



MEMORANDUM

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DATE:	18/03/2025
SUBJECT:	Tunnel Hill 2024 DHEM report

1 SUMMARY

This memorandum is a companion to the 2024 Renison DHEM report and covers the DHEM conducted on hole S1718 at Tunnel Hill. This area is located about ~3 km southwest of the Renison orebody.

Results show that all EM responses correspond with intersected sulphide zones in the drill logs. The most interesting targets are two highly conductive and moderately sized plates occurring at 700m and at the end of the hole. Both these plates intersect sulphides with the response at 700m corresponding to up to 2.06% tin.

Two small and low conductance responses have been modelled at 200m and 300m downhole. These are plates are modelled offhole, indicating the main source has not been intersected.

Finally, a thick and poorly defined stratigraphic zone was modelled from 420-650m.



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2 BACKGROUND

After the success of the 2023 downhole EM (DHEM) and fixed loop EM (FLEM) at Renison mine, further DHEM surveys were planned for at Ringrose, Ring River, the west zone, and Tunnel hill. In late 2024, DHEM was acquired down 18 holes at Ringrose, Ring River and the West zone and hole S1718 at Tunnel Hill. A nearby hole S1717 was also originally planned to be surveyed but unfortunately the hole failed.

Pre-existing geophysics over the prospect is as follows:

- 2012 helicopter magnetics, 80m line spacing.
- 2002 government Hummingbird EM, 200m E-W lines.
- 1970 (?) IP: Bishop's 1983 compilation show an IP line, of unknown provenance, which stops just short of our drill holes. This survey shows an end of line IP anomaly (~30mV/V) northwest of S1718 (Bishop, 1983)(see Figure 2).
- Most relevant to this project is the 1997 Crone PEM DHEM of S1643. This three component survey was remodelled in 2024 by Mitre. The data quality is fairly poor.
- 1990 Sirotem on S1456, located about 450m south of the current holes.
- 1990 downhole IP on S1456 which shows that the sulphide intersects are (unsurprisingly) low resistivity/high chargeability zones.

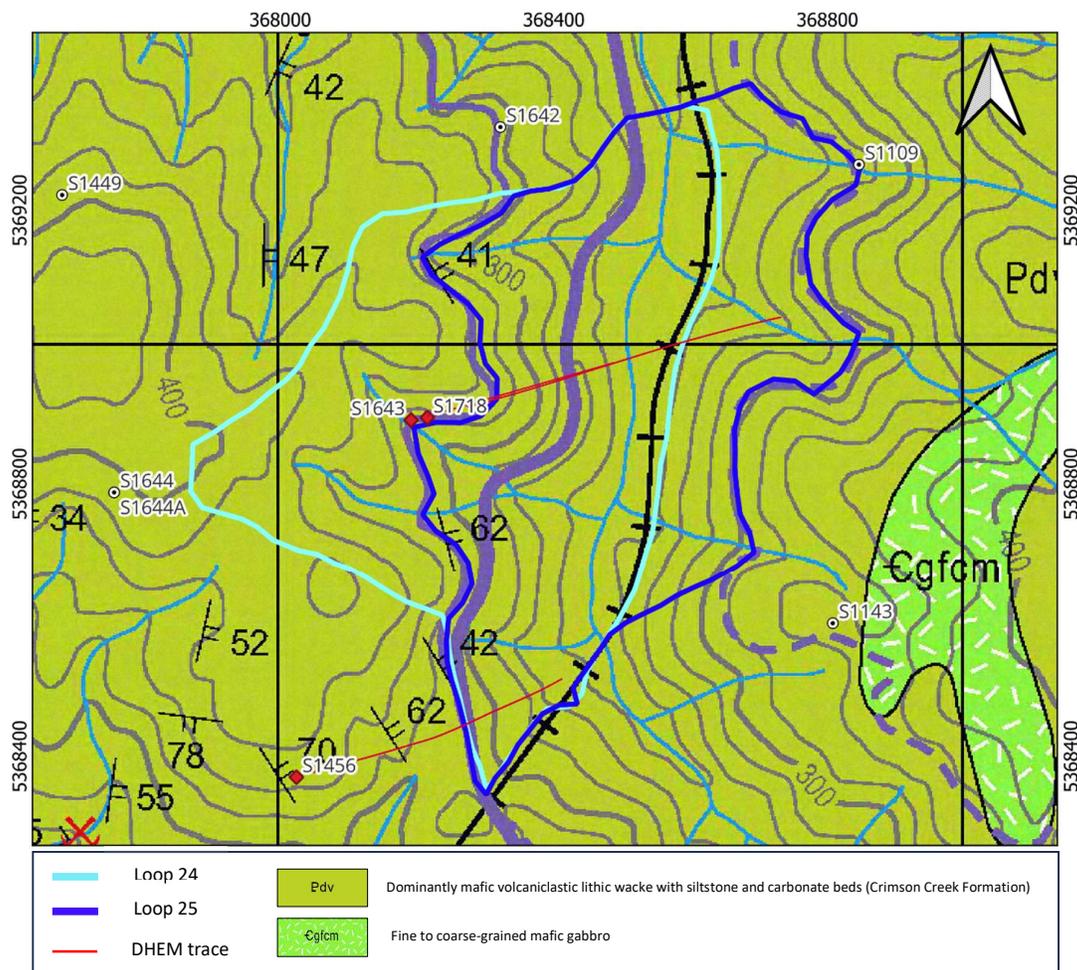


Figure 1: 2024 S1718 DHEM location with transmitter loops on local geology. Historic DHEM traces also included. The geological mapping indicates an eastward dip.

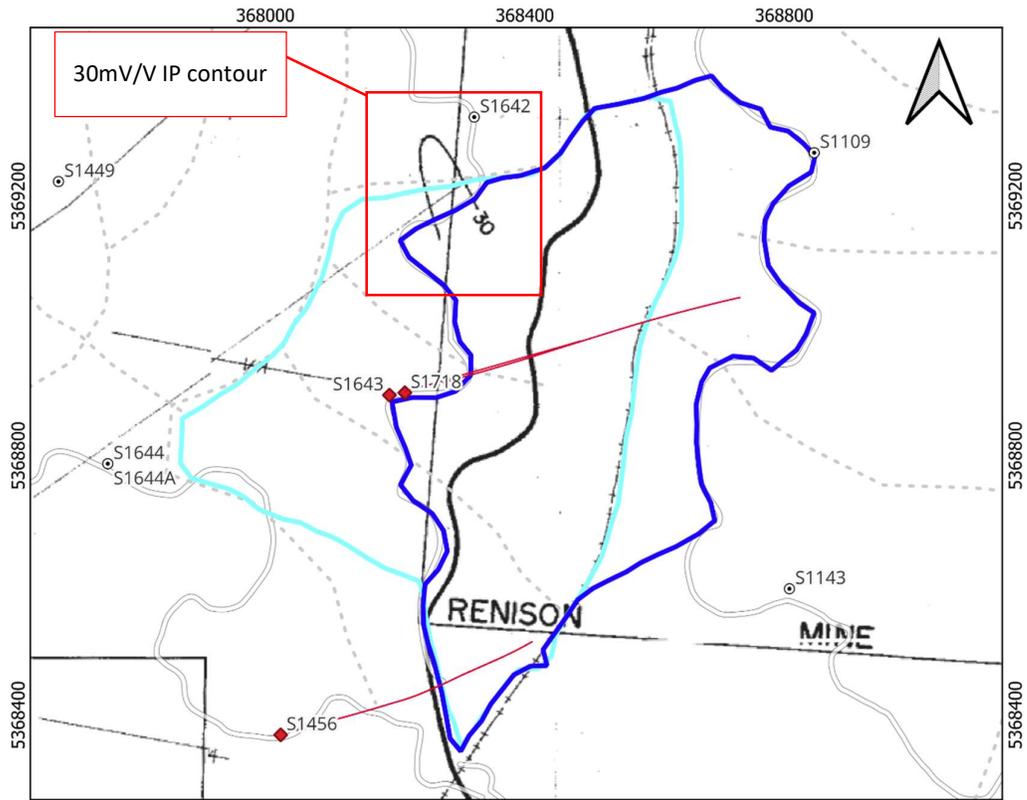


Figure 2: S1718 DHEM trace as well as the historic DHEM traces. Also depicted is an approximate georeferenced map of the IP anomalies from Bishop, 1983.



