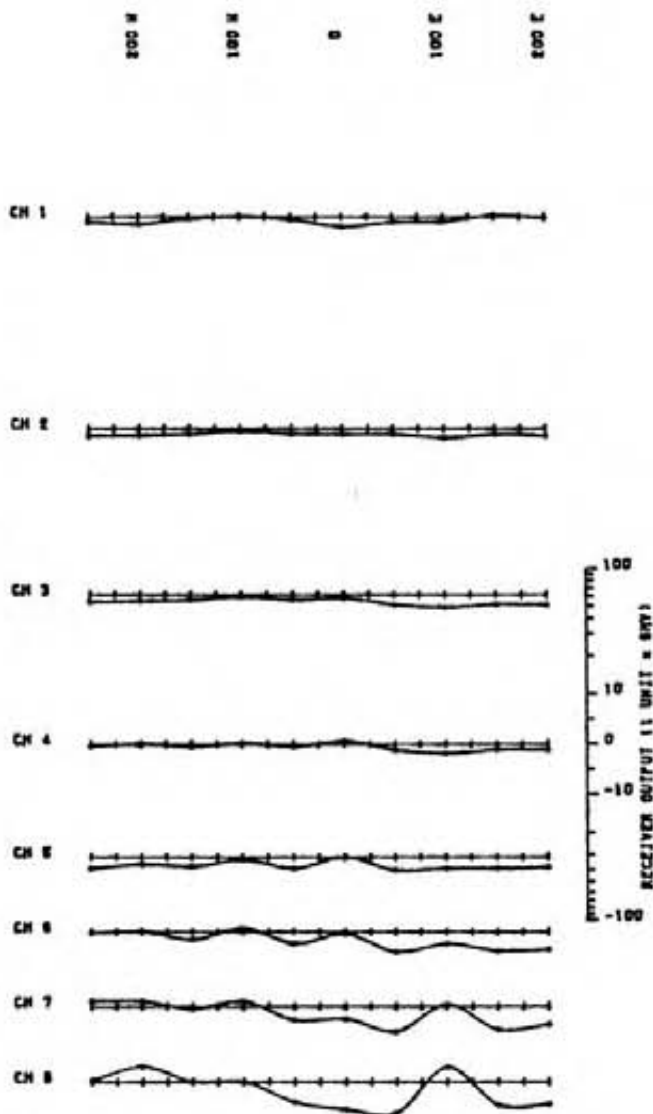


COIL SPACING	: 100 M
TX LOOP SIZE	: 15.0 M DIAMETER
TIME BASE	: 10.8 MS
HORIZONTAL SCALE	: 1:7500
SURVEYED BY	: AS.TT.
DATE	: OCT / 1981

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CLIENT	: CHEVRON STANDARD LTD.	
AREA	: IRON MOUNTAIN PROJECT	
GRID CODE	: B.	
LINE	: 3900N	



PEM  
MOVING COILS SURVEY  
RECEIVER OUTPUT VOLTAGE



COIL SPACING : 100 M  
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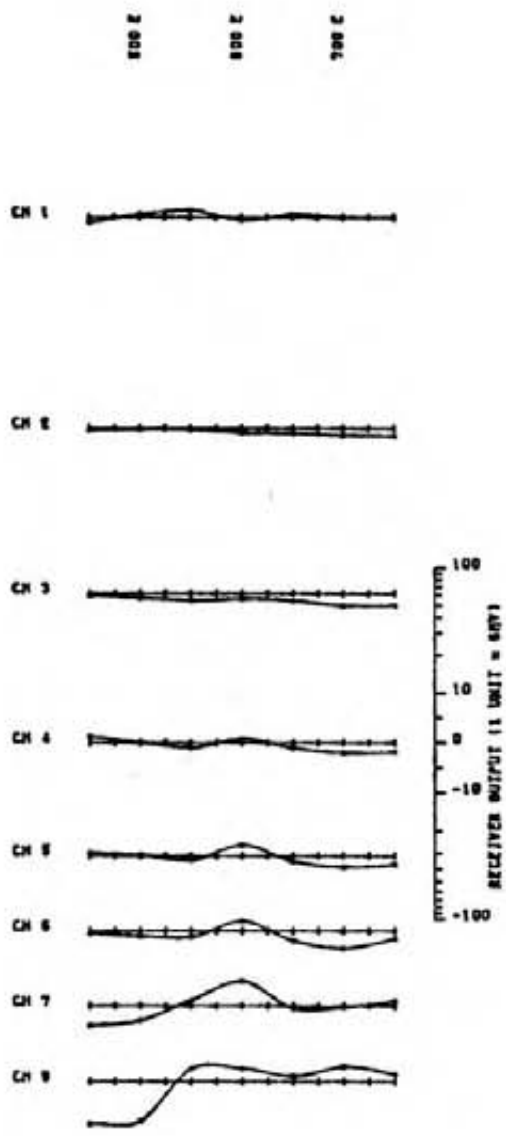


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GEOTREX LTD.

