Geophysical Survey Report
ADR survey
Zone 5-8 and Zone 13-14 – Raglan Mine Quebec
Project 00168
Raglan Mine, a Glencore Company

Report prepared by: Alan Goodwin (Adrok Canada), Daryl Ball (Raglan Mine), with appendices by Dr David Limmer, Michael Robinson (Adrok Ltd)

On behalf of: Raglan Mine; a Glencore Company

Date: 12th April 2017

Version 1

Adrok

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INTRODUCTION

An atomic dielectric resonance survey was completed at Raglan Mine during the summer of 2015. The logistical details of the survey are outlined in a report submitted by the contractor and attached to this report as Appendix 1 & 2.

The survey was completed in order to determine the capability of the system to detect Ni sulphide lens within the Raglan ultramafic complex. In order to resolve these discrete features, the first step of the interpretation process is to compare results to known Ni sulphide occurrences.

SIMPLE EXPLANATION OF ADR TECHNOLOGY

ADR technology uses electromagnetic radiation. Electromagnetic radiation is composed of particles of energy called photons travelling in waves at the speed of light. The electromagnetic spectrum increases in wavelength from the shortest gamma rays (which have wavelengths that are fractions of the size of atoms) through x-rays, ultraviolet light, visible light (which we can see), infra-red light, microwaves, short wave radio waves and then to the longest wave radio waves (which can theoretically be as long as the universe).

Conventional science says that electromagnetic energy can only penetrate solid ground to a depth of centimetres to a few metres (depending on wavelength). So, in the 1980s, when carrying out experiments with the European Space Agency transmitting X-band radar at a beach in Scotland (the penetration was predicted to be in millimetres), Dr Colin Stove was surprised to find that he was imaging the water table and a buried pipeline several metres below the surface of the beach.

Puzzled by this very unexpected effect, Dr Stove's follow-up research showed that because he was using a polarised transmission at a low power in a directional beam, the radiation he was transmitting was "trickling" into a standing wave, which acted like an electromagnetic drill, working its way past matter by making the atoms in its path 'resonate with' rather than 'absorb' the radiation.

Research into QED and the dielectric effects of matter on energy produced a patent for the process, christened Atomic Dielectric Resonance (ADR) in 1999, and since then the principles of ADR, using focused polarised low energy radar waves have been proved at ever deeper depths. ADROK has also developed a classification library that allows it to identify the chemical composition of target structures.

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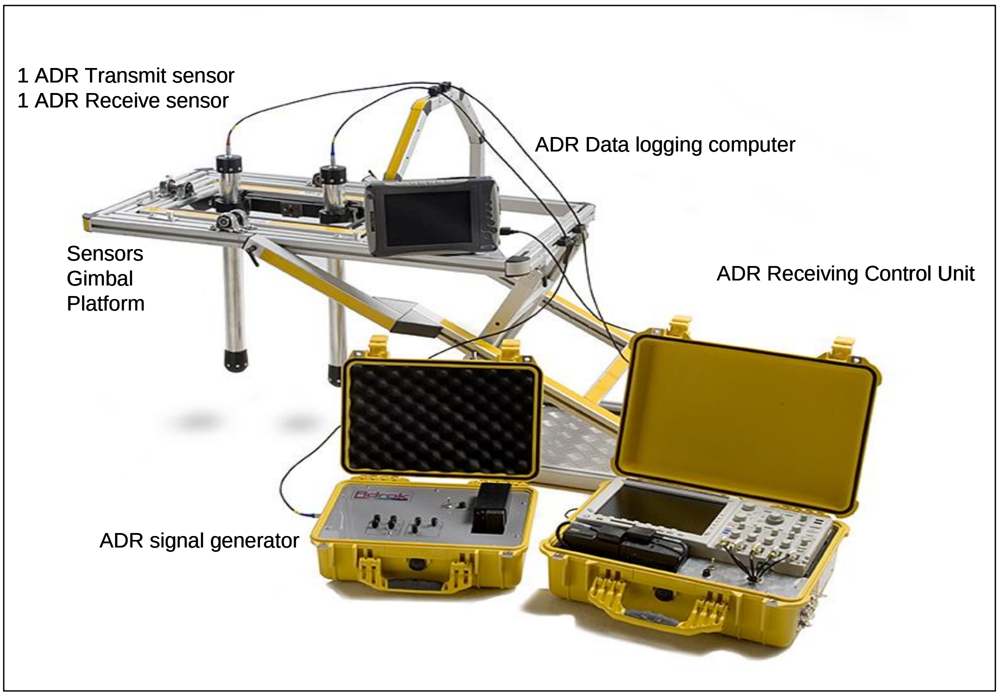
Where a Virtual Borehole generates data which doesn't fit existing ADROK library patterns, it is necessary to benchmark a survey against a known hole log, as was the case with these surveys.

ADROK's technology centres on the ADR Scanner. The ADR Scanner conditions and transmits wide bands of collimated radio-wave EM energy. The transmitted energy, rather than being rapidly absorbed like unconditioned electromagnetic waves, passes through most materials, and as it travels it causes the electrons it strikes to resonate in a characteristic manner. This resonance releases energy which is transmitted in part back to the surface detector. Here the resonant energy is analysed and compared with a library of known patterns, to give a material classification that resembles a Borehole Log, showing lithology by depth. Depths are classified according to a time base just as in a radar scan – the longer the return time of an "echo", the deeper the target.

In addition to its capability to detect materials and image with precision, the ADR Scanner has other advantages. The energy employed is very low (less than a few milli-watts), and the waves generated are non-destructive, so there is no detectible chemical or biological change in the materials under investigation. The equipment itself is light, compact and readily transportable, fitting into a handful of robust cases weighing a total of approx. 200 Kgs. Power supply is a simple sealed 12v battery. ADROK's Virtual Borehole provides stratigraphy, rock characteristics, and actual rock petrography, all without drilling.

ATOMIC DIELECTRIC RESONANCE (ADR) SCANNER

Adrok's ADR field equipment used for data acquisition at the Raglan Mine site was as follows:



The ADR signal generator produces a pulse of energy that is fed to the transmitting antenna. The transmitting antenna conditions the signal for propagation into the ground. Once the signal has been sent to the transmitting antenna a trigger signal is sent to the receiving control unit to synchronise collection of the subsurface reflected data which is collected through the receiving antenna from different subsurface layers and structures. The receiving control unit collects the signal from the receiving antenna and converts it into a digital form that can be stored and read on the data logging computer using Adrok's proprietary software suite. The data logged in the field is returned to Adrok's data processing centre in Scotland (United Kingdom) for analysis.

SURVEY CREW

One 3-person data acquisition field service crew was deployed by Adrok for Phase 1 (Data Acquisition). In addition the fieldwork was supervised by the Geological team at Raglan mine.
A 4-person Adrok data processing crew (4 Geoscientists) was utilised for data processing to ensure that multiple V-bore's were processed simultaneously and in a timely manner.

