Report to:

RARE EARTH METALS INC.

Technical Report on the Clay-Howells Fe-REE Project, Ontario, Canada

Document No. 1192410300-REP-R0001-01

Report to:

RARE EARTH METALS INC.

TECHNICAL REPORT ON THE CLAY-HOWELLS FE-REE PROJECT, ONTARIO, CANADA

EFFECTIVE DATE: SEPTEMBER 26, 2011

Prepared by Paul Daigle, P.Geo.

PD/vc

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Prepared by	*"Original document signed by Paul Daigle, P.Geo."* Paul Daigle, P.Geo.	Date	September 26, 2011
Reviewed by	*"Original document signed by Tim Maunula, P.Geo."* Tim Maunula, P.Geo.	Date	September 26, 2011
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REVISION HISTORY

REV. NO	ISSUE DATE	PREPARED BY AND DATE	REVIEWED BY AND DATE	APPROVED BY AND DATE	DESCRIPTION OF REVISION
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GLOSSARY

UNITS OF MEASURE

Above mean sea level	amsl
Acre	ac
Ampere	A
Annum (year)	a
Billion	B
Billion tonnes	Bt
Billion years ago	Ga
British thermal unit	BTU
Centimetre	cm
Cubic centimetre	cm^3
Cubic feet per minute	cfm
Cubic feet per second	ft^3/s
Cubic foot	ft^3
Cubic inch	in^3
Cubic metre	m^3
Cubic yard	yd^3
Coefficients of Variation	CVs
Day	d
Days per week	d/wk
Days per year (annum)	d/a
Dead weight tonnes	DWT
Decibel adjusted	dBa
Decibel	dB
Degree	°
Degrees Celsius	°C
Diameter	ø
Dollar (American)	US$
Dollar (Canadian)	Cdn$
Dry metric ton	dmt

Foot	ft
Gallon	gal
Gallons per minute (US)	gpm
Gigajoule	GJ
Gigapascal	GPa
Gigawatt	GW
Gram	g
Grams per litre	g/L
Grams per tonne	g/t
Greater than	>
Hectare (10,000 m^2)	ha
Hertz	Hz
Horsepower	hp
Hour	h
Hours per day	h/d
Hours per week	h/wk
Hours per year	h/a
Inch	"
Kilo (thousand)	k
Kilogram	kg
Kilograms per cubic metre	kg/m^3
Kilograms per hour	kg/h
Kilograms per square metre	kg/m^2
Kilometre	km
Kilometres per hour	km/h
Kilopascal	kPa
Kilotonne	kt
Kilovolt	kV
Kilovolt-ampere	kVA
Kilovolts	kV
Kilowatt	kW
Kilowatt hour	kWh
Kilowatt hours per tonne (metric ton)	kWh/t
Kilowatt hours per year	kWh/a
Less than	<
Litre	L
Litres per minute	L/m
Megabytes per second	Mb/s
Megapascal	MPa
Megavolt-ampere	MVA
Megawatt	MW
Metre	m
Metres above sea level	masl
Metres Baltic sea level	mbsl
Metres per minute	m/min
Metres per second	m/s

Metric ton (tonne)	t
Microns	µm
Milligram	mg
Milligrams per litre	mg/L
Millilitre	mL
Millimetre	mm
Million	M
Million bank cubic metres	Mbm^3
Million bank cubic metres per annum	Mbm^3/a
Million tonnes	Mt
Minute (plane angle)	'
Minute (time)	min
Month	mo
Ounce	oz
Pascal	Pa
Centipoise	mPa·s
Parts per million	ppm
Parts per billion	ppb
Percent	%
Pound(s)	lb
Pounds per square inch	psi
Revolutions per minute	rpm
Second (plane angle)	"
Second (time)	s
Specific gravity	SG
Square centimetre	cm^2
Square foot	ft^2
Square inch	in^2
Square kilometre	km^2
Square metre	m^2
Thousand tonnes	kt
Three Dimensional	3D
Three Dimensional Model	3DM
Tonne (1,000 kg)	t
Tonnes per day	t/d
Tonnes per hour	t/h
Tonnes per year	t/a
Tonnes seconds per hour metre cubed	ts/hm^3
Volt	V
Week	wk
Weight/weight	w/w
Wet metric ton	wmt
Year (annum)	a

ABBREVIATIONS AND ACRONYMS

All-Terrain Vehicles	ATVs
ALS Canada Ltd.	ALS
cerium-lanthanum-calcium	Ce-La-Ca
Clay-Howells iron-rare earth element Property	the Property
Electron Probe Micro Analysis	EPMA
Global Positioning System	GPS
ID	identification
inductively coupled plasma-mass spectroscopy	ICP-MS
inductively coupled plasma-optical emission spectroscopy	ICP-OES
Inverse Distance	ID2
iron oxide	Fe2O3%
iron-rare earth element	Fe-REE
low-thorium	Th
magnesium oxide	MnO%
National Instrument 43-101	NI 43-101
National Topographic System	NTS
Net Smelter Revenue Royalty	NSR
Niobium	Nb
niobium oxide	Nb_2O_5%
Ontario Power Generation	OPG
ordinary kriging	OK
Qualified Person	QP
Quantitative Evaluation of Materials by Scanning Electron Microscope	QEMSCAN
rare earth element	REE
Rare Earth Metals Inc.	REM
rare earth oxides	REOs
Reflex Positioning System	RPS
rubidium-strontium	Rb-Sr
Tetra Tech Wardrop	Tetra Tech
thorium oxide	ThO_2%
total rare earth oxide	TREO%
TSX Venture Exchange	TSXV
x-ray fluorescence	XRF
Yttrium	Y

1.0 SUMMARY

Tetra Tech Wardrop (Tetra Tech) was retained by Rare Earth Metals Inc. (REM) to produce the first National Instrument 43-101 (NI 43-101) compliant resource estimate on the Clay-Howells iron-rare earth element (Fe-REE) Property (the Property), and to provide the accompanying NI 43-101 technical report. This technical report is prepared in accordance with NI 43-101 and Form 43-101F1.

The Qualified Person (QP) responsible for this report is Paul Daigle, P.Geo., Tetra Tech Senior Geologist. Mr. Daigle conducted a site visit to the Property on July 7, 2011 for one day.

1.1 PROPERTY DESCRIPTION

The Property is located in northern Ontario, Canada, roughly 50 km north-northeast of the town of Kapuskasing. It is defined by 56 contiguous mining claims and 45 patented claims spanning a total of 13,104 ha, and are currently 100% held by REM. All claim and patents are in good standing.

On July 23, 2009, REM entered into a Property Option Agreement with 1376361 Ontario Ltd. where REM was given the exclusive option to acquire 100% ownership of the patented claims that make up the Property. REM exercised this option and has purchased the rights to the patented claims.

According to the Option Agreement, 1376361 Ontario Ltd. retains a 2% Net Smelter Revenue Royalty (NSR) on commercial production from the patented claims, and based on the calculation stipulated in Schedule “B” of the Option Agreement. REM has the right and option to purchase, at any time, one half of the NSR for the sum of $1 million.

1.2 GEOLOGY AND MINERALIZATION

The Clay-Howells Alkalic Complex is situated within the Kapuskasing Sub-province of the Superior Province in the Canadian Shield. The syenitic to monzonitic rocks appear to have intruded the region in several pulses. They are unmetamorphosed, and are thought to be mushroom-shaped in vertical cross-section. A dyke-like body of magnetite-rich carbonatite intrudes the syenitic rocks within the southeast corner of the complex (Sage, 1988).

The Property is predominantly comprised of these syenites, carbonatites, massive magnetites, fault-alteration breccias, and syenite breccias. REE-bearing minerals within the Clay-Howells deposit are complex, but primarily consist of a cerium-lanthanum-calcium (Ce-La-Ca) silicate and monazite (or phosphate phases similar in composition to monazite). A high Fe-REE mineral, fergusonite, and allanite are also observed in trace amounts. Monazite, apatite, and a Ce-La-Ca silicate are the three main mineral groups hosting the REE. The REE-bearing minerals are typically very coarse grained with approximately 50% of the distribution occurring as grains greater than 100 µm wide (Kormos, 2010).

1.3 Exploration Status

Between January 6 and March 29, 2010, REM drilled 18 diamond drillholes on the Property, totalling 5,436.5 m. The resource estimate presented in this report is based on 17 of the 18 completed drill holes.

An airborne magnetic and radiometric geophysical survey and ground magnetic geophysical survey were also conducted in 2010.

1.4 Resource Estimate

The effective date of the Clay-Howells Fe-REE mineral resource estimate is September 23, 2011.

The mineral resource estimate for the deposit, at 0.6 total rare earth oxide (TREO%) cut-off grade, is an Inferred Resource of 8.5 Mt at 44.15% iron oxide (Fe_2O_3%) and 0.73 TREO%.

The mineral resource was estimated by Ordinary Kriging (OK) interpolation method for Fe_2O_3%, 15 individual rare earth oxides (REOs), niobium oxide (Nb_2O_5%), magnesium oxide (MnO%) and thorium oxide (ThO_2%). The TREO% is a sum of the 15 individual interpolations of the REOs. No recoveries have been applied to the interpolated estimates.

Table 1.1 summarizes the Inferred Resource estimates for the Clay-Howells deposit at various cut-off grades between 0.20 and 0.90% TREO% cut-off. Table 1.2 presents the Inferred Resource Estimates by individual REOs.

Table 1.1 Inferred Resource Estimate for the Clay-Howells Deposit

TREO% Cut-Off	Tonnes (x 000)	Density	Light Rare Earth Oxide (LREO%)	Heavy Rare Earth Oxide (HREO%)*	TREO%**	HREO:TREO Ratio	Fe_2O_3%	Nb_2O_5%	MnO%	ThO_2%
0.9%	690	3.40	0.962	0.096	1.058	9%	45.47	0.13	2.34	0.06
0.8%	1,612	3.42	0.847	0.087	0.934	9%	45.92	0.14	2.33	0.07
0.7%	4,293	3.43	0.736	0.080	0.816	10%	45.17	0.13	2.25	0.08
0.6%	**8,477**	**3.44**	**0.661**	**0.071**	**0.732**	**10%**	**44.15**	**0.13**	**2.20**	**0.07**
0.5%	15,293	3.42	0.585	0.064	0.649	10%	42.19	0.12	2.09	0.07
0.4%	25,059	3.40	0.513	0.058	0.571	10%	38.93	0.12	1.93	0.06
0.3%	35,496	3.39	0.454	0.053	0.507	10%	35.44	0.12	1.77	0.05
0.2%	40,422	3.38	0.426	0.050	0.476	10%	34.62	0.11	1.71	0.05

Note: * Includes Y_2O_3
**See Table 14.22

Table 1.2 Inferred Resource Estimate for the Clay-Howells Deposit by REOs

TREO% Cut-Off	Tonnes (x 000)	LA_2O_3	CE_2O_3	PR_2O_3	ND_2O_3	SM_2O_3	EU_2O_3	GD_2O_3	TB_2O_3	DY_2O_3	HO_2O_3	ER_2O_3	TM_2O_3	YB_2O_3	LU_2O_3	Y_2O_3	TREO
0.9%	690	0.292	0.455	0.044	0.148	0.022	0.005	0.015	0.004	0.009	0.002	0.005	0.001	0.004	0.001	0.051	1.058
0.8%	1,612	0.251	0.403	0.039	0.133	0.020	0.005	0.014	0.005	0.009	0.002	0.004	0.001	0.003	0.000	0.045	0.934
0.7%	4,293	0.210	0.353	0.035	0.119	0.018	0.005	0.012	0.005	0.008	0.001	0.004	0.000	0.003	0.000	0.041	0.816
0.6%	**8,477**	**0.183**	**0.318**	**0.032**	**0.110**	**0.017**	**0.004**	**0.011**	**0.004**	**0.007**	**0.001**	**0.003**	**0.000**	**0.003**	**0.000**	**0.036**	**0.732**
0.5%	15,293	0.159	0.282	0.029	0.099	0.015	0.004	0.010	0.004	0.006	0.001	0.003	0.000	0.002	0.000	0.033	0.649
0.4%	25,059	0.138	0.248	0.025	0.088	0.014	0.004	0.009	0.003	0.006	0.001	0.003	0.000	0.002	0.000	0.030	0.571
0.3%	35,496	0.121	0.219	0.023	0.079	0.012	0.003	0.008	0.003	0.005	0.001	0.002	0.000	0.002	0.000	0.027	0.507
0.2%	40,422	0.114	0.205	0.021	0.075	0.012	0.003	0.008	0.003	0.005	0.001	0.002	0.000	0.002	0.000	0.025	0.476

Tetra Tech recommends that the remaining unsampled drill core from the 2010 drill program be split, sampled and analyzed, as per QA/QC procedures established by REM. This additional data will enable the interpretation of mineralized boundaries with greater confidence and increase the sample population for a more robust resource estimate. This cost is estimated at approximately $90,000.

Tetra Tech recommends that additional drilling be conducted to further investigate and develop the known Clay-Howells deposit and determine continuity of the carbonatite, mineralized syenite, and massive magnetite lithologies and Fe and REE grades. Additional in-fill drilling between the established drill sections would increase confidence in the continuity of grade and geology across the deposit. Tetra Tech also recommends that a specific gravity readings be included in the next phase of drilling as the tonnage will be greatly affected by the higher than normal densities from the iron mineralization.

Currently, REM has no immediate plans for drill program in the immediate future. Should the drill program go ahead, Tetra Tech recommends a minimum of 5,000 m and approximately 14 drill holes (two drill holes per infill section) from separate drill collars (to reduce the drill hole spacing and spacing between samples). The purpose of the infill program is to collect additional data to increase the sample population, reduce the distance between samples and, thereby bring additional confidence to the resource estimate. Such a drill program is estimated at $600,000.

2.0 INTRODUCTION

REM is a Canadian-based and Canadian-registered resource company, based in Thunder Bay, Ontario, and is publicly listed on the TSX Venture Exchange (TSXV) as RA.V and on the OTCQX as RAREF. REM is a junior exploration company focused on rare earth element (REE) projects with superior existing infrastructure or excellent potential infrastructure for mine development (Website: www.rareearthmetals.ca).

This technical report and resource estimate is on the Clay-Howells Fe-REE project in northern Ontario, approximately 40 km north-northeast of the town of Kapuskasing.

2.1 TERMS OF REFERENCE AND PURPOSE OF REPORT

Tetra Tech was retained by REM to produce the first NI 43-101 compliant resource estimate on the Clay-Howells Fe-REE property and to provide the accompanying NI 43-101 technical report. This technical report conforms to the standards set out in NI 43-101 Standards and Disclosure for Mineral Projects and is in compliance with Form 43-101F1.

2.1.1 UNITS OF MEASUREMENT

All units of measurement used in this technical report and resource estimate are in metric, unless otherwise stated.

2.2 INFORMATION AND DATA SOURCES

The main sources of information in preparing this report are listed below. A complete list of references is provided in Section 27.0 of this report.

- Kormos, L. July 10, 2010. Xstrata Process Support Mineralogical Report – 5010807.00 Prepared for Reg Felix, Rare Earth Metals Inc. Mineralogical Analysis and Magnetic Separation Testing of Clay-Howells Iron-REE-Nb Deposit Samples.
- Penney, G., and Nielsen, P. 2010. Work Report of Diamond Drilling, Prospecting, Line-cutting Activities and Magnetic Survey on Mineral Claims of the Clay-Howells Project, Clay, Howells, Hopkins and Mowbray Townships, Ontario, Canada. Rare Earth Metals Inc. internal report.
- Sage, R.P. 1988. Geology of Carbonatite – Alkalic Rock Complexes in Ontario: Clay-Howells Alkalic Rock Complex, District of Cochrane. Ontario

Geological Survey, Study 37. Ministry of Northern Development and Mines – Mines and Minerals Division. pp. 104.

2.3 TETRA TECH QP SITE VISIT

Paul Daigle, P.Geo., Senior Geologist with Tetra Tech, conducted a site visit to the Property on July 7, 2011 for one day.

3.0 RELIANCE ON OTHER EXPERTS

Tetra Tech has relied upon REM for information in this report and for matters relating to property ownership, property titles, and environmental issues. The majority of the information has been sourced from REM internal reports, company press releases, and from the following:

- Kormos, L. July 10, 2010. Xstrata Process Support Mineralogical Report – 5010807.00 Prepared for Reg Felix, Rare Earth Metals Inc. Mineralogical Analysis and Magnetic Separation Testing of Clay-Howells Iron-REE-Nb Deposit Samples.
- Sage, R.P. 1988. Geology of Carbonatite – Alkalic Rock Complexes in Ontario: Clay-Howells Alkalic Rock Complex, District of Cochrane. Ontario Geological Survey, Study 37. Ministry of Northern Development and Mines – Mines and Minerals Division. pp. 104.

Information from third party sources is referenced under Section 27. Tetra Tech used information from these sources under the assumption that the information is accurate. Tetra Tech has not conducted an examination of land titles or mineral rights for the Property.

4.0 PROPERTY DESCRIPTION AND LOCATION

The Property is defined by the mineral rights to 56 contiguous mining claims and 45 patented claims in northern Ontario, currently 100% held by REM, and cover an area approximately 13,104 ha.

4.1 LOCATION

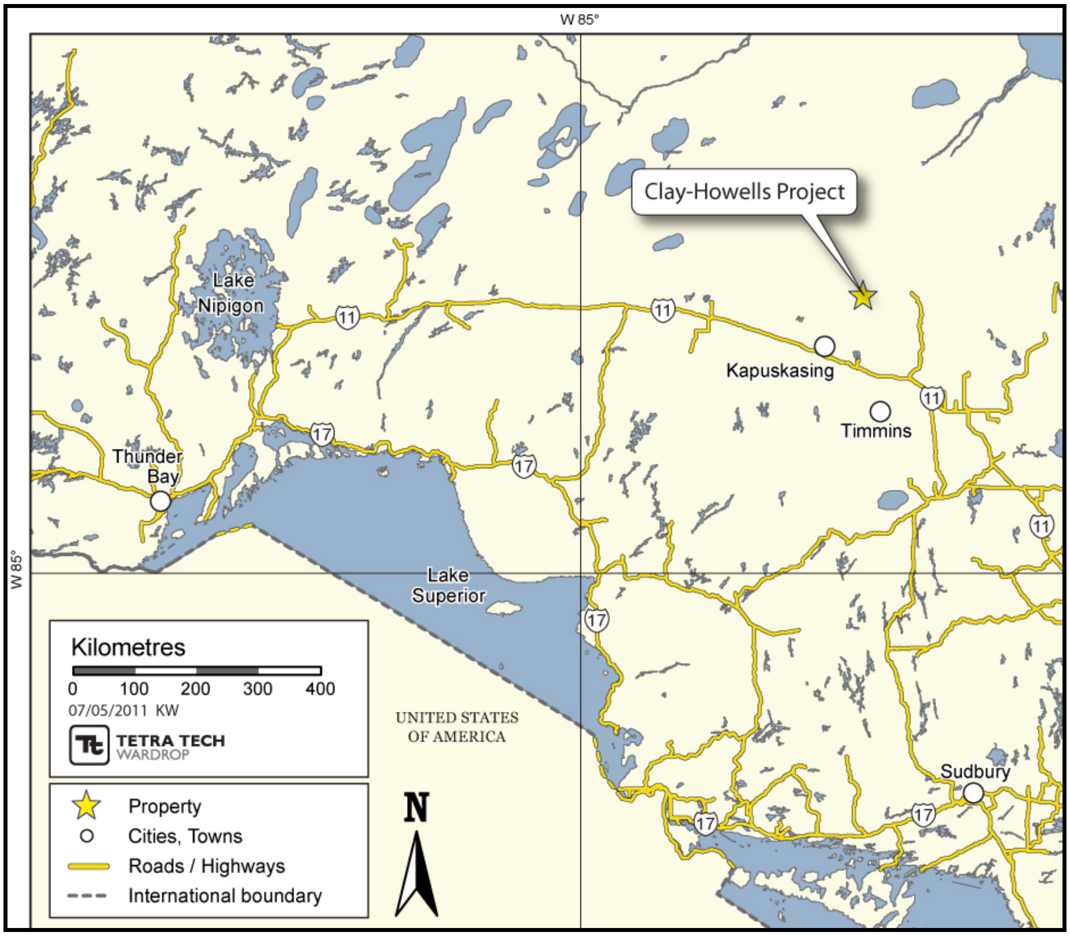
The Property is located:

- within National Topographic System (NTS) map sheets 42G/16 and 42G/09
- at approximately 424150E and 5519200N (Zone 17, NAD83) in north central Ontario, Canada
- at approximately 50 km north-northeast of Kapuskasing, Ontario
- at approximately 160 km north-northwest of Timmins, Ontario, in the District of Cochrane
- in the Townships of Clay, Howells, Mowbry, and Hopkins
- at approximately 20 km south-southeast of Power dam, on the Mattagami River
- on the right bank of the Mattagami River.

The Property is situated as shown in Figure 4.1 and Figure 4.2.

Figure 4.1 Property Location Map

Figure 4.2 Property Location Map of the Clay-Howells Property



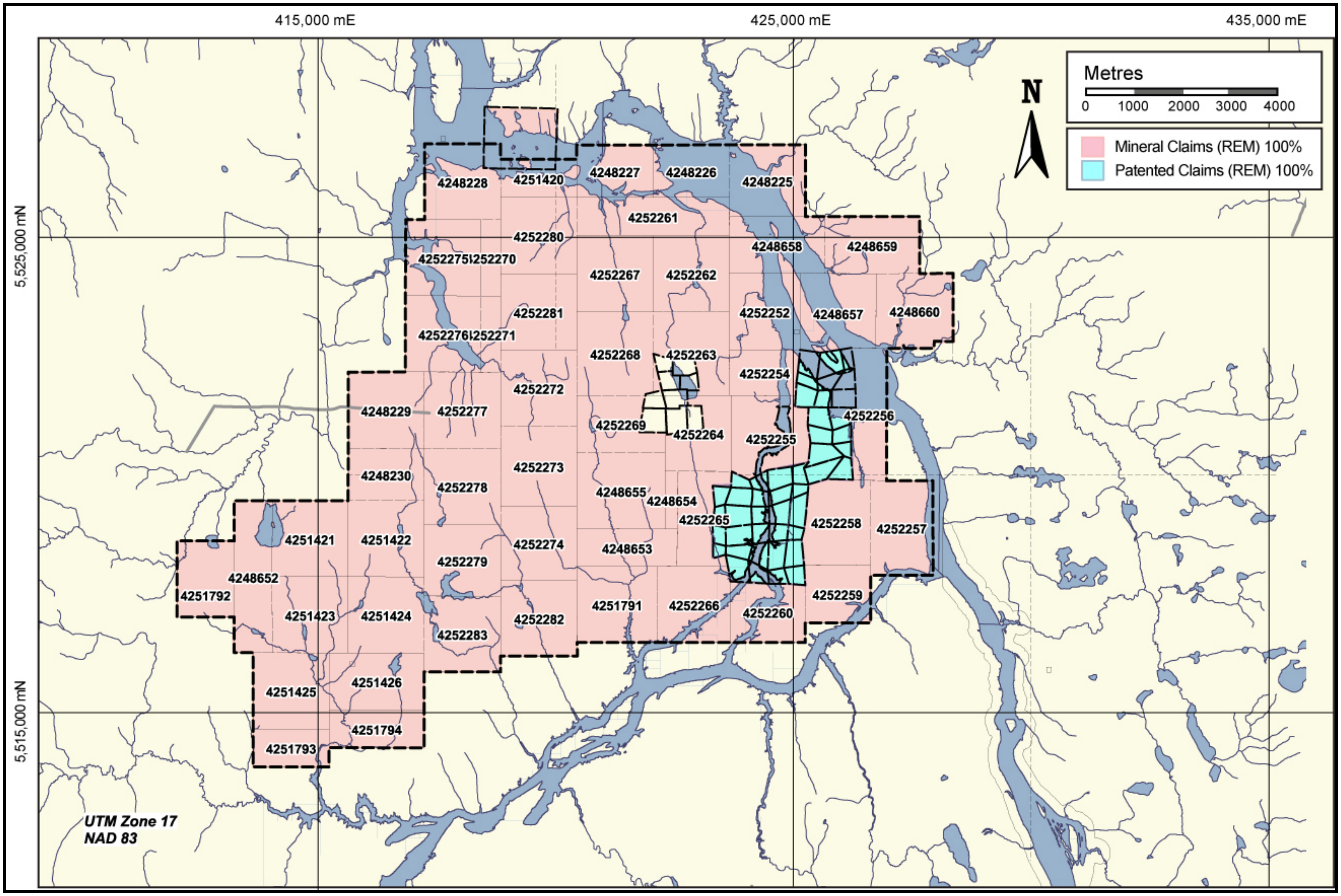
4.2 PROPERTY DESCRIPTION

The Property is comprised of 56 contiguous mining claims and 45 contiguous patented claims as summarized in Table 4.1 and illustrated in Figure 4.3 and Figure 4.4. Detailed information on the mineral and patented claims is found in Appendix A.

Table 4.1 Summary of the Clay-Howells Mining Claims

Claims	Number of Claims	Townships	Area (ha)
Mining Claims	56	Clay, Howells, Mowbry, Hopkins	12,482.8
Patented Claims	45	Clay, Howells	621.8
Total	101		13,104.6

Figure 4.3 Clay-Howells Mineral Claims

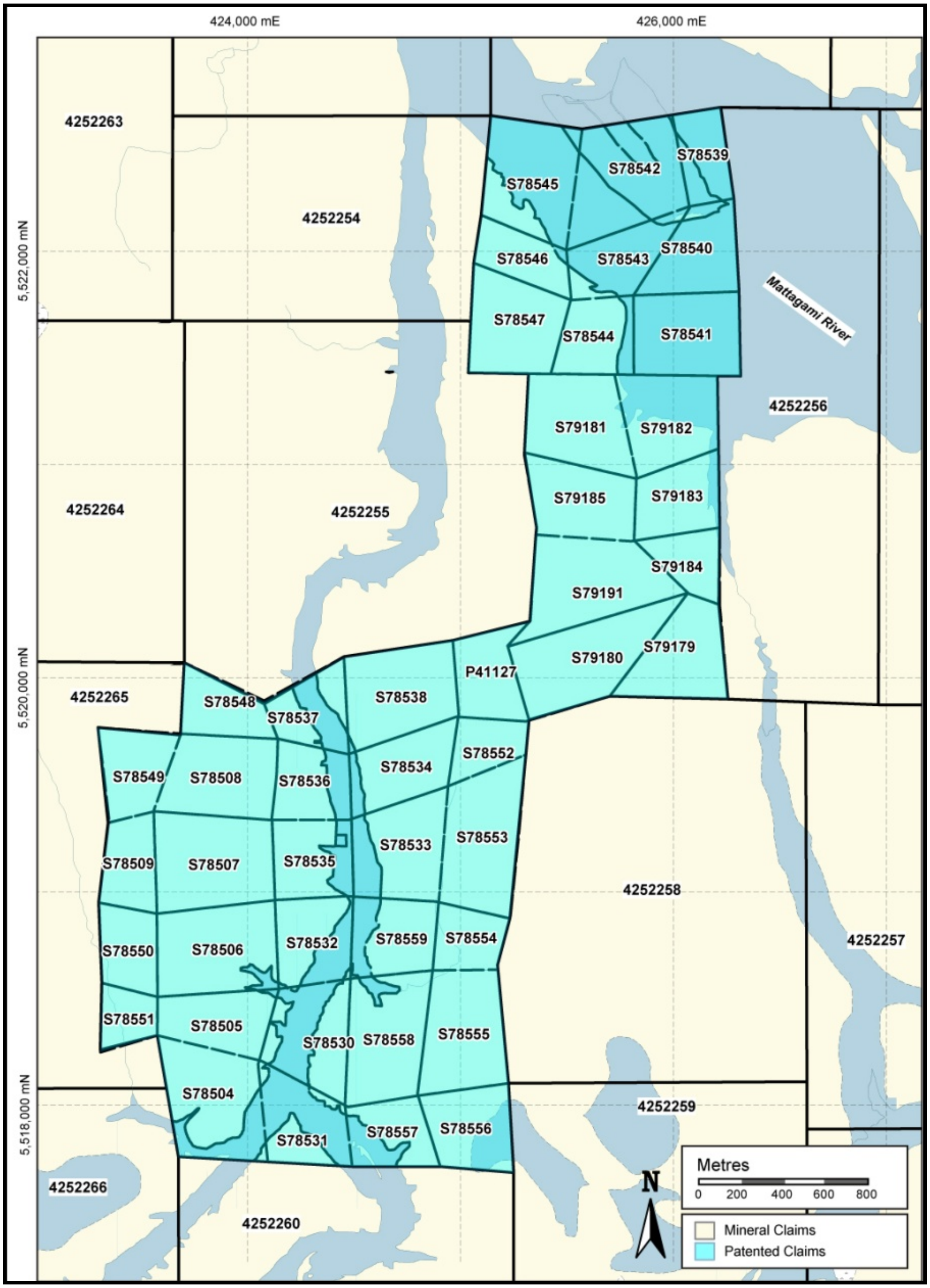


The abovementioned mining and patented claims cover all of the known mineralized area of the Clay-Howells deposit described within this report, and contain sufficient land for exploration and development purposes. The Clay-Howells Fe-REE deposit is located within the following patented claims listed in Table 4.2.

Table 4.2 Summary of Claims Covering the Clay-Howells Fe-REE Deposit

Claims	Townships	Area (ha)
Patented		
S78507	Clay	23.6
S78535	Clay	10.4
S78536	Clay	8.8
Total		92.9

Figure 4.4 Clay-Howells Patented Claims



4.3 AGREEMENTS

On July 23, 2009, REM entered into a Property Option Agreement with 1376361 Ontario Ltd. where REM was given the exclusive option to acquire 100% ownership of the patented claims that make up the Property. REM exercised this option and has purchased the rights to the patented claims.

According to the Option Agreement, 1376361 Ontario Ltd. retains a 2% NNSR on commercial production from the patented claims, and based on the calculation stipulated in Schedule "B" of the Option Agreement. REM has the right and option to purchase, at any time, one half of the NSR for the sum of $1 million.

4.4 ENVIRONMENTAL AND SURFACE RIGHTS

To Tetra Tech's knowledge, there are no known environmental or social issues.

All exploration activities conducted on the Property are in compliance with relevant environmental permitting requirements. To Tetra Tech's knowledge, REM has obtained permits to use the surface rights.

4.5 FIRST NATIONS

On February 17, 2010 the company announced that the 2010 drilling program was halted pending discussions with an independent First Nations group and the provincial government (Press Release, February 17, 2010). On March 5, 2010 it was announced that the discussions were successful in resolving the outstanding issues and drilling was resumed (Press Release, March 5, 2010).

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 ACCESSIBILITY

The Property area is located approximately 50 km north-northeast of Kapuskasing, and 160 km north-northwest of Timmins, and can be accessed by 4 x 4 vehicles using all-weather access roads (Figure 4.2) and an abandoned logging road labelled CSR-8. The deposit area is located 2.5 km east of the main logging road and winter logging roads allow access to the area by 4 x 4 All-Terrain Vehicles.

A boat launch is located on the Kapuskasing River approximately 25 km north of Kapuskasing along the all-weather roads. The boat launch allows travel by boat on the Kapuskasing and Mattagami Rivers to access the eastern and northern areas of the Property.

There are regular scheduled flights to and from Timmins to Kapuskasing.

5.2 CLIMATE

The Kapuskasing area is characterized by warm summer continental climatic zone (*Dfb*; Köppen climate classification) where summers are short and warm and winters are long and cold with heavy snowfall.

The minimum and maximum mean annual temperatures in the region are -5.2°C and 6.6°C, respectively. July average minimum and maximum temperatures are 10.4°C and 23.6°C, respectively, and January average minimum and maximum temperatures are -24.3°C and -12.2°C, respectively. Annual average precipitation is roughly 762.3 mm (www.worldclimate.com – Kapuskasing, ON).

Exploration activities may take place all year-round.

5.3 LOCAL RESOURCES

The closest town to the Property is Kapuskasing, population 8,500 (est. 2006); a northern service town for the Smoky Falls Generating Station and the Agrium phosphate mine. There is also a pulp and paper mill located at the town limits.

Most basic services and supplies may be sourced from Kapuskasing. Timmins, located 160 km from the Property, is the main mining centre for this region of Ontario where most mining service suppliers and contractors may be sourced.

Operations for the Clay-Howells project are based out of a temporary bush camp located on the all-weather logging road. The camp was demobilized at the time of the site visit, however, remaining on site were the core shack, core storage racks, and a prospector tent (for camp watchmen).

The Property has sufficient land for exploration and development purposes.

5.4 INFRASTRUCTURE

There is no infrastructure on the Clay-Howells deposit other than a network of all-weather and winter logging roads run through the area that allow access to most of the Property.

There is no source of electricity on the Property. However, the Clay-Howells deposit is located approximately 22 km from the Generating Station (52 MW). There are also three other power generating stations along the Mattagami River, either planned or under construction by the Ontario Power Generation (OPG) company.

The nearest airport and railhead are located in Kapuskasing.

Water sources are abundant on the Property.

5.5 PHYSIOGRAPHY

Relief over the majority of the Property is gentle to moderately flat and does not typically exceed 8 m. Exposure of bedrock is limited, with most of the outcrops occurring in the north-northeast portion of the Property. Outcrops tend to be low-lying and rounded, with wide swaths of thick forest cover or swamp in between (Penney and Neilson, 2010). A fairly continuous 15 to 30 m thick layer of clay overburden covers much of the Property (Press Release, May 9, 2011).

6.0 HISTORY

Prior to property ownership by REM, various exploration activities on the Clay-Howells Complex were completed between 1954 and 1977. A summary of these activities is provided in Table 6.1.

Table 6.1 Summary of Exploration Activities, 1954-1977

Year	Company	Work Completed	Comments
1954	Lundberg Explorations Ltd.	• Discovered an aeromagnetic anomaly within the Clay-Howells Complex.	• n/a
1956	Hopkins Township Syndicate	• Six diamond drillholes (1,124 m).	• Target was an aeromagnetic anomaly in the centre of the Hopkins Township. The holes intersected rocks of monzonite to gabbro composition, containing disseminated magnetite.
1957	Chibougamau Mining and Smelting Company Inc.	• Ground magnetometer survey and six diamond drillholes (1,516.40 m).	• Minor amounts of magnetite, carbonate and hornblende concentrations were encountered.
1958	Bewabik Minerals Ltd.	• Two diamond drillholes (827.2 m).	• The holes intersected minor amounts of magnetite.
1958	Mattagami Mining Company Ltd.	• Ground magnetometer survey over known mineralized zone, six diamond drillholes (4,539.0 m).	• Results outlined magnetic occurrence and company subsequently patented claims covering area of interest. Exploration program results suggested carbonatite body was 1,050 m long, 90 m long, striked NE, dipped 60° NW, and was comprised of 10-80% magnetite. An estimated 10 million tonnes of mineralization (not NI 43-101 compliant) was believed to be present.
1966	Argor Explorations Ltd.	• One diamond drillhole (153 m).	• Targeted airborne-detected geophysical anomaly which was to northwest of syenite-gneiss contact. Core intersected disseminated to almost massive pyrite and pyrrhotite within paragneiss.

table continues…

Year	Company	Work Completed	Comments
1967	Bennett et al. (1967)	• First published work on complex.	• Discussed a reconnaissance mapping program of the complex and environs.

Source: Sage, 1988, derived from assessment work files.

These activities led to the execution of a program designed to investigate the economic potential of the carbonatite-alkalic rock suite. This included a two-stage mapping initiative on the Clay-Howells Alkalic Rock Complex which was conducted by the Ontario Geological Survey in 1975 and 1977. The majority of outcrops within 3 km of the Kapuskasing and Mattagami Rivers were mapped by ground traversing in 1975, and the remaining isolated outcrops were examined via helicopter-assisted mapping in 1977 (Sage, 1988).

There are no historical mineral resources or reserves for the Property.

7.0 GEOLOGICAL SETTING AND MINERALIZATION

7.1 REGIONAL GEOLOGY

The Clay-Howells Alkalic Complex is situated within the Kapuskasing Sub-province of the Superior Province in the Canadian Shield. The syenitic to monzonitic rocks appear to intrude a sequence of orthogneisses and paragneisses, which were regionally metamorphosed from upper amphibolite to granulite facies. Such rocks are typical of the Kapuskasing Sub-province. Closure of isomagnetics contours on aeromagnetic maps indicates that the complex may have formed by the emplacement of syenitic magma in several pulses. This Neoproterozoic complex, dated at 1,072 ±16 Ma by rubidium-strontium (Rb-Sr) isotopic methods, is rather homogenous and little disruption in structural trends were caused by its emplacement into the surrounding gneissic rocks (Sage, 1988).

7.2 PROPERTY GEOLOGY

The Clay-Howells Complex is an unmetamorphosed complex thought to be mushroom-shaped in vertical cross-section. A dyke-like body of magnetite-rich carbonatite intrudes the syenitic rocks within the southeast corner of the complex. The surrounding syenitic rocks have been altered and metasomatized, and exhibit granoblastic textures. Figure 7.1 illustrates the Property geology.

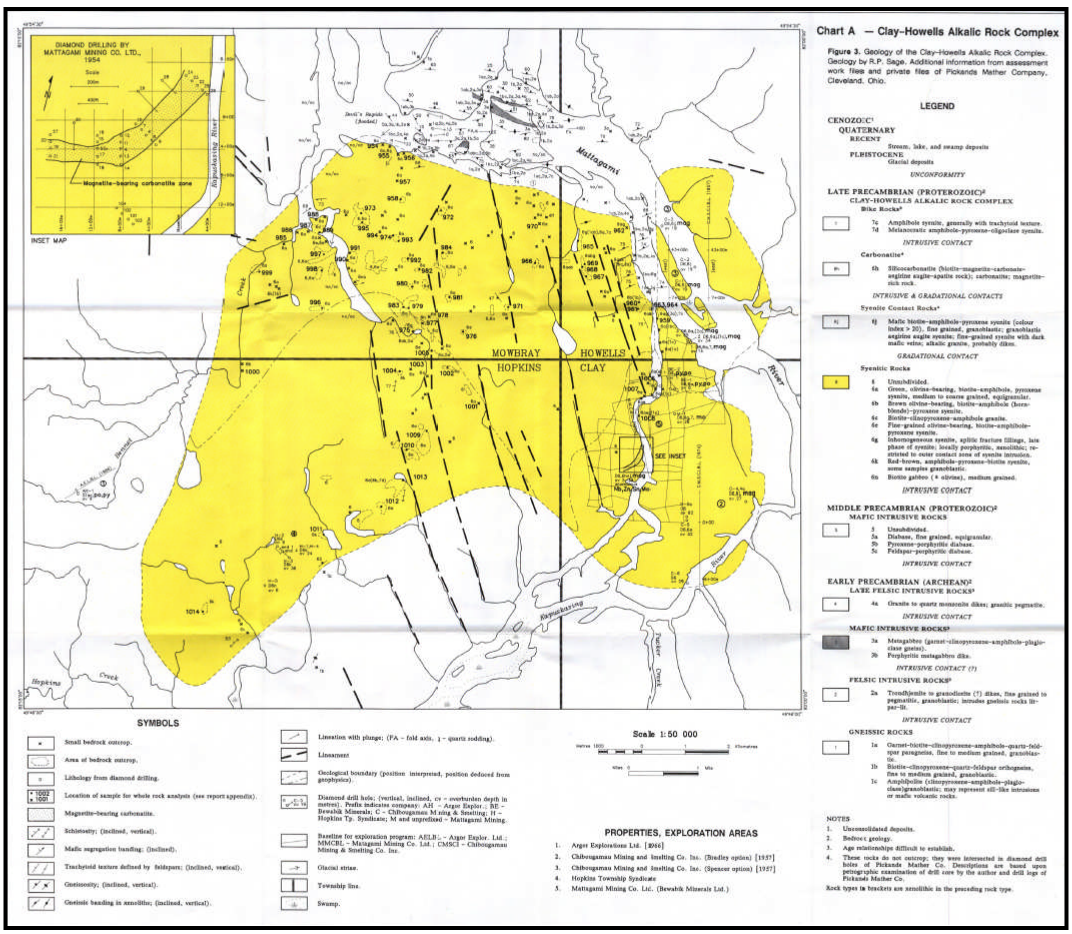
Drilling results and examination of outcrop by REM indicate that the Property is predominantly comprised of syenite, carbonatite, massive magnetite, fault-alteration breccia, and syenite breccia. A petrographic study completed by Dr. Lentz of the University of New Brunswick, concluded the following (www.rareearthmetals.ca):

- the REE-bearing monazite is a low-thorium (Th) bearing variety, with replacement bastnæsite
- Clay-Howells is a Neoproterozoic intrusive complex with many classic features of a circular (ring dyke) anorogenic alkali complex
- the late and locally discordant carbonatitic complex was rich in light REEs, niobium (Nb), and contained notable concentrations of yttrium (Y) and HREEs
- the associated ferro-carbonatite evolved into a magnetite-rich calcio-carbonatite

- magnetite saturation has led to crystal settling to form various magnetite-rich layers containing elevated concentrations of monazite, fergusonite, brithloite, bastnæsite, columbite, pyrochlore, and apatite
- the ore-forming elements to magnetite concentration ratios indicate that the mineralization is entirely of igneous origin.

Sage (1988) stated that the magnetite-bearing carbonatite approaches surface to within 5 m and is fine-grained, equigranular, massive, and allotriomorphic. The mode is quite variable with 0-50% biotite, 5-40% magnetite, 20-55% carbonate, 10-20% aegirine-augite, and ~5% apatite. Magnetite grains are disseminated, anhedral to subhedral, and are present throughout examined samples of core. Shkankla (1968) reported that within the main area of mineralization the carbonatite varies from 10%-80% magnetite (Sage, 1988).

Figure 7.1 Property Geology Map

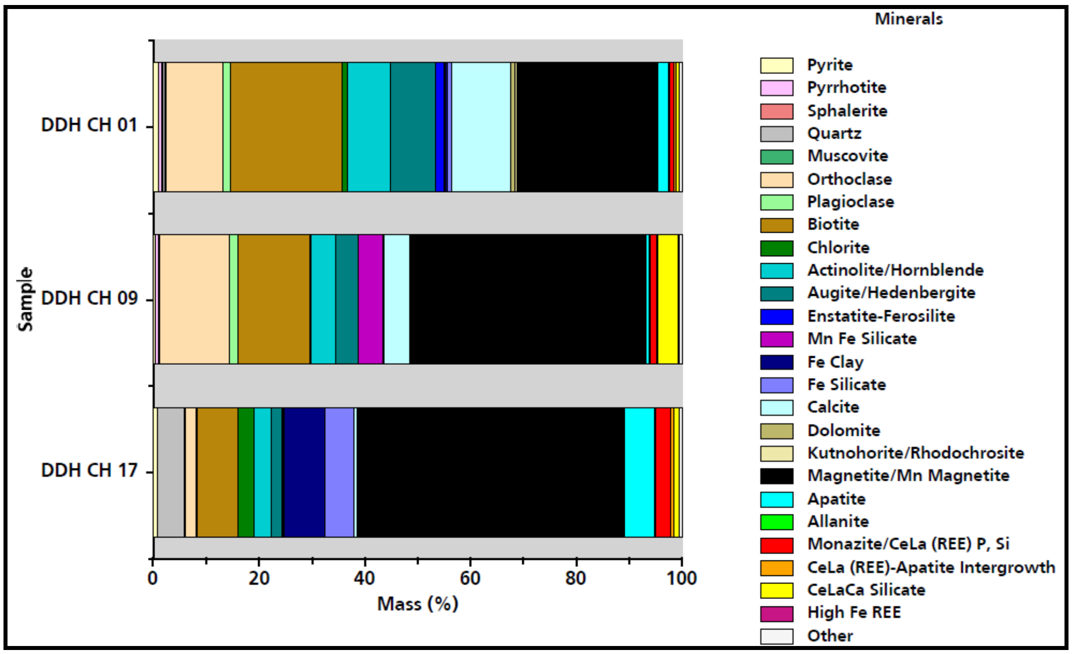


7.3 MINERALIZATION

REE-bearing minerals within the Clay-Howells deposit are complex, but primarily consist of a Ce-La-Ca silicate and monazite (or phosphate phases similar in composition to monazite). Composite samples made from core from drillholes CH-01, CH-09, and CH-17 were analyzed by Xstrata Process Support. Results indicate that the modal abundances of phases within the three composite samples are dominated by magnetite and manganese (Mn)-bearing magnetite, with lesser quantities of augite, biotite, actinolite, and Fe-clays (Kormos, 2010).

Figure 7.2 provides a graphical summary of modal abundances observed in the three composite samples.

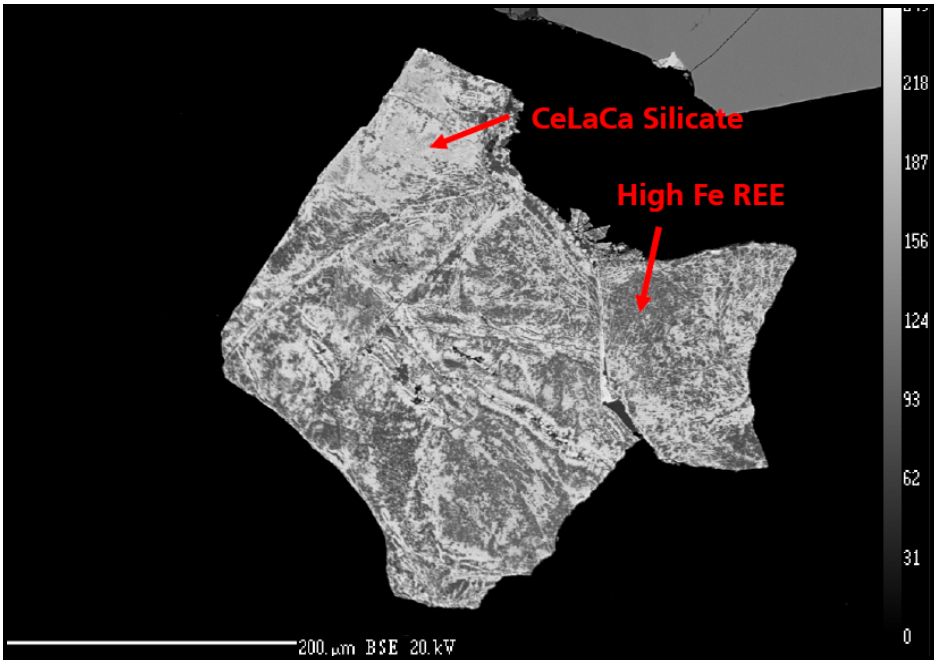
Figure 7.2 Mass Percentage Modal Mineralogy of the Three Composite Samples



Source: Kormos, 2010

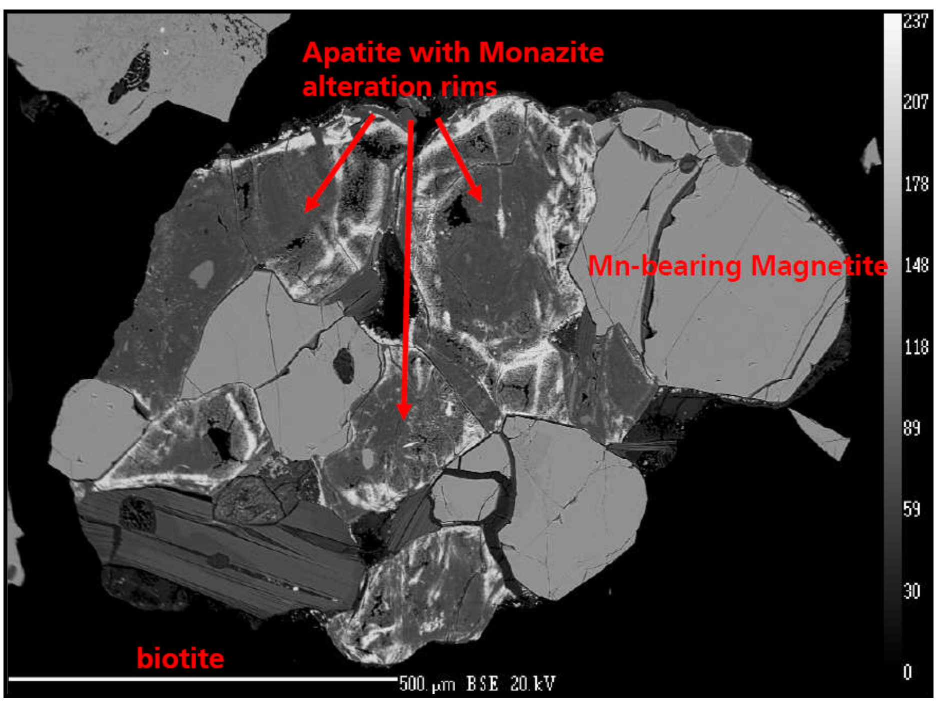
A high Fe-REE, fergusonite, and allanite were also observed in trace amounts. Low levels of REE in solid solution were found within apatite. Monazite, apatite, and a Ce-La-Ca silicate are the three main mineral groups hosting the REE. However, REE distribution is commonly zoned, yielding a heterogeneous spread within the mineral grains (Figure 7.3 and Figure 7.4). The REE-bearing minerals are typically very coarse grained with approximately 50% of the distribution occurring as grains larger than 100 µm (Kormos, 2010).

Figure 7.3 Backscattered Electron Image of Complex REE; Comprised of a High Fe-REE (Dark Phase) and a Ce-La-Ca Silicate (Bright Phase)



Source: Kormos 2010

Figure 7.4 Backscattered Electron Image of Complex REE; Comprised of Monazite (Bright Phase) Occurring Along Grain Edges and Crystallographic Planes of Apatite



Source: Kormos, 2010

8.0 DEPOSIT TYPES

A carbonatite is defined as an igneous rock body with greater than 50% modal carbonate minerals, mainly in the form of calcite, dolomite, ankerite, or sodium- and potassium-bearing carbonates. Carbonatites commonly occur as intrusive bodies, and rarely occur as extrusive rocks. Many carbonatites are associated with alkali silicate rocks (syenites, nepheline, syenites, ijolites, urtites, pyroxenites, etc.) although they can also occur as isolated sills, dikes, or small plugs. Carbonatites are usually surrounded by an aureole of metasomatically altered rocks called fenites. Carbonatite-associated deposits can be classified as magmatic or metasomatic types (Richardson and Birkett, 1996).

Carbonatites have been classified based on chemical classification into four classes (Woolley and Kempe, 1989) and further subdivided based on mineralogical and textural characteristics:

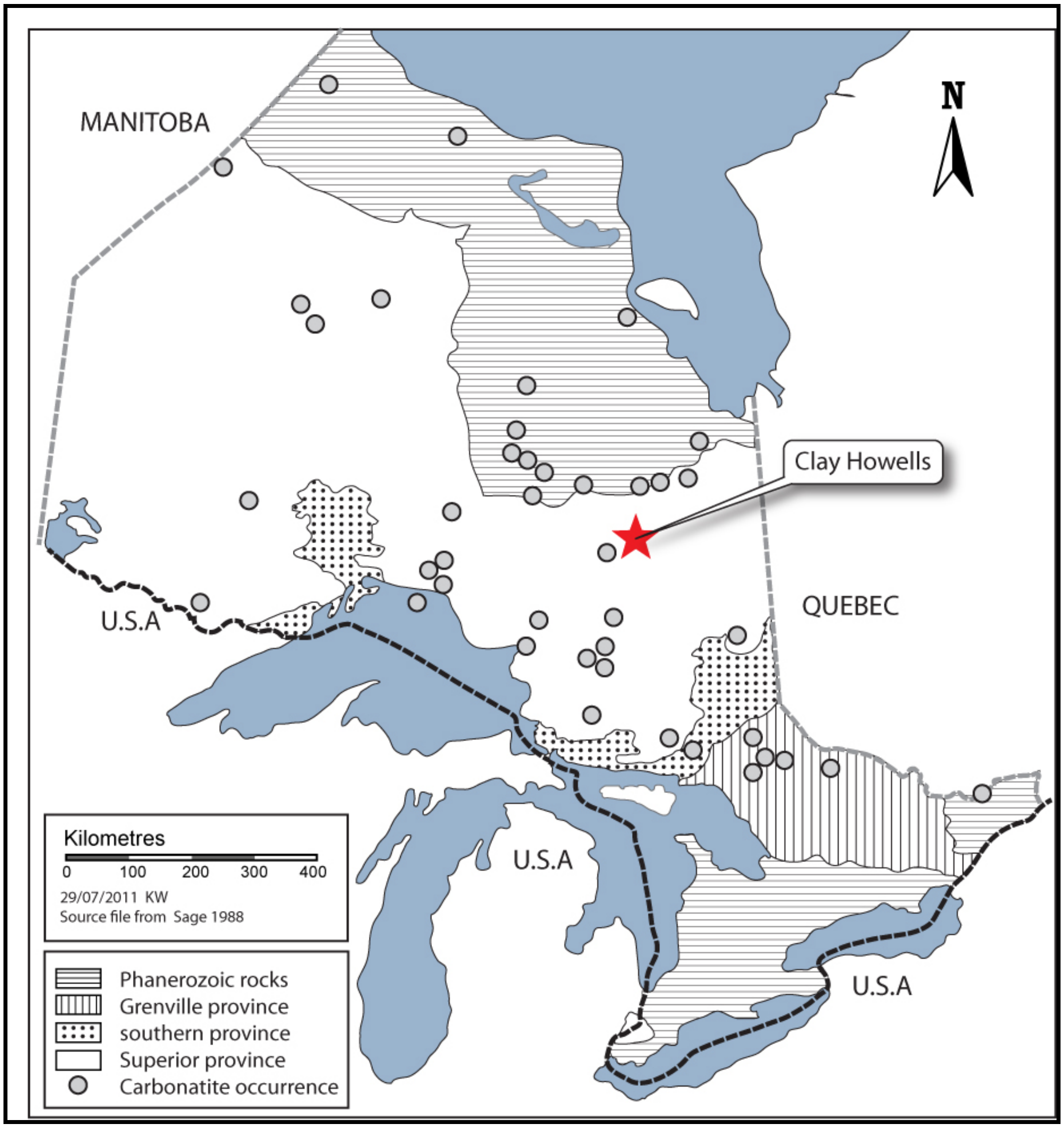
1. calico-carbonatite (coarse-grained: *sovite*, and finer-grained: *alvikite*)
2. magnesio-carbonatite (dolomite-rich: *beforsite*, and ankerite-rich: *rauhaugite*)
3. ferro-carbonatite (iron rich carbonates)
4. natro-carbonatite (sodium-potassium-calcium carbonates).

The use of a chemical classification of carbonatites should be used with caution when replacement or metasomatic processes have altered the primary composition of the carbonatite rock (Mitchell, 2005). The majority of carbonatite deposits are located within stable, intra-plate crustal units, although some are linked with orogenic activity, or plate separation. It is also important to note that carbonatites tend to occur in clusters, and in many places there has been repetition of activity over time (Woolley, 1989). Worldwide, carbonatite deposits are mined for niobium, REEs, iron, copper, phosphate (apatite), vermiculite and fluorite; with barite, zircon/baddeleyite, tantalum, and uranium as common by-products (Richardson and Birkett, 1996).

The rocks of the Clay-Howells property have been identified as carbonatitic. The ferro-carbonatite has evolved into a magnetite-rich calcio-carbonatite (www.rareearthmetals.ca).

