Kennecott Canada Exploration Inc.

2000 GROUND GEOPHYSICAL ASSESSMENT REPORT on the SUNDAY LAKE PROPERTY

NTS: 52A11 (Onion Lake)

Thunder Bay Mining Division, Ontario

2.42983

- Prepared by: -

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- Author -

Christophe Hyde

- Date of report -

October 16th, 2009

File: 2009-10-16 Sunday Lake assmt.doc

- CONTENTS -

LIST OF FIGURES AND MAPS

- LIST OF APPENDICES

INTRODUCTION

Project Description

The Sunday Lake property was the subject of a ground pulse EM fixed-loop survey and associated line-cutting program. The ground EM work was conducted by Crone Geophysics and Exploration. The line-cutting work was conducted by Kennecott Canada Exploration Inc. (KCEI) employees. All geophysical and line-cutting work was supervised by Christophe Hyde, Senior Project Geophysicist, an employee of KCEI.

Location and Access

The project area is comprised of 10 claim blocks totaling 1591.35ha located within the Onion Lake Map Area - NTS sheet 052A11 (fig.1), approximately 25km north of the city of Thunder Bay, Ontario. The property can be reached by traveling northeast on Hwy 102 from Thunder Bay to Hwy 589 than turning north and traveling ~27km to the junction with the seasonal road to Sunday lake and than turning north again and traveling ~0.8km to the junction with a trail that heads northwest into the claims.

Claim Information

Following is a list of claims for the Sunday Lake property.

Claim Number	Mining Division	Due Date	Work Required ($)
TB 4210861	Thunder Bay 40	18-Oct-09	$1,519.00
TB 4210860	Thunder Bay 40	18-Oct-09	$1,519.00
TB 4210859	Thunder Bay 40	18-Oct-09	$2,279.00
TB 4210858	Thunder Bay 40	18-Oct-09	$1,900.00
TB 4210857	Thunder Bay 40	18-Oct-09	$1,140.00
TB 4210856	Thunder Bay 40	18-Oct-09	$1,519.00
TB 4230096	Thunder Bay 40	21-Feb-10	$1,600.00
TB 4230097	Thunder Bay 40	21-Feb-10	$6,400.00
TB 4230098	Thunder Bay 40	21-Feb-10	$6,400.00
TB 4230099	Thunder Bay 40	21-Feb-10	$4,800.00

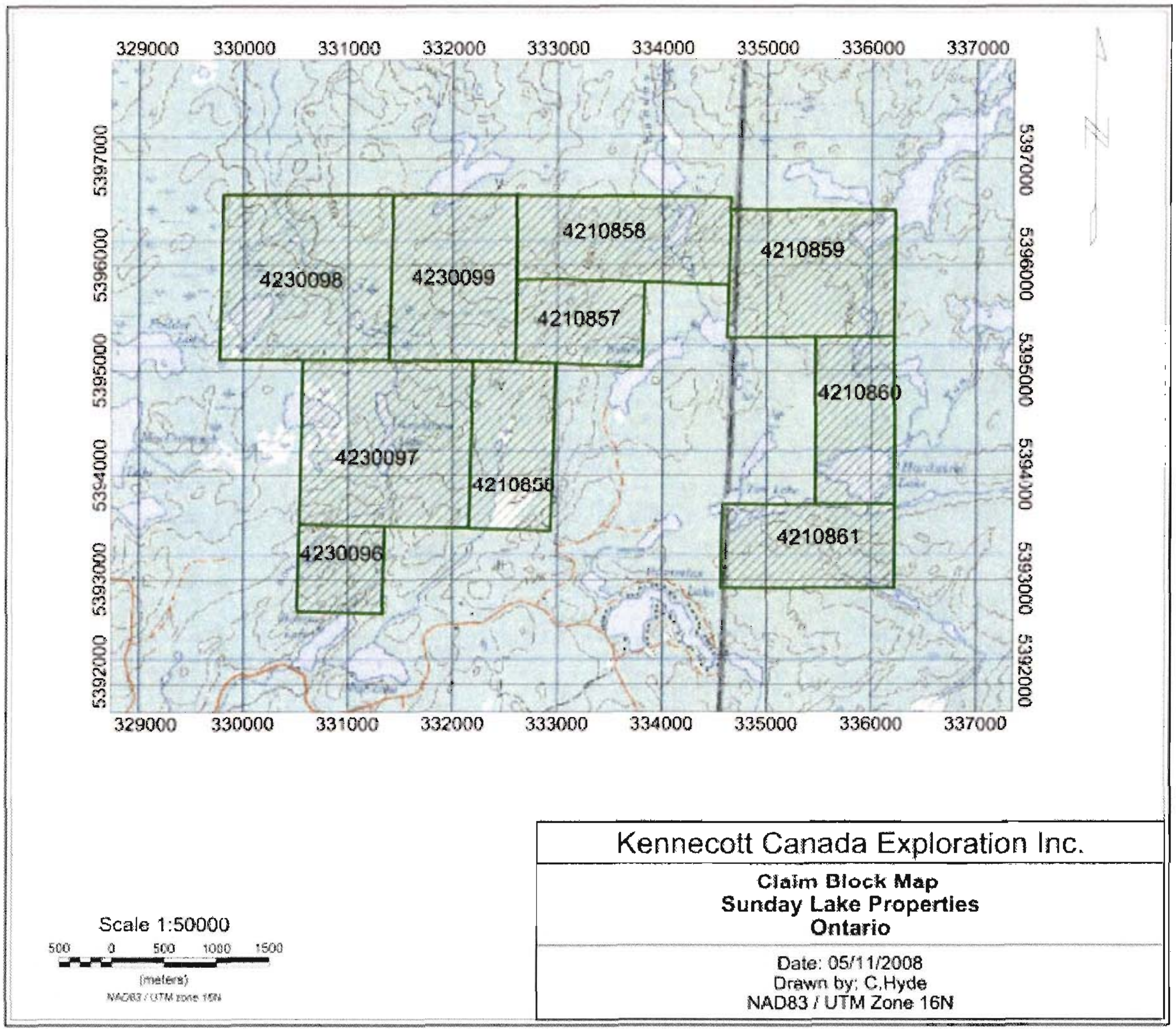


Figure 1) Map showing the location of Kennecott's Sunday Lake property claims.

Work History

Little previous exploration work has been done on the Sunday Lake property. The bedrock geology of the Sunday Lake area has been summarized on a regional compilation map by Pye and Fenwick (1965). The Sunday Lake area was also included in the government sponsored Shebandowan airborne electromagnetic and total field magnetic survey area (OGS Map 81567). The Quaternary geology of the area was described by Burwasser (1981).

Canstar Resources Inc. reported in a press release, that they had completed two drill holes totaling 484m in 2007 on a claim block adjoining the Kennecott claims. The holes reportedly intersected "intense zones of oxidized and epidotized meta-sediments".

Geology

Kennecott has not engaged in any prospecting or geologic mapping of the Sunday Lake property to date. The Sunday Lake property is located within the Archean in age, Quetico Subprovince. The Quetico Subprovince consists predominantly of meta-sedimentary rocks, derived migmatite and granite. Percival and Williams (1989) suggest that the Quetico belt represents an accretionary prism of sediments between the Wawa, terrane and the Wabigoon, terrane.

The Kennecott claims border a deep magnetic low anomaly picked from the Shebandowan airborne magnetic survey (OGS Map 81567). This anomaly may represent a buried mafic/ultramafic intrusion.

EXPLORATION PROGRAM

Eight lines – one base line and seven survey lines – were cut from July 29 to August 3rd by a crew of four KCEI employees. Based upon a \$500/day/person rate, the cost of the line-cutting was CDN \$12,000.00. The ground time-domain electromagnetic (TDEM) survey was conducted on the five southern lines which coincide with the position of a magnetic and weak electromagnetic anomaly observed during a previously described airborne EM (Aerotem) survey. The survey was conducted from August 4th to 6th at a cost of CDN \$11,175.00. The combined cost of the line-cutting and geophysical survey was \$23,175.00 and was conducted completely over Kennecott claim TB 4210857.

The survey specifications, equipment descriptions and all plans and data are included as appendix A.

EXPLORATION RESULTS

The main points from the data interpretation are as follows

- There are no strong conductors detected on any of the five surveyed lines that may indicate the presence or accumulation of massive sulphide mineralization.
- There are two styles of conductive features present in the data.
    - The first is a conductive overburden style of response which is best observed on all lines on early-time channels 2 through to channel 5 crossing over (polarity changing from negative to positive). This style response suggests a conductive overburden in the survey area which is consistent with results from the airborne (aerotem) survey described in a previous assessment report.
    - The second anomaly type is a local anomaly of moderate conductivity. It is best observed on Line 5070N from station 5375E to 5475E on channel 2. The anomaly is also apparent on channels 1 and 3 but has completely disappeared on channel 4. The rapid decay of this anomaly suggests this in

not a strong conductor and unlikely to be due to massive sulphide mineralization. In addition, the anomaly may have a subtle expression on the next line – 5170N – from 5350E to 5500E. The anomaly shape is consistent with a horizontal shallow conductor.

RECOMMENDATIONS

The anomaly of greatest interest lies on the most southern line of the survey (line 5070N). If access to the privately-held mineral title to the south is aquired, it is suggested that the ground EM survey be continued to the south to map any possible southern continuation of the moderate conductor mapped on line 5070N.

REFERENCES:

1991 Airborne electromagnetic and total intensity magnetic survey, Ontario Geological Survey, Map 81567, scale 1:20,000.

Burwasser, 1981,The Quaternary geology of the Onion and Sunshine Lakes area, District of Thunder Bay, OGS Misc. Paper 94.

Percival, J.A. and H.R. Williams, 1989,Late Archean Quetico accretionary complex, Superior Province, Canada, Geology, v.17; No. 1; p. 23-25.

Pye, E. G. and K.G.Fenwick,1965, Atikokan-Lakehead Sheet, Districts of Kenora, Rainy River, and Thunder Bay; Ontario Div.Mines, Geol. Comp. Ser. Map 2065, scale1:253,440.

STATEMENT OF QUALIFICATIONS

I, Christophe Hyde, of the city of Vancouver, Province of British Columbia, DO HEREBY CERTIFY THAT:

1) I am a senior project geophysicist employed by Kennecott Canada Exploration Inc. with a business office at 354–200 Granville Street, Vancouver, British Columbia, Canada, V6C 1S4.

2) I am a graduate in Geological Engineering with a Bachelor of Applied Science and Engineering from the University of Toronto, Toronto, Ontario in 1986.

3) I am a graduate in Geophysics with a Master's of Science from Queen's University, Kingston, Ontario in 1996.

4) I am a member of the Society of Exploration Geophysicists.

5) I am past president of the British Columbia Geophysical Society (BCGS).

6) I have practiced my profession as a geophysicist for the past 20 years.

   1 year as a geophysicist with MPH (1987-1988)

   3 years as geophysicist with Lamontagne Geophysics (1988-1991)

   4 years as a research assistant at Queens University (1991-1995)

   3 years as an environmental geophysicist at the Geological Survey of Canada (1995-1998).

   5 years as a PhD Candidate and research assistant as the University of British Columbia (1999-2004).

   4 years as project and senior project geophysicist for Kennecott Canada Exploration (2004-2008).

7) I supervised the 2009 Sunday Lake ground geophysical survey and associated line-cutting and wrote this report to document the results of work on the claims.

Dated:

October 16th 2009

Christophe Hyde
Senior Project Scientist

ATTACHMENT A

GEOPHYSICAL REPORT BY CONTRACTOR
INCLUDES
SURVEY AREAS AND SPECIFICATIONS
AND
TECHNICAL SPECIFICATIONS

Geophysical Survey Report

covering

Surface Pulse EM Surveys
over the
Sunday Lake Property
for
Kennecott Exploration
during
August 2009

by

CRONE GEOPHYSICS & EXPLORATION LTD.

Survey Area:	**Sunday Lake, Ontario**
Survey Type:	**Surface Pulse EM Surveys**
Survey Operator(s):	**Rob Chapman**
Surface EM Loop Surveys:	**09SL01**
Survey Period:	**Aug 04th to Aug 06th, 2009**
Report By:	**Mark Hunter**
Report Date:	**August 18, 2009**

TABLE OF CONTENTS

PULSE ELECTROMAGNETIC SURVEY

APPENDICES

LIST OF TABLES

1.0 INTRODUCTION

Crone Geophysics & Exploration Limited was contracted by Kennecott Exploration to conduct Surface Pulse Electromagnetic Surveys on its Sunday Lake Property approximately 30km north of Thunder Bay, Ontario. The property and survey grid location are detailed in Figures 1 and 2. This report summarizes the geophysical work carried out in August 2009.

