680037

MEMORANDUM

DATE: October 4, 1993

TO: Mr. Leigh W. Freeman, Vice President - U.S.
Orvana Resources Corporation
Golden, Colorado

FROM: A. L. Larson, Geophysical Consultant

SUBJECT: Magnetic Modeling With Postulated Remnance, Eholt Magnetic Anomaly, British Columbia

A second session of quantitative modeling of the Eholt magnetic anomaly was carried out in order to incorporate drilling information in the geometry of the source body as well as to include a probable remanent component in the calculations. Two profiles (the smoothest) were modeled, Lines 9820N and 9640N, and the parameters used for each model are shown on the attached plots. The work was carried out using Geosoft MAGMOD-3 interactive modeling software.

Several conclusions are intuitively apparent from the Eholt magnetic anomaly. First, the amplitude suggests a source body of more than a few percent magnetite by volume. Second, the deep negative to the west of the body indicates a probable remanent component has been added to the induced. Third, the apex of the source body must occur at about 11080E on both of the modeled profiles. And fourth, the apex of the source body must be quite shallow. Drilling results from holes on an adjacent line were analyzed for magnetic susceptibility and the highest interval encountered was about thirteen meters of less than 1.5 percent magnetite equivalent near the bottom of hole 93-3.

In this attempt to model the source of the Eholt anomaly it should be kept in mind that no hard information is available on the direction or intensity of the postulated remanent component of the magnetic field. The work that was carried out was largely designed to show that if a remanent component were present, that the source of the anomaly could lie in an area untested by the current round of drilling. As such, Nabhigian's analytical signal technique was used to deduce the position of the source body's vertices and then varying logical remanent directions and intensities were applied to the model.