HEALTH, SAFETY, ENVIRONMENT & QUALITY

HSEQ are essential to the planning and execution of all activities and endeavours undertaken by Adrok. The team makes every effort to maintain and improve HSEQ to foster a safer workplace, lessen the impact of the work on the environment and provide exceptional service to customers.

Each team member wears appropriate protective clothing and adheres to a client's health & safety and training requirements. Adrok is registered with Cognibox and the deploying personnel's relevant training and qualification records can be viewed through this media.

Adrok conducts business in a manner that ensures that customer requirements are delivered, while everything possible is done to eliminate or minimize risks to people, property and the environment. The success of Adrok is directly connected to the satisfaction of our customers. Adrok is ISO 9001:2015 registered and accredited.

Certification No. 188208

SURVEY LOCATION

The Raglan Mine Complex is situated in Northern Quebec (as shown by the blue shaded area at Figure 1). The survey zones were at specific locations within locally designated zones 5-8 & 13-14 (as defined at Figures 2 & 3).

Figure 1: Location of Raglan Property

Figure 2: Zone 5-8

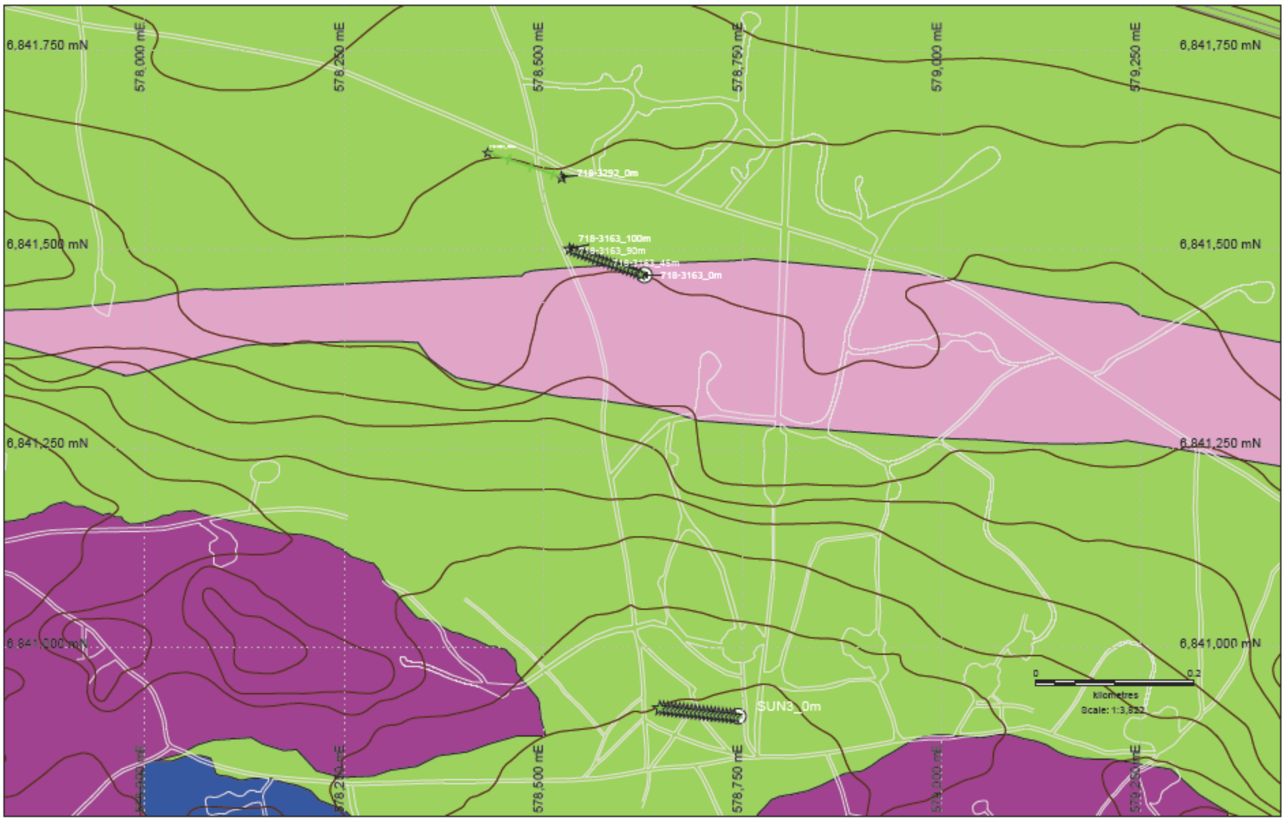


Figure 3: Zone 13-14

GENERAL DISCLAIMER

It is Adrok's understanding that the data and report provided to the client is to be used for the purpose agreed between the parties. That purpose was a significant factor in determining the scope and level of the Services being offered to the Client. Should the purpose for which the data and report is used change, the data and report may no longer be valid or appropriate and any further use of, or reliance upon, the data and report in those circumstances by the Client without Adrok's review and advice shall be at the Client's own and sole risk.

The Services were performed by Adrok exclusively for the purposes of the Client. Should the data and report be made available in whole or part to any third party, and such party relies thereon, that party does so wholly at its own and sole risk and Adrok disclaims any liability to such party.

Where the Services have involved Adrok's use of any information provided by the Client or third parties, upon which Adrok was reasonably entitled to rely, then the Services are limited by the accuracy of such information. Adrok is not liable for any inaccuracies (including any incompleteness) in the said information, save as otherwise provided in the terms of the contract between the Client and Adrok.

CERTIFICATE OF REVIEWER

I, Daryl Ball, do hereby certify that:

1. I am employed as a Senior Geophysicist for the Laval office of Raglan Mine
2. I hold the following academic qualifications: Hons B.Sc. Geophysics (1987), University of Western Ontario, London, Ontario
3. I am a member in good standing of the Ordre de geologues du Quebec (OGQ), member #1759
4. I have worked as a geophysicist for 30 years.
5. I am not independent of the Property that forms the subject of this Report.
6. I have visited the Property and worked directly with the crew that collected this data and prepared this Report.
7. I am not aware of any material fact or material change with respect to the subject matter of the Report that is not reflected in the Report, the omission to disclose which makes the Report misleading.
8. I have review the Report titled “ADR Survey“ dated “12th April 2017“ and prepared for Raglan Mine, a Glencore Company.

Dated this 12th day of April, 2017.

Respectfully submitted

Daryl Ball, geo (#1759)

Appendix 1

Contents

Disclaimer

The results, interpretations and conclusions in this report have been derived from Adrok's electronic system measurements and, whilst reasonable diligence has been applied to ensure data quality, Adrok cannot guarantee the accuracy or correctness of any results, interpretations and conclusions derived from those measurements. As a consequence, Adrok, or any of its directors, officers, employees, advisers and consultants, whether past or present shall not be held liable for any loss, costs, damages or expenses of whatever kind (including any consequential loss, costs, damages or expenses) incurred or sustained by any person with respect to such results, interpretations and conclusions or reliance thereon.