The Clay-Howells Complex is one of approximately 45 known carbonatite-alkalic rock complexes in Ontario. Its location, in relation to the other known occurrences within the province, is shown in Figure 8.1 (Sage, 1988).

Figure 8.1 Location Map of Carbonatite Occurrences in Ontario (modified from Sage, 1988)



9.0 EXPLORATION

9.1 GROUND MAGNETIC SURVEY

Using a grid with a baseline azimuth oriented to 055°, a ground based magnetic survey was performed over the carbonatite-magnetite zone in 2010. The survey was conducted by Hussey Geophysics and the data was processed by Johnson Geophysics.

9.2 AIRBORNE MAGNETIC AND RADIOMETRIC SURVEY

An airborne magnetic and radiometric survey was completed in 2009. A total of 1,683 line km was flown on a line-spacing of 50 m to 100 m apart. The magnetic data defines the Clay-Howells magnetite one as a discrete 1.2 km long anomaly and identifies several untested airborne magnetic anomalies (Press Release, January 6, 2010).

9.3 PROSPECTING

Based out of the exploration camp, a two-stage prospecting campaign was completed in 2010. The first stage occurred immediately after the drilling program, between April 25 and May 31, 2010, and the second stage of prospecting occurred from August 10 to 28, 2010. The undertaking was guided by a combination of the airborne radiometric survey and the positive correlation between radioactivity, TREO and thorium concentrations observed from drilling results. A total of 57 thorium anomalies trending roughly to the northwest were chosen for prospecting.

Traverses and sample locations were documented with hand-held Garmin Global Positioning System (GPS) units. The majority of traverses were done by foot, but All-Terrain Vehicles (ATVs) and a 16 ft aluminum boat were used wherever access was possible (Penney and Nielsen, 2010).

Approximately 143 bedrock and boulder samples were collected across the Property. All samples with >0.5% TREO were found to be LREE-enriched; the HREO concentration amongst the TREO was only 2 to 16%. REO concentrations were primarily comprised of La_2O_3 at 0.08-0.61%, Ce_2O_3 at 1.35-0.18%, and Nd_2O_3 at 0.08 to 0.51% (Penney and Nielsen, 2010).

10.0 DRILLING

To date, REM has drilled a total of 18 diamond drillholes in the main carbonatite-magnetite zone, and an additional eight diamond drillholes in surrounding magnetic anomalies of the Clay-Howells project.

10.1 2010 Drilling Program

Drilling activities and camp construction were performed by Norex Drilling Ltd between January 6 and March 29, 2010. Towards the end of the drill program, helicopter support was required and was provided by Wilderness Helicopters Inc.

Drillhole locations were controlled using the cut local grid, and due to the presence of a very strong magnetic field, a Reflex Positioning System (RPS) was employed to record collar locations and to properly read the starting orientation of the holes once they were completed. Drillholes were surveyed with a Reflex Maxibor II instrument, which uses optical principles, and is therefore not affected by magnetic fields. All downhole directional surveys were performed by REM personnel (Penney and Nielsen, 2010).

Table 10.1 Summary Statistics for the Drillholes (UTM locations are in NAD83, Zone 17N)

BHID	Easting (m)	Northing (m)	Elevation (masl)	Grid Easting	Grid Northing	Length (m)	Bearing (°Az)	Dip (°)
CH-01	424336	5519536	200	10450	10025	311	180.0°	-45.90
CH-02	424307	5519575	200	10450	10075	359	180.0°	-46.70
CH-03	424413	5518884	200	10150	9450	506	00.0°	-45.00
CH-04	424187	5519223	200	10150	9850	170	180.0°	-44.40
CH-05	424187	5519223	200	10150	9850	257	180.0°	-70.00
CH-06	424187	5519223	200	10150	9850	359	179.0°	-88.00
CH-07	424127	5519154	200	10050	9850	350	180.3°	-45.40
CH-08	424268	5519954	200	10350	10000	278	180.0°	-45.70
CH-09	424112	5519159	200	10050	9850	390	180.0°	-72.10
CH-10	424268	5519454	200	10350	10000	350	180.0°	-70.30
CH-11	424006	5519129	200	9950	9875	228	180.0°	-46.00
CH-12	423815	5519052	200	9750	9925	188	180.0°	-46.10
CH-13	424006	5519129	200	9950	9875	350	180.0°	-70.80
CH-14	423815	5519052	200	9750	9925	290	180.0°	-69.50
CH-15	424226	5519340	200	10250	9925	230	180.0°	-46.80

table continues…

BHID	Easting (m)	Northing (m)	Elevation (masl)	Grid Easting	Grid Northing	Length (m)	Bearing (°Az)	Dip (°)
CH-16	423881	5519133	200	9850	9950	228	180.0°	-44.80
CH-17	424226	5519340	200	10250	9925	314	180.0°	-69.70
CH-18	423881	5519133	200	9850	9950	278	180.2°	-70.50

All holes targeted the carbonatite-magnetite zone and tested the Nb-REE mineralization. A total of 5,436.5 m were drilled, and 1,825 assay samples were taken. All holes were of NQ size. Table 10.1 provides a summary of the statistics for each drillhole. With the exception of CH-03, all holes were drilled towards the south, with dips between -44° and -88°. Up to three holes, with different dips, were drilled from the same set-up during the program.

A summary of the significant mineralized intersections from all holes is provided in Table 10.2.

Table 10.2 Summary of Significant Mineralized Intersections

Hole	From (m)	To (m)	Length (m)	TREO (%)	HREO:TREO	Fe_2O_3 (T)* (%)	Nb_2O_5 (%)
CH-01	35.5	178.0	142.5	0.450	0.11	33.73	0.17
including	76.6	82.5	5.9	0.230	0.18	43.08	1.11
and	92.0	102.0	10.0	1.010	0.10	42.67	0.13
CH-02	127.6	147.0	19.4	0.660	0.17	27.81	0.22
including	129.6	133.8	4.2	1.050	0.20	45.44	0.47
	216.5	230.4	13.9	1.20	0.06	48.94	0.09
including	216.5	220.4	3.9	2.120	0.04	46.53	0.06
CH-03	164.0	203.0	39	0.480	0.08	23	0.17
CH-04	65.0	110.0	45	0.540	0.10	47.63	0.09
including	105.7	110.0	4.3	1.120	0.10	26.72	0.08
CH-05	96.3	132.6	36.3	0.420	0.08	27.65	0.05
including	108.8	112.4	3.6	1.350	0.07	69.36	0.07
including	180.5	191.0	10.5	0.890	0.06	71.59	0.06
	180.5	185.0	4.5	1.410	0.06	64.87	0.07
CH-06	158.0	210.0	52.0	0.620	0.09	43.18	0.12
including	169.2	173.5	4.3	1.940	0.07	40.26	0.17
	239.0	304.5	65.5	0.620	0.11	40.48	0.14
including	250.3	256.3	6.0	1.030	0.11	31.56	0.08
CH-07	222.0	232.8	10.8	1.150	0.08	31.10	0.19
CH-08	79.2	83.0	3.8	0.726	0.32	34.14	0.06
	97.0	149.5	52.5	0.551	0.14	28.45	0.16
including	97.0	104.5	7.5	0.717	0.20	31.60	0.11
including	116.5	126.1	9.6	0.694	0.17	39.44	0.25

table continues…

Hole	From (m)	To (m)	Length (m)	TREO (%)	HREO:TREO	Fe_2O_3 (T)* (%)	Nb_2O_5 (%)
including	137.5	150.0	12.0	0.789	0.08	38.72	0.16
	180.0	200.0	20.0	0.556	0.07	50.89	0.12
including	180.0	185.0	5.0	0.703	0.09	41.84	0.11
CH-09	124.5	201.1	76.6	0.690	0.10	47.2	0.12
including	150.8	155.7	4.9	2.450	0.08	46.21	0.09
	214.8	235.6	20.8	0.600	0.08	38.60	0.09
including	214.8	219.9	5.1	0.870	0.06	38.39	0.11
CH-10	190.3	277.0	86.2	0.530	0.09	40.65	0.10
including	191.8	199.0	7.5	0.880	0.13	45.25	0.25
and	239.5	247.0	7.5	1.010	0.05	66.48	0.10
CH-11	68.0	113.0	45.0	0.793	0.10	53.10	0.17
	68.0	84.9	16.9	1.088	0.08	65.95	0.14
	104.9	113.8	8.9	1.017	0.10	52.95	0.15
CH-12	79.6	101.0	21.6	0.869	0.05	52.31	0.15
including	88.6	94.6	6.0	0.975	0.05	53.52	0.13
CH-13	102.2	207.5	105.3	0.694	0.10	57.83	0.14
including	102.2	118.5	16.3	0.817	0.10	45.37	0.14
and	164.0	203.0	39.0	0.846	0.09	59.41	0.13
	279.6	298.0	18.4	0.470	0.05	53.29	0.06
CH-14	59.3	89.1	29.8	0.605	0.10	37.97	0.11
including	82.6	89.1	6.5	0.879	0.07	44.91	0.12
including	88.6	89.1	0.5	1.789	0.06	74.33	0.05
	230.0	233.0	3.0	1.196	0.06	23.79	0.16
CH-15	156.9	180.2	23.3	0.61	0.14	49.45	0.30
CH-16	57.0	86.0	29.0	0.503	0.11	45.03	0.07
including	80.0	86.0	6.0	0.770	0.08	79.53	0.08
	150.2	181.3	31.1	0.391	0.09	28.67	0.09
including	176.8	181.3	4.5	0.742	0.09	44.12	0.19
CH-17	85.0	120.0	35.0	0.850	0.08	37.76	0.13
including	94.5	101.0	6.5	2.060	0.06	59.04	0.16
	221.0	248.0	27.0	0.540	0.12	30.29	0.19
including	221.0	228.5	7.5	1.120	0.08	40.07	0.09
CH-18	206.7	209.7	3.0	0.620	0.095	30.92	0.11
	231.9	234.9	3.0	1.060	0.17	68.95	0.23
	249.8	251.5	5.0	1.150	0.15	28.87	0.13
	254.0	254.8	0.8	4.440	0.14	59.03	0.31

Note: Drill intercepts do not represent true widths

*Fe_2O_3(T) signifies total FeO+Fe_2O_3 as the two cannot be distinguished during analysis

Intersections from drilling confirmed the presence of 50 m to 100 m thick massive to banded magnetite unit with significant niobium and REE concentrations (REM Press Release July 19, 2011). The highest TREO intersections were in CH-18 and CH-09, with 0.8 m of 4.44% and 4.9 m of 2.45%, respectively. These intersections also contained elevated concentrations of Fe_2O_3(T) at 59.03% and 46.21%, respectively. The HREE distribution is variable throughout the carbonatite-magnetite zone. The HREO concentrations range from 5 to 32% of the TREO, signifying that the zone is much more LREE-enriched (Penney and Nielsen, 2010).

10.2 2011 Drilling Program

Following the 2010 drill program, an eight diamond drill hole program was initiated in early 2011 to test other magnetic anomalies within the 110 km^2 carbonatite complex. Roughly 2,154 m were drilled and 235 samples were sent for assaying. Several high priority magnetic zones located outside of the main Clay-Howells deposit were tested. These consisted of both discrete magnetic highs and lows associated with circular features (Press Release, May 9, 2011).

Three of the eight drillholes intersected significant mineralization and the results are tabulate in Table 10.3.

Table 10.3 Assay Highlights from Warly 2011 Drill Program

Hole	From (m)	To (m)	Length (m)	TREO (%)	Fe_2O_3 (T) (%)	Nb_2O_5 (%)
CH-11-02	269.00	295.90	26.90	0.12	51.55	0.07
CH-11-06	82.50	89.40	6.90	0.57	18.33	0.15
CH-11-08	57.20	73.00	15.80	0.67	48.41	0.05
and	94.17	117.65	23.48	0.46	33.48	0.054

Source: Press Release, May 9, 2011
Note: Drill intercepts do not represent true widths

11.0 SAMPLE PREPARATION, ANALYSES, AND SECURITY

During the 2010 drilling program, core was delivered from the drill sites to the exploration camp on a daily basis. In the core shack, samples were taken at geologically significant intervals (Penney and Nielsen, 1988). The use of a hand-held x-ray fluorescence (XRF) device was used to aid in the determination of sample intervals (Press Release May 9, 2011). Samples were typically 1.5 m long and core recovery was considered to be very good at 90-95%. A diamond saw or manual core splitter was used to cut the sample intervals. One half of the core was sent for assaying, while the other half was placed back into the core box. Best practice guidelines were followed at all times. Sample bags were placed in rice bags and sealed with a unique security tag number, and subsequently transported to Kapuskasing by REM personnel. They were then given to Manitoulin Transport for delivery to Actlabs in Thunder Bay, Ontario, where sample preparation was performed. The samples were subsequently transported to Ancaster, Ontario, where analyses took place (Penney and Nielsen, 1988).

Samples were prepared using a lithium metaborate/tetraborate fusion method. Analysis of major oxides was done by inductively coupled plasma-optical emission spectroscopy (ICP-OES), whereas analyses of 43 trace elements was accomplished via inductively coupled plasma-mass spectroscopy (ICP-MS) and Bb via XRF. Precision and accuracy of the results was further tested by the systematic use of reference standards and duplicate samples (Penney and Nielsen, 1988).

The following provides a list of which elements were analyzed by which analytical techniques (Penney and Nielsen, 1998):

- **Fusion ICP OES**: SiO_2, Al_2O_3, Fe_2O_3 (T), MnO, MgO, CaO, Na_2O, K_2O, TiO_2, P_2O_5, LOI, Sc, Be, V, Sr, Y, Zr, Ba
- **Fusion ICP-MS**: Cr, Co, Ni, Cu, Zn, Ga, Ge, As, Rb, Mo, Ag, In, Sn, Sb, Cs, Bi, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Hf, Ta, W, Tl, Pb, Th, U
- **Fusion XRF**: Nb_2O_5.

12.0 DATA VERIFICATION

12.1 DATA VERIFICATION

Tetra Tech performed an internal verification process of Rare Earth Metals' Clay-Howells project database against the laboratory-issued assay certificates. The validation of the data was completed on all 18 of the drillholes, accounting for 100% of the assays.

The data verification process examined certificate ID, sample number, and all elemental analyses. For assays that were below detection limit, half the detection limit value was used [this was only required for Nb_2O_5%, P_2O_5%, SiO_2%, Zn (ppm) and ZrO_2%]. Approximately 68% of the Zr assays were not originally included in the database, but were subsequently incorporated, and not counted as errors. Table 12.1 and Table 12.2outline all corrections that were made to the database. A total of 14 samples required corrections to assay values, representing only 0.77% of the entire dataset.

Table 12.1 Corrected Assays Values – Uncorrected Database Values

DDH	Sample No	Nb_2O_5 (%)	Mo (ppm)	Ag (ppm)	Sn (ppm)	Cs (ppm)	Ba (ppm)	Bi (ppm)	La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)	Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)	Hf (ppm)	Ta (ppm)	W (ppm)	Tl (ppm)	Pb (ppm)	Th (ppm)	U (ppm)
CH-03	414439	0.367	< 2	0.9	4	0.6	1285	0.5	257	599	70	268	49.6	14.4	36.8	5.1	25.1	4.1	10.1	1.22	6.8	0.95	5.3	39.7	< 1	0.2	94	76.3	87.9
CH-03	414440	0.465	< 2	1.4	7	< 0.5	856	< 0.4	134	306	37	140	24.4	6.78	17	2.3	11.6	2.1	5.7	0.8	5	0.77	6.8	115	< 1	< 0.1	91	29.9	109
CH-03	414441	0.4	< 2	1.4	6	< 0.5	1451	< 0.4	157	316	35.6	135	23.5	6.65	17.3	2.3	12	2.1	5.8	0.8	4.8	0.75	9.1	127	< 1	< 0.1	108	23.9	144
CH-03	414442	0.581	< 2	2.3	18	< 0.5	923	< 0.4	132	311	36.1	139	24.4	7.14	19.2	2.7	14.2	2.5	6.8	0.96	6	0.91	14.5	209	< 1	< 0.1	132	49.5	174
CH-03	414443	0.35	< 2	1.7	9	< 0.5	1005	< 0.4	154	355	39.8	150	28.1	7.95	22.3	3.4	17.8	3.1	8.2	1.12	6.8	1.04	11.2	59.2	< 1	0.2	90	56	94.4
CH-03	414444	0.077	< 2	< 0.5	4	1.6	76	< 0.4	28.9	75	7.91	25.6	5.9	0.25	4.5	0.8	4.5	0.8	2.5	0.41	3	0.51	6	43.4	2	0.8	17	17.7	20.4
CH-03	414445	0.371	< 2	2	8	< 0.5	771	< 0.4	145	358	42.3	164	29.4	8.42	22	3.1	15.9	2.8	7.6	1.07	6.8	1.05	13.1	63.8	< 1	0.1	88	63.3	92.4
CH-03	414446	0.415	< 2	0.8	4	< 0.5	1218	0.5	168	418	50.5	200	38.1	10.8	27.5	3.9	19.9	3.5	9.4	1.25	7.2	1.03	5.9	52.6	< 1	< 0.1	91	89.7	101
CH-03	414447	0.236	< 2	0.7	4	< 0.5	923	< 0.4	237	555	63.6	244	46.1	13.6	35.1	4.9	24.4	4	9.8	1.21	6.7	0.97	4.8	7.3	< 1	< 0.1	77	68	41.4
CH-03	414448	0.208	6	0.6	2	1.6	1224	2.5	402	1040	128	504	96	27.5	69.4	9.1	39.4	6	12.9	1.38	6.6	0.85	2.1	10	< 1	0.2	102	199	31.6
CH-03	414449	0.286	6	1.3	2	1.5	1358	0.9	832	1620	187	664	110	29.9	76.7	10.1	45.7	7.3	16.9	1.92	9.9	1.27	5.4	23.2	< 1	0.4	93	235	54.4
CH-03	414450	0.379	5	1.5	4	3.7	782	0.4	751	1460	157	541	81.6	20.9	55.1	7.2	33	5.4	13.4	1.61	9	1.25	7.2	95.7	< 1	0.8	107	233	112
CH-03	414451	0.109	4	2.5	7	1.3	962	< 0.4	667	1340	147	550	92.8	19.7	67.2	9.6	49.2	9	23.2	3.14	18.2	2.72	30.1	24.4	1	0.3	26	62.2	10.7
CH-03	414452	0.082	5	2	8	1.8	1027	< 0.4	524	1060	116	420	62.2	11.8	38.7	5.3	26.3	4.8	12.9	1.77	10.9	1.67	27.1	21.5	2	0.3	36	70.9	11.3

Table 12.2 Corrected Values

DDH	Sample No	Nb_2O_5 (%)	Mo (ppm)	Ag (ppm)	Sn (ppm)	Cs (ppm)	Ba (ppm)	Bi (ppm)	La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)	Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)	Hf (ppm)	Ta (ppm)	W (ppm)	Tl (ppm)	Pb (ppm)	Th (ppm)	U (ppm)
CH-03	414439	0.073	9	2	3	5.1	3040	< 0.4	148	269	26.6	88	12.6	3.08	8.2	1.1	5.6	1.1	2.9	0.42	2.7	0.41	16.6	35.3	1	0.4	24	17.8	11.3
CH-03	414440	0.209	4	2.3	3	4.3	2977	< 0.4	235	455	46.2	161	23.8	5.6	14.7	1.9	9.5	1.7	4.5	0.63	3.8	0.54	13.5	76.2	1	0.4	45	39.7	40.7
CH-03	414441	0.367	< 2	0.9	4	0.6	1285	0.5	257	599	70	268	49.6	14.4	36.8	5.1	25.1	4.1	10.1	1.22	6.8	0.95	5.3	39.7	< 1	0.2	94	76.3	87.9
CH-03	414442	0.465	< 2	1.4	7	< 0.5	856	< 0.4	134	306	37	140	24.4	6.78	17	2.3	11.6	2.1	5.7	0.8	5	0.77	6.8	115	< 1	< 0.1	91	29.9	109
CH-03	414443	0.4	< 2	1.4	6	< 0.5	1451	< 0.4	157	316	35.6	135	23.5	6.65	17.3	2.3	12	2.1	5.8	0.8	4.8	0.75	9.1	127	< 1	< 0.1	108	23.9	144
CH-03	414444	0.581	< 2	2.3	18	< 0.5	923	< 0.4	132	311	36.1	139	24.4	7.14	19.2	2.7	14.2	2.5	6.8	0.96	6	0.91	14.5	209	< 1	< 0.1	132	49.5	174
CH-03	414445	0.35	< 2	1.7	9	< 0.5	1005	< 0.4	154	355	39.8	150	28.1	7.95	22.3	3.4	17.8	3.1	8.2	1.12	6.8	1.04	11.2	59.2	< 1	0.2	90	56	94.4
CH-03	414446	0.077	< 2	< 0.5	4	1.6	76	< 0.4	28.9	75	7.91	25.6	5.9	0.25	4.5	0.8	4.5	0.8	2.5	0.41	3	0.51	6	43.4	2	0.8	17	17.7	20.4
CH-03	414447	0.371	< 2	2	8	< 0.5	771	< 0.4	145	358	42.3	164	29.4	8.42	22	3.1	15.9	2.8	7.6	1.07	6.8	1.05	13.1	63.8	< 1	0.1	88	63.3	92.4
CH-03	414448	0.415	< 2	0.8	4	< 0.5	1218	0.5	168	418	50.5	200	38.1	10.8	27.5	3.9	19.9	3.5	9.4	1.25	7.2	1.03	5.9	52.6	< 1	< 0.1	91	89.7	101
CH-03	414449	0.236	< 2	0.7	4	< 0.5	923	< 0.4	237	555	63.6	244	46.1	13.6	35.1	4.9	24.4	4	9.8	1.21	6.7	0.97	4.8	7.3	< 1	< 0.1	77	68	41.4
CH-03	414450	0.208	6	0.6	2	1.6	1224	2.5	402	1040	128	504	96	27.5	69.4	9.1	39.4	6	12.9	1.38	6.6	0.85	2.1	10	< 1	0.2	102	199	31.6
CH-03	414451	0.286	6	1.3	2	1.5	1358	0.9	832	1620	187	664	110	29.9	76.7	10.1	45.7	7.3	16.9	1.92	9.9	1.27	5.4	23.2	< 1	0.4	93	235	54.4
CH-03	414452	0.379	5	1.5	4	3.7	782	0.4	751	1460	157	541	81.6	20.9	55.1	7.2	33	5.4	13.4	1.61	9	1.25	7.2	95.7	< 1	0.8	107	233	112

Note: this accounts for 0.77% of the entire dataset

The Certificate ID (identification) for 15.77% of all samples was incorrectly labelled in the original database, and subsequently corrected. Table 12.3 lists these corrections.

Table 12.3 Corrected Assay Certificate ID

Uncorrected Database Certificate ID	Corrected Certificate ID	Comments
A10-0558 Final	A10-0588 Final	Samples 414102-414208 from CH-01 and CH-02
A10-1194 Prelim	A10-1194 Final	Samples 415658-415709 from CH-06
A10-1194 Final	A10-1269 Final	Samples 415702-415707 from CH-06
A10-1335 Prelim	A10-1335 Final	Samples 415879-598515 from CH-08
A10-1148 Final	A10-1148 Final	Samples 599084-599139 from CH-16

Only one sample number error, representing 0.05% of the dataset was found in the database and corrected.

The drillhole data was imported into the Gemcom GEMS™ program, which has a routine that checks for duplicate intervals, overlapping intervals, and intervals beyond the end of the hole. The errors identified in the routine were checked against the original logs and subsequently corrected. Table 12.4 provides a summary of these changes.

Table 12.4 Corrected Intervals in Database

Drillhole	Previous Length (m)	Corrected Length (m)	Comments
CH-04	135	135.50	Corrected the depth of the contact between Carbonatite (A) and Syenite.
CH-09	387 and 390	386	There were two extra survey readings deeper than the end of the hole.
CH-10, sample 598668	257	257.50	Corrected the sample "to" value.
CH-11, sample 598726	-	83.4	Sample "to" value was not in database.

12.2 SITE VISIT, JULY 2011

The site visit was conducted by Paul Daigle, Senior Geologist for Tetra Tech, on July 7, 2011 for one day. Access to site was by helicopter chartered out of Timmins directly to the Clay Howells Camp.

The camp was demobilized with only the core logging and sampling building, core storage racks and a prospector tent (for camp watchmen) remaining.

The camp was still accessible by road, however, according to REM, during the demobilization of the drill equipment the road was damaged. The damage was severe enough to stop any type of vehicle, other than a 4x4 ATV, to pass. The refurbishment of the road is expected to be carried for any future exploration activities.

The camp was still accessible by road. However, during the summer (after the site visit) two bridges were pulled to stop public access to the area. Future exploration programs will require the instalment of these bridges.

12.2.1 DRILL CORE STORAGE

The drill core storage racks are kept on site behind the drill core logging and sampling building. The drill core is kept in open wooden core boxes.

12.2.2 DRILL CORE

Selected drill core boxes were taken into the core logging building for inspection to the drill logs and for the collection of assay check samples.

12.3 ASSAY CHECK

Independent samples were taken during the site visit by Tetra Tech. Four samples were collected from the core box. However, due to a lack of core splitter or saw, the samples were collected by removing alternate pieces of drill core within the sample interval by the author. Due the difference in the drill core sampling procedures, inconsistencies in the comparative analyses are expected.

The samples were placed in sample bags, labelled and sealed on site by Tetra Tech. The samples were kept with the author at all times for the duration of the site visit and return to Toronto. The samples were sent to ALS Canada Ltd. (ALS) in Sudbury, ON and the assay results were compared with the REM's analysis also from ALS. The same sample preparation and analyses were conducted on the samples with the exception that Tetra Tech's samples did not undergo XRF analysis for Nb_2O_5%.

The results between Fe and REEs show variations between the two samples. The variations in the assay results may indicate a more 'nuggety' distribution within the drill core since only alternating pieces of core were removed for sampling as opposed to collecting quarter core. Therefore, differences in assay results even within the drill core samples are expected.

The samples collected by Tetra Tech were collected from intervals with an abundance of Fe and LREE-bearing minerals and, although not representative of the carbonatite and magnetite lithologies, appear higher than those of REM. This may be due to real variations within the mineralized lithologies.

Also noted was that since HREEs occur with relatively low values, any variations in absolute differences show a greater percentage difference.

Results of the check assay samples and corresponding sample analysis by REM are shown in Table 12.5 and Table 12.6 below.

Table 12.5 Summary of Check Sample Collected by Tetra Tech

Tetra Tech Sample No.	REM Sample No.	Drill Hole	Sample Interval (m)	Lithology
W-1	598533	CH-09	139.5 – 141.0	Carbonatite
W-2	414273	CH-02	143.3 – 143.9	Carbonatite
W-3	599129	CH-16	178.3 – 179.8	Massive Magnetite
W-4	598742	CH-11	104.9 – 106.3	Carbonatite

Table 12.6 Comparison of Assay Results for REEs (All Assay Values are in ppm Unless Otherwise Stated

Tetra Tech Sample No.	Drill Hole	Fe_2O_3 (%)	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Y
W-1	CH-09	63.7	860	1990	190.0	684	161.5	60.8	163.5	23.2	132.5	24.5	67.2	7.88	44.3	5.62	412
W-2	CH-02	28.6	1620	3540	358.0	1245	235	84.3	237.0	30.2	160.0	27.6	71.7	8.14	47.7	6.09	681
W-3	CH-16	59.0	1080	1960	187.5	623	83.8	23.5	60.8	7.8	42.9	7.8	22.2	2.91	20.5	2.91	191
W-4	CH-11	41.4	2350	5090	462.0	1520	146.5	35.4	77.7	9.9	57.3	11.2	33.3	4.26	28.1	4.01	339
REM Sample No.																	
598533	CH-09	85.53	784	1600	180	632	127	40.5	121	17.9	92.2	15.8	40.3	5.36	32	4.51	396
414273	CH-02	62.28	1050	2070	200	700	159	52.4	142	21.8	117	20.8	53.4	7.05	41.1	5.71	429
599129	CH-16	54.14	801	1400	143	491	68.3	16.8	49	6.8	36.9	7	19.8	3.05	20.9	3.26	185
598742	CH-11	44.42	3140	6020	628	1810	182	41.2	125	13.9	72.6	13.3	38.1	5.51	33.7	4.81	408
Difference (ppm)	CH-09	21.83	-76	-390	-10	-52	-34.5	-20.3	-42.5	-5.3	-40.3	-8.7	-26.9	-2.52	-12.3	-1.11	-16
	CH-02	33.68	-570	-1470	-158	-545	-76	-31.9	-95	-8.4	-43	-6.8	-18.3	-1.09	-6.6	-0.38	-252
	CH-16	-4.86	-279	-560	-44.5	-132	-15.5	-6.7	-11.8	-1	-6	-0.8	-2.4	0.14	0.4	0.35	-6
	CH-11	3.02	790	930	166	290	35.5	5.8	47.3	4	15.3	2.1	4.8	1.25	5.6	0.8	69
Difference (%)	CH-09	26%	-10%	-24%	-6%	-8%	-27%	-50%	-35%	-30%	-44%	-55%	-67%	-47%	-38%	-25%	-4%
	CH-02	54%	-54%	-71%	-79%	-78%	-48%	-61%	-67%	-39%	-37%	-33%	-34%	-15%	-16%	-7%	-59%
	CH-16	-9%	-35%	-40%	-31%	-27%	-23%	-40%	-24%	-15%	-16%	-11%	-12%	5%	2%	11%	-3%
	CH-11	7%	25%	15%	26%	16%	20%	14%	38%	29%	21%	16%	13%	23%	17%	17%	17%

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

Mineralogical measurements of three composites from diamond drillholes CH-01, CH-09, and CH-17 were performed by Quantitative Evaluation of Materials by Scanning Electron Microscope (QEMSCAN) and Electron Probe Micro Analysis (EPMA) using a wet drum separator. Work was completed by Xstrata Process Support and the purpose of the test work was to quantify modal analysis, REE mineral grain size, and REE distribution within the samples in order to better understand the ore-hosting minerals and the economics of the mineral occurrences. Another main objective of the work was to provide a preliminary assessment of the amenability of the samples to magnetic separation. All assays were analyzed at ALS Chemex in Vancouver.

The following excerpts, taken from Kormos (2010), summarizes the main findings from the test work program:

ASSAY AND MINERALOGICAL FEED ANALYSIS

- *TREO content in DDH CH 01, DDH CH 09 and DDH CH 17 is 0.84%, 1.75% and 1.75%, respectively. The corresponding HREO content content in each of the composites is 0.09%, 0.14% and 0.11%. The HREO/TREO ratio, expressed in %, is 10.9, 8.3 and 6.4, respectively.*
- *Sizing and assaying of -10 mesh material indicates that the REE have a finer size distribution compared to Fe_2O_3 for composites DDH CH 01 and DDH CH 09. Composite DDH CH 17 has a similar distribution of REE and Fe_2O_3 across size.*
- *The mineralogical analysis of the feed composites indicates the host rock is a Mn-bearing magnetite. Electroprobe micro-analyzer (EPMA) analysis indicates an average Mn content of 2.81%.*
- *DDH CH 01 composite contains more Ca bearing species (calcite, amphibole, pyroxene) and less Mn magnetite than is present in the other two composites.*
- *DDH CH 17 mineralogy indicates strong alteration. In addition to Mn magnetite, this composite is characterized by Fe bearing clays, Fe silicate, quartz and associated brecciation textures. This alteration and texture is likely responsible for the softer nature of this composite compared to the other two composites.*

- *REE mineralogy consists of phosphates and silicates. EPMA analysis indicates the phosphates are similar to monazite, but contain lower levels phosphorus than typical monazites.*
- *Phosphates dominate the REE mineralogy in composites DDH CH 01 and DDH CH 17. REE mineralogy in DDH CH 09 is dominated by a Ca REE silicate. Trace levels of allanite and very rare grains of fergusonite were also identified in the composites.*
- *REE mineralogy is coarse grained. The grain size distributions indicate that the 45.8% and 56.0% of the REE mineral distribution occurs as grains larger than 100 µm in samples DDH CH 01 and DDH CH 09 respectively. Approximately three quarters of the distribution in these two composites are grains over 50 µm in size. Composite DDH CH 17 is somewhat finer, with 18.9% of the mass of REE minerals occurring in grains larger than 100µm, and 52.0% over 50 µm in size.*
- *EPMA analysis was completed to check for low levels of solid solution REE in silicates, oxides, carbonates and phosphates. Results indicate apatite contains an average of 4.0% Ce, 2.0% La, and 1.08% Nd in solid solution within its structure. REE were not detected in any other species.*
- *Ce, La and Nd deportments show these REE occur in the same mineral species and the distribution of the REE within the mineral species occur in approximately the same proportions regardless of the element. This analysis confirms that these three REE are mineralogical associated with one another, and that processing of this material will result in similar Ce, La and Nd recoveries, regardless of how fine the material is ground. (i.e. these recoveries will move together). Thorium deportment data shows slightly different distributions into the various REE minerals. It should therefore be expected that processing of this material will result in Th recoveries that will differ somewhat from Ce, La and Nd recoveries.*

MAGNETIC SEPARATION

- *Wet drum magnetic separation was performed to provide an initial assessment of this material's amenability to magnetic separation. Each sample was ground to 53 µm, based on the results of the mineralogical assessment, and then run through a wet drum magnetic separator at a maximum setting of 2000 gauss. Two passes through the separator were completed for each composite.*
- *Results indicate:*
  - *There is a consistent upgrading of REE into the non-magnetic fraction and corresponding upgrading of Fe_2O_3 into the magnetic fraction, indicating that production of a magnetic Fe concentrate and a non-magnetic REE fraction which may be amenable to further upgrading is possible.*

- *TREO grades in the non-magnetic fraction were upgraded to 1.4% in composite DDH CH 01 and 3.9% in each of DDH CH 09 and DDH CH 17 at recoveries of 46.6%, 57.2% and 64.4% respectively.*
- *The Fe_2O_3 grade in the magnetic fraction was upgraded to 55.8% in DDH CH 01, 71.6% in DDH CH 09 and 71.7% in DDH CH 17 at recoveries of 89.5%, 93.1% and 86.1%.*

- *Results indicate that optimization is required to improve REE recoveries to the non-magnetic fraction. Mass pulls to the magnetic concentrate were high at 68.8%, 72.0% and 68.0%, which is greater than the magnetite content in the composite feeds. It is likely that some of the REE were recovered to the magnetic fraction through entrainment.*

As a result of the iron on the property being in the form of magnetite, the magnetic separation study suggests that two products would be produced: a high grade iron ore concentrate and a higher grade REE product (Website: www.rareearthmetals.ca).

The main recommendations made by Xstrata Process Support from results of the test work included the execution of a scoping study to assess metallurgical processing of the material. This would necessitate supplementary volumes of representative samples and should incorporate optimization of magnetic separation followed by flotation testing (Kormos, 2010).

14.0 MINERAL RESOURCE ESTIMATES

14.1 INTRODUCTION

The following is a NI 43-101 compliant resource estimate for the Clay-Howells Fe-REE deposit. The effective date of this resource estimate is September 23, 2011.

This initial resource estimate was prepared using two interpreted domains. A cut-off grade of 0.6 TREO% was chosen for the Fe-REE deposit resource estimate based on comparable deposits and in the absence of metallurgical data and recoveries and other economic parameters. Tetra Tech considers this cut-off grade to be reasonable.

14.1.1 DATABASE

REM supplied all of the digital data for the resource estimate. This data was compiled from the assay analyses, which came directly to REM from ActLabs in Microsoft Excel formats. The data was verified and imported into GEMS™ version 6.3.0.1 Resource Evaluation Edition.

The drillhole dataset included the header files and three other tables (including the survey, assay and lithology files). The dataset included 18 drillholes with 1,825 assay values, and 1,742 survey readings. Of the 18 drillholes completed by REM, 17 drillholes intersect the interpreted Clay-Howells deposit, for a total of 1,608 assay values.

A manual check on the database was made to search for obvious errors, such as negative values and overlapping sample intervals, prior to statistical treatments. No errors were found in the database.

14.1.2 SPECIFIC GRAVITY

REM conducted bulk density measurements on only 15 samples, approximately two readings per lithology. These density measurements were assigned to specific lithology codes and subsequently interpolated by nearest neighbour (NN) method for the block model. REM has not yet conducted comprehensive bulk density measurements.

Overall, the specific gravity values range from 3.11 g/cc to 4.38 g/cc. The summary of the specific gravity measurements are listed in Table 14.1.

Table 14.1 Summary Statistics for Specific Gravity Data (g/cc)

Lithology	Rock Code	Count	Weighted Mean
Syenite	100	3	3.12
Syenite Breccia	101	-	-
Amphibolite	102	-	-
Equigranular Carbonatite	401	2	3.40
Porphyroblastic Amphibole Carbonatite	402	2	3.25
Carbonatite	403	-	-
Inter-banded Syenite and Carbonatite	404	2	3.11
Mineralized Fault Zone	405	1	3.86
Magnetite Iron Formation	500	3	4.38

14.2 EXPLORATORY DATA ANALYSIS

Exploratory data analysis is the application of various statistical tools to explain the characteristics of the data set. In this case, the objective is to understand the population distribution of the grade elements through the use of such tools as histograms, descriptive statistics and probability plots.

14.2.1 RAW ASSAYS

Raw assay statistics for the entire dataset are shown in Table 14.2. Raw Statistics by domain are shown in Table 14.3 and Table 14.4. Only those values greater than zero were used in the statistical analysis. A summary of descriptive statistics for all REOs by domain may be found in Appendix B.

Table 14.2 Raw Assay Statistics (No Zeroes) for TREO% and Four Metal Oxides

	Length	Fe_2O_3%	TREO%	Nb_2O_5%	MnO%	ThO_2%
Count	1,608	1,608	1,608	1,608	1,608	1,608
Minimum	0.40	1.650	0.016	0.002	0.046	0.001
Maximum	5.00	94.750	6.787	2.309	5.535	0.825
Mean	1.31	34.518	0.482	0.124	1.741	0.047
Standard Deviation	0.34	23.665	0.468	0.124	0.981	0.064
Variance	0.12	560.048	0.219	0.015	0.962	0.004
Coefficient of Variance (CV)	0.26	0.686	0.971	1.002	0.563	1.376

Table 14.3 Summary of Raw Assay Statistics for the REOs; All Lithologies

	La_2O_3	Ce_2O_3	Pr_2O_3	Nd_2O_3	Sm_2O_3	Eu_2O_3	Gd_2O_3	Tb_2O_3	Dy_2O_3	Ho_2O_3	Er_2O_3	Tm_2O_3	Yb_2O_3	Lu_2O_3	Y_2O_3
Count	1,608	1,608	1,608	1,608	1,608	1,608	1,608	1,608	1,608	1,608	1,608	1,608	1,608	1,608	1,608
Minimum	0.003	0.007	0.001	0.003	0.00045	0.00008	0.00028	0.00003	0.0002	0.00002	0.00008	0.00001	0.00009	0.00001	0.00013
Maximum	2.299	3.302	0.250	0.672	0.106	0.036	0.101	0.015	0.068	0.011	0.028	0.004	0.020	0.003	0.347
Mean	0.115	0.210	0.022	0.075	0.011	0.003	0.008	0.001	0.005	0.001	0.002	0.000	0.002	0.000	0.026
Standard Deviation	0.131	0.217	0.020	0.065	0.010	0.003	0.007	0.001	0.005	0.001	0.002	0.000	0.002	0.000	0.023
Variance	0.017	0.047	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
CV	1.138	1.032	0.913	0.858	0.840	0.857	0.885	0.911	0.900	0.882	0.864	0.847	0.826	0.802	0.901

Table 14.4 Summary of Raw Assay Statistics for Syenite Lithologies; Rock Codes 100, 101, 102

	Fe_2O_3%	Nb_2O_5%	MnO%	ThO_2%	La_2O_3	Ce_2O_3	Pr_2O_3	Nd_2O_3	Sm_2O_3	Eu_2O_3	Gd_2O_3	Tb_2O_3	Dy_2O_3	Ho_2O_3	Er_2O_3	Tm_2O_3	Yb_2O_3	Lu_2O_3	Y_2O_3
Count	452	452	452	452	452	452	452	452	452	452	452	452	452	452	452	452	452	452	452
Minimum	2.590	0.009	0.057	0.001	0.004	0.008	0.001	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
Maximum	82.130	0.727	3.521	0.384	1.419	2.143	0.183	0.533	0.069	0.019	0.049	0.006	0.030	0.005	0.014	0.002	0.011	0.002	0.179
Mean	20.684	0.093	1.092	0.026	0.076	0.136	0.014	0.050	0.008	0.002	0.005	0.001	0.004	0.001	0.002	0.000	0.002	0.000	0.019
Standard Deviation	16.956	0.083	0.707	0.039	0.096	0.159	0.015	0.050	0.007	0.002	0.005	0.001	0.004	0.001	0.002	0.000	0.001	0.000	0.019
Variance	287.517	0.007	0.499	0.002	0.009	0.025	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CV	0.820	0.893	0.647	1.487	1.264	1.169	1.047	0.999	0.963	1.009	0.995	0.994	0.978	0.957	0.931	0.887	0.830	0.765	0.981

Table 14.5 Summary of Raw Assay Statistics for Carbonatite Lithologies; Rock Codes 401, 402, 403, 404, 405 and 500

	Fe_2O_3%	Nb_2O_5%	MnO%	ThO_2%	La_2O_3	Ce_2O_3	Pr_2O_3	Nd_2O_3	Sm_2O_3	Eu_2O_3	Gd_2O_3	Tb_2O_3	Dy_2O_3	Ho_2O_3	Er_2O_3	Tm_2O_3	Yb_2O_3	Lu_2O_3	Y2O3
Count	1,156	1,156	1,156	1,156	1,156	1,156	1,156	1,156	1,156	1,156	1,156	1,156	1,156	1,156	1,156	1,156	1,156	1,156	1,156
Minimum	1.650	0.002	0.046	0.001	0.003	0.007	0.001	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Maximum	94.750	2.309	5.535	0.825	2.299	3.302	0.250	0.672	0.106	0.036	0.101	0.015	0.068	0.011	0.028	0.004	0.020	0.003	0.347
Mean	39.927	0.136	1.995	0.055	0.131	0.240	0.025	0.085	0.013	0.003	0.009	0.001	0.006	0.001	0.003	0.000	0.002	0.000	0.028
Standard Deviation	23.723	0.135	0.956	0.070	0.140	0.230	0.021	0.067	0.010	0.003	0.007	0.001	0.005	0.001	0.002	0.000	0.002	0.000	0.024
Variance	562.775	0.018	0.913	0.005	0.019	0.053	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
CV	0.594	0.993	0.479	1.284	1.068	0.958	0.842	0.786	0.771	0.781	0.822	0.861	0.853	0.839	0.824	0.817	0.807	0.797	0.856

14.2.2 CAPPING

Cumulative probability plots, descriptive statistics and Parrish analysis were used to assess the need for capping of metal assays. Typically, a step-change in the profile or a separation of the data points is present if there are different populations in the dataset. High value outliers will show up in the last few percent of a cumulative probability plot (in the 97% to 100% range) and the break in the probability distribution may be selected to set a capping level.

Figure 14.1 and Figure 14.2 show examples of the histogram and cumulative frequency plots for the raw uncapped Fe_2O_3% data for the carbonatite lithologies and syenite lithologies respectively. Figure 14.3 and Figure 14.4 show examples of the histogram and cumulative frequency plots for the raw uncapped La_2O_3% data for the carbonatite lithologies and syenite lithologies respectively.

Histogram and cumulative frequency plots for the 19 metal oxides may be found in Appendix C.

Figure 14.1 Histogram and Cumulative Probability Plot for Fe_2O_3%; Syenite Lithologies

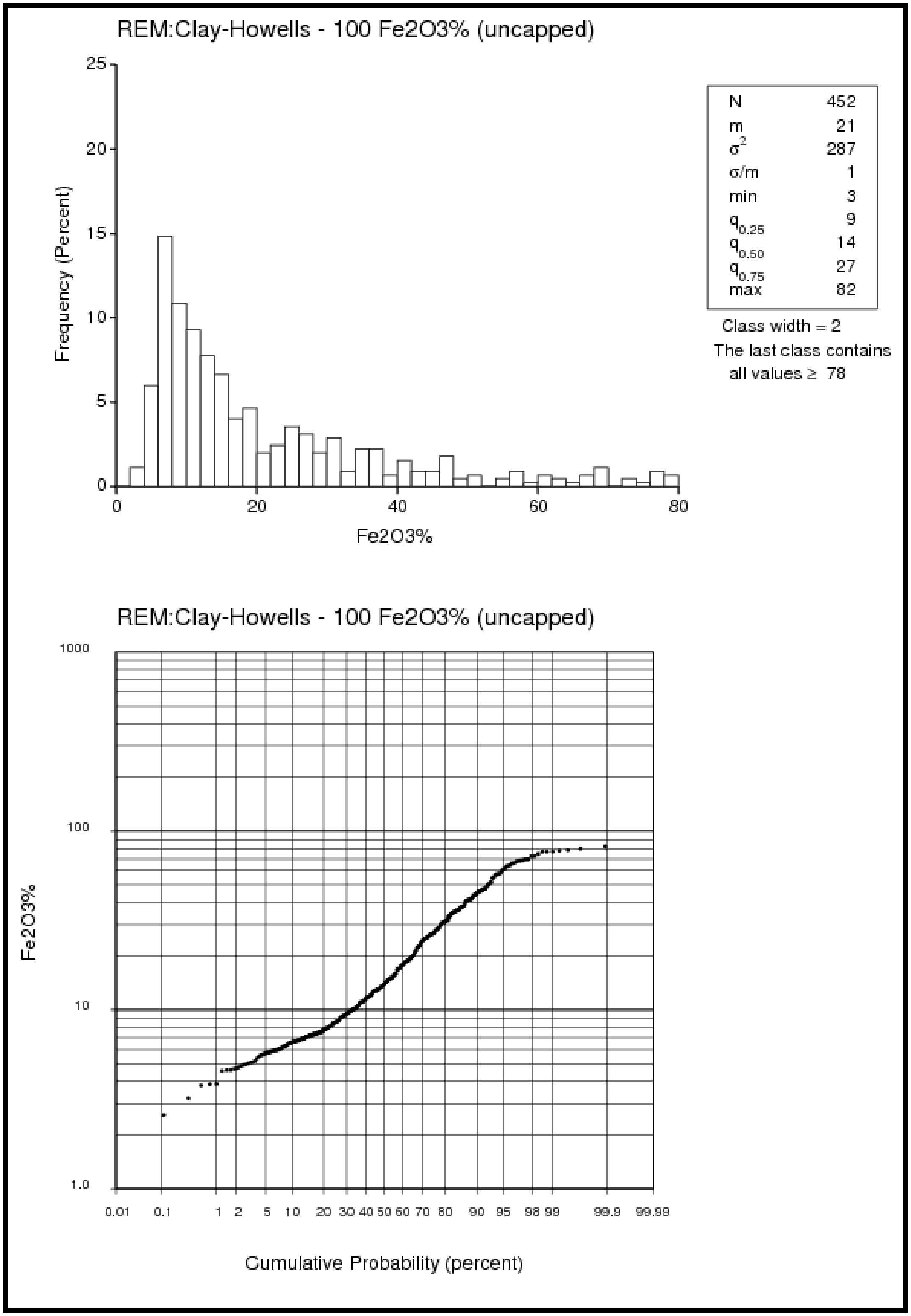


Figure 14.2 Example of Histogram and Cumulative Probability Plot for La_2O_3%; Carbonatite Lithologies

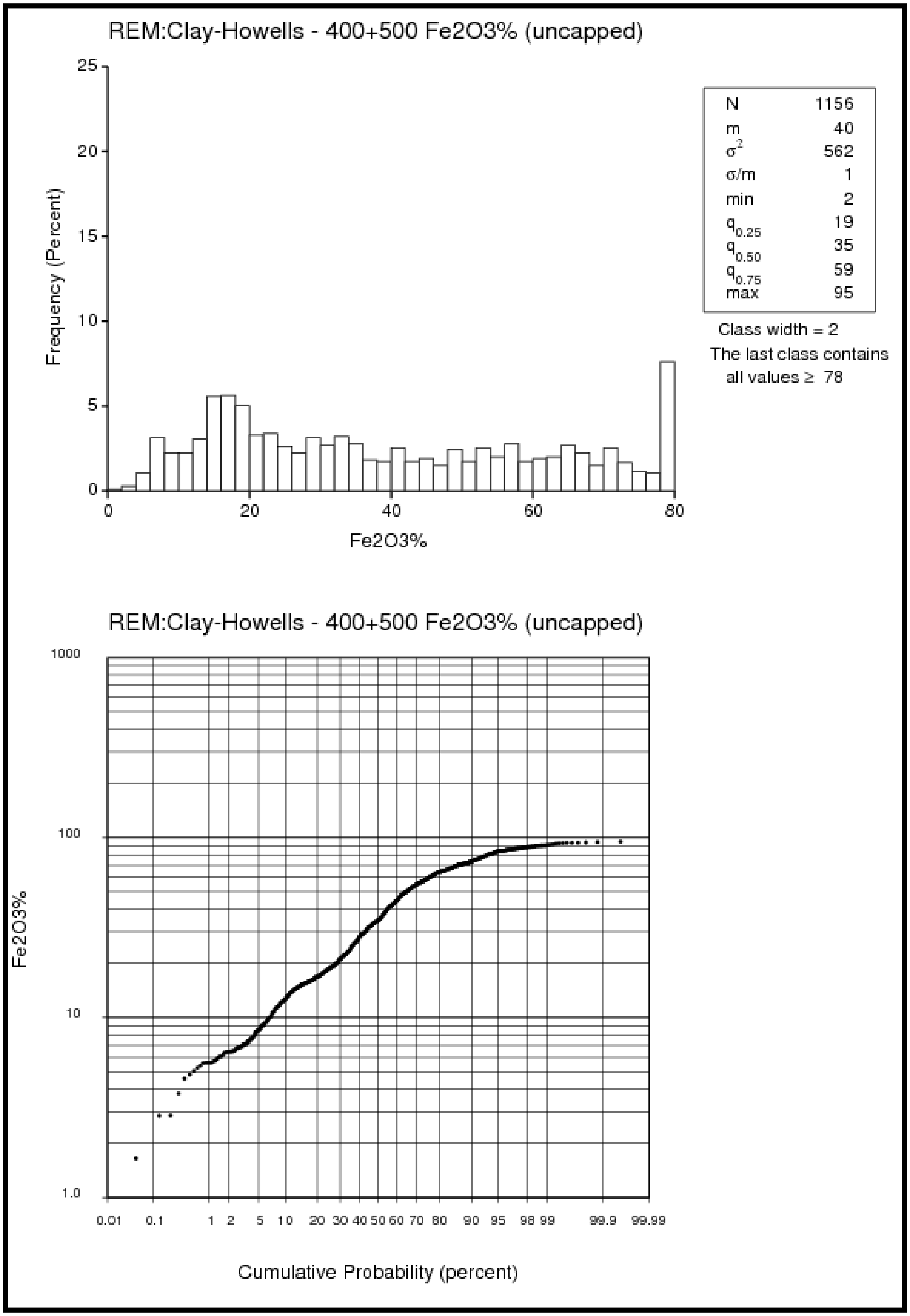


Figure 14.3 Example of Histogram and Cumulative Probability Plot for La_2O_3%; Syenite Lithologies

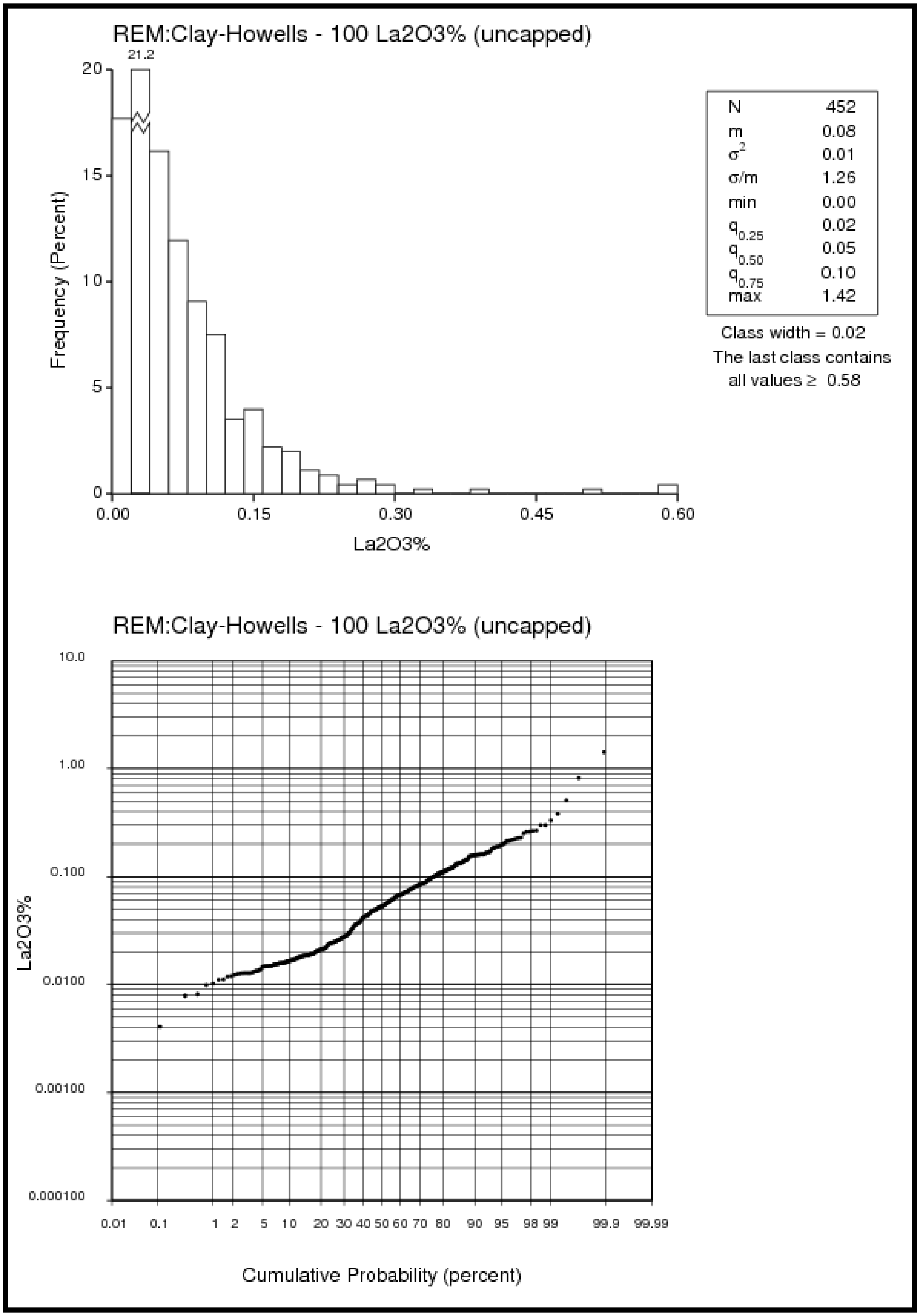
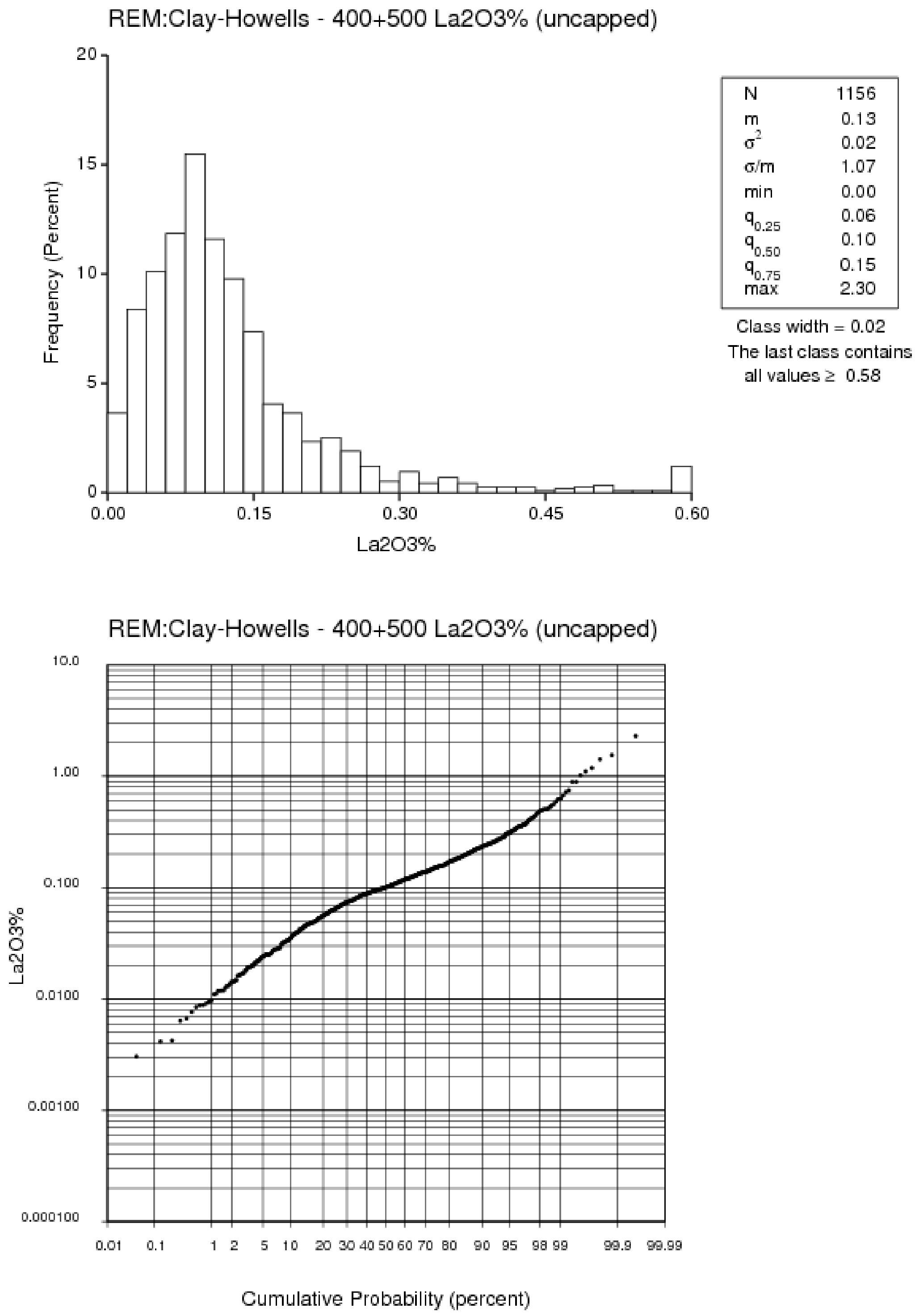


Figure 14.4 Example of Histogram and Cumulative Probability Plot for Fe_2O_3%; Carbonatite Lithologies



Assay data for the 15 REOs and the four metal oxides were analyzed by lithology groups and examined separately. Capping values were assessed for Fe_2O_3%, Nb_2O_5%, MnO, ThO_2 and the 15 REOs for the two lithological groups. Table 14.6 below summarizes the capping levels for each metal oxide by lithology group and the number of affected assay values.