Five (5) lines were surveyed during the survey period August 04th 2009 to August 06th 2009. The appendices to this report contain page size plan maps, PEM profiles (linear 5-axis and logarithmic scale), and step response profiles

2.0 PERSONNEL

The personnel involved in this project during the reporting period include:

Survey Operators:	Rob Chapman
Data Processing:	Mark Hunter
Report:	Mark Hunter

3.0 SURVEY METHODS

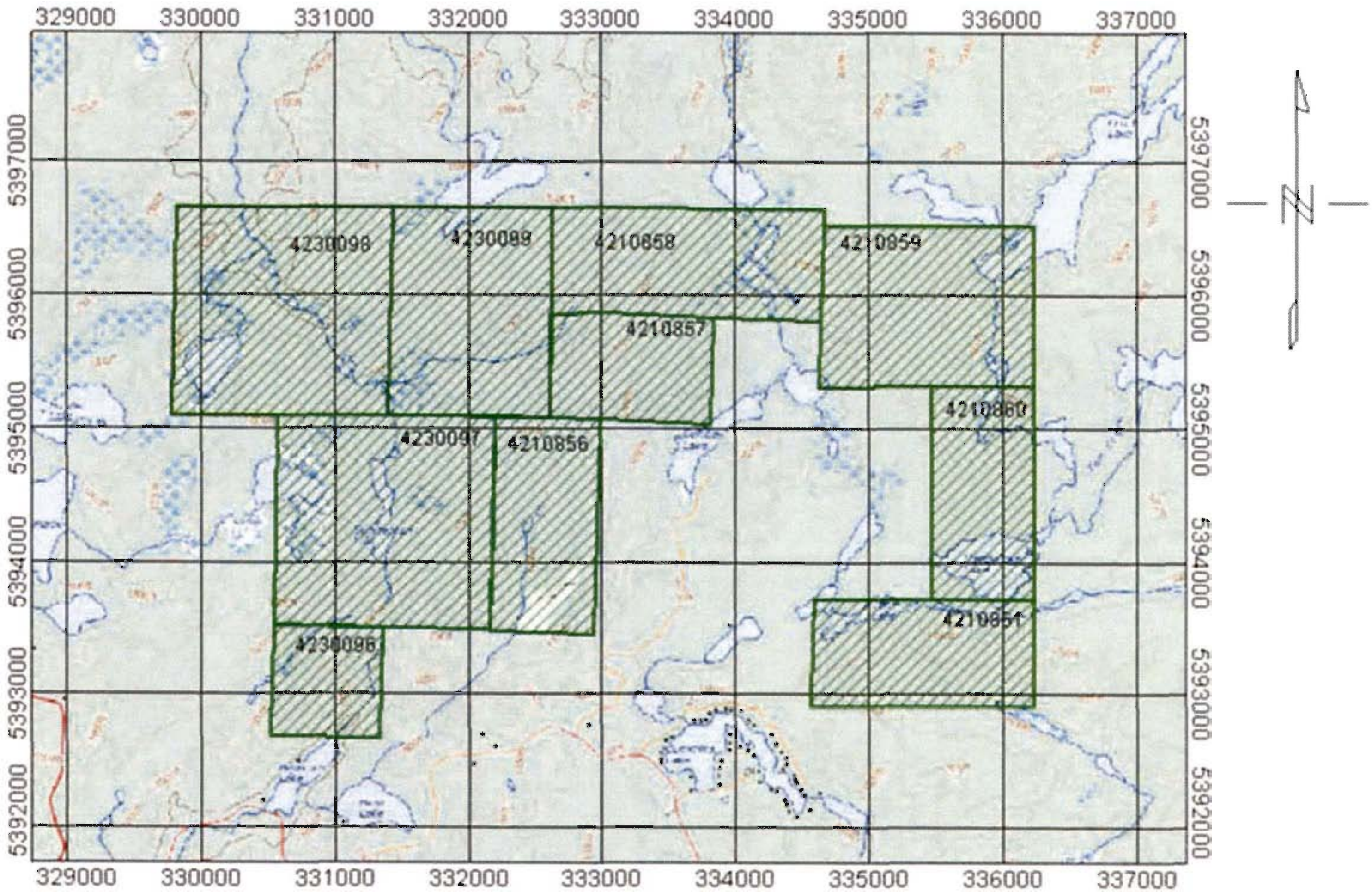
Crone Pulse EM is a time domain electromagnetic method in which a precise pulse of current with a controlled linear shut off is transmitted through a large loop of wire on the ground and the rate of decay of the induced secondary field is measured across a series of time windows during the off-time. The EMF created by the shutting-off of the current induces eddy currents in nearby conductive material thus setting-up a secondary magnetic field. When the primary field is terminated, this magnetic field will decay with time. The amplitude of the secondary field and the decay rate are dependent on the quality and size of the conductor.

Five (5) lines of length 675 meters were surveyed with a nominal station interval of 25 meters, with a line spacing of 100 meters.

Data was acquired using a time base of 8.33ms (base frequency 30 Hz). One on-time and 16 off-time measurements were acquired (*see Table III*). Vertical (Z-component) data was collected. The primary inducing field is defined as positive up inside the transmitter loop.

In addition to measuring the standard Primary Pulse channel on the ramp and the 16 (8.33 ms) off-time channels, the Step Response was also calculated.

Step Response requires accurate geometrical control in which the loop position and the measurement station are accurately determined. Positional information was



Scale 1:50000

500 0 500 1000 1500

(meters)

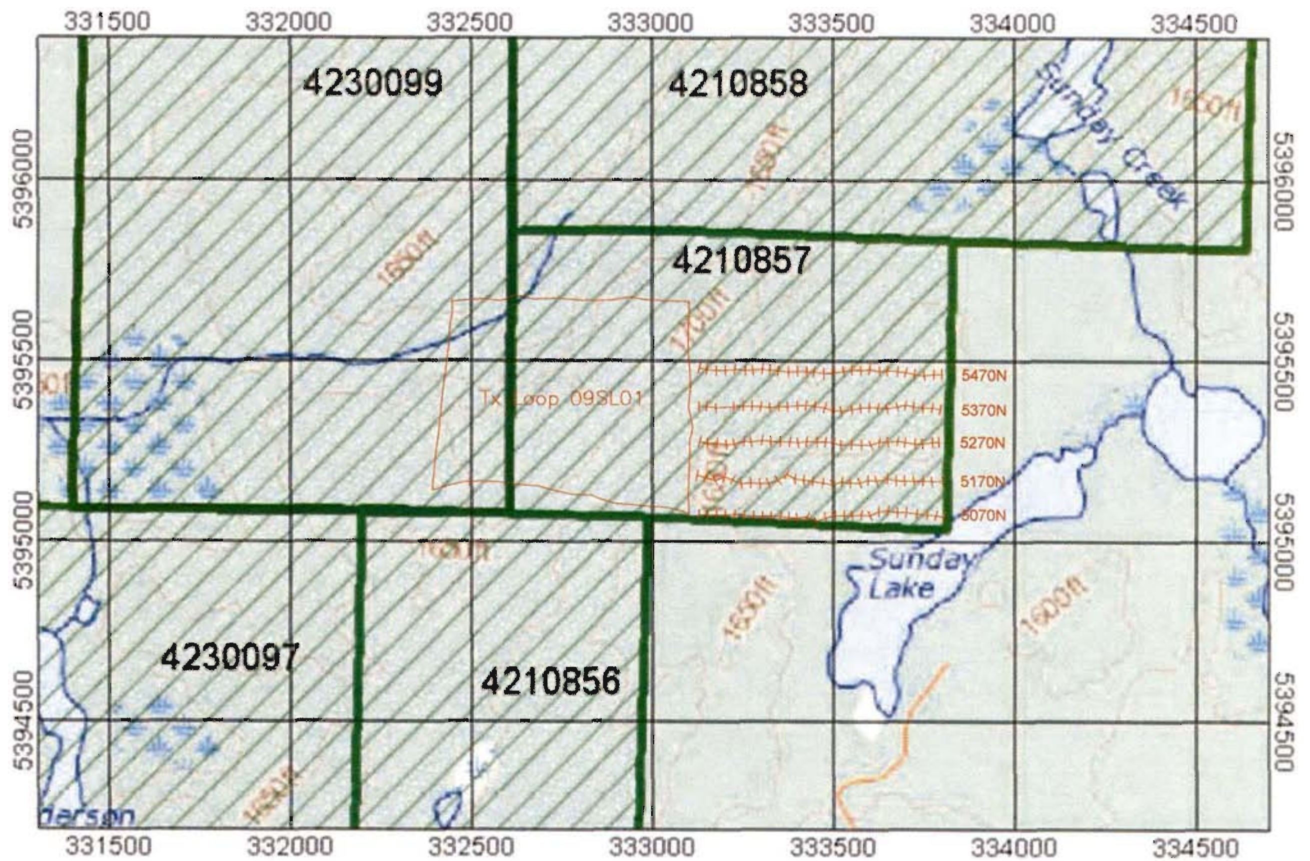
NAD83 / UTM zone 16N

Kennecott Canada Exploration Inc.

Claim Block Map
Sunday Lake Properties
Ontario

Date: 05/11/2008
Drawn by: C.Hyde
NAD83 / UTM Zone 16N

Figure 1: Sunday Lake property location map



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250 0 250 500

(meters)

NAD83 / UTM zone 16N

Kennecott Canada Exploration Inc.

Loop and Line Layout of Ground EM survey
Sunday Lake Project
Ontario

Date: 09/15/2008
Drawn by: C.Hyde
NAD83 / UTM Zone 16N

Figure 2: Sunday Lake detail property location map with survey overlay

provided by a sub-meter capable GPS and local base station. Coordinates are given in the UTM projection zone 16 North using the NAD 1983 Canada datum.

The calculated Step Response values were binned into an S1 channel (from 0.5T to T), an S2 channel (from 0.25T to 0.5T), an S3 channel (from 0.125T to 0.25T) and an S4 channel (from 0.0625T to 0.125T, where T is the time base). The S1 channel is normalized to the theoretical primary field, while S2, S3 and S4 are normalized to S1. The S1 value is used to identify responses from highly conductive sources. In the absence of any conductors the Primary Field should exactly equal the theoretical field for a given component assuming there are no geometric errors associated with the loop and/or station positions. In the case of generally resistive host and poorer conductors the S1 value will be very close or equal to the theoretical field for a given component

The equipment used on this project includes a 4.8 kW transmitter with a 220V voltage regulator, which is powered by an 11 hp motor generator. The Crone Digital Receiver was used to collect the field data. Synchronization between the Transmitter and the Receiver was maintained by crystal clock.

Data units are nT/s.

4.0 SURVEY PARAMETERS

Table I: Surface Survey Coverage

Tx Loop	Zone	Line	TB (ms)	From	To	Length (m)	Comp
09SL01	Sunday Lake	5070N	8.33	5025E	5700E	675	Z
09SL01	Sunday Lake	5170N	8.33	5025E	5700E	675	Z
09SL01	Sunday Lake	5270N	8.33	5025E	5700E	675	Z
09SL01	Sunday Lake	5370N	8.33	5025E	5700E	675	Z
09SL01	Sunday Lake	5470N	8.33	5025E	5700E	675	Z

Table II: Transmitter Loop Coverage

Loop	Zone	Size (meters)	Corner Coordinates UTM Zone 16N NAD 1983 Canada	Ramp Time (ms)	Current (Amps)	Time Base (ms)
09SL01	Sunday Lake	680x570	332444E 5395666N; 332389E 5395138N; 333100E 5395072N; 333101E 5395665N	1.5	14	8.33

The following table shows the various time gates that constitute the channel configurations set up in the Crone PEM Receiver used in the surveys discussed in this report. Time windows are relative to time zero which marks the end of the current shut-off ramp. A time base of 8.33ms uses 16 off-time channels as shown below.

Table III: Channel Configuration

Channel	Start	Finish	Channel	Start	Finish
PP	-200 µs	-100 µs			
1	48 µs	64 µs	2	64 µs	84 µs
3	84 µs	112 µs	4	112 µs	152 µs
5	152 µs	204 µs	6	204 µs	268 µs
7	268 µs	360 µs	8	360 µs	480 µs
9	480 µs	640 µs	10	640 µs	848 µs
11	848 µs	1.128 ms	12	1.128 ms	1.496 ms
13	1.496 ms	1.992 ms	14	1.992 ms	2.644 ms
15	2.644 ms	3.512 ms	16	3.512 ms	4.664 ms