Introduction

This report presents an interpretation of geological boundaries found in the first blind test site SUN3, based on Adrok datasets from two training holes and feedback received from Glencore. If successful this knowledge can be applied to the remaining two blind test sites to aid their interpretation.

Training Results Mean Harmonics

DC, e-logs, weighted mean frequency and correlation analysis at two discrete frequency bands were sent to Glencore for two training sites. The two training sites were 718-3163 which was drilled through an orebody containing ore of grades in excess of 30%, and 718-3192 where no distinct ore body was present, though mineralization in excess of 7% had been identified. Also submitted to Glencore were the average harmonic values for the following properties E_ADR, E_Gamma, E_Mean, E_SD, F_ADR, F_Gamma, F_Mean, F_SD. Total harmonics were submitted at a later date and E_Range was included in this dataset. Feedback was only given on the data submitted 25/9/2015 as shown in the table below:

Parameter	Glencore Comment
E_ADR (average)	Lows mark boundary of ore body
E_Gamma (average)	Peaks mark boundary of ore body
E_Mean (average)	Peak at top of ore body

E_SD (average)	Minimum values in ore body
F_ADR (average)	Minimum values mark sediment contact
F_Gamma (average)	Minimum values mark sediment contact
F_Mean (average)	No correlation
F_SD (average	Minimum values mark sediment contact

Blind test Results Total Harmonics, DC, E-log, WMF, Correlation Analysis

For the blind test V-bore SUN3, Adrok submitted DC, e-logs, weighted mean frequency and the correlation analysis at the same two discrete frequency bands. This time only the total harmonics for the parameters above was submitted.

Unlike the training V-bores, Glencore only specified if there was correlation between the geology and the Adrok data in general term and didn't specify where or how many ore bodies were present. Glencore stated the following for each parameter:

Parameter	Glencore Comment
E_ADR (total)	Minimum shows good correlation
E_Gamma (total)	No obvious correlation
E_Mean (total)	No obvious correlation
E_Range (total)	Maximum values show some correlation
E_SD (total)	Minimum shows some correlation
F_ADR (total)	Minimum shows some correlation
F_Gamma (total)	No obvious correlation
F_Mean (total)	Maximum values show some correlation
F_SD (total)	Maximum values show some correlation
DC	Maximum values show some correlation
E-log	No obvious correlation
WMF	No obvious correlation
Correlation 1-5MHz	Good correlation with geology
Correlation 5-10MHz	Poor correlation with geology

Interpretation

By combining the feedback received from all three V-bores an attempt was made to identify possible ore bodies in SUN3. The first identifying factor was finding a low total E_ADR as correlation was classified as 'good' and then looking at the 1-5MHz correlation coefficients. Four distinct lows in total E_ADR can be seen. These are at 231m, 500m, 630m and 850m. Each of these was checked against the other parameters and the identification of two orebodies built around this. From this two areas of interest either gabbro or orebodies have been identified. These are between 430m and 470m and between 620m and 670m.

The robustness of this interpretation was tested by checking if the parameters noted above are seen in the two training sites. Although there were some discrepancies observed in the 1-5MHz correlation datasets at 718-3292, it was generally found that the gabbro/orebody identifiers that worked well at SUN3 also worked well at the two training sites. Further, while it was noted by Glencore for SUN3 that peaks in total E_Range show 'some correlation' to geology, when total E_Range is plotted against the training data at 718-3163 this corresponds well to the mineral zone (previously E_means were plotted). It was also noted that peaks in total E_Range may be a good indicator of lithological boundaries, this will have to be tested for further blind test sites.

It is also noted that the 1-5MHz correlation value for SUN3 at 650m is 0.7, which is more similar to the correlation high of 0.65 at 600m in 718-3292 compared to the correlation high of 0.83 at 540m in 718-3163. Analyses of further sites will allow us to establish if this correlation high is related to an increased percentage of mineralisation.