PROJECT NO.  
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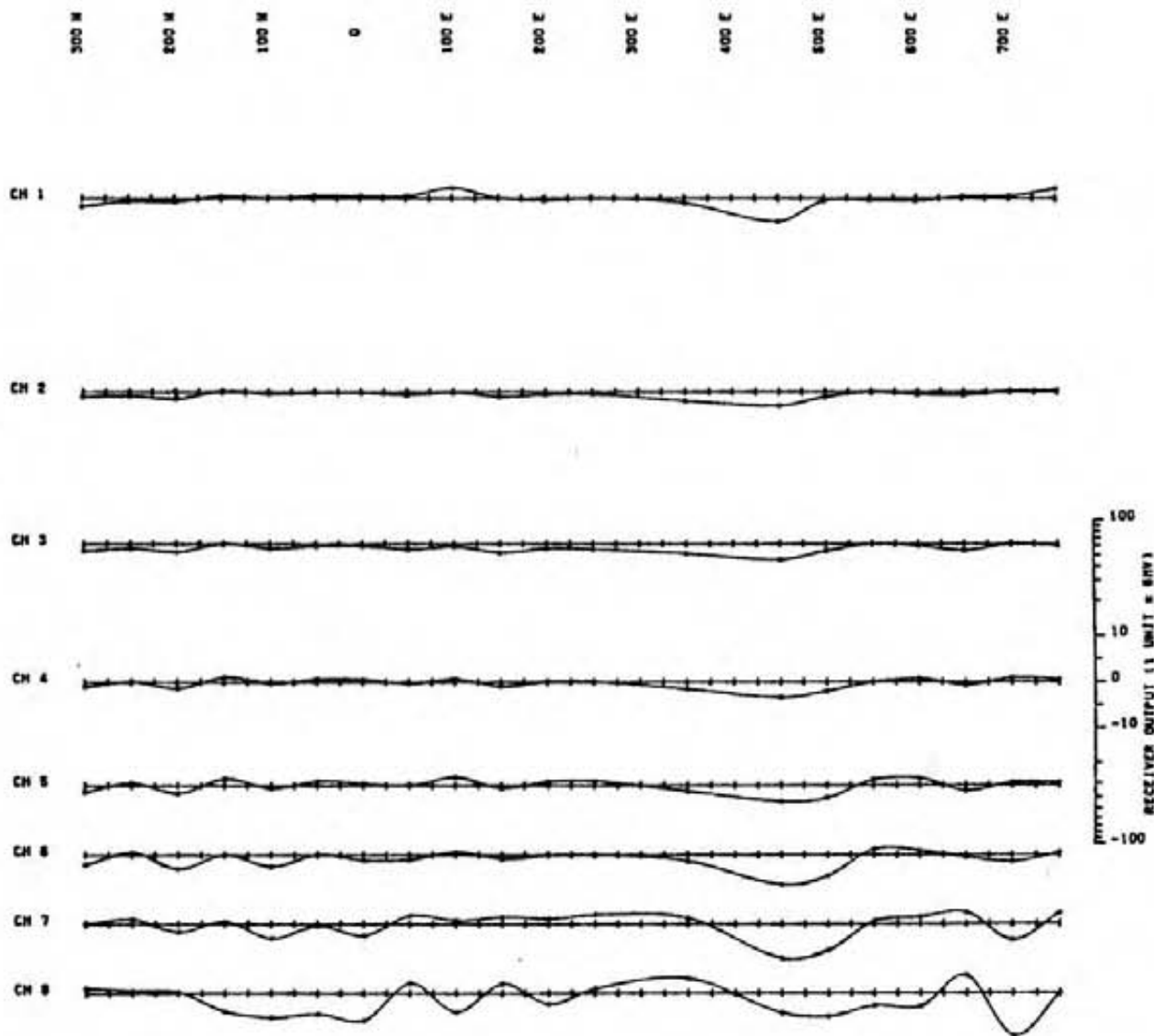
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MOVING COILS SURVEY  
RECEIVER OUTPUT VOLTAGE




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DATE	: OCT / 1981

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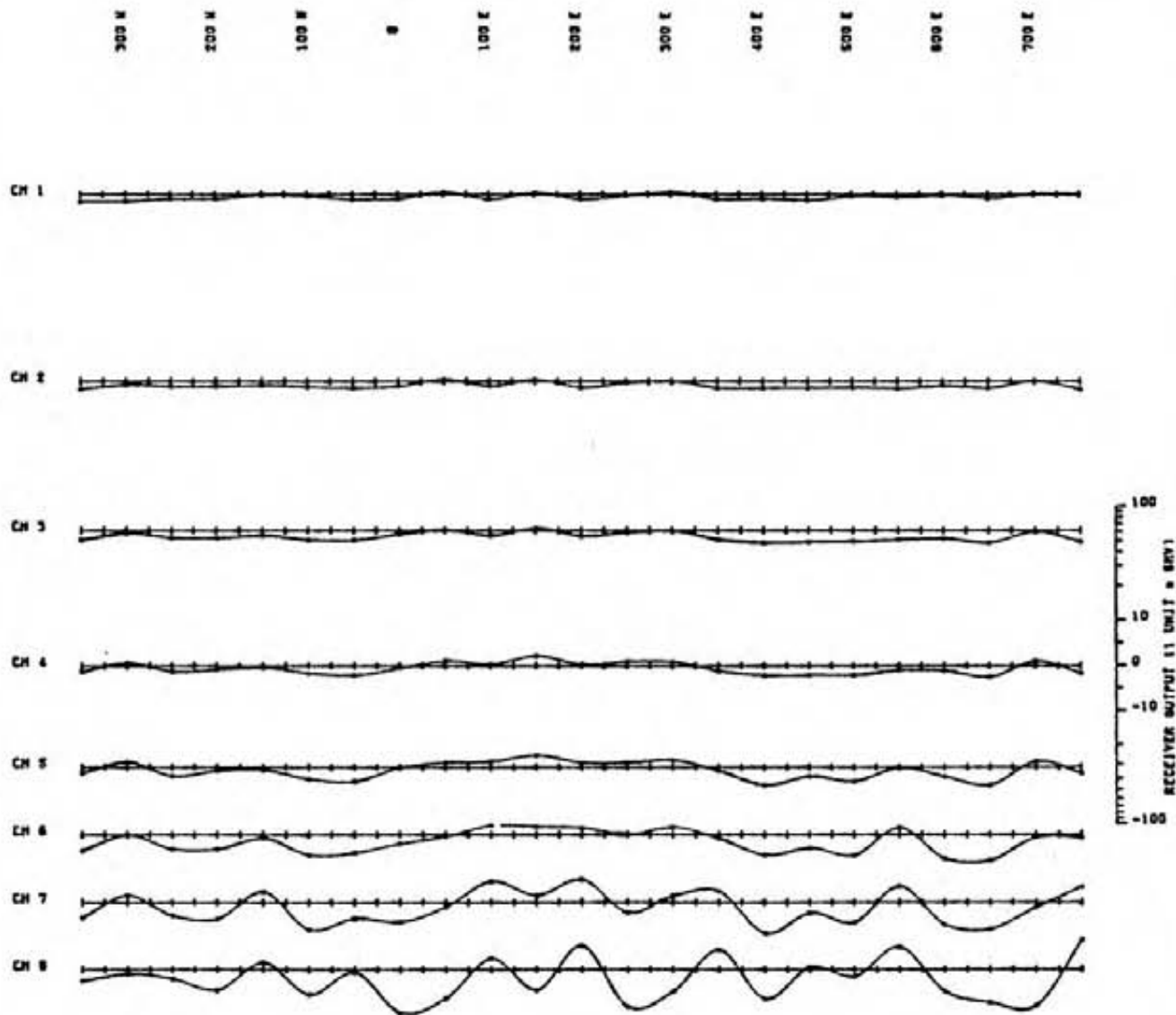
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RECEIVER OUTPUT VOLTAGE



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	GEOTREX LTD.	85-907
CLIENT	: CHEVRON STANDARD LTD.	
AREA	: IRON MOUNTAIN PROJECT	
GRID CODE	: B.	
LINE	: 4100N	