5.0 PRODUCTION SUMMARY

Table IV: Production Summary

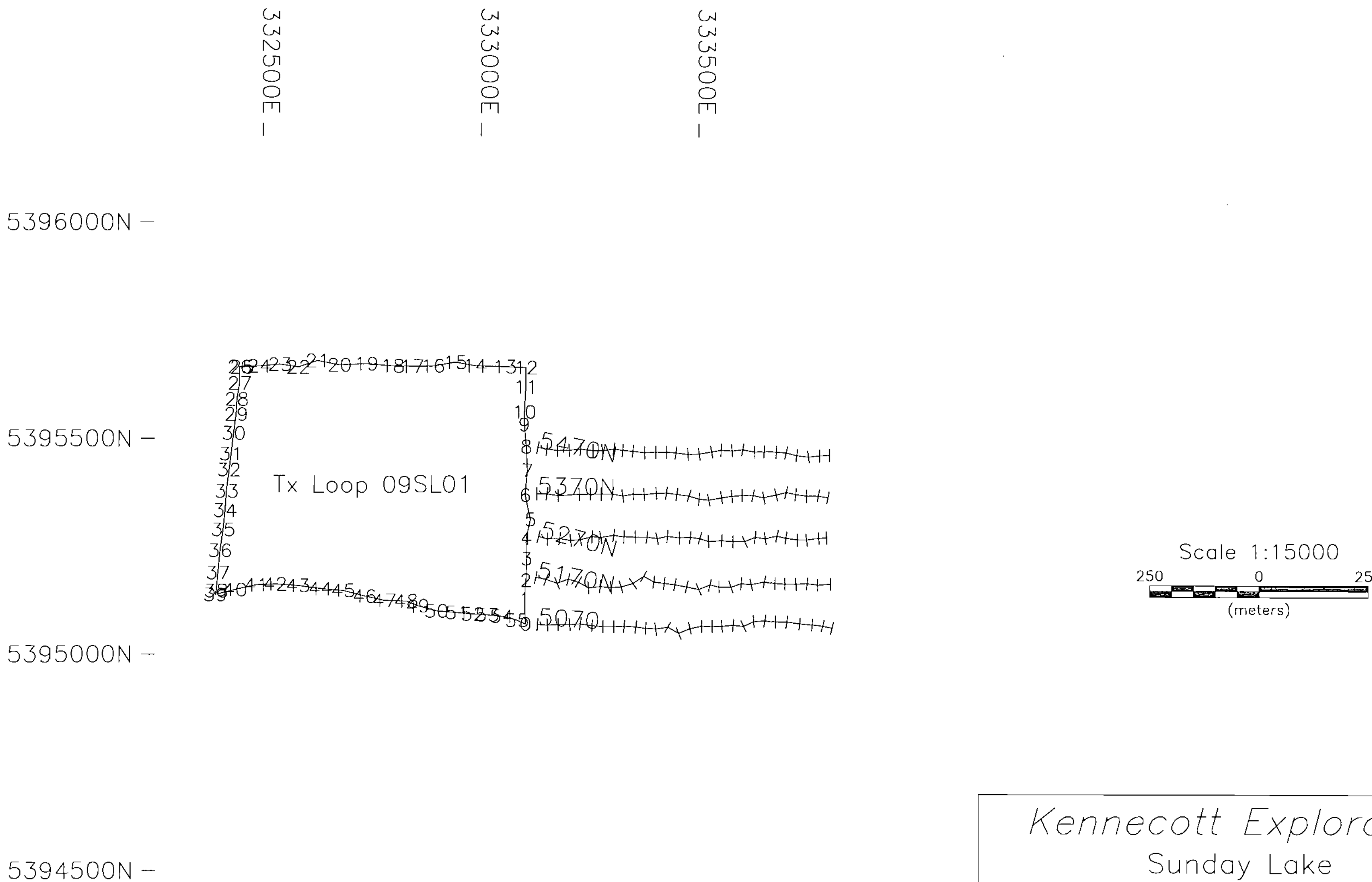
3-Aug-2009	MOB
4-Aug-2009	Laid loop 09SL01
5-Aug-2009	SPEM: 16600N 5025E-5700E Z Loop: 09SL01 SPEM: 16600N 5025E-5700E Z Loop: 09SL01 SPEM: 16400N 5025E-5700E Z Loop: 09SL01
6-Aug-2009	SPEM: 16200N 5025E-5700E Z Loop: 09SL01 SPEM: 16000N 5025E-5700E Z Loop: 09SL01
7-Aug-2009	Picked up loop 09SL01
8-Aug-2009	DEMOB
9-Aug-2009	DEMOB

Respectfully submitted,

Mark Hunter
Crone Geophysics & Exploration Ltd.

APPENDIX I

PLAN MAPS



Kennecott Exploration

Sunday Lake

Pulse EM Survey

Line & Loop Location Map

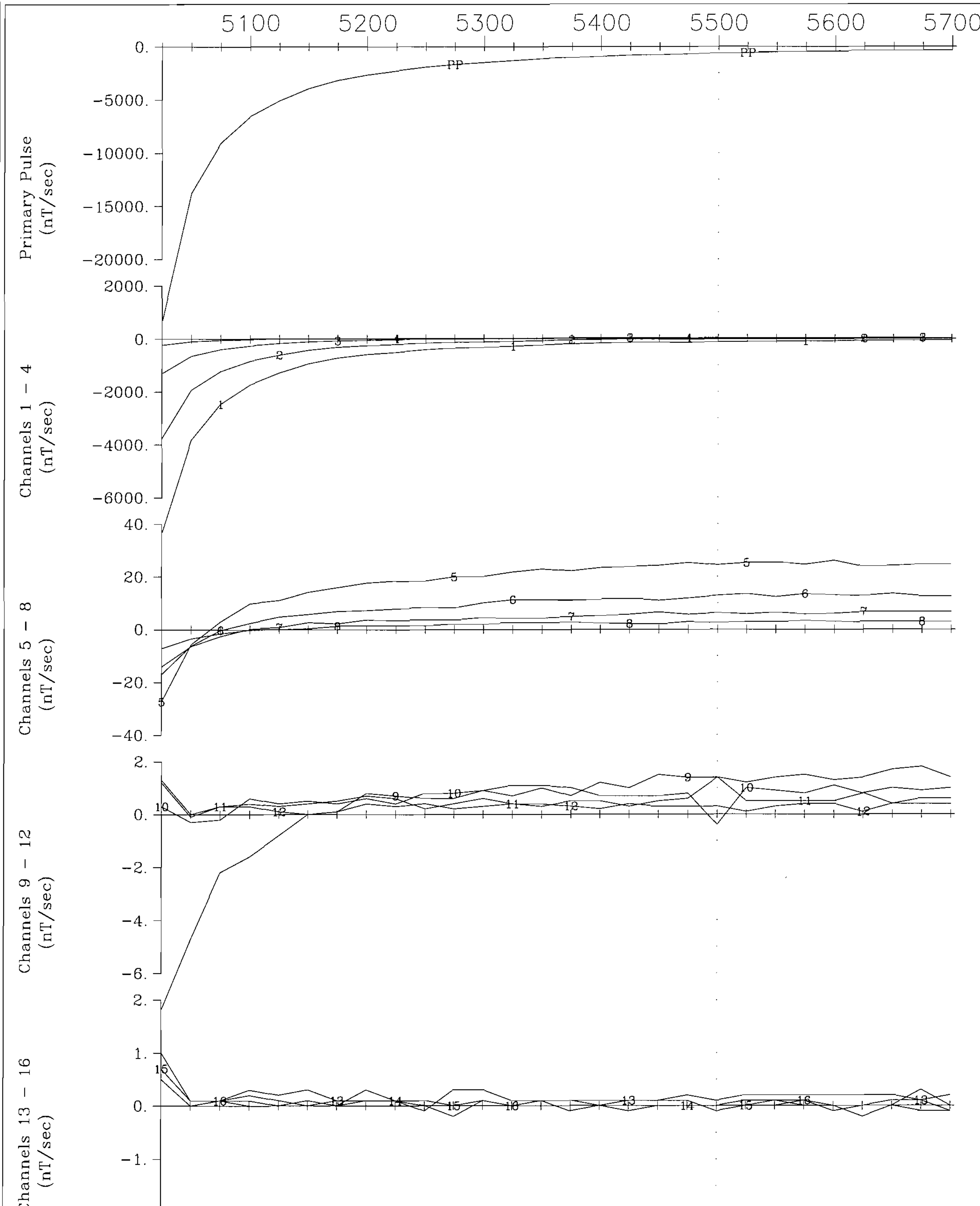
Loop: 09SL01

Survey Date: Aug 5-6, 2009

Crone Geophysics & Exploration Ltd.

APPENDIX II

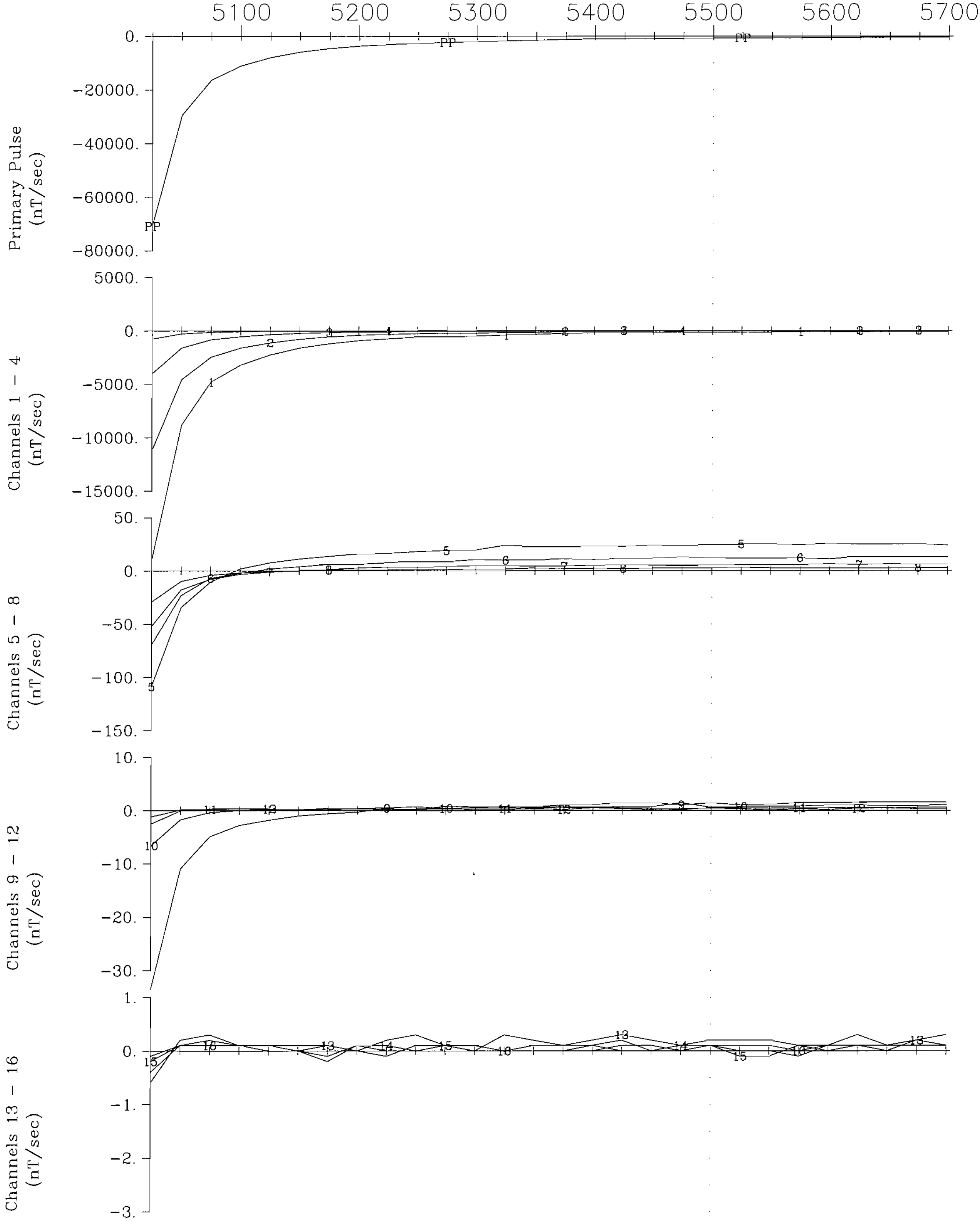
LINEAR (5-AXIS) PULSE EM DATA PROFILES



Kennecott Exploration Sunday Lake

Loop 09SL01, Line 5070N Z Component

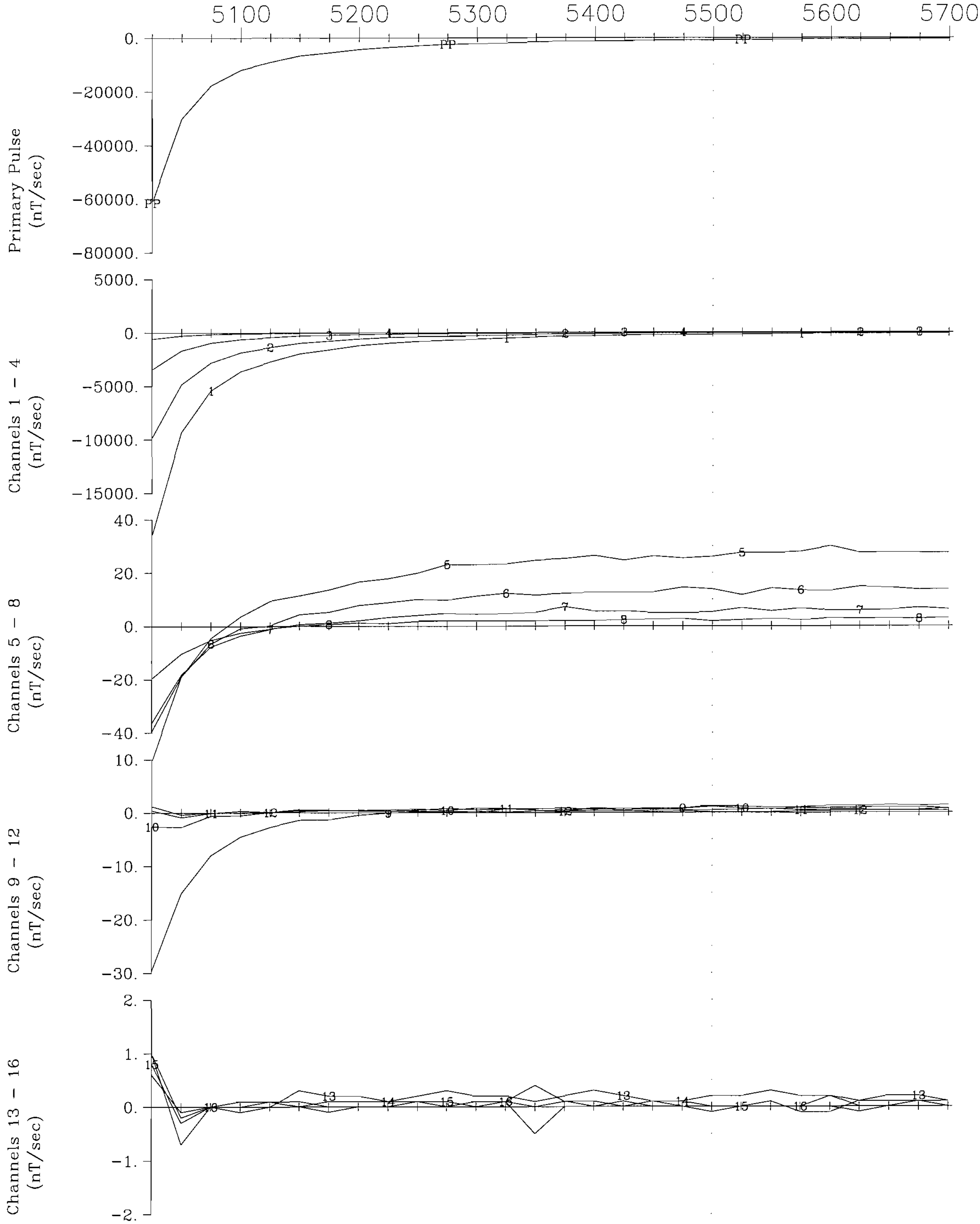
Crone Geophysics & Exploration Ltd.