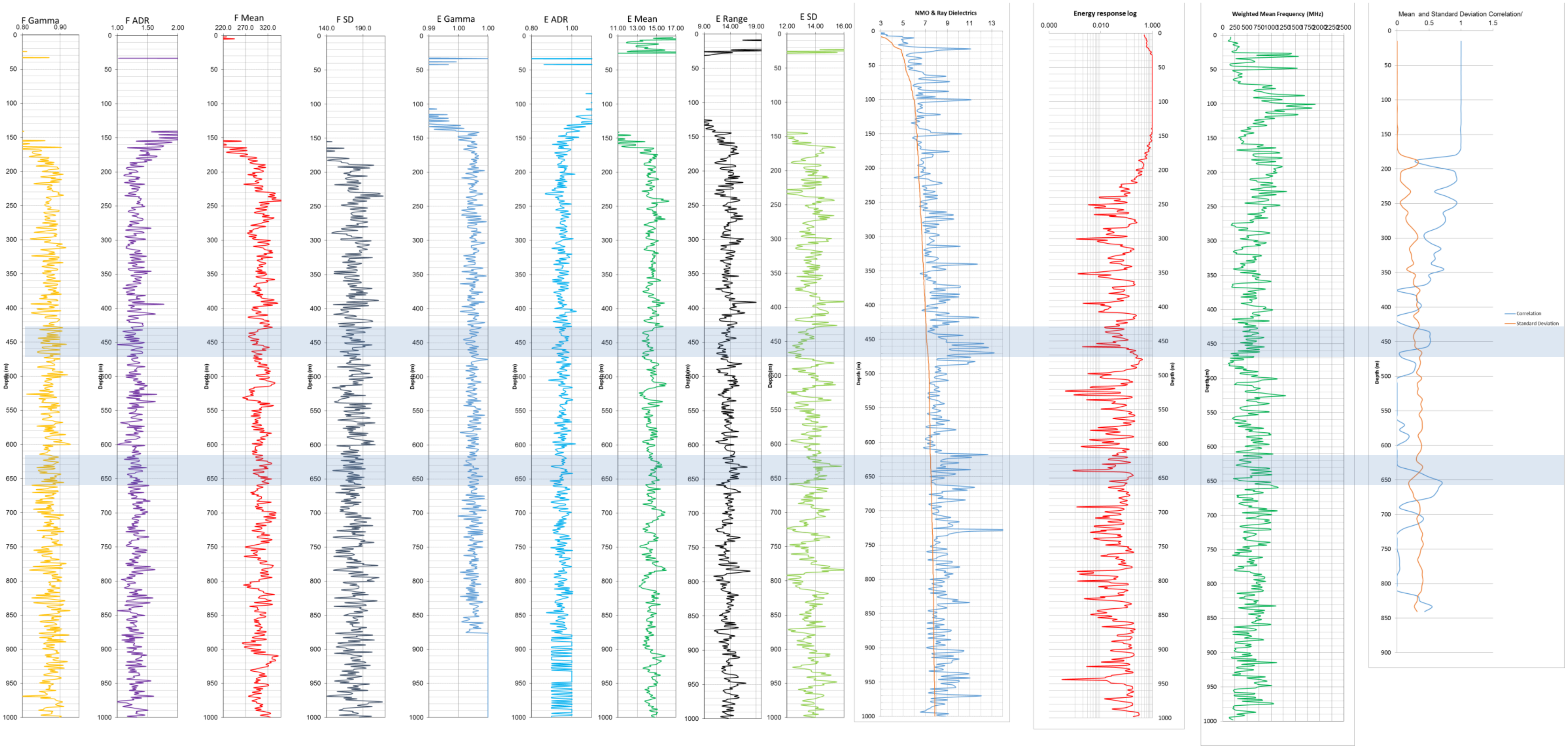


Figure 4: Mean harmonics, dielectric constant, energy log, weighted mean frequency, mean correlation and standard deviation correlations for SUN3

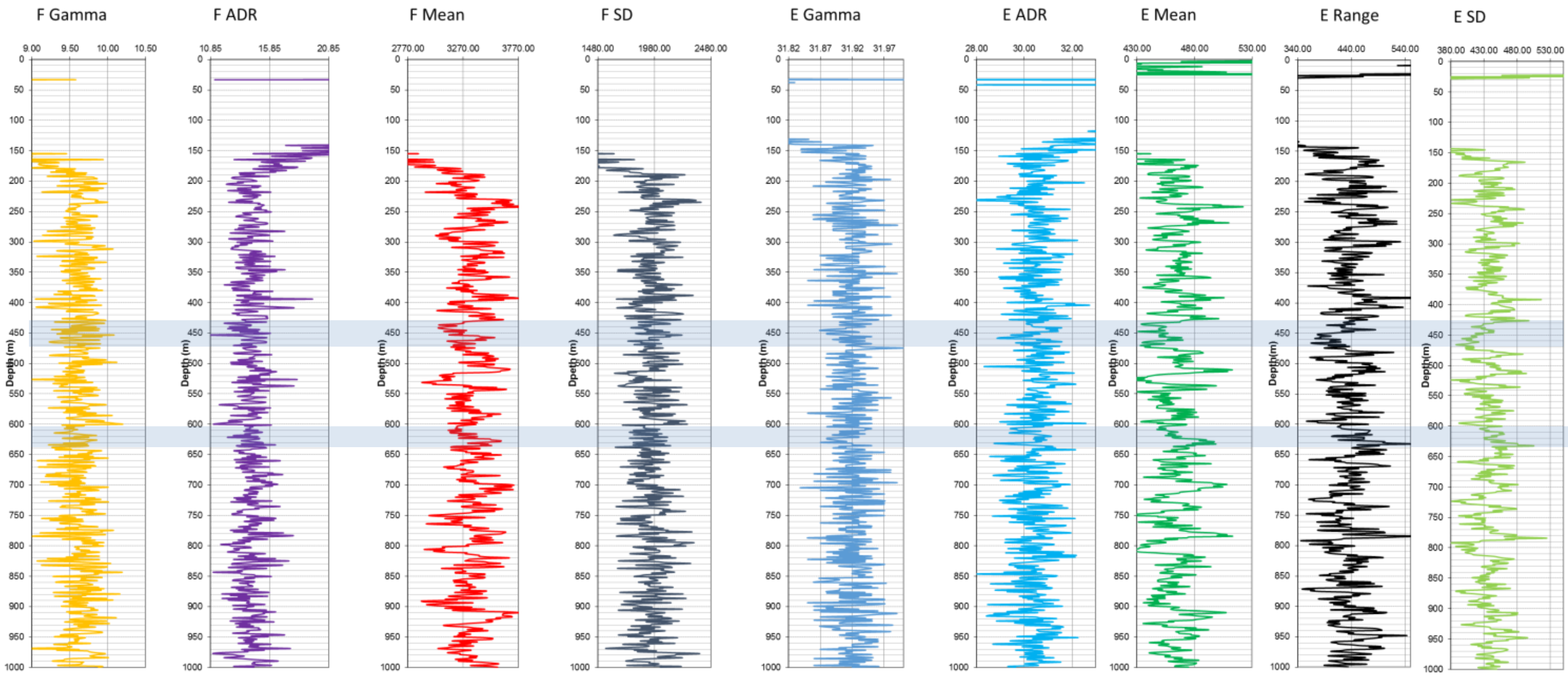


Figure 5 Total harmonics for SUN3 with EADR low clearly visible

Conclusions and Recommendations

Based on training data harmonics, dielectrics and correlation and feedback received from Glencore two areas of interest have been identified at approximately 430m-470m and 620m-670m at blind test site SUN3. From trends seen in the training holes it is believed these could either be gabbro or mineral bodies. The key parameters for the identification were:

- A trough in total E-ADR and total E-Range
- Areas where the correlation coefficient values are greater than the standard deviation.
- A high in dielectrics that is occurs in multiple horizons at close proximity
- Troughs in mean FADR, F-Gamma and F-SD above and below areas where the above three parameters are all present

These rules shall be applied to the further two blind test sites. In conjunction with this, further analyses using either rank matching or spectral line analysis shall be conducted to help generate more knowledge of the subsurface and will aim to identify specific subsurface targets.

Appendix 2

Contents

Disclaimer

The results, interpretations and conclusions in this report have been derived from Adrok's electronic system measurements and, whilst reasonable diligence has been applied to ensure data quality, Adrok cannot guarantee the accuracy or correctness of any results, interpretations and conclusions derived from those measurements. As a consequence, Adrok, or any of its directors, officers, employees, advisers and consultants, whether past or present shall not be held liable for any loss, costs, damages or expenses of whatever kind (including any consequential loss, costs, damages or expenses) incurred or sustained by any person with respect to such results, interpretations and conclusions or reliance thereon.

Introduction

This report presents the results of two further blind test sites; SAT1 and THURS1 using the same basic interpretation method as Adrok's previous report "00168 Adrok Survey Report Interpretation SUN3" (shown at Appendix 1, above).

Previous Feedback Parameters

The following parameters were used for both the two training sites and the blind hole SUN3 to identify areas of interest;

- Troughs in mean and total EADR
- Peaks in mean and total E-Range (training holes suggest the lowest value indicated highest grade of mineralisation)
- Peaks in F-Gamma, F-Mean and F-SD
- Peaks in Dielectric Constant
- Correlation at 1-5Mhz

SAT1 and THURS1 Results

By combining the feedback received from all three V-bores an attempt was made to identify possible ore bodies in SAT1 and THURS1. The first identifying factor was finding a low total E_ADR as correlation was classified as 'good' and the interpretation was based around this. Results of SAT1 for the total harmonics are shown in **Figure 6** and mean harmonics for **Figure 7**. These suggest three broad areas of interest between at 280-310m, 500-530m and 690-730m.