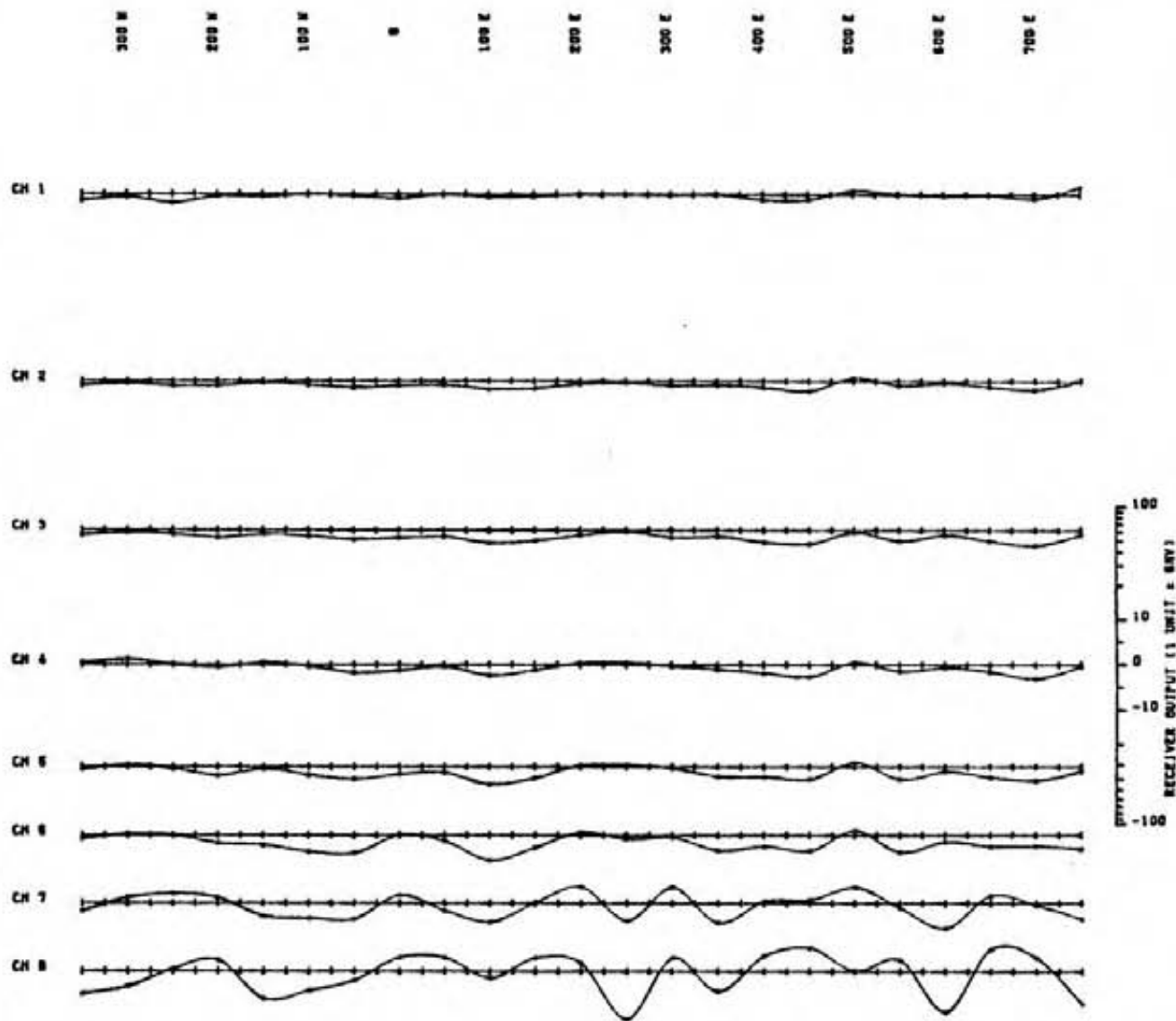
PEM  
MOVING COILS SURVEY  
RECEIVER OUTPUT VOLTAGE



COIL SPACING	: 100 M
TX LOOP SIZE	: 15.0 M DIAMETER
TIME BASE	: 10.8 MS
HORIZONTAL SCALE	: 1:7500
SURVEYED BY	: AS.TT.
DATE	: SEPT / 1981

	SURVEYED & COMPILED BY	PROJECT NO.
	GEOTREX LTD.	85-907
CLIENT	: CHEVRON STANDARD LTD.	
AREA	: IRON MOUNTAIN PROJECT	
GRID CODE	: B.	
LINE	: 4200N	