3 SURVEY PARAMETERS

3.1 S1718 SURVEY PARAMETERS

Date: 26-27th November 2024
Contractor: AGS
Collar location: 368215mE, 5368897mN, 308RL
Projection system: GDA94 MGA zone 55
Hole azimuth, dip, depth: 75.94°, 53.72°, 861.52m
Tx current: 45-50A
Components: AUV
Frequency: 0.5Hz
Transmitter: GeoRESULTS DRTX TX 4
Receiver: SMARTem24
Probe: DigiAtlantis#184
Stacks: 32-64
Units: pT/A
Channels: 36 channels over the interval 0.087 to 218.259msec
Loop: Loop 24 ~700x520m, Loop 25 ~1000x360m
Loop corner coordinates: See table below.

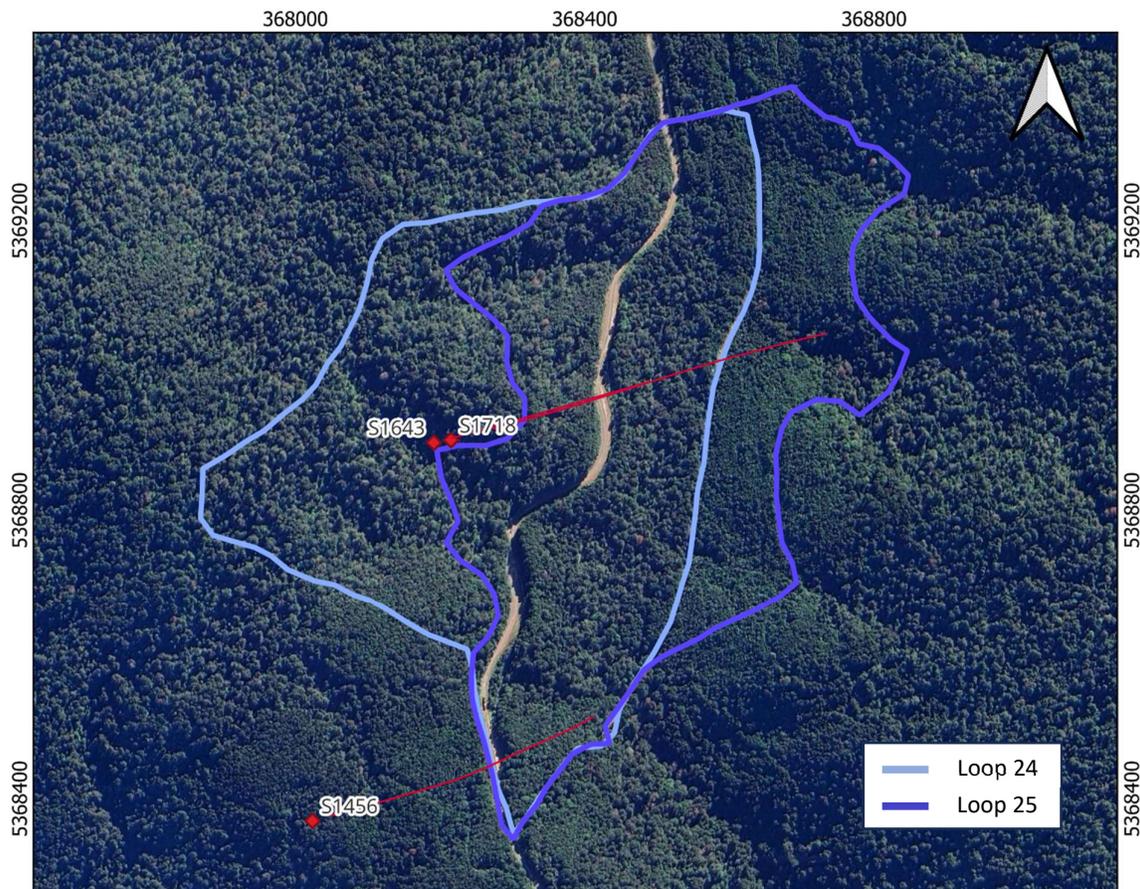


Figure 3: Map showing S1718 and transmitter loop locations.



Table 1: Loop 24 corner coordinates

Easting	Northing	RL
368320.8	5368377	301.57
368354.1	5368426	291.85
368390.3	5368470	271.43
368441	5368491	242.67
368462.8	5368551	241.04
368496.6	5368604	240.21
368526.8	5368671	243.5
368543.9	5368726	238.79
368553.2	5368797	238.52
368564.8	5368866	237.86
368572.1	5368933	236.23
368586.7	5368999	234.95
368619.9	5369076	233.43
368639.5	5369135	232.21
368641.5	5369199	231.55
368640.8	5369260	231.03
368630.3	5369318	226.33
368589.1	5369353	220.89
368515.1	5369337	228.31
368469.2	5369289	246.82
368432.4	5369245	275.49
368379.3	5369231	293.65
368322.2	5369225	313.24
368248.9	5369211	328.18
368184.8	5369198	343.98
368119.8	5369175	351.79
368098.2	5369112	352.78
368075.5	5369052	362.28
368043.9	5369003	368.94
368009.2	5368953	376.19
367956.8	5368910	385.74
367903.4	5368876	396.2
367871.2	5368826	396.21
367886	5368765	384.06
367943.8	5368749	373.13
367989.7	5368718	375.48
368054.1	5368697	369.37
368103	5368675	375.66
368156.3	5368643	365.3
368210.5	5368617	338.69
368244.2	5368580	314.8
368253.5	5368520	316.51
368269.2	5368455	313.38
368291.6	5368387	315.21
368302	5368352	315.18

368263.6	5368890	316.42
368195.2	5368883	313.13
368216	5368811	312.46
368208.2	5368755	310.15
368257.3	5368711	314.54
368280.5	5368653	315.87
368246	5368602	314.41
368244.1	5368538	317.17
368260.3	5368480	314.97
368278.7	5368398	314.86
368301.1	5368344	317.51
368333.4	5368391	294
368366	5368440	287.28
368408.4	5368476	264.05
368428	5368501	242.37
368465.9	5368554	241.05
368504.9	5368595	241.19
368556.2	5368621	269.22
368606.3	5368648	290.37
368668.2	5368680	311.98
368686.7	5368727	308.46
368668.7	5368782	304.3
368665.1	5368848	300.44
368672.5	5368913	297.25
368720.9	5368953	297.84
368780.3	5368931	295.1
368833.6	5368987	287.41
368823.4	5369035	295.52
368775.4	5369093	292.76
368770.2	5369163	283.72
368807	5369216	273.5
368847.5	5369263	268.36
368805.9	5369300	263.35
368763.7	5369334	260.52
368704.9	5369366	256.9
368662.7	5369379	247.13
368610.2	5369360	224.21
368544.6	5369342	220.01
368488.6	5369315	233.6
368455.1	5369267	260.69
368393.1	5369232	289.33
368341.4	5369221	306.71

Table 2: Loop 25 corner coordinates

Easting	Northing	RL
368323.1	5369196	307.95
368262.3	5369165	313.8
368207.6	5369132	319.94
368247.6	5369085	324.52
368293.7	5369040	328.17
368299.8	5368976	328.14
368316.6	5368924	324.5



4 DATA

The DHEM profiles are provided in Appendix 1.