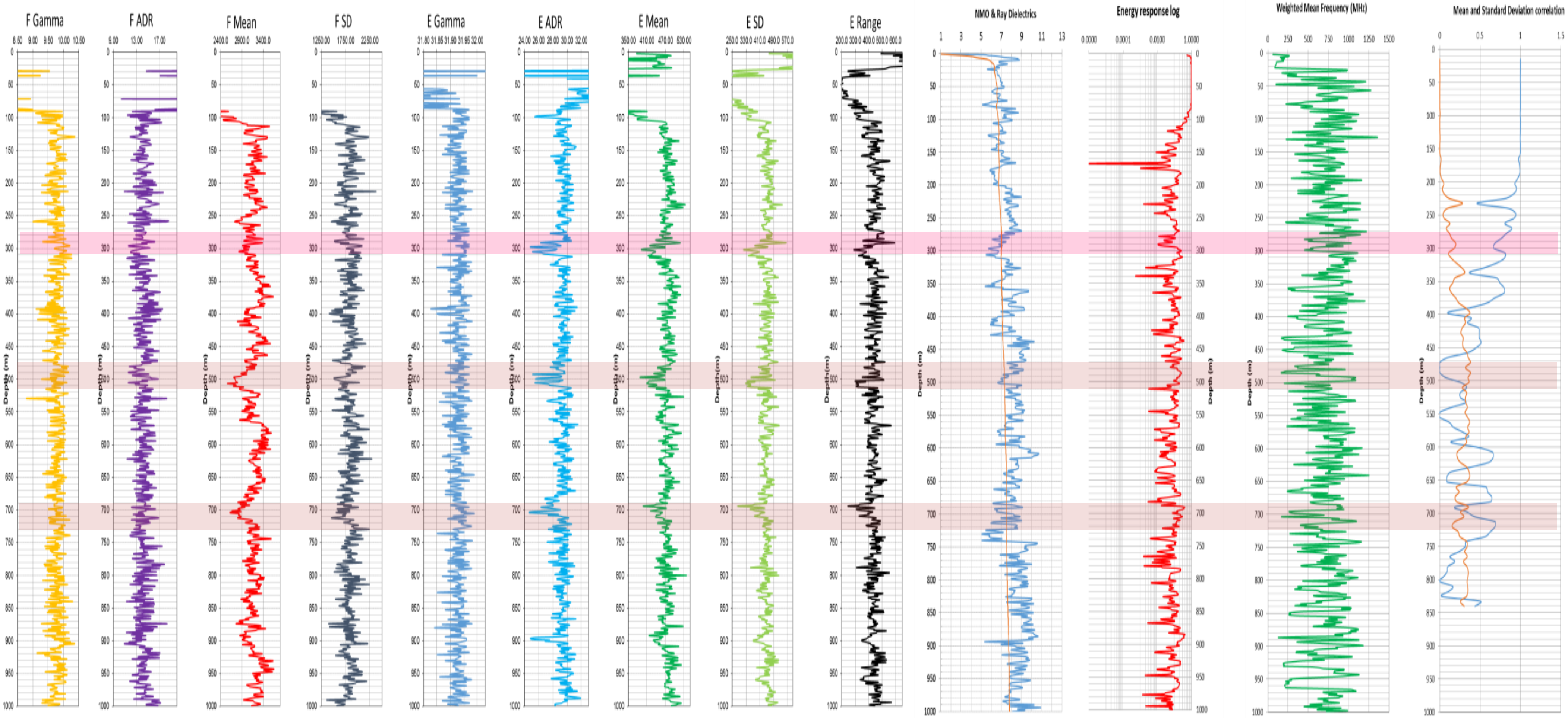


Figure 6: Total harmonics, dielectrics, energy and Weighted mean frequency for SAT1 showing three areas of interest