Table 14.6 Summary of Capping Levels

Oxide or Element	Syenite		Carbonatite	
	Capped Value	Number of Assay Values Capped	Capped Value	Number of Assay Values Capped
Fe_2O_3%	-	-	-	-
Nb_2O_5%	-	-	1.00	4
MnO%	-	-	-	-
ThO_2%	-	-	-	-
La_2O_3%	0.40	3	1.20	3
Ce_2O_3%	0.60	3	1.10	9
Pr_2O_3%	0.06	3	0.11	9
Nd_2O_3%	0.21	3	0.36	9
Sm_2O_3%	0.038	2	0.082	1
Eu_2O_3%	0.011	2	0.02	1
Gd_2O_3%	0.03	3	0.56	1
Tb_2O_3%	-	-	0.0066	2
Dy_2O_3%	-	-	0.032	2
Ho_2O_3%	-	-	0.006	2
Er_2O_3%	-	-	0.015	2
Tm_2O_3%	-	-	-	-
Yb_2O_3%	-	-	0.013	2
Lu_2O_3%	-	-	0.0018	2
Y_2O_3%	-	-	0.20	1

Note: '-' indicates no capping applied

For comparison of the overall effect of capping of raw data, Table 14.7 shows statistical comparison on the raw and capped data for La_2O_3%, globally and by domain. A summary of descriptive statistics for all raw and capped metals and metal oxides may be found in Appendix D.

Table 14.7 Comparison of Capped and Uncapped La_2O_3%

	La_2O_3 (%) Uncapped	La_2O_3 (%) Capped
All Lithologies		
Count	1,608	1,608
Minimum	0.003	0.003
Maximum	2.299	1.200
Mean	0.115	0.113
Variance	0.017	0.013
Standard Deviation	0.131	0.113
Coefficient of Variation	1.138	0.998
Syenite Lithologies		
Count	452	452
Minimum	0.004	0.004
Maximum	1.419	0.400
Mean	0.076	0.072
Variance	0.009	0.004
Standard Deviation	0.096	0.065
Coefficient of Variation	1.264	0.897
Carbonatite Lithologies		
Count	1,069	1,069
Minimum	0.003	0.003
Maximum	2.299	1.200
Mean	0.130	0.129
Variance	0.019	0.015
Standard Deviation	0.139	0.123
Coefficient of Variation	1.071	0.954

14.2.3 COMPOSITES

In the GEMS project, the table “15M_COMP”, and; the point area “1.5mCompsCap” was created for composited point data that includes both capped and raw 1.5 m composite data.

Table 14.8 shows the descriptive statistics for the assay sample lengths of the entire raw data set for the Clay Howells deposit. It was decided that a 1.5 m composite length would offer the optimum sample population for estimating the block model.

Table 14.8 Statistics on the Assay Sample Lengths of the Raw Data

	Count	Minimum	Maximum	Average	Standard Deviation
Length (m)	1,825	0.40	5.00	1.29	0.34

A total of 1,321 composite samples were created constrained to the solid intersections of the two Carbonatite and the Gradeshell domains. A total of 635 composites lie within the Gradeshell domain and a total of 686 composites lie within the two carbonatite domains. All composited data was used in the interpolation of the Clay Howells deposit.

As an example for comparison of the overall effect of capping levels, Table 14.9 shows statistical comparison for the 1.5 m composites on the all raw and capped data for La_2O_3%, and by domain. A detailed list of the raw and capped 1.5 m composite data is found in Appendix D.

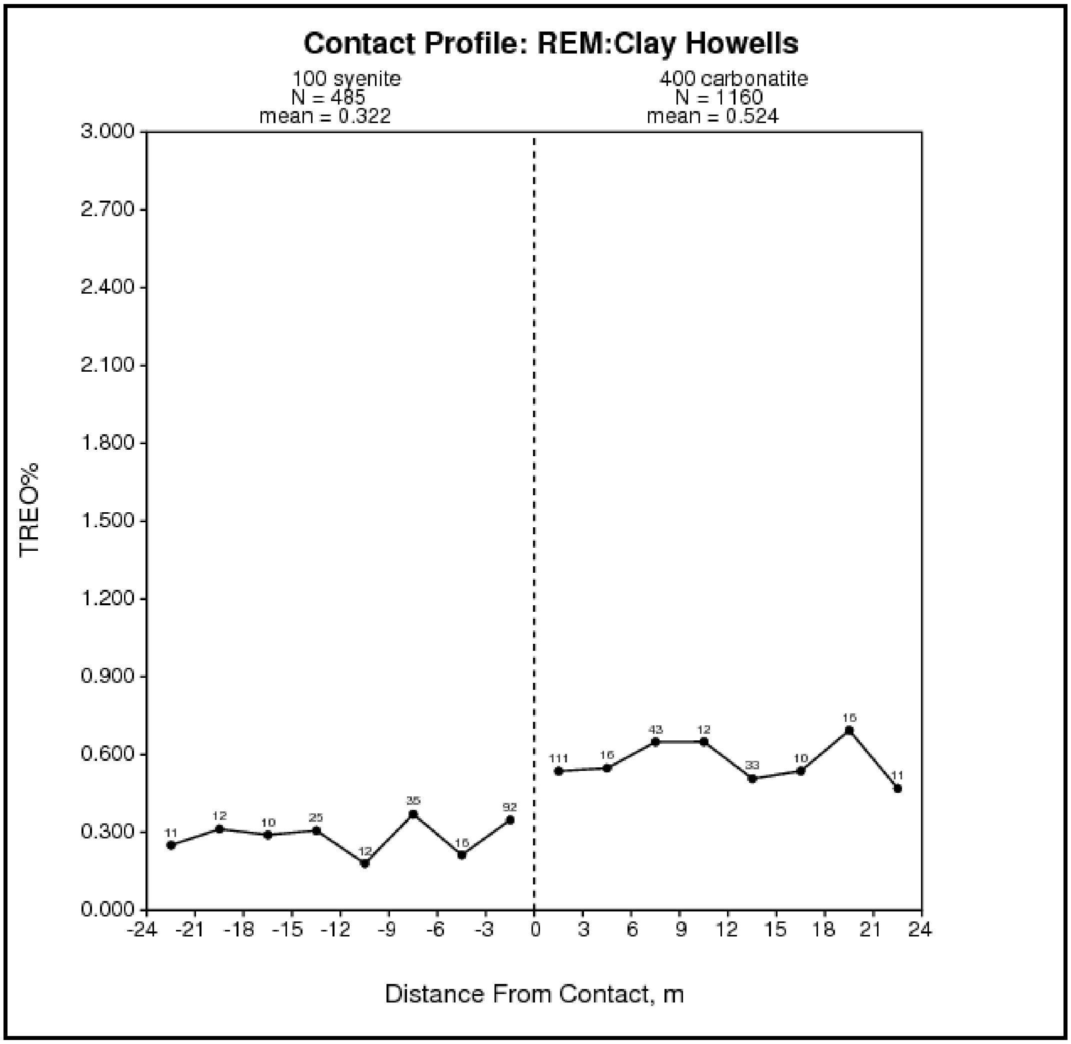
Table 14.9 Comparison of Capped and Uncapped La_2O_3% 1.5 m Composite Data

	La_2O_3 (%) Uncapped	La_2O_3 (%) Capped
All Domains		
Count	1,321	1,321
Minimum	0.005	0.005
Maximum	1.581	0.857
Mean	0.119	0.118
Variance	0.011	0.009
Standard Deviation	0.104	0.093
Coefficient of Variation	0.875	0.792
GS_0.2 Domain		
Count	635	635
Minimum	0.008	0.008
Maximum	1.581	0.848
Mean	0.112	0.110
Variance	0.011	0.008
Standard Deviation	0.104	0.087
Coefficient of Variation	0.930	0.793
Carbonatite Domains		
Count	686	686
Minimum	0.005	0.005
Maximum	0.946	0.857
Mean	0.126	0.125
Variance	0.011	0.010
Standard Deviation	0.104	0.098
Coefficient of Variation	0.827	0.784

14.2.4 CONTACT PROFILES

Contact profiles were made to confirm the limits of the carbonatite lithological domain. Contact plots between carbonatite and syenite indicate a higher mean grade of TREO% in the carbonatite domain. Figure 14.5 presents the contact profile for TREO% between the syenite and carbonatite lithology.

Figure 14.5 Contact Profile for TREO%



14.3 GEOLOGICAL INTERPRETATION

Interpretation of the Clay-Howells deposit is relatively complex as it encompasses either multiple phases of mineralization either post- or syn-genetic. The Clay Howells deposit was interpreted using a combination of lithological data and TREO% assay data from 17 of the 18 drill holes. While the lithological boundaries for two carbonatite units could be ascertained on the drill sections, interpretation between the other lithologies was more complex. Two interpreted cross-cutting faults that lie to the northeast and southwest of the core of the deposit appear to interfere with the continuity of the carbonatite units and the mineralized syenite units.

Since the carbonatite lithologies were targeted for priority assaying and mineralized syenite was selectively sampled and analysed based on scintillometer counts it was determined that a gradeshell of 0.2 TREO% was the best method to capture the mineralized carbonatite and syenite outside of the two core carbonatite units. Therefore, REE mineralization is recognized in the syenite lithologies.

Rock codes were established for the main lithologies and the statistical analysis was carried out based on lithology. The carbonatite units were constrained with bounding wireframes were used to create two carbonatite domains. A bounding wireframe was created around all data greater than or equal to 0.2 TREO%. This gradeshell does not differentiate between lithologies due to the low sample population and density across the 800 m strike length of the deposit. All rock codes and domains are summarized in Table 14.10.

Table 14.10 List of Rock Codes and Wireframe Codes

Description	Rock Code	Wireframe Code (Domain)	Rock Type
Syenite	100		
Syenite Breccia	101		
Amphibolite	102		
Equigranular Carbonatite	401		
Porphyroblastic Amphibole Carbonatite	402		
Carbonatite	403		
Interbanded Syenite and Carbonatite	404		
Mineralized Fault Zone	405		
Magnetite Iron Formation	500		
0.2 TREO% Gradeshell		200	GS_0.2
Carbonatite 1		411	CARB1
Carbonatite 2		412	CARB2

Figure 14.6 to Figure 14.8 illustrate the Carbonatite wireframe and 0.2 TREO% Gradeshell.

Figure 14.6 Plan View Carbonatite Domains

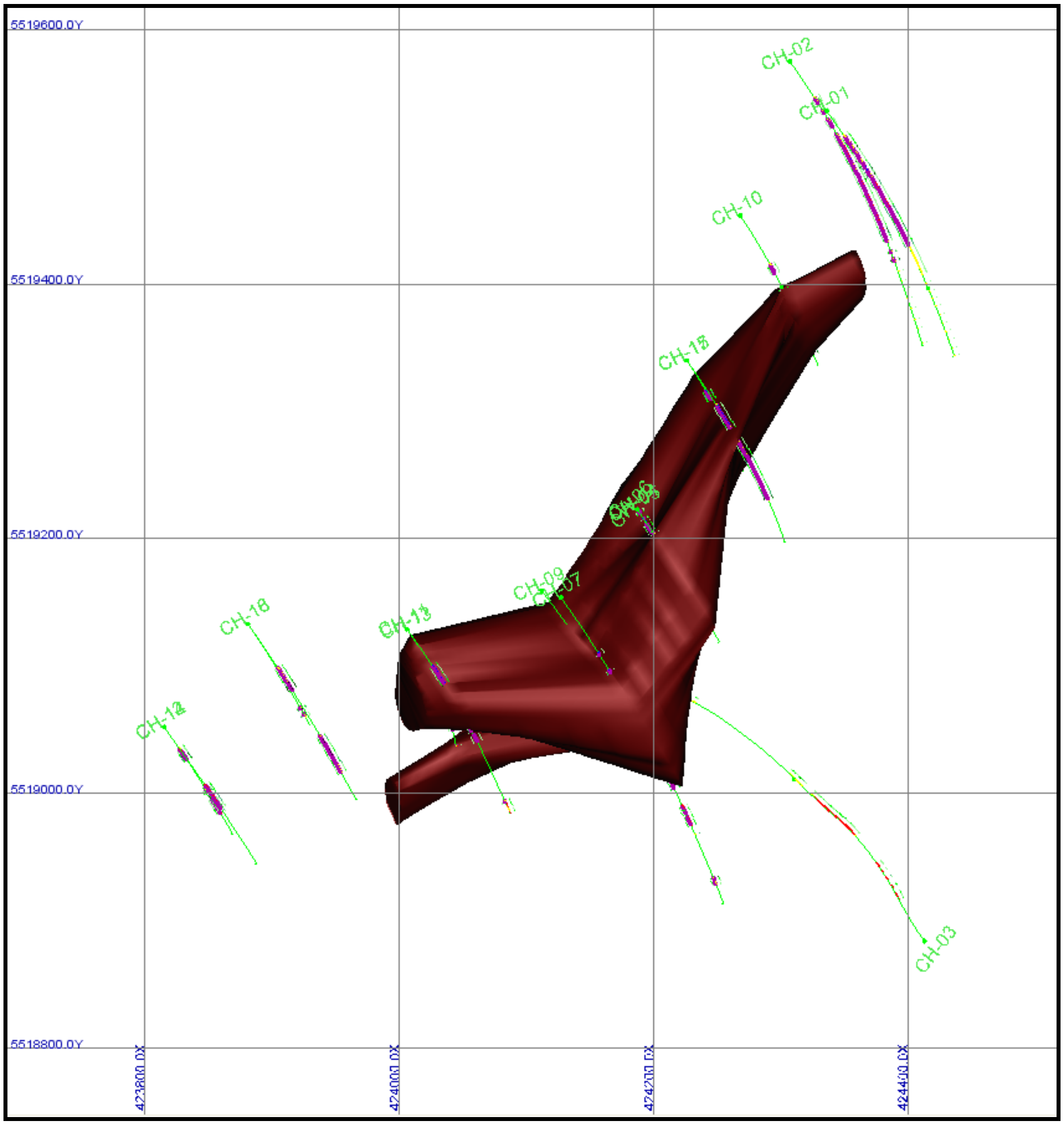


Figure 14.7 Plan View of Carbonatite and Gradeshell Domains with Interpreted Faults

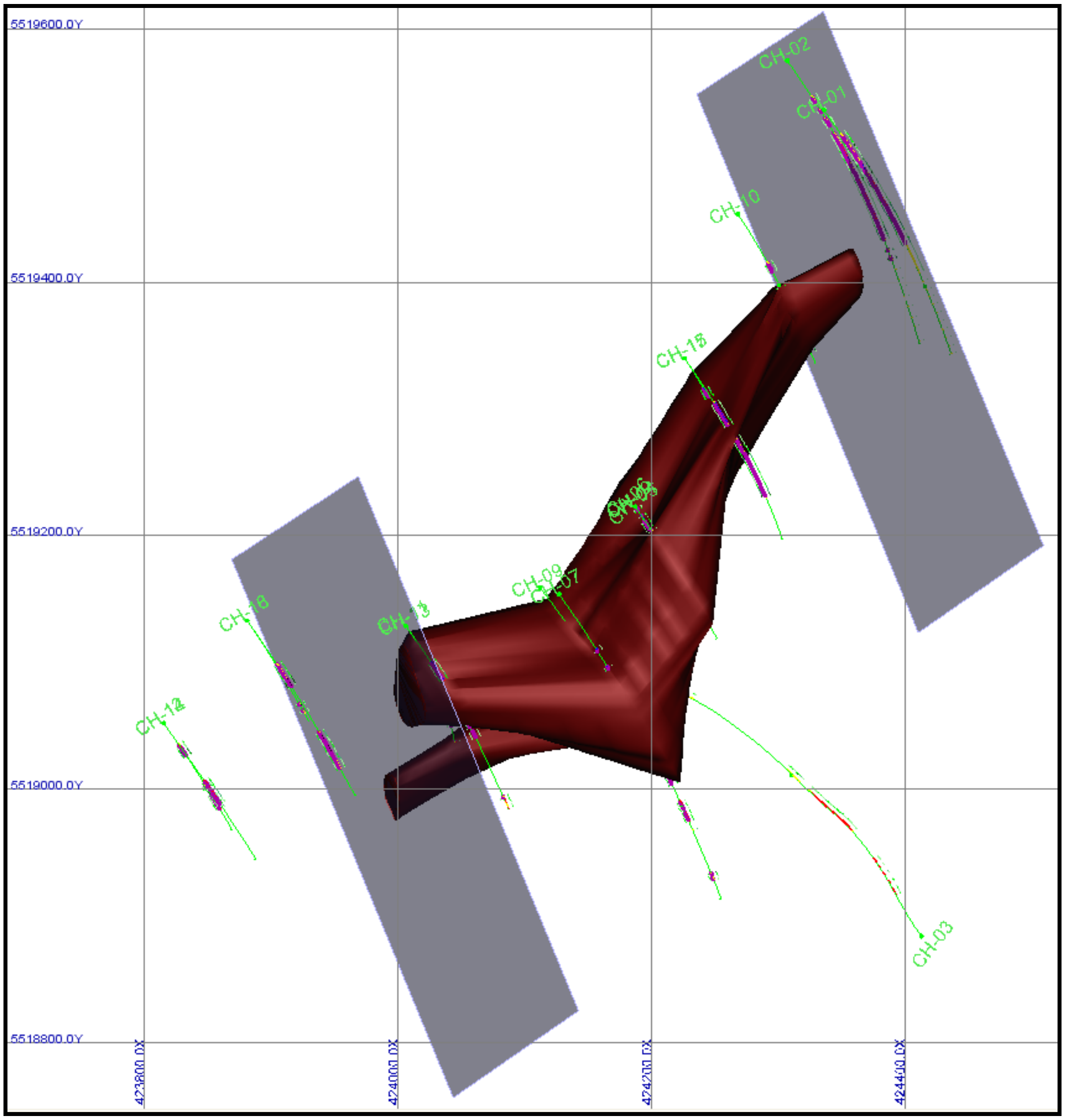
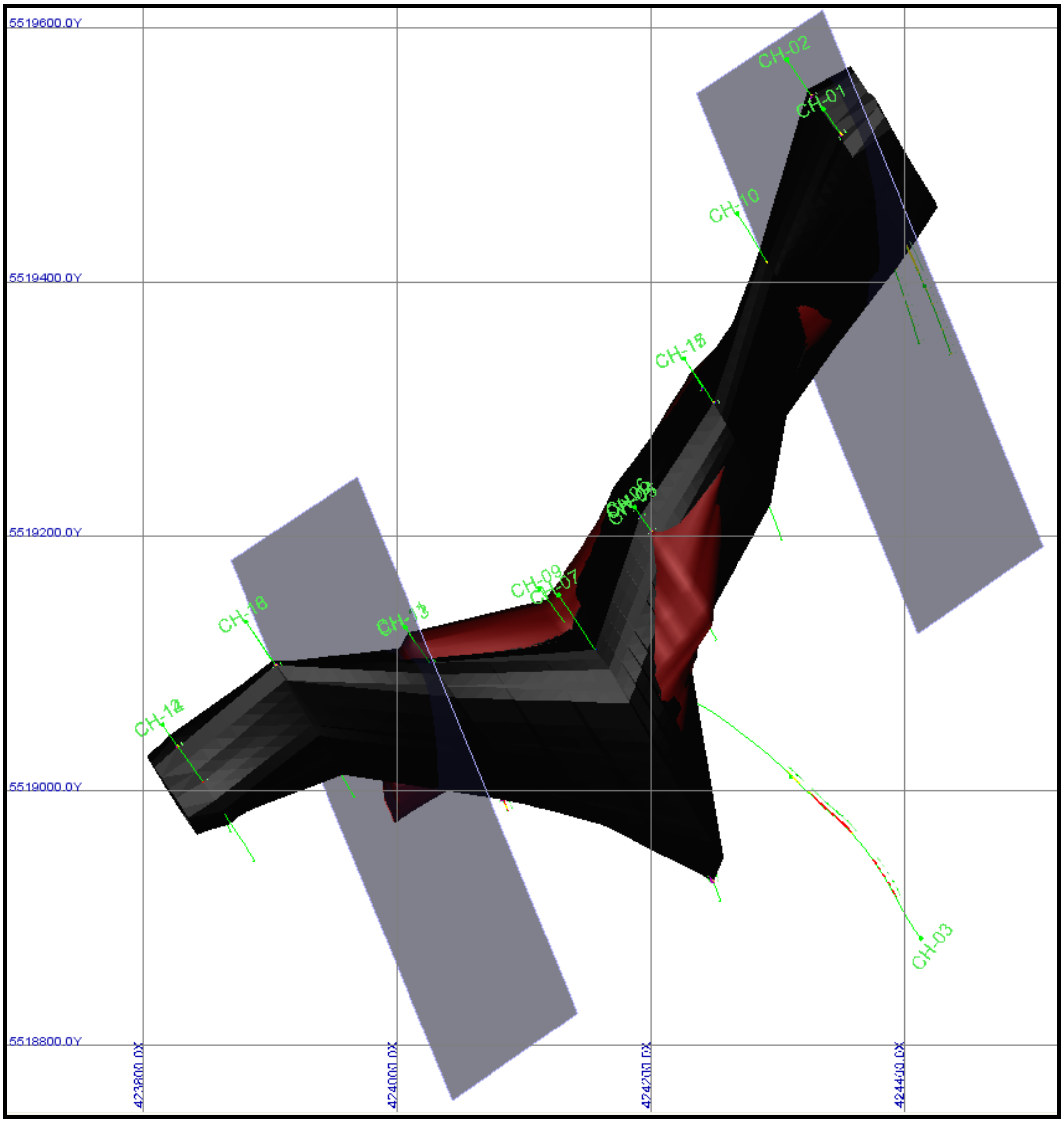
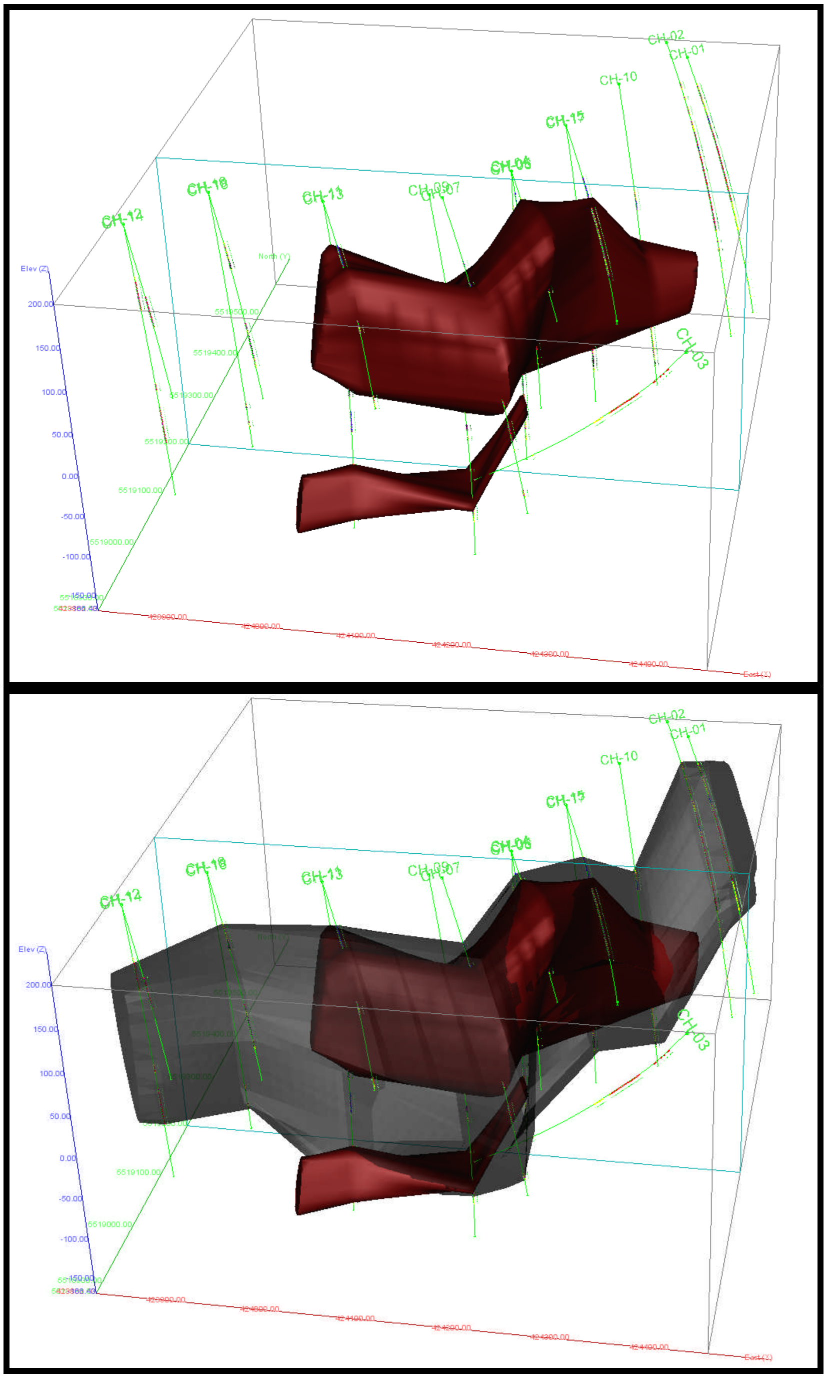


Figure 14.8 Plan View of Carbonatite and Gradeshell Domains



The mineralized carbonatite units, CARB1 (larger) and CARB2 (smaller) are the two domains that are most evident based on continuity of geology across four drill sections. The gradeshell (GS_0.2) was created based on raw assay data with a minimum 0.2 TREO% and encompasses isolated carbonatite, mineralized syenite and magnetite lithologies. The limits of the wireframes were at half the distance between drillhole sections, that is, approximately 25 m. At depth, the wireframes were constrained by either the limits of the carbonatite or the 0.2 TREO% gradeshell and does not surpass the limits of the drilling. Figure 14.9 shows all three wireframe domains.

Figure 14.9 Carbonatite and Gradeshell Domain Wireframes*



*Note: Perspective View Looking North-Northwest; No Scale

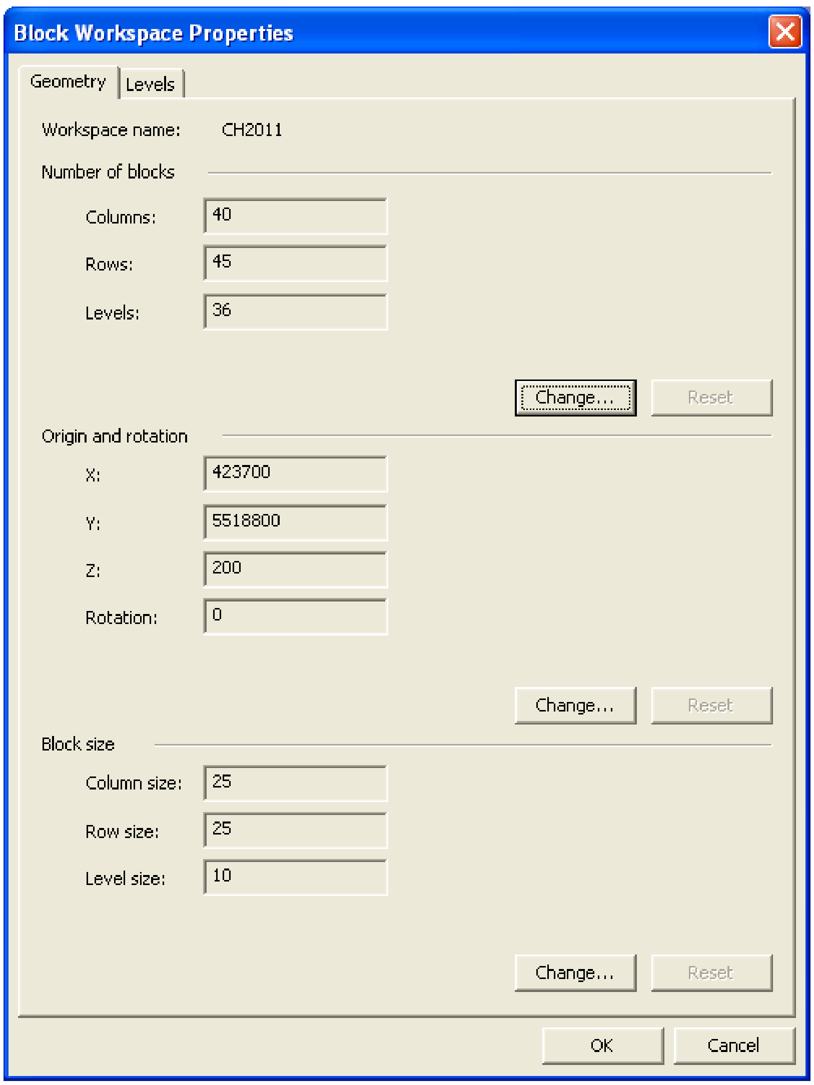
14.4 BLOCK MODEL

A single block model was created to cover the known Clay-Howells deposit. Table 14.11 shows the GEMS coordinates for the block model origins. Figure 14.10 is a screen capture of the Clay-Howells block model workspace. A block size of 25 m x 25 m x 10 m was used for block model and resource estimate.

Table 14.11 Block Coordinates for the Clay-Howells Block Model

	Minimum	Maximum	Number
Easting	423700	424700	40 columns
Northing	5518800	5519925	45 rows
Elevation	-160	200	36 levels

Figure 14.10 Block Model Origin for the Clay-Howells Block Model

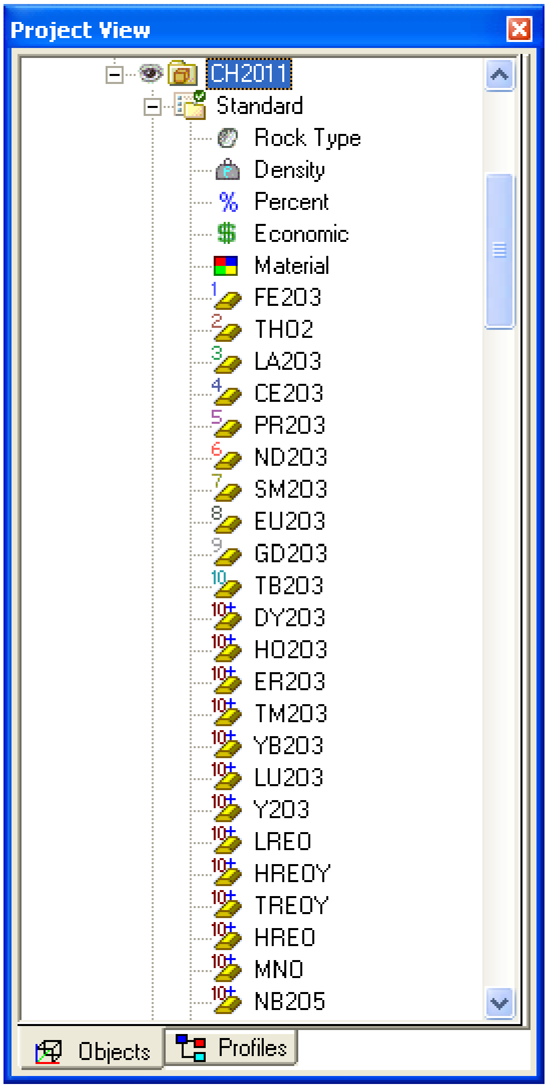


Tetra Tech considers the block size adequate for this deposit since the number of drill holes is few across an approximate strike of 700 m. Several drillholes were also collared from the same position, hence, sample spacing down the drill holes vary from 8 m at the interface of the bedrock up to 200 m at the toe of the drillhole. Drill section spacing is approximately 100 m.

The block size allows between three and five blocks to be interpolated between drill holes. This block size is considered acceptable for the Clay-Howells as there is a relatively low population of data across the deposit and concentrated on the 100 m spaced drill sections.

The block model folders created in GEMS for the Clay-Howells deposit are shown in Figure 14.11.

Figure 14.11 Block Model Folders for the Clay Howells GEMS Project



14.4.1 VARIOGRAPHY

Samples used for variography are a function of geological interpretation. However, due to the low population of assay data within the two interpreted domains, all composited data was used in determining variograms for four groups of elements. Based on correlation coefficients, the four groups of elements are: the LREOs, HREOs, Fe_2O_3 and Nb_2O_5. MnO shows a strong correlation with Fe_2O_3 therefore the variogram for Fe_2O_3 was used in estimating MnO. ThO_2 shows a moderate correlation with HREOs therefore the variogram for HREO was used in estimating ThO_2.

As the sample populations for two domains are relatively small and spread out, variography invariably was poor. Therefore, variograms were established using all the 1.5 m composite samples and used for both the Carbonatite domain and Gradeshell domain.

The variography was generated using Datamine™ Studio 3 software. The composited drillhole data was exported from GEMS as a text file (.csv format) and imported into Datamine™ Studio 3. Down hole variograms, using a lag distance equal to the composite length, were created for each element group.

Since the distance between drill holes is approximately 100 m between drill sections, lag distances of 75 m and 100 m were used in determining experimental variograms to capture the data along strike of the deposit. The ranges of the experimental variograms appear to reach the sill at approximately 200 m.

Experimental variography was subsequently used to calculate best-fit modeled variography. One or two spherical structures were used for spatial modelling and orientations for each grade group and were customized to GEMS requirements. Modeled variography results were exported from Datamine as a report file and ellipses of the model variogram directions were exported in DXF format for visual reference and are presented in Appendix E. Table 14.12 below shows which variogram profile was used for each metal oxide.

Table 14.12 Variogram Parameter Profiles and Associated Metal Oxides

Profile Name	Metal Oxides
DM_LREO	La_2O_3, Ce_2O_3, Pr_2O_3, Nd_2O_3, Sm_2O_3
DM_HREO	Eu_2O_3, Gd_2O_3, Tb_2O_3, Dy_2O_3, Ho_2O_3, Er_2O_3, Tm_2O_3, Yb_2O_3, Lu_2O_3, Y_2O_3, ThO_2
DM_FE	Fe_2O_3, MnO
DM_NB	Nb_2O_5

14.4.2 VARIOGRAPHY PARAMETERS

In GEMS, the convention used for variography parameters for Kriging profiles is right hand in the Z direction, right hand in the X direction and right hand rotation in the Z direction. Table 14.13 to Table 14.16 summarizes the variography parameters used for OK interpolation for each group of metal oxides.

Table 14.13 Variography Parameters Fe_2O_3%

Profile Name	Sill =1	Search Anisotropy	Rotation About Z	Rotation About X	Rotation About Z	X Range	Y Range	Z Range	Search Type
C0 (nugget)	0.05	-	-	-	-	-	-	-	-
C1	0.95	Rotation ZXZ	-60	-60	0	70.0	221.0	139.0	Spherical

Table 14.14 Variography Parameters for LREO%

Profile Name	Sill =1	Search Anisotropy	Rotation About Z	Rotation About X	Rotation About Z	X Range	Y Range	Z Range	Search Type
C0	0.32	-	-	-	-	-	-	-	-
C1	0.00	Rotation ZXZ	-60	60	0	50.0	75.0	100.0	Spherical
C2	0.68	Rotation ZXZ	-60	60	0	92.0	151.0	120.0	Spherical

Table 14.15 Variography Parameters for HREO% and ThO_2%

Profile Name	Sill =1	Search Anisotropy	Rotation About Z	Rotation About X	Rotation About Z	X Range	Y Range	Z Range	Search Type
C0	0.18	-	-	-	-	-	-	-	-
C1	0.40	Rotation ZXZ	-60	60	0	51.0	61.0	97.0	Spherical
C2	0.42	Rotation ZXZ	-60	60	0	83.0	151.0	137.0	Spherical

Table 14.16 Variography Parameters Nb_2O_5%

Profile Name	Sill =1	Search Anisotropy	Rotation About Z	Rotation About X	Rotation About Z	X Range	Y Range	Z Range	Search Type
C0	0.02	-	-	-	-	-	-	-	-
C1	0.98	Rotation ZXZ	-30	-60	0	450.0	200.0	185.0	Spherical

14.4.3 Interpolation Plan and Spatial Analysis

The interpolation methods used for populating the block model were Ordinary Kriging (OK), Inverse Distance (ID2) and NN on capped data. For validation purposes, ID2 and NN interpolation methods were carried out on uncapped data.

For all interpolation methods, only one pass was used. For each domain, a minimum of 6 composite samples and a maximum of 18 composite samples were used on the first pass to interpolate a block for the 15 REOs, Fe2O3%, Nb_2O_5%, MnO%, and ThO_2%. This allows the grade for each block to be interpolated by using composite assay values from at least three drill holes. A summary of the interpolation passes are described in Table 14.17 below.

Table 14.17 Description of Interpolation Passes

Profile Name	Search Ellipse Parameters	Number of Composite Samples Used	Maximum Samples per Drill hole
CH_P1	150 m x 100 m x 40 m	Minimum 6; Maximum 18	4

A list of parameters for the search ellipse used for the Clay-Howells resource estimate is shown in Table 14.18. Figure 14.12 illustrates the orientation of the search ellipse used in the interpolation of the Clay-Howells block model.

Table 14.18 Search Ellipse Parameters

Profile Name	Search Anisotropy	Rotation About Z	Rotation About X	Rotation About Z	X Range	Y Range	Z Range	Search Type
CH_P1	Rotation ZYZ	50°	-45°	0°	150 m	100 m	40 m	Ellipsoidal

Figure 14.12 Search Ellipse CH_P1 for all Domains; Perspective View Looking North; No Scale

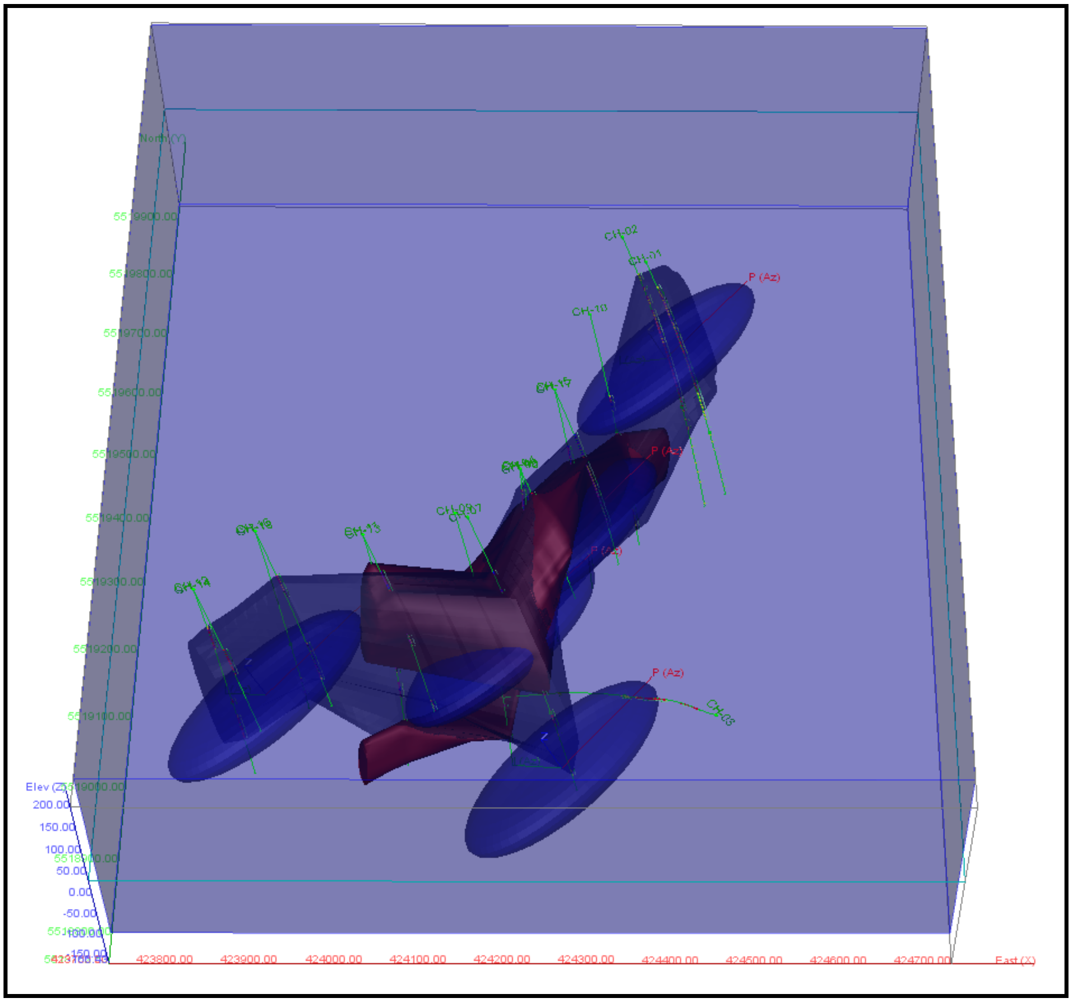
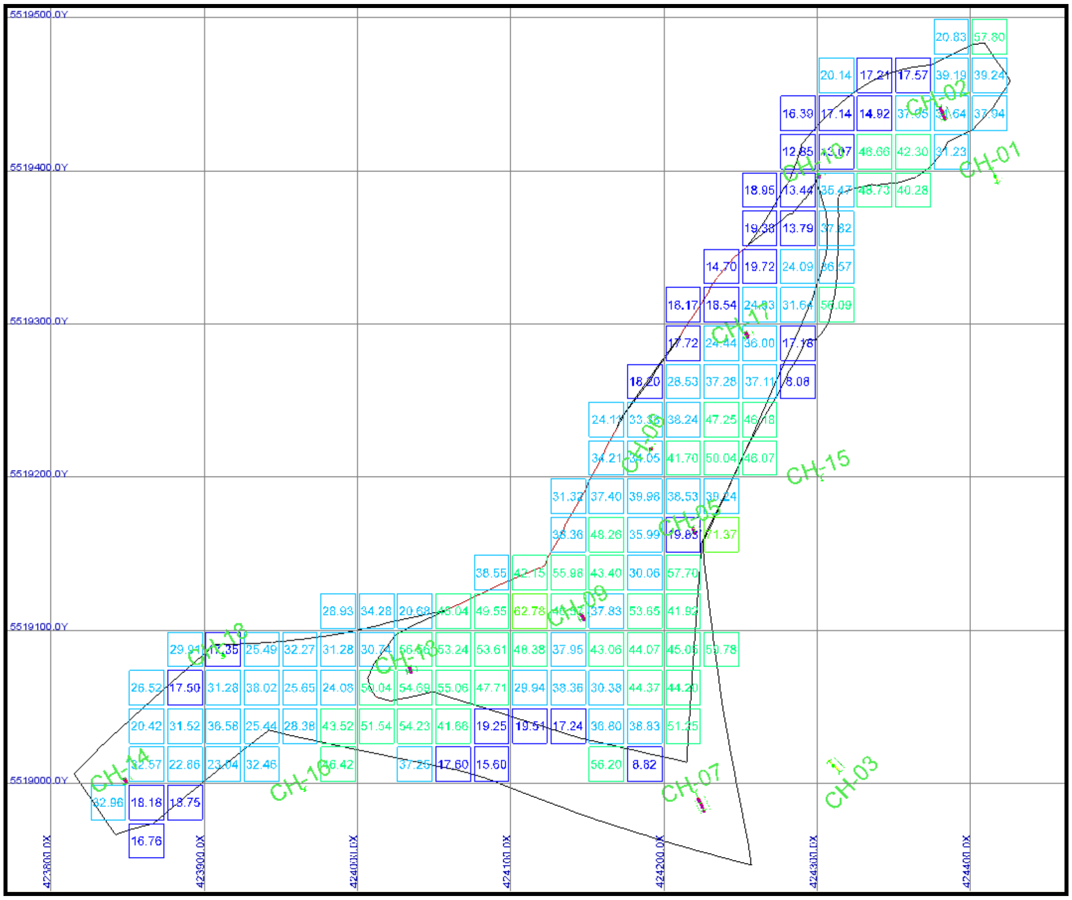


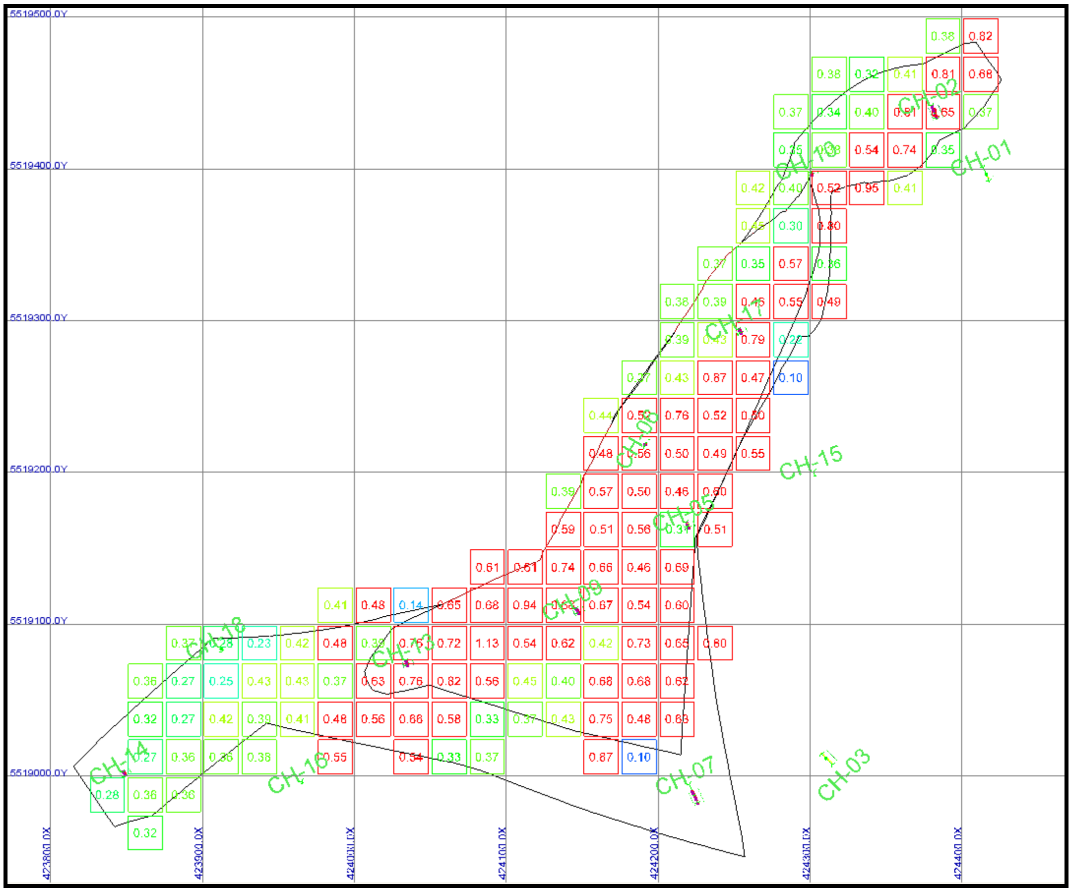
Figure 14.13 presents the resulting OK interpolation, at the 425 m elevation, illustrating the general trend of the mineralization in a north/northeast direction.

Figure 14.13 Block Model Plan Section (35 m Elevation) Showing Fe_2O_3%



Note: * Block Size is 25 m x 25 m x 10 m

Figure 14.14 Block Model Plan Section (35 m elevation) Showing TREO%*



Note: *Illustrating north/northeast trend of the REO mineralization; Block Size is 25 m x 25 m x 10 m

14.4.4 *MINERAL RESOURCE CLASSIFICATION*

The effective date of the Clay-Howells Fe-REE mineral resource estimate is September 23, 2011.

The block model and mineral resource for the Clay-Howells deposit is classified as Inferred Resources based on drill hole spacing and sample data population. The mineral resource estimate for the deposit, at 0.6 TREO% cut-off grade, is an Inferred Resource of 8.5 Mt at 44.15 Fe_2O_3% and 0.73 TREO%.

The mineral resource was estimated by OK interpolation method for Fe_2O_3%, 15 individual REOs, Nb_2O_5%, MnO% and ThO_2%. The TREO% is a sum of the 15 individual interpolations of the REOs. No recoveries have been applied to the interpolated estimates.

Table 14.19 below summarizes the Inferred Resource estimates for the Clay-Howells deposit at various cut-off grades between 0.20 and 0.90% TREO% cut-off. Table 14.20 presents the Inferred Resource Estimates by individual REOs.

Figure 14.15 and Figure 14.16 illustrate the grades and tonnages for the Inferred Resources for Fe_2O_3% and TREO% respectively.