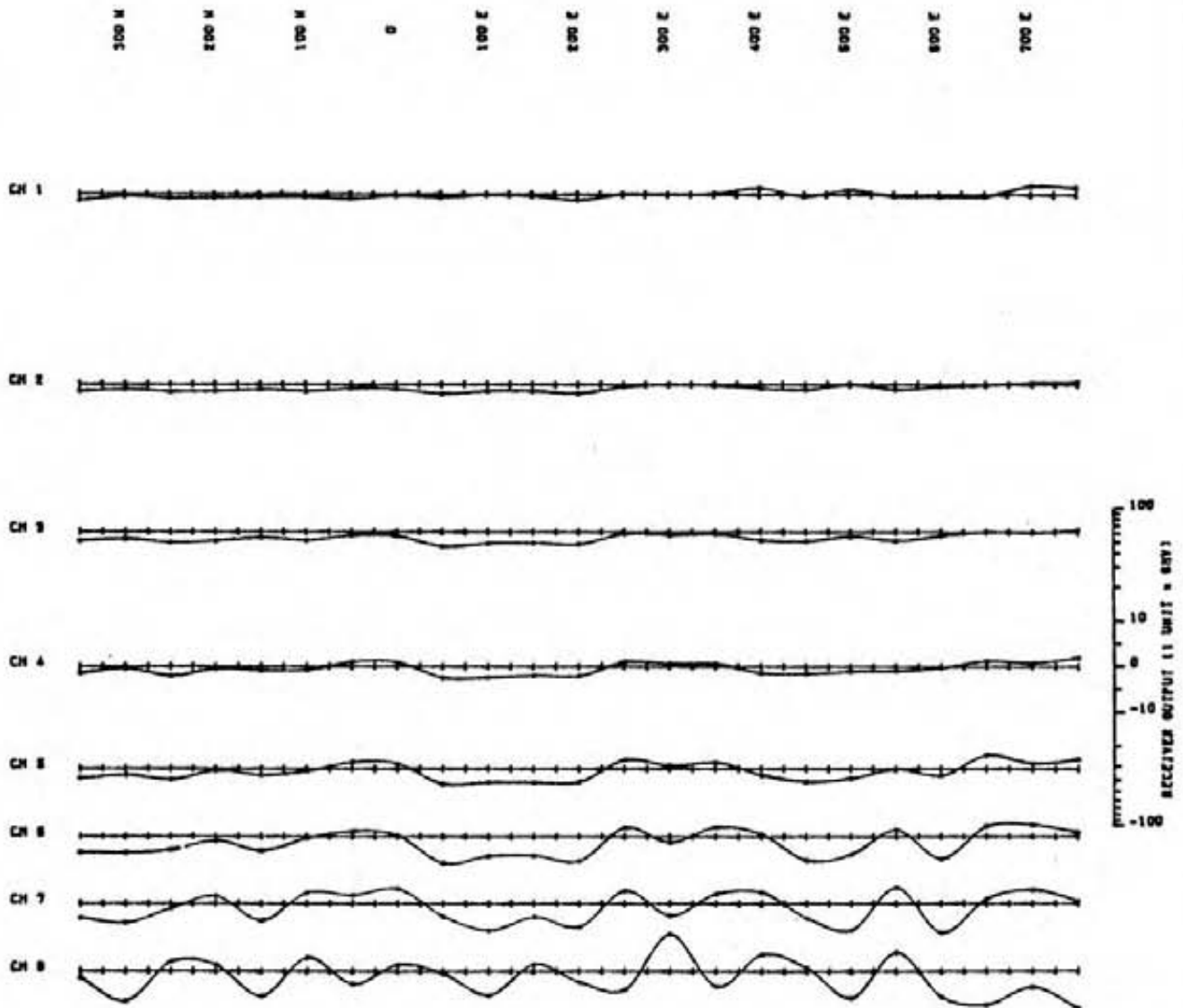
PEM  
MOVING COILS SURVEY  
RECEIVER OUTPUT VOLTAGE




COIL SPACING	: 100 M
TX LOOP SIZE	: 15.0 M DIAMETER
TIME BASE	: 10.8 MS
HORIZONTAL SCALE	: 1:7500
SURVEYED BY	: AS.TT.
DATE	: SEPT / 1981

	SURVEYED & COMPILED BY	PROJECT NO.
	GEOTREX LTD.	85-907
CLIENT	: CHEVRON STANDARD LTD.	
AREA	: IRON MOUNTAIN PROJECT	
GRID CODE	: B.	
LINE	: 4300N	

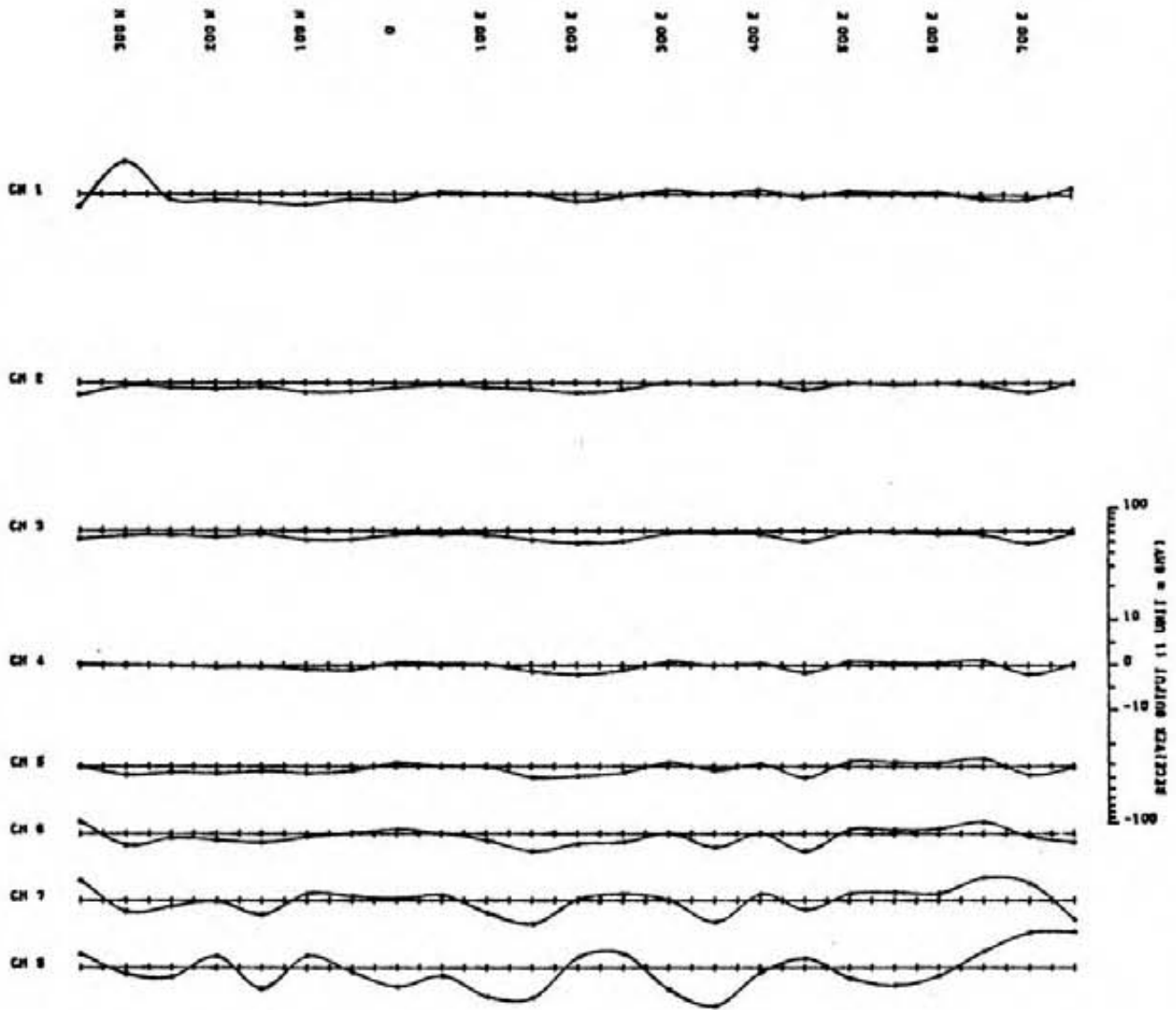
PEM  
MOVING COILS SURVEY  
RECEIVER OUTPUT VOLTAGE




COIL SPACING : 100 M  
 TX LOOP SIZE : 15.0 M DIAMETER  
 TIME BASE : 10.8 MS  
 HORIZONTAL SCALE : 1:7500  
 SURVEYED BY : AS.TT.  
 DATE : SEPT / 1981

	SURVEYED & COMPILED BY GEOTREX LTD.	PROJECT NO. 85-907
	CLIENT : CHEVRON STANDARD LTD.	AREA : IRON MOUNTAIN PROJECT
	GRID CODE : B.	LINE : 4400N