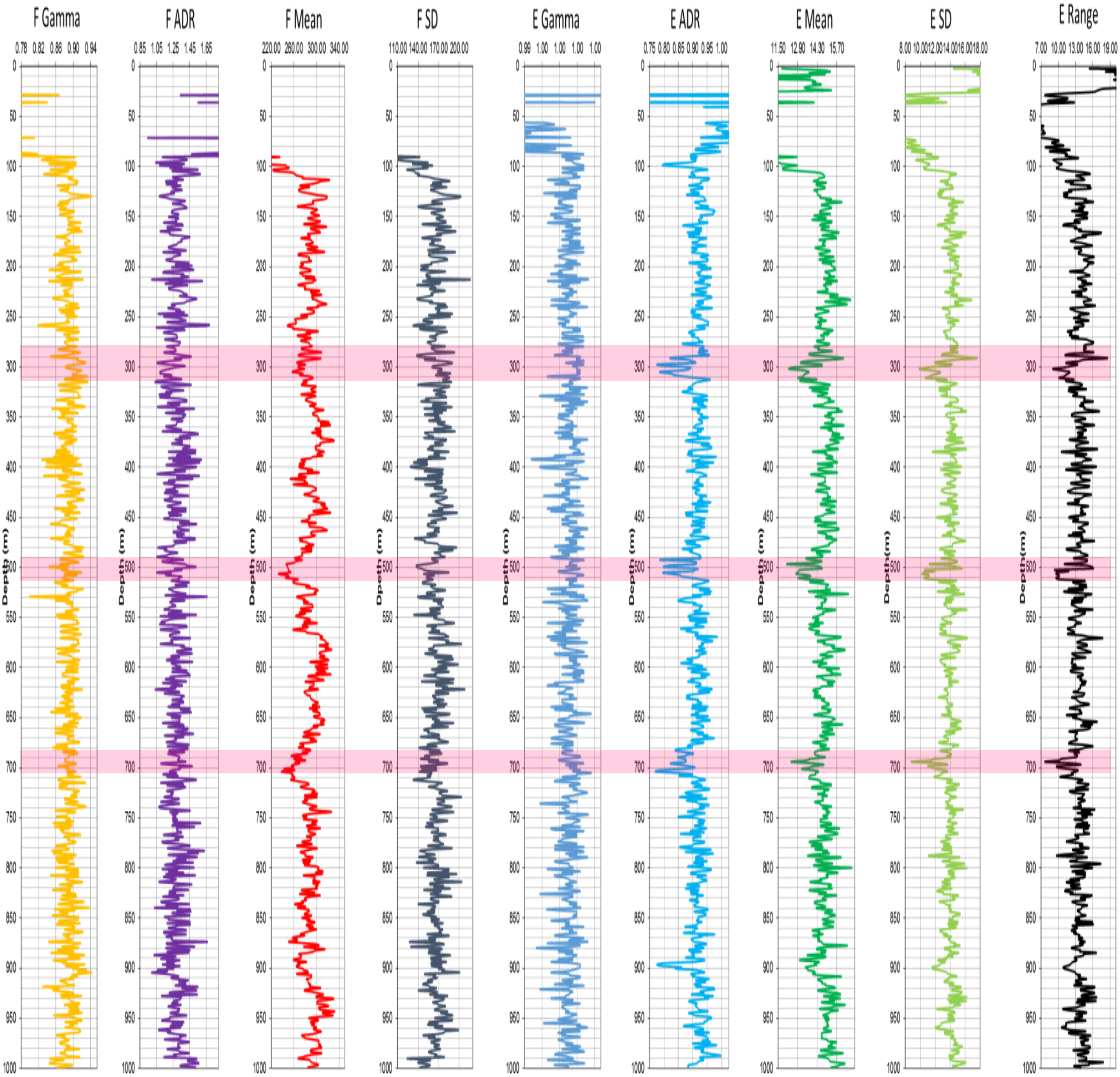


Figure 7: Mean harmonic data for SAT1

Results for THURS1 are shown in **Figure 8** for total harmonics and **Figure 9** for mean harmonics. Two areas of interest are identified at 400m and 680m. However compared to SAT1 values for EADR are higher with no distinct troughs. It could be that there is little mineralisation at this site.

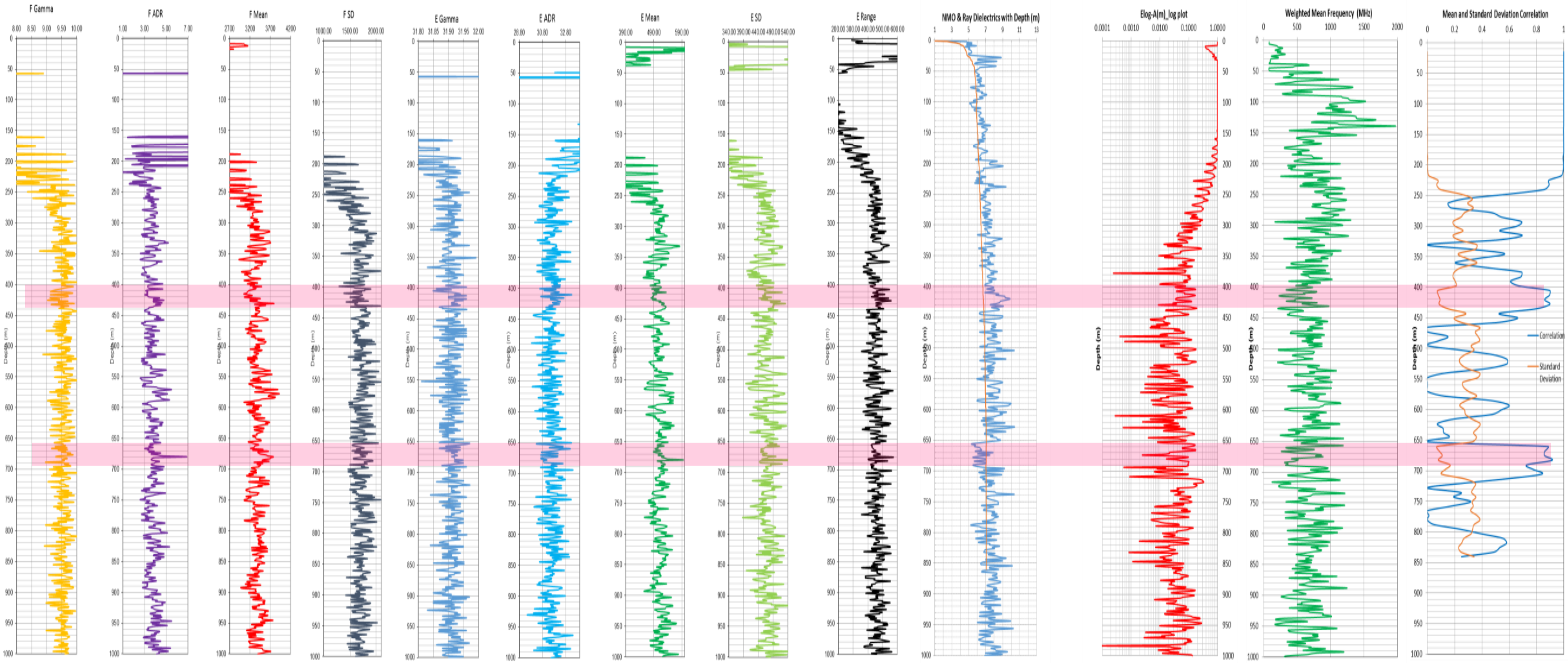


Figure 8: Total harmonics, dielectric constant, energy and weighted mean frequency data for THURS1