Table 14.19 Inferred Resource Estimate for the Clay-Howells Deposit

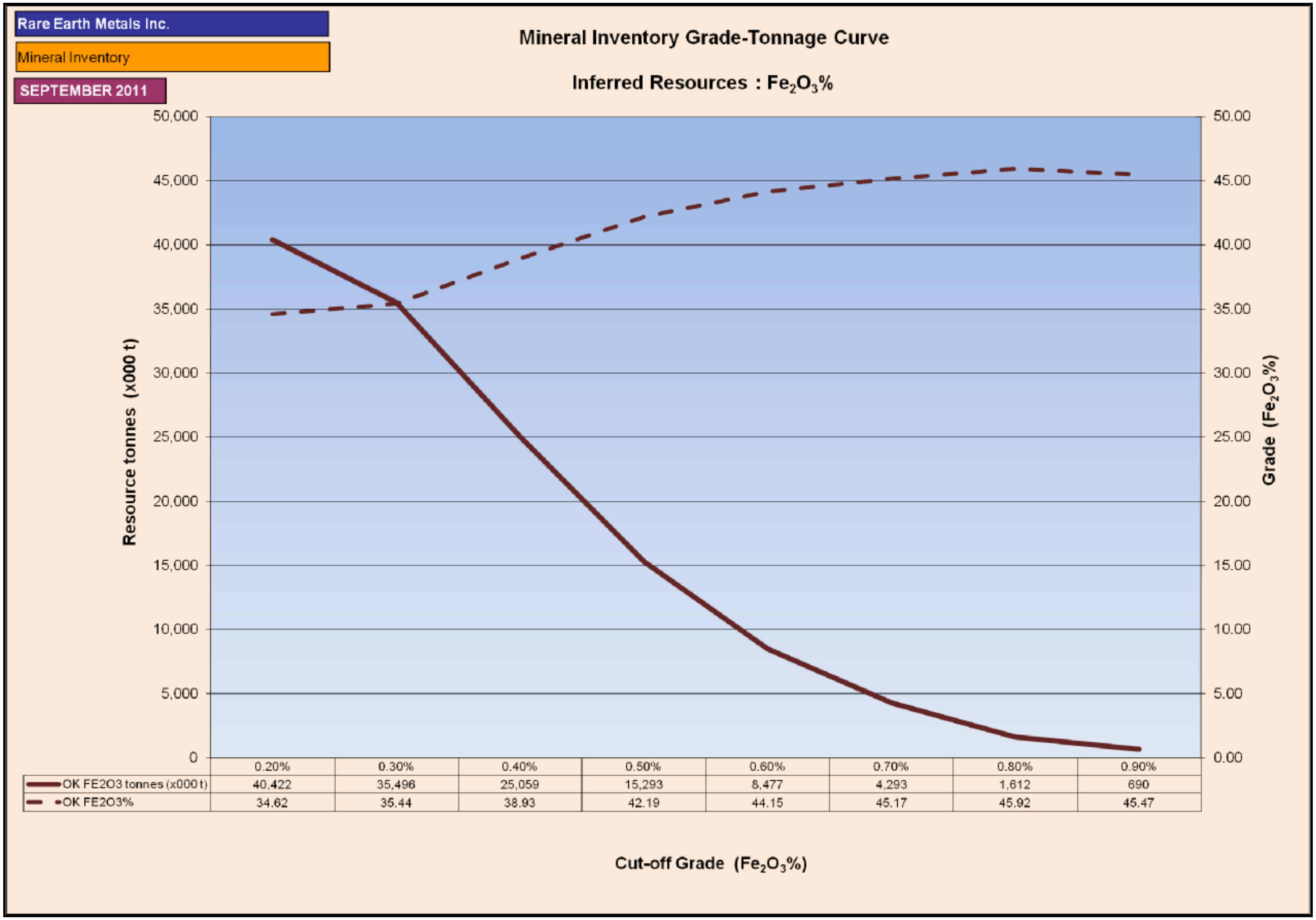
TREO% Cut-off	Tonnes (x 000)	Density	LREO%	HREO%*	TREO%**	HREO:TREO Ratio	Fe_2O_3%	Nb_2O_5%	MnO%	ThO_2%
0.9%	690	3.40	0.962	0.096	1.058	9%	45.47	0.13	2.34	0.06
0.8%	1,612	3.42	0.847	0.087	0.934	9%	45.92	0.14	2.33	0.07
0.7%	4,293	3.43	0.736	0.080	0.816	10%	45.17	0.13	2.25	0.08
0.6%	**8,477**	**3.44**	**0.661**	**0.071**	**0.732**	**10%**	**44.15**	**0.13**	**2.20**	**0.07**
0.5%	15,293	3.42	0.585	0.064	0.649	10%	42.19	0.12	2.09	0.07
0.4%	25,059	3.40	0.513	0.058	0.571	10%	38.93	0.12	1.93	0.06
0.3%	35,496	3.39	0.454	0.053	0.507	10%	35.44	0.12	1.77	0.05
0.2%	40,422	3.38	0.426	0.050	0.476	10%	34.62	0.11	1.71	0.05

Note: * Includes Y_2O_3
**See Table 14.22

Table 14.20 Inferred Resource Estimate for the Clay-Howells Deposit by REOs

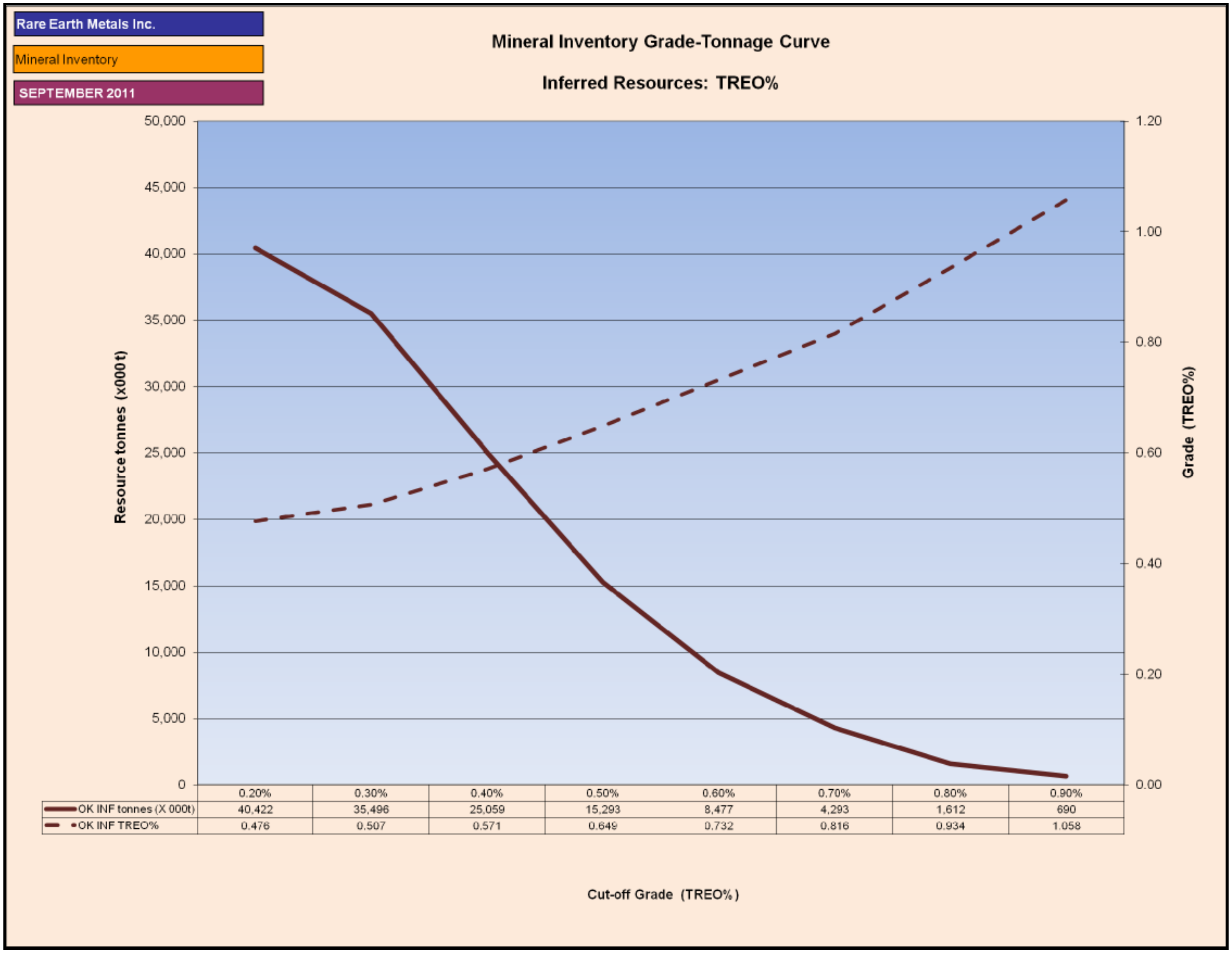
TREO Cut-off	Tonnes (x 000)	La_2O_3%	Ce_2O_3%	Pr_2O_3%	Nd_2O_3%	Sm_2O_3%	Eu_2O_3%	Gd_2O_3%	Tb_2O_3%	Dy_2O_3%	Ho_2O_3%	Er_2O_3%	Tm_2O_3%	Yb_2O_3%	Lu_2O_3%	Y_2O_3%
0.9%	203	0.292	0.455	0.044	0.148	0.022	0.005	0.015	0.004	0.009	0.002	0.005	0.001	0.004	0.001	0.051
0.8%	471	0.251	0.403	0.039	0.133	0.020	0.005	0.014	0.005	0.009	0.002	0.004	0.001	0.003	0.000	0.045
0.7%	1,250	0.210	0.353	0.035	0.119	0.018	0.005	0.012	0.005	0.008	0.001	0.004	0.000	0.003	0.000	0.041
0.6%	**2,467**	**0.183**	**0.318**	**0.032**	**0.110**	**0.017**	**0.004**	**0.011**	**0.004**	**0.007**	**0.001**	**0.003**	**0.000**	**0.003**	**0.000**	**0.036**
0.5%	4,475	0.159	0.282	0.029	0.099	0.015	0.004	0.010	0.004	0.006	0.001	0.003	0.000	0.002	0.000	0.033
0.4%	7,399	0.138	0.248	0.025	0.088	0.014	0.004	0.009	0.003	0.006	0.001	0.003	0.000	0.002	0.000	0.030
0.3%	10,527	0.121	0.219	0.023	0.079	0.012	0.003	0.008	0.003	0.005	0.001	0.002	0.000	0.002	0.000	0.027
0.2%	11,971	0.114	0.205	0.021	0.075	0.012	0.003	0.008	0.003	0.005	0.001	0.002	0.000	0.002	0.000	0.025

Figure 14.15 Grade – Tonnage Curves showing Inferred Resources for Fe_2O_3%



	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%
OK FE2O3 tonnes (x000 t)	40,422	35,496	25,059	15,293	8,477	4,293	1,612	690
OK FE2O3%	34.62	35.44	38.93	42.19	44.15	45.17	45.92	45.47

Figure 14.16 Grade – Tonnage Curves showing Inferred Resources for TREO%



14.5 VALIDATION

14.5.1 MODEL VOLUME VALIDATION

The block model volumes were validated against the solid wireframe volumes and all differences were found to be within a tolerance of less than 1.5%. The result of the comparison is shown in Table 14.21.

Table 14.21 Volume Comparison between Wireframe Solid Models and Block Models

Wireframe	Wireframe Volume (m^3)	Block Model Volume (m^3)	% Difference
Carb1 / clip / 15aug	5,829,762	5,790,870	0.67%
Carb2 / clip / 15aug	341,401	346,272	1.43%
GS_0.2 / final / aug31	8,518,479	8,415,764	1.21%

14.5.2 INTERPOLATION VALIDATION

A comparison was made of the estimated metal oxide grades from the three interpolation methods as a further validation of the resource estimation. The comparison between these three values for each metal oxide is shown in Table 14.22.

Table 14.22 Comparison of OK and NN Values (at 0.6 TREO% Cut-Off)

Interpolation Method	TREO%	Fe2O3%	Nb_2O_5%	MnO%	ThO_2%
OK	0.732	44.14	0.126	2.202	0.071
ID2	0.750	45.37	0.126	2.260	0.073
NN	0.776	43.59	0.122	2.212	0.076

14.5.3 SWATH PLOTS

Swath Plots were created for each estimated capped TREO% grade by bench, by column (Easting) and by row (Northing) for each interpolation method as a visual comparison of the precision of the interpolation methods. Figure 14.17 to Figure 14.19 illustrate the swath plots for TREO% by elevation, easting and northing respectively. Variations at the ends of the graphs, particularly with the NN grades, denote an edge effect of the model where sample populations used for estimation are no longer similar.

Figure 14.17 Swath Plots for TREO% by Elevation

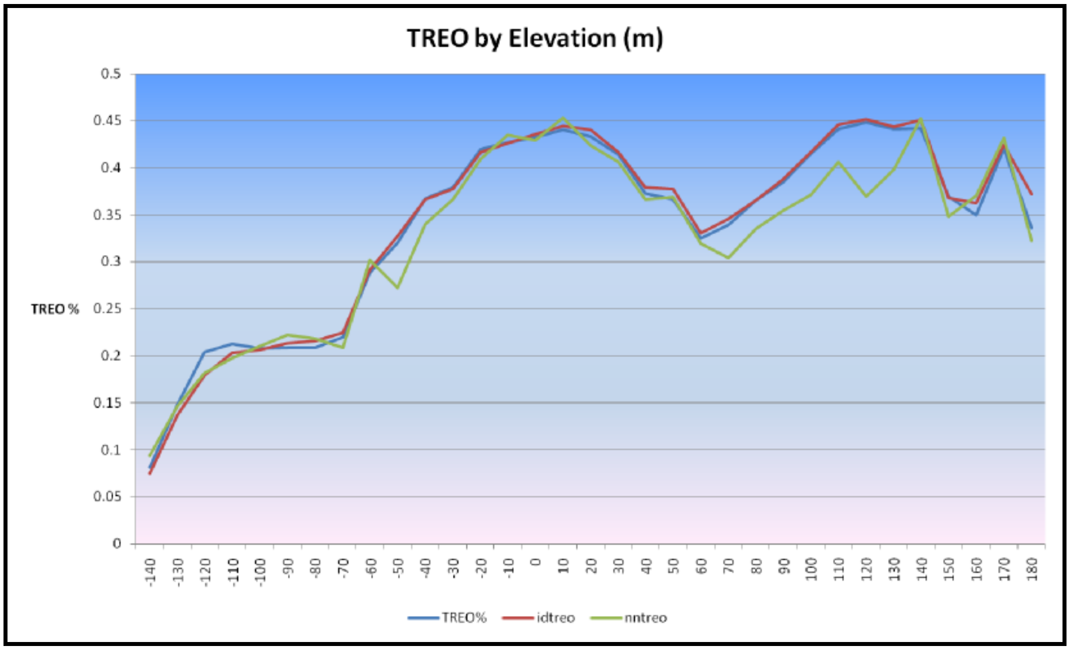


Figure 14.18 Swath Plots for TREO% by Easting

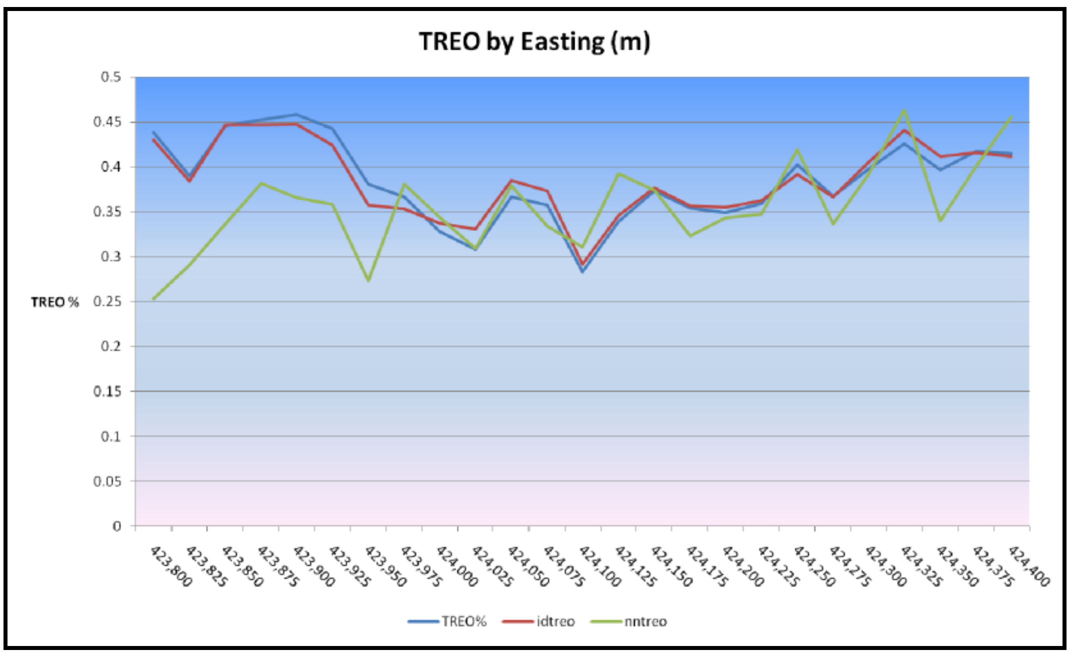
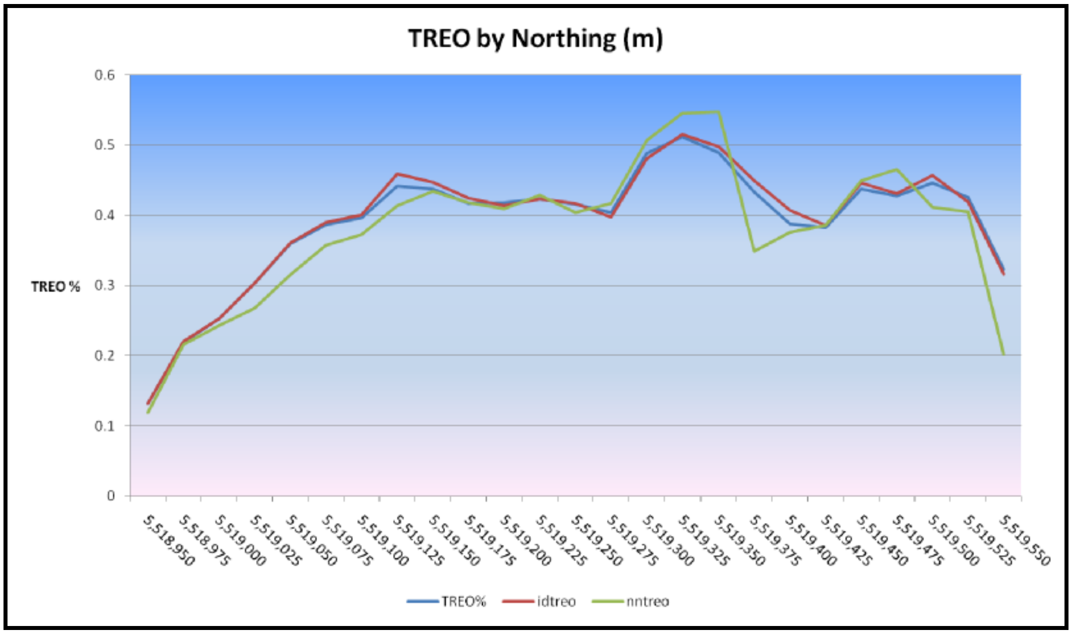


Figure 14.19 Swath Plots for TREO% by Northing



15.0 ADJACENT PROPERTIES

There are no significant properties or mineral occurrences adjacent to the Property.

16.0 OTHER RELEVANT DATA AND INFORMATION

This section is not relevant to this report.

17.0 INTERPRETATION AND CONCLUSIONS

Tetra Tech has completed an NI 43-101 resource estimate update for the Clay Howells Fe-REE deposit. The mineral resource for the Clay-Howells deposit is classified as having Inferred Resources based on drill hole spacing and sample data population. The mineral resource is constrained by two carbonatite lithological wireframes and within a 0.2 TREO% gradeshell. The two carbonatite lithologies are interpreted between two bounding faults over a 400 m strike length. Carbonatite also occurs to the west and northeast extremities of the deposit but analytical data is still required to establish separate lithological wireframes, or domains. Therefore, a gradeshell was used to capture the mineralized carbonatite and syenite outside of the two core carbonatite lithologies.

The mineral resource estimate for the Clay-Howells Fe-REE, effective September 23, 2011, at a 0.6 TREO% cut-off is an Inferred Resource of 8.5 Mt at 44.15 Fe_2O_3% and 0.73 TREO%. The resource estimate was estimated by OK interpolation method for the 15 REOs and the four associated metal oxides: Fe_2O_3%, Nb_2O_5%, MnO% and ThO_2%. TREO%, LREO%, and HREO% are sums of the individual interpolations of the REOs. No recoveries have been applied to the interpolated estimates.

Table 17.1 summarizes the Inferred Resource estimates for the Clay-Howells deposit at various cut-off grades between 0.20 and 0.90% TREO% cut-off.

Table 17.2 presents the Inferred Resource Estimates by individual REOs.

Table 17.1 Inferred Resource Estimate for the Clay-Howells Fe-REE Deposit

TREO% Cut-off	Tonnes ('000)	LREO%	HREO%*	TREO%**	HREO: TREO Ratio	Fe_2O_3%	Nb_2O_5%	MnO%	ThO_2%
0.9%	690	0.962	0.096	1.058	9%	45.47	0.13	2.34	0.06
0.8%	1,612	0.847	0.087	0.934	9%	45.92	0.14	2.33	0.07
0.7%	4,293	0.736	0.080	0.816	10%	45.17	0.13	2.25	0.08
0.6%	**8,477**	**0.661**	**0.071**	**0.732**	**10%**	**44.14**	**0.13**	**2.20**	**0.07**
0.5%	15,314	0.585	0.064	0.649	10%	42.19	0.12	2.09	0.07
0.4%	25,131	0.513	0.058	0.570	10%	38.94	0.12	1.94	0.06
0.3%	35,629	0.454	0.053	0.506	10%	35.48	0.12	1.77	0.05
0.2%	40,458	0.427	0.050	0.477	10%	34.64	0.11	1.71	0.05

Note: * Includes Y_2O_3
**See Table 14.22

Table 17.2 Inferred Resource Estimate for the Clay-Howells Fe-REE Deposit by REOs

TREO Cut-off	Tonnes (x 000)	La_2O_3%	Ce_2O_3%	Pr_2O_3%	Nd_2O_3%	Sm_2O_3%	Eu_2O_3%	Gd_2O_3%	Tb_2O_3%	Dy_2O_3%	Ho_2O_3%	Er_2O_3%	Tm_2O_3%	Yb_2O_3%	Lu_2O_3%	Y_2O_3%
0.9%	203	0.292	0.455	0.044	0.148	0.022	0.005	0.015	0.004	0.009	0.002	0.005	0.001	0.004	0.001	0.051
0.8%	471	0.251	0.403	0.039	0.133	0.020	0.005	0.014	0.005	0.009	0.002	0.004	0.001	0.003	0.000	0.045
0.7%	1,250	0.210	0.353	0.035	0.119	0.018	0.005	0.012	0.005	0.008	0.001	0.004	0.000	0.003	0.000	0.041
0.6%	**2,467**	**0.183**	**0.318**	**0.032**	**0.110**	**0.017**	**0.004**	**0.011**	**0.004**	**0.007**	**0.001**	**0.003**	**0.000**	**0.003**	**0.000**	**0.036**
0.5%	4,475	0.159	0.282	0.029	0.099	0.015	0.004	0.010	0.004	0.006	0.001	0.003	0.000	0.002	0.000	0.033
0.4%	7,399	0.138	0.248	0.025	0.088	0.014	0.004	0.009	0.003	0.006	0.001	0.003	0.000	0.002	0.000	0.030
0.3%	10,527	0.121	0.219	0.023	0.079	0.012	0.003	0.008	0.003	0.005	0.001	0.002	0.000	0.002	0.000	0.027
0.2%	11,971	0.114	0.205	0.021	0.075	0.012	0.003	0.008	0.003	0.005	0.001	0.002	0.000	0.002	0.000	0.025

18.0 RECOMMENDATIONS

Tetra Tech recommends that the remaining unsampled drill core from the 2010 drill program be split, sampled and analyzed, as per QA/QC procedures established by REM. This additional data will enable the interpretation of mineralized boundaries with greater confidence and increase the sample population for a more robust resource estimate. This cost is estimated at approximately $90,000.

Tetra Tech recommends that additional drilling be conducted to further investigate and develop the known Clay-Howells deposit and determine continuity of the carbonatite, mineralized syenite, and massive magnetite lithologies and Fe and REE grades. Additional in-fill drilling between the established drill sections would increase confidence in the continuity of grade and geology across the deposit. Tetra Tech also recommends that a specific gravity readings be included in the next phase of drilling as the tonnage will be greatly affected by the higher than normal densities from the iron mineralization

Currently, REM has no immediate plans for drill program in the immediate future. Should the drill program go ahead, Tetra Tech recommends a minimum of 5,000 m and approximately 14 drillholes (two drillholes per infill section) from separate drill collars (to reduce the drillhole spacing and spacing between samples). The purpose of the infill program is to collect additional data to increase the sample population, reduce the distance between samples and, thereby bring additional confidence to the resource estimate. The cost of such a drill program is estimated at $600,000.

19.0 REFERENCES

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www.rareearthmetals.ca, July 2011.

www.worldclimate.com, July 22, 2011.

20.0 CERTIFICATE OF QUALIFIED PERSON

I, Paul Daigle, P.Geo., of Toronto, Ontario, do hereby certify:

- I am a Senior Geologist with Wardrop Engineering Inc., with a business address at Suite 900, 330 Bay Street, Toronto, Ontario, M5H 2S8.
- This certificate applies to the technical report entitled "Technical Report on the Clay-Howells Fe-REE Project, Ontario, Canada", dated September 26, 2011 (the "Technical Report").
- I am a graduate of Concordia University, (B.Sc. Geology, 1989). I am a member in good standing of the Association of Professional Geoscientists of Ontario (Registration #1592) and the Association of Professional Engineers and Geoscientists of Saskatchewan (Registration #10665). My relevant experience includes over 19 years of experience in a wide variety of geological settings. I am a "Qualified Person" for purposes of National Instrument 43-101 (the "Instrument").
- My most recent personal inspection of the Property was on July 7, 2011 for one day.
- I am responsible for all Sections of the Technical Report.
- I am independent of Rare Earth Minerals Inc. as defined by Section 1.5 of the Instrument.
- I have no prior involvement with the Property that is the subject of the Technical Report.
- I have read the Instrument and the technical report has been prepared in compliance with the Instrument.
- As of the date of this certificate, to the best of my knowledge, information and belief, the technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Signed and dated this 26th day of September, 2011 at Toronto, Ontario

"Original document signed and sealed by Paul Daigle, P.Geo."

Paul Daigle, P.Geo.
Senior Geologist
Wardrop Engineering Inc.

APPENDIX A

Summary of the Clay-Howells Mining Claims

Summary of the Clay-Howells Mining Claims

Claim Number	Recording Date	Claim Due Date	Percent Option	Work Required	Township/Area	Registered	Area (ha)
4248225	25-Jun-10	25-Jun-12	100%	$6,400.00	HOWELLS	Rare Earth Metals Inc.	239.8
4248226	25-Jun-10	25-Jun-12	100%	$4,800.00	HOWELLS	Rare Earth Metals Inc.	177.5
4248227	25-Jun-10	25-Jun-12	100%	$4,800.00	MOWBRAY	Rare Earth Metals Inc.	176.4
4248228	25-Jun-10	25-Jun-12	100%	$6,400.00	MOWBRAY	Rare Earth Metals Inc.	254.6
4248229	25-Jun-10	25-Jun-12	100%	$6,400.00	MOWBRAY	Rare Earth Metals Inc.	255.8
4248230	25-Jun-10	25-Jun-12	100%	$4,800.00	HOPKINS	Rare Earth Metals Inc.	176.1
4248652	18-Nov-09	18-Nov-11	100%	$6,400.00	HOPKINS	Rare Earth Metals Inc.	254.6
4248653	18-Nov-09	18-Nov-11	100%	$4,000.00	HOPKINS	Rare Earth Metals Inc.	167.0
4248654	18-Nov-09	18-Nov-11	100%	$1,200.00	HOPKINS	Rare Earth Metals Inc.	32.3
4248655	18-Nov-09	18-Nov-11	100%	$6,400.00	HOPKINS	Rare Earth Metals Inc.	296.4
4248657	19-Jan-10	19-Jan-12	100%	$6,400.00	HOWELLS	Rare Earth Metals Inc.	255.1
4248658	19-Jan-10	19-Jan-12	100%	$6,000.00	HOWELLS	Rare Earth Metals Inc.	240.4
4248659	22-Feb-10	22-Feb-12	100%	$6,000.00	HOWELLS	Rare Earth Metals Inc.	240.2
4248660	22-Feb-10	22-Feb-12	100%	$6,400.00	HOWELLS	Rare Earth Metals Inc.	248.2
4251420	11-Jun-10	11-Jun-12	100%	$3,200.00	MOWBRAY	Rare Earth Metals Inc.	128.0
4251421	22-Oct-09	22-Oct-11	100%	$6,400.00	HOPKINS	M. Stares	255.1
4251422	22-Oct-09	22-Oct-11	100%	$6,400.00	HOPKINS	M. Stares	255.6
4251423	22-Oct-09	22-Oct-11	100%	$6,400.00	HOPKINS	M. Stares	254.9
4251424	22-Oct-09	22-Oct-11	100%	$6,400.00	HOPKINS	M. Stares	255.0
4251425	22-Oct-09	22-Oct-11	100%	$6,400.00	HOPKINS	M. Stares	255.5
4251426	22-Oct-09	22-Oct-11	100%	$6,000.00	HOPKINS	M. Stares	239.3
4251791	22-Feb-10	22-Feb-12	100%	$6,400.00	HOPKINS	Rare Earth Metals Inc.	270.4
4251792	22-Feb-10	22-Feb-12	100%	$4,800.00	HOPKINS	Rare Earth Metals Inc.	191.8
4251793	22-Feb-10	22-Feb-12	100%	$3,200.00	HOPKINS	Rare Earth Metals Inc.	127.7
4251794	22-Feb-10	22-Feb-12	100%	$4,000.00	HOPKINS	Rare Earth Metals Inc.	159.1
4252252	07-Oct-09	07-Oct-11	100%	$6,400.00	HOWELLS	M. Stares	238.2
4252254	07-Oct-09	07-Oct-11	100%	$3,200.00	HOWELLS	M. Stares	138.2
4252255	07-Oct-09	07-Oct-11	100%	$6,400.00	HOWELLS	M. Stares	250.1
4252256	07-Oct-09	07-Oct-11	100%	$5,600.00	HOWELLS	M. Stares	198.5
4252257	07-Oct-09	07-Oct-11	100%	$6,000.00	CLAY	M. Stares	259.8
4252258	07-Oct-09	07-Oct-11	100%	$6,400.00	CLAY	M. Stares	245.0
4252259	08-Oct-09	08-Oct-11	100%	$4,800.00	CLAY	Rare Earth Metals Inc.	167.8
4252260	08-Oct-09	08-Oct-11	100%	$3,200.00	CLAY	Rare Earth Metals Inc.	195.2
4252261	08-Oct-09	08-Oct-11	100%	$6,400.00	HOWELLS	Rare Earth Metals Inc.	256.1
4252262	07-Oct-09	07-Oct-11	100%	$6,400.00	HOWELLS	M. Stares	256.5
4252263	07-Oct-09	07-Oct-11	100%	$6,400.00	HOWELLS	M. Stares	280.9
4252264	07-Oct-09	07-Oct-11	100%	$6,400.00	HOWELLS	M. Stares	223.4
4252265	07-Oct-09	07-Oct-11	100%	$6,000.00	CLAY	M. Stares	168.7
4252266	08-Oct-09	08-Oct-11	100%	$4,800.00	CLAY	Rare Earth Metals Inc.	244.5
4252267	08-Oct-09	08-Oct-11	100%	$6,400.00	MOWBRAY	Rare Earth Metals Inc.	256.0
4252268	08-Oct-09	08-Oct-11	100%	$6,400.00	MOWBRAY	Rare Earth Metals Inc.	281.1
4252269	08-Oct-09	08-Oct-11	100%	$6,000.00	MOWBRAY	Rare Earth Metals Inc.	223.2
4252270	08-Oct-09	08-Oct-11	100%	$1,600.00	MOWBRAY	Rare Earth Metals Inc.	64.8
4252271	08-Oct-09	08-Oct-11	100%	$1,600.00	MOWBRAY	Rare Earth Metals Inc.	64.8
4252272	08-Oct-09	08-Oct-11	100%	$6,400.00	MOWBRAY	Rare Earth Metals Inc.	255.6

4252273	08-Oct-09	08-Oct-11	100%	$6,400.00	HOPKINS	Rare Earth Metals Inc.	270.6
4252274	08-Oct-09	08-Oct-11	100%	$6,400.00	HOPKINS	Rare Earth Metals Inc.	247.1
4252275	08-Oct-09	08-Oct-11	100%	$6,400.00	MOWBRAY	Rare Earth Metals Inc.	254.3
4252276	08-Oct-09	08-Oct-11	100%	$6,400.00	MOWBRAY	Rare Earth Metals Inc.	255.3
4252277	08-Oct-09	08-Oct-11	100%	$6,400.00	MOWBRAY	Rare Earth Metals Inc.	256.2
4252278	08-Oct-09	08-Oct-11	100%	$6,400.00	HOPKINS	Rare Earth Metals Inc.	256.7
4252279	08-Oct-09	08-Oct-11	100%	$6,400.00	HOPKINS	Rare Earth Metals Inc.	242.7
4252280	08-Oct-09	08-Oct-11	100%	$6,400.00	MOWBRAY	Rare Earth Metals Inc.	256.9
4252281	08-Oct-09	08-Oct-11	100%	$6,400.00	MOWBRAY	Rare Earth Metals Inc.	256.9
4252282	08-Oct-09	08-Oct-11	100%	$6,400.00	HOPKINS	Rare Earth Metals Inc.	255.4
4252283	08-Oct-09	08-Oct-11	100%	$6,400.00	HOPKINS	Rare Earth Metals Inc.	255.4
TOTAL							**12,482.8**

Source: Penney and Nielsen (2010).

Summary of the Clay Howells Patented Claims

Claim Number	Percent Option	Registered	Township/Area	Area (ha)
P41127	100%	Rare Earth Metal Inc.	Clay	11.9
S78504	100%	Rare Earth Metal Inc.	Clay	16.9
S78505	100%	Rare Earth Metal Inc.	Clay	13.5
S78506	100%	Rare Earth Metal Inc.	Clay	21.6
S78507	100%	Rare Earth Metal Inc.	Clay	23.6
S78508	100%	Rare Earth Metal Inc.	Clay	19.1
S78509	100%	Rare Earth Metal Inc.	Clay	10.4
S78530	100%	Rare Earth Metal Inc.	Clay	7.8
S78531	100%	Rare Earth Metal Inc.	Clay	4.4
S78532	100%	Rare Earth Metal Inc.	Clay	9.4
S78533	100%	Rare Earth Metal Inc.	Clay	15.1
S78534	100%	Rare Earth Metal Inc.	Clay	13.4
S78535	100%	Rare Earth Metal Inc.	Clay	10.4
S78536	100%	Rare Earth Metal Inc.	Clay	8.8
S78537	100%	Rare Earth Metal Inc.	Clay	4.2
S78538	100%	Rare Earth Metal Inc.	Clay	20.9
S78539	100%	Rare Earth Metal Inc.	Howells	7.1
S78540	100%	Rare Earth Metal Inc.	Howells	13.6
S78541	100%	Rare Earth Metal Inc.	Howells	19.1
S78542	100%	Rare Earth Metal Inc.	Howells	13.9
S78543	100%	Rare Earth Metal Inc.	Howells	10.6
S78544	100%	Rare Earth Metal Inc.	Howells	10.2
S78545	100%	Rare Earth Metal Inc.	Howells	16.6
S78546	100%	Rare Earth Metal Inc.	Howells	9.6
S78547	100%	Rare Earth Metal Inc.	Howells	18.6
S78548	100%	Rare Earth Metal Inc.	Clay	10.3
S78549	100%	Rare Earth Metal Inc.	Clay	12.0
S78550	100%	Rare Earth Metal Inc.	Clay	10.1
S78551	100%	Rare Earth Metal Inc.	Clay	6.6

S78552	100%	Rare Earth Metal Inc.	Clay	8.2
S78553	100%	Rare Earth Metal Inc.	Clay	22.8
S78554	100%	Rare Earth Metal Inc.	Clay	9.0
S78555	100%	Rare Earth Metal Inc.	Clay	20.5
S78556	100%	Rare Earth Metal Inc.	Clay	14.4
S78557	100%	Rare Earth Metal Inc.	Clay	7.8
S78558	100%	Rare Earth Metal Inc.	Clay	20.2
S78559	100%	Rare Earth Metal Inc.	Clay	10.3
S79179	100%	Rare Earth Metal Inc.	Clay	16.8
S79180	100%	Rare Earth Metal Inc.	Clay	22.9
S79181	100%	Rare Earth Metal Inc.	Clay	19.7
S79182	100%	Rare Earth Metal Inc.	Clay	18.2
S79183	100%	Rare Earth Metal Inc.	Clay	12.9
S79184	100%	Rare Earth Metal Inc.	Clay	8.3
S79185	100%	Rare Earth Metal Inc.	Clay	16.4
S79191	100%	Rare Earth Metal Inc.	Clay	23.7
TOTAL				**621.8**

APPENDIX B

Statistics on Raw Data

Descriptive Statistics
All lithologies

	NB2O5(%)	FE2O3(%)	MNO(%)	THO2(%)	LA2O3(%)	CE2O3(%)	PR2O3(%)	ND2O3(%)	SM2O3(%)	EU2O3(%)	GD2O3(%)	TB2O3(%)	DY2O3(%)	HO2O3(%)	ER2O3(%)	TM2O3(%)	YB2O3(%)	LU2O3(%)	Y2O3(%)
Valid cases	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608
Mean	0.124	34.518	1.741	0.047	0.115	0.210	0.022	0.075	0.011	0.003	0.008	0.001	0.005	0.001	0.002	0.000	0.002	0.000	0.026
Std. error of mean	0.003	0.590	0.024	0.002	0.003	0.005	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Variance	0.015	560.048	0.962	0.004	0.017	0.047	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Std. Deviation	0.124	23.665	0.981	0.064	0.131	0.217	0.020	0.065	0.010	0.003	0.007	0.001	0.005	0.001	0.002	0.000	0.002	0.000	0.023
Variation Coefficient	1.002	0.686	0.563	1.376	1.138	1.032	0.913	0.858	0.840	0.857	0.885	0.911	0.900	0.882	0.864	0.847	0.826	0.802	0.901
rel. V.coefficient(%)	2.500	1.710	1.405	3.432	2.837	2.573	2.277	2.140	2.094	2.136	2.206	2.272	2.243	2.200	2.154	2.113	2.060	2.001	2.246
Skew	6.532	0.675	0.469	4.785	6.760	5.595	4.462	3.663	2.995	3.358	3.668	4.183	4.014	3.840	3.572	3.447	3.359	3.422	3.884
Kurtosis	81.080	-0.685	-0.397	34.372	76.922	52.312	34.374	23.963	16.344	24.591	28.201	36.943	33.426	30.344	25.017	22.458	20.026	20.207	31.205
Minimum	0.002	1.650	0.046	0.001	0.003	0.007	0.001	0.003	0.00045	0.00008	0.00028	0.00003	0.00016	0.00002	0.00008	0.00001	0.00009	0.00001	0.00013
Maximum	2.309	94.750	5.535	0.825	2.299	3.302	0.250	0.672	0.106	0.036	0.101	0.015	0.068	0.011	0.028	0.004	0.020	0.003	0.347
Range	2.308	93.100	5.489	0.825	2.296	3.295	0.250	0.669	0.106	0.036	0.101	0.014	0.068	0.011	0.028	0.004	0.020	0.003	0.347
1st percentile	0.014	4.823	0.192	0.002	0.010	0.019	0.002	0.007	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.003
5th percentile	0.022	6.745	0.319	0.003	0.017	0.030	0.003	0.012	0.002	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.004
10th percentile	0.031	8.310	0.475	0.006	0.023	0.042	0.005	0.016	0.002	0.001	0.002	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.006
25th percentile	0.060	14.990	0.968	0.014	0.049	0.096	0.010	0.035	0.005	0.001	0.004	0.000	0.002	0.000	0.001	0.000	0.001	0.000	0.012
Median	0.098	28.085	1.636	0.027	0.090	0.166	0.018	0.062	0.009	0.002	0.006	0.001	0.004	0.001	0.002	0.000	0.001	0.000	0.020
75th percentile	0.151	53.050	2.438	0.058	0.140	0.266	0.028	0.100	0.015	0.004	0.010	0.001	0.006	0.001	0.003	0.000	0.002	0.000	0.032
90th percentile	0.229	70.908	3.143	0.102	0.214	0.391	0.040	0.135	0.021	0.006	0.014	0.002	0.009	0.002	0.004	0.001	0.004	0.001	0.048
95th percentile	0.296	79.742	3.479	0.133	0.277	0.492	0.050	0.170	0.027	0.007	0.018	0.002	0.012	0.002	0.006	0.001	0.005	0.001	0.064
99th percentile	0.560	90.004	4.123	0.362	0.593	1.045	0.091	0.317	0.045	0.014	0.038	0.005	0.024	0.004	0.011	0.001	0.009	0.001	0.119
Geom. mean	0.092	26.232	1.413	0.026	0.081	0.150	0.016	0.056	0.008	0.002	0.006	0.001	0.004	0.001	0.002	0.000	0.002	0.000	0.019

Descriptive Statistics [Subset]
Syenite Rock Codes 100 101 102

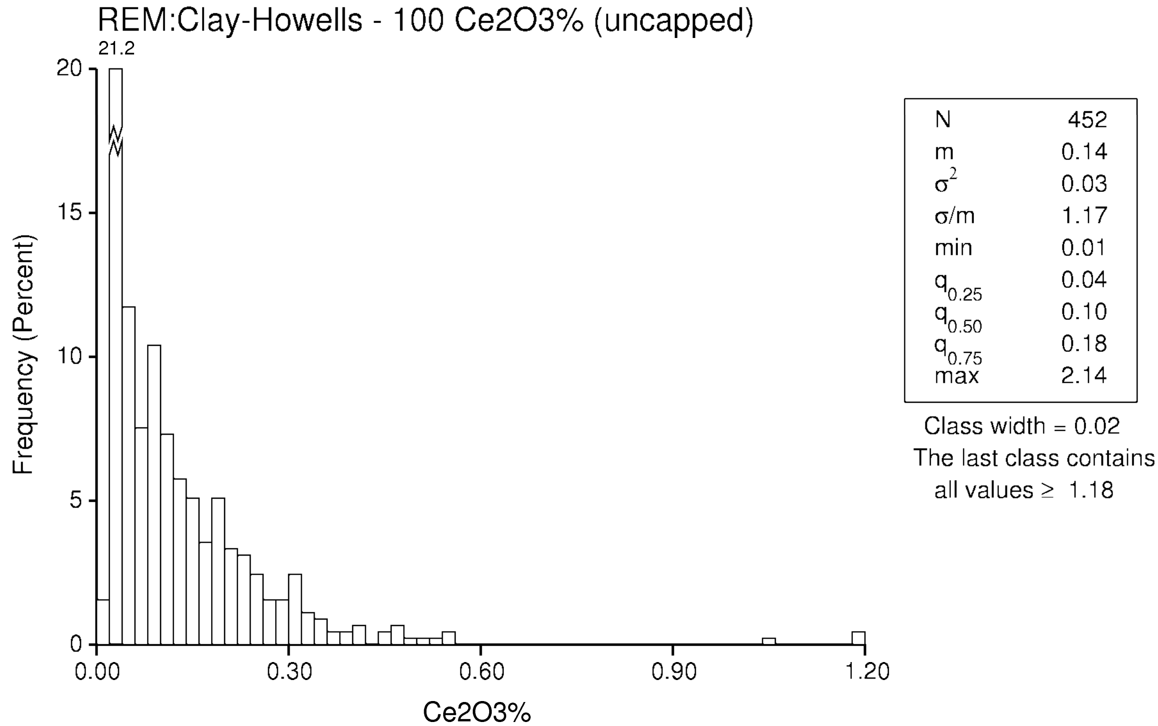
	NB2O5(%)	FE2O3(%)	MNO(%)	THO2(%)	LA2O3(%)	CE2O3(%)	PR2O3(%)	ND2O3(%)	SM2O3(%)	EU2O3(%)	GD2O3(%)	TB2O3(%)	DY2O3(%)	HO2O3(%)	ER2O3(%)	TM2O3(%)	YB2O3(%)	LU2O3(%)	Y2O3(%)
Valid cases	452	452	452	452	452	452	452	452	452	452	452	452	452	452	452	452	452	452	452
Mean	0.093	20.684	1.092	0.026	0.076	0.136	0.014	0.050	0.008	0.002	0.005	0.001	0.004	0.001	0.002	0.000	0.002	0.000	0.019
Std. error of mean	0.004	0.798	0.033	0.002	0.005	0.007	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Variance	0.007	287.517	0.499	0.002	0.009	0.025	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Std. Deviation	0.083	16.956	0.707	0.039	0.096	0.159	0.015	0.050	0.007	0.002	0.005	0.001	0.004	0.001	0.002	0.000	0.001	0.000	0.019
Variation Coefficient	0.893	0.820	0.647	1.487	1.264	1.169	1.047	0.999	0.963	1.009	0.995	0.994	0.978	0.957	0.931	0.887	0.830	0.765	0.981
rel. V.coefficient(%)	4.199	3.856	3.044	6.996	5.946	5.500	4.923	4.697	4.529	4.747	4.678	4.676	4.601	4.503	4.380	4.171	3.906	3.600	4.615
Skew	2.608	1.612	0.706	4.281	7.738	6.268	4.810	3.770	3.145	3.170	3.140	3.045	2.977	2.951	2.921	2.874	2.897	2.945	3.202
Kurtosis	10.901	2.134	-0.076	25.563	93.609	65.041	41.436	25.915	17.758	17.773	16.408	14.323	13.279	12.991	12.577	11.860	11.892	12.645	16.600
Minimum	0.009	2.590	0.057	0.001	0.004	0.008	0.001	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
Maximum	0.727	82.130	3.521	0.384	1.419	2.143	0.183	0.533	0.069	0.019	0.049	0.006	0.030	0.005	0.014	0.002	0.011	0.002	0.179
Range	0.718	79.540	3.464	0.383	1.415	2.135	0.182	0.530	0.069	0.019	0.048	0.006	0.030	0.005	0.014	0.002	0.010	0.001	0.176
1st percentile	0.012	3.851	0.105	0.001	0.010	0.018	0.002	0.007	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.003
5th percentile	0.019	5.729	0.253	0.002	0.014	0.025	0.003	0.010	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.004
10th percentile	0.022	6.591	0.292	0.003	0.016	0.029	0.003	0.011	0.002	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.004
25th percentile	0.037	8.565	0.465	0.006	0.025	0.043	0.005	0.016	0.002	0.001	0.002	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.007
Median	0.070	14.010	0.996	0.015	0.053	0.096	0.011	0.036	0.006	0.001	0.004	0.001	0.003	0.000	0.001	0.000	0.001	0.000	0.014
75th percentile	0.116	26.893	1.583	0.030	0.097	0.182	0.019	0.067	0.010	0.003	0.007	0.001	0.005	0.001	0.002	0.000	0.002	0.000	0.026
90th percentile	0.192	45.241	2.043	0.062	0.158	0.287	0.030	0.106	0.017	0.004	0.012	0.002	0.008	0.001	0.004	0.000	0.003	0.000	0.040
95th percentile	0.268	61.432	2.311	0.103	0.198	0.349	0.038	0.134	0.020	0.006	0.015	0.002	0.010	0.002	0.005	0.001	0.004	0.001	0.055
99th percentile	0.399	77.213	3.062	0.251	0.356	0.545	0.055	0.200	0.035	0.009	0.027	0.004	0.020	0.003	0.009	0.001	0.008	0.001	0.102
Geom. mean	0.068	15.623	0.849	0.014	0.051	0.092	0.010	0.034	0.005	0.001	0.004	0.001	0.003	0.000	0.001	0.000	0.001	0.000	0.014

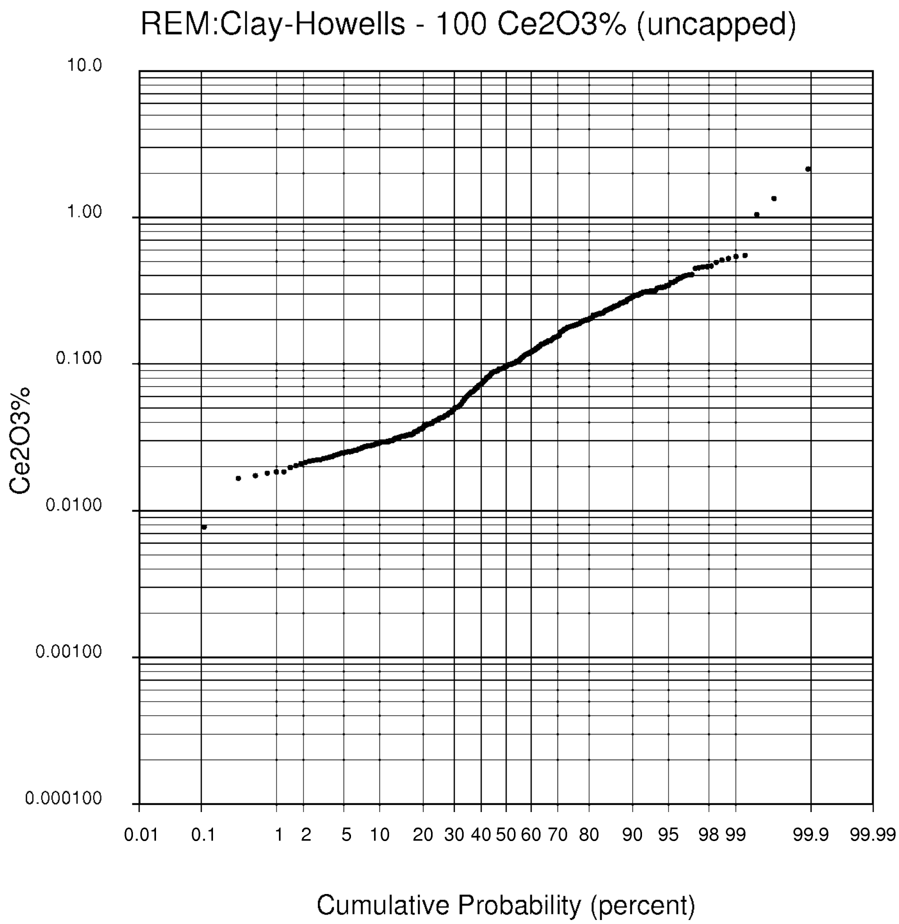
Descriptive Statistics [Subset]
Carbonatite Rock Codes 401, 402, 403, 404, 405 and Magnetite Rock Code 500

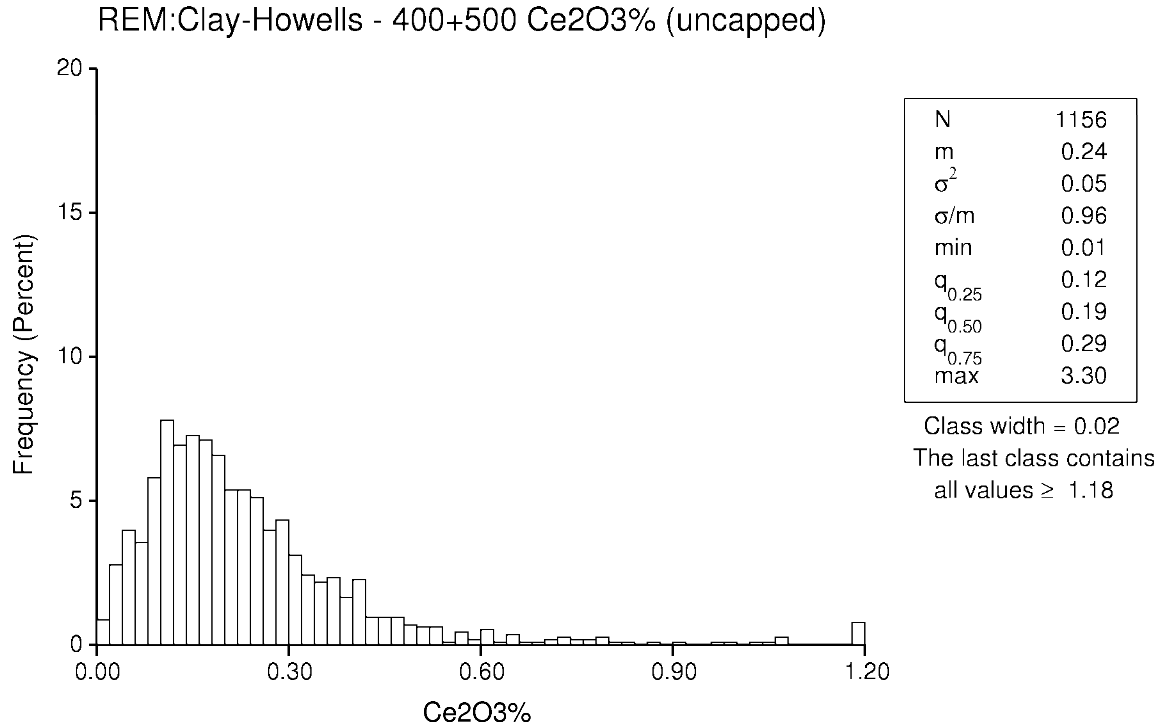
	NB2O5(%)	FE2O3(%)	MNO(%)	THO2(%)	LA2O3(%)	CE2O3(%)	PR2O3(%)	ND2O3(%)	SM2O3(%)	EU2O3(%)	GD2O3(%)	TB2O3(%)	DY2O3(%)	HO2O3(%)	ER2O3(%)	TM2O3(%)	YB2O3(%)	LU2O3(%)	Y2O3(%)
Valid cases	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156
Mean	0.136	39.927	1.995	0.055	0.131	0.240	0.025	0.085	0.013	0.003	0.009	0.001	0.006	0.001	0.003	0.000	0.002	0.000	0.028
Std. error of mean	0.004	0.698	0.028	0.002	0.004	0.007	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Variance	0.018	562.775	0.913	0.005	0.019	0.053	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Std. Deviation	0.135	23.723	0.956	0.070	0.140	0.230	0.021	0.067	0.010	0.003	0.007	0.001	0.005	0.001	0.002	0.000	0.002	0.000	0.024
Variation Coefficient	0.993	0.594	0.479	1.284	1.068	0.958	0.842	0.786	0.771	0.781	0.822	0.861	0.853	0.839	0.824	0.817	0.807	0.797	0.856
rel. V.coefficient(%)	2.920	1.748	1.409	3.775	3.142	2.818	2.477	2.310	2.269	2.298	2.419	2.532	2.510	2.467	2.423	2.402	2.373	2.344	2.519
Skew	6.663	0.434	0.335	4.605	6.655	5.591	4.546	3.790	3.051	3.524	3.823	4.411	4.235	4.040	3.723	3.550	3.405	3.426	4.047
Kurtosis	77.536	-0.958	-0.483	30.679	73.257	50.525	34.064	24.387	16.420	26.340	29.652	39.279	35.776	32.551	26.616	23.476	20.349	19.965	33.112
Minimum	0.002	1.650	0.046	0.001	0.003	0.007	0.001	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Maximum	2.309	94.750	5.535	0.825	2.299	3.302	0.250	0.672	0.106	0.036	0.101	0.015	0.068	0.011	0.028	0.004	0.020	0.003	0.347
Range	2.308	93.100	5.489	0.825	2.296	3.295	0.250	0.669	0.106	0.036	0.101	0.014	0.068	0.011	0.028	0.004	0.020	0.003	0.347
1st percentile	0.015	5.620	0.273	0.002	0.010	0.020	0.002	0.008	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.002
5th percentile	0.027	8.523	0.584	0.007	0.024	0.046	0.005	0.017	0.003	0.001	0.002	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.006
10th percentile	0.042	12.577	0.843	0.011	0.035	0.075	0.008	0.027	0.004	0.001	0.003	0.000	0.002	0.000	0.001	0.000	0.001	0.000	0.008
25th percentile	0.070	18.693	1.196	0.018	0.065	0.121	0.013	0.046	0.007	0.002	0.004	0.001	0.003	0.000	0.001	0.000	0.001	0.000	0.014
Median	0.108	34.900	1.912	0.034	0.101	0.191	0.020	0.073	0.011	0.003	0.007	0.001	0.004	0.001	0.002	0.000	0.002	0.000	0.022
75th percentile	0.164	59.113	2.703	0.068	0.152	0.294	0.031	0.109	0.017	0.004	0.011	0.001	0.007	0.001	0.003	0.000	0.003	0.000	0.035
90th percentile	0.243	73.822	3.330	0.109	0.233	0.416	0.042	0.142	0.023	0.006	0.015	0.002	0.010	0.002	0.005	0.001	0.004	0.001	0.052
95th percentile	0.314	83.944	3.616	0.154	0.314	0.529	0.053	0.177	0.029	0.007	0.020	0.003	0.013	0.002	0.006	0.001	0.005	0.001	0.067
99th percentile	0.691	91.093	4.285	0.402	0.650	1.065	0.094	0.328	0.058	0.014	0.038	0.005	0.025	0.004	0.011	0.002	0.009	0.001	0.132
Geom. mean	0.104	32.124	1.725	0.034	0.096	0.183	0.019	0.067	0.010	0.003	0.007	0.001	0.004	0.001	0.002	0.000	0.002	0.000	0.022