S1718 was surveyed using both Loop 24 and Loop 25 because the geometry, and thus coupling, of the target was unknown. Unfortunately, both Loop 24 and 25 was altered during deployment as the culverts that provided the highway crossing were found to be blocked. A risk assessment showed that laying the loops along the highway was too risky. As a combined result of all of the back and forth changes in loop geometry, both to the eastern margin of Loop 24 and western side of Loop 25, the primary field for the two loops is fairly similar. This means that dip is more ambiguous than usual.



Loop 24 shows the following responses:

- Small early time off hole response at ~200m from a small body with low conductance
- Small early time off hole response at ~350m from a small body with low conductance
- A broad response at ~500m from a very large conductor.
- Intersection response centred at ~700m. Corresponds to magnetic spike.
- Strong end of hole intersection response.

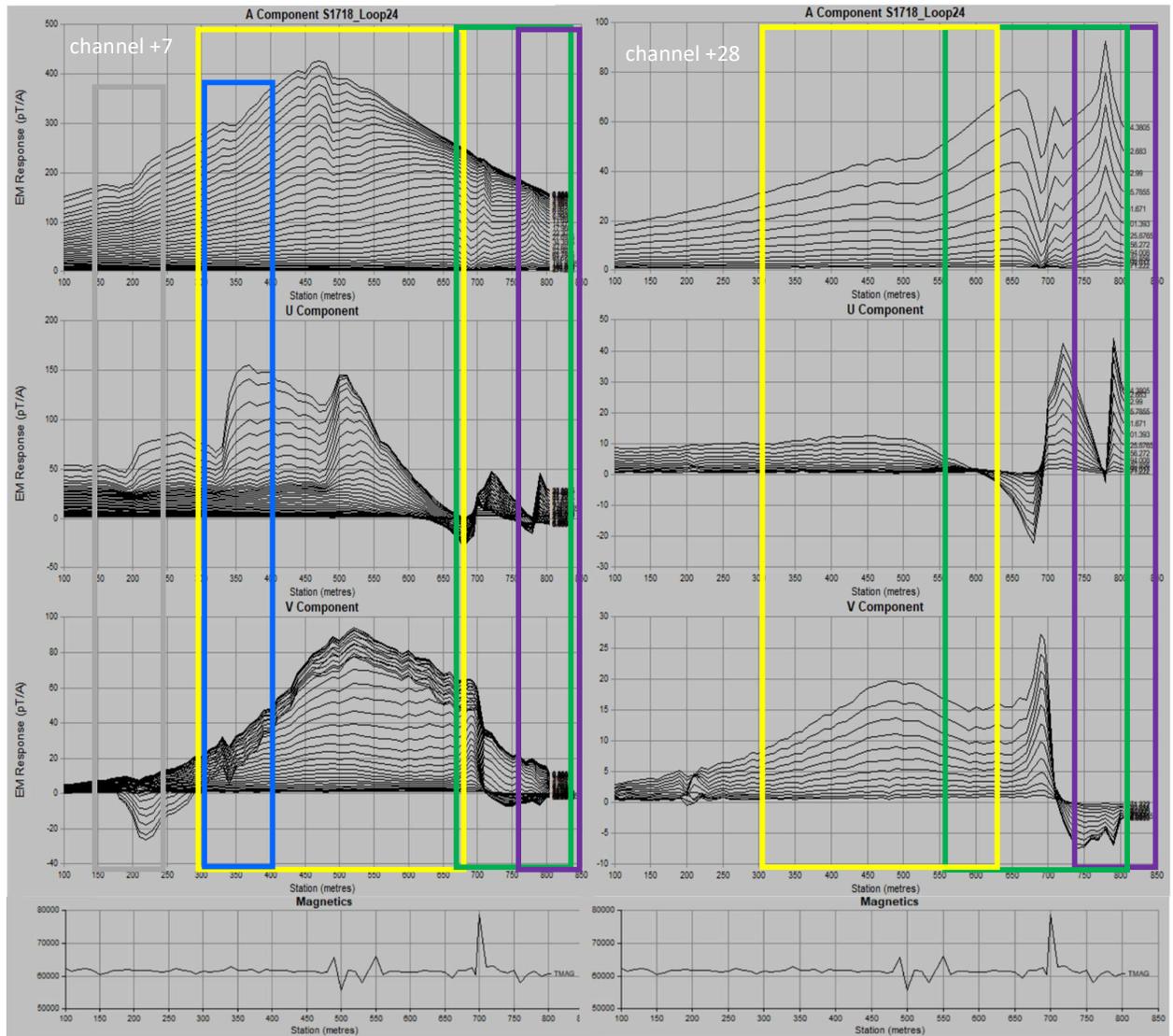


Figure 4: Profile for S1718 Loop 24 with responses outlined.



Loop 25 shows the following responses:

- Small early time off hole response at ~200m from a small body with low conductance
- Small early time off hole response at ~350m from a small body with low conductance
- Broad early time off hole response to late time **intersection** response from a large conductor centred ~520m.
- Strong edge intersection response at ~ 700m. Corresponds to magnetic spike.
- Strong **end of hole** response