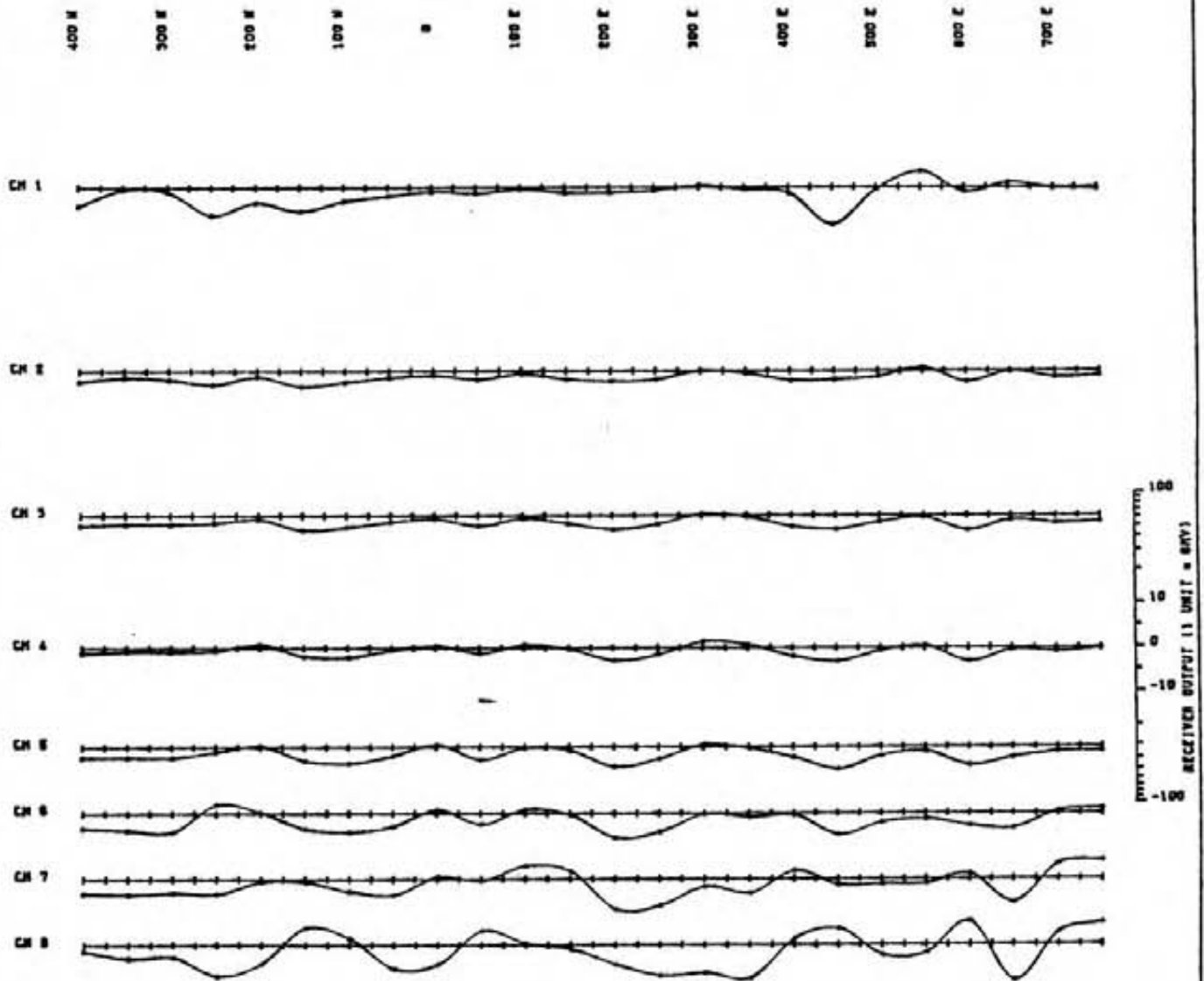
PEM  
MOVING COILS SURVEY  
RECEIVER OUTPUT VOLTAGE



COIL SPACING	: 100 M
TX LOOP SIZE	: 15.0 M DIAMETER
TIME BASE	: 10.8 MS
HORIZONTAL SCALE	: 1:7500
SURVEYED BY	: AS.TT.
DATE	: OCT / 1981

	SURVEYED & COMPILED BY	PROJECT NO.
	GEOTREX LTD.	85-907
CLIENT	: CHEVRON STANDARD LTD.	
AREA	: IRON MOUNTAIN PROJECT	
GRID CODE	: B.	
LINE	: 4500N	

PEM  
MOVING COILS SURVEY  
RECEIVER OUTPUT VOLTAGE



COIL SPACING : 100 M  
 TX LOOP SIZE : 15.0 M DIAMETER  
 TIME BASE : 10.8 MS  
 HORIZONTAL SCALE : 1:7500  
 SURVEYED BY : AS.TT.  
 DATE : OCT / 1981



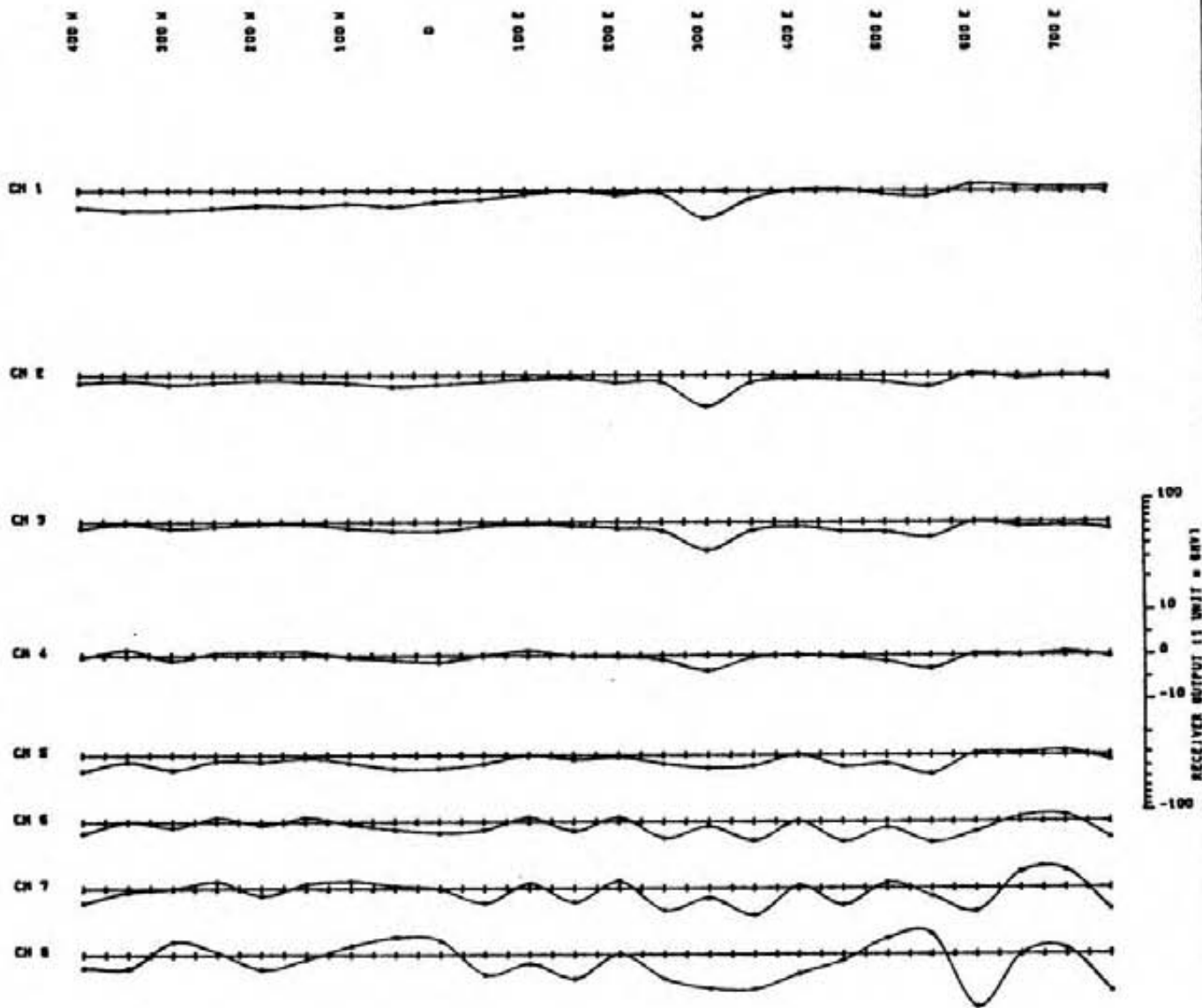
SURVEYED & COMPILED BY  
 GEOTREX LTD.