Kennecott Exploration Sunday Lake

Loop 09SL01, Line 5170N Z Component

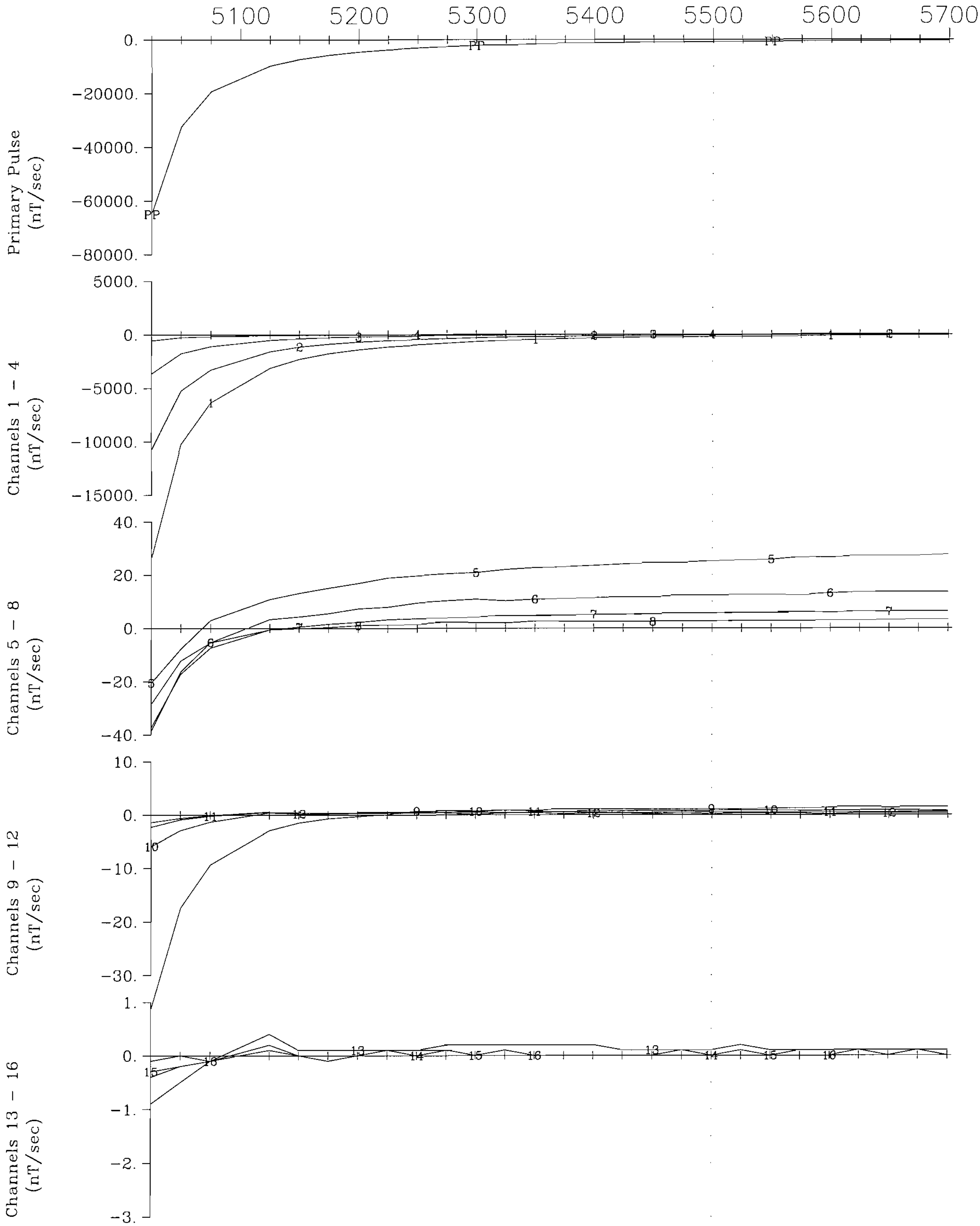
Crone Geophysics & Exploration Ltd.



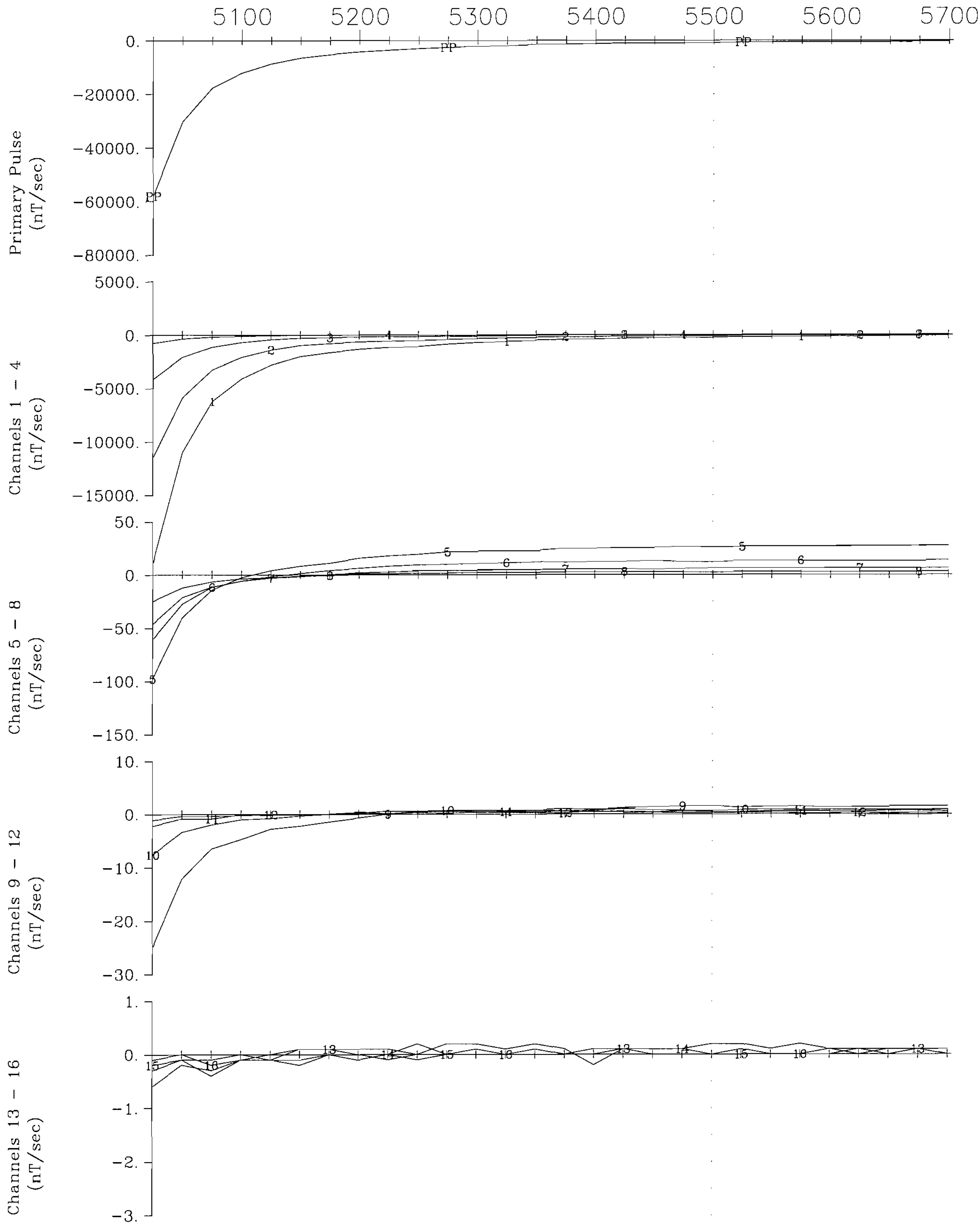
Kennecott Exploration Sunday Lake

Loop 09SL01, Line 5270N Z Component

Crone Geophysics & Exploration Ltd.



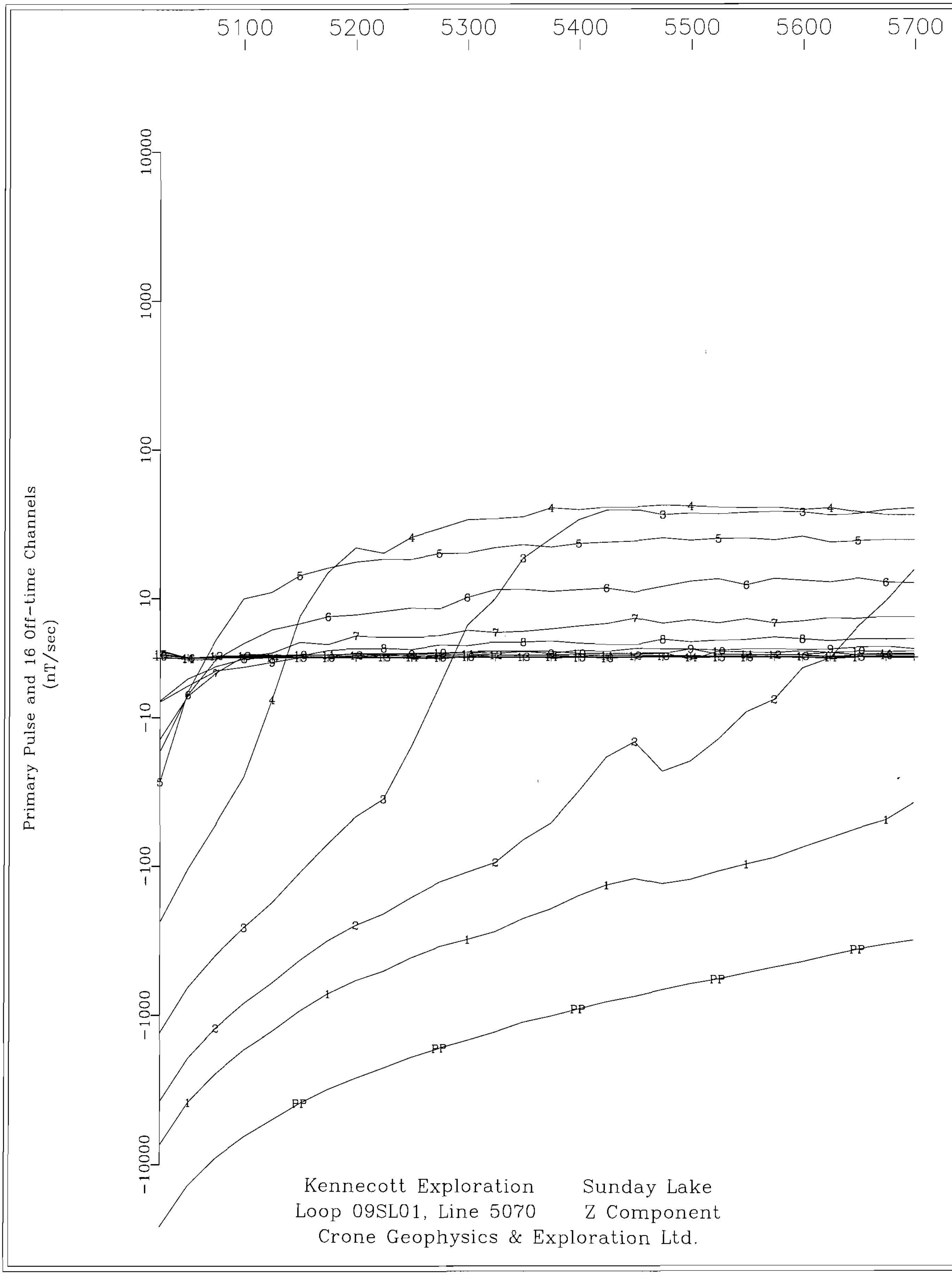
Kennecott Exploration Sunday Lake
Loop 09SL01, Line 5370N Z Component
Crone Geophysics & Exploration Ltd.