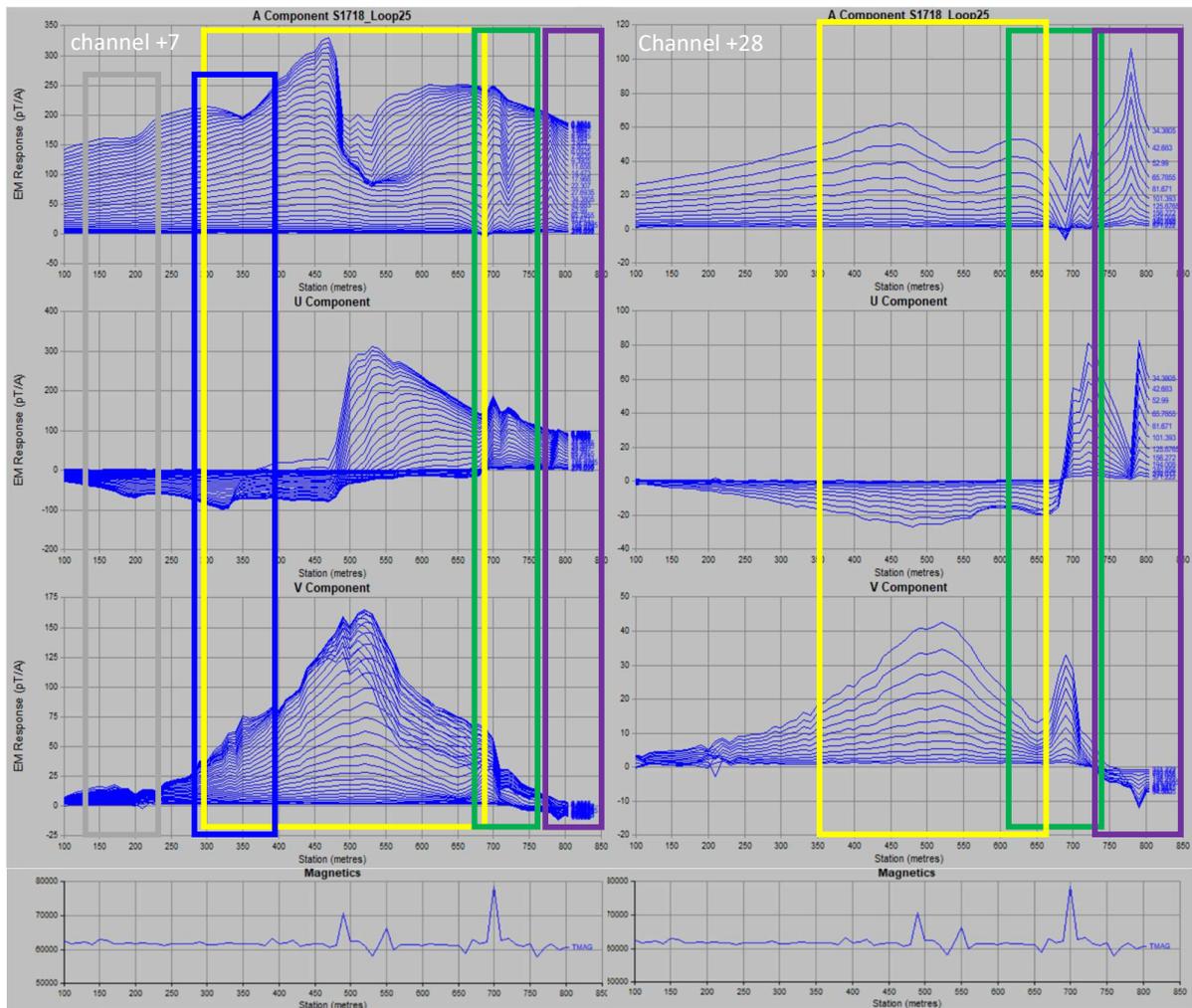


Figure 5: Profile for S1718 Loop 25 with responses outlined.



5 MODELLING

The models were constructed using Maxwell. The DHEM plates are named using the hole name and other useful descriptive words. The plates are named to capture basic information about their location, strength and reliability according to the following format.

[Hole name]_[Type of response]@[depth of response]_conductance]S

[Type of response]: IHR = in hole response i.e. the source has been intersected by the hole, Edge = hole has intersected very close to the edge, OHR = source is off hole, BHR = off hole below the hole, AHR= above the hole, EOHR= end of hole response –something beyond the end of the hole.

[Depth of response] reflects the point downhole that the response is strongest *which, for OHR, is not necessarily the point downhole closest to the plate*. However, for intersection responses this is usually the depth which the hole has intersected the source. Note that, generally, DHEM depths are only accurate to around 5-15m downhole depending on station spacing, hole length (stretch in the cable), and errors on the winch odometer. E.g. if a plate conductor is intersected at 595m according to the plate model, any sulphides between 580 and 610m could be the source.

5.1 S1718

A small offhole early time response at 200m was modelled with [S1718_OHR@200m_50S](#). This plate is a small 80x80m, low conductance (50S) plate. The strike length, depth extent and conductance are fairly well constrained and can be increased, but not by much. The dip is also reliable and is modelled gently dipping towards the west. The response indicates the source is very close to the hole but not intersecting. Directly down-dip, the logs indicate up to 5% pyrrhotite.

Another small offhole early time response is identified ~350m downhole, and is modelled by an 80x80m, 100S plate called [S1643_S1718_OHR@350m_100S](#). The U component for both loops indicate the plate is above the hole and the general shape indicates it sits very close. The dip has been modelled steeply dipping towards the east however, it is highly unconstrained. The dip can essentially be changed to any dip as long as it remains above the hole and does not intersect. The strike is could also easily be much larger, but depth extent is reasonably well defined. The logs for S1718 show a thick zone (320-400m) of up to 18% sulphides however, the main cause of the response has not been intersected.

The bottom half of the hole is taken up with a broad response from a very large, low conductance, intersecting source. The response here is somewhat tricky and seems to indicate a thick stratigraphic zone which is not able to be accurately represented with thin sheets. Therefore, a single thin sheet, [S1643-1718_IHR@460m_50S](#) was used to represent the top of the zone, and give a general indication of size and dip, and a 100m thick background plate, was used to approximate the broader features. These plates only represent a general guide as rectangular sheets are a poor representation of a layer which likely varies in thickness and conductance at different locations. All we can really tell from this zone is that it is very large and probably thick. Interestingly, this zone at 440-580m has logged up to 14% sulphides and also shows spikes of anomalous magnetics values.

Towards the end of the hole, it gets a bit more interesting. Two strong intersection responses are clear at 700m and at the end of the hole. The 700m responses was modelled by [S1718_IHR@700m_3000S](#), a 150x150m, 3000S plate that just clips the drillhole. The position and depth extent of this model is reliable, but the strike could be longer and source less conductive. Encouragingly, the drill logs show the area corresponds to up to 10% sulphides with assays of 2.06% tin at 696m and 1.18% at 698m.

The end of hole response was modelled with plate [S1718_EOH_3000S](#), a 150x150m 3000S conductor. This source is highly conductive however is unlikely to be much bigger than modelled and, in fact, it could be smaller and still fit the data well. The dip is most likely to be dipping towards the west however could be anywhere between steeply dipping to almost horizontal. It should also be noted that east dipping conductors at this depth are poorly coupled with both loops, so anything dipping this direction would not be detected. The intersection in the logs show up to 30% sulphides and 50% magnetite. While the magnetite is not expected to be conductive, it's very strange that there



is no magnetics (TMI) anomaly associated with the magnetite intersection. There is, however, logged high magnetic susceptibility in the core. The large percentage of magnetite is only present for about a metre, however it should theoretically still show up in magnetics. This does not have any practical effect on the EM models, but the discrepancy is still worth noting.



5.2 HISTORIC SURVEY S1643

DHEM was conducted on the nearby historic hole, S1643, in 1997. The data was three component Crone data using a single collar loop. This data was previously roughly modelled by Mitre however the plate models were flagged as being very unreliable. This is partly due to the fact that the data is noisier than modern surveys but also due to the use of a coil receiver means that the survey was not sensitive to the high time constants typical of Renison mineralisation. Despite this, the data is still worth re-evaluating in light of the new data in S1718.

The intersection response at 260m downhole was previously modelled with [S1643_int_260m_v2_40S](#), a 100x100m low conductance plate. The size and geometry is not very reliable and it is possibly smaller than modelled. No response at this depth is seen in 1718 however, the conductor lies directly down dip from [S1718_OHR@200m_50S](#). With similar size, location and conductance, they may be the same zone with S1643 intersection slightly higher concentration of sulphides (20%).

Another intersection response at 310m had several plate models but no response at this depth was visible in the S1718 data. The intersection was remodelled to account for this, with two plates, [S1643_IHR@310m_v1_30S](#) and [S1643_OHR@300m_200S](#). Intersections in S1643 show sulphides of up to 20% while up dip in hole S1718 at ~270-300m, intersections of 6% are found. While these two zones appear to correlate, it should be noted the S1643 plate models are too far away and small to be seen in the S1718 DHEM data.

The broad (stratigraphic?) response characterised in S1718 is also observed in S1643. This response has been modelled with a large plate model, [S1643@460m_50S_v2](#) and is almost certainly the same thick stratigraphic zone modelled by [S1643-1718_IHR@460m_50S](#). The new version 2 plate was modelled as it fits the A and U component slightly better. The variations reflects the uncertainty inherent in DHEM. The thicker background plate modelled in S1718 does not fit the data here because the Crone coil-probes are insensitive to the longer time constants readily visible to the B-field Atlantis probes. Also noteworthy is the elevated tin (1.85%) present at 470m in this hole, with the only other anomalous value at ~500m (0.75%), both within this thick stratigraphic zone.