PROJECT NO.  
 85-907


CLIENT : CHEVRON STANDARD LTD.  
 AREA : IRON MOUNTAIN PROJECT  
 GRID CODE : B.  
 LINE : 4600N



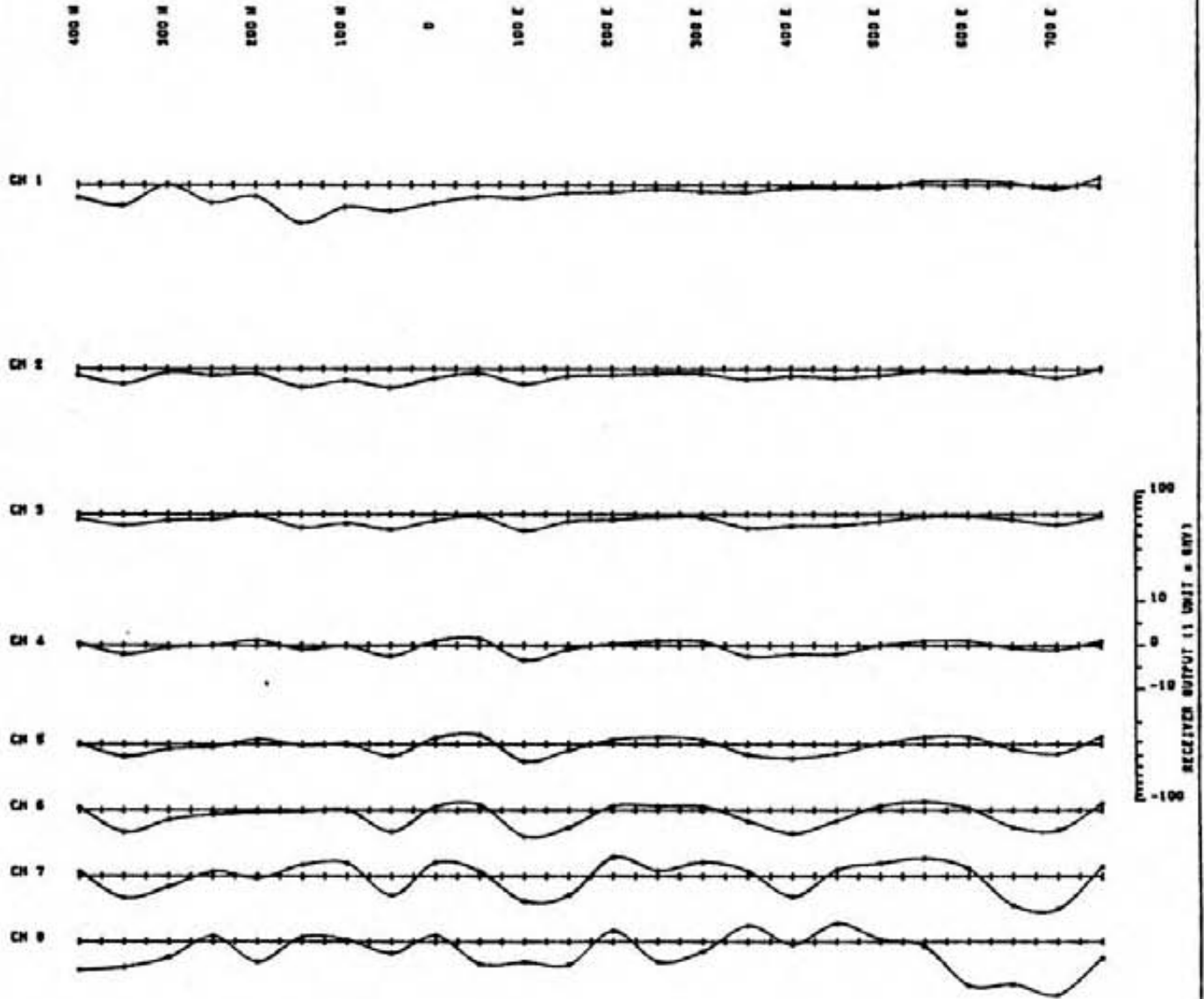
PEM  
MOVING COILS SURVEY  
RECEIVER OUTPUT VOLTAGE




COIL SPACING : 100 M  
 TX LOOP SIZE : 15.0 M DIAMETER  
 TIME BASE : 10.8 MS  
 HORIZONTAL SCALE : 1:7500  
 SURVEYED BY : AS.TT.  
 DATE : OCT / 1981

	SURVEYED & COMPILED BY GEOTERREX LTD.	PROJECT NO. 85-907
	CLIENT : CHEVRON STANDARD LTD.	AREA : IRON MOUNTAIN PROJECT
	GRID CODE : B.	LINE : 4700N