In the first case, the results were inconclusive but tended to suggest that the uppermost vertex of the body occurs at or just east of 11080E on both profiles, a reasonable position for the top of the body.

The second case, where remanent components were varied, is illustrated by seven attached plots. The three plots for Line 9640N show remnance ratios of 1.0 and 10.0 with varying body geometries, susceptibilities and remanent vector directions. The orientation of the vector was chosen to be near parallel or perpendicular to the induced field and then inverted to produce a source body fixed in the most probable location. As can be seen from the plots, steeply dipping bodies with strong magnetization are possible.

In the case of Line 9820N, inversions were made on most of the parameters of the body except half length, remnance ratio and in two cases remnance declination. The inversions surprisingly converged on a single body shape much like that first interpreted for the Eholt anomaly. This suggests that a steeply dipping body with several plausible remnance intensities and orientations could result in a body with a geometry that could have been missed by the drilling.

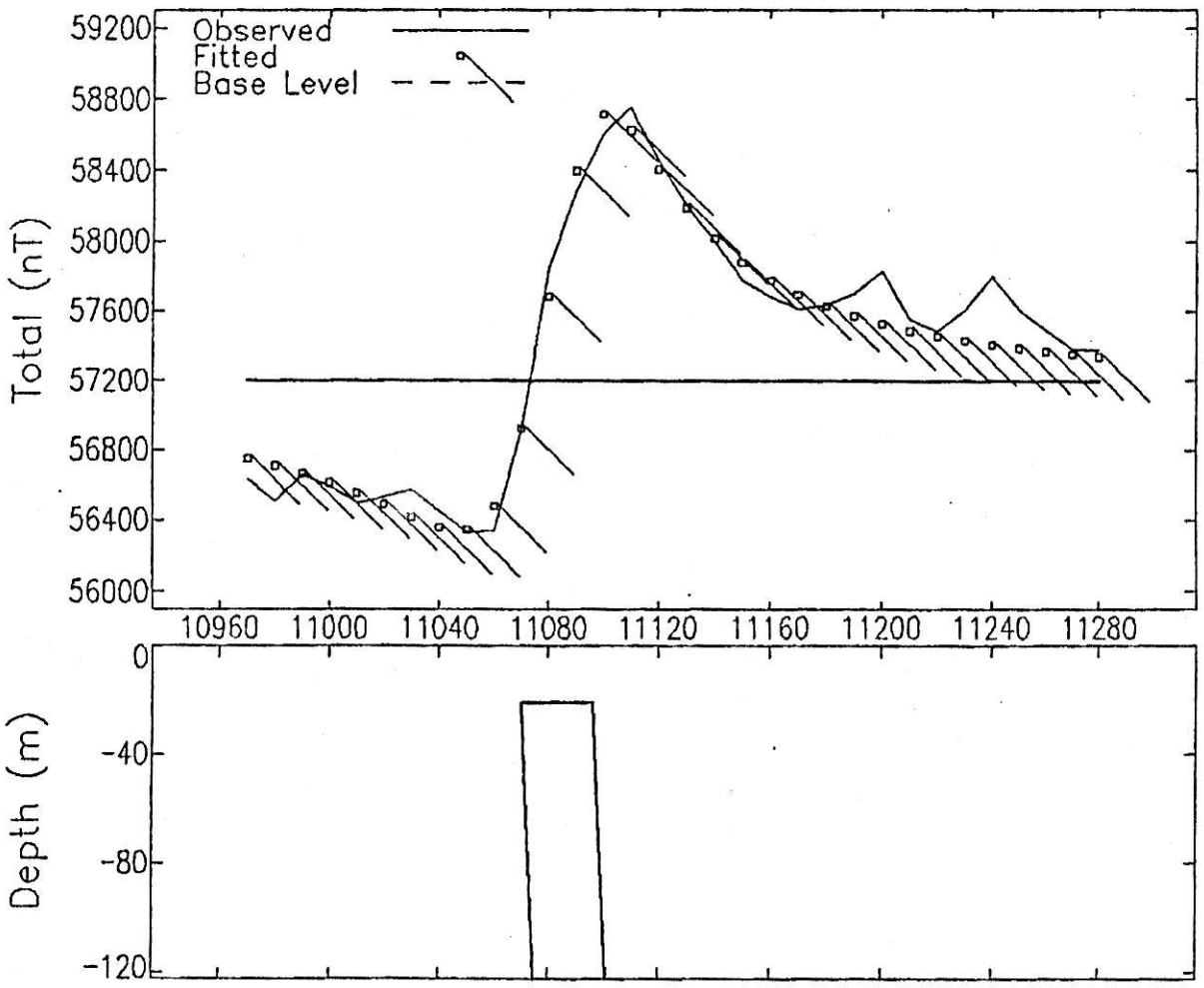
It should be restated however, that a remanent component, if it exists, has unknown physical attributes and cannot therefore be accurately modeled. The work carried out here merely suggests that under plausible assumptions of source body geometry and magnetization, a magnetite concentration could exist under the anomaly that could contain tens of percent magnetite rather than a few percent. And the body could occur in a configuration that has as yet escaped detection by drilling.