6 CONCLUSION

The results for the 2024 DHEM at Tunnel Hill show several low conductance bodies in the half of the drillhole and two strong responses towards the bottom of the hole. All EM responses correspond to intersected sulphides zones in the drill logs, however several offhole responses indicate the main source has not been tested.

Two offhole responses occur at 200m and 300m downhole from small low conductance bodies that lie close to the hole. The shallower of the two is reasonably well defined and dips to the west, while the deeper 350m response is modelled as dipping east to near horizontal. A thick, poorly defined stratigraphic zone from 420-650m is observed in both S1718 and the historic data from S1643. This zone corresponds to sulphide intersections and interestingly, elevated tin levels in S1643. The strongest responses are modelled with two highly conductive and moderately sized plates that intersect the drillhole at 700m (S1718_IHR@700m_3000S) and at the end of the hole (S1718_EOH_3000S). Both these plates intersect sulphides and encouragingly S1718_IHR@700m_3000S also intersects up to 2.06% tin.

The historic results from S1643 correlate well with responses from S1718.

7 CONTACT DETAILS

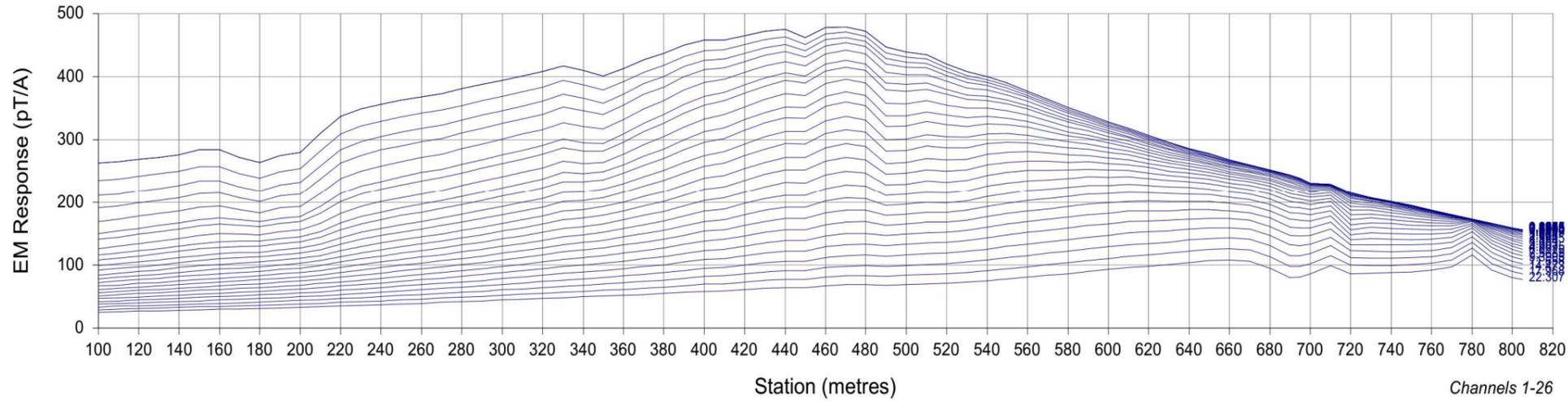
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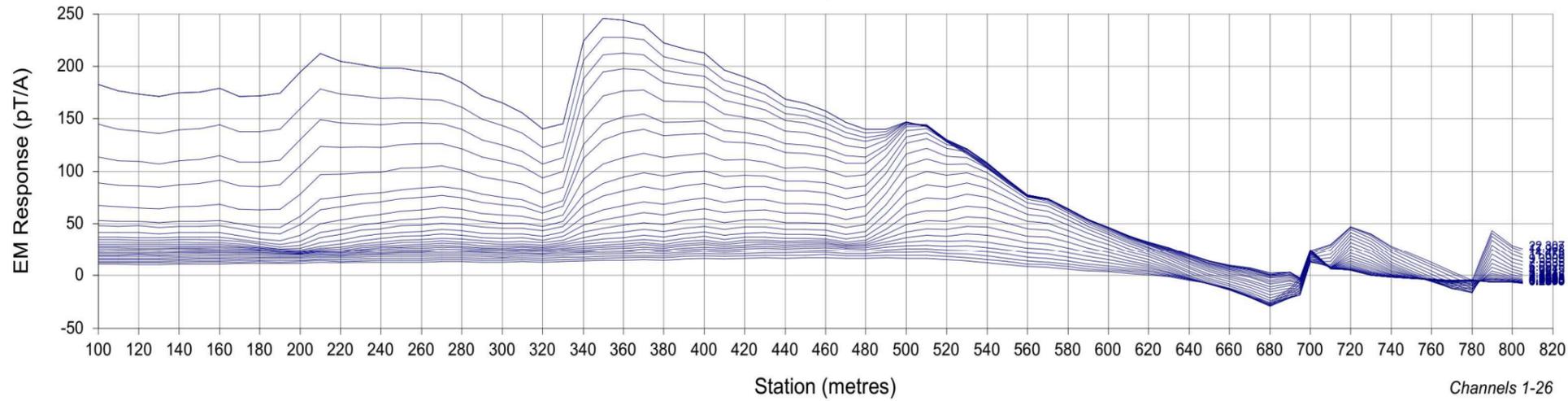
8 APPENDIX 1: PROFILES



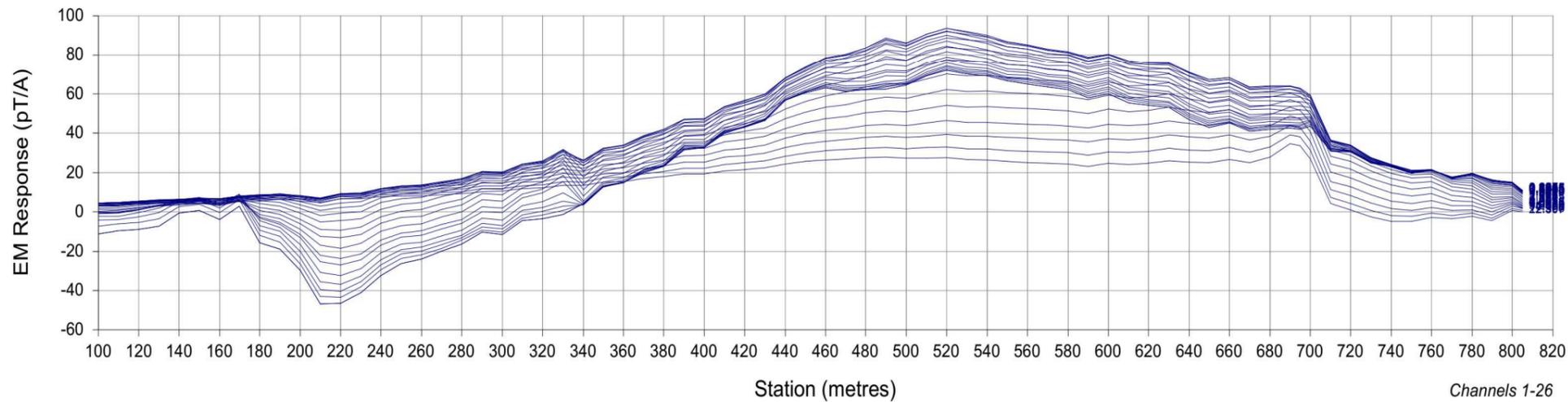
A Component S1718_Loop24



U Component



V Component



WINDOW TIMES (ms): Centre From the end of the turn off (500.880 ms)

