# ARGUS METALS CORP.

# REPORT ON

# TRANSIENT ELECTROMAGNETIC SURVEY

# HYLAND PROJECT

# WATSON LAKE AREA, Y.T.

**by**

**Braden Adams, B.Sc.**

**Cliff Candy, P.Geo.**

**October 2010** **PROJECT FGI-1165**

Frontier Geosciences Inc. 237 St. Georges Avenue, North Vancouver, B.C., Canada V7L 4T4
Tel: 604.987.3037 Fax: 604.984.3074

# CONTENTS

ILLUSTRATIONS

## 1. INTRODUCTION

In the period October 3 to October 15, 2010, Frontier Geosciences Inc. carried out a Transient Electromagnetic (TEM) profiling for Argus Metals Corp. at the Hyland project site. The survey area is located approximately 70 km northeast of Watson Lake, Y.T., and approximately 70 kilometres southwest of the Northwest Territories border. A Survey Location Plan of the area is shown at 1:450,000 scale in Figure 1.

The purpose of the TEM survey was to profile the conductivity of the site in order to provide subsurface geoelectric information and trace surface mineralisation at depth. A transmitter loop of 1000 m by 500 m was employed, with a survey station interval of 25 metres. In total, five TEM profiling traverses were completed totalling approximately 5000 m of surveying.


ARGUS METALS CORP.
HYLAND PROJECT, WATSON LAKE, Y.T.

TRANSIENT E.M. SURVEY

SURVEY LOCATION PLAN

FRONTIER GEOSCIENCES INC.

| | | |
|---|---|---|
| DATE: OCT. 2010 | SCALE 1:450,000 | FIG. 1 |

## 2. THE TRANSIENT ELECTROMAGNETIC SURVEY

### 2.1 Equipment

The surface TEM survey utilized the Geonics Ltd., Protem TEM-37 transmitter and TEM-57 receiver system, together with a single component coil. Although the surface receiver coil is only capable of detecting one component of the electromagnetic field at a time, it is possible to collect data for multiple components by manipulating the orientation of the coil. Additional equipment included a generator and several kilometres of insulated copper wire to create the primary electromagnetic field.

### 2.2 Field Procedure

The field procedure entails setting out a rectangular transmitter loop, approximately 1000 m by 500 m, on the ground surface. Advantage was taken of existing roads and cut paths to lay the transmitter loop approximately parallel with the anticipated strike of the host rock. Transects were surveyed perpendicular to the long axis of the loop and bedrock strike. In operation, the transmitter loop is energized with an electrical current which is rapidly terminated. The rapid reduction of the primary magnetic field causes eddy currents to flow into any nearby conductors, generating secondary magnetic fields that produce a characteristic decay determined by the conductivity, size, and shape of conductors.

Transects were made to the west of the survey loop in order to define the conductance, size and character of any identifiable conductors. This was accomplished by acquiring data at 25 metre sampling stations on predefined transects. At each station, the surface receiver coil was placed on the ground and levelled to ensure that a constant electromagnetic field direction was acquired. For each station, a 30 second sample of the induced secondary magnetic field was obtained for the vertical component (Z) of the secondary electromagnetic field. The decaying secondary electromagnetic field was sampled over 20, logarithmically-spaced channel windows, sampled as early as 0.117 ms to as late as 27.92 ms after the turn-off time of the transmitter. A similar procedure was followed to obtain information on the horizontal (X) component of the secondary EM field at each station. The X component of the secondary magnetic field is parallel to the survey lines and perpendicular to the geologic strike of the area. Transects were made, roughly, every 200 metres in order to provide an optimum balance between data resolution and coverage area. Time synchronization between the transmitter and receiver was obtained using crystal time bases on the transmitter and receiver. Results for all station measurements were digitally stored in the Protem receiver until they could be downloaded and processed for interpretation.

## 2.3 Data Processing

The vertical and horizontal (Z and X) component profiles were created for each surveyed line (Figures 3 through 14 of the Appendix). The profiles for each transect were all scaled in accordance with the greatest range of response amplitudes within the survey loop.

Additionally, a colour contour map of the secondary magnetic field response for the survey area was produced in plan view by compiling the results from the late time anomaly in the X component (Figure 13). The color scale was created using the range of the data set. This was accomplished by establishing the minimum and maximum secondary magnetic field response for each area and then scaling the colour bars in order to best illustrate the range of data.

## 2.4 Data Interpretation

Generally, the profiles of the response offer quantitative information about the character of a conductor; specifically its depth, dip, and conductance. The colour contour plot provides a quick, qualitative sense of the location and intensity of the conductor as well as a good measure of its strike.

To make determinations about the depth and dip of a conductor, X component profiles were analyzed using a variety of methods. The anomaly only appears in the late-time response of the X and Z components with a very broad peak. The anomaly on all the X profiles implies that the conducter is steeply deeping and is deeply burried. To get an apporximate depth, a half-width calculation was performed. The data was forward modeled with the MOTEM software. This software treats the anomaly as a thin conducting plate in a resistive half-space. The program produces a model data set from different configurations and properties of the thin conducting plate. Variables are adjusted until the forward modelled data mimics the real world data. This would then be considered to be the thin conducting plate model for the real world data set.

# 3. TRANSIENT ELECTROMAGNETIC RESULTS

## 3.1 General

The results from the surface TEM survey are shown, as profiles, in Figures 3 through 12 of the Appendix. The profiles include all the gates for each line. A contour plot of gate 16 is presented in Figure 13. The data displays a normal half-space decay over the survey lines for gates 1 to 15 on each component. On gates 16-20, there is a broad high on the X component and a cross-over on the Z component centred over each line.

.

## 3.2 Discussion

The half-space decay of the early time gates for each component, in Figures 3 to 12, indicate that there are no strong shallow conductors present at the Hyland Main Zone. This may be due to a lack of inter-connectivity of the sulphides in the shallower region of the zone. At greater depth, the presence of a peak in the late-time X component and the cross-over in the late-time Z component is seen. This response is characteristic of a deep, steeply dipping conductor. The calculated depth to the top of this conductor is approximately 150 metres.

The results from the X component high on gate 16 were plotted as a contour plan in Figure 13. This plot shows the anomaly's approximate strike and displays the contrast between the observed measurements over the anomaly and the background. The zone trends approximately north-south. It closely matches the surface trace of the surface mineralisation near line 300S and diverges somewhat to the west of the surface mineralisation in the northern survey lines.

Using the calculated depth to the conductor from the half-width calculation (150m), the zone was forwarded modelled with the plate model program MOTEM. Using this program, the strike of the anomaly was determined to be approximately 9 degrees, bounded by the contour plot. Due to non-uniqueness and the conductivity-thickness product nature of the response, the thickness or conductivity of the model cannot be determined. Based on the modelled depth and strike, a 3-dimensional representation of the thin plate under the survey area topography was created and is shown in Figure 14. For direct reference, the contour plot was overlaid on the topography.

## 4. LIMITATIONS

Transient electromagnetic (EM) surveys are successful providing adequate contrasts exist in the subsurface in electrical conductivity between distinct geological materials. Also affecting conductivity are the degree of saturation of materials and the porosity, the concentration of dissolved electrolytes, the temperature and the amount and composition of colloids. Conductors identified in TEM surveying are diverse and depending on geological settings, may include mineralisation, graphite, argillite, shear or fault zones, clay beds, saturated materials, clay shale, clay till, mineralized leachate and zones of salt water intrusion.

Transient EM and other electromagnetic techniques have limitations for detecting thin resistive strata. Transient EM methods excel at mapping conductive targets. In deep surveys, large transmitter moments are required to produce sufficiently large signals at depth. Penetration depths may be affected by the presence of highly conductive surficial materials that may partially mask deeper geological layering. Man-made structures such as pipes, fences and power lines can have a significant influence on transient electromagnetic measurements.

The results are interpretive in nature and are considered to be a reasonably accurate representation of existing subsurface conditions within the limitations of the transient electromagnetic survey method.

For: Frontier Geosciences Inc.

Braden Adams, B. Sc.