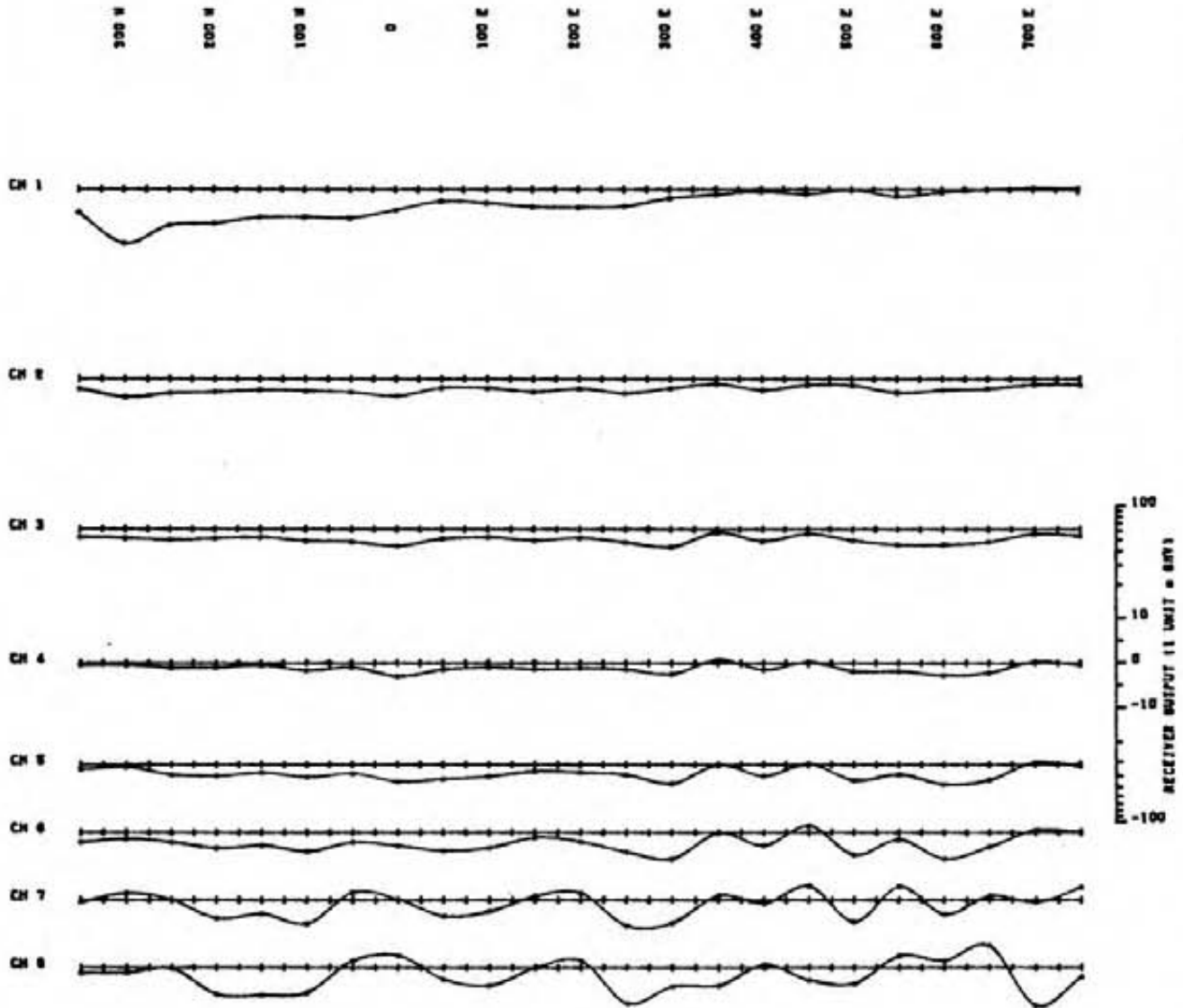
**PEM**  
**MOVING COILS SURVEY**  
**RECEIVER OUTPUT VOLTAGE**



COIL SPACING	: 100 M
TX LOOP SIZE	: 15.0 M DIAMETER
TIME BASE	: 10.8 MS
HORIZONTAL SCALE	: 1:7500
SURVEYED BY	: AS.TT.
DATE	: OCT / 1981

	SURVEYED & COMPILED BY	PROJECT NO.
	GEOTREX LTD.	85-907
CLIENT	: CHEVRON STANDARD LTD.	
AREA	: IRON MOUNTAIN PROJECT	
GRID CODE	: 8.	
LINE	: 4800N	

**PEM**  
**MOVING COILS SURVEY**  
**RECEIVER OUTPUT VOLTAGE**



COIL SPACING : 100 M  
 TX LOOP SIZE : 15.0 M DIAMETER  
 TIME BASE : 10.8 MS  
 HORIZONTAL SCALE : 1:7500  
 SURVEYED BY : AS.TT.  
 DATE : OCT / 1981