1	: 0.0995	21	: 7.564
2	: 0.1245	22	: 9.390
3	: 0.1540	23	: 11.66
4	: 0.1910	24	: 14.47
5	: 0.2375	25	: 17.97
6	: 0.2950	26	: 22.31
7	: 0.3660	27	: 27.69
8	: 0.4545	28	: 34.38
9	: 0.5645	29	: 42.68
10	: 0.7005	30	: 52.99
11	: 0.8695	31	: 65.79
12	: 1.080	32	: 81.67
13	: 1.341	33	: 101.4
14	: 1.664	34	: 125.9
15	: 2.066	35	: 156.3
16	: 2.565	36	: 194.0
17	: 3.184	37	: 240.9
18	: 3.953	38	: 299.0
19	: 4.908	39	: 371.2
20	: 6.093		

SURVEY PARAMETERS

Configuration : Downhole
Station Spacing : 5-10 m

RECEIVER

Receiver : DigiAtlantis
Frequency : 0.5
Component : A,U,V

TRANSMITTER

Transmitter : Geonics
Loop : Loop24_actual
Tx Current : 50 A
Turn Off : 0.880 ms

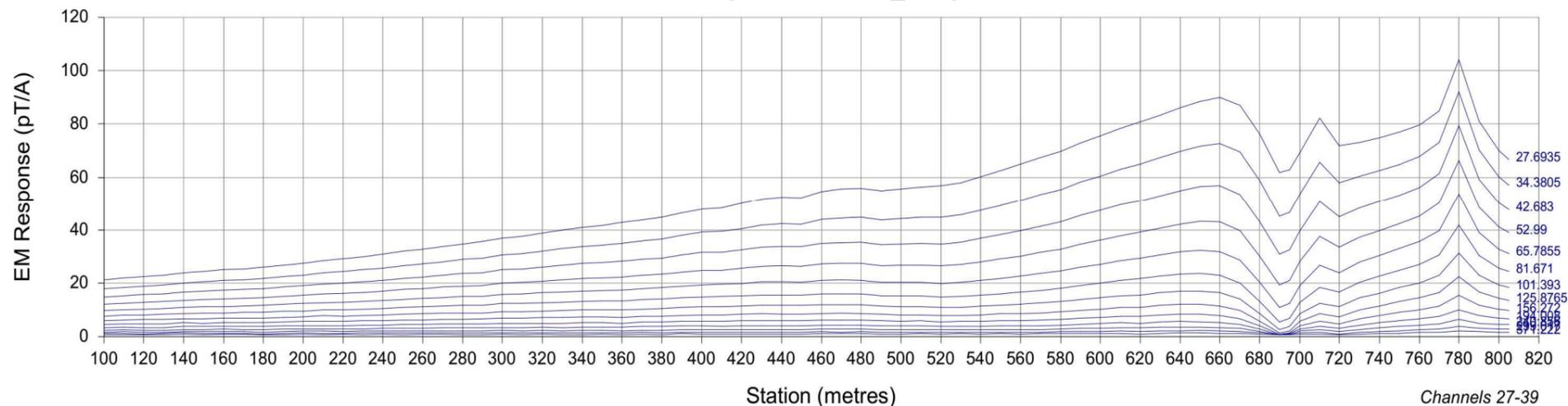


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Prospect
Downhole EM Survey
PROFILES OF EM RESPONSE
Line S1718_Loop24



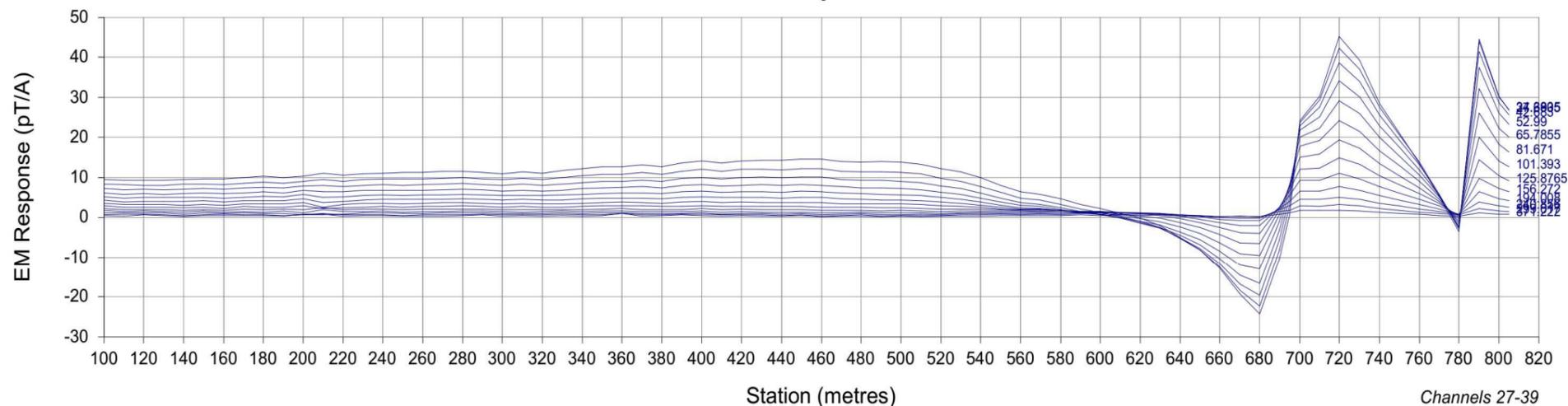
A Component S1718_Loop24



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18 : 3.953	38 : 299.0
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U Component



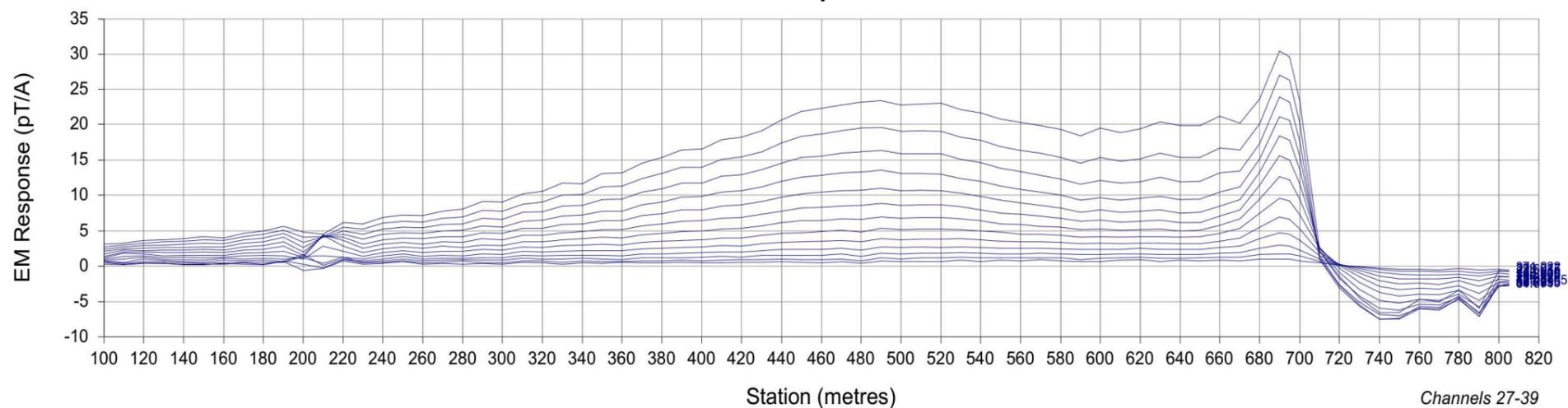
SURVEY PARAMETERS

Configuration : Downhole
 Station Spacing : 5-10 m

RECEIVER
 Receiver : DigiAtlantis
 Frequency : 0.5
 Component : A,U,V

TRANSMITTER
 Transmitter : Geonics
 Loop : Loop24_actual
 Tx Current : 50 A
 Turn Off : 0.880 ms