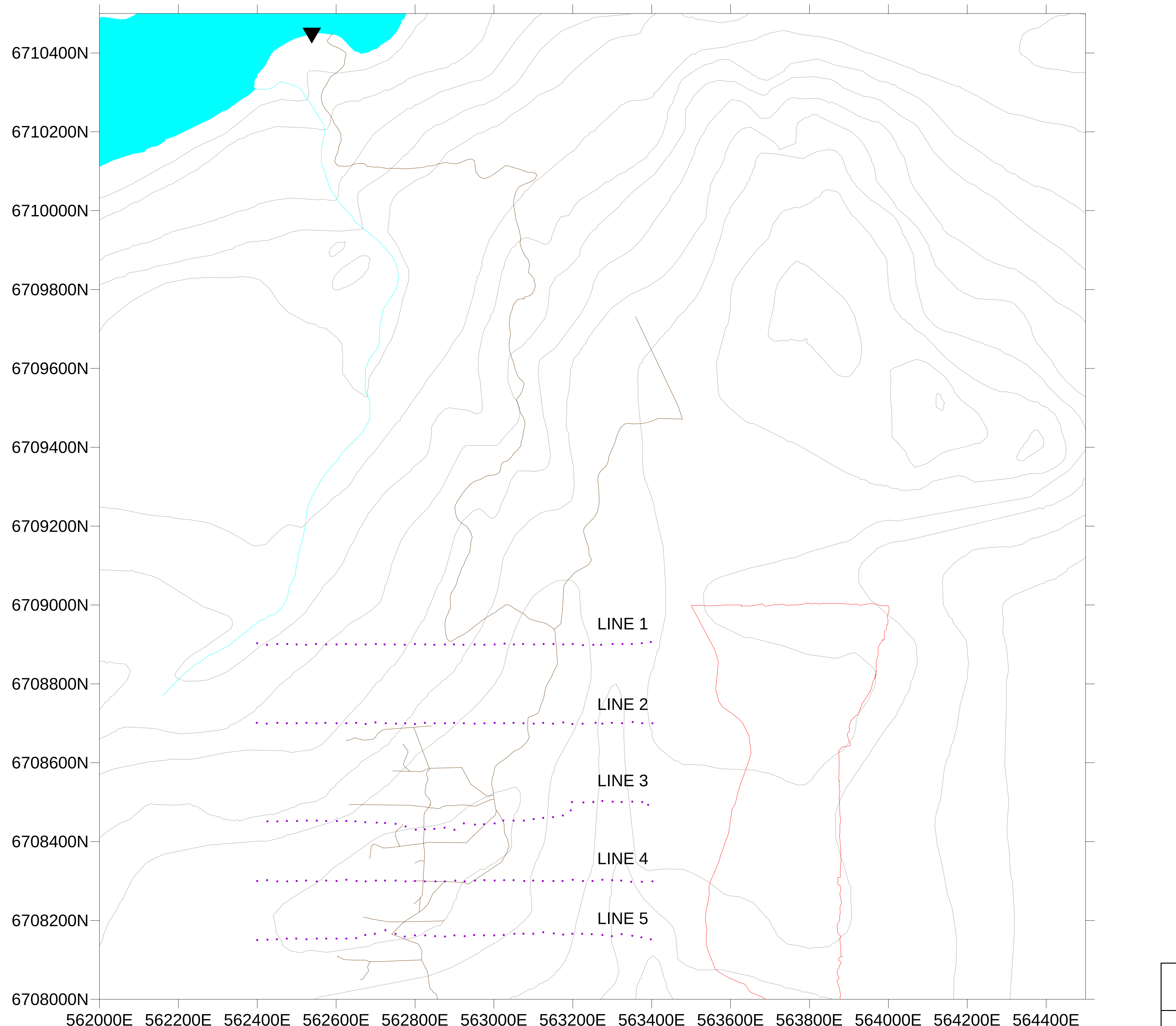
Cliff Candy, P.Geo.

## 5. TEM TECHNICAL NOTES

| | | |
|---|---|---|
| Measured Quantity | : | Time rate of decay of magnetic flux along 3 axes |
| Sensors 1. (L.F.) | : | Air-cored coil of bandwidth 60 kHz; 100 cm diameter |
| 2. (H.F.) | : | Air-cored coil of bandwidth 700 kHz; 61 cm diameter |
| 3. (3D-3) | : | Three orthogonal component sensor; simultaneous operation |
| 4. (3D-1) | : | Three orthogonal component sensor; sequential operation |
| 5. (H.F. 3D) | : | High frequency three orthogonal component sensor |
| Time Channels | : | 20 or 30 geometrically spaced time gates for each base frequency gives range from 6 µs to 800 ms |
| Repetition Rate (Base Frequency) | : | 0.3 Hz, 0.75 Hz, 3 Hz, 7.5 Hz, 30 Hz, 75 Hz or 285 Hz for countries using 60 Hz power line frequency. 0.25 Hz, 0.625 Hz, 2.5 Hz, 6.25 Hz, 25 Hz, 62.5 Hz or 237.5 Hz for countries using 50 Hz power line frequency. |
| Synchronization | : | (1) Reference cable<br>(2) High stability quartz crystal (optional) |
| Integration Time | : | 0.25, 2, 4, 8, 15, 30, 60, 120, sec |
| Calibration | : | Internal self calibration<br>External Q coil calibration (optional) |
| Keyboards | : | Two 3 x 4 matrix sealed key pads with positive tactile feedback |
| Gain | : | Manual control |
| Dynamic Range | : | 29 bits (175 dB) |

| | | |
|---|---|---|
| Display Quantity | : | (1) Table of time rate of decay of magnetic flux (dB/dt)<br>(2) Curve of rate of decay of magnetic flux (dB/dt)<br>(3) Table of apparent resistivity ($\rho_a$)<br>(4) Curve of apparent resistivity ($\rho_a$)<br>(5) Profile of dB/dt<br>(6) Real time noise monitor<br>(7) Calibration curve<br>(8) Data acquisition statistics (real time) |
| Storage | : | Solid state memory with capacity for over 3000 data sets<br>Optional: 26 000 data sets |
| Display | : | 8 lines x 40 characters (240 x 64 dot) graphic LCD |
| Data Transfer | : | Standard RS-232 communication port |
| Processor | : | CMOS 68HC000 8 MHz CPU |
| Receiver Battery | : | 12 volts rechargeable battery for 8 hours continuous operation. 6 hours in XTAL mode |
| Receiver Size | : | 34 x 38 x 27 cm |
| Receiver Weight | : | 15 kg (includes battery) |
| Operating Temperature | : | -40°C to +50°C |

Note: The PROTEM Digital Receiver can be used with all five **Geonics** transmitters -
TEM47, TEM57, TEM37, TEM57-MK2, TEM67