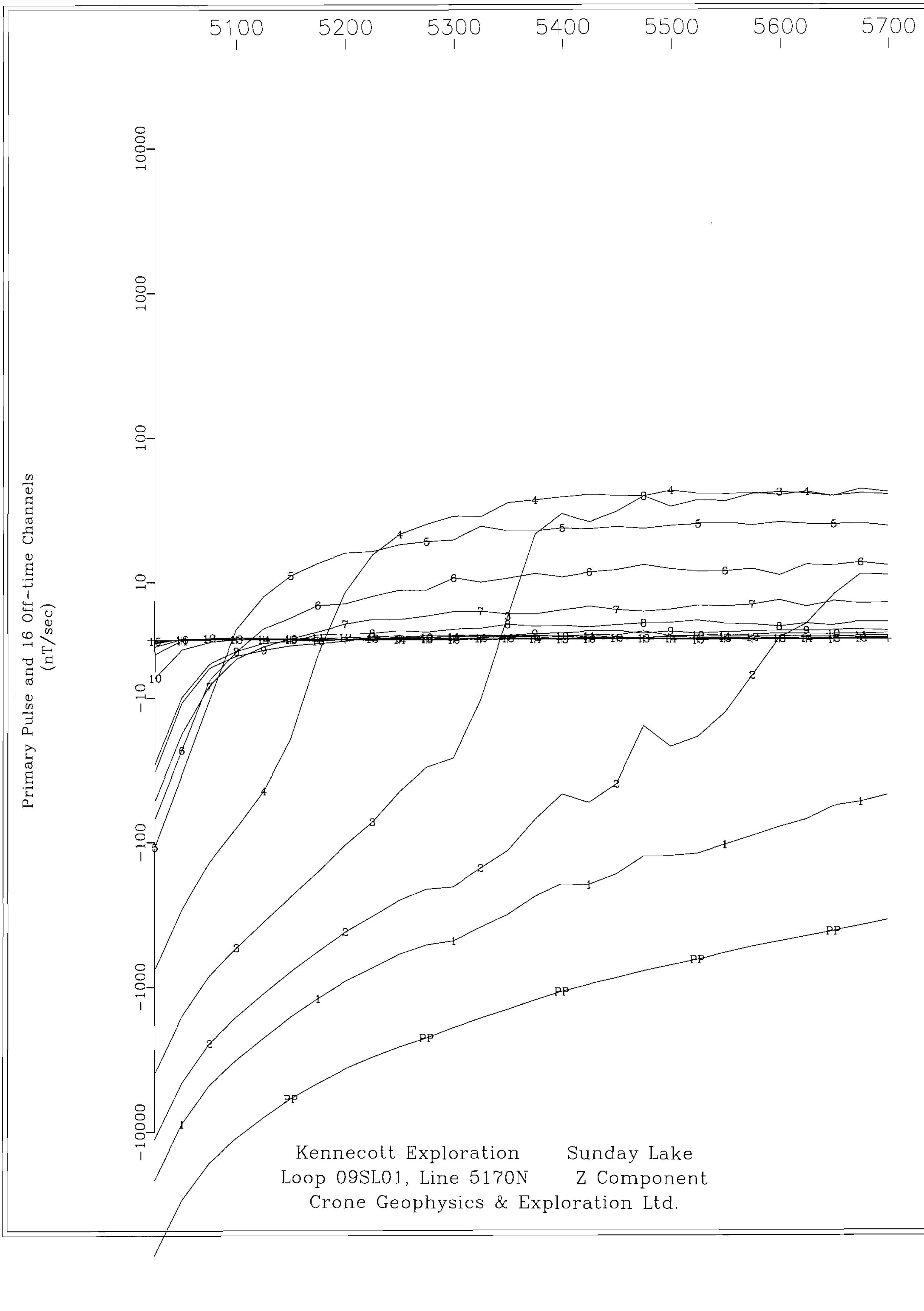


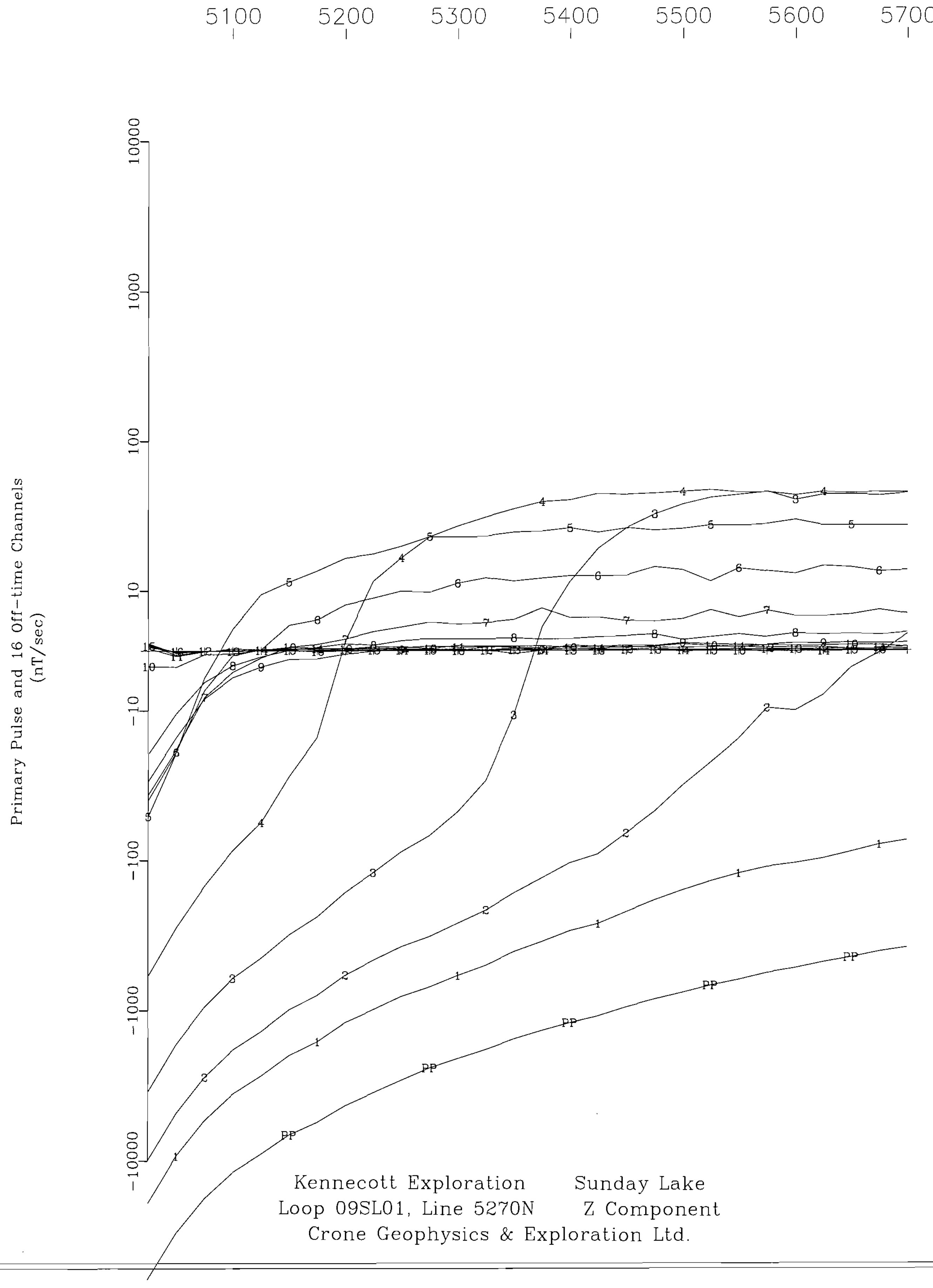
Kennecott Exploration Sunday Lake
Loop 09SL01, Line 5470N Z Component
Crone Geophysics & Exploration Ltd.

APPENDIX III

PULSE EM DATA PROFILES (LIN-LOG SCALE)


5100
5200
5300
5400
5500
5600
5700
Primary Pulse and 16 Off-time Channels
(nT/sec)
10000
1000
100
10
-10
-100
-1000
-10000
Kennecott Exploration
Sunday Lake
Loop 09SL01, Line 5070
Z Component
Crone Geophysics & Exploration Ltd.


5100
5200
5300
5400
5500
5600
5700
10000
1000
100
10
-10
-100
-1000
-10000
Primary Pulse and 16 Off-time Channels
(nT/sec)
Kennecott Exploration Sunday Lake
Loop 09SL01, Line 5170N Z Component
Crone Geophysics & Exploration Ltd.



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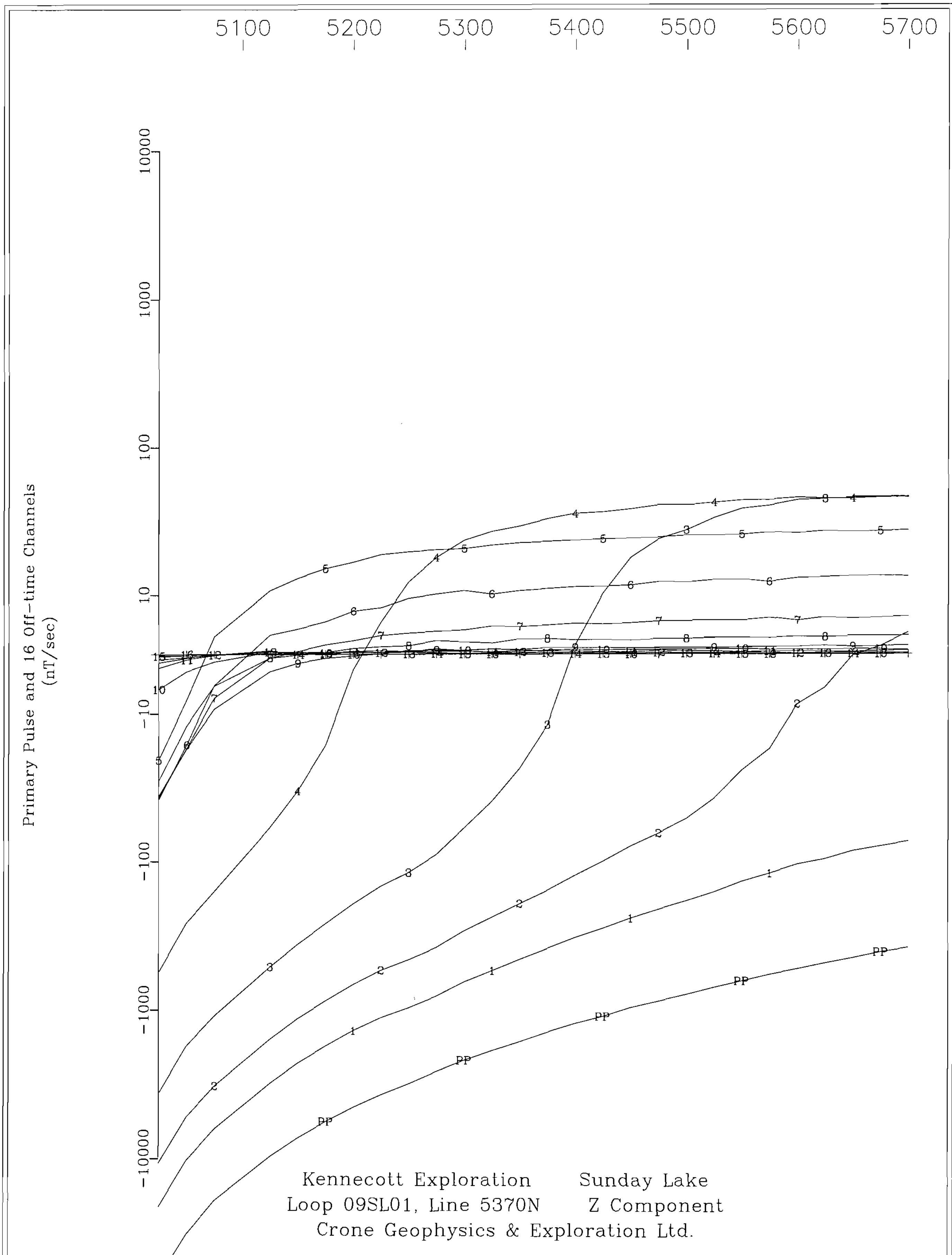
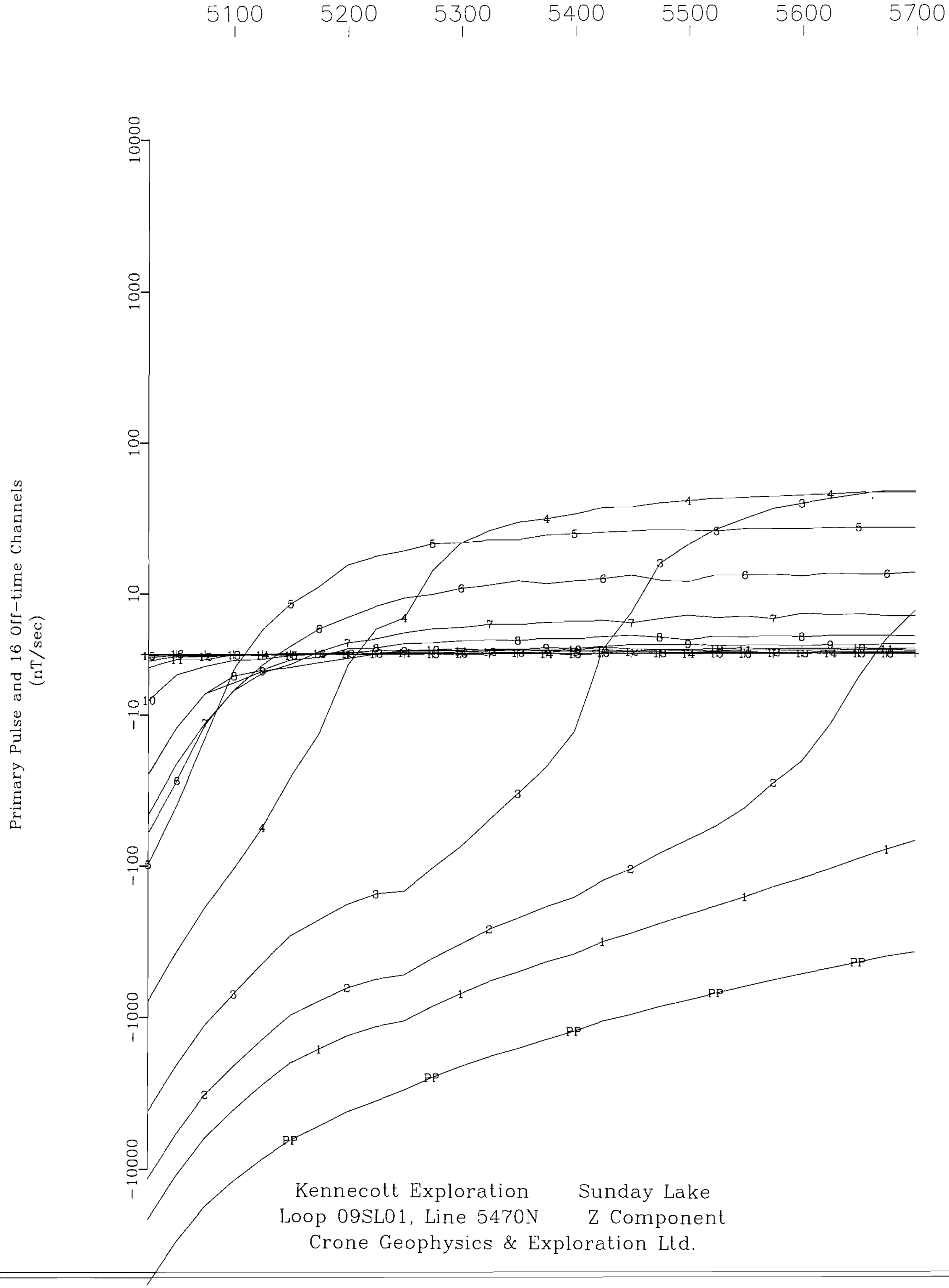
Loop 09SL01, Line 5270N Z Component
Crone Geophysics & Exploration Ltd.