V Component

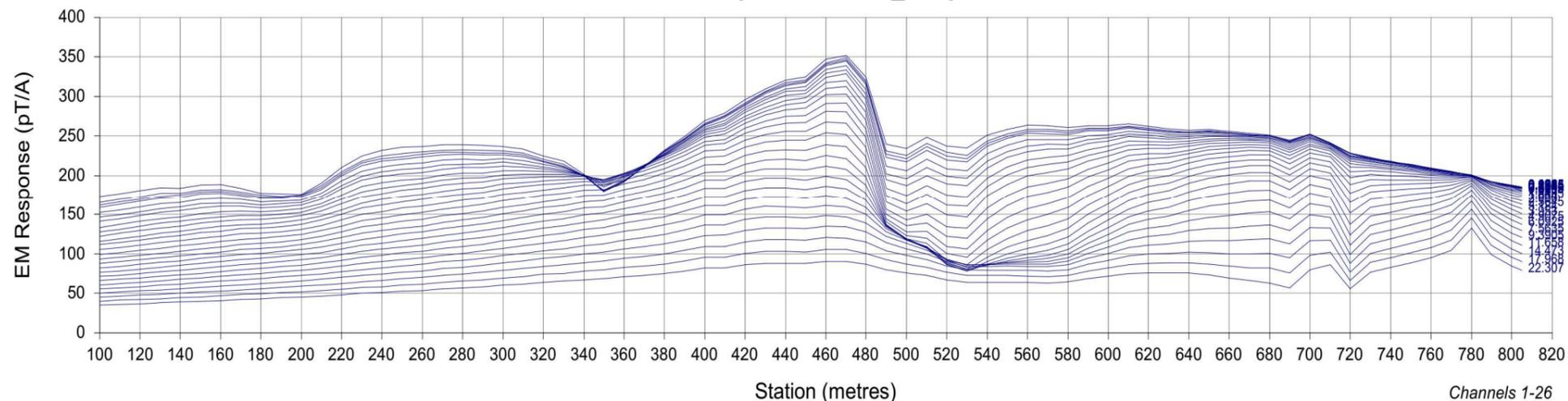


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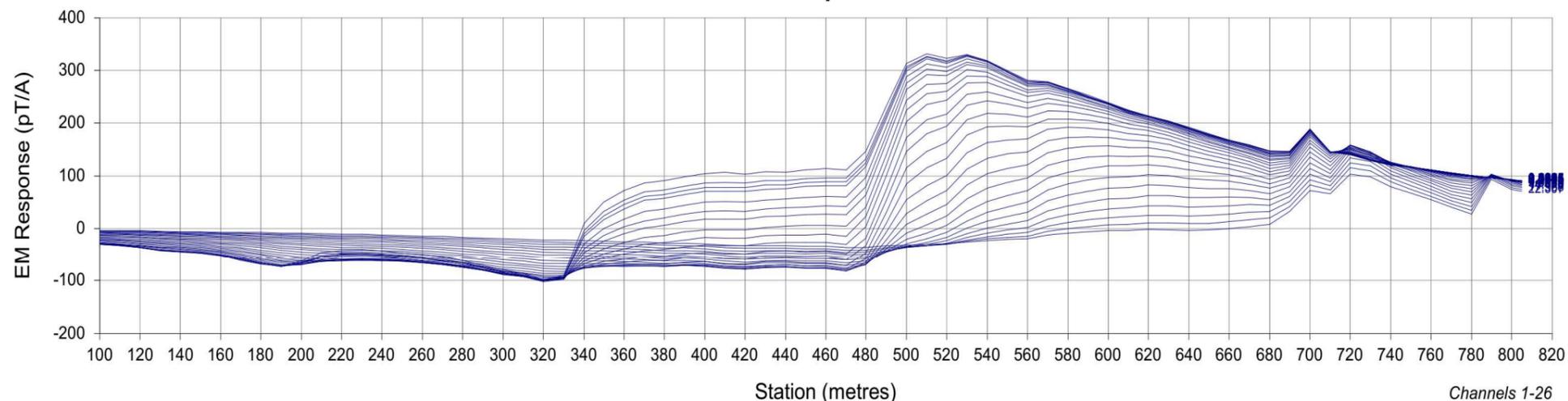
Prospect
Downhole EM Survey
PROFILES OF EM RESPONSE
Line S1718_Loop24



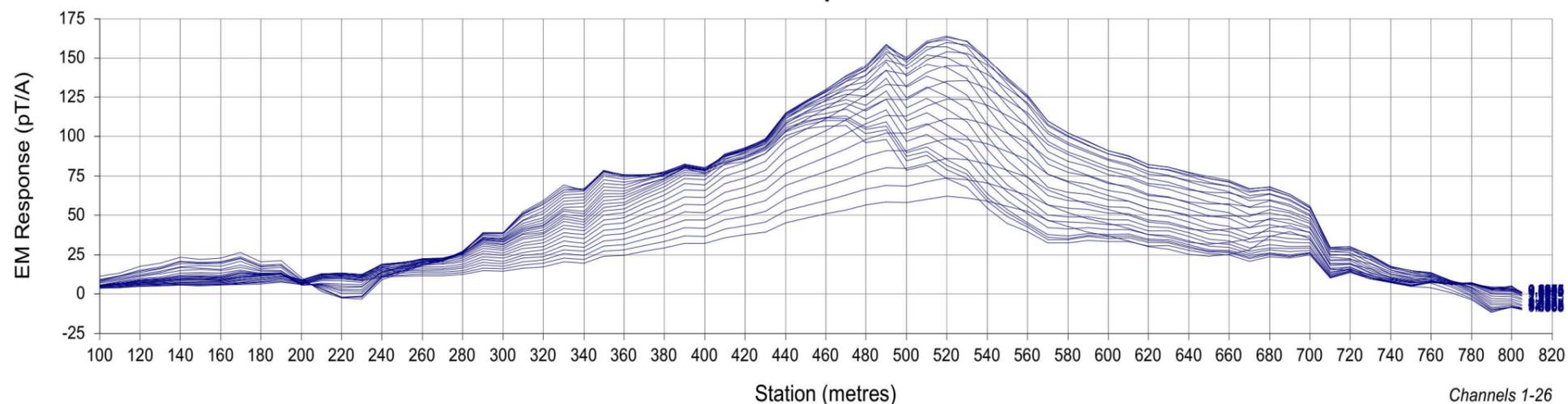
A Component S1718_Loop25



U Component



V Component



WINDOW TIMES (ms): Centre From the end of the turn off (500.900 ms)

1	: 0.0995	21	: 7.564
2	: 0.1245	22	: 9.390
3	: 0.1540	23	: 11.66
4	: 0.1910	24	: 14.47
5	: 0.2375	25	: 17.97
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18	: 3.953	38	: 299.0
19	: 4.908	39	: 371.2
20	: 6.093		