100 ft TOPOGRAPHIC INTERVAL

CREEK

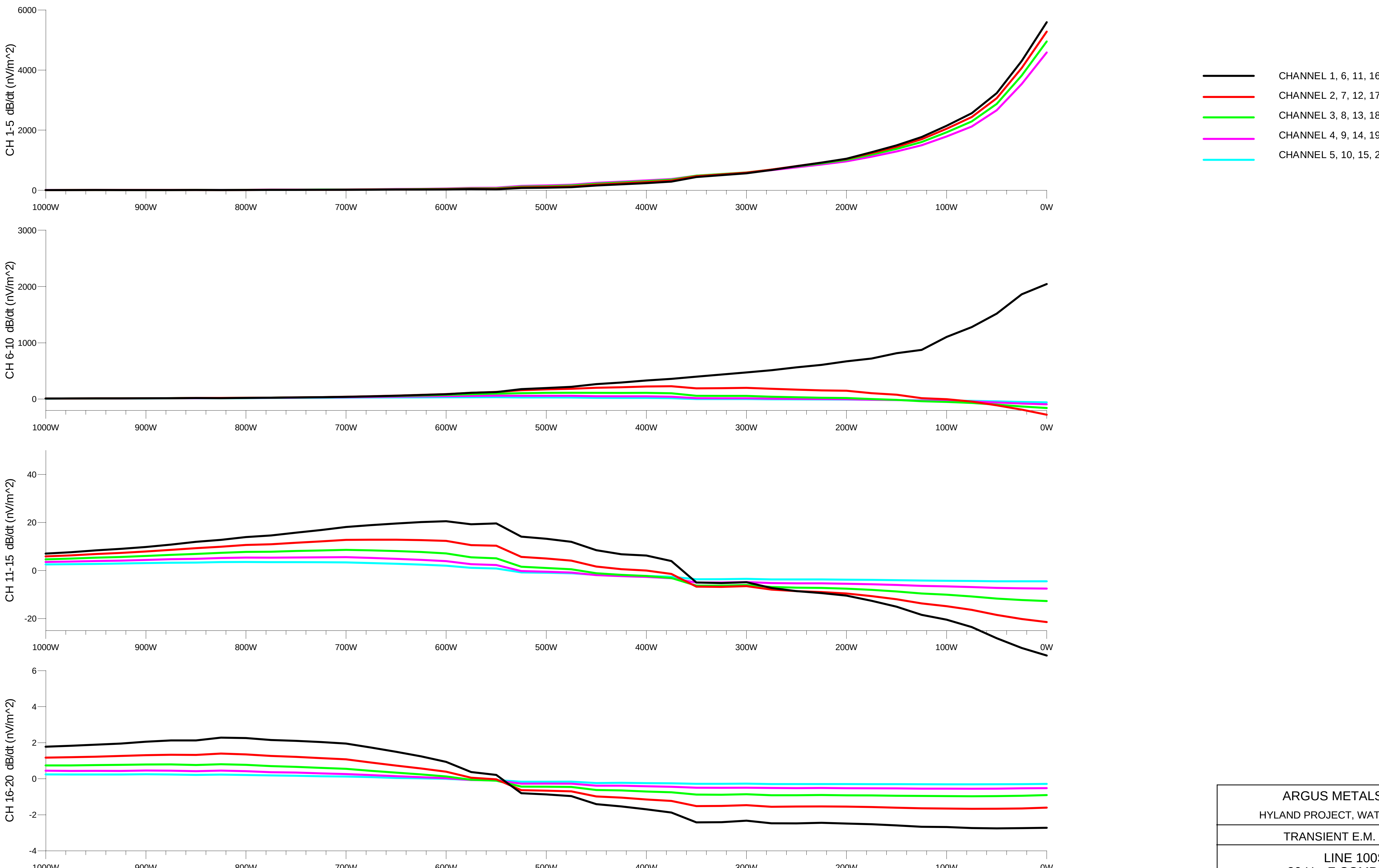
ROAD

CAMP

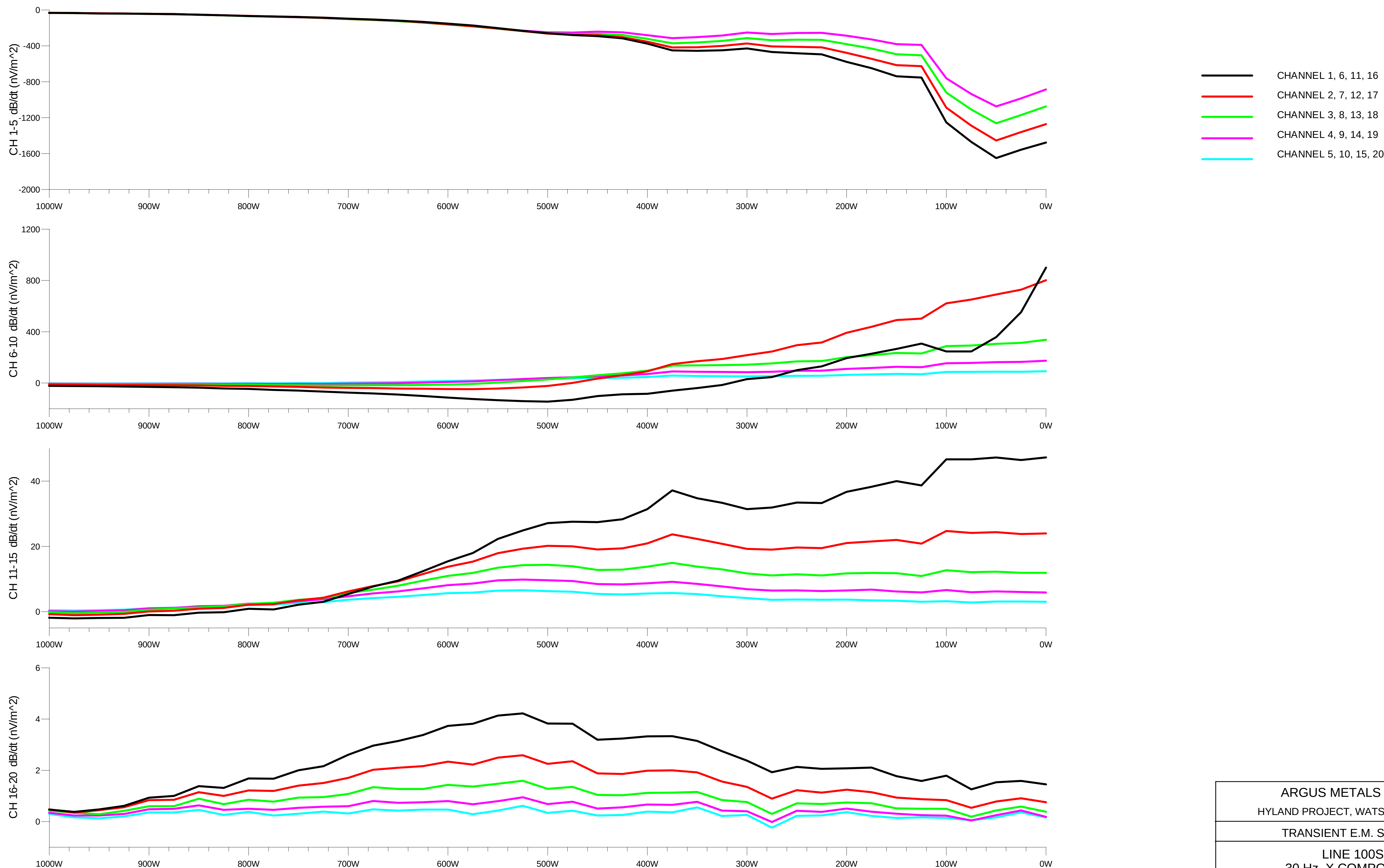
SURVEY LINES

TRANSMITTER LOOP

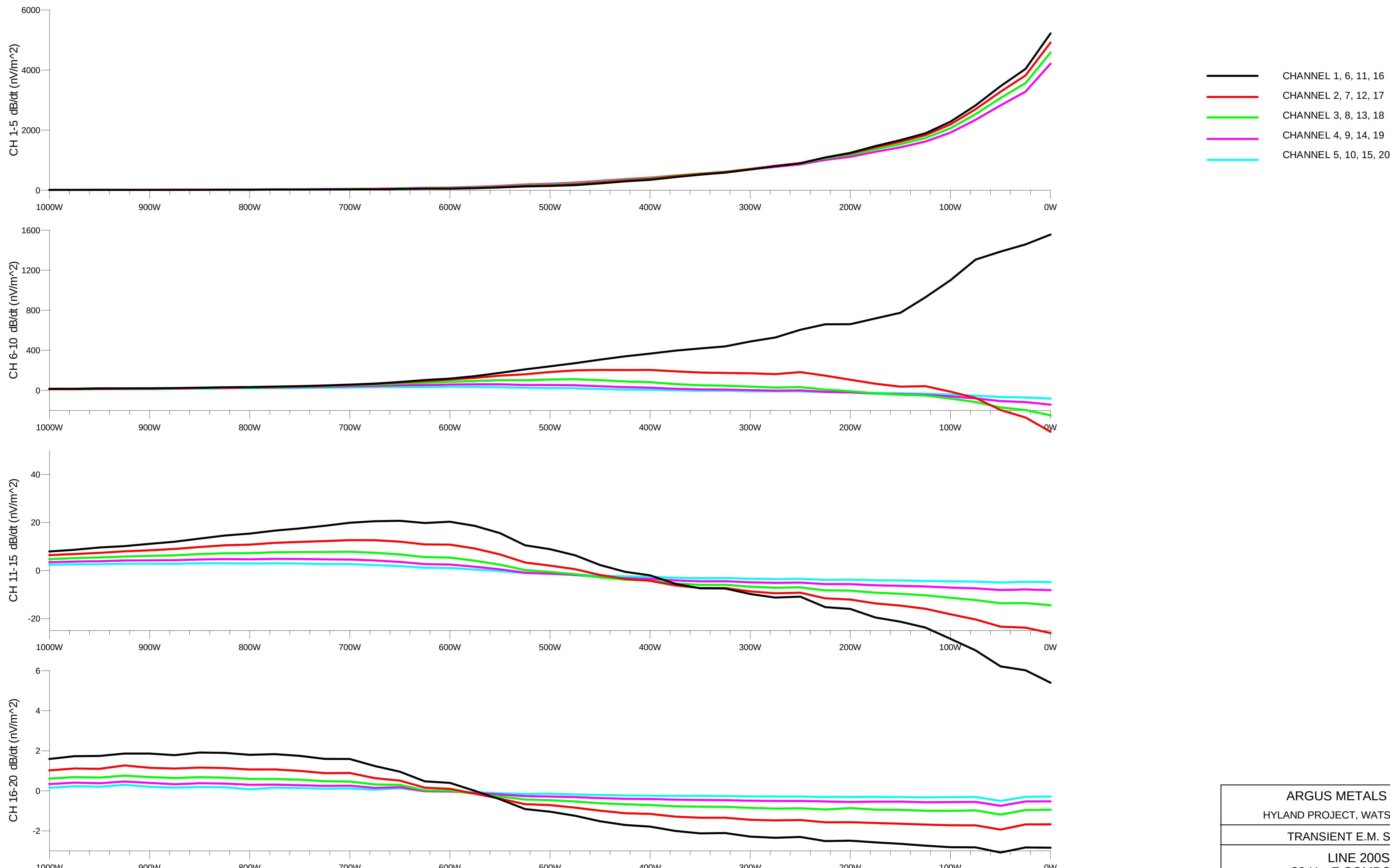
| ARGUS METALS CORP.<br>HYLAND PROJECT, WATSON LAKE, Y.T. | | |
|---|---|---|
| TRANSIENT E.M. SURVEY | | |
| SITE PLAN | | |
| FRONTIER GEOSCIENCES INC. | | |
| DATE: OCT. 2010 | SCALE 1:12,000 | FIG. 2 |