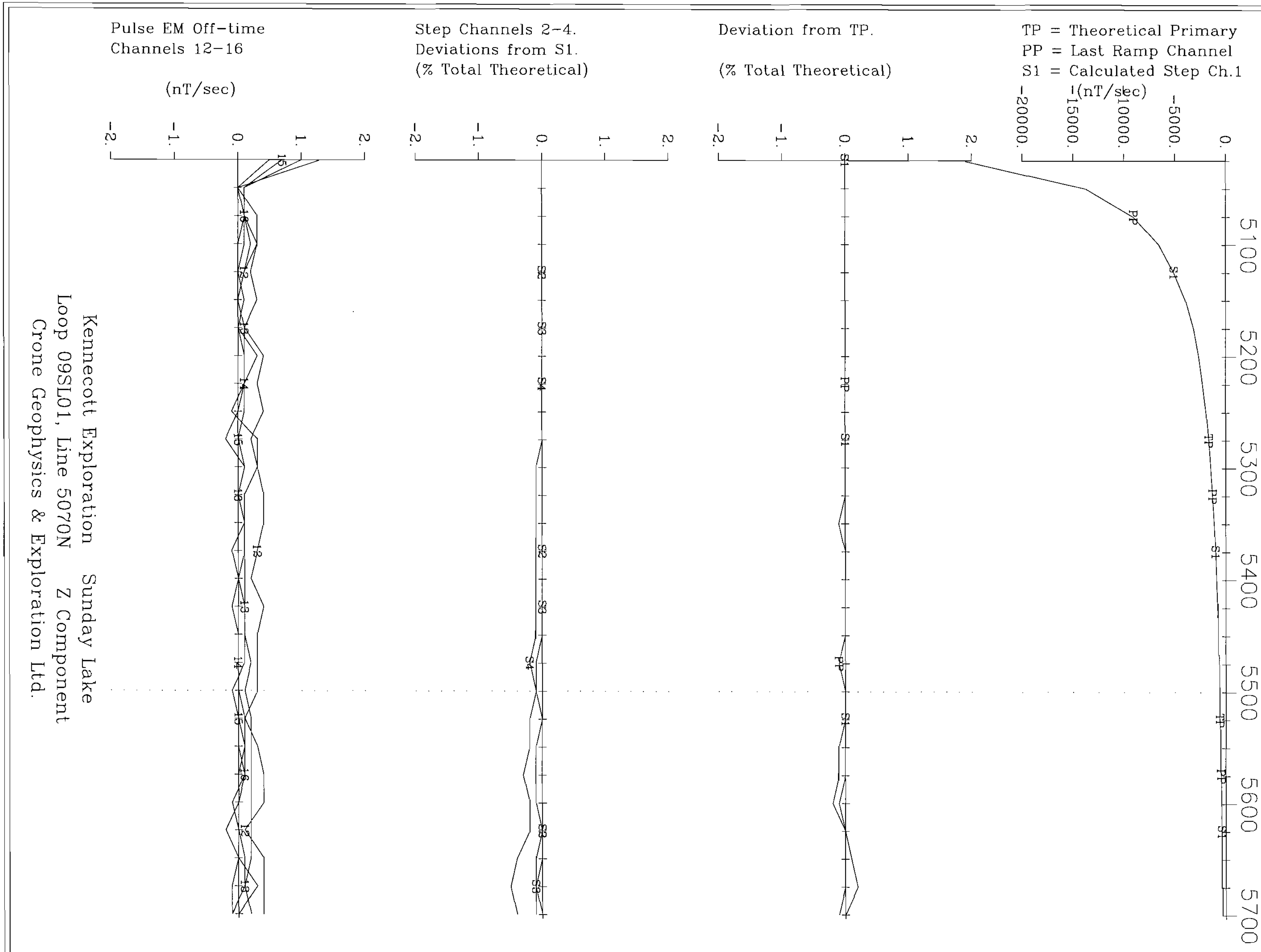

5100
5200
5300
5400
5500
5600
5700
10000
1000
100
10
-10
-100
-1000
-10000
Primary Pulse and 16 Off-time Channels
(nT/sec)
Kennecott Exploration Sunday Lake
Loop 09SL01, Line 5370N Z Component
Crone Geophysics & Exploration Ltd.



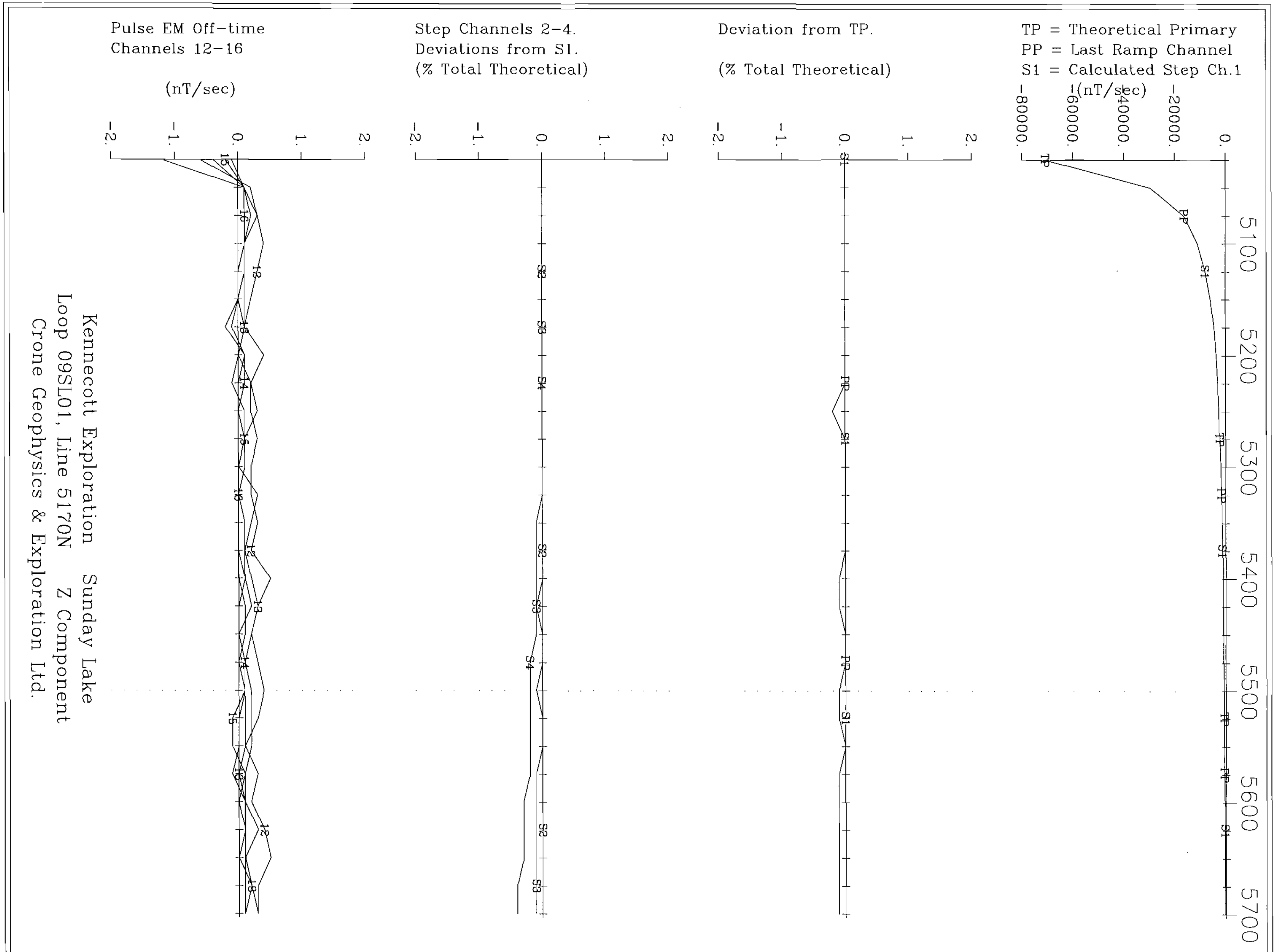
Kennecott Exploration Sunday Lake
Loop 09SL01, Line 5470N Z Component
Crone Geophysics & Exploration Ltd.