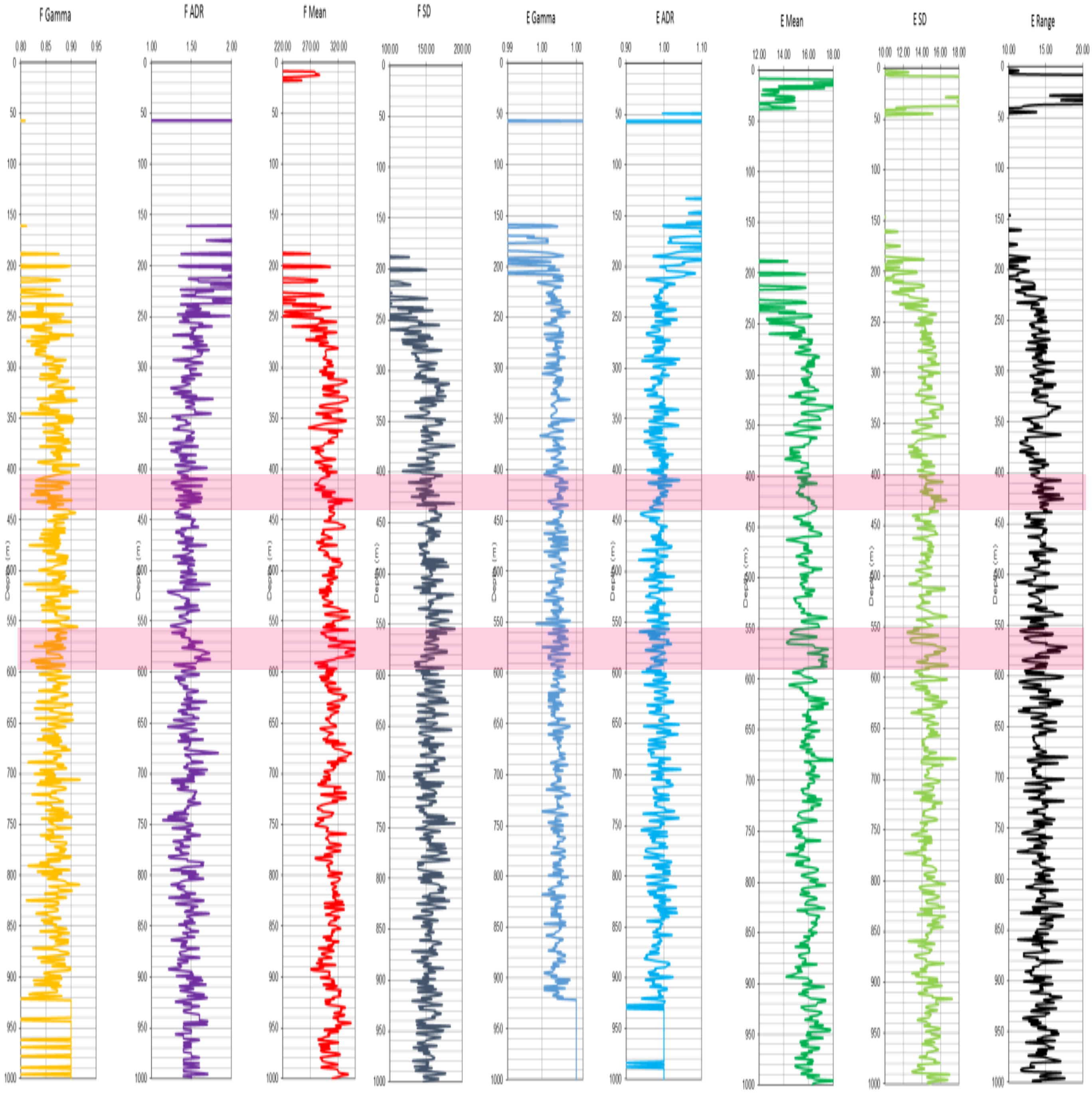


Figure 9: Mean harmonics for THURS1

Weighted Results

In the training results and the WED3 blind hole, the mineral parameter was identified by a peak in the weighted function of 3 and then a sudden drop to at least 1.5. The results for SAT1 are shown in **Figure 10** and appear to show two areas of interest at 480-510m and 690-730m agreeing with the full dataset presented above (figures 1-2). The trough seen at 280-310m in figures 6 and figures 7 is less clear in the weighted dataset.

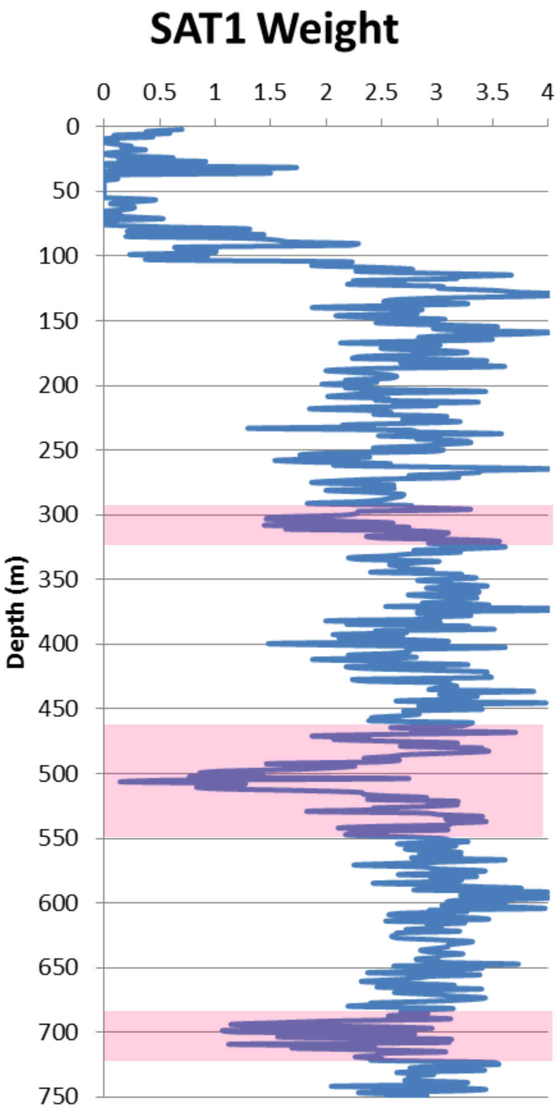


Figure 10: Weighted function for SAT1

The results for THURS1 are shown in Figure 11 and suggest up to three areas of interest 400-440m, 560-590m and 610-640m, though based on this weighted methodology a smaller body of interest could also be present at 770m. However when compared with SAT1 the weighted values are generally lower and this may indicate a lower grade of mineralization.