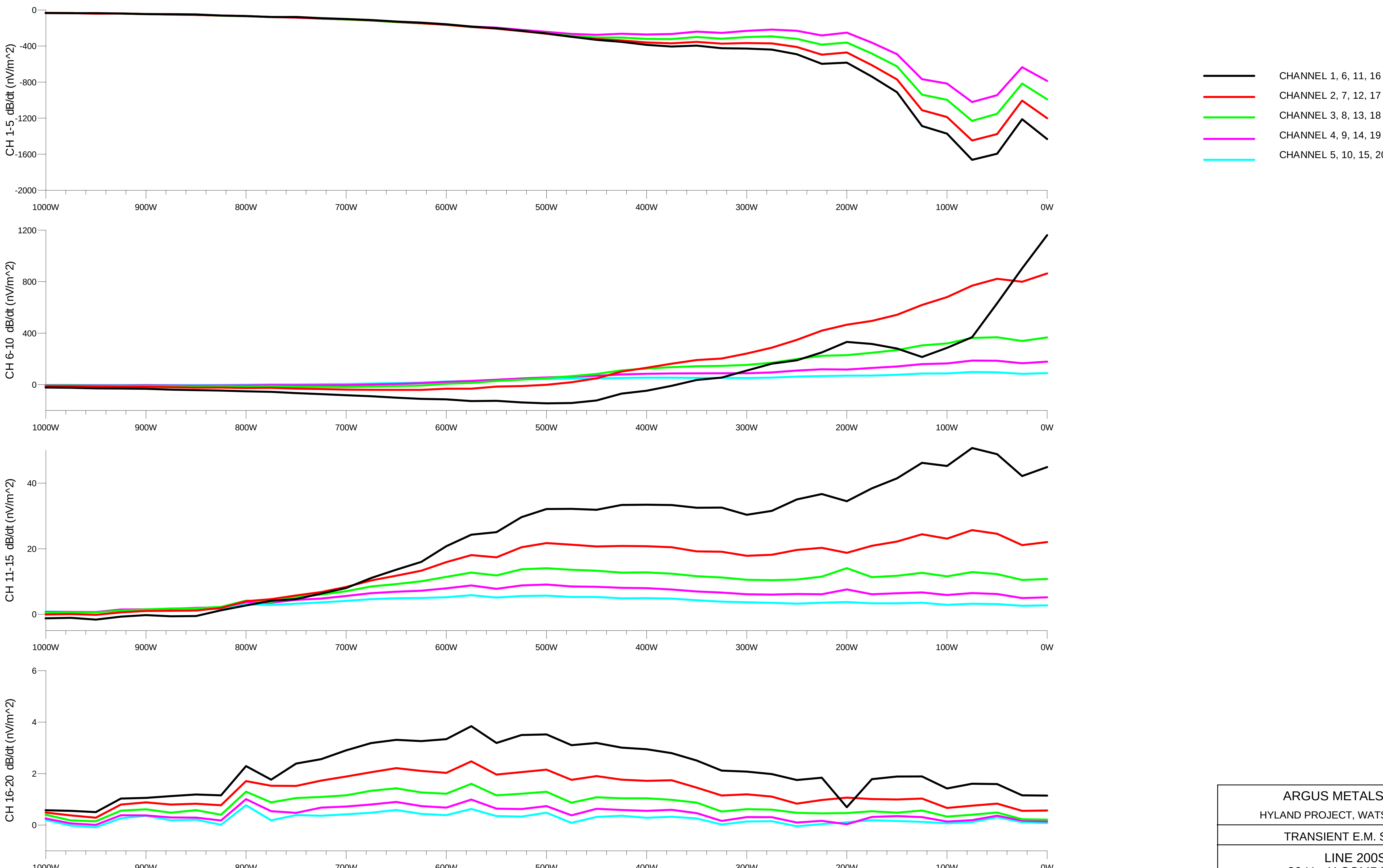

| ARGUS METALS CORP. | | |
|---|---|---|
| HYLAND PROJECT, WATSON LAKE, YK | | |
| TRANSIENT E.M. SURVEY | | |
| LINE 100S<br>30 Hz, Z COMPONENT<br>FIXED LOOP PROFILING | | |
| FRONTIER GEOSCIENCES INC. | | |
| DATE: OCT. 2010 | HScale 1:4,000 | FIG: 3 |




| | | |
|---|---|---|
| ARGUS METALS CORP.<br>HYLAND PROJECT, WATSON LAKE, YK | | |
| TRANSIENT E.M. SURVEY | | |
| LINE 100S<br>30 Hz, X COMPONENT<br>FIXED LOOP PROFILING | | |
| FRONTIER GEOSCIENCES INC. | | |
| DATE: OCT. 2010 | HScale 1:4,000 | FIG: 4 |




| ARGUS METALS CORP. | | |
|---|---|---|
| HYLAND PROJECT, WATSON LAKE, YK | | |
| TRANSIENT E.M. SURVEY | | |
| LINE 200S<br>30 Hz, Z COMPONENT<br>FIXED LOOP PROFILING | | |
| FRONTIER GEOSCIENCES INC. | | |
| DATE: OCT. 2010 | HScale 1:4,000 | FIG: 5 |




ARGUS METALS CORP.

