Rainbow Rare Earths

Bosveld Stacks - Mineral Resource Estimate - May 2021

Introduction

Rainbow Rare Earths ("RRE" or "Rainbow") acquired the rights in December 2020 to process 2 stacks of phosphogypsum residue to extract rare earth minerals for commercial production and sale. The phosphogypsum stacks are located in Phalaborwa, South Africa. Phalaborwa is a significant mining industrial centre located approximately 500 km or 5 hrs drive from OR Tambo airport (depending on the route taken) on high quality bitumen roads. Phalaborwa does have an airport so can also be accessed in less than 1 hour by charter flight. Phalaborwa has all the necessary infrastructure to support a processing facility.

Geology

A Google Earth image of the Bosveld processing complex presented in Figure 1 shows the 2 phosphogypsum stacks derived as a residue from the production of phosphoric acid when processing a phosphate concentrate from the Foskor mine next door. This phosphoric acid plant was last operated by Sasol Ltd . The phosphate concentrate contains apatite minerals and specifically fluorapatite which can contain significant amounts of Rare Earth Elements ("REE").

Figure 1: Google map image showing Bosveld Stack A (NW) and Stack B (SE) with Bosveld processing complex (NE)

The phosphate concentrate delivered from Foskor was derived from an apatite orebody from the adjacent Phalaborwa mining operations. The apatite ore contains REE with a favourable distribution of individual REE mainly Neodymium ("Nd"), Praseodymium ("Pr") and Dysprosium ("Dy"). The REE are upgraded by the Foskor concentration process and then again during the phosphoric acid production process where REE report to the phosphogypsum residue that was deposited on the stacks. The historic production of phosphoric acid from the phosphate concentate has produced a considerable amount of phopsphogypsum residue which has been preserved in two stacks. These stacks, locally named Stack A and Stack B, make up a REE mineral resource which Rainbow is currently evaluating

Volume Survey

Stack A and B plus local surrounds were surveyed by specialist service provider DSI during the period 27th April to 1st May 2021. Ground control points were placed on the ground and surveyed to provide accurate control points. The survey grid used was WGS84/36S.

A LiDAR scanner attached to a multi-copter drone was employed for the survey which was conducted at height of ~75m at 8 m/s flight speed generating 80-100 survey points per square metre.

A bathymetric survey was conducted on the water ponds located in the centre of both stacks using a floating sonar depth sensor. This data was used to calculate the pond basal surface

A high resolution ortho-mosaic image was captured with a mirrorless Sony A600 camera mounted to a fixed wing drone at 120m above ground level to produce a 2.5cm resolution ortho-mosaic which was geo-referenced using the surveyed ground control points.

The combination of the LiDAR survey, bathometric survey and photographic imagery was used by DSI to create the XYZ points representing the upper surface of the phosphogypsum material for both Stack A and B at a 0.5 m XY resolution. This information was handed over the Rainbow.

Using Datamine software the Competent Person ("CP") created a digital terrain model ("DTM") for both Stack A and B at a 1 m XY resolution representing the gypsum upper surface for use in construction of model to estimate the volume of phosphogypsum - Figure 2.

Surface mapping identified an area shown in brown (Figure 2) which contains a mixed zone of rubble and phosphogypsum residue. The depth of the rubble is unknown but based on personal communications with Bosveld staff (email to D Dodd 23 May 2021) it is understood that rubble and gypsum were dumped simultaneously in the designated area since 1964, so the complete area beneath the rubble has been removed from the mineral resource. The central areas containing residual solution (acidic water and minerals) are shown in blue. These areas could not be pumped dry at the time of drilling to enable access.