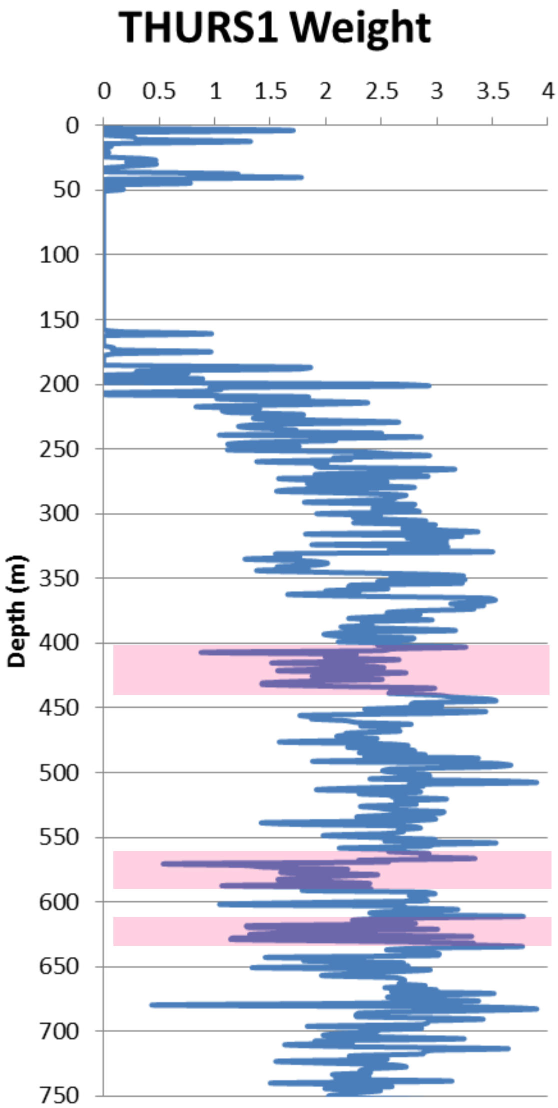


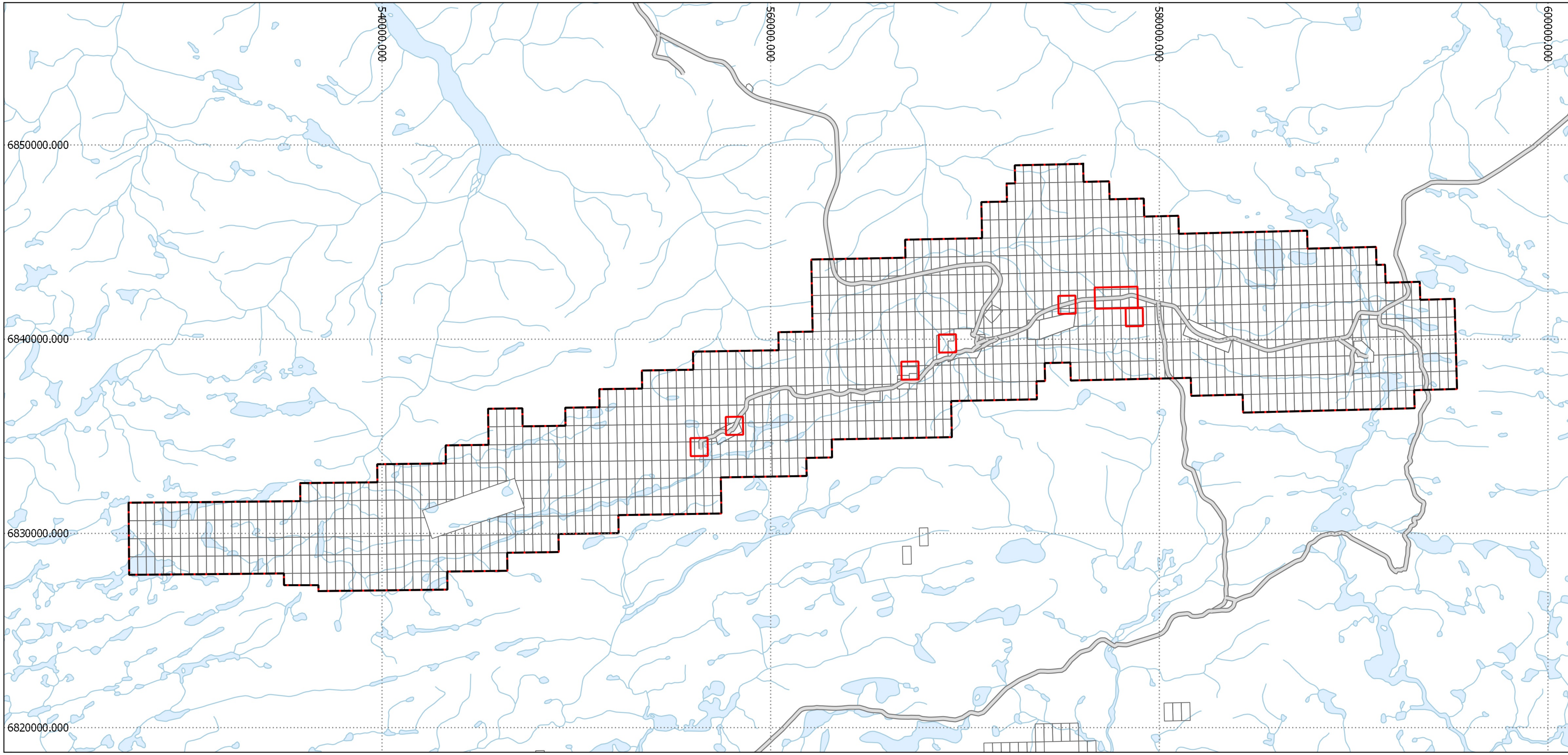
Figure11: Weighted function at THURS with lower values

Conclusions and Recommendations

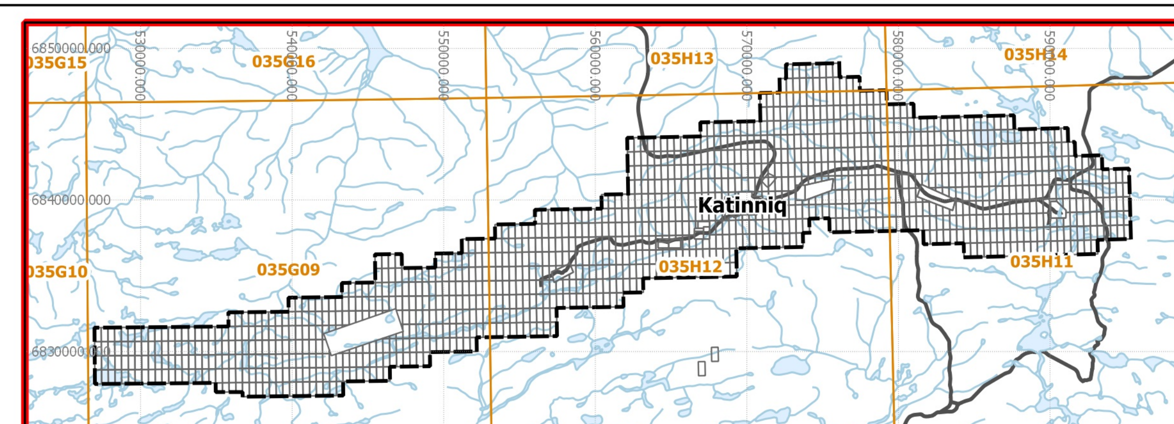
Based on harmonics, dielectrics and correlation data and feedback received from the client up three areas of interest have been identified at approximately 290-310m, 460m-470m and between 620m-670m at the blind test site SAT1. These could either be gabbro or mineral bodies. The key parameters for the identification were:

- A trough in total E-ADR and total E-Range
- Peaks in total F-mean, F-Gamma and F-SD bounding the areas of interest
- A drop in the weighted function from <3 to at least 1.5

Up to three areas of interest are also identified in THURS1 based on the weighted parameters. However there is a smaller range of data within the harmonics which made suggest no ore body is present in this V-bore



Perimètre de la mine Raglan
OverviewAtlasPagesExploRprt_2015_2016_s copy
Réseau routier
Claim
Plan d'eau
Cours d'eau



Levée géophysique (GP)
Atomic dielectric resonance Survol
Adrok 2015

Thématique :
Mine Raglan, 2017
Energie et ressources naturelles (QC)

MINE RAGLAN
UNE COMPAGNIE GLENCORE

1:200 000
NAD83 UTM 18N

Feuillets NTS
035G09
035G16
035G07
035G10
035G15
035G08

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Créé par le département d'exploration de la Mine Raglan
Ajour : 2017-06-01

Dossier : L:/2D/ARCGIS/_Cartographie_production/ExpAssmntRprt_ear/Donnees_ExploAssmnt_2015_2016_shp/GP_Adrok_2015/GP_Adrok2015_170531.qgs