APPENDIX IV

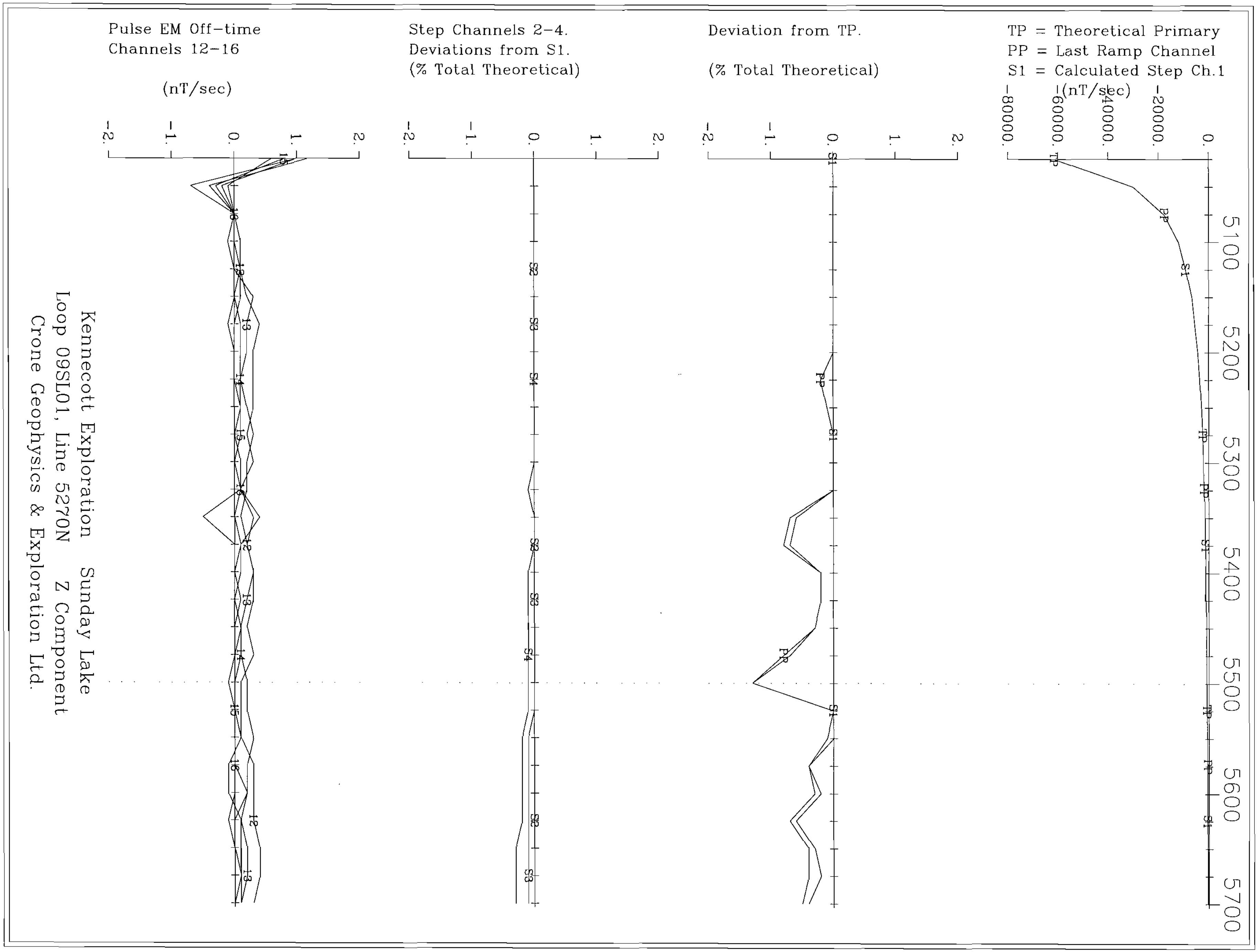
STEP RESPONSE DATA PROFILES



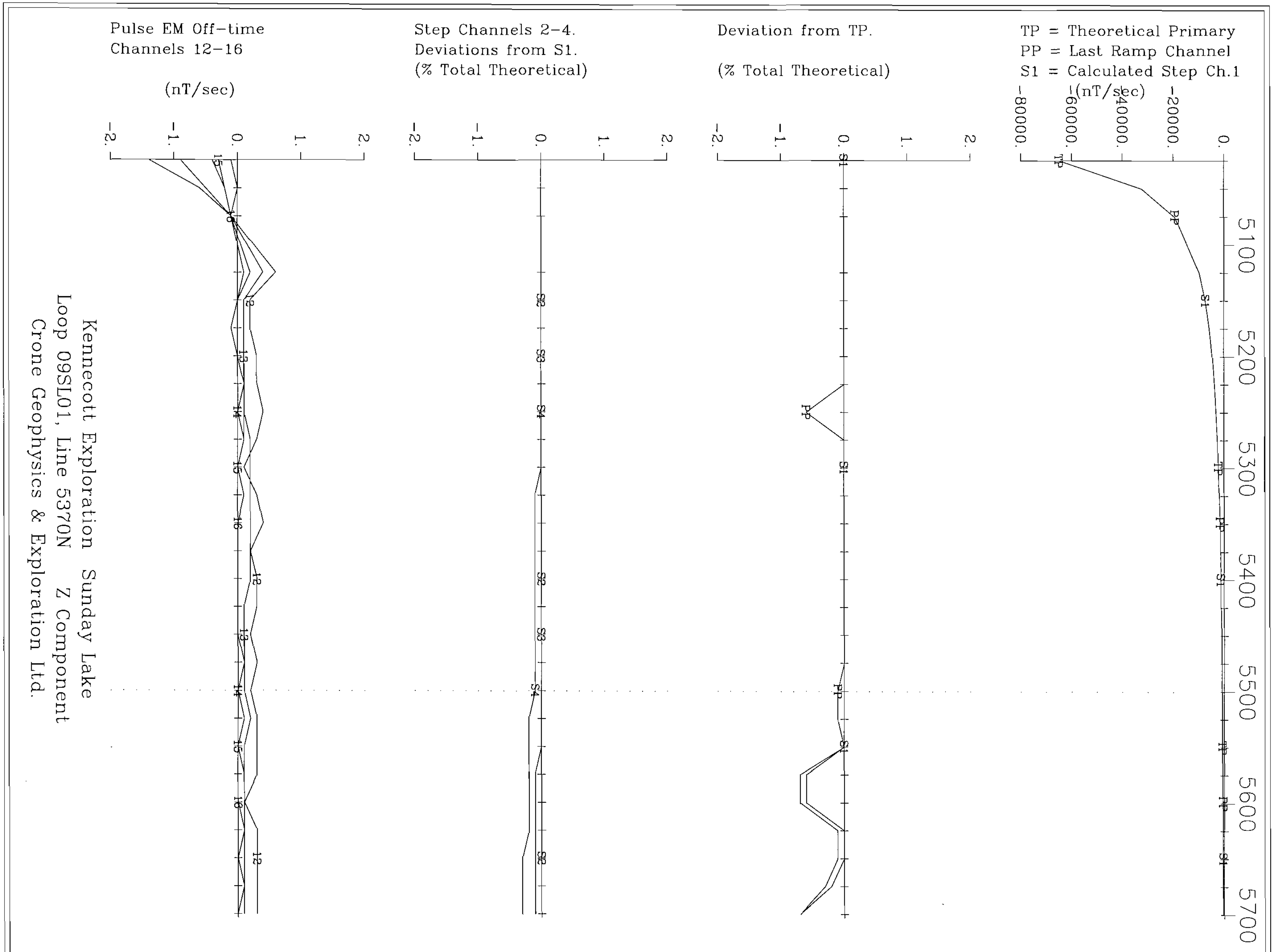
Pulse EM Off-time
Channels 12-16
(nT/sec)
Step Channels 2-4.
Deviations from S1.
(% Total Theoretical)
Deviation from TP.
(% Total Theoretical)
TP = Theoretical Primary
PP = Last Ramp Channel
S1 = Calculated Step Ch.1
(nT/sec)
-20000.
-15000.
-10000.
-5000.
0.
-2.
-1.
0.
1.
2.
5100
5200
5300
5400
5500
5600
5700
Kennecott Exploration Sunday Lake
Loop 09SL01, Line 5070N Z Component
Crone Geophysics & Exploration Ltd.



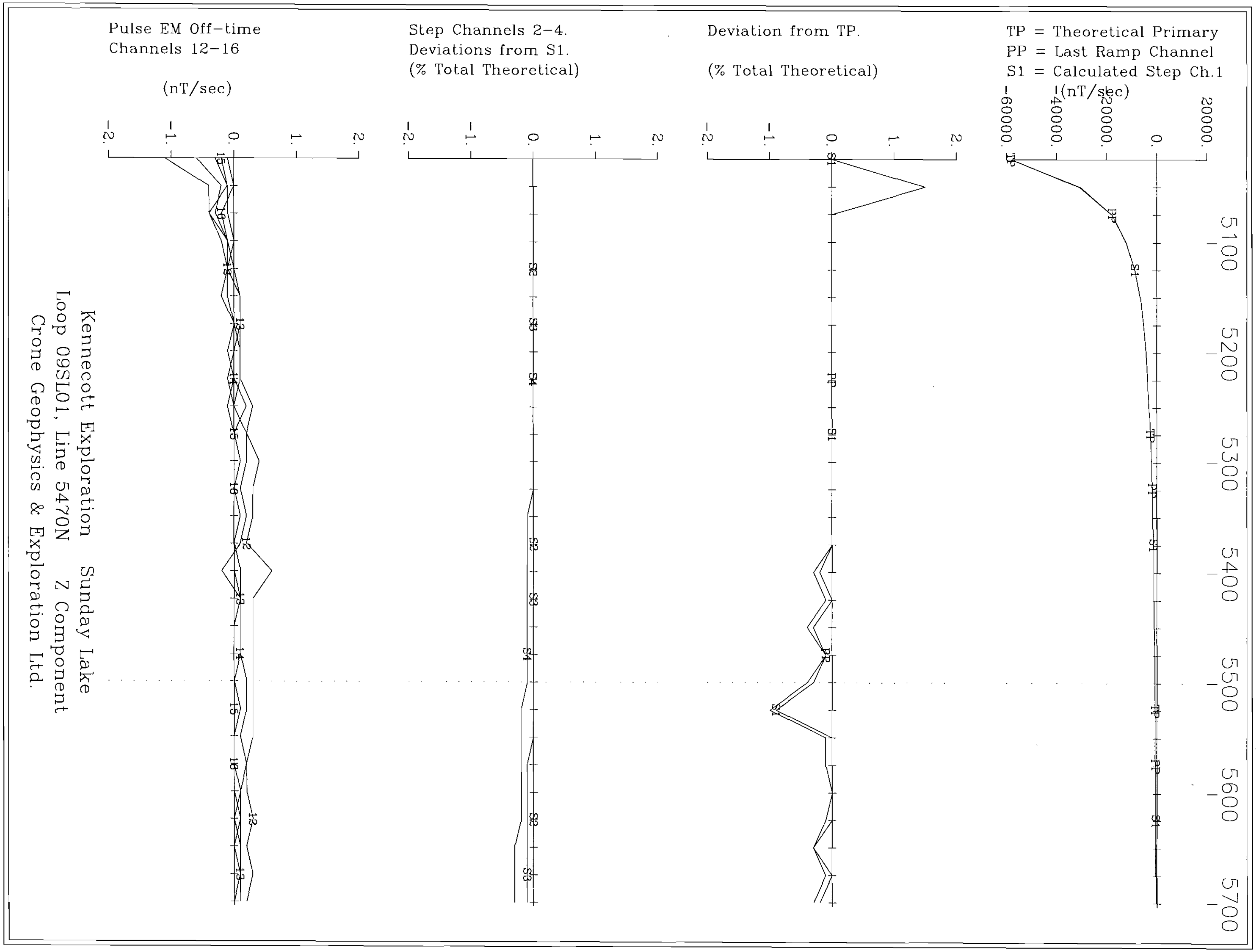
Pulse EM Off-time
Channels 12-16
(nT/sec)
Step Channels 2-4.
Deviations from S1.
(% Total Theoretical)
Deviation from TP.
(% Total Theoretical)
TP = Theoretical Primary
PP = Last Ramp Channel
S1 = Calculated Step Ch.1
(nT/sec)
5100
5200
5300
5400
5500
5600
5700
Kennecott Exploration Sunday Lake
Loop 09SL01, Line 5170N Z Component
Crone Geophysics & Exploration Ltd.



Pulse EM Off-time
Channels 12-16
(nT/sec)
Step Channels 2-4.
Deviations from S1.
(% Total Theoretical)
Deviation from TP.
(% Total Theoretical)
TP = Theoretical Primary
PP = Last Ramp Channel
S1 = Calculated Step Ch.1
(nT/sec)
-80000.
-60000.
-40000.
-20000.
0.
-2.
-1.
0.
1.
2.
5100
5200
5300
5400
5500
5600
5700
Kennecott Exploration Sunday Lake
Loop 09SL01, Line 5270N Z Component
Crone Geophysics & Exploration Ltd.



Pulse EM Off-time
Channels 12-16
(nT/sec)
Step Channels 2-4.
Deviations from S1.
(% Total Theoretical)
Deviation from TP.
(% Total Theoretical)
TP = Theoretical Primary
PP = Last Ramp Channel
S1 = Calculated Step Ch.1
(nT/sec)
-80000.
-60000.
-40000.
-20000.
0.
-2.
-1.
0.
1.
2.
5100
5200
5300
5400
5500
5600
5700
Kennecott Exploration Sunday Lake
Loop 09SL01, Line 5370N Z Component
Crone Geophysics & Exploration Ltd.



Pulse EM Off-time
Channels 12-16
(nT/sec)
Step Channels 2-4.
Deviations from S1.
(% Total Theoretical)
Deviation from TP.
(% Total Theoretical)
TP = Theoretical Primary
PP = Last Ramp Channel
S1 = Calculated Step Ch.1
(nT/sec)
-60000. -40000. -20000. 0. 20000.
-2. -1. 0. 1. 2.
5100 5200 5300 5400 5500 5600 5700
Kennecott Exploration Sunday Lake
Loop 09SL01, Line 5470N Z Component
Crone Geophysics & Exploration Ltd.

APPENDIX V

CRONE INSTRUMENT SPECIFICATIONS

CRONE PULSE EM SYSTEM

SYSTEM DESCRIPTION

The Crone Pulse EM system is a time domain electromagnetic method (TDEM) that utilizes an alternating pulsed primary current with a controlled shut-off and measures the rate of decay of the induced secondary field across a series of time windows during the off-time. The system uses a transmit loop of any size or shape. A portable power source feeds a transmitter which provides a precise current waveform through the loop. The receiver apparatus is moved along surface lines or down boreholes.

The transmitter cycle consists of slowly increasing the current over a few milliseconds, a constant current, abrupt linear termination of the current, and finally zero current for a selected length of time in milliseconds. The EMF created by the shutting-off of the current induces eddy currents in nearby conductive material thus setting-up a secondary magnetic field. When the primary field is terminated, this magnetic field will decay with time. The amplitude of the secondary field and the decay rate are dependent on the quality and size of the conductor. The receiver, which is synchronized to the off-time of the transmitter, measures this transient magnetic field where it cuts the surface coil or borehole probe. These readings are across fixed time windows or "channels".

SYSTEM TERMINOLOGY

Ramp Time

"Ramp time" refers to the controlled shut-off of the transmitter current. Three ramp times are selectable by the operator; 0.5ms, 1.0ms, and 1.5ms. By controlling the shut-off rather than having it depend on the loop size and current ensures that the same waveform is maintained for different loops so data can be properly compared.

The 1.5ms ramp is the normally used setting for good conductors. It keeps the early channel responses on scale and decreases the chance of overload. The faster ramp times of 1.0ms and 0.5ms will enhance the early time responses. This can be useful for weak conductors when data from the higher end of the frequency spectrum is desired.

Time Base

Time base is the length of time the transmitter current is off (it includes the ramp time). This also equals the on time of the current. Eight time bases are selectable by the operator. They include the original time bases used in the analog system as well as time bases to eliminate the effects of powerline interference. The eight time bases are as follows: compatible to analog Rx: 10.89ms, 21.79ms; 60hz powerline noise reduction: 8.33ms, 16.66ms, & 33.33ms; 50hz powerline noise reduction: 10.00ms, 20.00ms, & 40.00ms

Since readings are taken during the off cycles, the time base will have an effect on the receiver channels. Normally, a standard time base is selected for the type of system and survey being used, but this can be changed to suit a particular situation. A longer time base is preferred for conductors of greater time constants, and in surveys such as resistive soundings where more channels are desired.