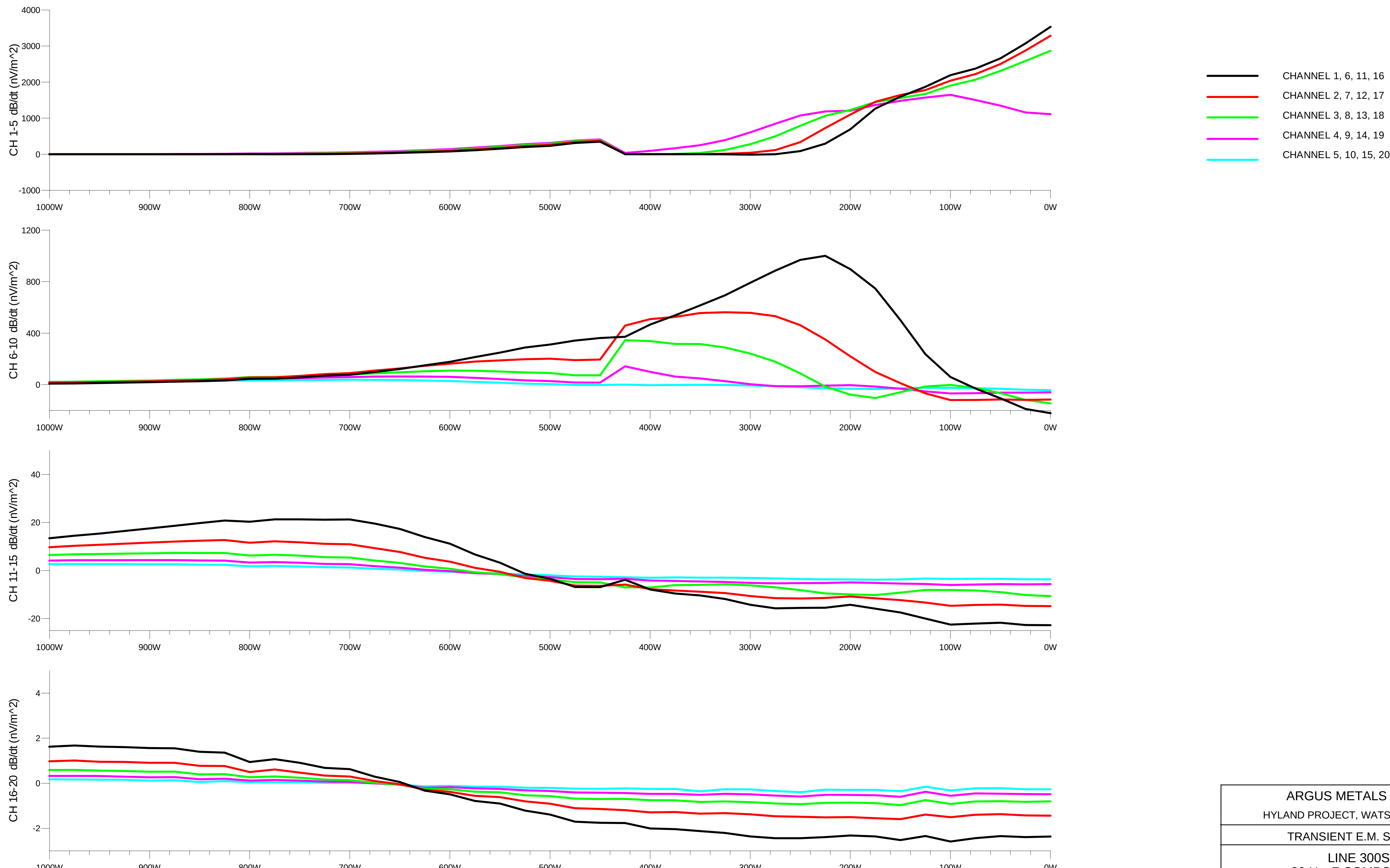
HYLAND PROJECT, WATSON LAKE, YK

TRANSIENT E.M. SURVEY

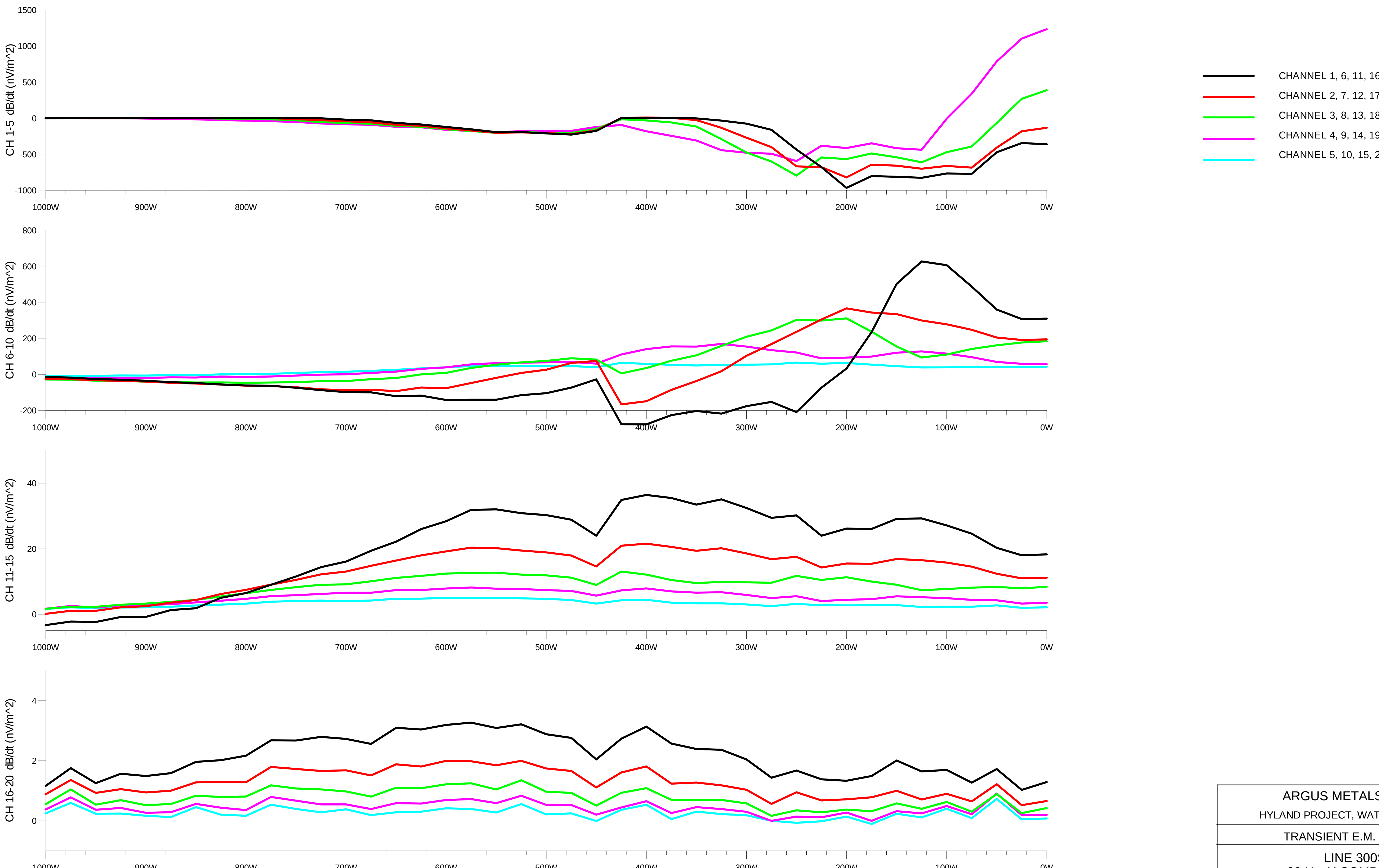
LINE 200S
30 Hz, X COMPONENT
FIXED LOOP PROFILING

FRONTIER GEOSCIENCES INC.

| | | |
|---|---|---|
| DATE: OCT. 2010 | HScale 1:4,000 | FIG: 6 |




| ARGUS METALS CORP.<br>HYLAND PROJECT, WATSON LAKE, YK | | |
|---|---|---|
| TRANSIENT E.M. SURVEY | | |
| LINE 300S<br>30 Hz, Z COMPONENT<br>FIXED LOOP PROFILING | | |
| FRONTIER GEOSCIENCES INC. | | |
| DATE: OCT. 2010 | HScale 1:4,000 | FIG: 7 |




ARGUS METALS CORP.