APPENDIX C

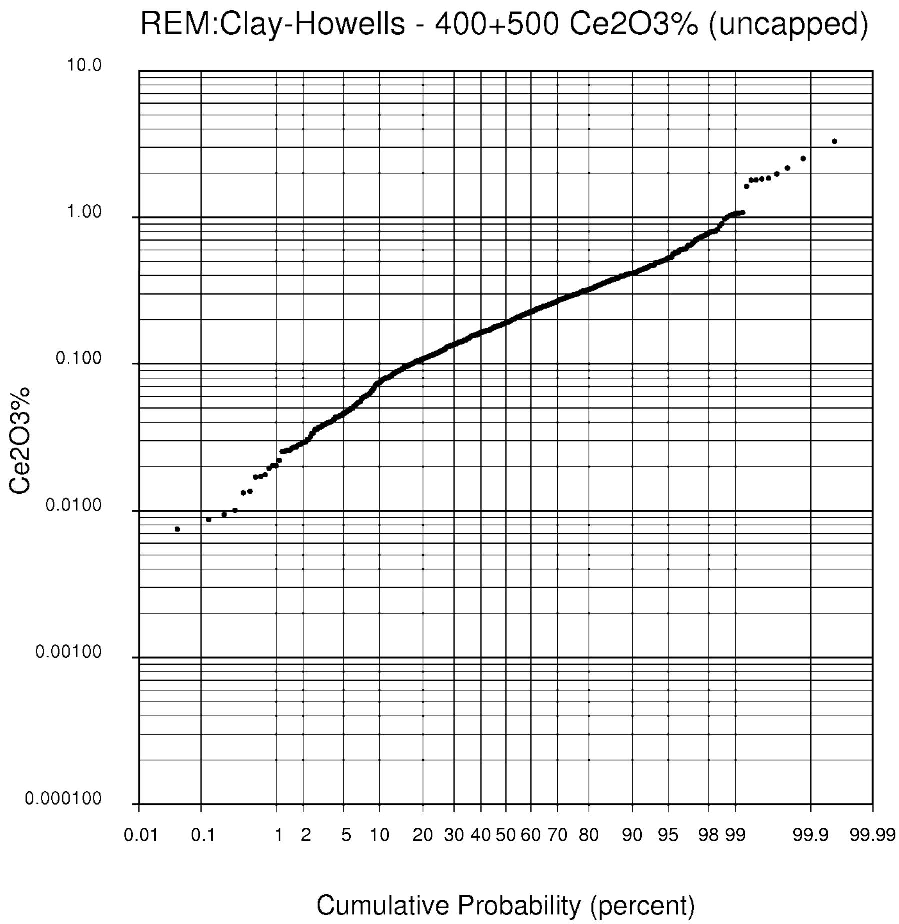
HISTOGRAMS


REM:Clay-Howells - 100 Ce2O3% (uncapped)
21.2
Frequency (Percent)
Ce2O3%
N 452
m 0.14
σ2 0.03
σ/m 1.17
min 0.01
q0.25 0.04
q0.50 0.10
q0.75 0.18
max 2.14
Class width = 0.02
The last class contains
all values ≥ 1.18


REM:Clay-Howells - 100 Ce2O3% (uncapped)
Ce2O3%
Cumulative Probability (percent)

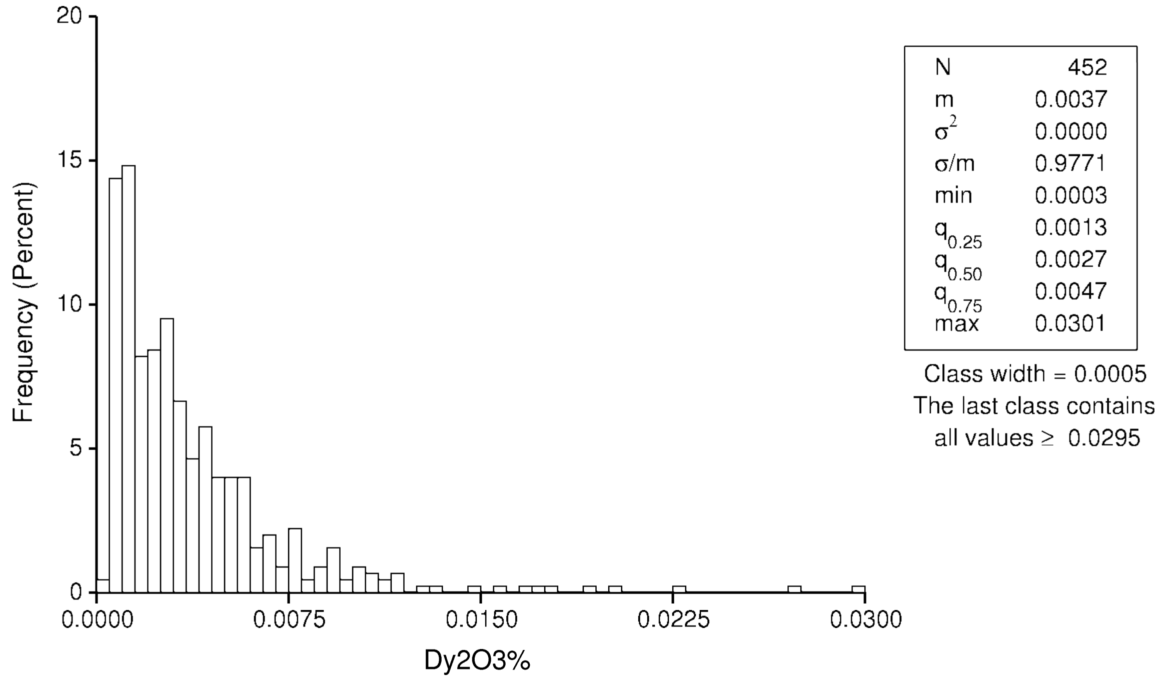


REM:Clay-Howells - 400+500 Ce2O3% (uncapped)
Frequency (Percent)
Ce2O3%
0
5
10
15
20
0.00
0.30
0.60
0.90
1.20
N 1156
m 0.24
σ2 0.05
σ/m 0.96
min 0.01
q0.25 0.12
q0.50 0.19
q0.75 0.29
max 3.30
Class width = 0.02
The last class contains
all values ≥ 1.18

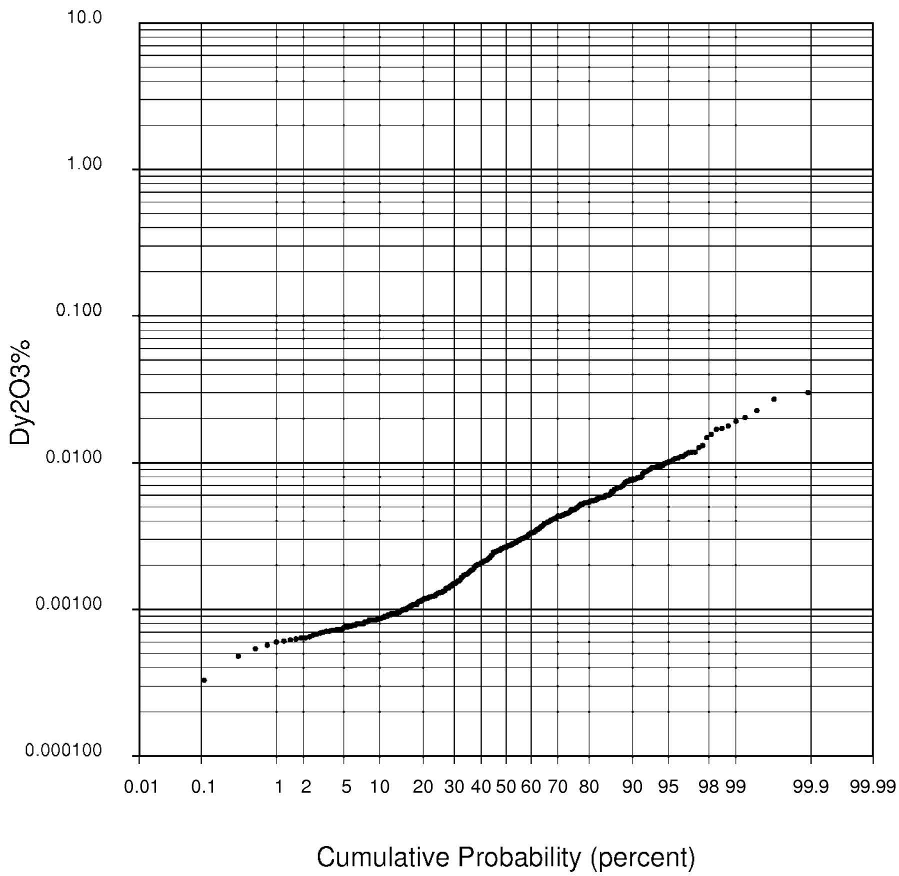


REM:Clay-Howells - 400+500 Ce2O3% (uncapped)
Ce2O3%
10.0
1.00
0.100
0.0100
0.00100
0.000100
0.01
0.1
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.9
99.99
Cumulative Probability (percent)

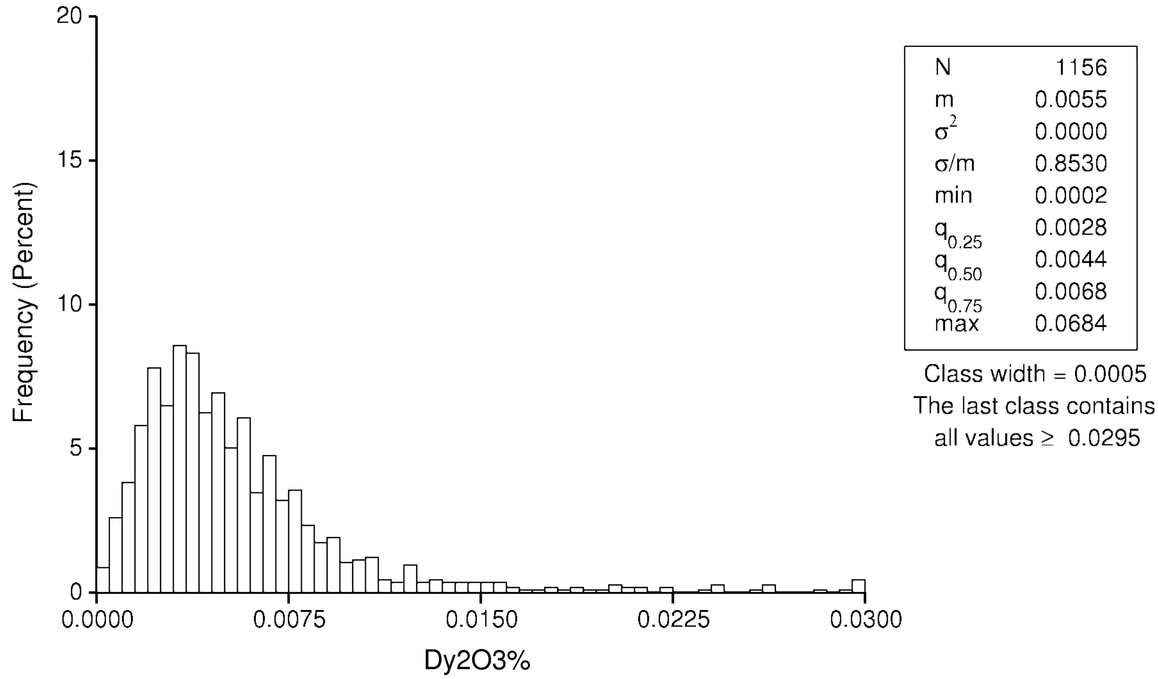
REM:Clay-Howells - 100 Dy2O3% (uncapped)



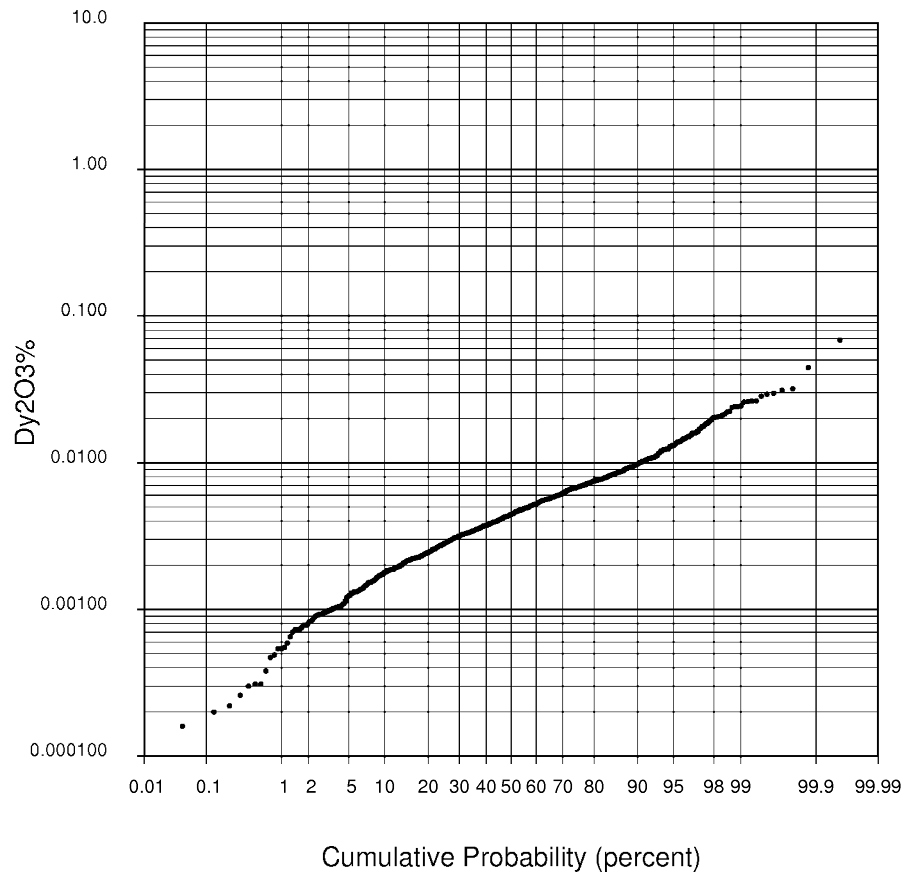
REM:Clay-Howells - 100 Dy2O3% (uncapped)

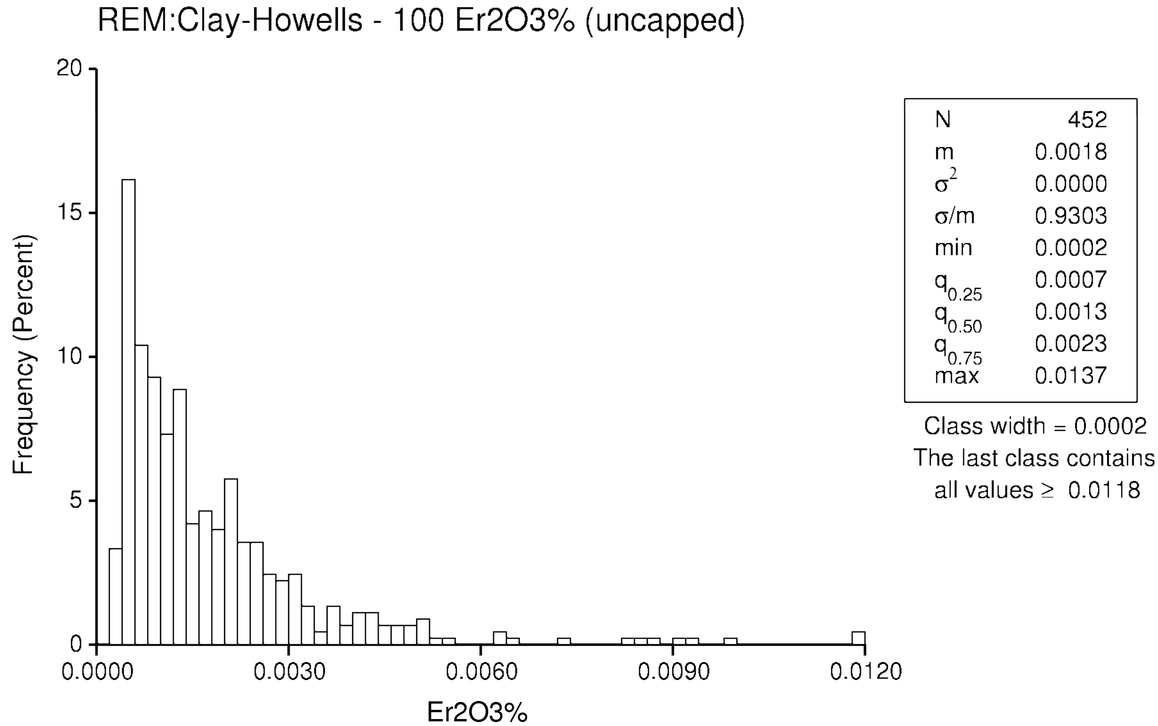


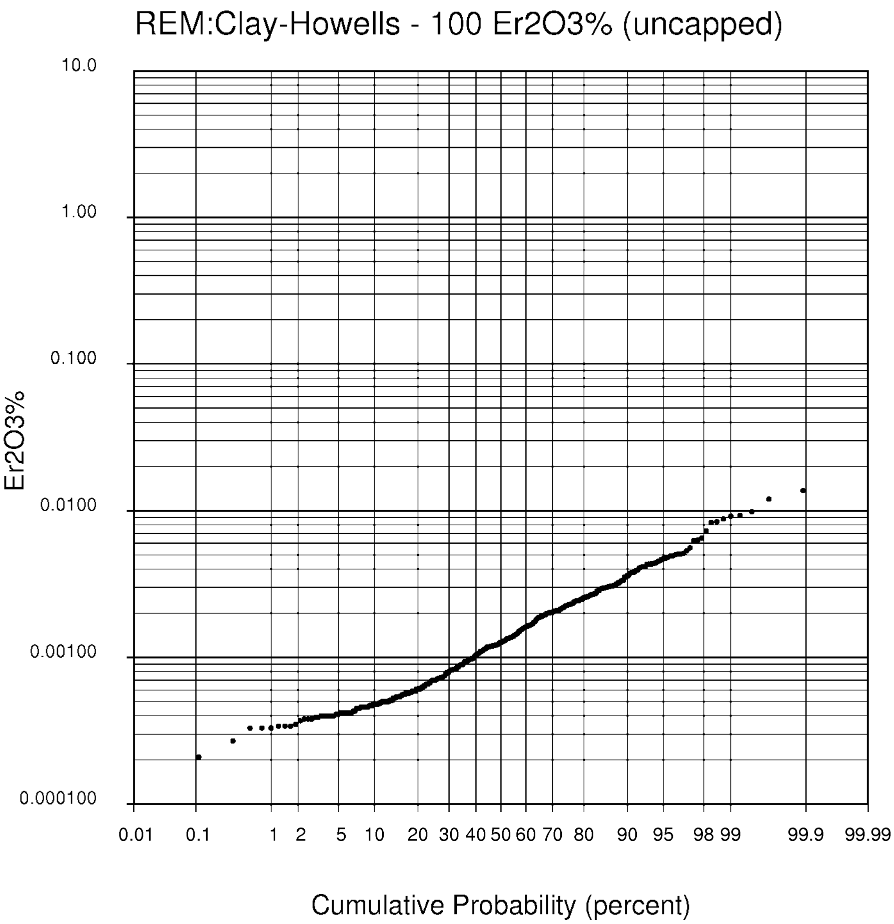
REM:Clay-Howells - 400+500 Dy2O3% (uncapped)

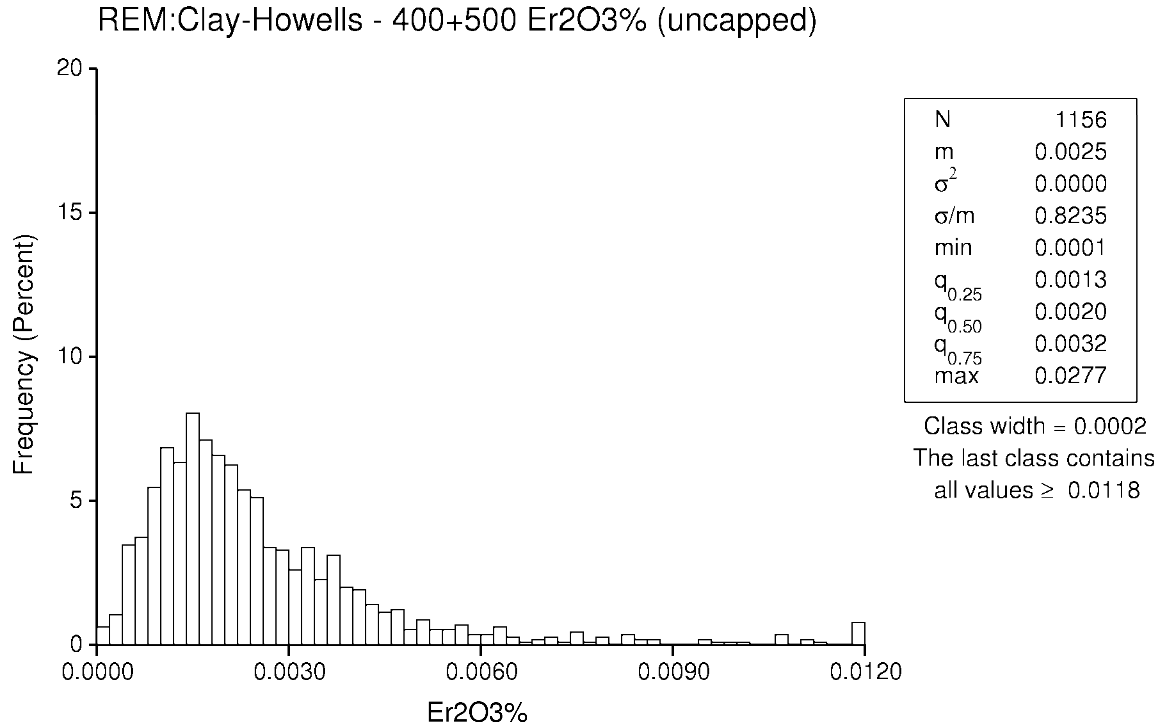


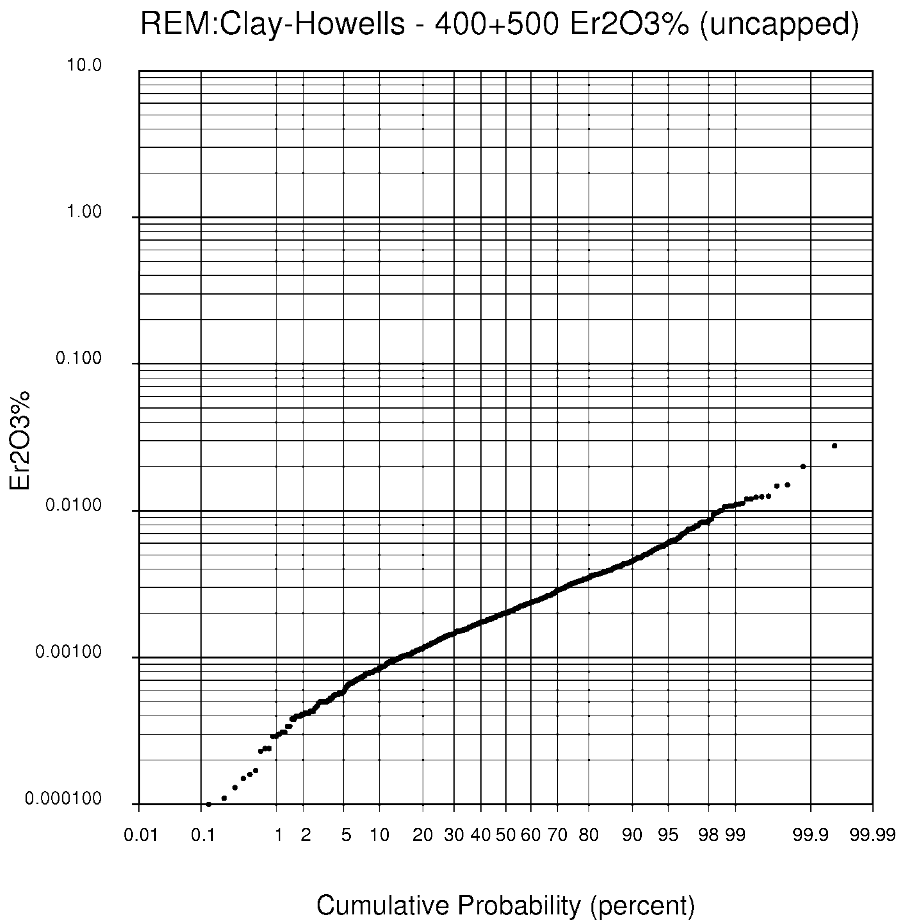
REM:Clay-Howells - 400+500 Dy2O3% (uncapped)

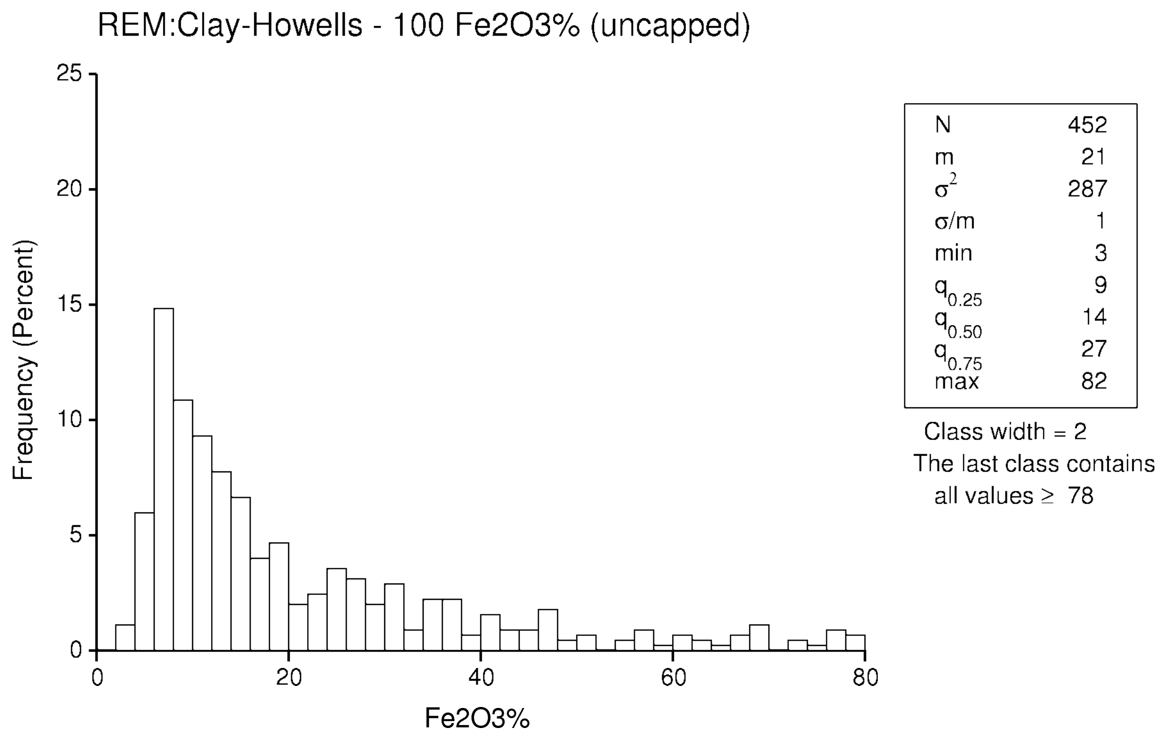



REM:Clay-Howells - 100 Er2O3% (uncapped)
Frequency (Percent)
Er2O3%
N 452
m 0.0018
σ² 0.0000
σ/m 0.9303
min 0.0002
q0.25 0.0007
q0.50 0.0013
q0.75 0.0023
max 0.0137
Class width = 0.0002
The last class contains all values ≥ 0.0118

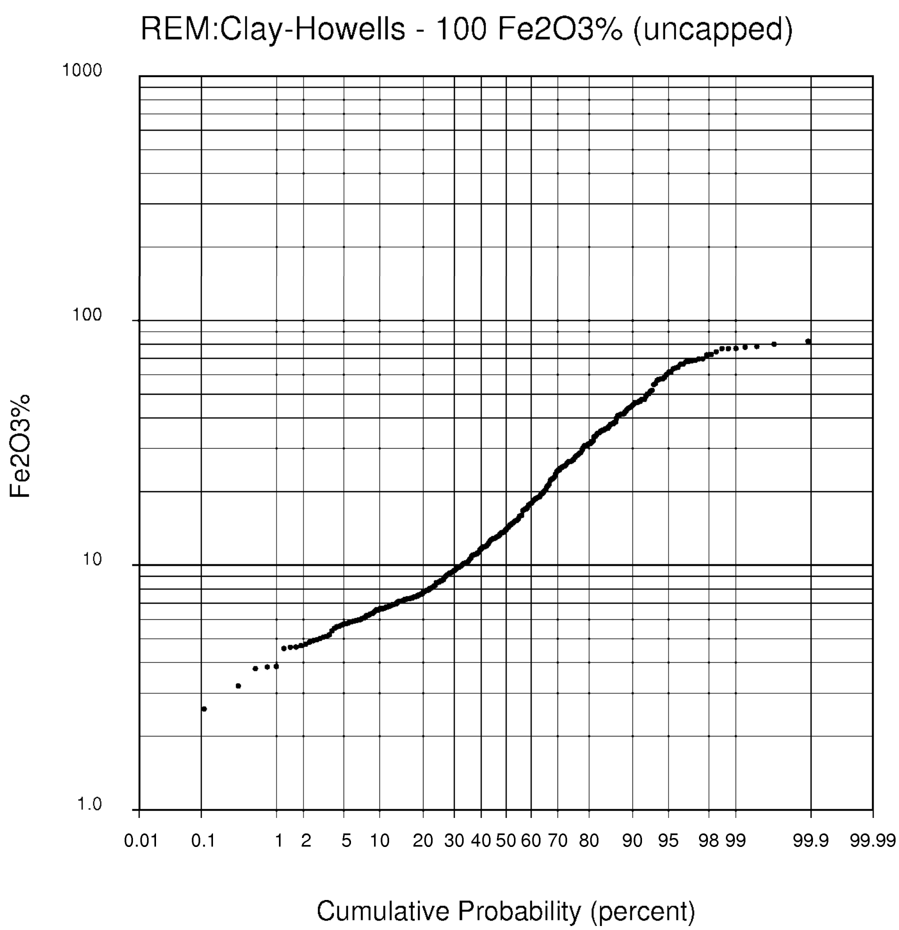

REM:Clay-Howells - 100 Er2O3% (uncapped)
Er2O3%
Cumulative Probability (percent)


REM:Clay-Howells - 400+500 Er2O3% (uncapped)
Frequency (Percent)
Er2O3%
N 1156
m 0.0025
σ² 0.0000
σ/m 0.8235
min 0.0001
q0.25 0.0013
q0.50 0.0020
q0.75 0.0032
max 0.0277
Class width = 0.0002
The last class contains
all values ≥ 0.0118

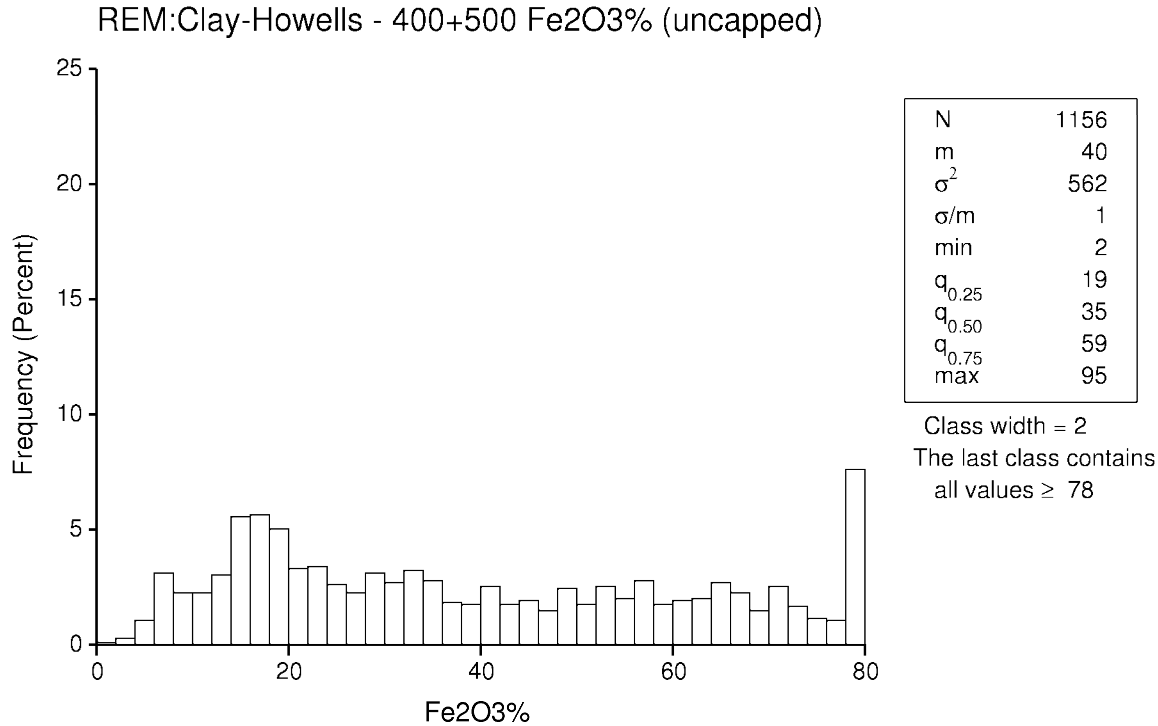

REM:Clay-Howells - 400+500 Er2O3% (uncapped)
Er2O3%
Cumulative Probability (percent)



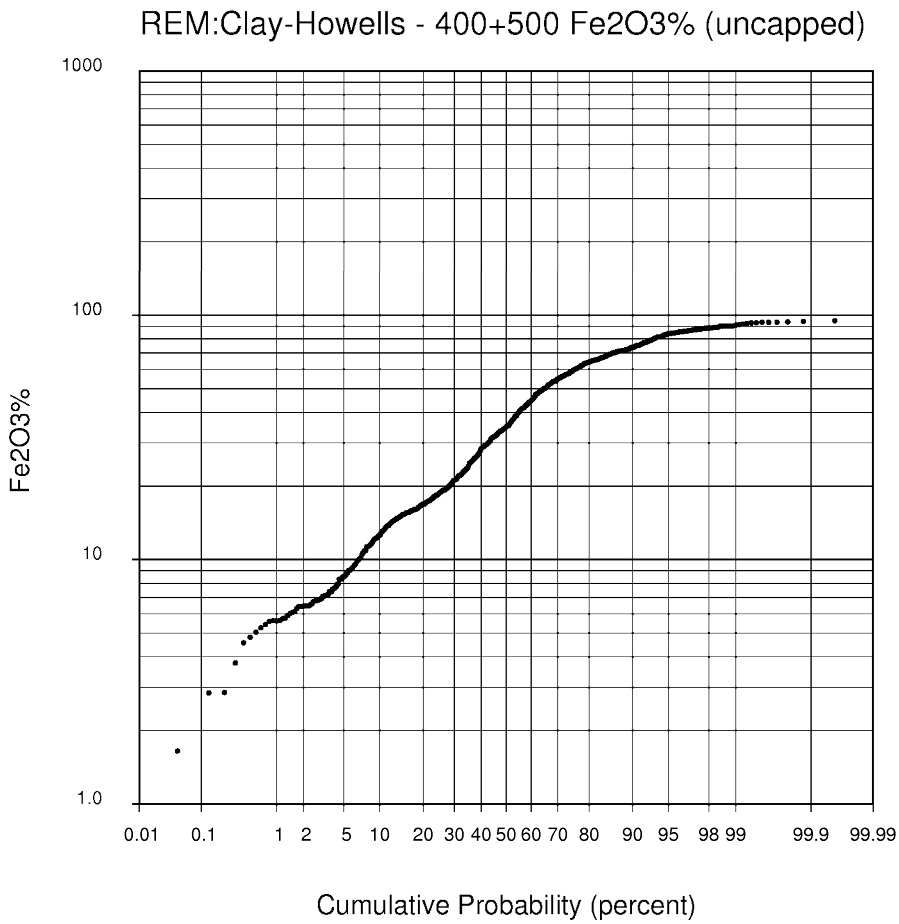
REM:Clay-Howells - 100 Fe2O3% (uncapped)
Frequency (Percent)
Fe2O3%
N 452
m 21
σ² 287
σ/m 1
min 3
q0.25 9
q0.50 14
q0.75 27
max 82
Class width = 2
The last class contains
all values ≥ 78



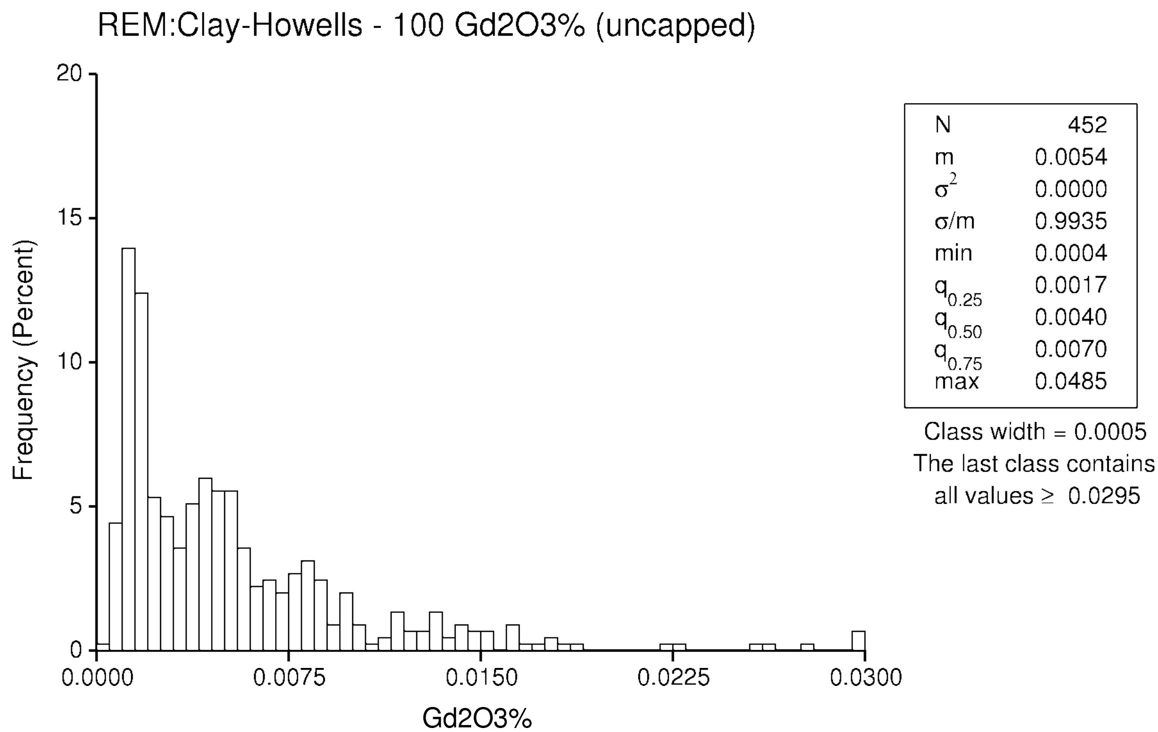
REM:Clay-Howells - 100 Fe2O3% (uncapped)
Fe2O3%
Cumulative Probability (percent)

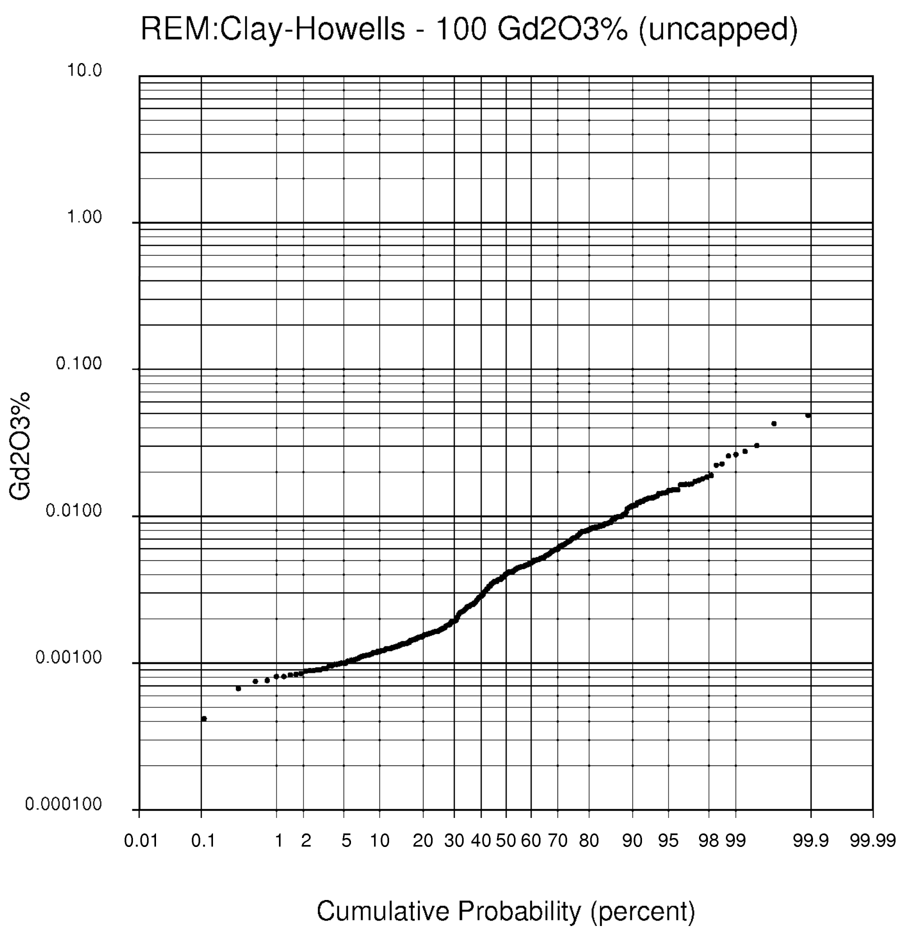


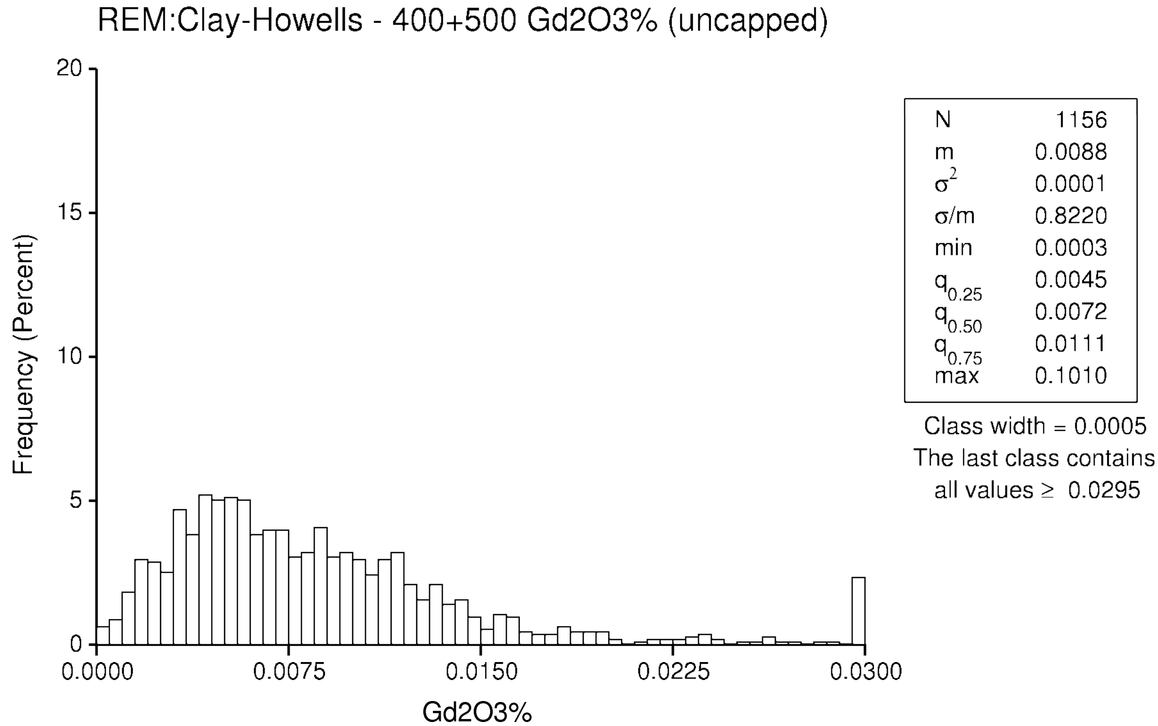
REM:Clay-Howells - 400+500 Fe2O3% (uncapped)
Frequency (Percent)
Fe2O3%
N 1156
m 40
σ2 562
σ/m 1
min 2
q0.25 19
q0.50 35
q0.75 59
max 95
Class width = 2
The last class contains
all values ≥ 78

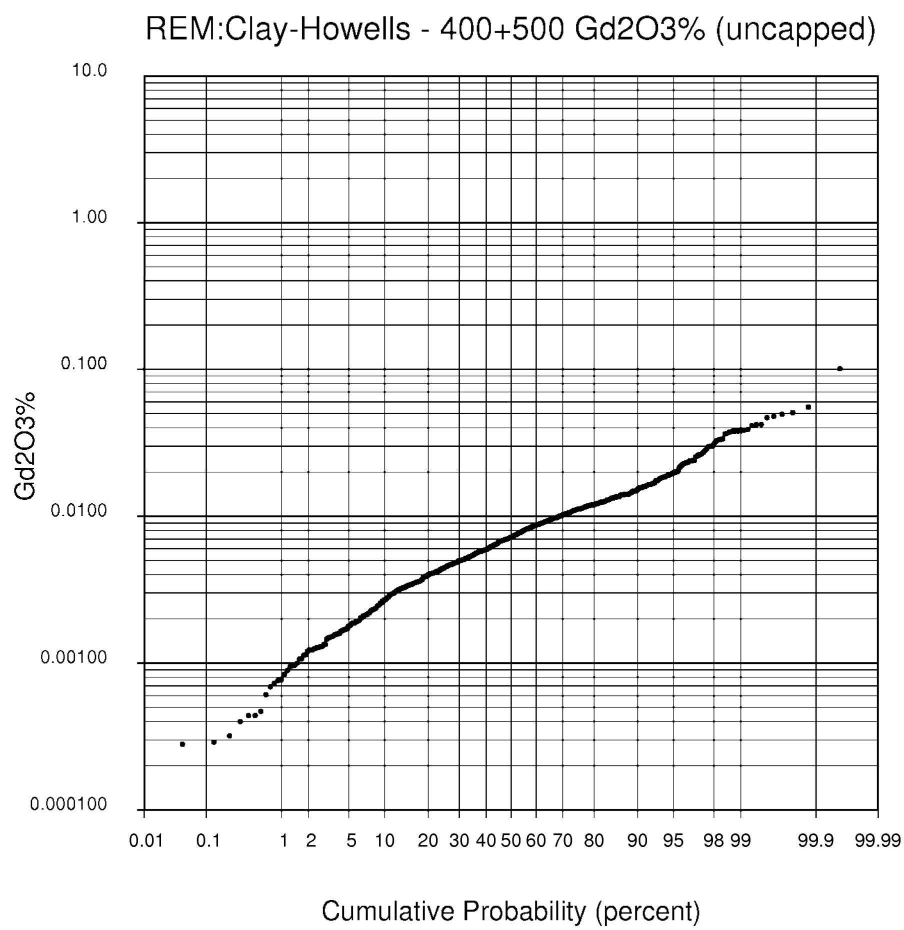


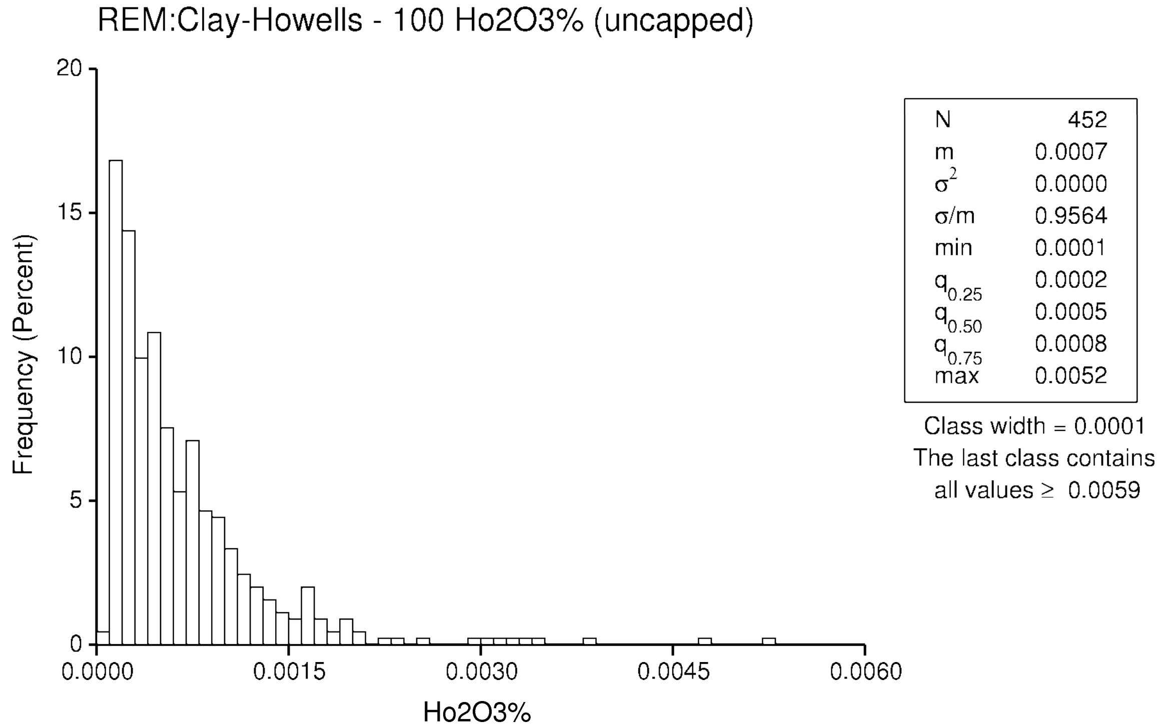
REM:Clay-Howells - 400+500 Fe2O3% (uncapped)
Fe2O3%
Cumulative Probability (percent)


REM:Clay-Howells - 100 Gd2O3% (uncapped)
Frequency (Percent)
Gd2O3%
N 452
m 0.0054
σ2 0.0000
σ/m 0.9935
min 0.0004
q0.25 0.0017
q0.50 0.0040
q0.75 0.0070
max 0.0485
Class width = 0.0005
The last class contains
all values ≥ 0.0295

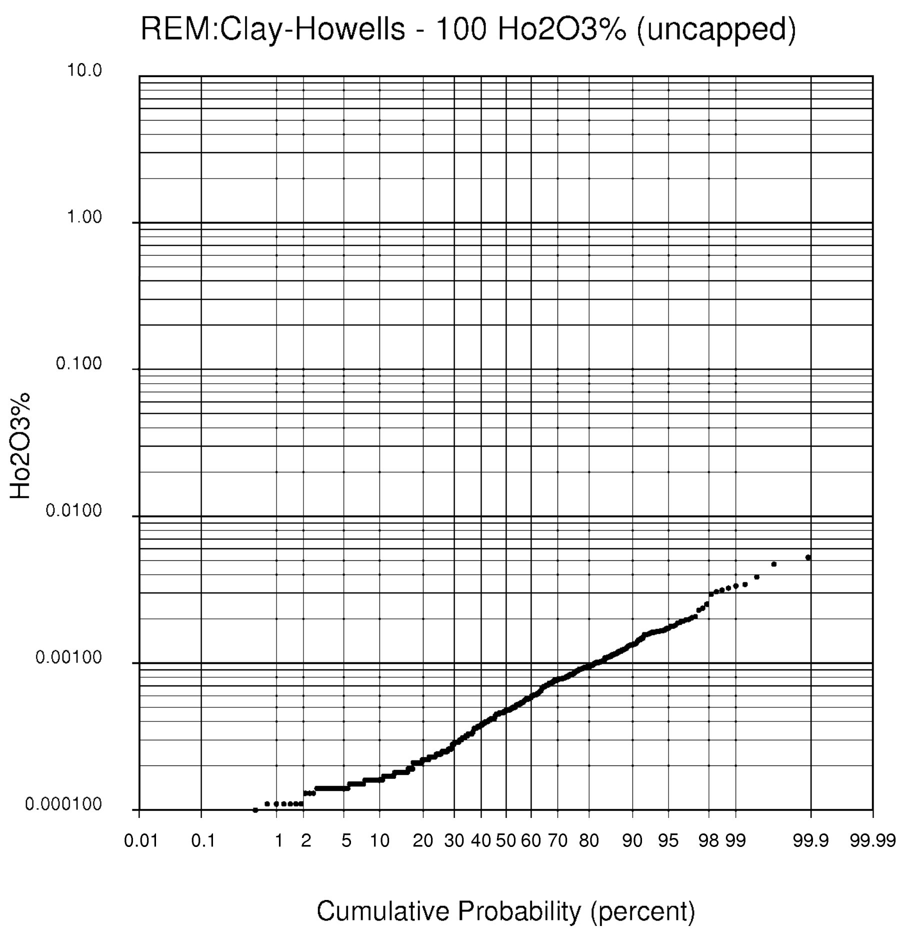

REM:Clay-Howells - 100 Gd2O3% (uncapped)
Gd2O3%
Cumulative Probability (percent)


REM:Clay-Howells - 400+500 Gd2O3% (uncapped)
Frequency (Percent)
Gd2O3%
N 1156
m 0.0088
σ² 0.0001
σ/m 0.8220
min 0.0003
q0.25 0.0045
q0.50 0.0072
q0.75 0.0111
max 0.1010
Class width = 0.0005
The last class contains
all values ≥ 0.0295

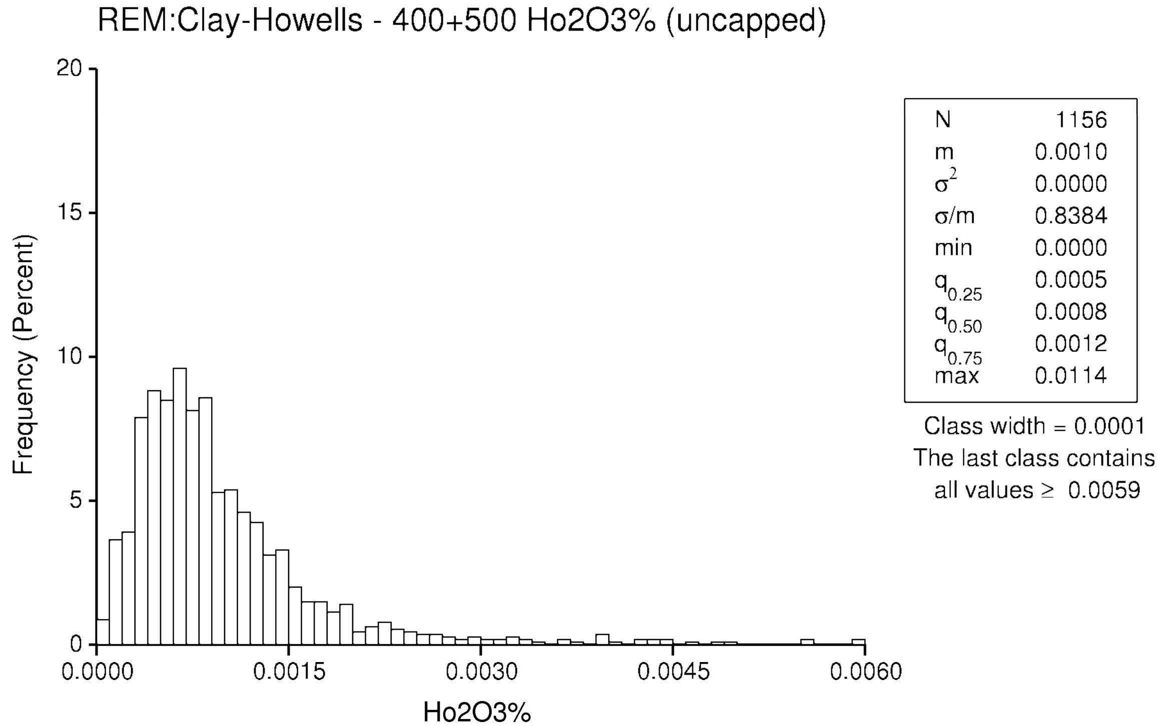

REM:Clay-Howells - 400+500 Gd2O3% (uncapped)
Gd2O3%
Cumulative Probability (percent)