Zero Time Set

The term "zero time set" or "ZTS" refers to the starting point for the receiver channel measurements. It is manually set on the receiver by the operator thus allowing adjustments for the ramp times and fine tuning for any fluctuations in the transmitter signal.

Receiver Channels

The rate of decay of the secondary field is measured across fixed time windows which occupy most of the off-time of the transmitter. These time windows are referred to as "channels". These channels are numbered in sequence with "1" being the earliest. The analog and datalogger receivers measured eight fixed channels. The digital receiver, being under software control, offers more flexibility in the channel positioning, channel width, and number of channels.

PP Channel

The PEM system monitors the primary field by taking a measurement during the current ramp and storing this information in a "PP channel". This means that data can be presented in either normalized or unnormalized formats, and additional information is available during interpretation. The PP channel data can provide useful diagnostic information and helps avoid critical errors in field polarity.

Synchronization

Since the PEM system measures the secondary field in the absence of the primary field, the receiver must be in "sync" with the transmitter to read during the off-time. There are three synchronization methods available: cable connection, radio telemetry, and crystal clock. This flexibility enhances the operational capabilities of the system.

SURVEY METHODS

The wide frequency spectrum of data produced by a Pulse EM survey can be used to provide structural geological information as well as the direct detection of conductive or conductive associated ore deposits. The various types of survey methods, from surface and borehole, have greatly improved the chances of success in deep exploration programs. There are eight basic profiling methods as well as a resistivity sounding mode.

Moving Coil

A small, multi-turn transmitter loop (13.7m diameter) is moved for each reading while the receiver remains a fixed distance away. This method is ideal for quick reconnaissance in areas of high background conductivity.

Moving Loop

Same as Moving Coil method, but with a larger transmit loop (100 to 300 meters square). This method provides deeper penetration in areas of high background conductivity, and works best for near-vertical conductors. This method can be used in conjunction with the Moving In-loop survey for increased sensitivity to horizontal conductors.

Moving In-Loop

A transmit loop of size 100 to 300 meters square is moved for each reading while the receiver remains at the center of the loop. This method provides deep penetration in areas of very high background conductivity, and works best for near-horizontal conductors. It can be used in conjunction with the Moving Loop survey.

Large In-Loop

A very large, stationary transmit loop (800m square or more) is used, and survey lines are run inside the loop. This mode provides very deep penetration (700m or more) and couples best with shallow dip conductors (<45 deg.) under the loop.

Deepem

A large, stationary transmit loop is used, and survey lines are run outside the loop. This mode provides very deep penetration, and couples best with steeply dipping conductors (>45 deg.) outside the loop.

Borehole (Z Component only)

Isolated Borehole: A drill hole is surveyed by lowering a probe down a hole and surveying it with a number of transmit loops laid out on surface. The data from multiple loops gives directional information on the conductors.

Multiple Boreholes: One large transmit loop is used to survey a number of closely spaced holes. The change in anomaly from hole to hole provides directional information.

These methods have detected conductors to depths of 2500m from surface and up to 200m from the hole.

3-D Borehole

Drill holes are surveyed with both the Z and the XY borehole probes. The X and Y components provide accurate direction information using just one transmit loop.

Since the probe rotates as it moves down the hole a correction is required for the X-Y data. This is accomplished in one of two ways. The standard approach is to use the measurement of the primary field from the "PP" channel, apply a "cleaning" algorithm to remove most of the secondary field contamination, and compare this to theoretical values. The amount of probe rotation is then calculated, and the correction can be made. The second method involves the use of an optional orientation device for the X-Y probe which is produced in co-operation with IFG Corp. This attachment uses dipmeters to calculate the probe rotation.

Underground Borehole

Underground drill holes can be surveyed in any of the above mentioned borehole methods with one or more transmit loops on the surface. Near-horizontal holes can be surveyed using a push-rod system.

Resistivity Soundings

By reading a large number of channels in the centre of a transmit loop it is possible to perform a decay curve analysis giving a best-fit layer earth model using programs such as ARRTI or TEMIX.

EQUIPMENT

Transmit Loops

The PEM system can operate with practically any size of transmit loop, from a multi-turn circular loop 13.7m in diameter, to a 1 or 2 turn loop of any shape up to 1 or 2 kilometers square using standard insulated copper wire of 10 or 12 gauge. The multi-turn loop is made in two sections with screw connectors. The 10 or 12 gauge loop wire comes on spools in either 300m or 400m lengths. The spools can be mounted on packframe winders for laying out or retrieving.

Power Supply

The PEM system normally operates with an input voltage from 24v to 120v. Modifications have recently been made to increase the power to 240 volts. The maximum current is still 20 amps. For low power surveys a 20amp/hr 24v battery can be used. The power supply requires a motor generator and a voltage regulator to control and filter the input voltage to the transmitter.

Specifications: PEM Motor Generator

- 4.5 hp Wisconsin, (2 kw) - 11 hp Honda (4 kw); 4 cycle engine
- belt drive to D.C. alternator
- cable output to regulator

- maximum output: 120v, 20amp (2 kw); 240v, 20amp (4 kw)
- fuse type overload protection

- steel frame
- external gas tank
- unit weight: 33kg (2 kw); 52kg (4 kw)
- optional packframe
- wooden shipping box
- shipping weight: 47kg (2 kw); 80kg (4 kw)

Specifications: PEM Variable Voltage Regulator

- selectable voltage between 24v and 120v or 48v and 240v
- 20amp maximum current
- fuse and internal circuit breaker protection
- cable connections to motor generator and transmitter
- anodized aluminum case
- unit weight 10kg; shipping weight 18kg
- padded wooden shipping box

Transmitter

The transmitter controls the bi-polar on-off waveform and linear current shut-off ramp. The latest 2000w PEM Transmitter has the following specifications:

Specifications: PEM Transmitter

- time bases: 10.89ms, 21.79ms, 8.88ms, 16.66ms, 33.33ms, 10ms, 20ms, 30ms
- ramp times: 0.5ms, 1.0ms, 1.5ms
- operating voltage: 24v to 120v (2 kw); 48v to 240v (4 kw)
- output current: 5amp to 20amp
- monitors for input voltage, output current, shut-off ramp, tx loop continuity, instrument temperature, and overload output current
- automatic shut-off for open loop, high instrument temperature, and overload
- fuse and circuit breaker overload protection
- three sync modes: 1) built-in radio and antenna
  2) cable sync output for direct wire link to receiver or remote radio
  3) connectors for the crystal clock
- anodized aluminum case
- optional packframe
- unit weight 12.5kg; shipping weight 22kg
- padded wooden shipping box

Receiver

The receivers measure the rate of decay of the secondary field across several time channels. Three types of receivers are available with the PEM system: Analog Rx, Datalogger Rx, and Digital Rx. The Analog Rx and Datalogger Rx read eight fixed time channels while the Digital Rx, under software control, offers a variety of channel configurations. The Digital Rx has been used in the field for contract surveys since 1987.

Specifications: Digital PEM Receiver

- operating temperature -40°C to 50°C
- optional packframe
- unit weight 15kg; shipping weight 25.5kg
- padded wooden shipping box

Menu driven operating software system offering the following functions:

- controls channel positions, channel widths, and number of channels

- time bases: 10.89ms, 21.79ms, 8.88ms, 16.66ms, 33.33ms, 10ms, 20ms, and 30ms
- ramp time selection
- sample stacking from 512 to 65536
- scrolling routines for viewing data
- graphic display of decay curve and profile with various plotting options
- routines for memory management
- control of data transmission
- provides information on instrument and operating status

Sync Equipment

There are three modes of synchronization available; radio, cable, and crystal clock. The radio sync signal can be transmitted through a booster antenna from either the PEM Transmitter internal radio or through a Remote Radio.

Specifications: Sync Cable

- 2 conductor, 24awg, Teflon coated
- approx. 900m per aluminum spool with connectors

Specifications: Remote Radio

- operating frequency 27.12mhz
- 12v rechargeable gel cell battery supply
- fuse protection
- sync wire link to transmitter
- coaxial link to booster antenna
- anodized aluminum case
- unit weight 2.7kg

Specifications: Booster Antenna

- 8m, 4 section aluminum mast
- guide rope support
- ¼ wave CB fiberglass antenna
- range up to 2km
- coaxial connection to transmitter or remote radio

Specification: Crystal Clocks

- heat stabilized crystals
- 24v rechargeable gel cell battery supply
- anodized aluminum case
- rx unit can be separate or housed in the receiver
- outlet for external supplementary battery supply

Surface PEM Receive Coil

The Surface PEM Receive Coil picks up the EM field to be measured by the receiver. The coil is mounted on a tripod that can be positioned to take readings of any component of the field.

Specifications: Surface PEM Receive Coil

- ferrite core antenna
- VLF filter
- 10khz bandwidth
- two 9v transistor battery supply
- tripod adjustable to all planes
- unit weight 4.5kg; shipping weight 13.5kg

- padded wooden shipping box

Borehole PEM Z Component Probe

The Z component probe measures the axial component of the EM field. The Z component data is not affected by probe rotation so no correction are required.

Specifications: Borehole PEM Z Component Probe

- ferrite core
- dimensions: length - 1.6m; dia - 3.02cm (3.15cm for high pressure tested probes)
- internal rechargeable ni-cad battery supply
- replaceable heat shrink tubing for abrasion protection
- pressure tested for depths 1300m, 2000m, and 2800m
- packaged in padded cover and aluminum tube
- shipped in padded wooden box; total weight 17kg

Borehole PEM XY Component Probe

The XY probe measures two orthogonal components of the EM field perpendicular to the axis of the hole. Correction for probe rotation can be achieved by two methods. The standard approach is to use the measurement of the primary field from the "PP" channel, apply a "cleaning" algorithm to remove most of the secondary field contamination, and compare this to theoretical values. The amount of probe rotation is then calculated, and the correction can be made. The second method involves the use of an optional orientation device for the X-Y probe that uses dipmeters to calculate the probe rotation.

Specifications: Borehole PEM XY Component Probe

- ferrite core
- dimensions: length - 2.01m; dia - 3.02cm
- internal rechargeable ni-cad battery supply
- selection of X or Y coils by means of a switch box on surface or automatic switching with Digital receiver
- replaceable heat shrink tubing for abrasion protection
- pressure tested for depths to 2800m
- packaged in padded cover and aluminum tube
- shipped in padded wooden box; total shipping weight 20kg

Orientation Device

The orientation device is an optional attachment for the XY probe which measures the rotation of the probe using two dipmeters.

Specifications: Orientation Device

- 2 axis tilt sensors
- sensitivity +/- 0.1 deg.
- operating range -89.5 to -10 deg.
- dimensions: length - 0.94m; dia - 28.5cm
- packaged in padded cover and aluminum tube
- shipped in padded wooden box; total shipping weight 11kg

Borehole Equipment

To lower the probe down a drill hole requires a cable and spool, winch assembly frame and cable counter. Borehole surveys also require equipment to "dummy probe" the hole before doing the survey.

Specifications: Borehole Cable

- two conductor shielded cable
- kevlar strengthened
- lengths are available up to 2600m on three sizes of spools.
- shipped in wooden box

Specifications: Slip Ring

- attaches to side of borehole cable spool providing a connection to the receiver while allowing the spool to turn.
- VLF filter
- pure silver contacts

Specifications: Borehole Frame

- welded aluminum frame
- removable axle
- chain driven, 3 speed gear box
- hand or optional power winding
- hand brake and lock
- two sizes: standard for up to 1300m cable; larger for longer cables
- shipped in wooden box

Specifications: Borehole Counter

- attaches to the drill hole casing
- calibrated in meters
- shipped in wooden box; total weight 13kg

Specifications: Dummy Probe and Cable

- solid steel or steel pipe
- same dimensions as borehole probe
- shear pin connection to dummy cable
- steel dummy cable on aluminum spool
- cable mounts on borehole frame
- various lengths to 2600m on 3 spool sizes.

ATTACHMENT B

INVOICE

CRONE GEOPHYSICS & EXPLORATION LTD.
2135 MEADOWPINE BLVD., MISSISSAUGA, ONTARIO, CANADA L5N 6L5
Phone: 905-814-0100 ◦ Fax: 905-814-8617 ◦ email: info@cronegeophysics.com

Invoice

Date: August 10, 2009
Invoice #: 14629 Revised

To: Kennecott Exploration Co.
Granville Square
#354 - 200 Granville Street
Vancouver, B.C.
V6C 1S4

Project	Payment Terms	Due Date
Sunday Lake-Thunder Bay area	Net 30 days; Overdue invoices are subject to a 24% per annum handling charge without formal notice	9/9/09

Description	Details	Qty	Unit Price	Line Total
	Survey in Sunday Lake - Thunder Bay, Ontario for August, 2009			
Field Activity	Survey Day	3	2,335.00	7,005.00
	Mob Day	0.5	1,470.00	735.00
	Demob Day	1	1,470.00	1,470.00
	Demob Day	1	1,325.00	1,325.00
Equipment	GPS unit	8	80.00	640.00

Subtotal	$	11,175.00
Adjustments *	$	-
GST # 101208858		558.75
Total	$	11,733.75

Make all checks payable to CRONE GEOPHYSICS & EXPLORATION LTD.
Thank you for your business!

NJS

KCEI PAYMENT APPROVAL

	Signed	Date
Goods Received	[illegible]	Sept 18th 2009
Costs Correct	[illegible]	Sept 18th 2009
Math Checked	[illegible]	Sept 18th 2009
Approved	[illegible]	Sept 18th 2009
Project Code	Expense Element	Amount
V3745	921500	C$ 11,175.00
Z6910	113655	C$ 558.75