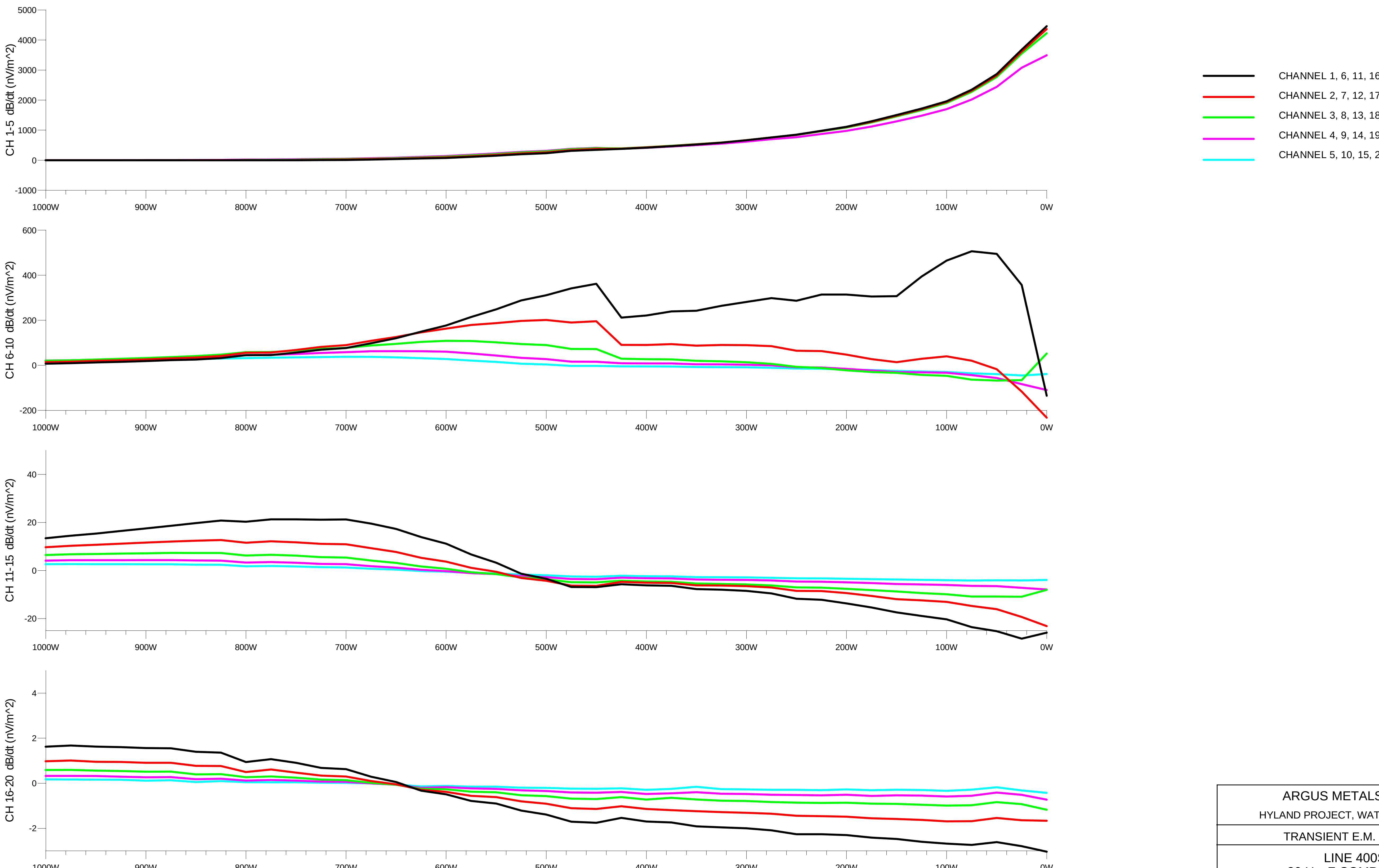
HYLAND PROJECT, WATSON LAKE, YK

TRANSIENT E.M. SURVEY

LINE 300S
30 Hz, X COMPONENT
FIXED LOOP PROFILING

FRONTIER GEOSCIENCES INC.

| | | |
|---|---|---|
| DATE: OCT. 2010 | HScale 1:4,000 | FIG: 8 |




ARGUS METALS CORP.

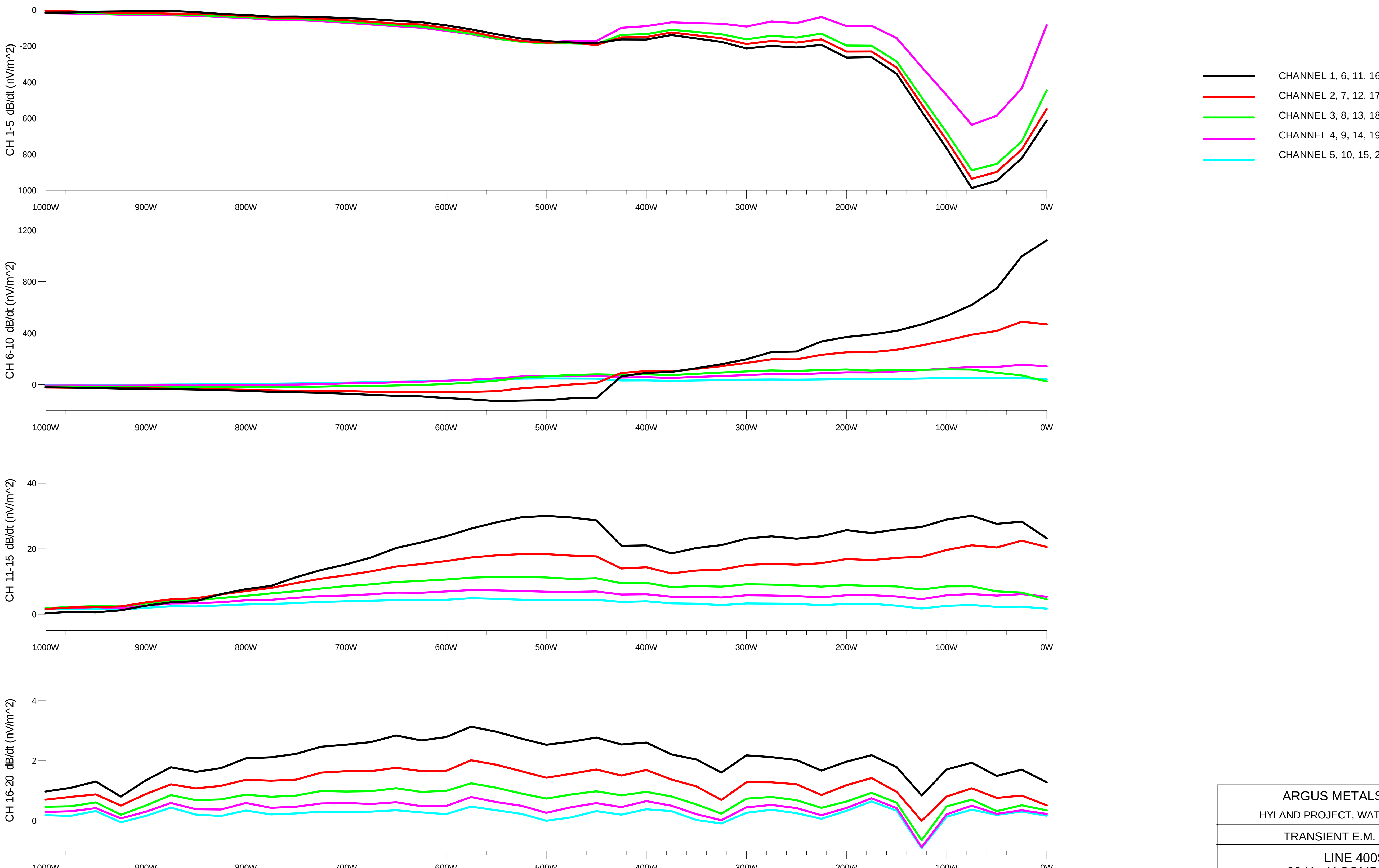
HYLAND PROJECT, WATSON LAKE, YK

TRANSIENT E.M. SURVEY

LINE 400S
30 Hz, Z COMPONENT
FIXED LOOP PROFILING

FRONTIER GEOSCIENCES INC.

| DATE: OCT. 2010 | HScale 1:4,000 | FIG: 9 |
|---|---|---|




ARGUS METALS CORP.