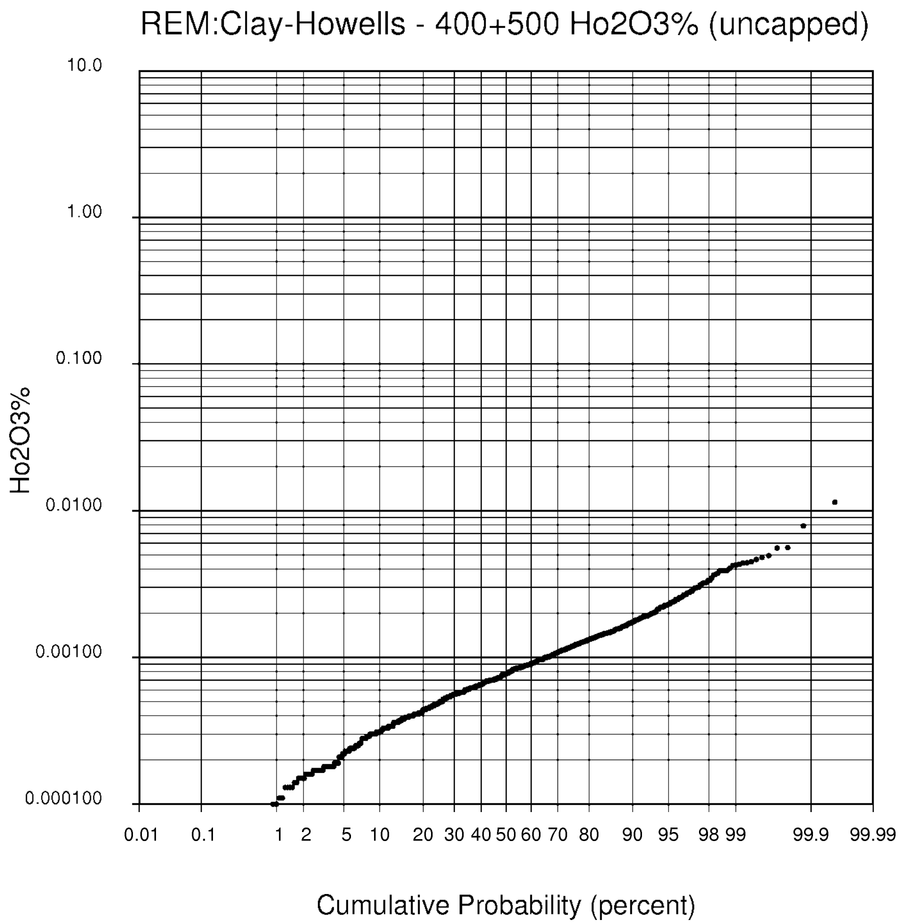
REM:Clay-Howells - 100 Ho2O3% (uncapped)
Frequency (Percent)
Ho2O3%
0.0000
0.0015
0.0030
0.0045
0.0060
20
15
10
5
0
N 452
m 0.0007
σ2 0.0000
σ/m 0.9564
min 0.0001
q0.25 0.0002
q0.50 0.0005
q0.75 0.0008
max 0.0052
Class width = 0.0001
The last class contains
all values ≥ 0.0059



REM:Clay-Howells - 100 Ho2O3% (uncapped)
Ho2O3%
10.0
1.00
0.100
0.0100
0.00100
0.000100
0.01 0.1 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.9 99.99
Cumulative Probability (percent)

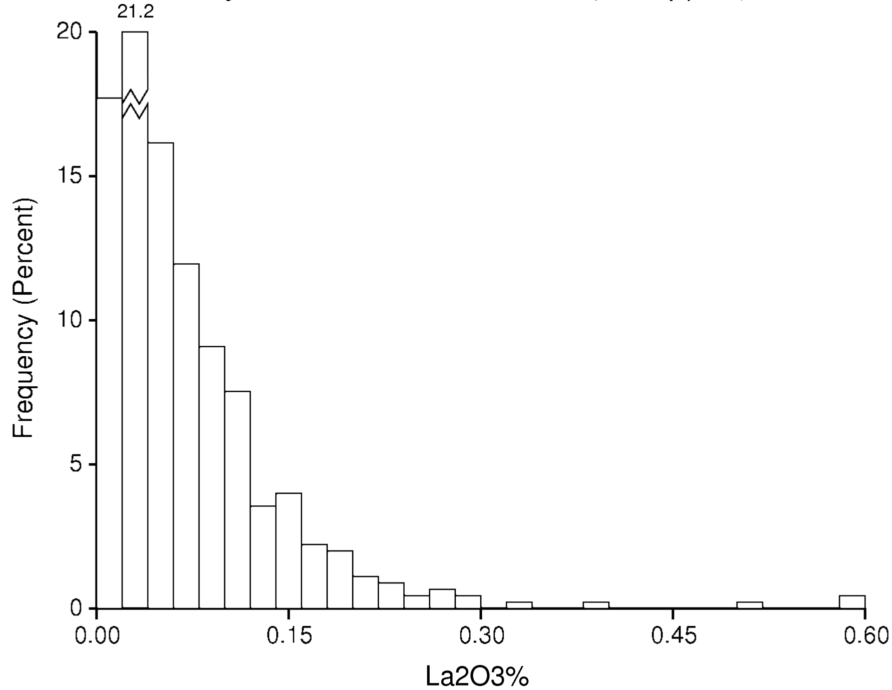


REM:Clay-Howells - 400+500 Ho2O3% (uncapped)
Frequency (Percent)
Ho2O3%
N 1156
m 0.0010
σ2 0.0000
σ/m 0.8384
min 0.0000
q0.25 0.0005
q0.50 0.0008
q0.75 0.0012
max 0.0114
Class width = 0.0001
The last class contains all values ≥ 0.0059



REM:Clay-Howells - 400+500 Ho2O3% (uncapped)
Ho2O3%
Cumulative Probability (percent)

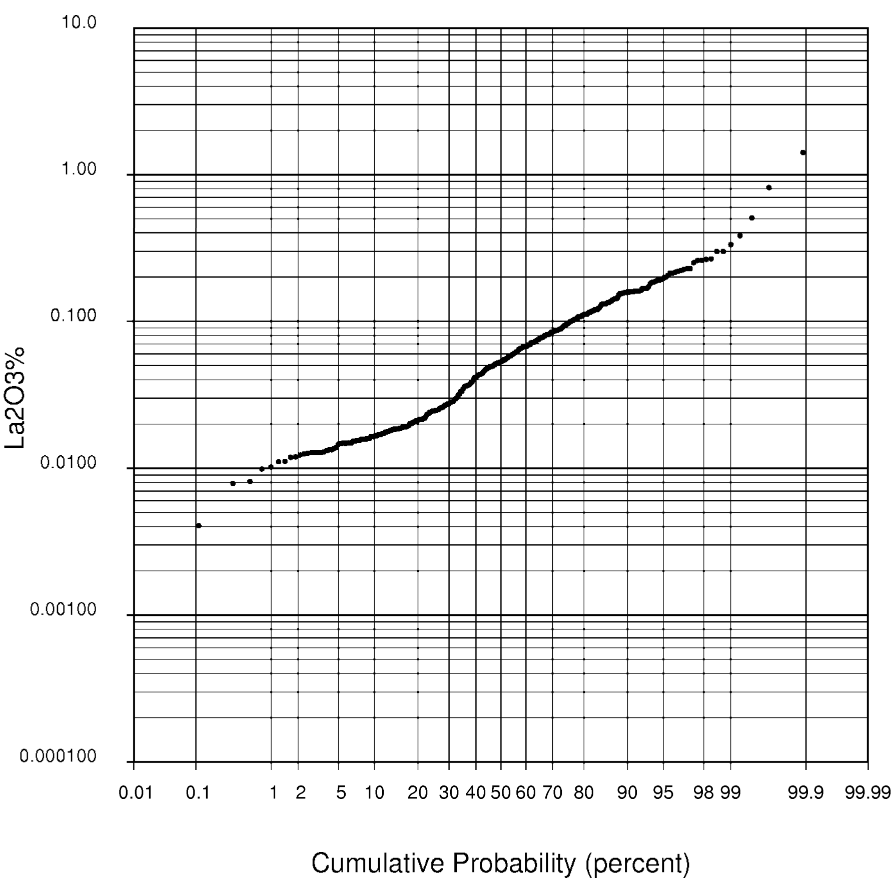
REM:Clay-Howells - 100 La2O3% (uncapped)



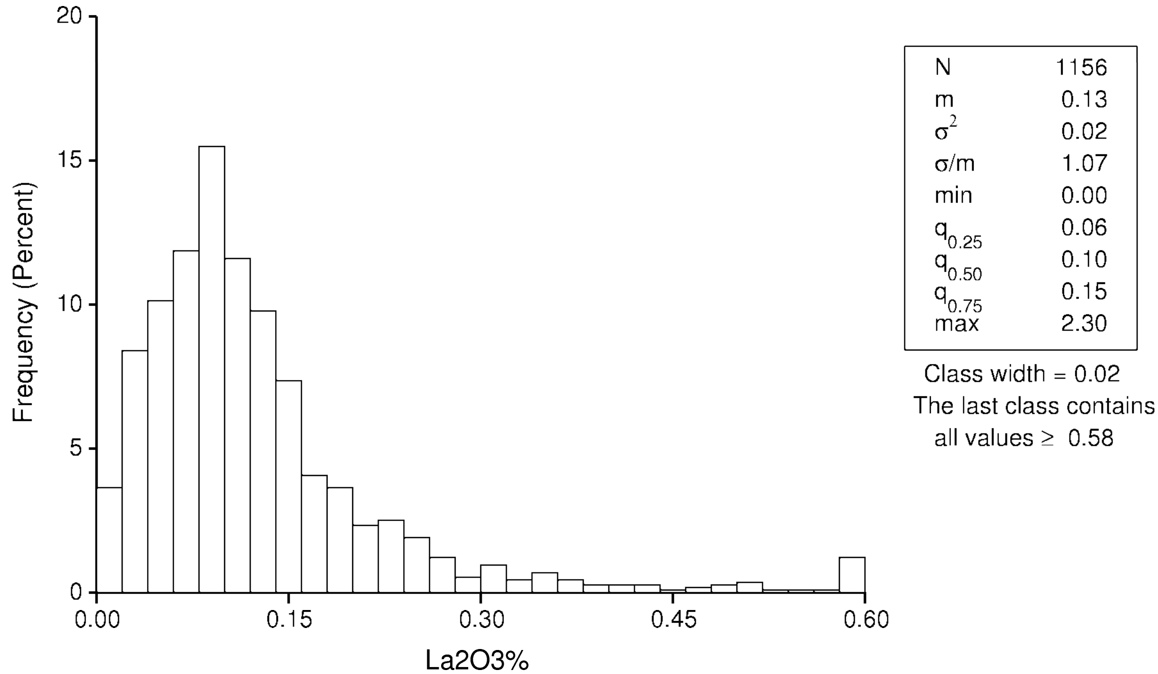
N	452
m	0.08
σ^2	0.01
σ/m	1.26
min	0.00
$q_{0.25}$	0.02
$q_{0.50}$	0.05
$q_{0.75}$	0.10
max	1.42

Class width = 0.02
The last class contains all values ≥ 0.58

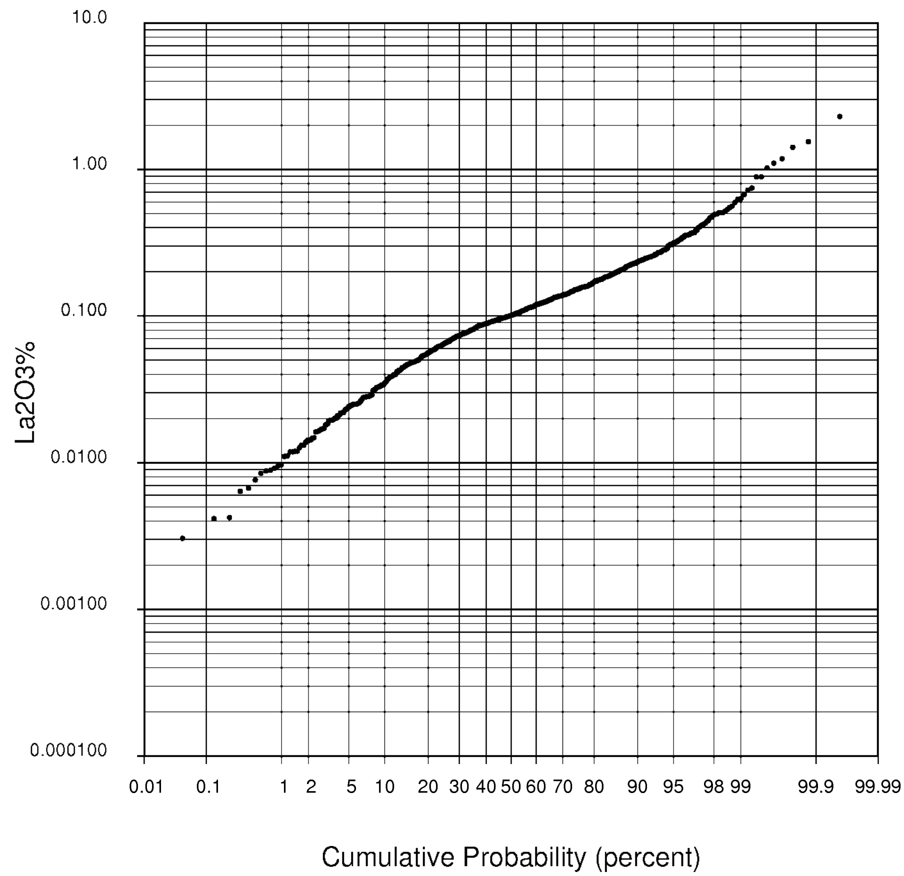
REM:Clay-Howells - 100 La2O3% (uncapped)

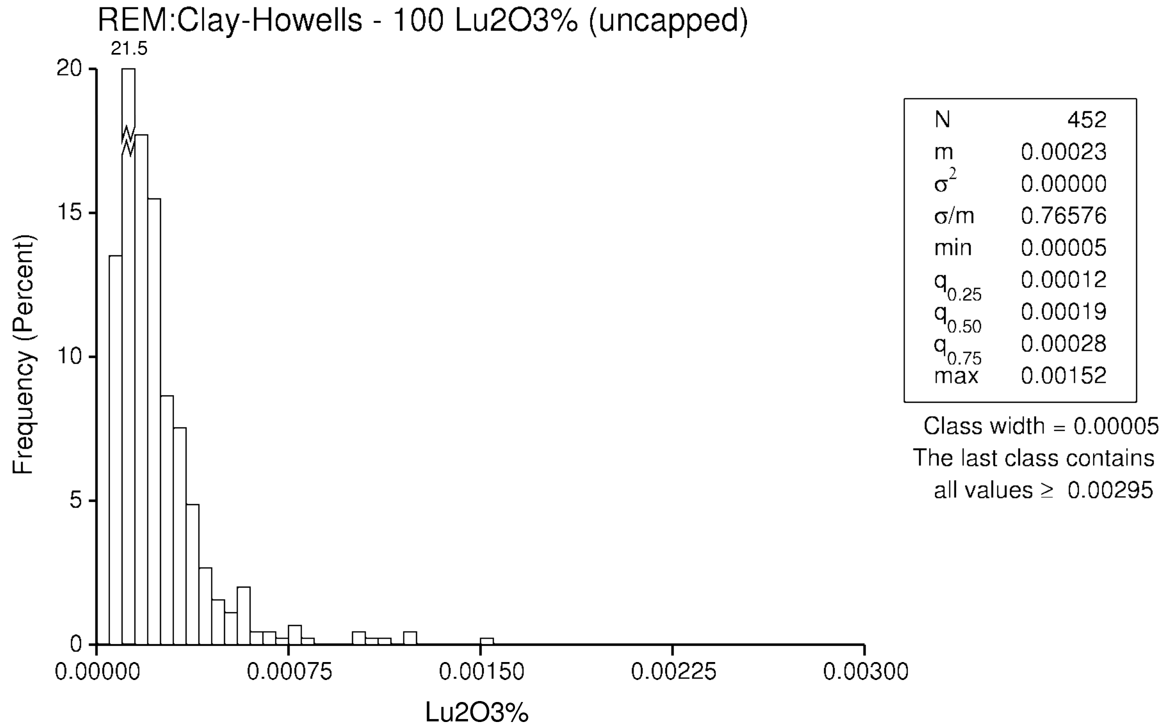


REM:Clay-Howells - 400+500 La2O3% (uncapped)

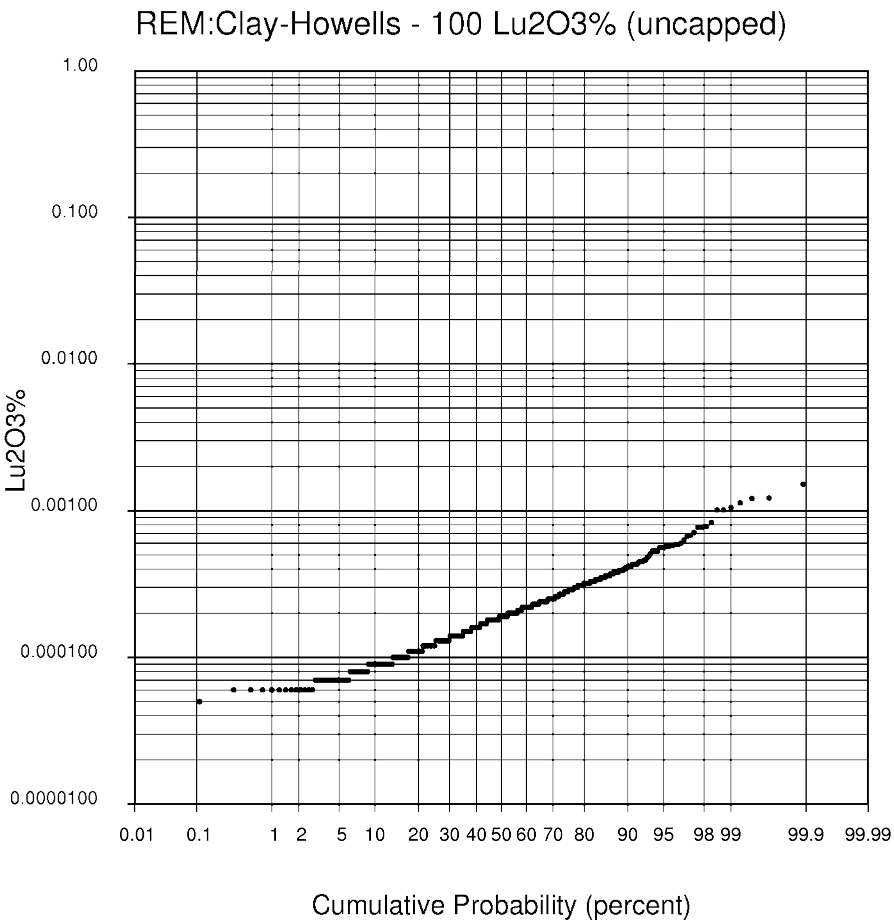


REM:Clay-Howells - 400+500 La2O3% (uncapped)

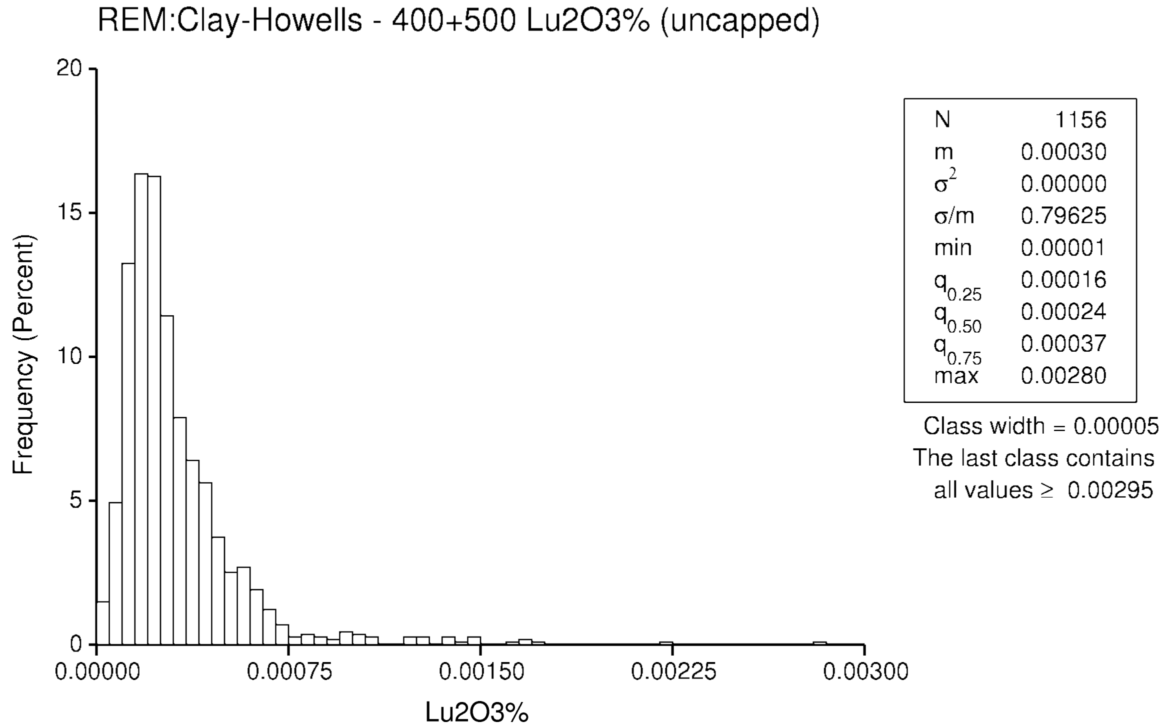




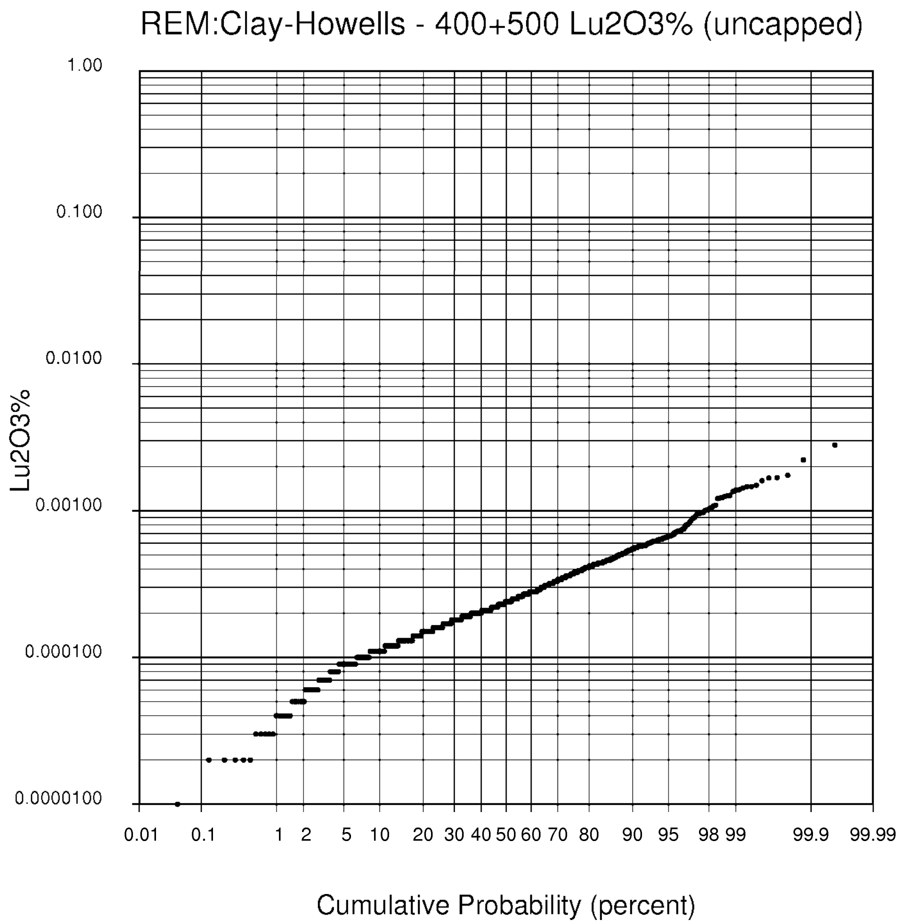
REM:Clay-Howells - 100 Lu2O3% (uncapped)
21.5
Frequency (Percent)
Lu2O3%
N 452
m 0.00023
σ2 0.00000
σ/m 0.76576
min 0.00005
q0.25 0.00012
q0.50 0.00019
q0.75 0.00028
max 0.00152
Class width = 0.00005
The last class contains
all values ≥ 0.00295



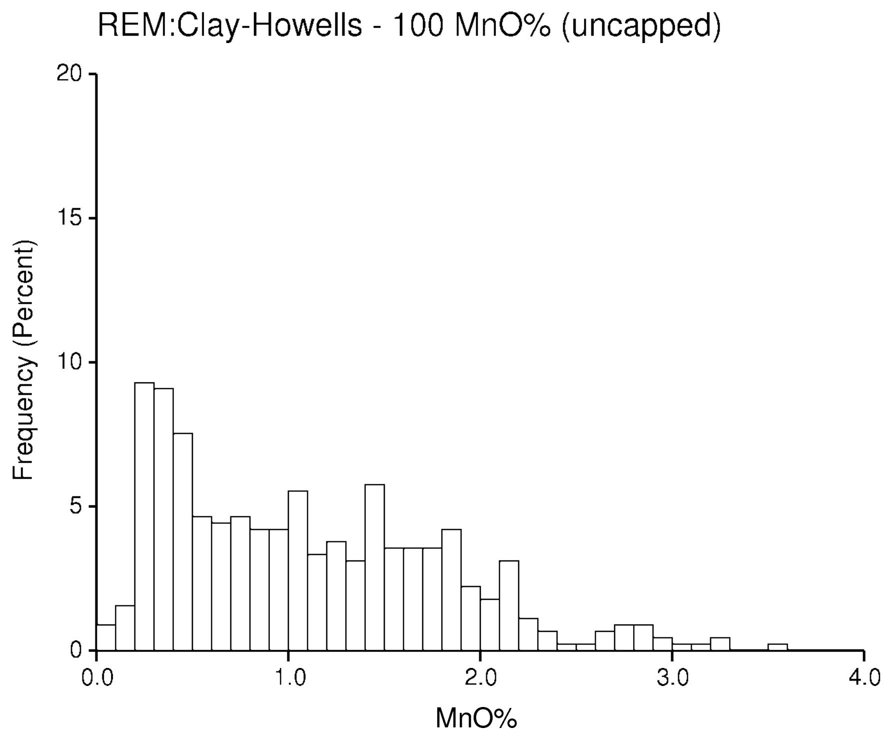
REM:Clay-Howells - 100 Lu2O3% (uncapped)
Lu2O3%
Cumulative Probability (percent)



REM:Clay-Howells - 400+500 Lu2O3% (uncapped)
Frequency (Percent)
Lu2O3%
0.00000
0.00075
0.00150
0.00225
0.00300
N 1156
m 0.00030
σ2 0.00000
σ/m 0.79625
min 0.00001
q0.25 0.00016
q0.50 0.00024
q0.75 0.00037
max 0.00280
Class width = 0.00005
The last class contains
all values ≥ 0.00295

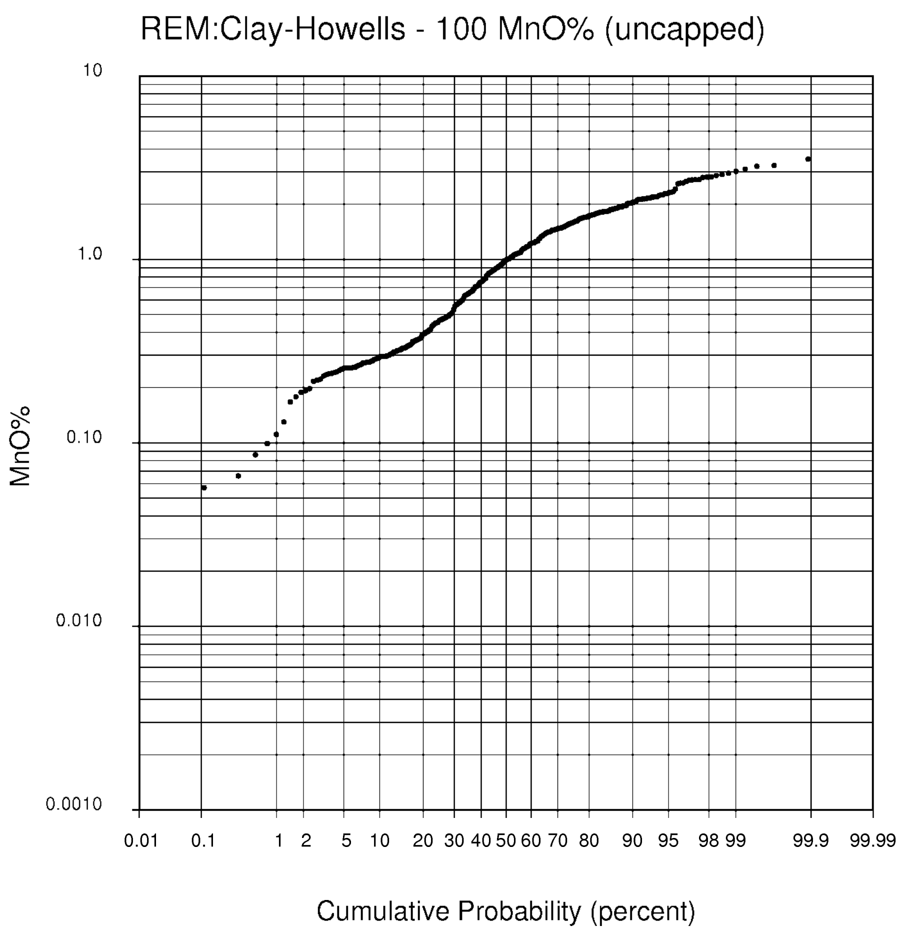


REM:Clay-Howells - 400+500 Lu2O3% (uncapped)
Lu2O3%
1.00
0.100
0.0100
0.00100
0.000100
0.0000100
0.01 0.1 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.9 99.99
Cumulative Probability (percent)

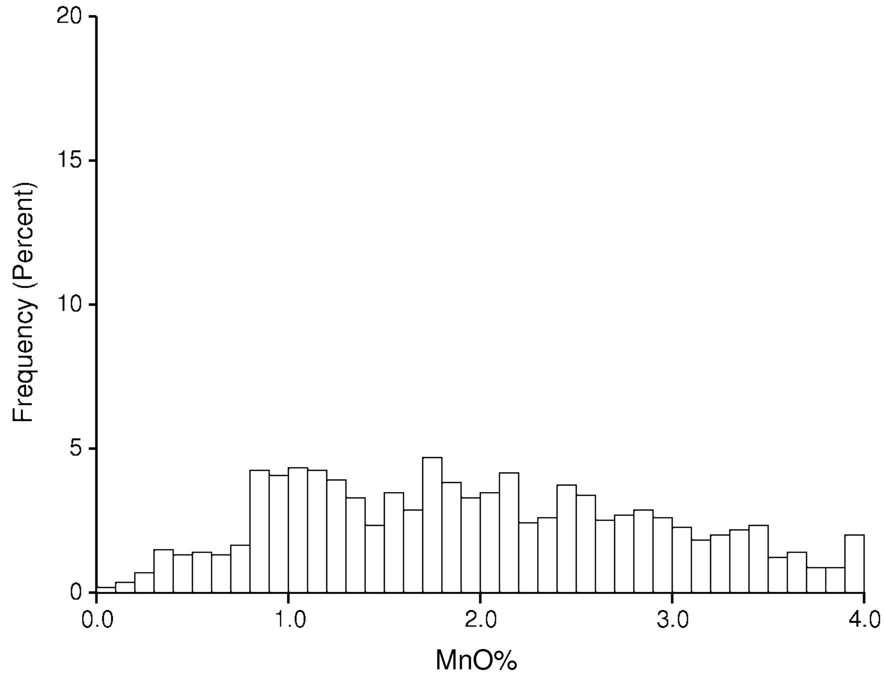


N	452
m	1.1
σ^2	0.5
σ/m	0.6
min	0.1
$q_{0.25}$	0.5
$q_{0.50}$	1.0
$q_{0.75}$	1.6
max	3.5

Class width = 0.1
The last class contains all values ≥ 3.9



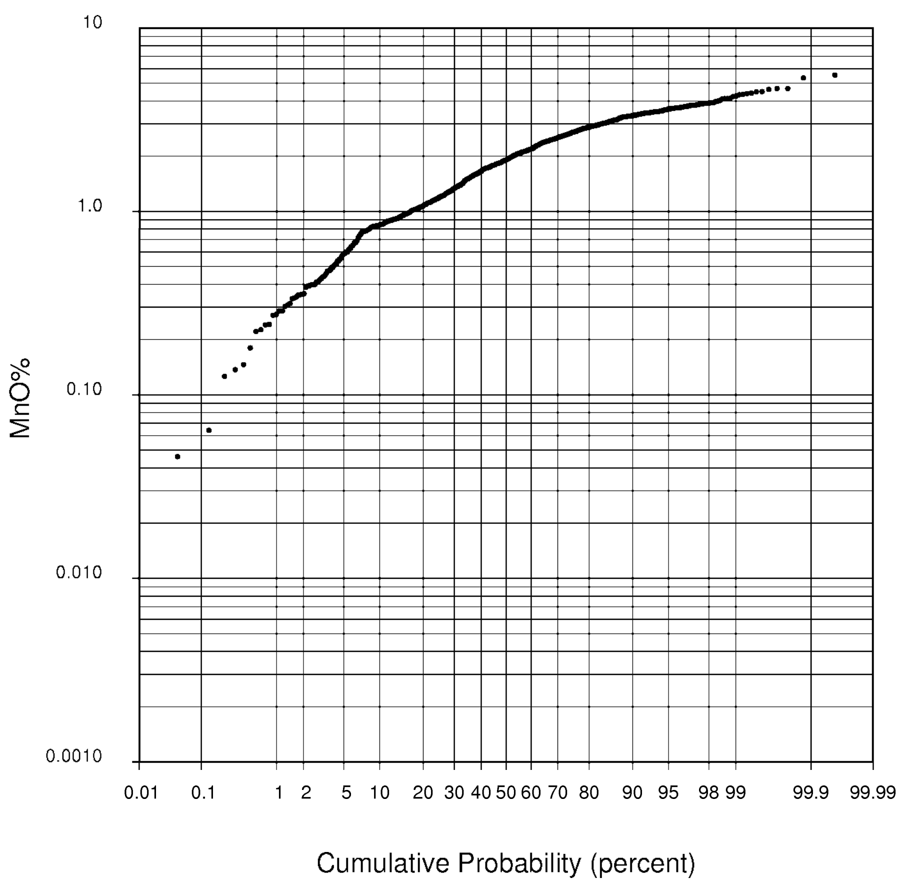
REM:Clay-Howells - 400+500 MnO% (uncapped)

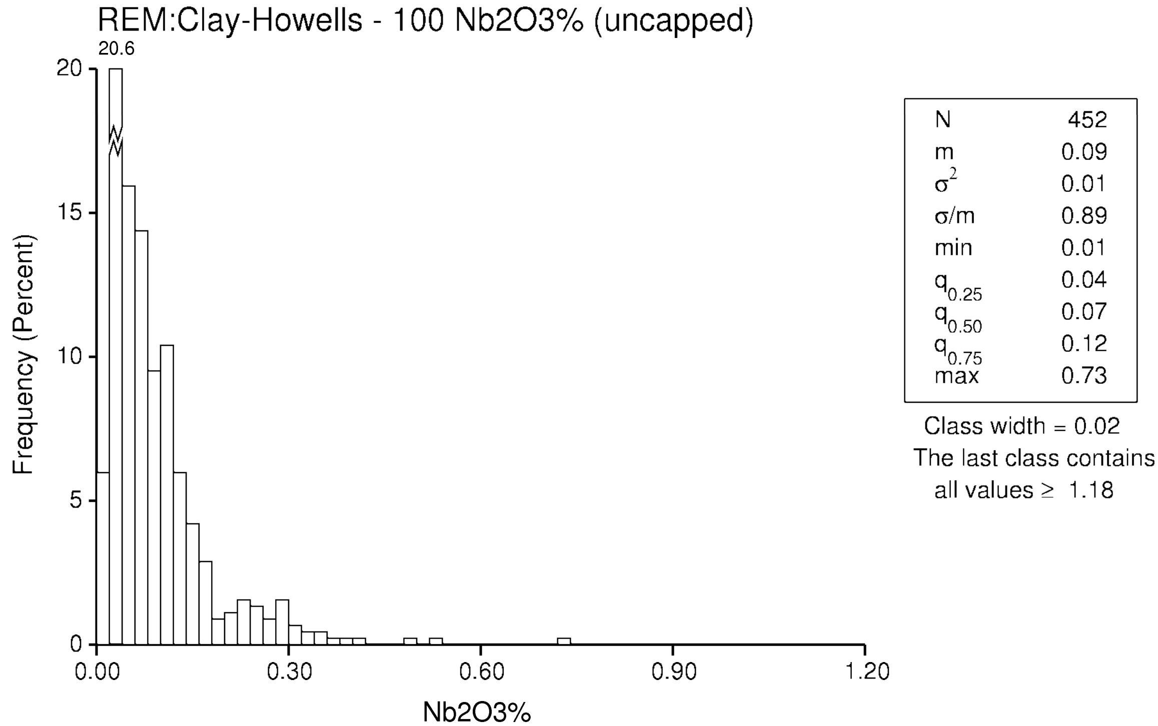


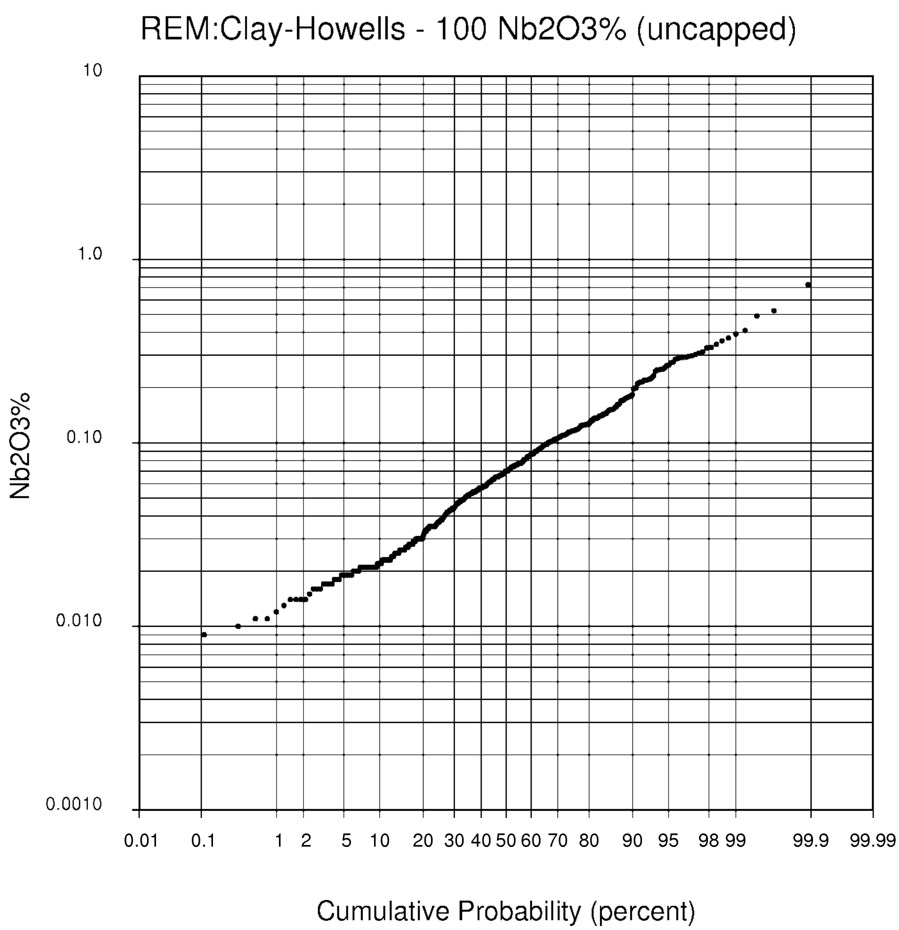
N	1156
m	2.0
σ^2	0.9
σ/m	0.5
min	0.0
$q_{0.25}$	1.2
$q_{0.50}$	1.9
$q_{0.75}$	2.7
max	5.5

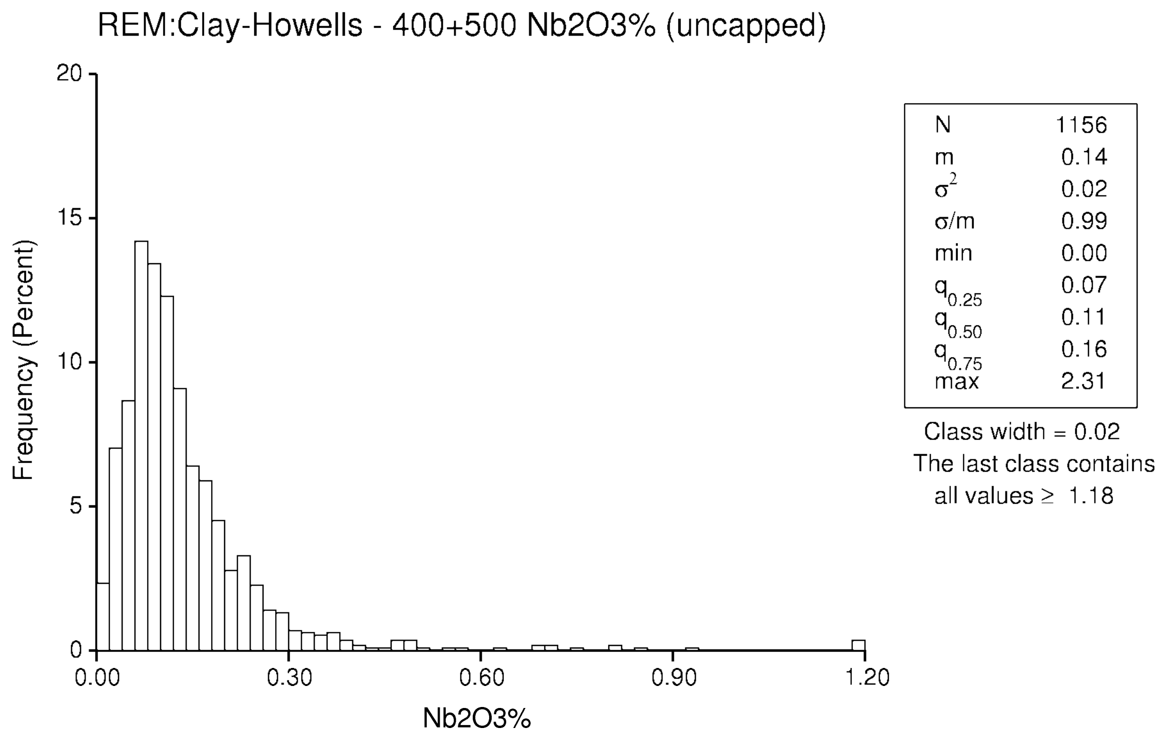
Class width = 0.1
The last class contains
all values ≥ 3.9

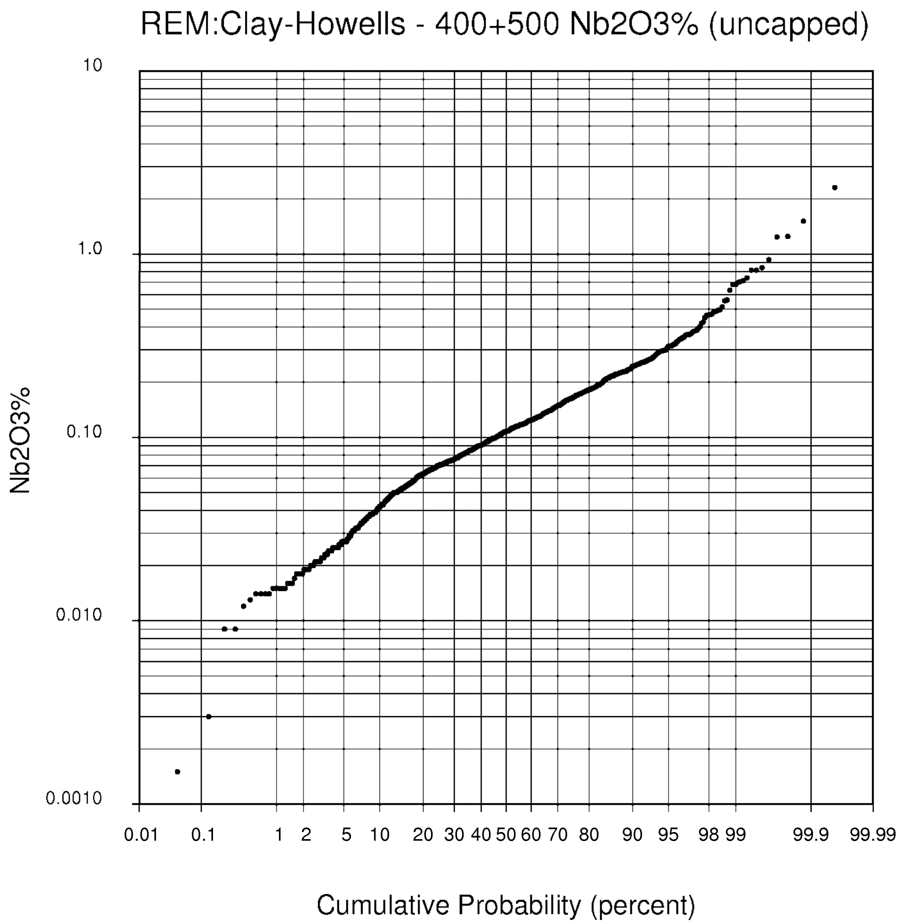
REM:Clay-Howells - 400+500 MnO% (uncapped)



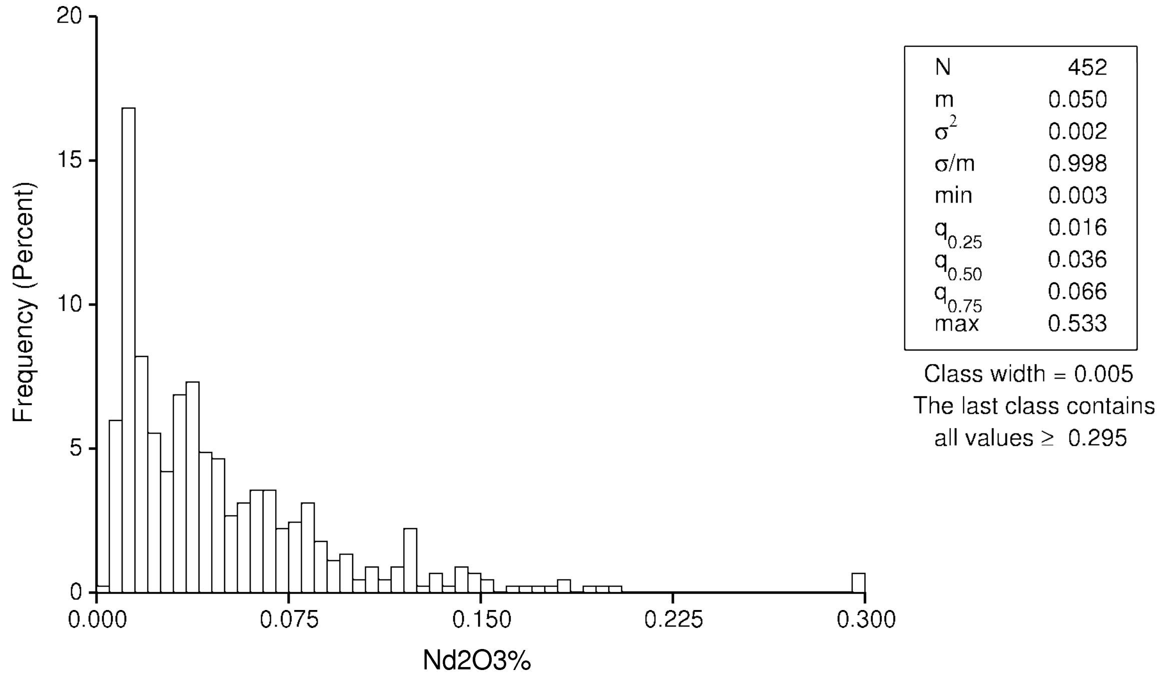

REM:Clay-Howells - 100 Nb2O3% (uncapped)
20.6
Frequency (Percent)
Nb2O3%
0.00
0.30
0.60
0.90
1.20
N 452
m 0.09
σ2 0.01
σ/m 0.89
min 0.01
q0.25 0.04
q0.50 0.07
q0.75 0.12
max 0.73
Class width = 0.02
The last class contains all values ≥ 1.18


REM:Clay-Howells - 100 Nb2O3% (uncapped)
Nb2O3%
10
1.0
0.10
0.010
0.0010
0.01 0.1 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.9 99.99
Cumulative Probability (percent)

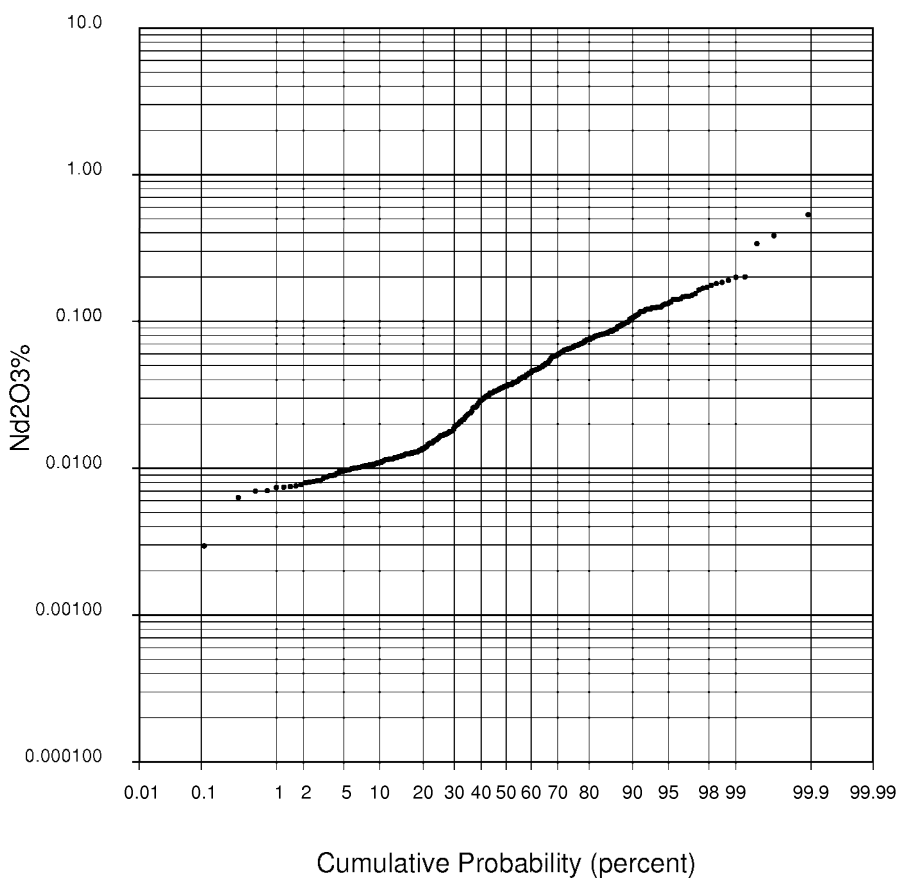

REM:Clay-Howells - 400+500 Nb2O3% (uncapped)
Frequency (Percent)
Nb2O3%
0.00
0.30
0.60
0.90
1.20
0
5
10
15
20
N 1156
m 0.14
σ² 0.02
σ/m 0.99
min 0.00
q0.25 0.07
q0.50 0.11
q0.75 0.16
max 2.31
Class width = 0.02
The last class contains
all values ≥ 1.18

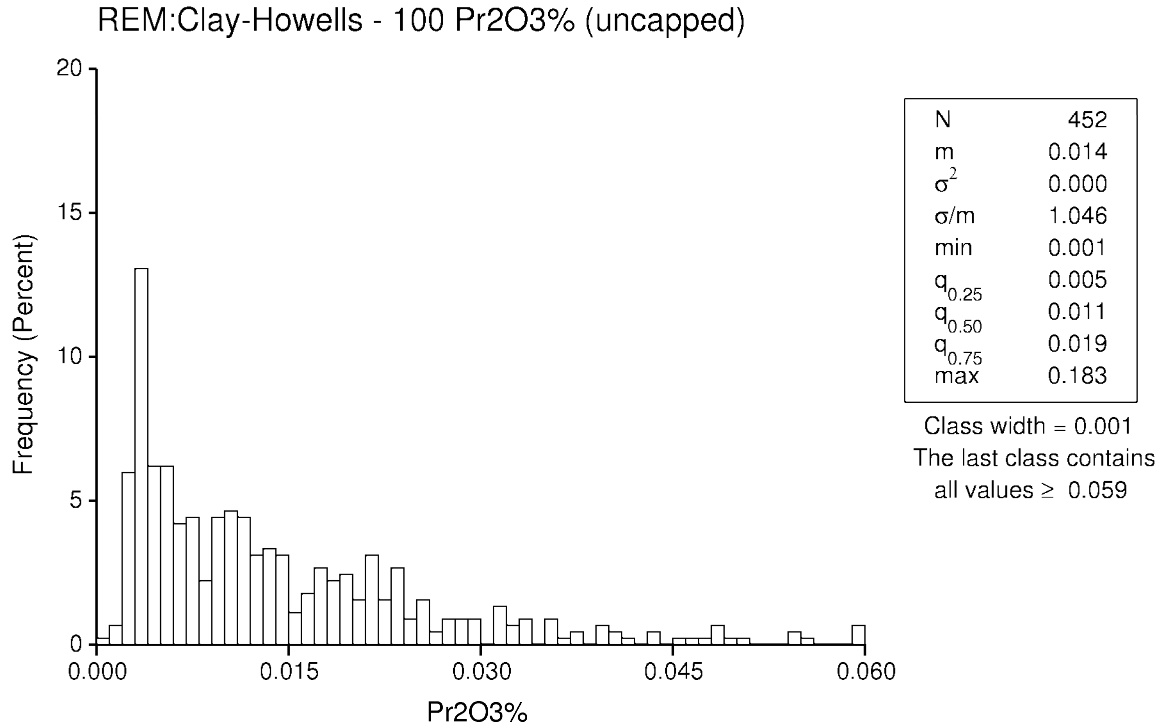

REM:Clay-Howells - 400+500 Nb2O3% (uncapped)
Nb2O3%
10
1.0
0.10
0.010
0.0010
0.01 0.1 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.9 99.99
Cumulative Probability (percent)