A.L.L.

Eholt Area, B.C. - Tabular 2 Model

Remanence ratio - 1.0

LINE 9640 NORTH



MODEL PARAMETERS:

Model Type		Tabular2
Depth	F	20.8 m
Half Width	F	13.2 m
Half Length	X	200 m
Offset	X	0 m
Dip	F	87 deg
Thickness	F	3075 m
Susceptibility	F	0.0454 emu
Remnance Ratio	X	1
Remnance Incl	F	-54 deg
Remnance Decl	F	297 deg
Main Position	F	11083.55 m
Cross Position	X	9640 m
Base Level	F	57198.7 nT
Base Slope	X	0 nT/m
Base Curvature	X	0 nT/m2

(F-fitted, X-fixed, L-limit)

GEOMAGNETIC FIELD:

Field Strength	57184 nT
Inclination	72 deg
Declination	20 deg

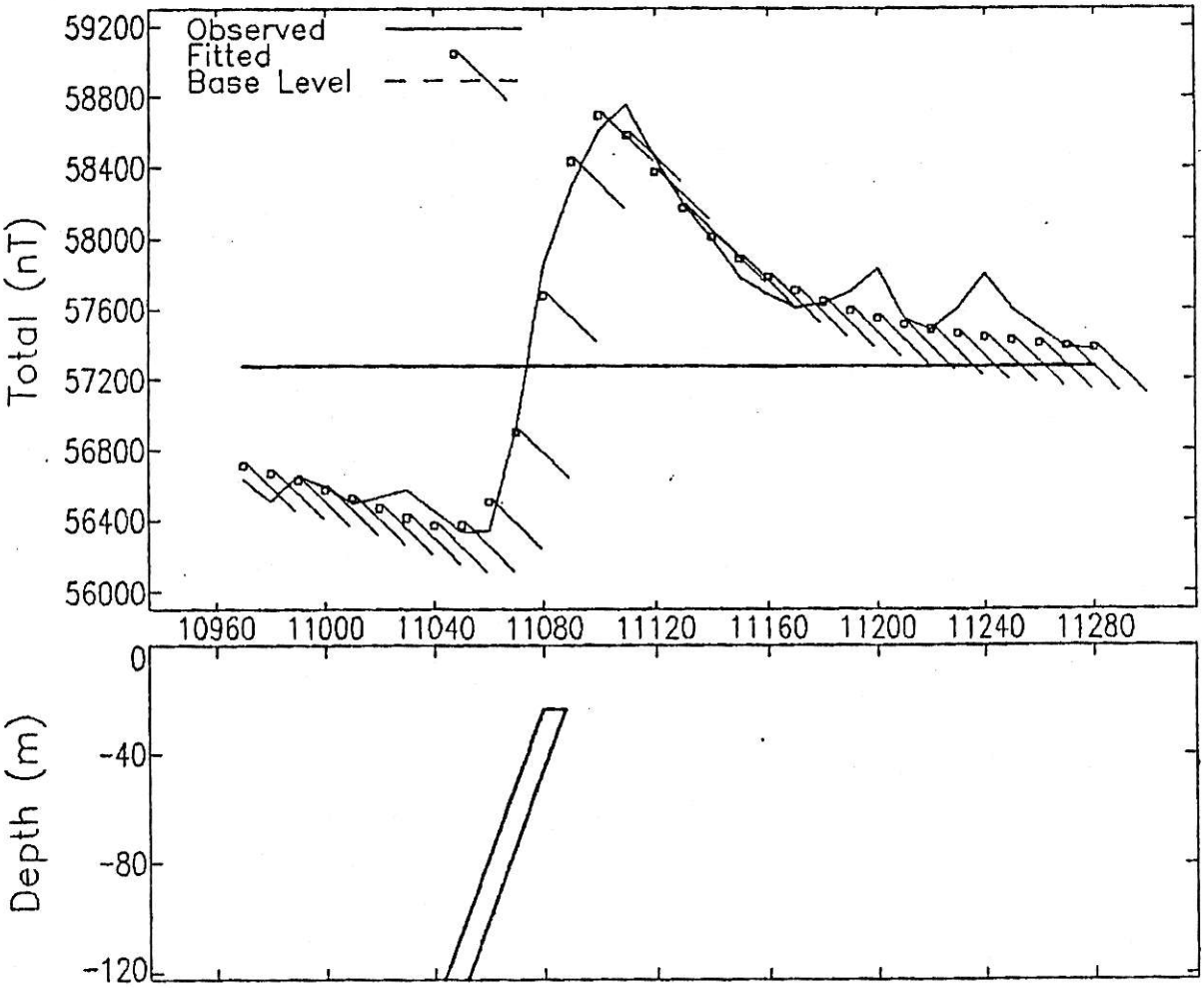
COORDINATES:

Sensor Height	2 m
Strike Perp	90 deg
Line Direction	90 deg
Main Direction	90 deg
Main Offset	
Cross Direction	0 deg
Cross Offset	

Eholt Area, B.C. - Tabular 2 Model

Remanence ratio - 10.0

LINE 9640 NORTH



MODEL PARAMETERS:

Model Type		Tabular2
Depth	F	23.4 m
Half Width	F	4.18 m
Half Length	X	200 m
Offset	X	0 m
Dip	F	110 deg
Thickness	F	2910 m
Susceptibility	F	0.0122 emu
Remnance Ratio	X	10
Remnance Incl	F	-7 deg
Remnance Decl	F	-36 deg
Main Position	F	11083.79 m
Cross Position	X	9640 m
Base Level	F	57275.1 nT
Base Slope	X	0 nT/m
Base Curvature	X	0 nT/m2

(F-fitted, X-fixed, L-limit)

GEOMAGNETIC FIELD:

Field Strength	57184 nT
Inclination	72 deg
Declination	20 deg

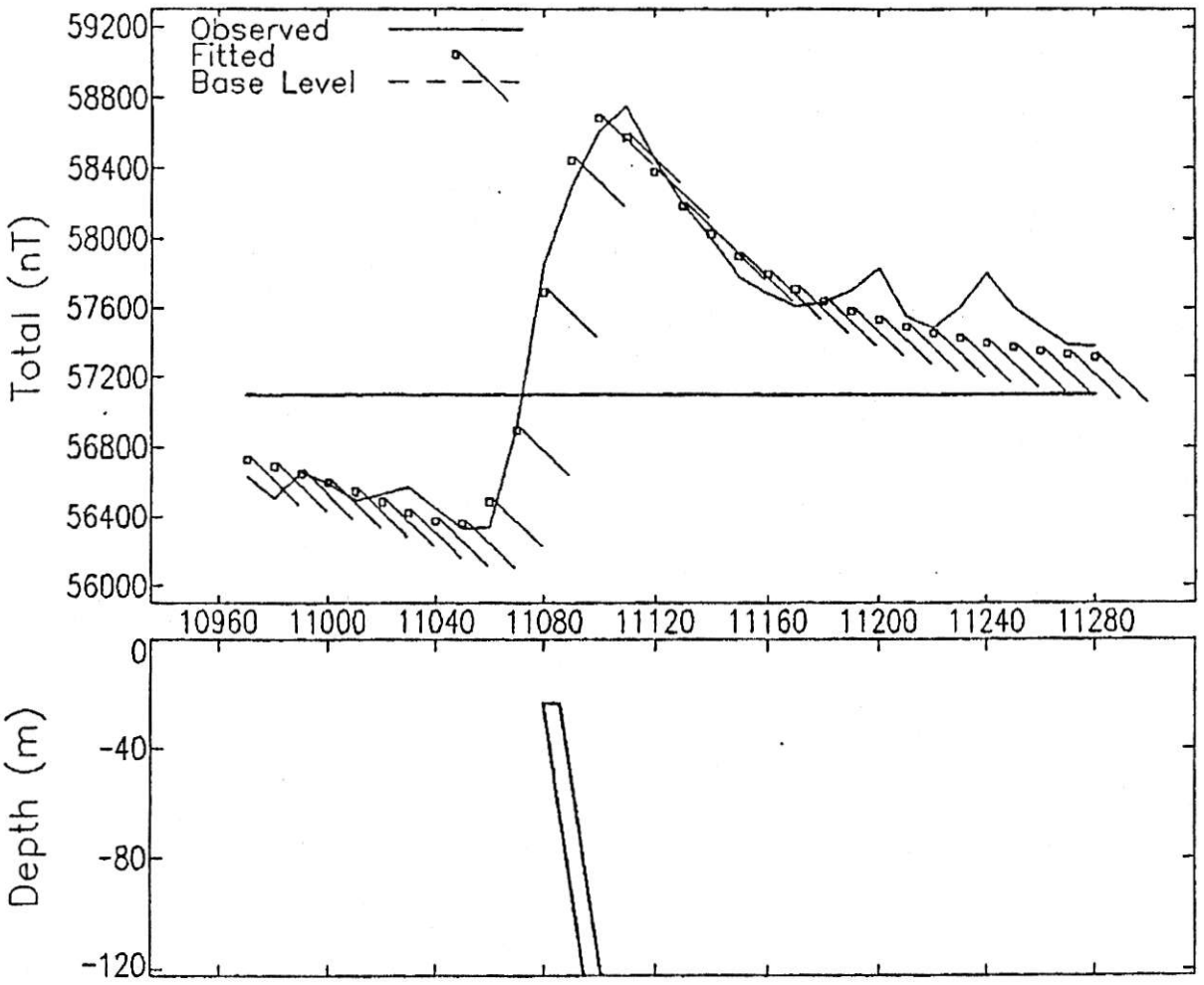
COORDINATES:

Sensor Height	2 m
Strike Perp	90 deg
Line Direction	90 deg
Main Direction	90 deg
Main Offset	
Cross Direction	0 deg
Cross Offset	

Eholt Area, B.C. - Tabular 2 Model

Remanence ratio - 10 - east declination

LINE 9640 NORTH



MODEL PARAMETERS:

Model Type		Tabular2
Depth	F	23.5 m
Half Width	F	3.06 m
Half Length	X	200 m
Offset	X	0 m
Dip	F	81 deg
Thickness	F	3092 m
Susceptibility	F	0.00893 emu
Remnance Ratio	X	10
Remnance Incl	F	162 deg
Remnance Decl	X	90 deg
Main Position	F	11082.79 m
Cross Position	X	9640 m
Base Level	F	57097.17 nT
Base Slope	X	0 nT/m
Base Curvature	X	0 nT/m2

(F-fitted, X-fixed, L-limit)

GEOMAGNETIC FIELD:

Field Strength	57184 nT
Inclination	72 deg
Declination	20 deg

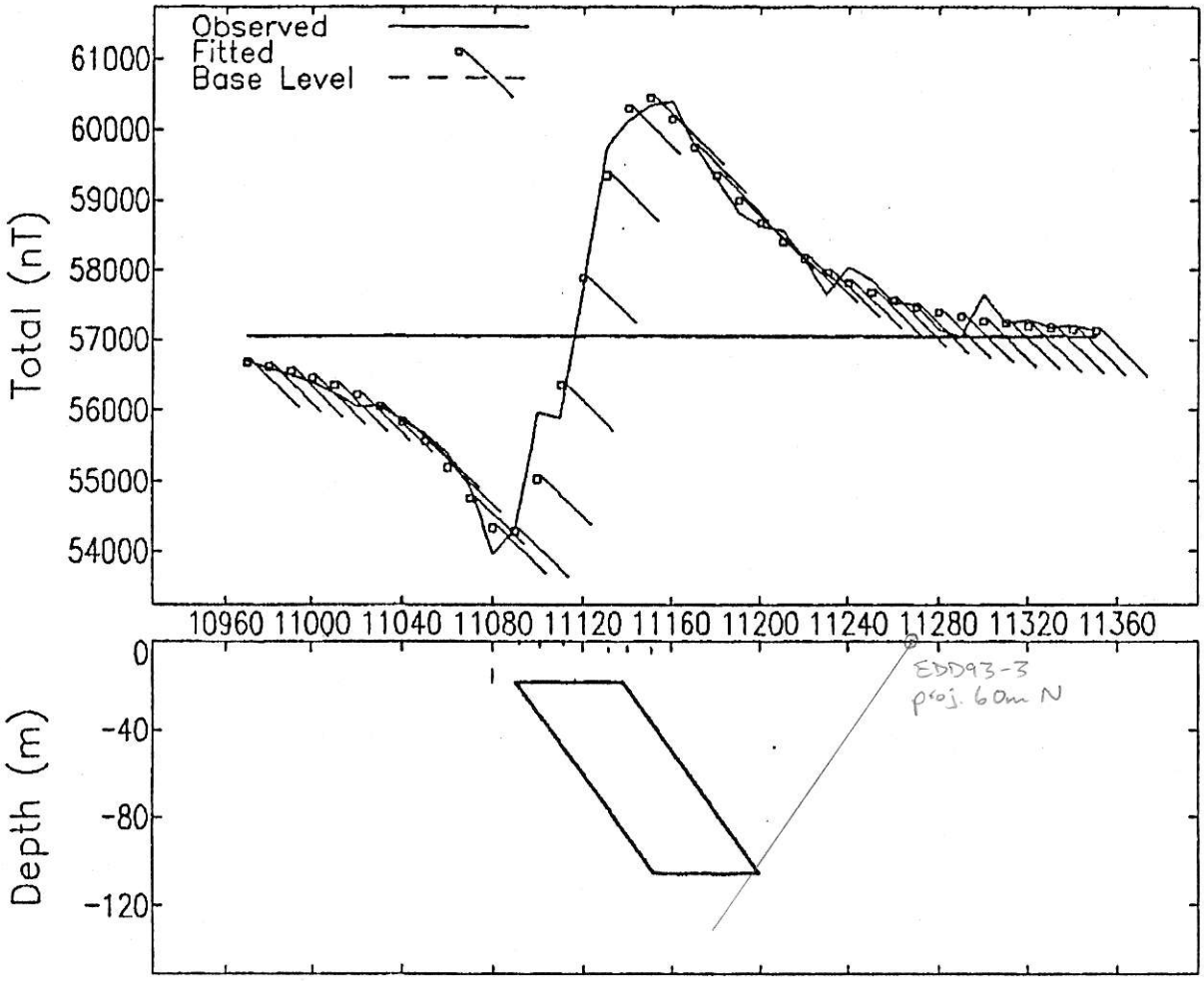
COORDINATES:

Sensor Height	2 m
Strike Perp	90 deg
Line Direction	90 deg
Main Direction	90 deg
Main Offset	
Cross Direction	0 deg
Cross Offset	

Eholt Area, B.C. - Tabular 2 Model

Remanence ratio - 1.0

LINE 9820 NORTH



MODEL PARAMETERS:

Model Type		Tabular2
Depth	F	18.2 m
Half Width	F	23.9 m
Half Length	X	200 m
Offset	X	0 m
Dip	F	55 deg
Thickness	F	87.0 m
Susceptibility	F	0.121 emu
Remnance Ratio	X	1
Remnance Incl	F	-58 deg
Remnance Decl	F	-132 deg
Main Position	F	11114.02 m
Cross Position	X	9820 m
Base Level	F	57049.16 nT
Base Slope	X	0 nT/m
Base Curvature	X	0 nT/m2

(F-fitted, X-fixed, L-limit)

GEOMAGNETIC FIELD:

Field Strength	57184 nT
Inclination	72 deg
Declination	20 deg

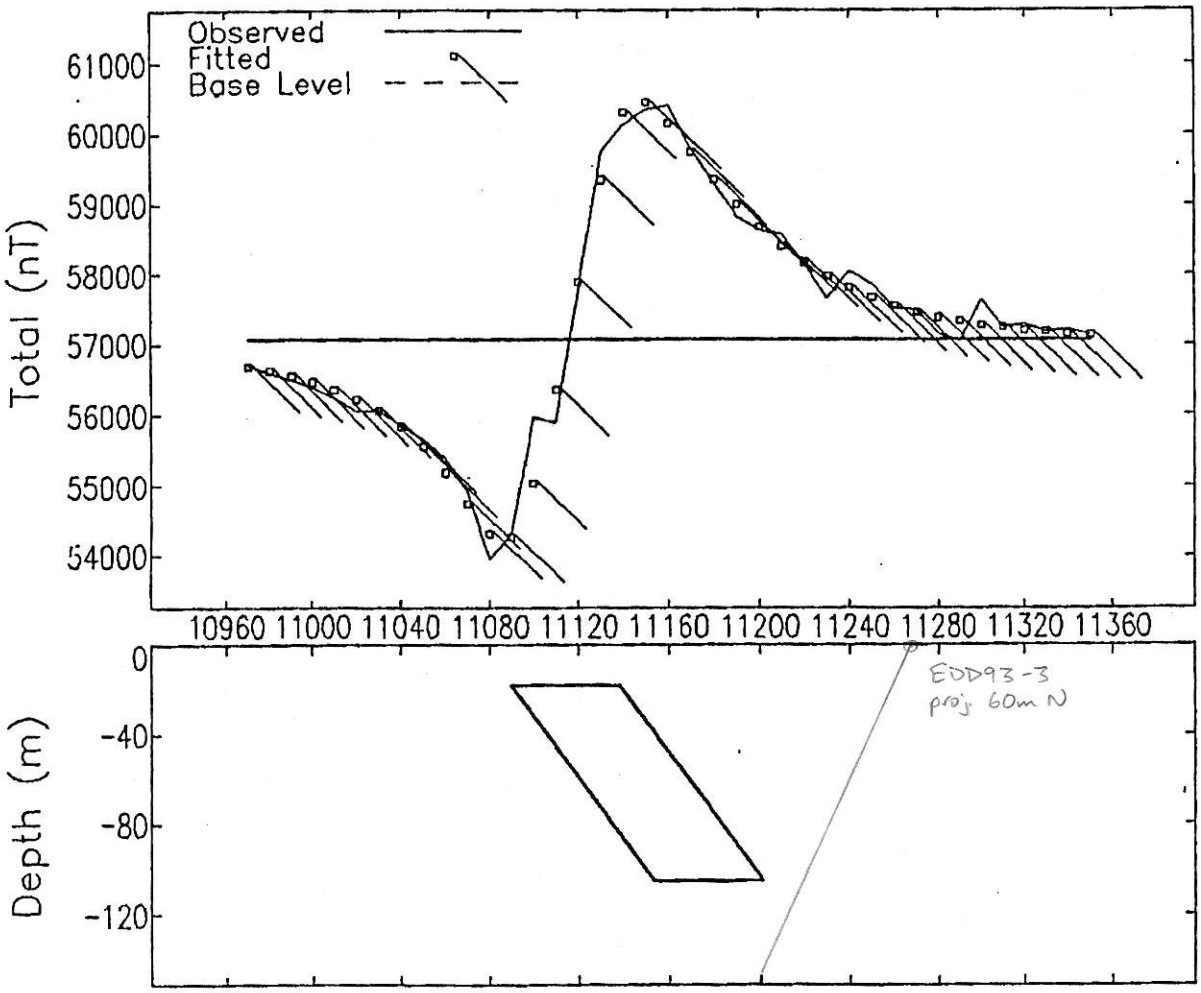
COORDINATES:

Sensor Height	2 m
Strike Perp	90 deg
Line Direction	90 deg
Main Direction	90 deg
Main Offset	
Cross Direction	0 deg
Cross Offset	

Eholt Area, B.C. - Tabular 2 Model

Remanence ratio - 10 - east declination

LINE 9820 NORTH



MODEL PARAMETERS:

Model Type		Tabular2
Depth	F	18.0 m
Half Width	F	24.1 m
Half Length	X	200 m
Offset	X	0 m
Dip	F	54 deg
Thickness	F	87.0 m
Susceptibility	F	0.00358 emu
Remnance Ratio	X	10
Remnance Incl	F	165 deg
Remnance Decl	X	90 deg
Main Position	F	11113.96 m
Cross Position	X	9820 m
Base Level	F	57062.22 nT
Base Slope	X	0 nT/m
Base Curvature	X	0 nT/m2

(F-fitted, X-fixed, L-limit)

GEOMAGNETIC FIELD:

Field Strength	57184 nT
Inclination	72 deg
Declination	20 deg

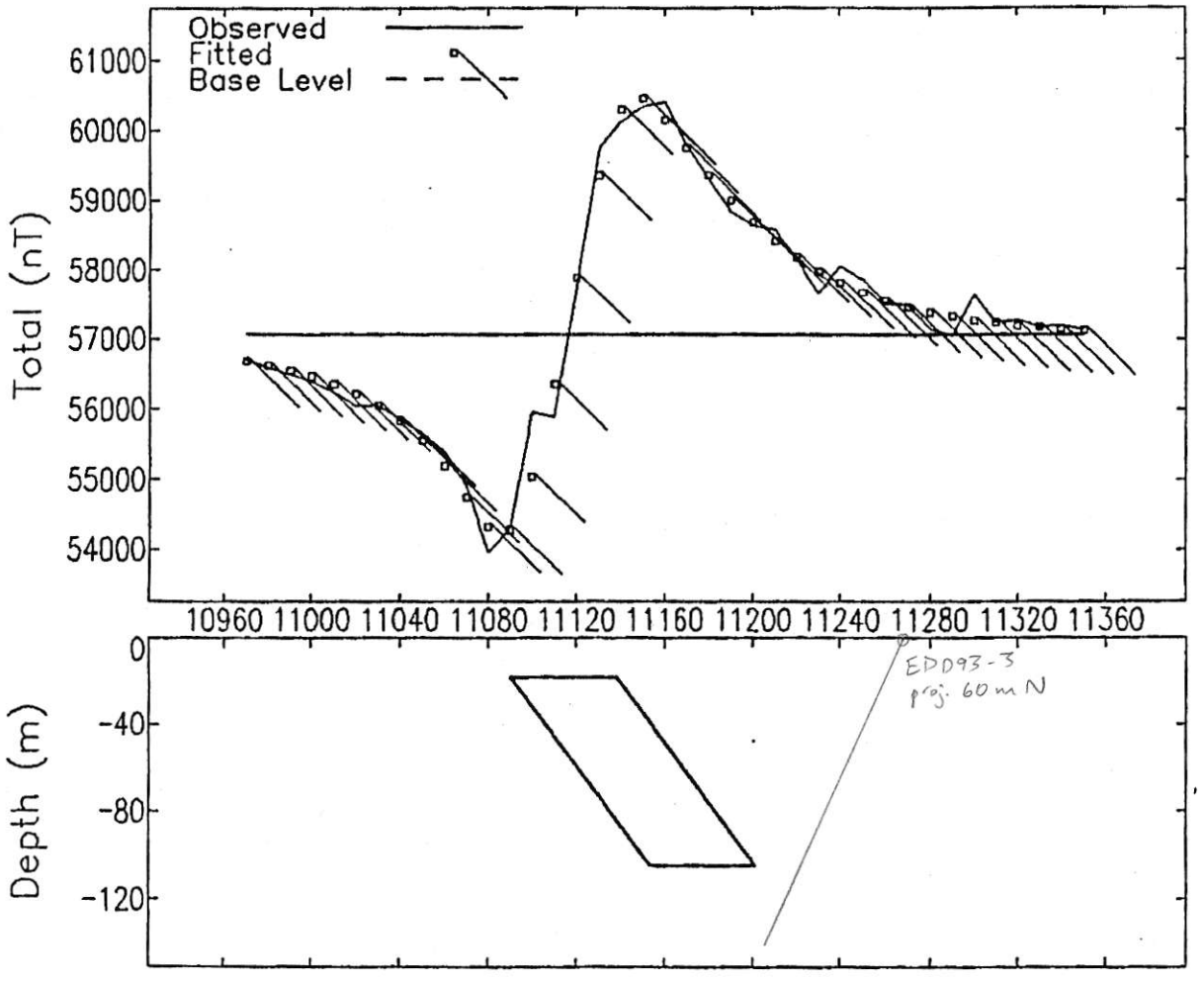
COORDINATES:

Sensor Height	2 m
Strike Perp	90 deg
Line Direction	90 deg
Main Direction	90 deg
Main Offset	
Cross Direction	0 deg
Cross Offset	

Eholt Area, B.C. – Tabular 2 Model

Ramanence ratio – 10 – west declination

LINE 9820 NORTH



MODEL PARAMETERS:

Model Type		Tabular2
Depth	F	18.1 m
Half Width	F	24.0 m
Half Length	X	200 m
Offset	X	0 m
Dip	F	54 deg
Thickness	F	86.7 m
Susceptibility	F	0.00359 emu
Remnance Ratio	X	10
Remnance Incl	F	15 deg
Remnance Decl	X	270 deg
Main Position	F	11113.94 m
Cross Position	X	9820 m
Base Level	F	57062.81 nT
Base Slope	X	0 nT/m
Base Curvature	X	0 nT/m2

(F-fitted, X-fixed, L-limit)

GEOMAGNETIC FIELD:

Field Strength	57184 nT
Inclination	72 deg
Declination	20 deg

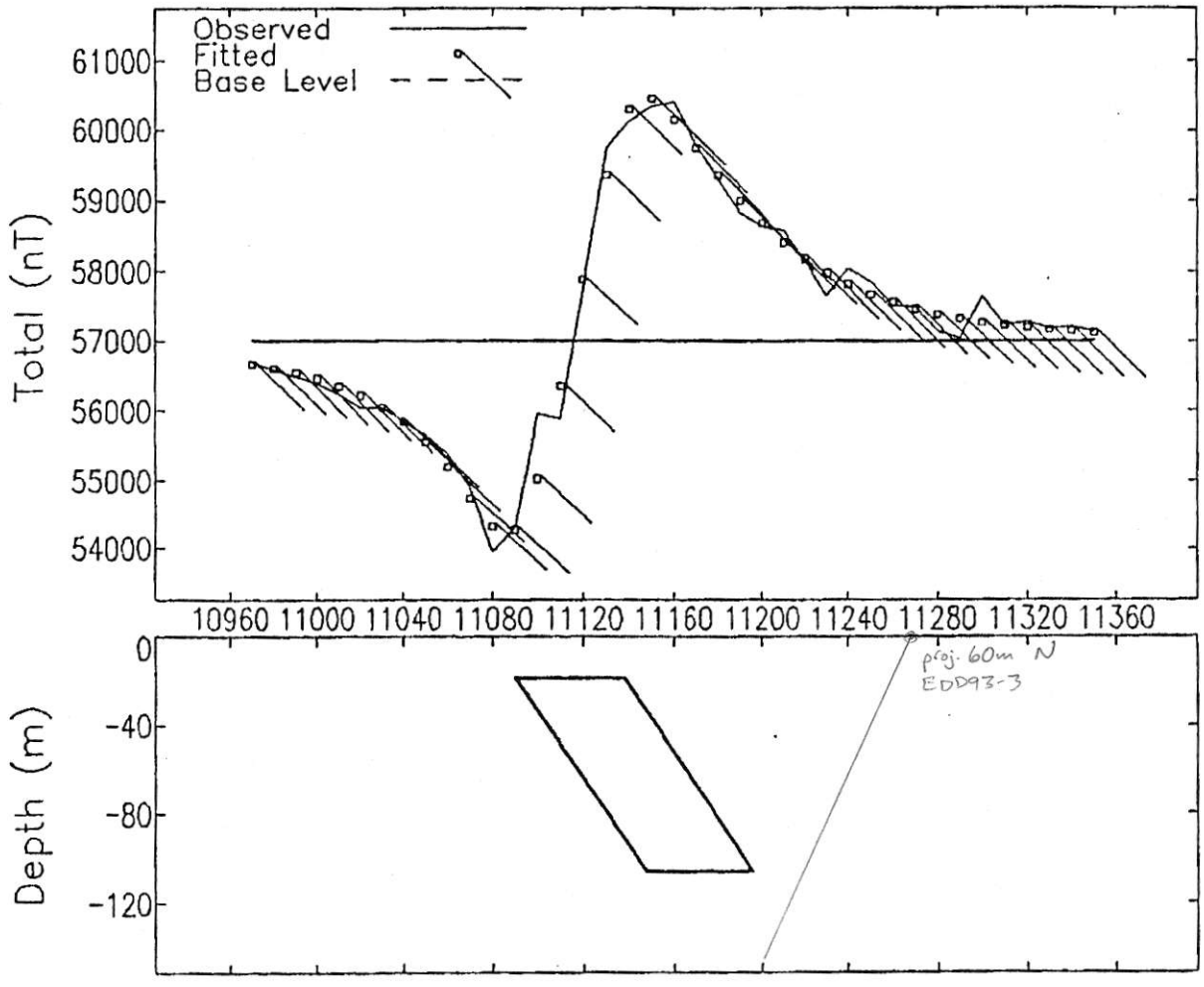
COORDINATES:

Sensor Height	2 m
Strike Perp	90 deg
Line Direction	90 deg
Main Direction	90 deg
Main Offset	
Cross Direction	0 deg
Cross Offset	

Eholt Area, B.C. - Tabular 2 Model

Remanence ratio - 10.0

LINE 9820 NORTH



MODEL PARAMETERS:

Model Type		Tabular2
Depth	F	18.4 m
Half Width	F	23.9 m
Half Length	X	200 m
Offset	X	0 m
Dip	F	57 deg
Thickness	F	87.3 m
Susceptibility	F	0.00540 emu
Remnance Ratio	X	10
Remnance Incl	F	6 deg
Remnance Decl	F	-139 deg
Main Position	F	11113.95 m
Cross Position	X	9820 m
Base Level	F	56999.79 nT
Base Slope	X	0 nT/m
Base Curvature	X	0 nT/m2

(F-fitted, X-fixed, L-limit)

GEOMAGNETIC FIELD:

Field Strength	57184 nT
Inclination	72 deg
Declination	20 deg

COORDINATES:

Sensor Height	2 m
Strike Perp	90 deg
Line Direction	90 deg
Main Direction	90 deg
Main Offset	
Cross Direction	0 deg
Cross Offset	

Geosoft MAGMOD-3 Modeling Result 93/09/29