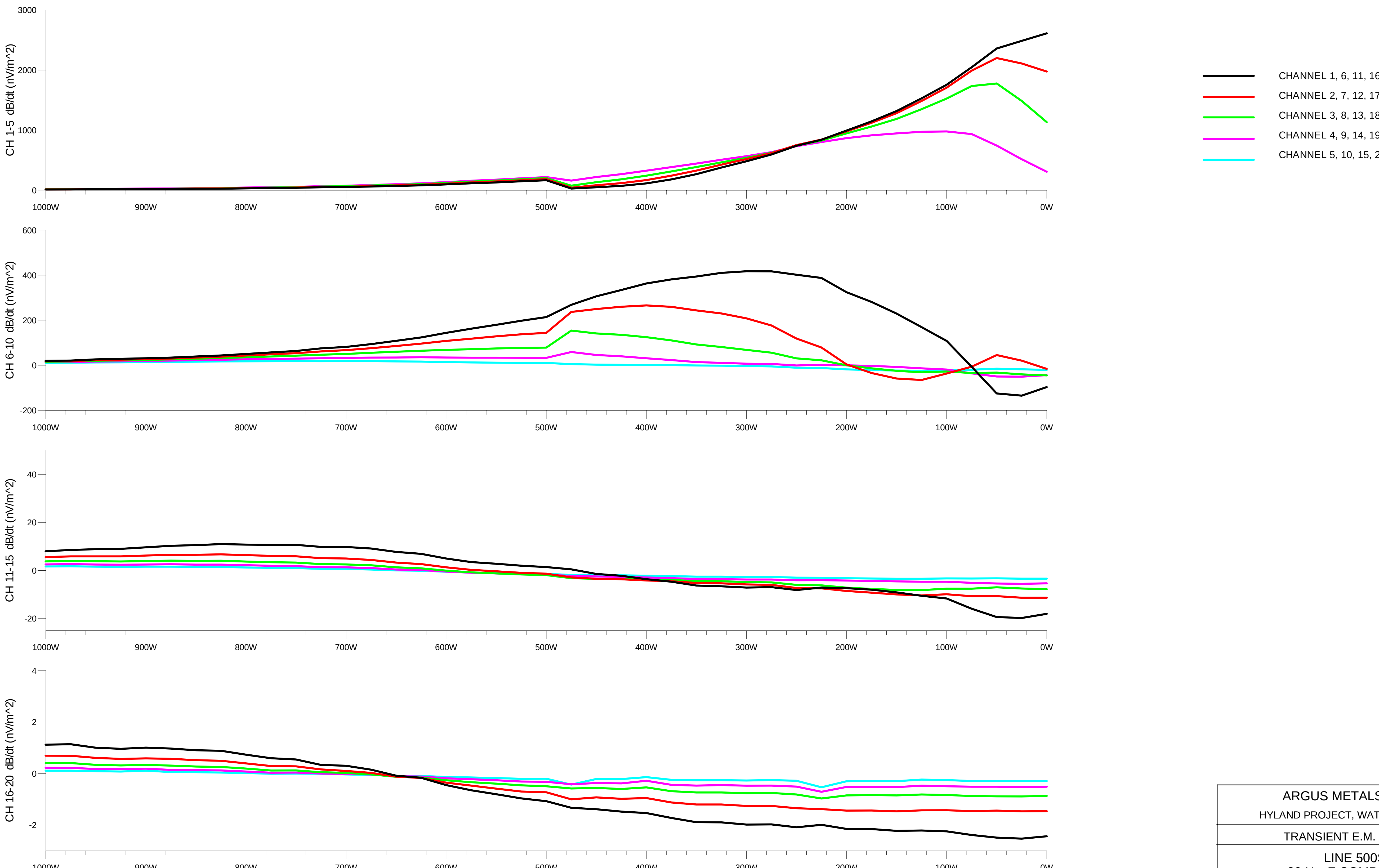
HYLAND PROJECT, WATSON LAKE, YK

TRANSIENT E.M. SURVEY

LINE 400S
30 Hz, X COMPONENT
FIXED LOOP PROFILING

FRONTIER GEOSCIENCES INC.

| DATE: OCT. 2010 | HScale 1:4,000 | FIG: 10 |
|---|---|---|




ARGUS METALS CORP.

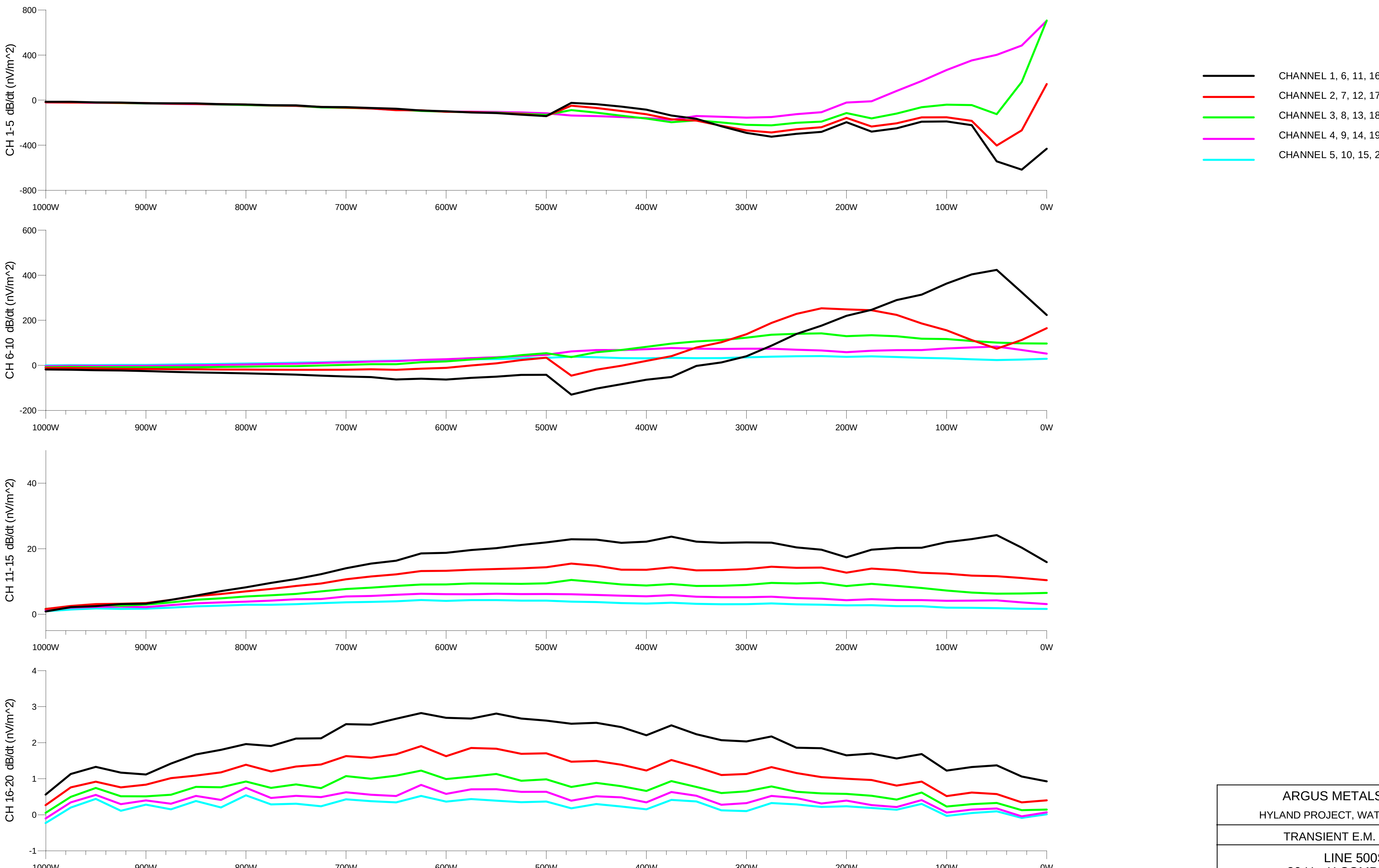
HYLAND PROJECT, WATSON LAKE, YK

TRANSIENT E.M. SURVEY

LINE 500S
30 Hz, Z COMPONENT
FIXED LOOP PROFILING

FRONTIER GEOSCIENCES INC.

| DATE: OCT. 2010 | HScale 1:4,000 | FIG: 11 |
|---|---|---|




ARGUS METALS CORP.