REM:Clay-Howells - 100 Nd2O3% (uncapped)

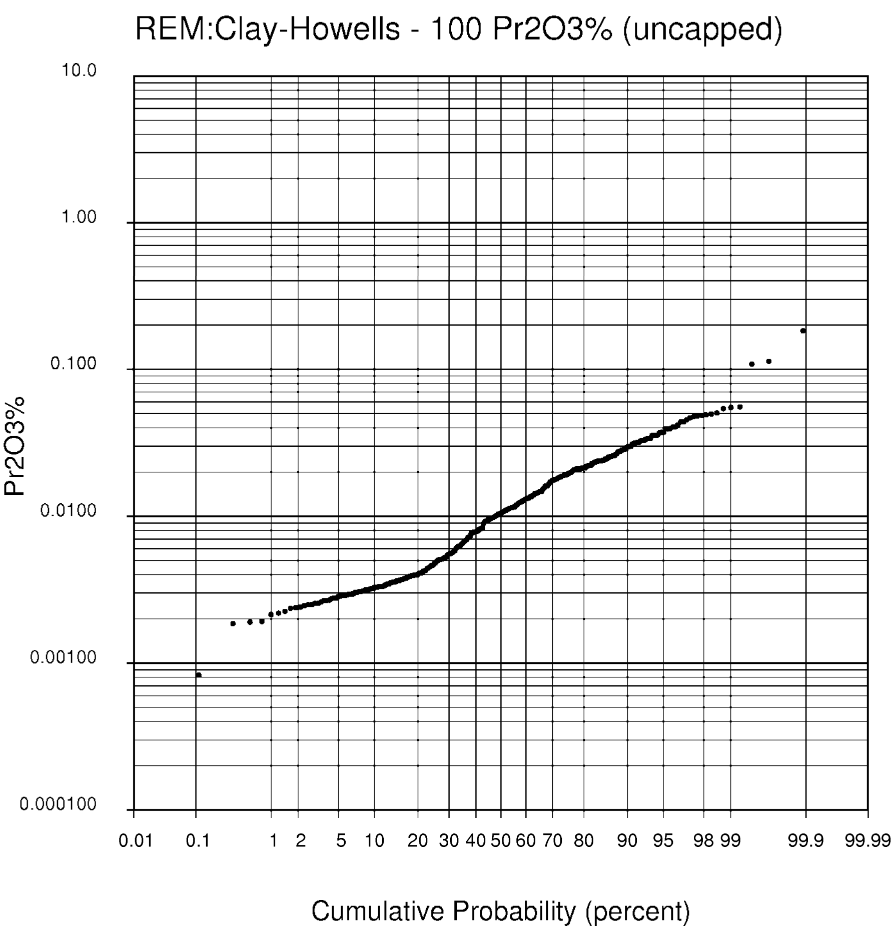


REM:Clay-Howells - 100 Nd2O3% (uncapped)



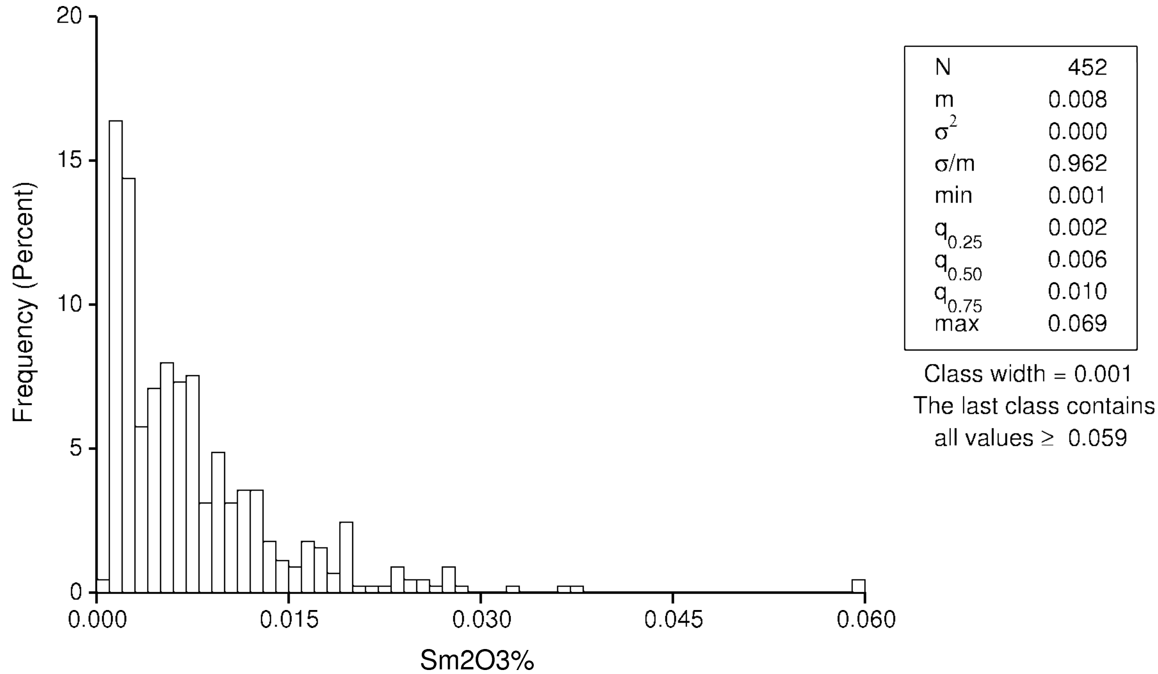


REM:Clay-Howells - 100 Pr2O3% (uncapped)
Frequency (Percent)
Pr2O3%
N 452
m 0.014
σ2 0.000
σ/m 1.046
min 0.001
q0.25 0.005
q0.50 0.011
q0.75 0.019
max 0.183
Class width = 0.001
The last class contains
all values ≥ 0.059

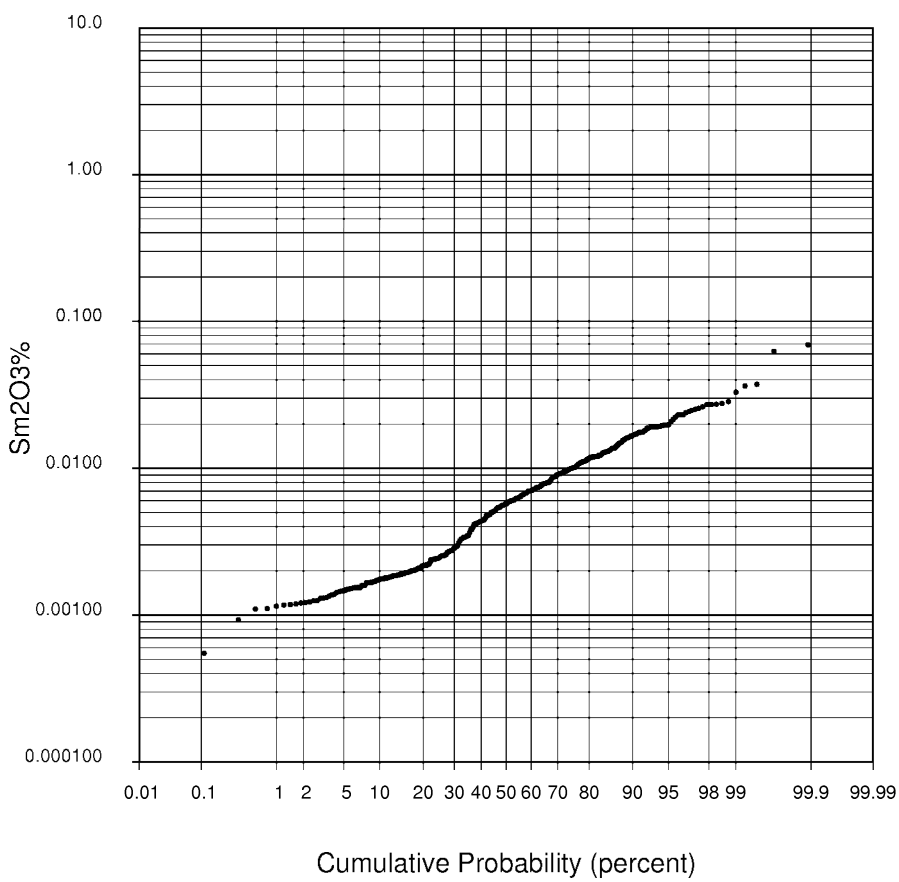


REM:Clay-Howells - 100 Pr2O3% (uncapped)
Pr2O3%
Cumulative Probability (percent)

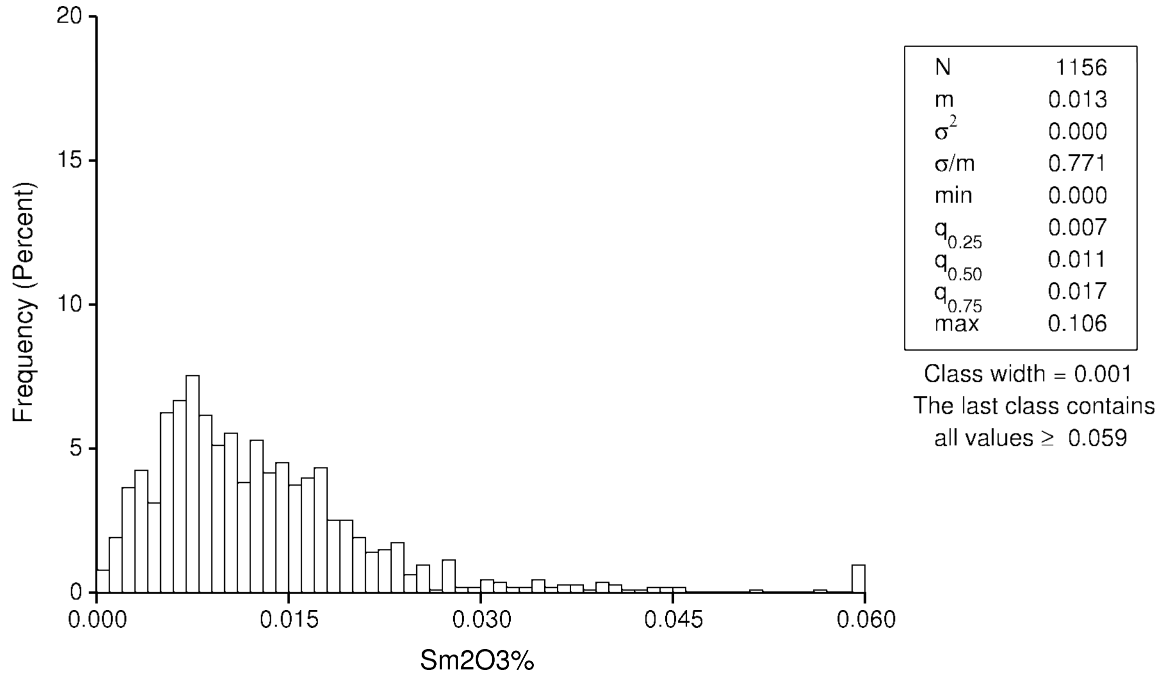
REM:Clay-Howells - 100 Sm2O3% (uncapped)



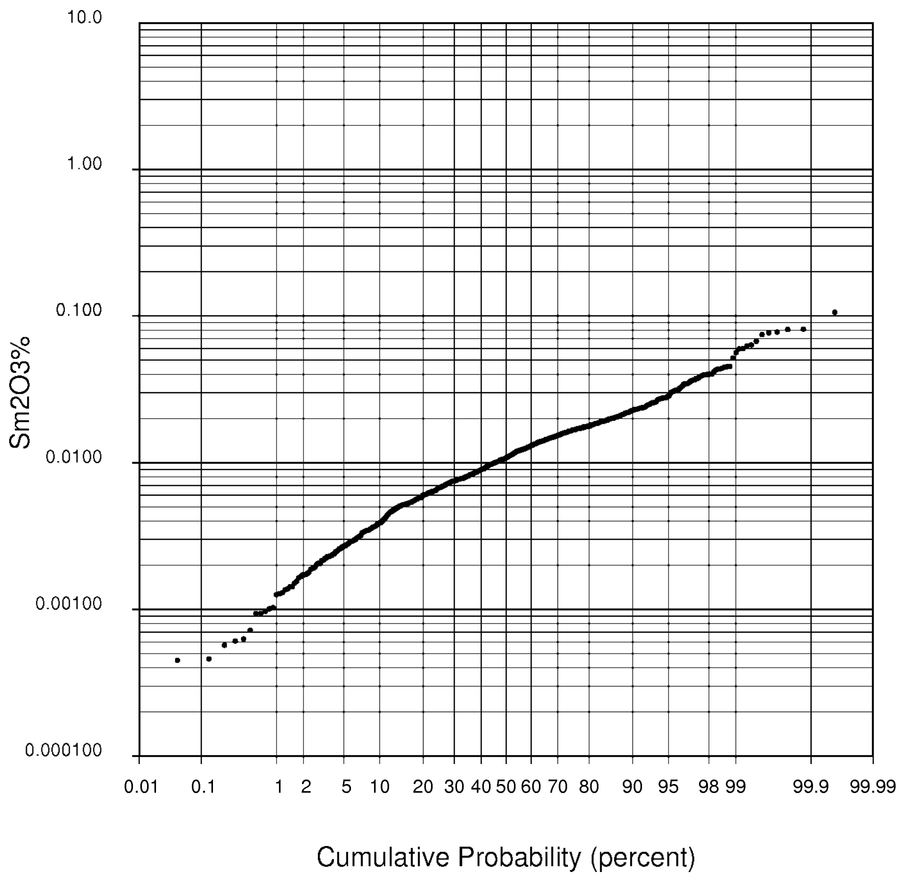
REM:Clay-Howells - 100 Sm2O3% (uncapped)



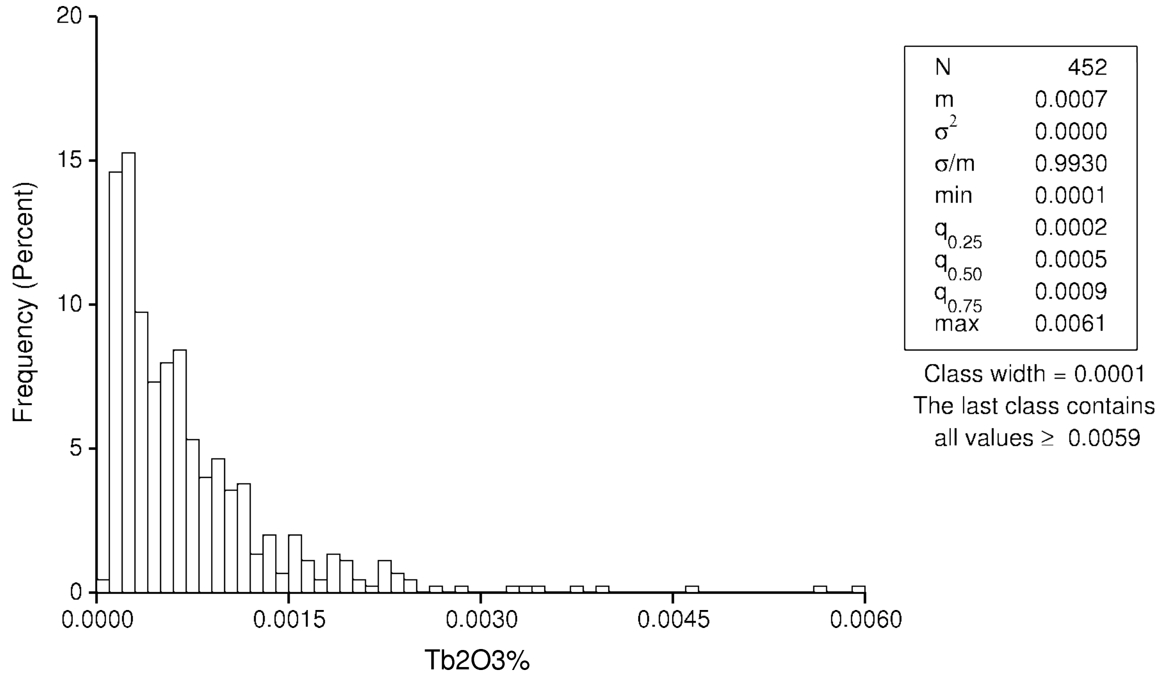
REM:Clay-Howells - 400+500 Sm2O3% (uncapped)



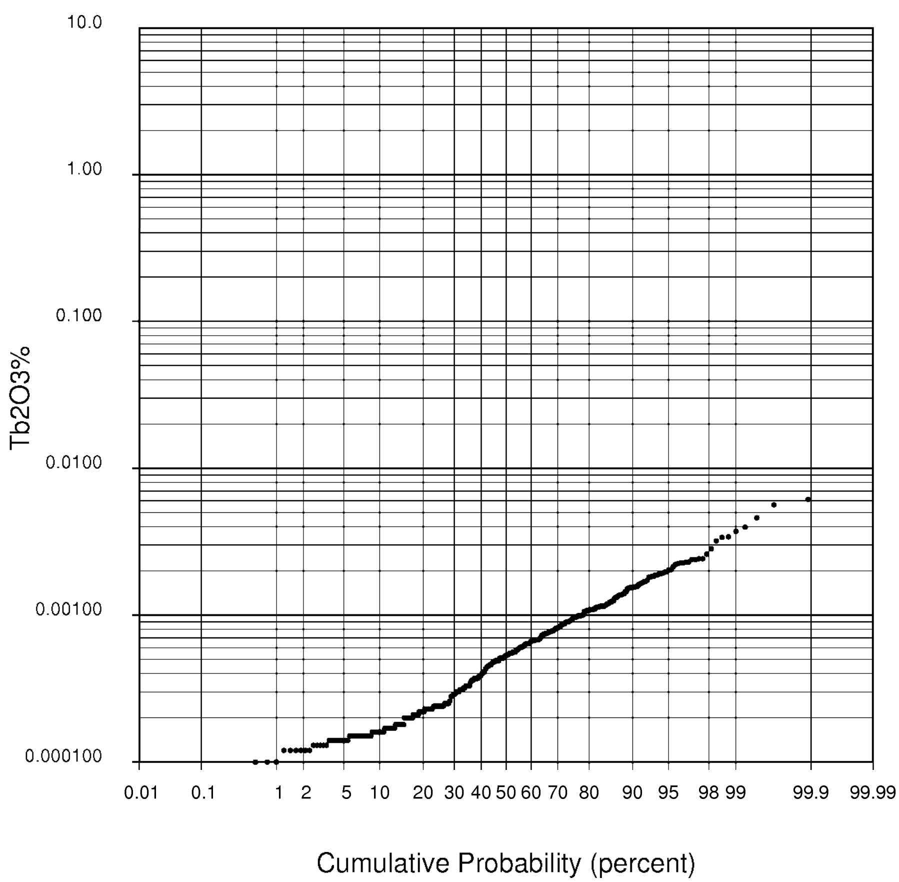
REM:Clay-Howells - 400+500 Sm2O3% (uncapped)

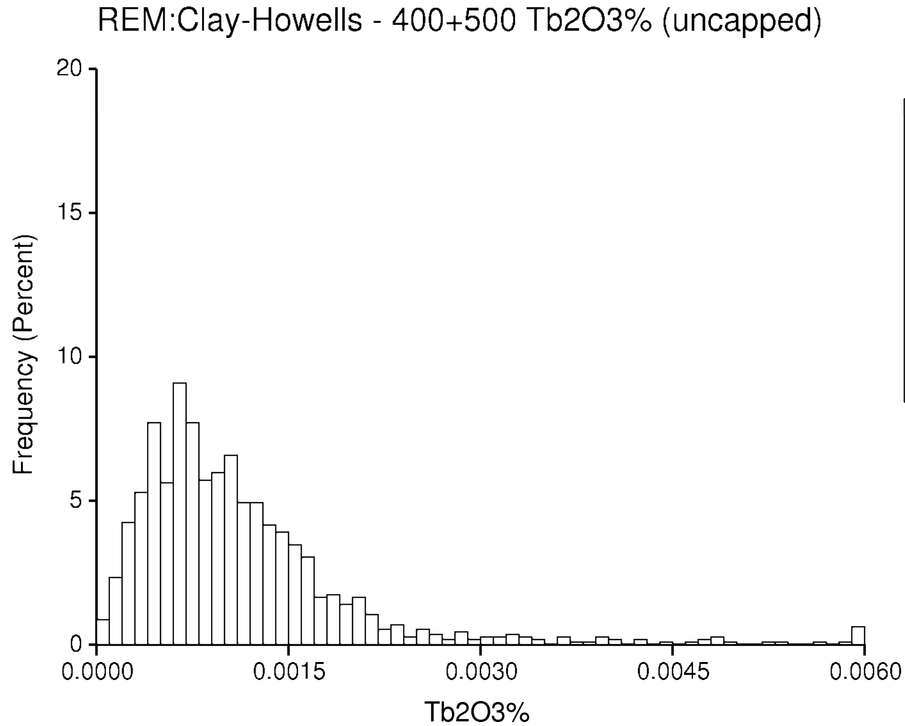


REM:Clay-Howells - 100 Tb2O3% (uncapped)



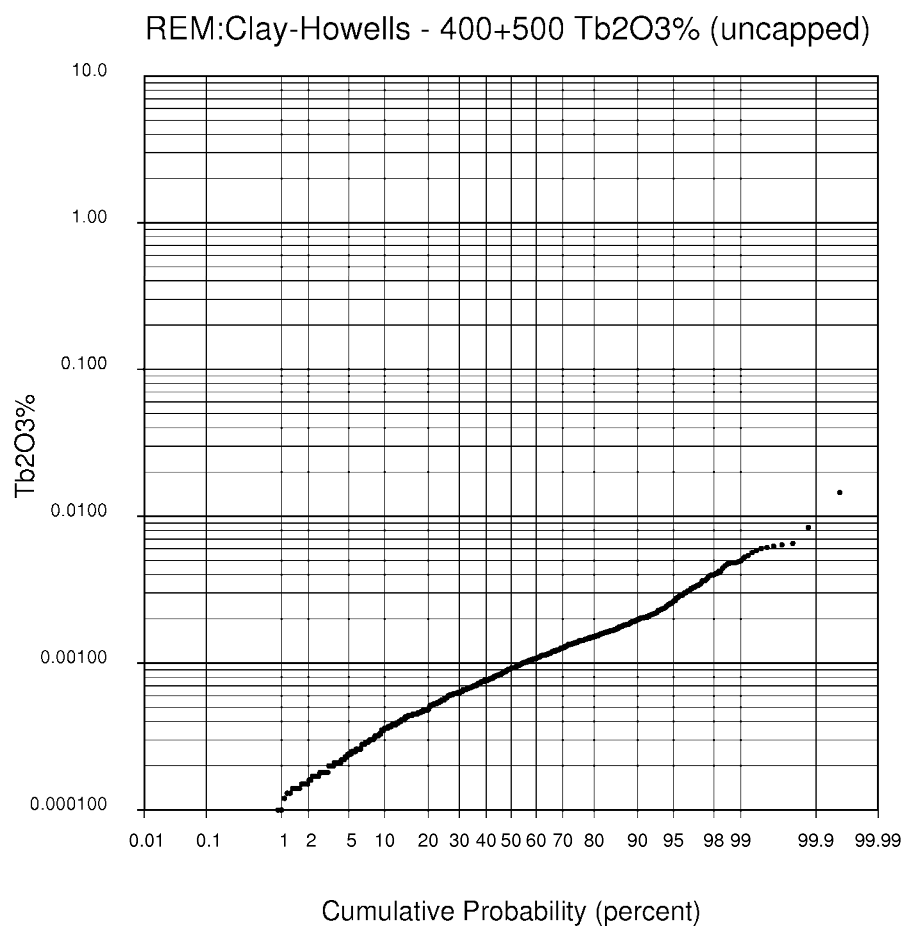
REM:Clay-Howells - 100 Tb2O3% (uncapped)

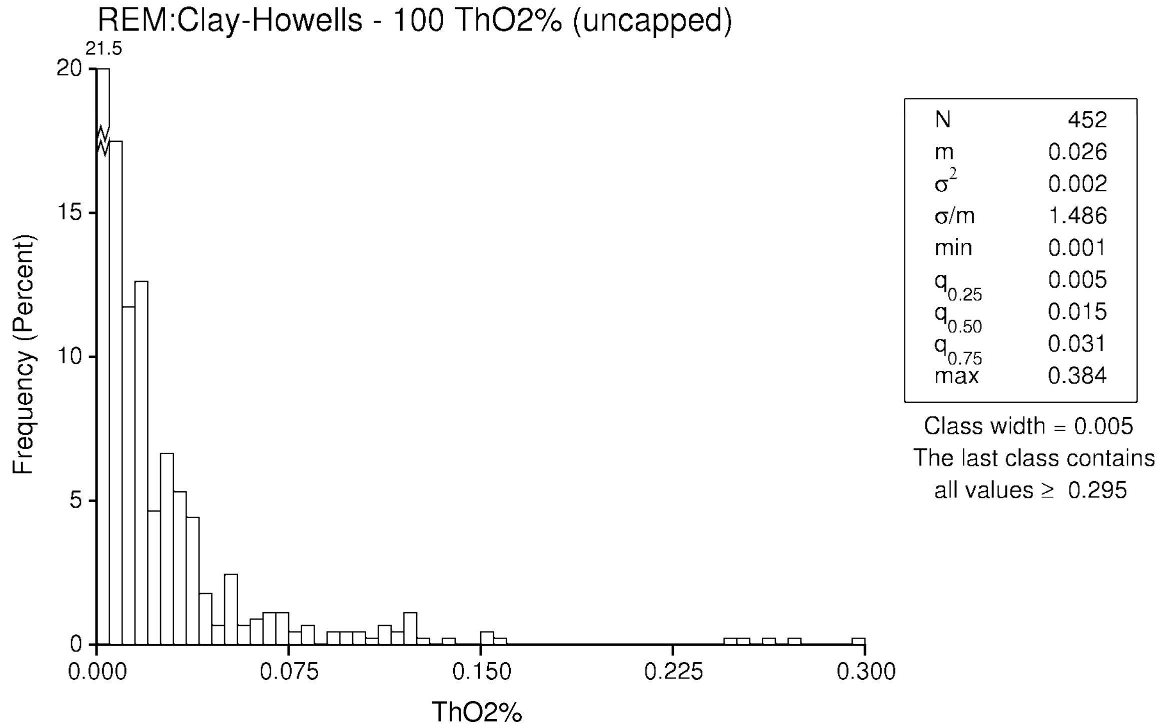


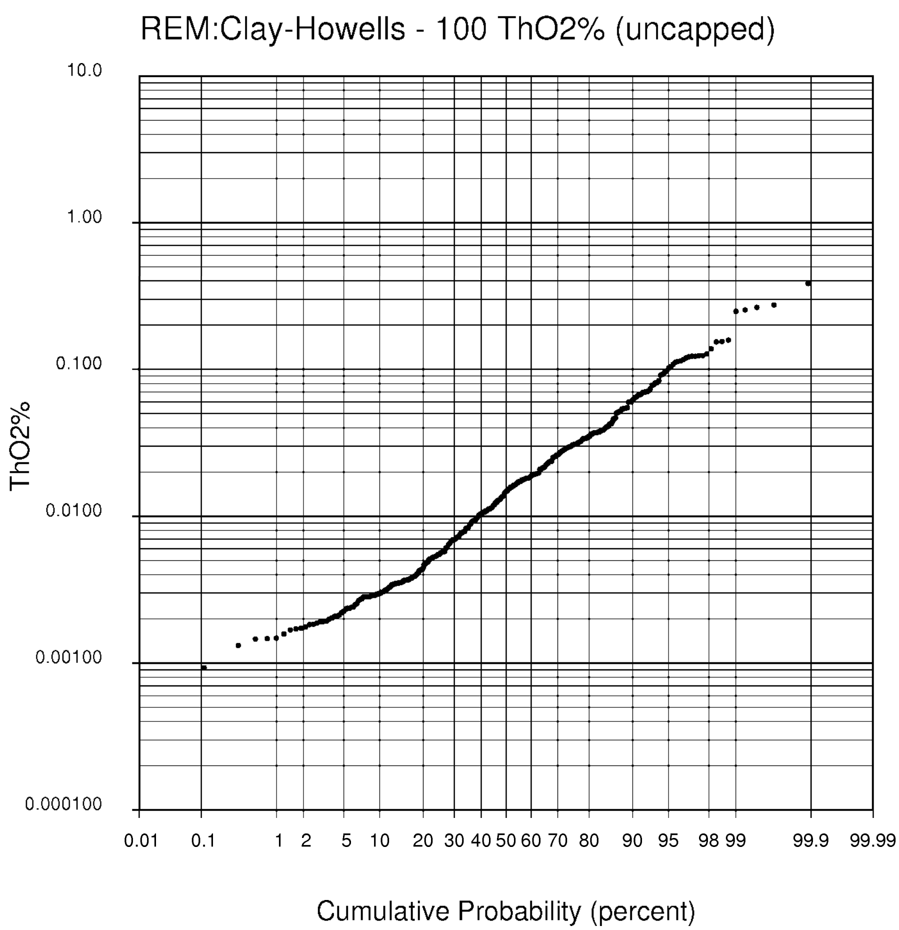


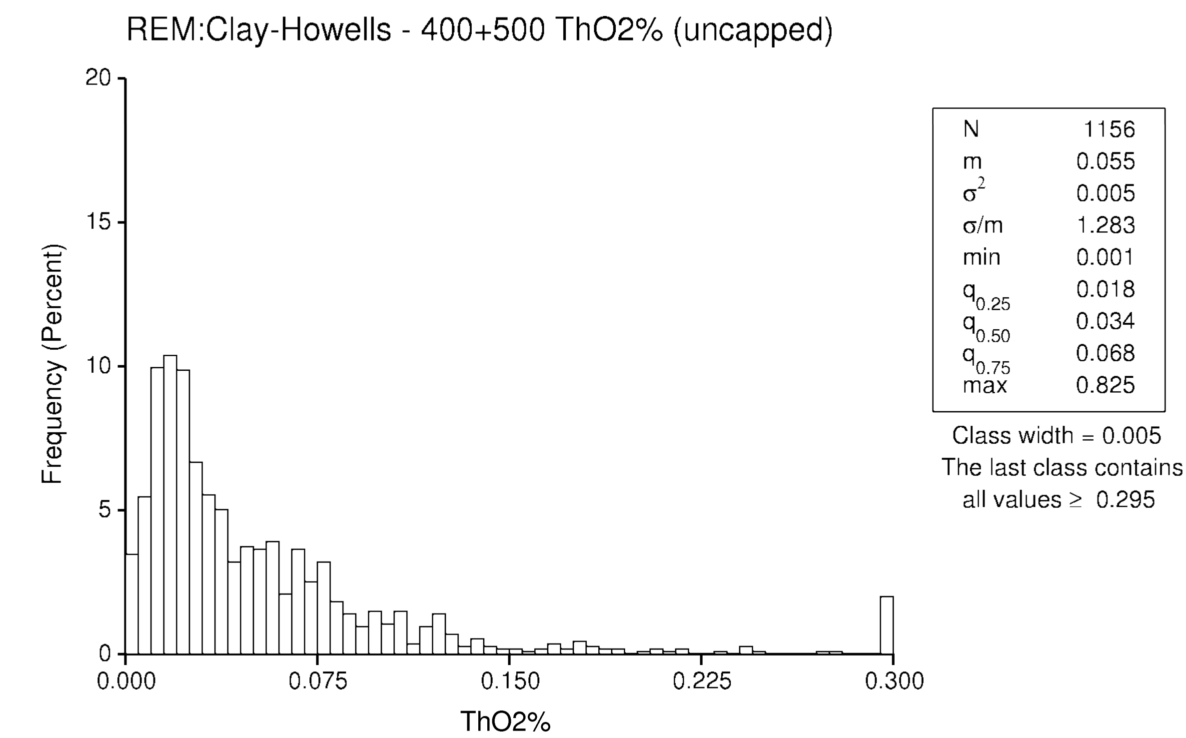
N	1156
m	0.0011
σ^2	0.0000
σ/m	0.8605
min	0.0000
$q_{0.25}$	0.0006
$q_{0.50}$	0.0009
$q_{0.75}$	0.0014
max	0.0145

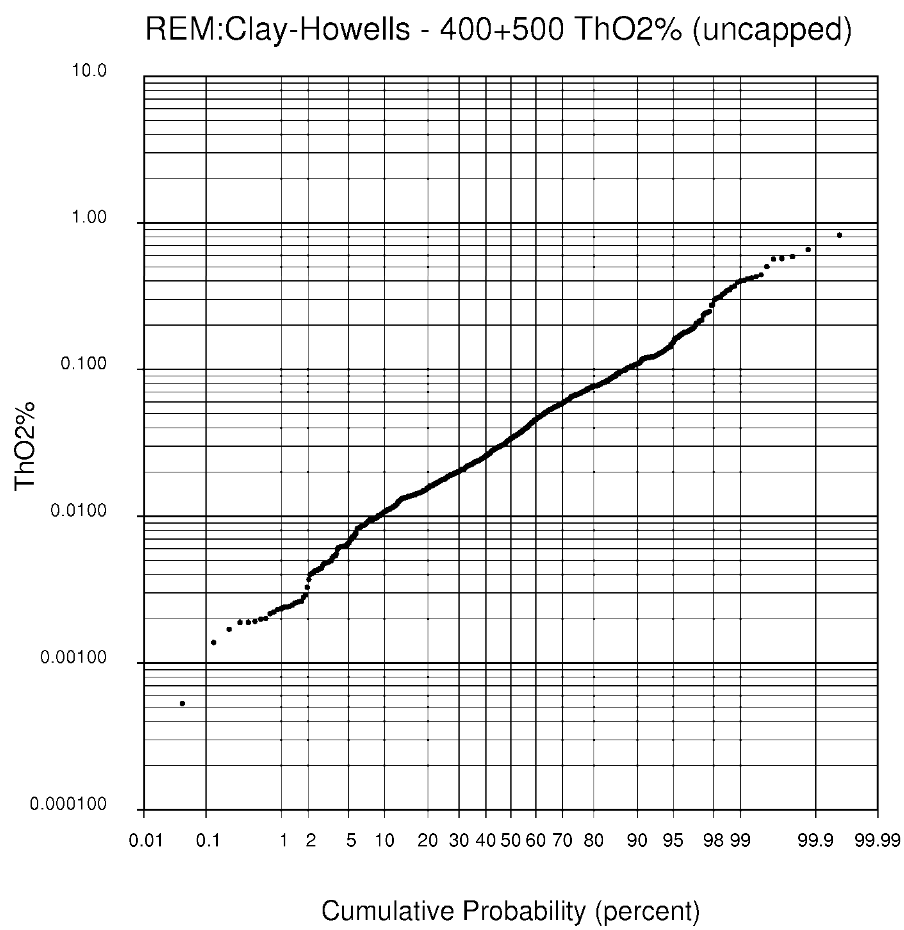
Class width = 0.0001
The last class contains all values ≥ 0.0059

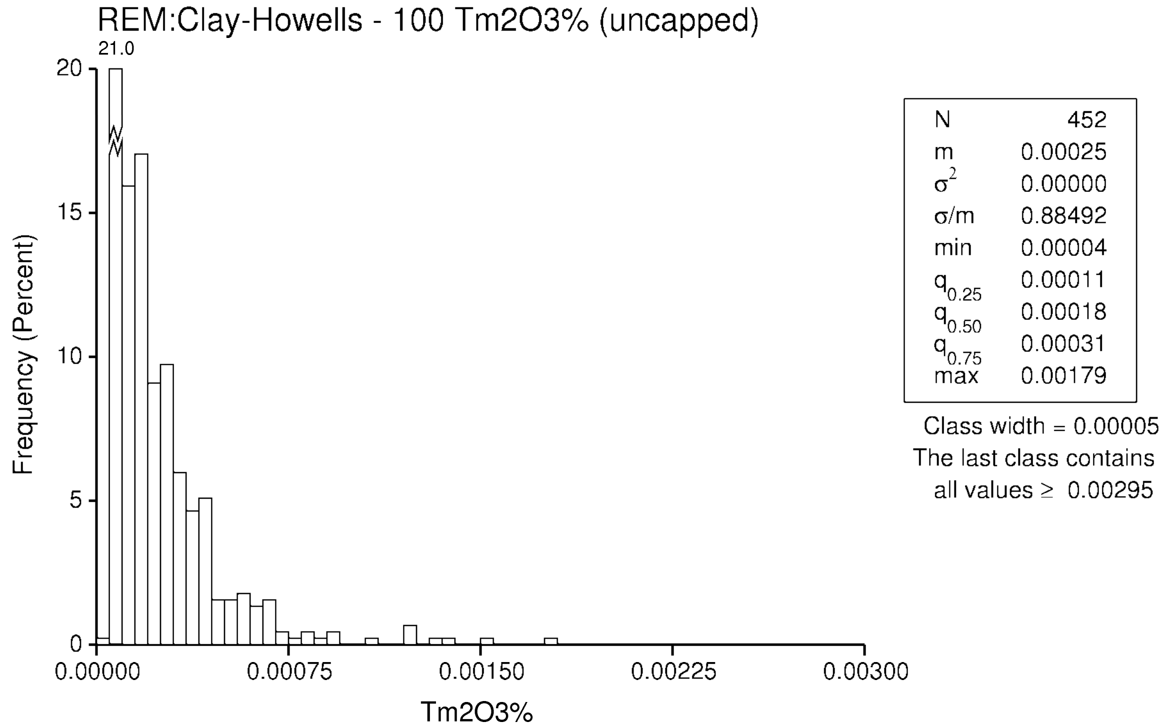


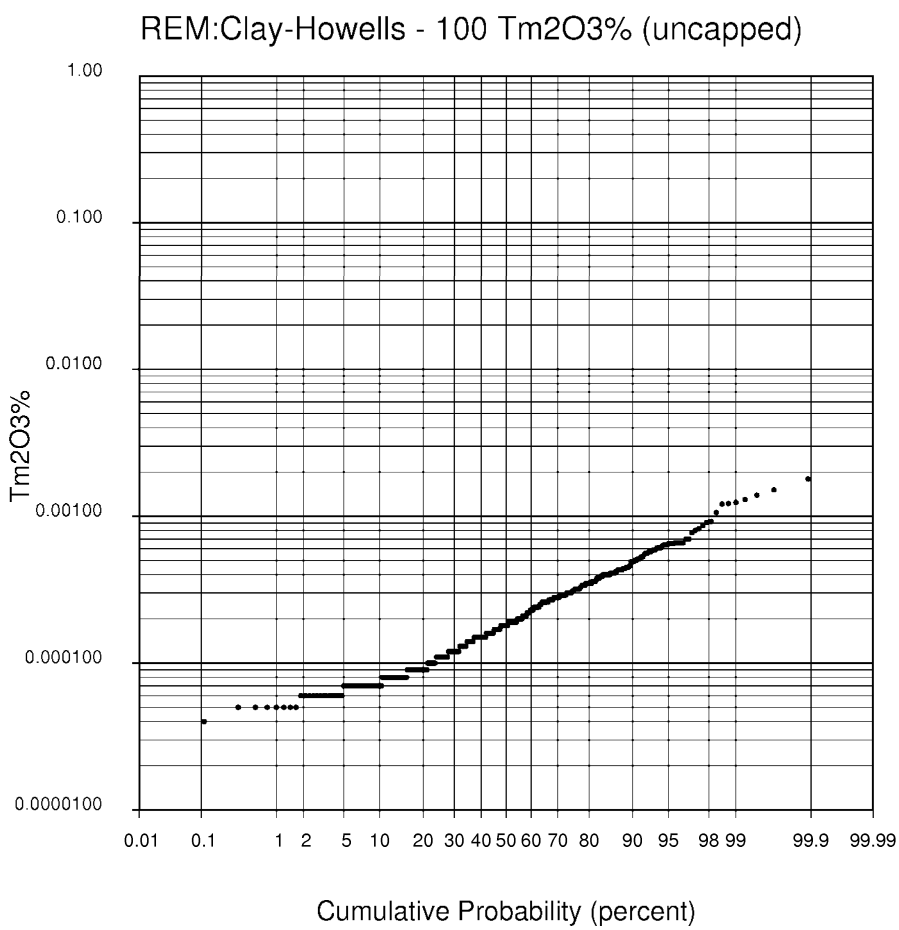

REM:Clay-Howells - 100 ThO2% (uncapped)
21.5
20
15
10
5
0
Frequency (Percent)
0.000
0.075
0.150
0.225
0.300
ThO2%
N 452
m 0.026
σ2 0.002
σ/m 1.486
min 0.001
q0.25 0.005
q0.50 0.015
q0.75 0.031
max 0.384
Class width = 0.005
The last class contains
all values ≥ 0.295

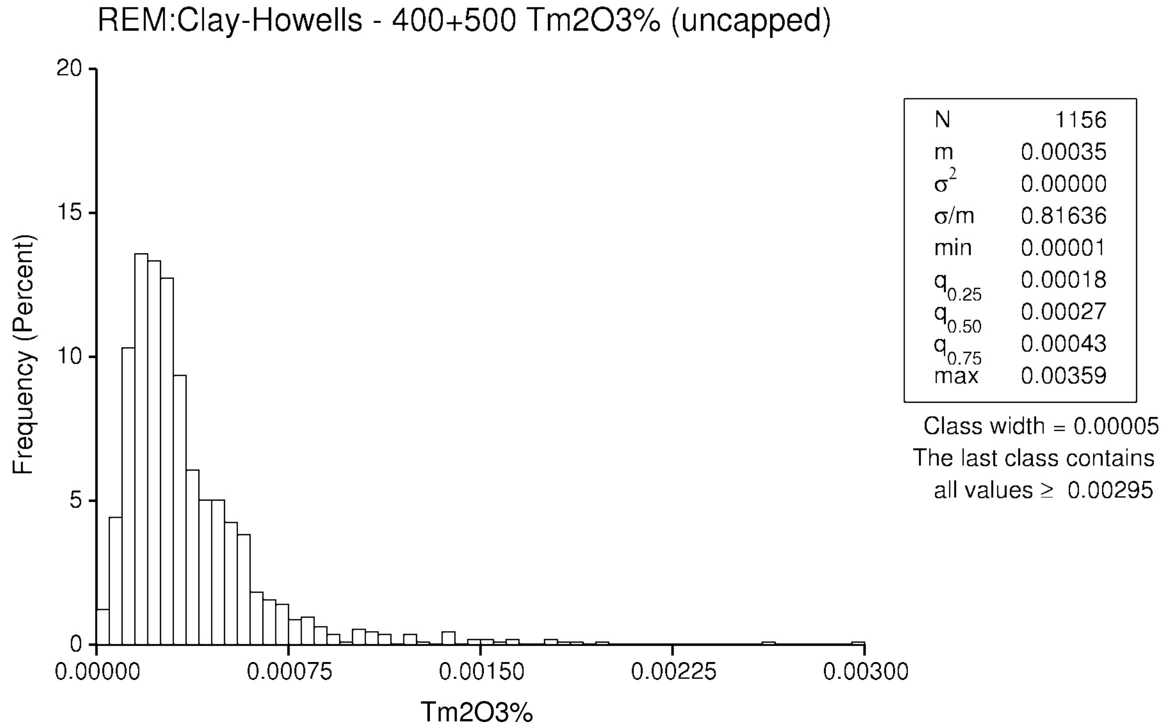

REM:Clay-Howells - 100 ThO2% (uncapped)
10.0
1.00
0.100
0.0100
0.00100
0.000100
ThO2%
0.01
0.1
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.9
99.99
Cumulative Probability (percent)


REM:Clay-Howells - 400+500 ThO2% (uncapped)
Frequency (Percent)
ThO2%
N 1156
m 0.055
σ2 0.005
σ/m 1.283
min 0.001
q0.25 0.018
q0.50 0.034
q0.75 0.068
max 0.825
Class width = 0.005
The last class contains
all values ≥ 0.295

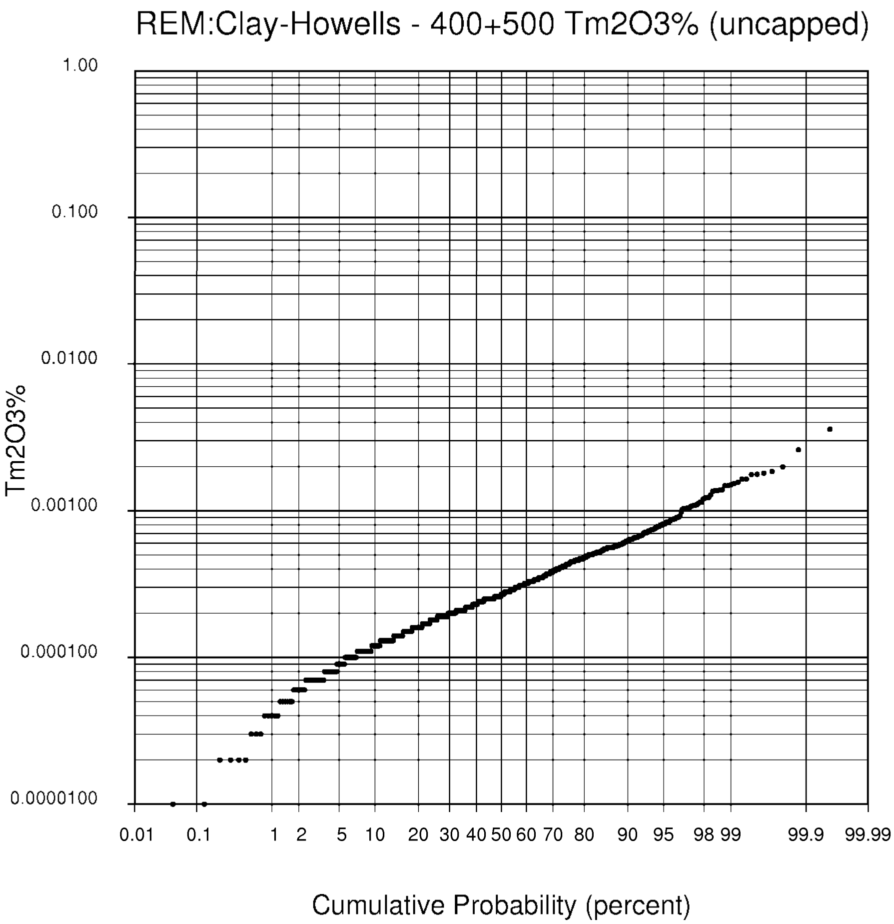

REM:Clay-Howells - 400+500 ThO2% (uncapped)
ThO2%
Cumulative Probability (percent)


REM:Clay-Howells - 100 Tm2O3% (uncapped)
21.0
Frequency (Percent)
Tm2O3%
0.00000
0.00075
0.00150
0.00225
0.00300
N 452
m 0.00025
σ2 0.00000
σ/m 0.88492
min 0.00004
q0.25 0.00011
q0.50 0.00018
q0.75 0.00031
max 0.00179
Class width = 0.00005
The last class contains
all values ≥ 0.00295

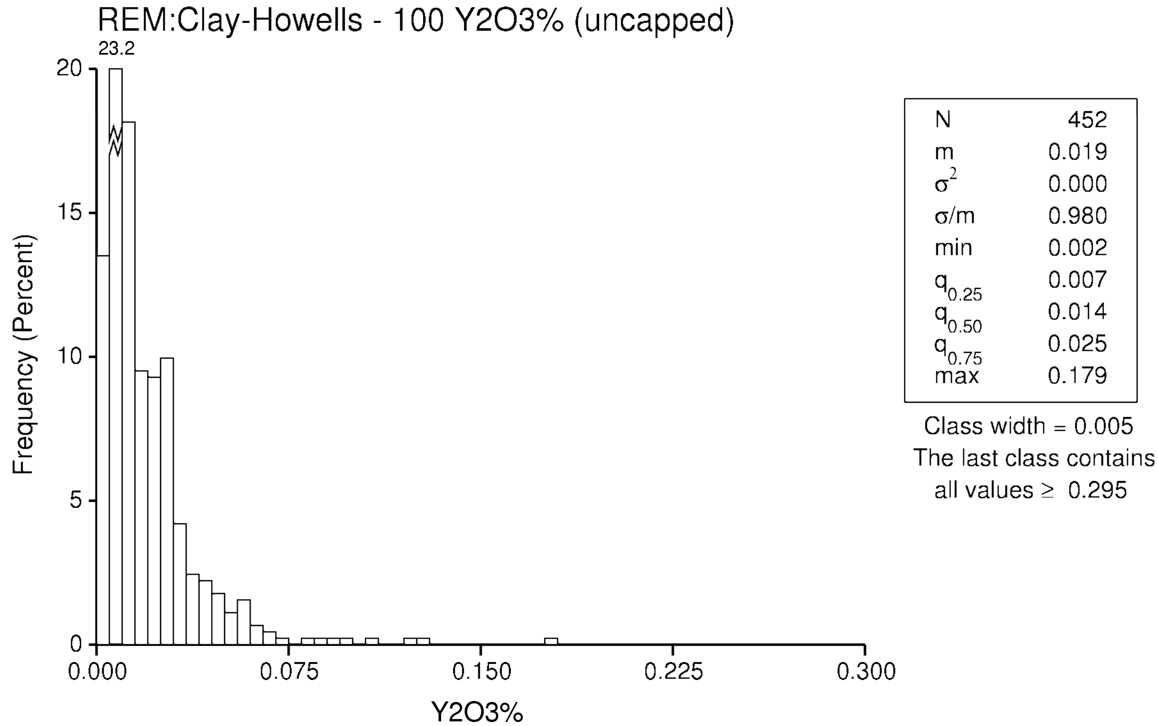

REM:Clay-Howells - 100 Tm2O3% (uncapped)
Tm2O3%
1.00
0.100
0.0100
0.00100
0.000100
0.0000100
Cumulative Probability (percent)

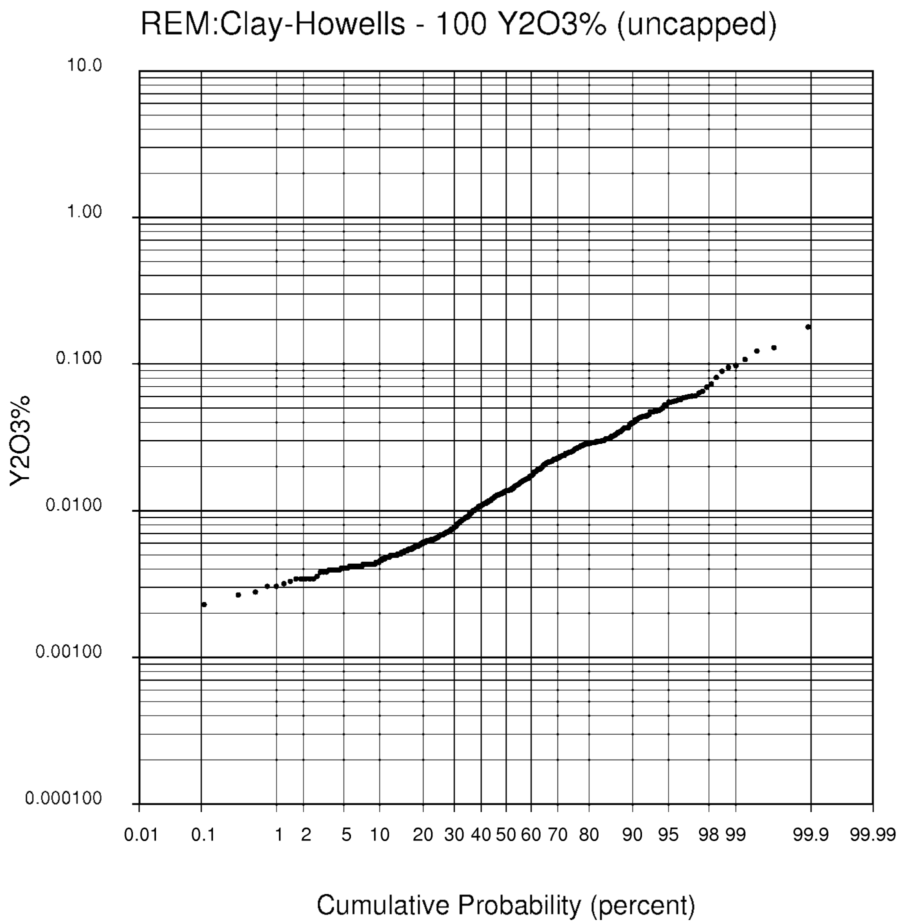


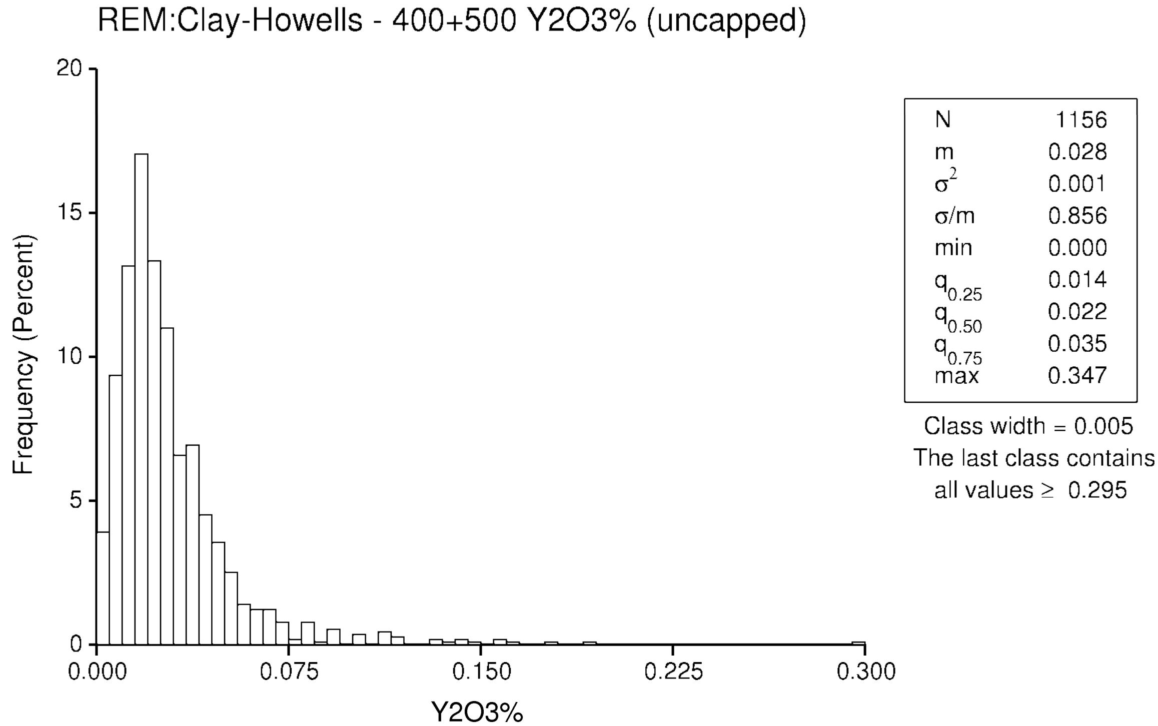
REM:Clay-Howells - 400+500 Tm2O3% (uncapped)
Frequency (Percent)
Tm2O3%
N 1156
m 0.00035
σ2 0.00000
σ/m 0.81636
min 0.00001
q0.25 0.00018
q0.50 0.00027
q0.75 0.00043
max 0.00359
Class width = 0.00005
The last class contains all values ≥ 0.00295