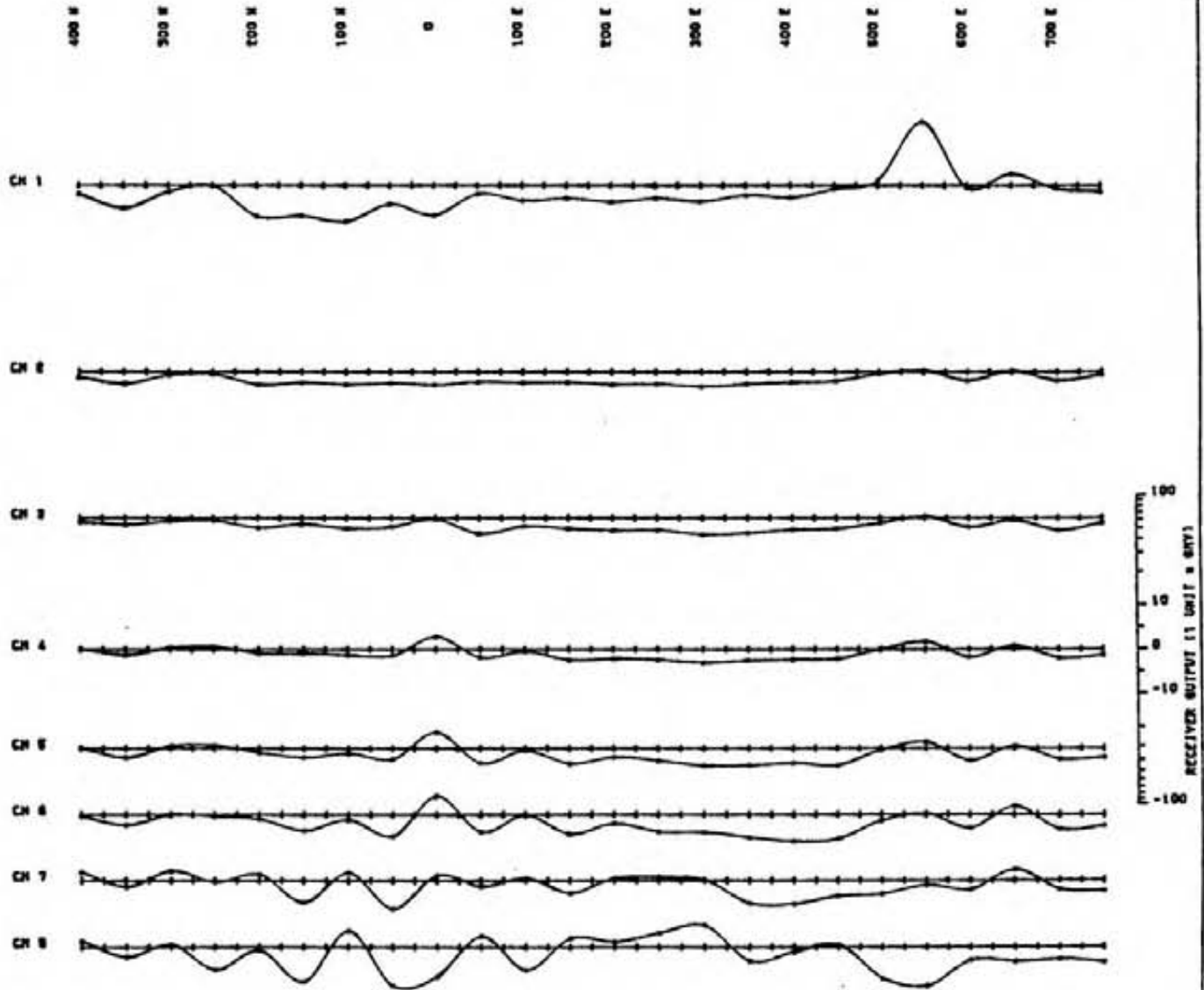


SURVEYED & COMPILED BY  
 GEOTREX LTD.


PROJECT NO.  
 85-907

CLIENT : CHEVRON STANDARD LTD.  
 AREA : IRON MOUNTAIN PROJECT  
 GRID CODE : B.  
 LINE : 4900N

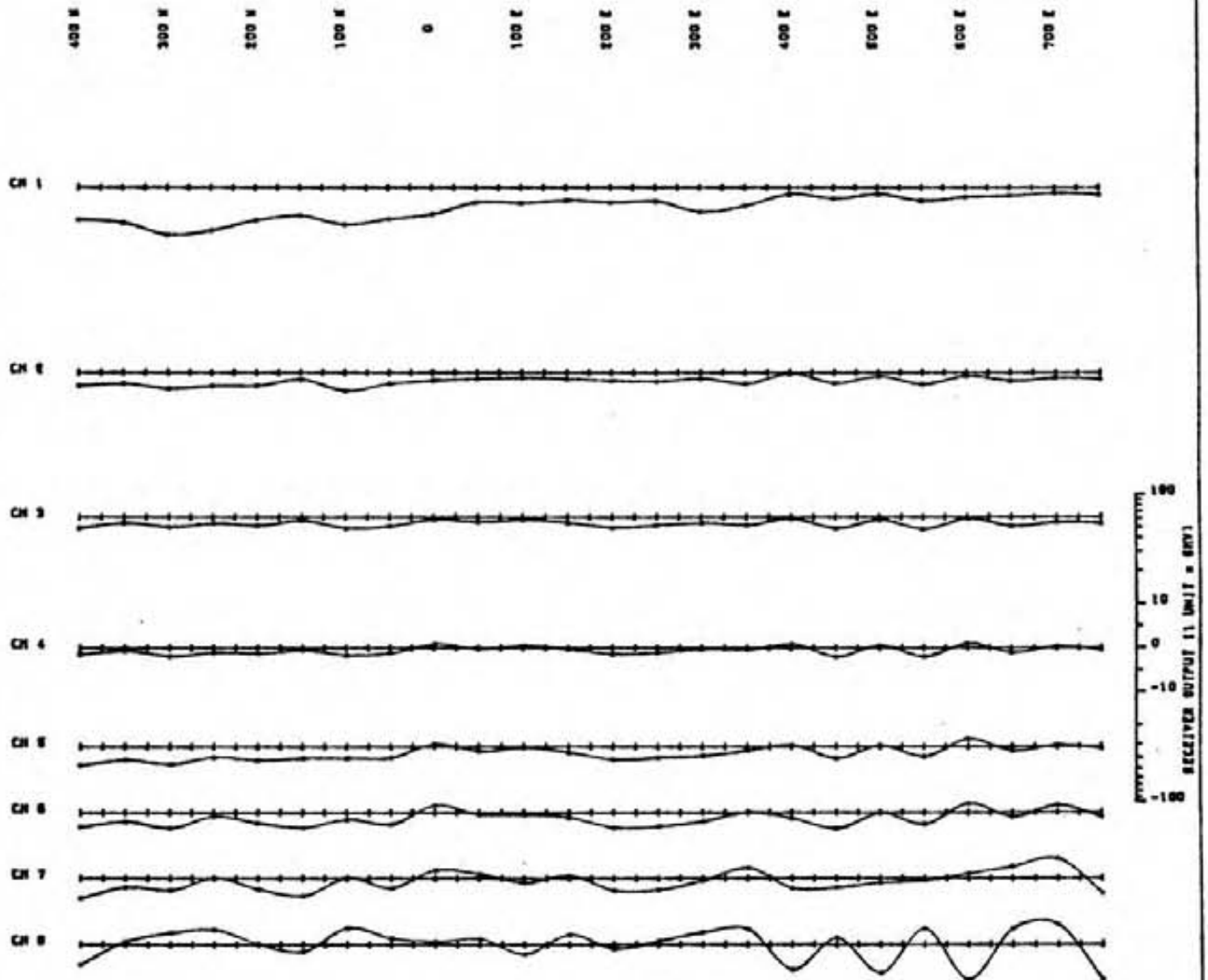
**PEM**  
**MOVING COILS SURVEY**  
**RECEIVER OUTPUT VOLTAGE**




COIL SPACING	: 100 M
TX LOOP SIZE	: 15.0 M DIAMETER
TIME BASE	: 10.8 MS
HORIZONTAL SCALE	: 1:7500
SURVEYED BY	: AS.TT.
DATE	: OCT / 1981

	SURVEYED & COMPILED BY	PROJECT NO.
	GEOTREX LTD.	85-907
CLIENT	: CHEVRON STANDARD LTD.	
AREA	: IRON MOUNTAIN PROJECT	
GRID CODE	: B.	
LINE	: 5000N	

PEM  
MOVING COILS SURVEY  
RECEIVER OUTPUT VOLTAGE



COIL SPACING	: 100 M
TX LOOP SIZE	: 15.0 M DIAMETER
TIME BASE	: 10.8 MS
HORIZONTAL SCALE	: 1:7500
SURVEYED BY	: AS.TT.
DATE	: OCT / 1981

	SURVEYED & COMPILED BY	PROJECT NO.
	GEOTREX LTD.	85-907
CLIENT	: CHEVRON STANDARD LTD.	
AREA	: IRON MOUNTAIN PROJECT	
GRID CODE	: B.	
LINE	: 5100N	