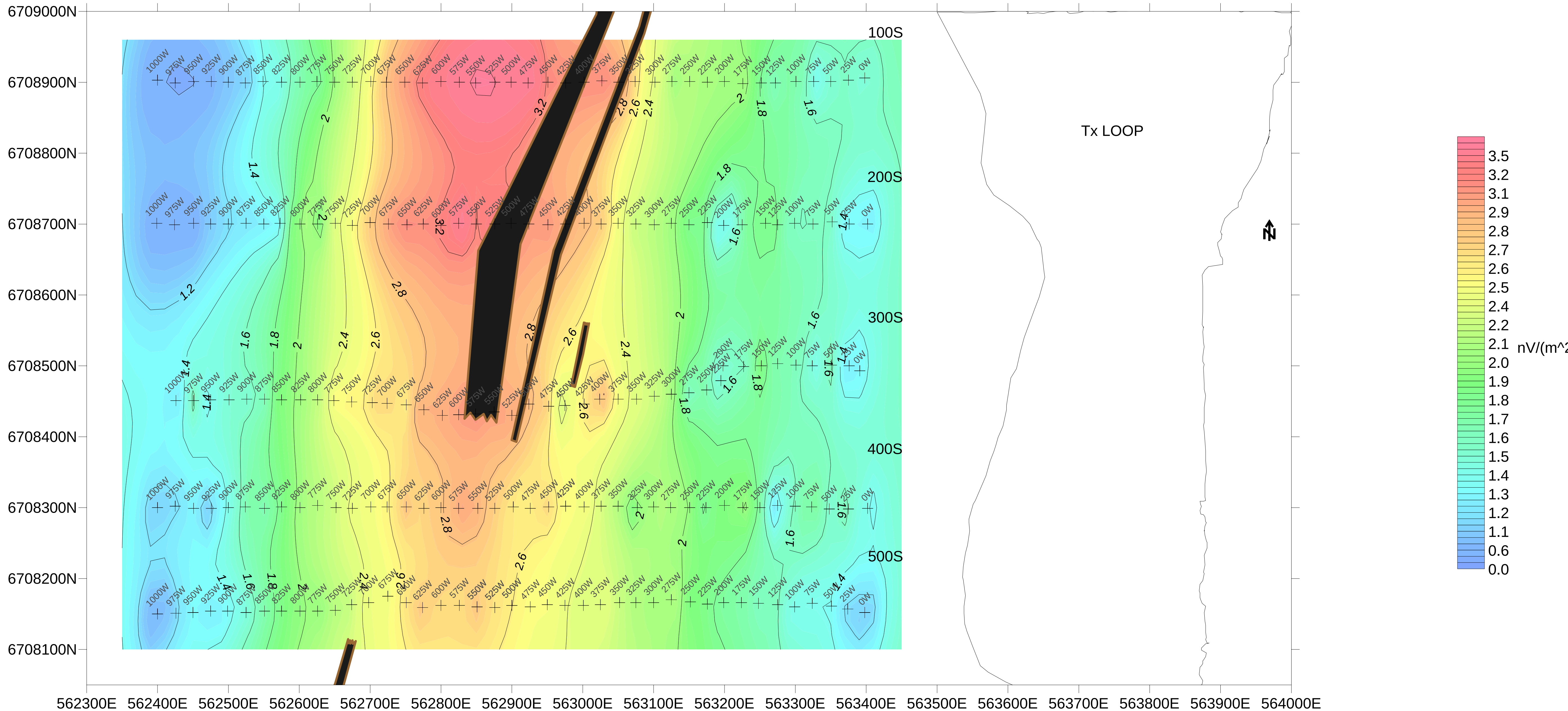
HYLAND PROJECT, WATSON LAKE, YK

TRANSIENT E.M. SURVEY

LINE 500S
30 Hz, X COMPONENT
FIXED LOOP PROFILING

FRONTIER GEOSCIENCES INC.

| DATE: OCT. 2010 | HScale 1:4,000 | FIG: 12 |
|---|---|---|




NOTE: DATUM NAD83

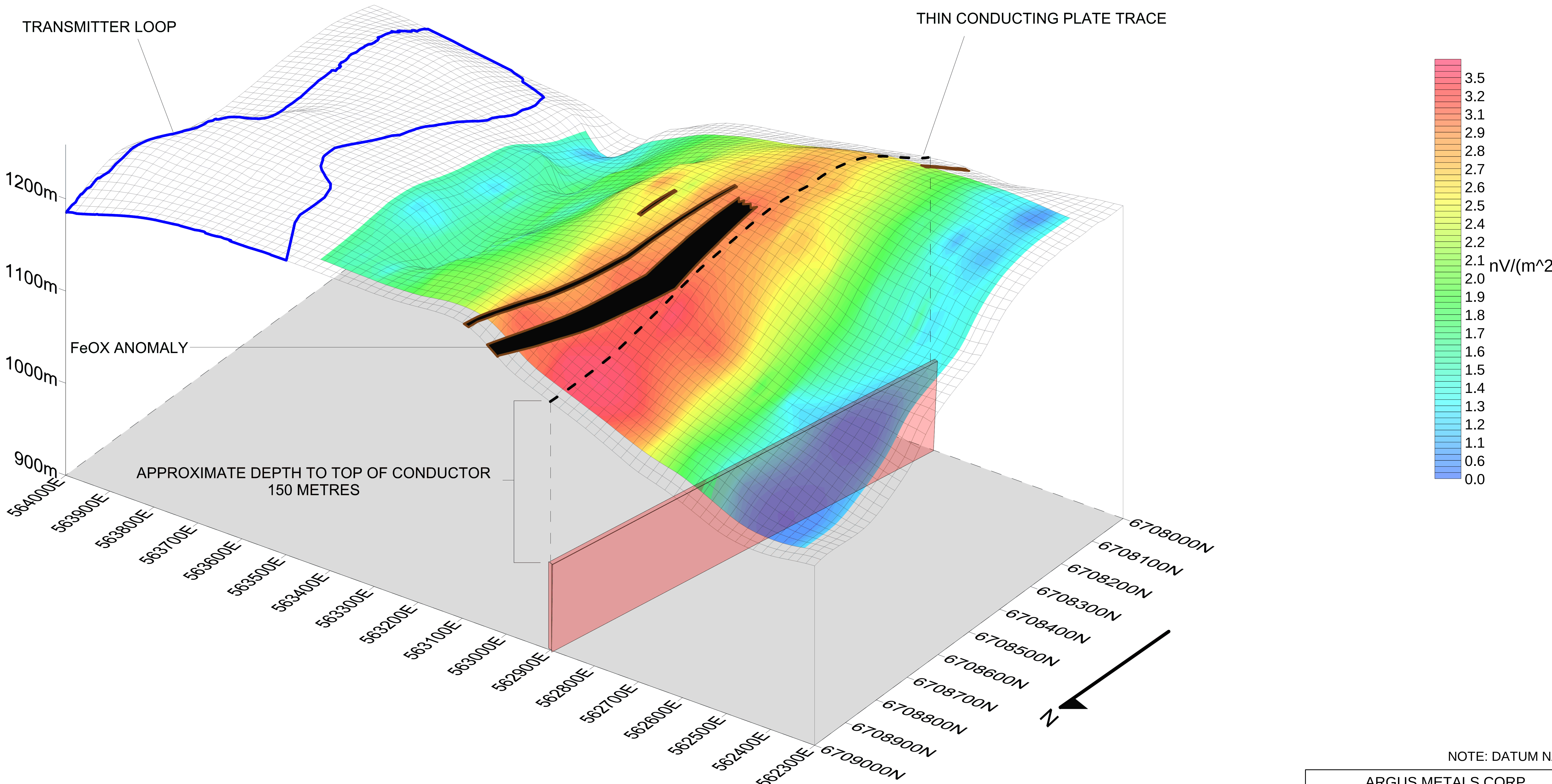
ARGUS METALS CORP.
HYLAND PROJECT, WATSON LAKE, Y.T.

TRANSIENT E.M. SURVEY

30 Hz, X COMPONENT
FIXED LOOP PROFILING
CONTOUR PLAN

FRONTIER GEOSCIENCES INC.

| DATE: OCT. 2010 | SCALE 1:2,500 | FIG. 13 |
|---|---|---|




NOTE: DATUM NAD83

ARGUS METALS CORP.
HYLAND PROJECT, WATSON LAKE, Y.T.

TRANSIENT E.M. SURVEY

30 Hz, X COMPONENT
FIXED LOOP PROFILING
3D THIN CONDUCTING PLATE

FRONTIER GEOSCIENCES INC.

2:1 VERTICAL EXAGGERATION

| DATE: OCT. 2010 | HSCALE 1:8000 | FIG. 14 |
|---|---|---|