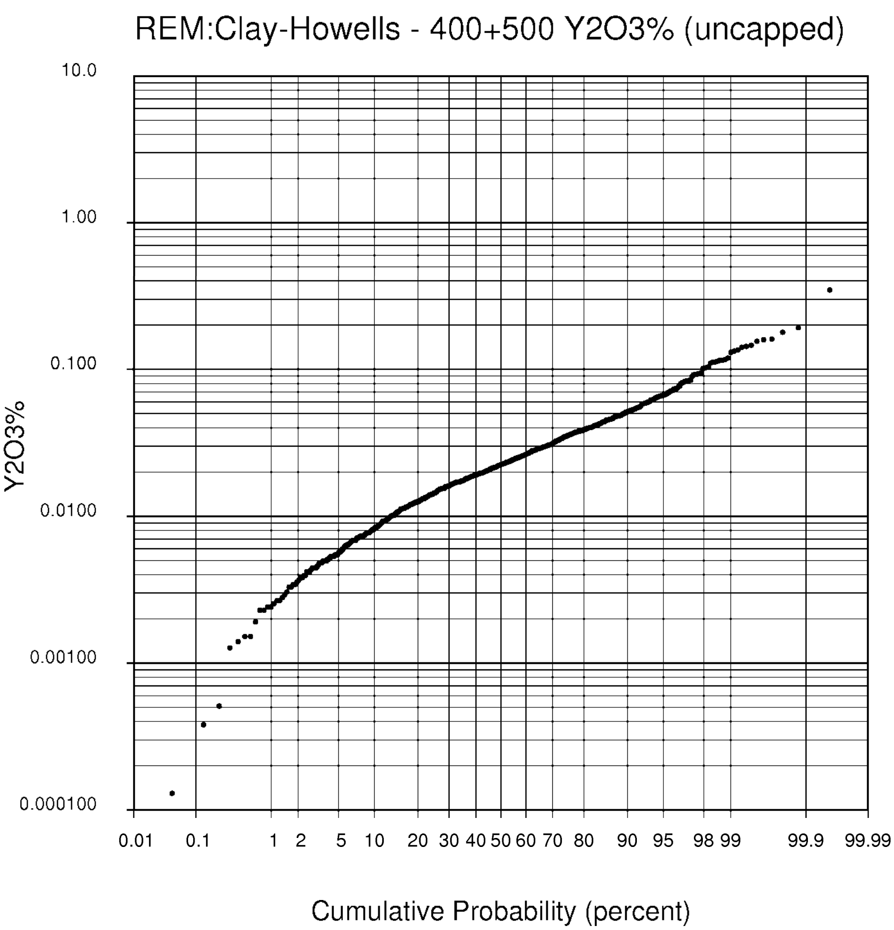
REM:Clay-Howells - 400+500 Tm2O3% (uncapped)
Tm2O3%
Cumulative Probability (percent)


REM:Clay-Howells - 100 Y2O3% (uncapped)
23.2
Frequency (Percent)
Y2O3%
0.000
0.075
0.150
0.225
0.300
N 452
m 0.019
σ^2 0.000
σ/m 0.980
min 0.002
$q_{0.25}$ 0.007
$q_{0.50}$ 0.014
$q_{0.75}$ 0.025
max 0.179
Class width = 0.005
The last class contains
all values ≥ 0.295

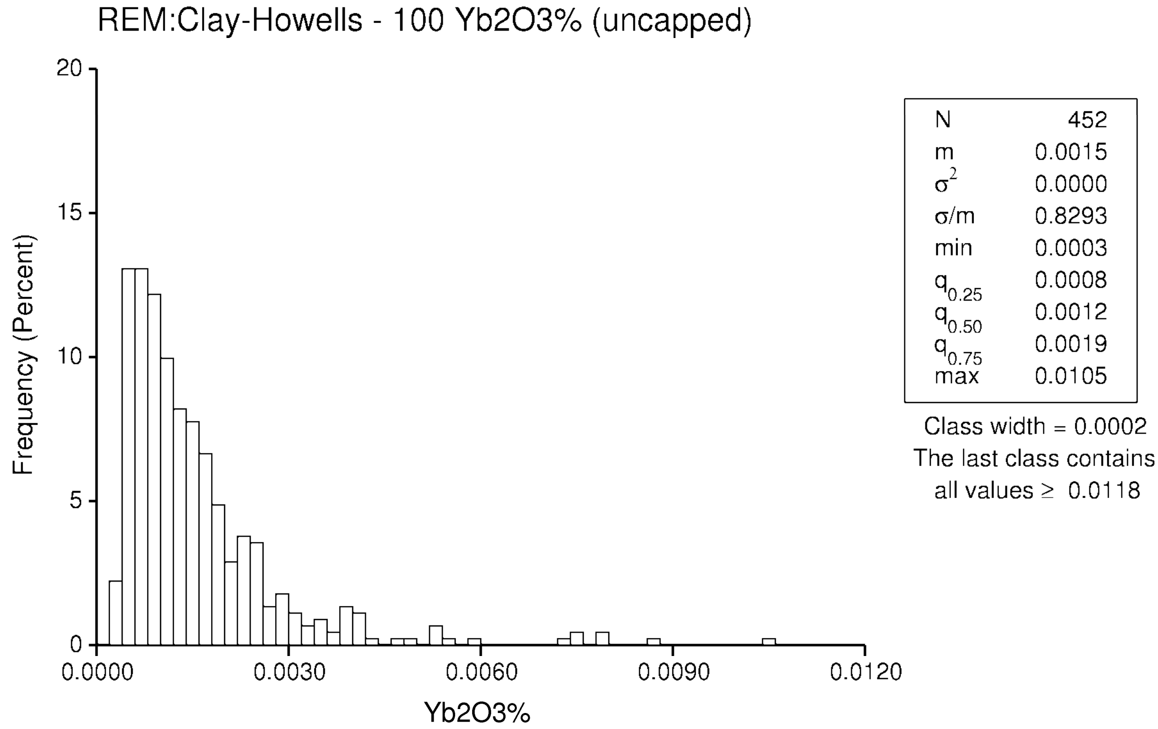

REM:Clay-Howells - 100 Y2O3% (uncapped)
Y2O3%
10.0
1.00
0.100
0.0100
0.00100
0.000100
0.01 0.1 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.9 99.99
Cumulative Probability (percent)

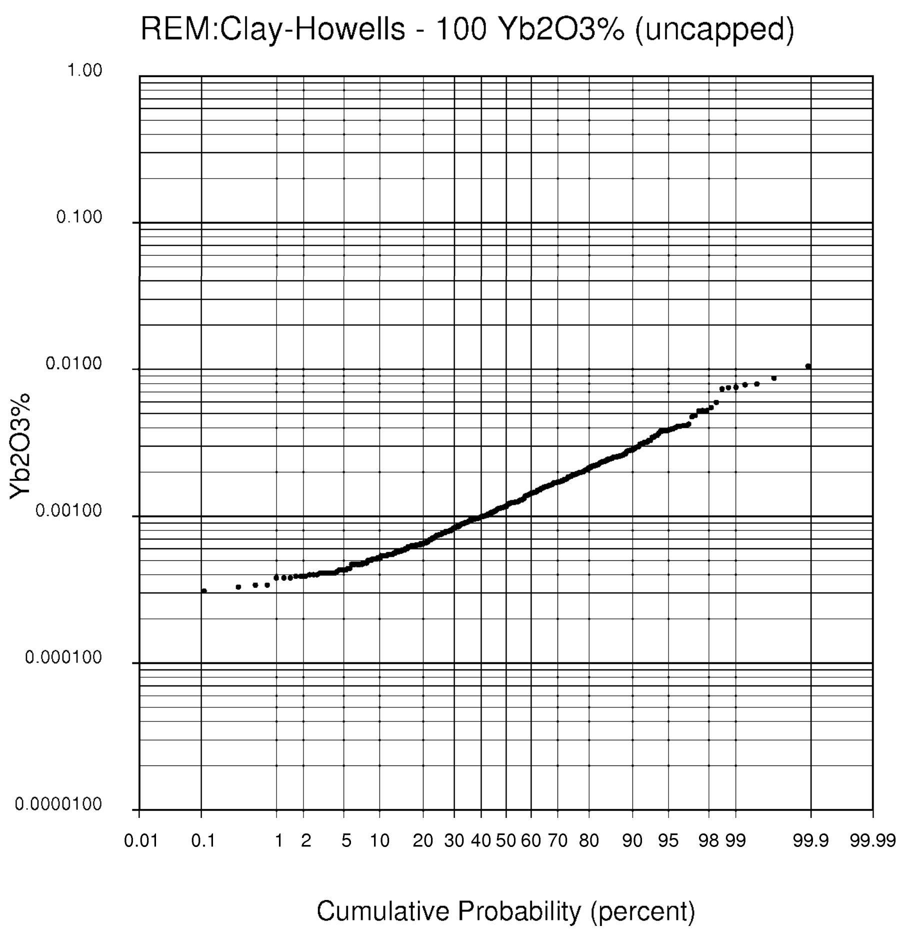


REM:Clay-Howells - 400+500 Y2O3% (uncapped)
Frequency (Percent)
Y2O3%
N 1156
m 0.028
σ2 0.001
σ/m 0.856
min 0.000
q0.25 0.014
q0.50 0.022
q0.75 0.035
max 0.347
Class width = 0.005
The last class contains
all values ≥ 0.295

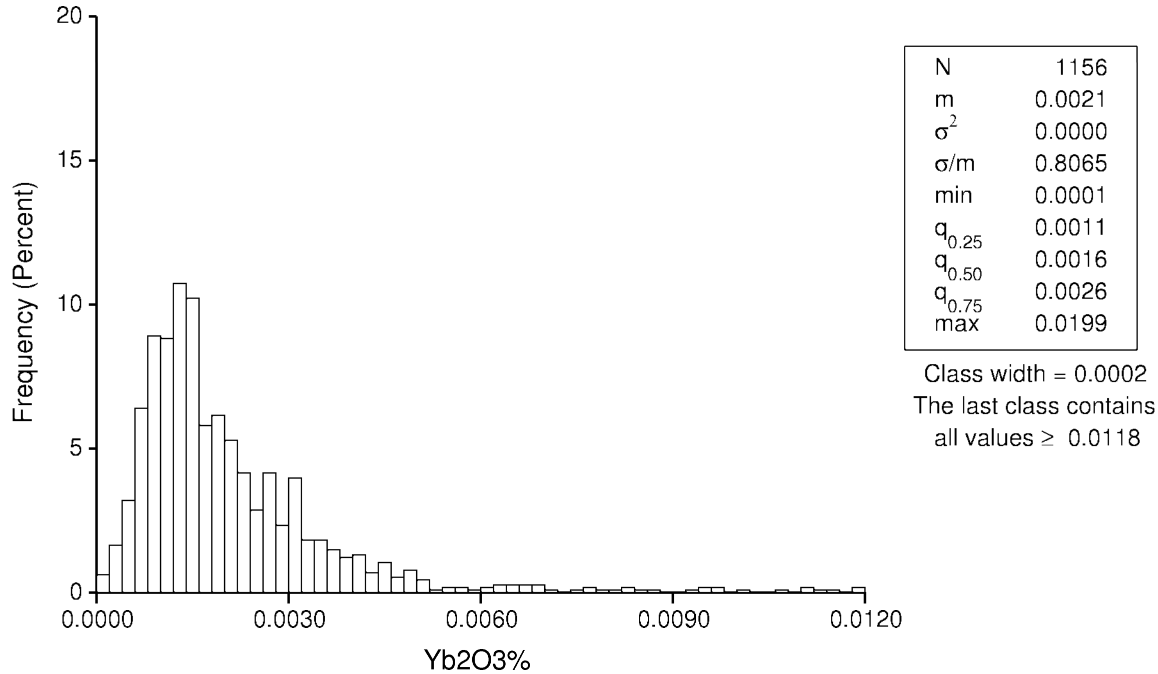


REM:Clay-Howells - 400+500 Y2O3% (uncapped)
Y2O3%
Cumulative Probability (percent)

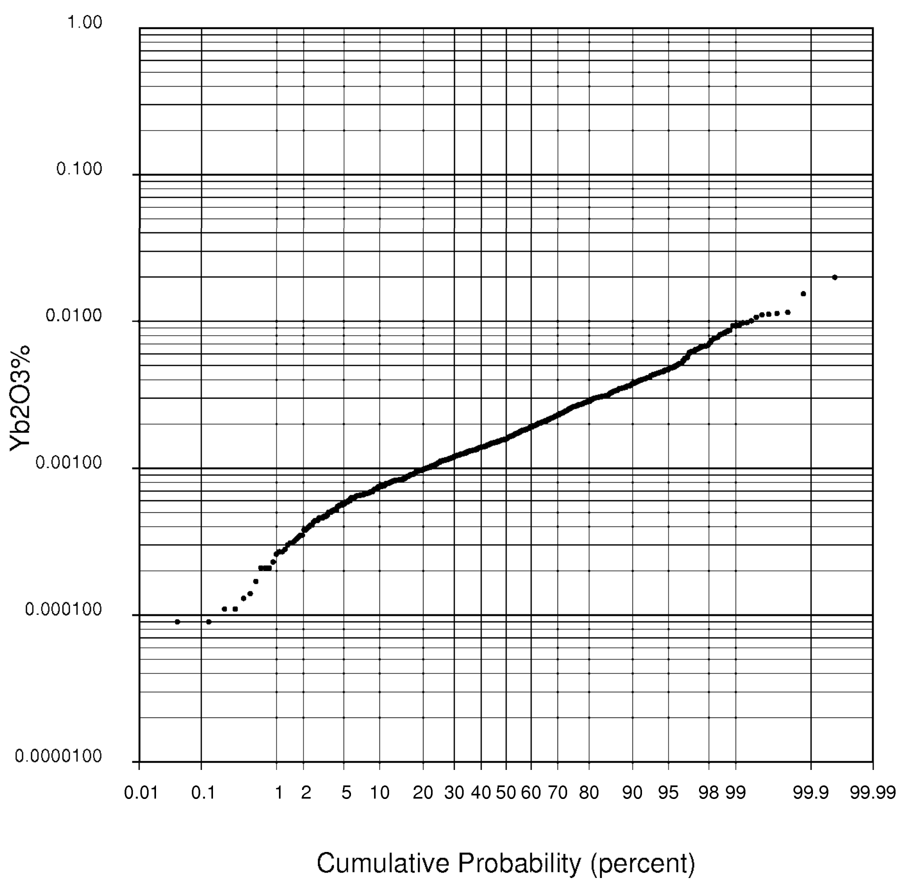

REM:Clay-Howells - 100 Yb2O3% (uncapped)
Frequency (Percent)
20
15
10
5
0
0.0000
0.0030
0.0060
0.0090
0.0120
Yb2O3%
N 452
m 0.0015
σ2 0.0000
σ/m 0.8293
min 0.0003
q0.25 0.0008
q0.50 0.0012
q0.75 0.0019
max 0.0105
Class width = 0.0002
The last class contains
all values ≥ 0.0118


REM:Clay-Howells - 100 Yb2O3% (uncapped)
Yb2O3%
1.00
0.100
0.0100
0.00100
0.000100
0.0000100
0.01 0.1 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.9 99.99
Cumulative Probability (percent)

REM:Clay-Howells - 400+500 Yb2O3% (uncapped)



REM:Clay-Howells - 400+500 Yb2O3% (uncapped)



APPENDIX D

STATISTICS ON CAPPED DATA

Descriptive Statistics

All lithologies

	NB2O5_C(%)	FE2O3_C(%)	MNO_C(%)	THO2_C(%)	LA2O3_C(%)	CE2O3_C(%)	PR2O3_C(%)	ND2O3_C(%)	SM2O3_C(%)	EU2O3_C(%)	GD2O3_C(%)	TB2O3_C(%)	DY2O3_C(%)	HO2O3_C(%)	ER2O3_C(%)	TM2O3_C(%)	YB2O3_C(%)	LU2O3_C(%)	Y2O3_C(%)
Valid cases	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608
Mean	0.122	34.518	1.741	0.047	0.113	0.203	0.021	0.074	0.011	0.003	0.008	0.001	0.005	0.001	0.002	0.000	0.002	0.000	0.026
Std. error of mean	0.003	0.590	0.024	0.002	0.003	0.004	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Variance	0.012	560.048	0.962	0.004	0.013	0.027	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Std. Deviation	0.108	23.665	0.981	0.064	0.113	0.164	0.016	0.055	0.009	0.002	0.007	0.001	0.004	0.001	0.002	0.000	0.002	0.000	0.022
Variation Coefficient	0.879	0.686	0.563	1.376	0.998	0.809	0.758	0.741	0.819	0.815	0.841	0.856	0.846	0.836	0.824	0.847	0.802	0.778	0.865
rel. V.coefficient(%)	2.193	1.710	1.405	3.432	2.488	2.016	1.890	1.848	2.042	2.033	2.097	2.136	2.110	2.085	2.056	2.113	1.999	1.940	2.157
Skew	3.454	0.675	0.469	4.785	4.428	2.227	1.994	1.801	2.689	2.375	2.618	2.713	2.634	2.629	2.601	3.447	2.768	2.846	2.857
Kurtosis	19.234	-0.685	-0.397	34.372	31.631	7.711	6.603	5.456	12.918	9.560	11.014	10.987	10.205	10.375	10.018	22.458	11.301	11.897	12.821
Minimum	0.002	1.650	0.046	0.001	0.003	0.007	0.001	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Maximum	1.000	94.750	5.535	0.825	1.200	1.100	0.110	0.360	0.082	0.020	0.056	0.007	0.032	0.006	0.015	0.004	0.013	0.002	0.200
Range	0.999	93.100	5.489	0.825	1.197	1.093	0.109	0.357	0.082	0.020	0.056	0.007	0.032	0.006	0.015	0.004	0.013	0.002	0.200
1st percentile	0.014	4.823	0.192	0.002	0.010	0.019	0.002	0.007	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.003
5th percentile	0.022	6.745	0.319	0.003	0.017	0.030	0.003	0.012	0.002	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.004
10th percentile	0.031	8.310	0.475	0.006	0.023	0.042	0.005	0.016	0.002	0.001	0.002	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.006
25th percentile	0.060	14.990	0.968	0.014	0.049	0.096	0.010	0.035	0.005	0.001	0.004	0.000	0.002	0.000	0.001	0.000	0.001	0.000	0.012
Median	0.098	28.085	1.636	0.027	0.090	0.166	0.018	0.062	0.009	0.002	0.006	0.001	0.004	0.001	0.002	0.000	0.001	0.000	0.020
75th percentile	0.151	53.050	2.438	0.058	0.140	0.266	0.028	0.100	0.015	0.004	0.010	0.001	0.006	0.001	0.003	0.000	0.002	0.000	0.032
90th percentile	0.229	70.908	3.143	0.102	0.214	0.391	0.040	0.135	0.021	0.006	0.014	0.002	0.009	0.002	0.004	0.001	0.004	0.001	0.048
95th percentile	0.296	79.742	3.479	0.133	0.277	0.492	0.050	0.170	0.027	0.007	0.018	0.002	0.012	0.002	0.006	0.001	0.005	0.001	0.064
99th percentile	0.560	90.004	4.123	0.362	0.549	0.969	0.085	0.285	0.045	0.013	0.037	0.005	0.024	0.004	0.011	0.001	0.009	0.001	0.119
Geom. mean	0.092	26.232	1.413	0.026	0.081	0.150	0.016	0.055	0.008	0.002	0.006	0.001	0.004	0.001	0.002	0.000	0.002	0.000	0.019

Descriptive Statistics [Subset]

Syenite Rock Codes 100 101 102

	NB2O5_C(%)	FE2O3_C(%)	MNO_C(%)	THO2_C(%)	LA2O3_C(%)	CE2O3_C(%)	PR2O3_C(%)	ND2O3_C(%)	SM2O3_C(%)	EU2O3_C(%)	GD2O3_C(%)	TB2O3_C(%)	DY2O3_C(%)	HO2O3_C(%)	ER2O3_C(%)	TM2O3_C(%)	YB2O3_C(%)	LU2O3_C(%)	Y2O3_C(%)
Valid cases	452	452	452	452	452	452	452	452	452	452	452	452	452	452	452	452	452	452	452
Mean	0.093	20.684	1.092	0.026	0.072	0.130	0.014	0.048	0.008	0.002	0.005	0.001	0.004	0.001	0.002	0.000	0.002	0.000	0.019
Std. error of mean	0.004	0.798	0.033	0.002	0.003	0.005	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Variance	0.007	287.517	0.499	0.002	0.004	0.013	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Std. Deviation	0.083	16.956	0.707	0.039	0.065	0.112	0.012	0.041	0.007	0.002	0.005	0.001	0.004	0.001	0.002	0.000	0.001	0.000	0.019
Variation Coefficient	0.893	0.820	0.647	1.487	0.897	0.864	0.838	0.849	0.874	0.927	0.923	0.994	0.978	0.957	0.931	0.887	0.830	0.765	0.981
rel. V.coefficient(%)	4.199	3.856	3.044	6.996	4.221	4.063	3.940	3.995	4.109	4.359	4.342	4.676	4.601	4.503	4.380	4.171	3.906	3.600	4.615
Skew	2.608	1.612	0.706	4.281	2.053	1.625	1.547	1.564	1.796	1.961	2.150	3.045	2.977	2.951	2.921	2.874	2.897	2.945	3.202
Kurtosis	10.901	2.134	-0.076	25.563	5.710	2.918	2.470	2.493	3.925	5.023	6.160	14.323	13.279	12.991	12.577	11.860	11.892	12.645	16.600
Minimum	0.009	2.590	0.057	0.001	0.004	0.008	0.001	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
Maximum	0.727	82.130	3.521	0.384	0.400	0.600	0.060	0.210	0.038	0.011	0.030	0.006	0.030	0.005	0.014	0.002	0.011	0.002	0.179
Range	0.718	79.540	3.464	0.383	0.396	0.592	0.059	0.207	0.037	0.011	0.030	0.006	0.030	0.005	0.014	0.002	0.010	0.001	0.176
1st percentile	0.012	3.851	0.105	0.001	0.010	0.018	0.002	0.007	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.003
5th percentile	0.019	5.729	0.253	0.002	0.014	0.025	0.003	0.010	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.004
10th percentile	0.022	6.591	0.292	0.003	0.016	0.029	0.003	0.011	0.002	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.004
25th percentile	0.037	8.565	0.465	0.006	0.025	0.043	0.005	0.016	0.002	0.001	0.002	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.007
Median	0.070	14.010	0.996	0.015	0.053	0.096	0.011	0.036	0.006	0.001	0.004	0.001	0.003	0.000	0.001	0.000	0.001	0.000	0.014
75th percentile	0.116	26.893	1.583	0.030	0.097	0.182	0.019	0.067	0.010	0.003	0.007	0.001	0.005	0.001	0.002	0.000	0.002	0.000	0.026
90th percentile	0.192	45.241	2.043	0.062	0.158	0.287	0.030	0.106	0.017	0.004	0.012	0.002	0.008	0.001	0.004	0.000	0.003	0.000	0.040
95th percentile	0.268	61.432	2.311	0.103	0.198	0.349	0.038	0.134	0.020	0.006	0.015	0.002	0.010	0.002	0.005	0.001	0.004	0.001	0.055
99th percentile	0.399	77.213	3.062	0.251	0.356	0.545	0.055	0.200	0.035	0.009	0.027	0.004	0.020	0.003	0.009	0.001	0.008	0.001	0.102
Geom. mean	0.068	15.623	0.849	0.014	0.051	0.091	0.010	0.034	0.005	0.001	0.004	0.001	0.003	0.000	0.001	0.000	0.001	0.000	0.014

Descriptive Statistics [Subset]

Carbonatite Rock Codes 401, 402, 403, 404, 405 and Magnetite Rock Code 500

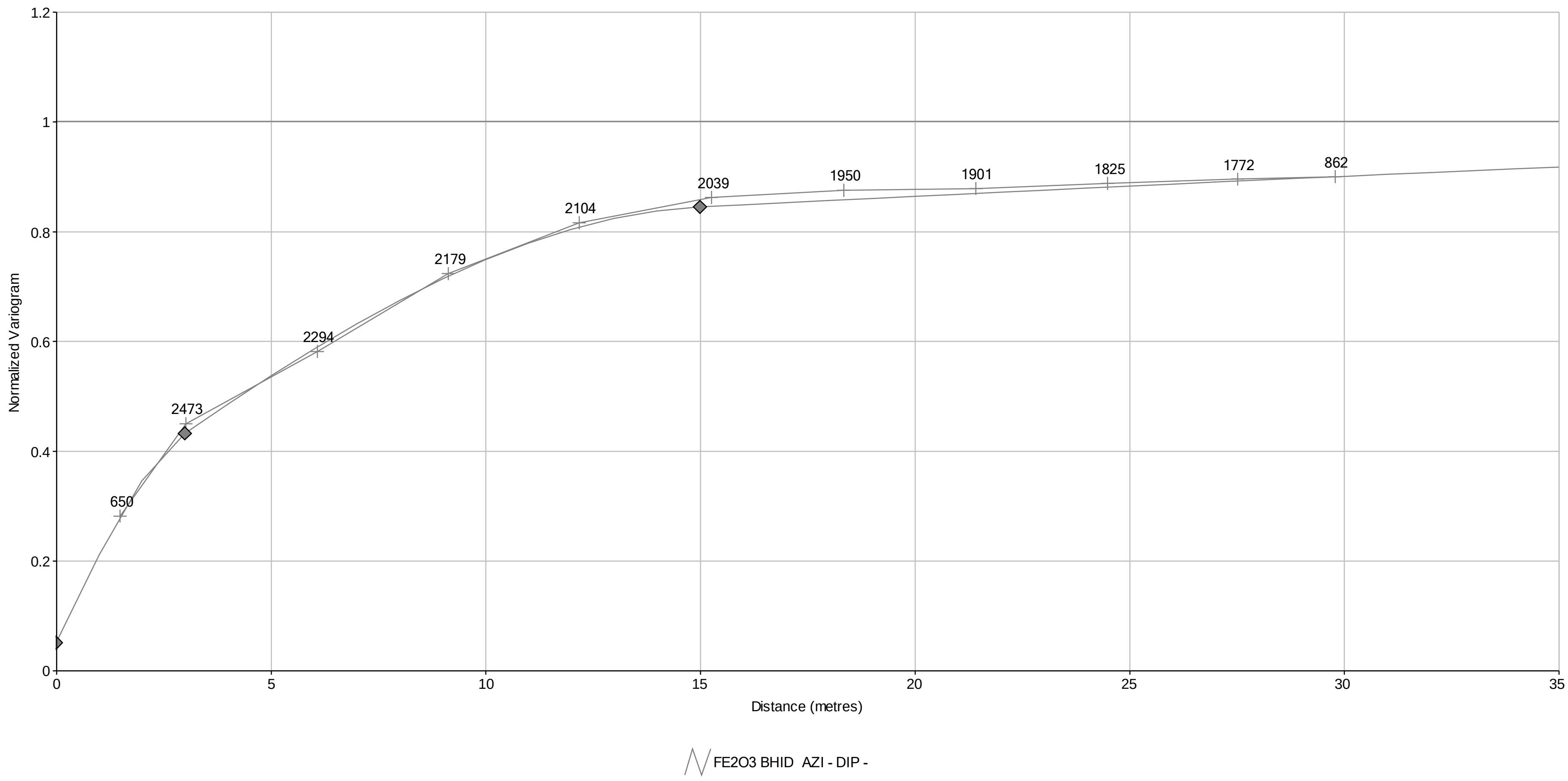
	NB2O5_C(%)	FE2O3_C(%)	MNO_C(%)	THO2_C(%)	LA2O3_C(%)	CE2O3_C(%)	PR2O3_C(%)	ND2O3_C(%)	SM2O3_C(%)	EU2O3_C(%)	GD2O3_C(%)	TB2O3_C(%)	DY2O3_C(%)	HO2O3_C(%)	ER2O3_C(%)	TM2O3_C(%)	YB2O3_C(%)	LU2O3_C(%)	Y2O3_C(%)
Valid cases	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156
Mean	0.134	39.927	1.995	0.055	0.129	0.232	0.024	0.083	0.013	0.003	0.009	0.001	0.005	0.001	0.003	0.000	0.002	0.000	0.028
Std. error of mean	0.003	0.698	0.028	0.002	0.004	0.005	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Variance	0.013	562.775	0.913	0.005	0.015	0.030	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Std. Deviation	0.114	23.723	0.956	0.070	0.123	0.172	0.017	0.056	0.010	0.003	0.007	0.001	0.004	0.001	0.002	0.000	0.002	0.000	0.023
Variation Coefficient	0.850	0.594	0.479	1.284	0.954	0.743	0.692	0.670	0.759	0.745	0.782	0.795	0.789	0.783	0.776	0.817	0.777	0.767	0.813
rel. V.coefficient(%)	2.499	1.748	1.409	3.775	2.806	2.186	2.034	1.971	2.234	2.191	2.299	2.340	2.320	2.303	2.282	2.402	2.285	2.255	2.391
Skew	3.533	0.434	0.335	4.605	4.356	2.246	2.051	1.864	2.782	2.463	2.682	2.706	2.617	2.611	2.572	3.550	2.726	2.780	2.828
Kurtosis	19.030	-0.958	-0.483	30.679	28.445	7.332	6.616	5.649	12.937	9.750	10.983	10.603	9.839	10.073	9.670	23.476	10.882	11.217	12.296
Minimum	0.002	1.650	0.046	0.001	0.003	0.007	0.001	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Maximum	1.000	94.750	5.535	0.825	1.200	1.100	0.110	0.360	0.082	0.020	0.056	0.007	0.032	0.006	0.015	0.004	0.013	0.002	0.200
Range	0.999	93.100	5.489	0.825	1.197	1.093	0.109	0.357	0.082	0.020	0.056	0.007	0.032	0.006	0.015	0.004	0.013	0.002	0.200
1st percentile	0.015	5.620	0.273	0.002	0.010	0.020	0.002	0.008	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.002
5th percentile	0.027	8.523	0.584	0.007	0.024	0.046	0.005	0.017	0.003	0.001	0.002	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.006
10th percentile	0.042	12.577	0.843	0.011	0.035	0.075	0.008	0.027	0.004	0.001	0.003	0.000	0.002	0.000	0.001	0.000	0.001	0.000	0.008
25th percentile	0.070	18.693	1.196	0.018	0.065	0.121	0.013	0.046	0.007	0.002	0.004	0.001	0.003	0.000	0.001	0.000	0.001	0.000	0.014
Median	0.108	34.900	1.912	0.034	0.101	0.191	0.020	0.073	0.011	0.003	0.007	0.001	0.004	0.001	0.002	0.000	0.002	0.000	0.022
75th percentile	0.164	59.113	2.703	0.068	0.152	0.294	0.031	0.109	0.017	0.004	0.011	0.001	0.007	0.001	0.003	0.000	0.003	0.000	0.035
90th percentile	0.243	73.822	3.330	0.109	0.233	0.416	0.042	0.142	0.023	0.006	0.015	0.002	0.010	0.002	0.005	0.001	0.004	0.001	0.052
95th percentile	0.314	83.944	3.616	0.154	0.314	0.529	0.053	0.177	0.029	0.007	0.020	0.003	0.013	0.002	0.006	0.001	0.005	0.001	0.067
99th percentile	0.691	91.093	4.285	0.402	0.650	1.065	0.094	0.328	0.058	0.014	0.038	0.005	0.025	0.004	0.011	0.002	0.009	0.001	0.132
Geom. mean	0.104	32.124	1.725	0.034	0.096	0.182	0.019	0.067	0.010	0.003	0.007	0.001	0.004	0.001	0.002	0.000	0.002	0.000	0.022

APPENDIX E

VARIOGRAMS

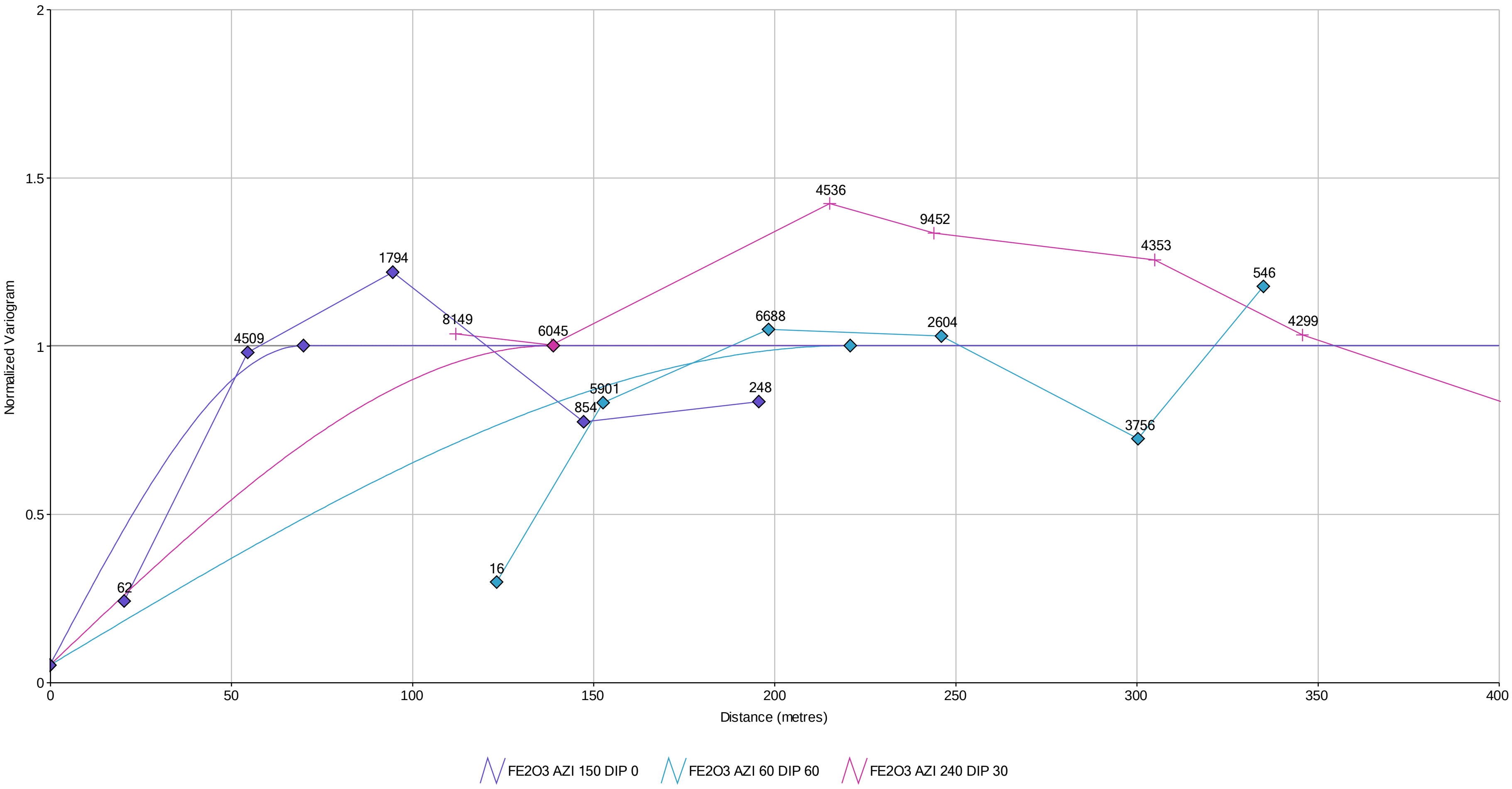
Variogram Fe2O3 Downhole

Type	Variance	Range
Nugget	0.05	-
Spherical	0.216	3
Spherical	0.518	15
Spherical	0.216	80



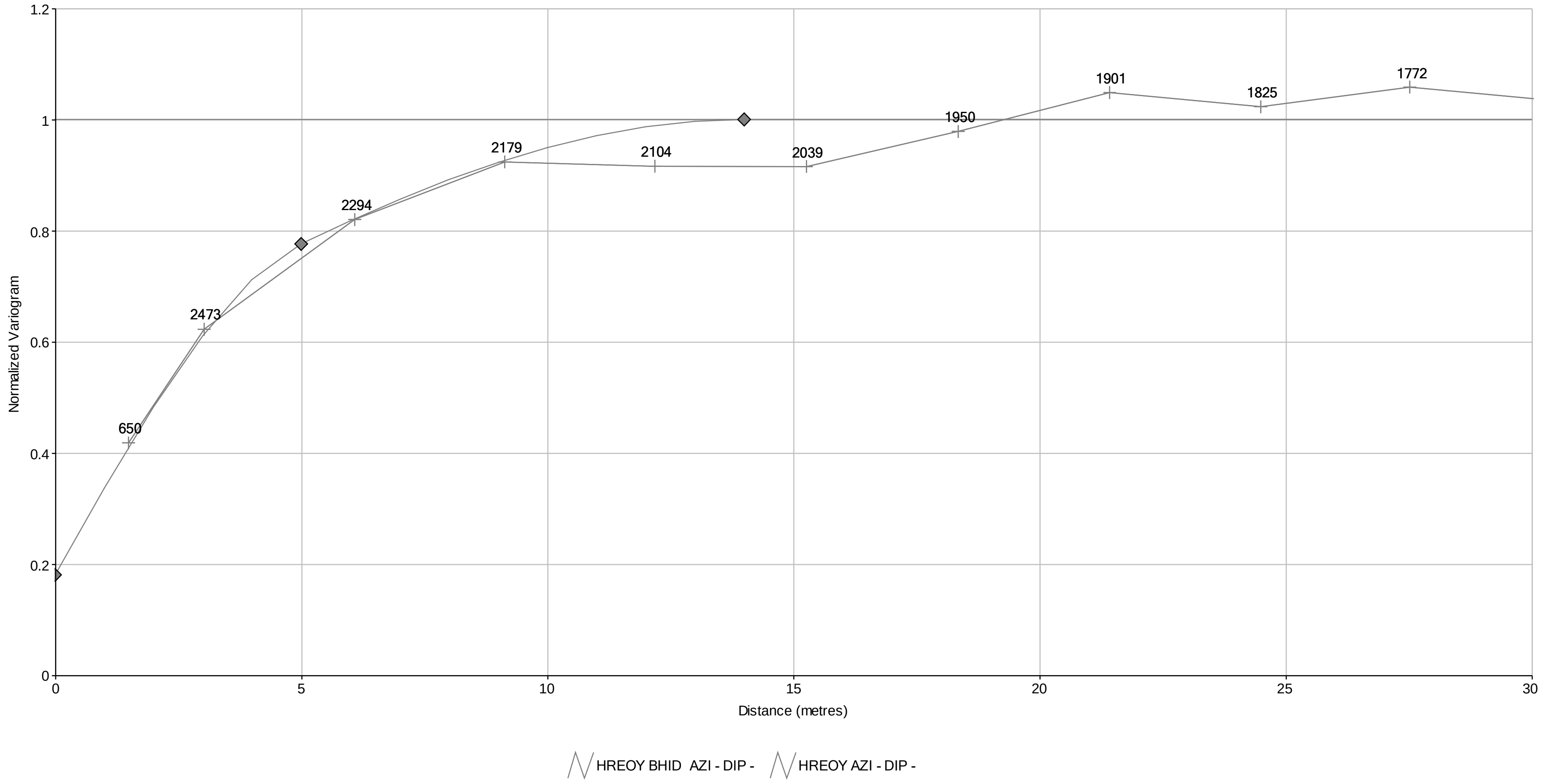
Variogram Fe2O3

Type	Variance	150/0	60/60	240/30
Nugget	0.05	-	-	-
Spherical	0.950	70	221	139



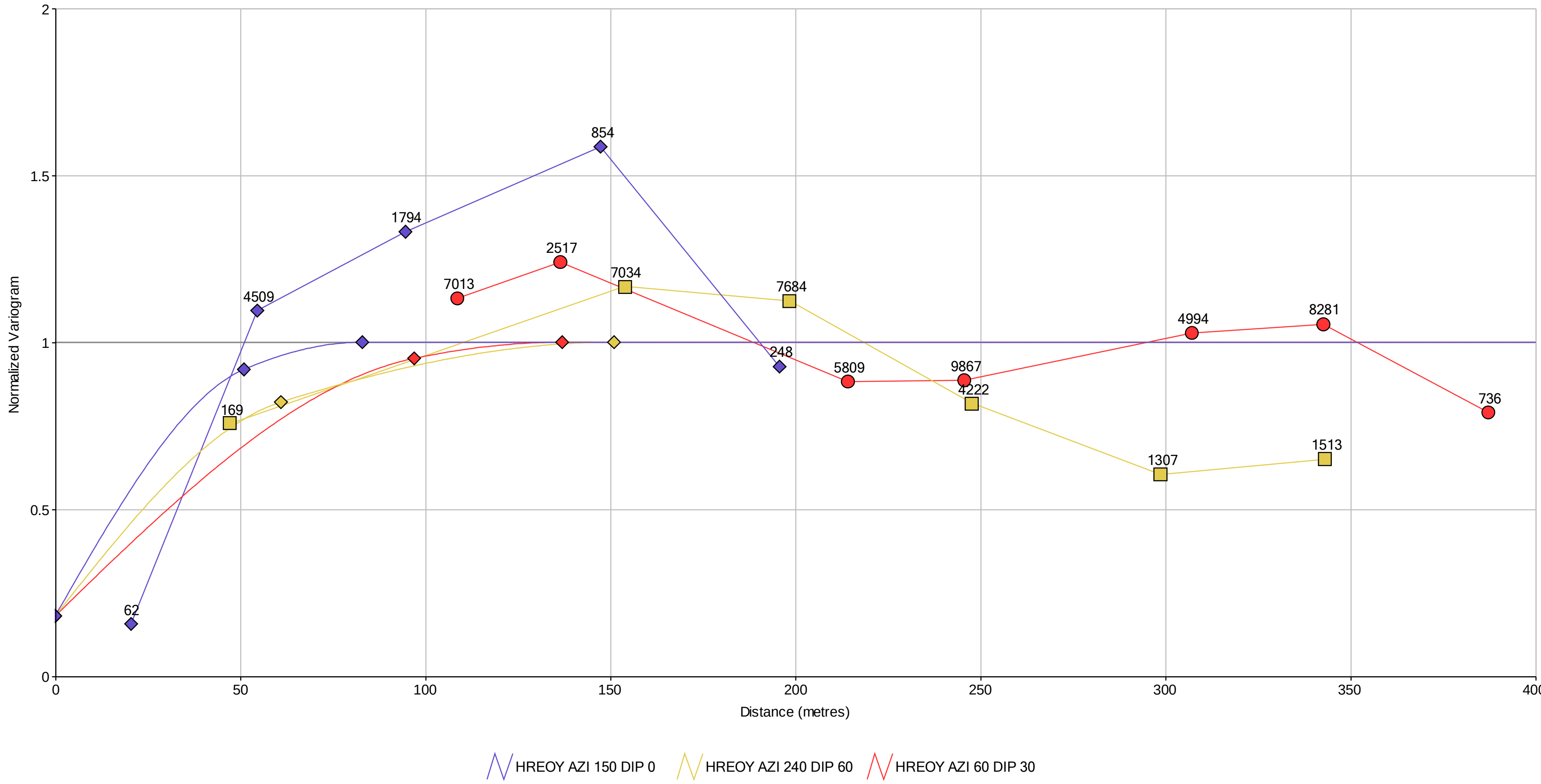
Variogram HREO Downhole

Type	Variance	Range
Nugget	0.18	-
Spherical	0.360	5
Spherical	0.460	14



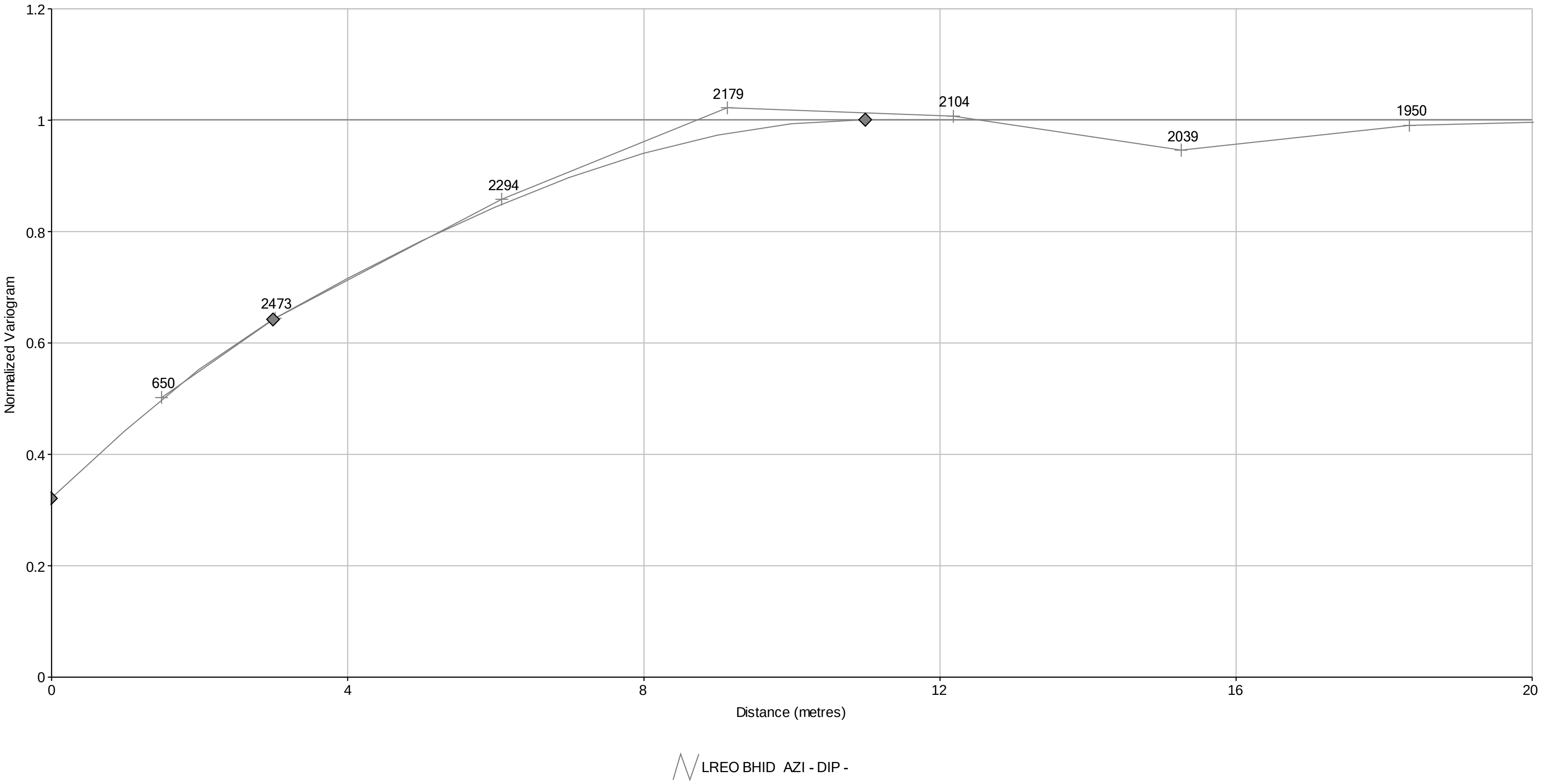
Variogram HREO

Type	Variance	150/0	240/60	60/30
Nugget	0.18	-	-	-
Spherical	.4	51	61	97
Spherical	0.420	83	151	137



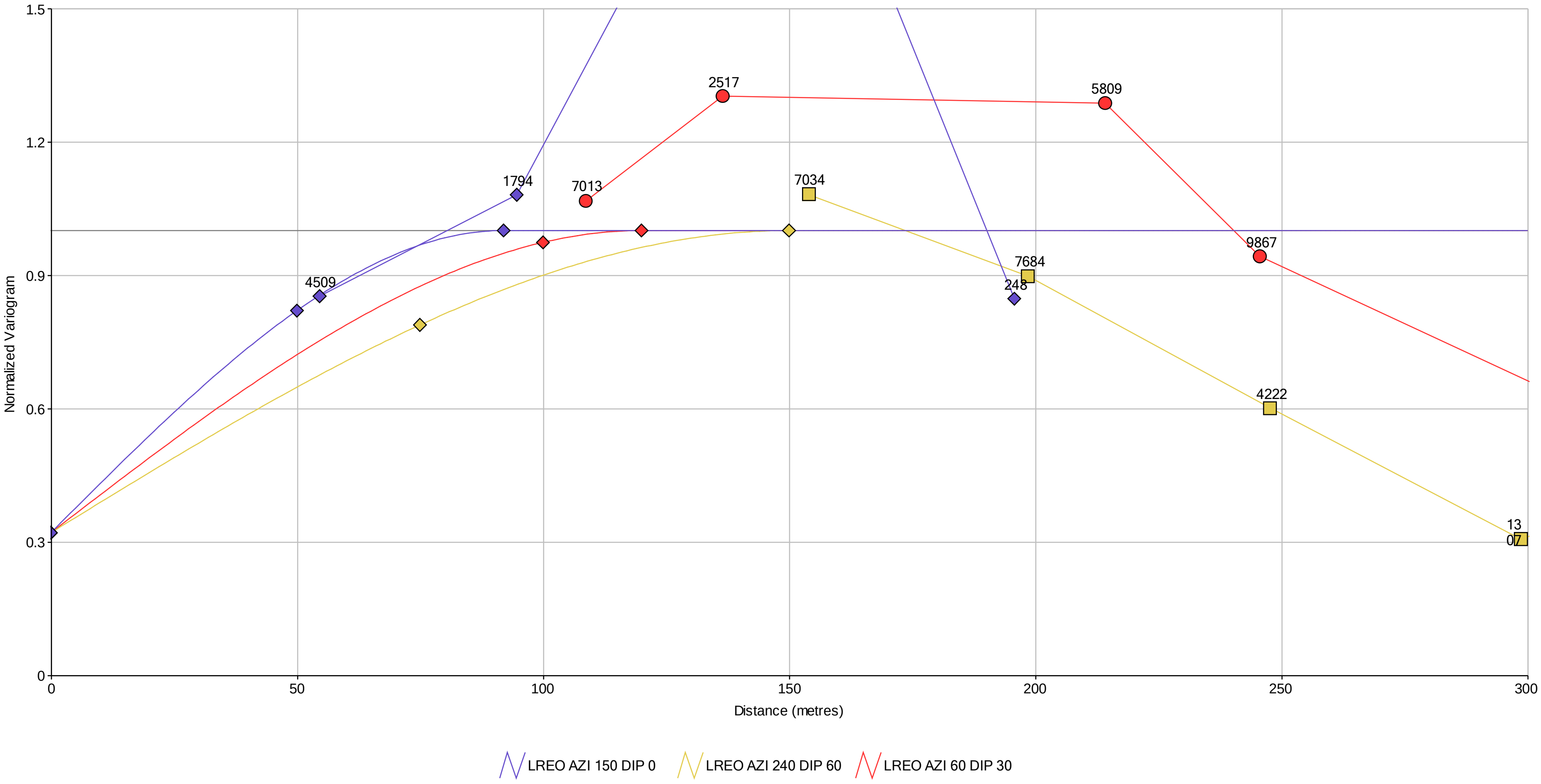
Variogram LREO Downhole

Type	Variance	Range
Nugget	0.32	-
Spherical	0.083	3
Spherical	0.597	11



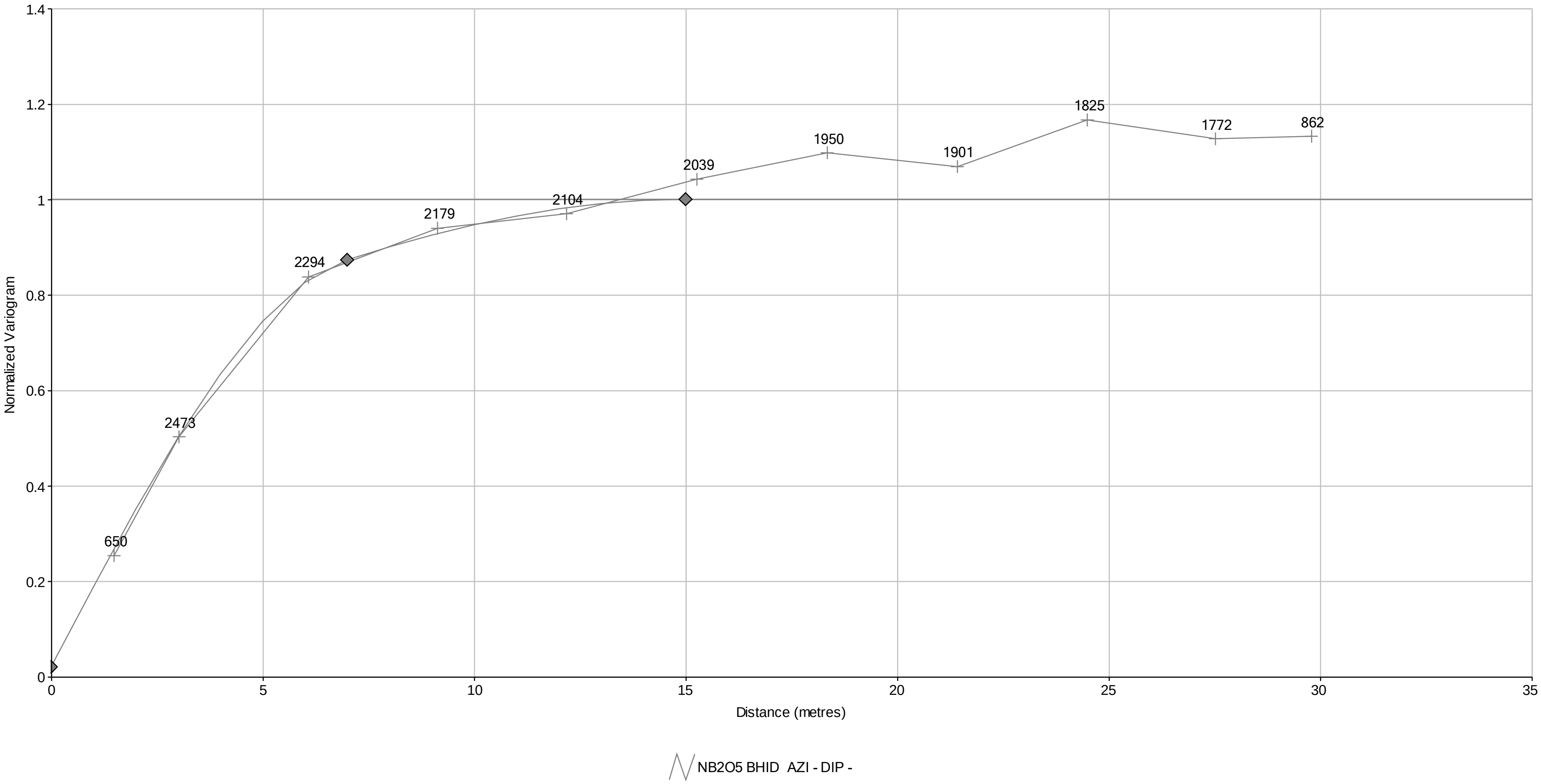
Variogram LREO

Type	Variance	150/0	240/60	60/30
Nugget	0.32	-	-	-
Spherical	0.000	50	75	100
Spherical	0.680	92	150	120



Variogram Nb2O5 - Downhole

Type	Variance	Range
Nugget	0.02	-
Spherical	0.618	7
Spherical	0.362	15



Variogram Nb2O5

Type	Variance	120/0	30/60	210/30
Nugget	0.02	-	-	-
Spherical	0.980	450	200	185