SURVEY PARAMETERS

Configuration : Downhole
 Station Spacing : 5-10 m

RECEIVER

Receiver : DigiAtlantis
 Frequency : 0.5
 Component : A,U,V

TRANSMITTER

Transmitter : Geonics
 Loop : Loop25_actual
 Tx Current : 45 A
 Turn Off : 0.900 ms

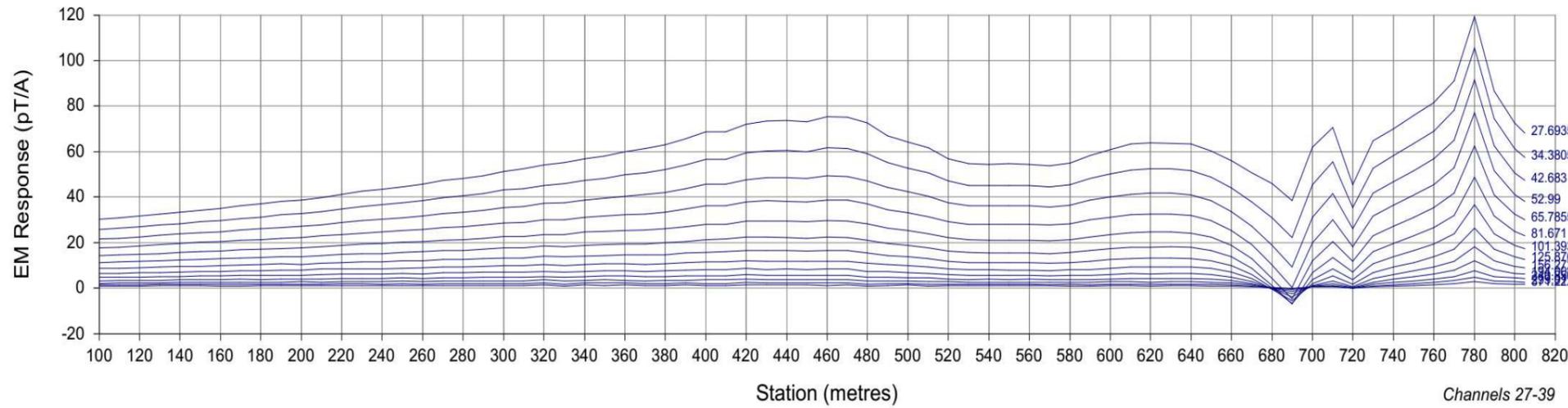


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Prospect
Downhole EM Survey
PROFILES OF EM RESPONSE
Line S1718_Loop25



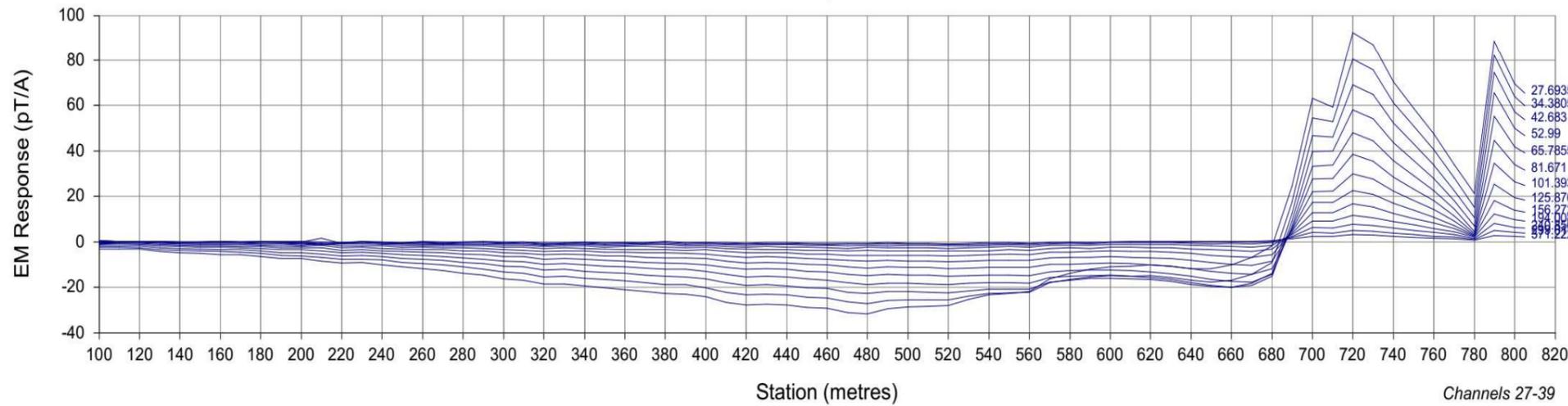
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11	: 0.8695	31	: 65.79
12	: 1.080	32	: 81.67
13	: 1.341	33	: 101.4
14	: 1.664	34	: 125.9
15	: 2.066	35	: 156.3
16	: 2.565	36	: 194.0
17	: 3.184	37	: 240.9
18	: 3.953	38	: 299.0
19	: 4.908	39	: 371.2
20	: 6.093		

U Component



SURVEY PARAMETERS

Configuration : Downhole
 Station Spacing : 5-10 m

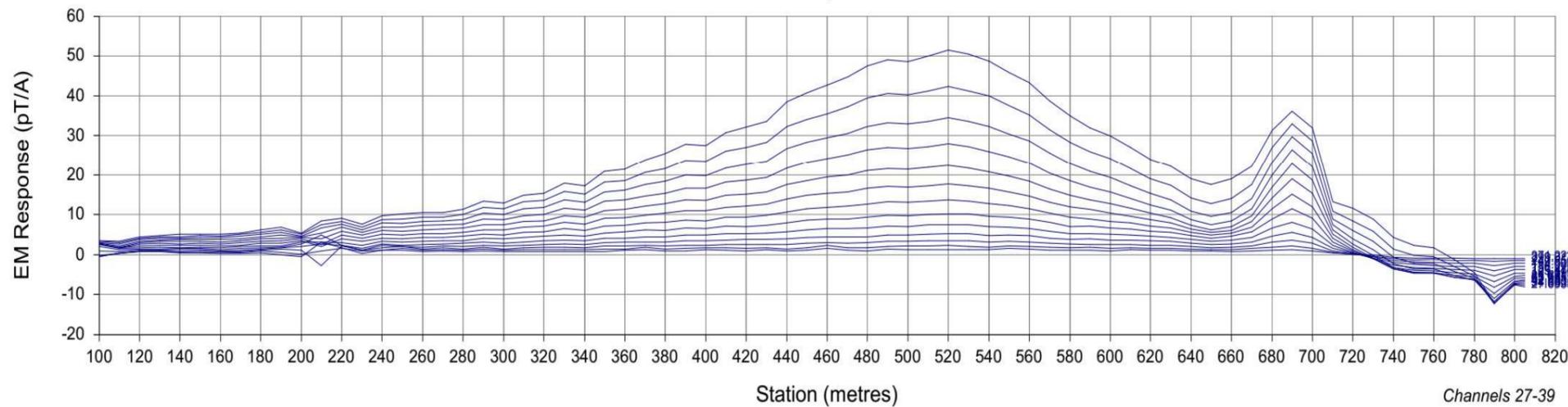
RECEIVER

Receiver : DigiAtlantis
 Frequency : 0.5
 Component : A,U,V

TRANSMITTER

Transmitter : Geonics
 Loop : Loop25_actual
 Tx Current : 45 A
 Turn Off : 0.900 ms

V Component



Mitre Geophysics Pty Ltd
 Mineral Exploration and Engineering Consultants

Prospect
Downhole EM Survey
PROFILES OF EM RESPONSE
Line S1718_Loop25