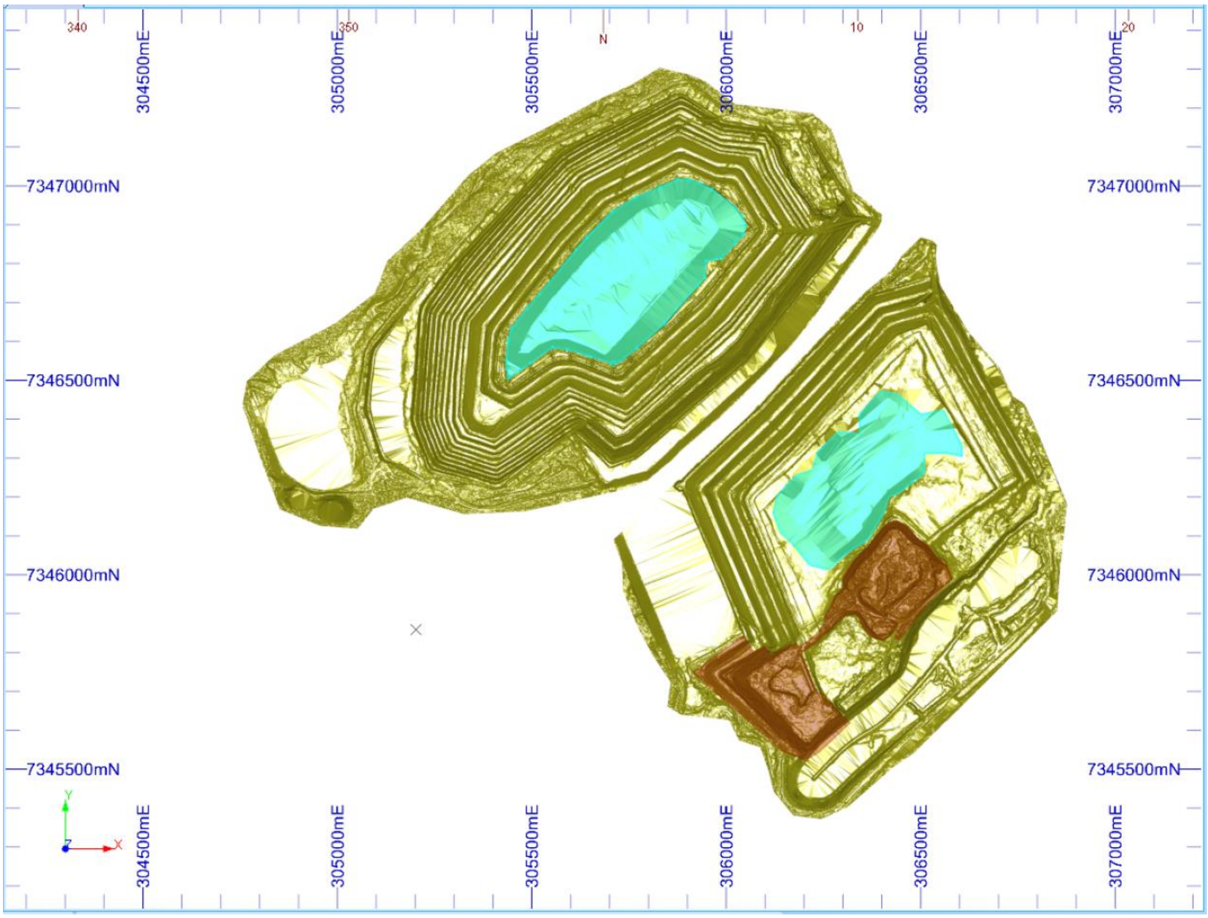


Figure 2: DTM surface of Stack A and B, with solution in blue and mixed rubble and phosphogypsum zone in brown

The topography surface derived from the LiDAR survey at the edge of each Stack was isolated and projected underneath each stack to create a basal DTM representing the original topography surface prior to construction of the stacks. This basal layer was further refined utilising drillhole data where the base of the stack was intercepted during drilling. Refer to Figure 3. The yellow periphery zone is the 'natural topography' at the edge of each Stack. The blue dots are the base of the last sample of REE gypsum before intercepting the base of the stack. The pale green surface is the interpolated 'natural topography' prior to stack dumping of residue. The blue outline is the footprint of each Stack used for estimation of REE mineral resource, which excludes areas currently being reclaimed for small-scale agricultural use.

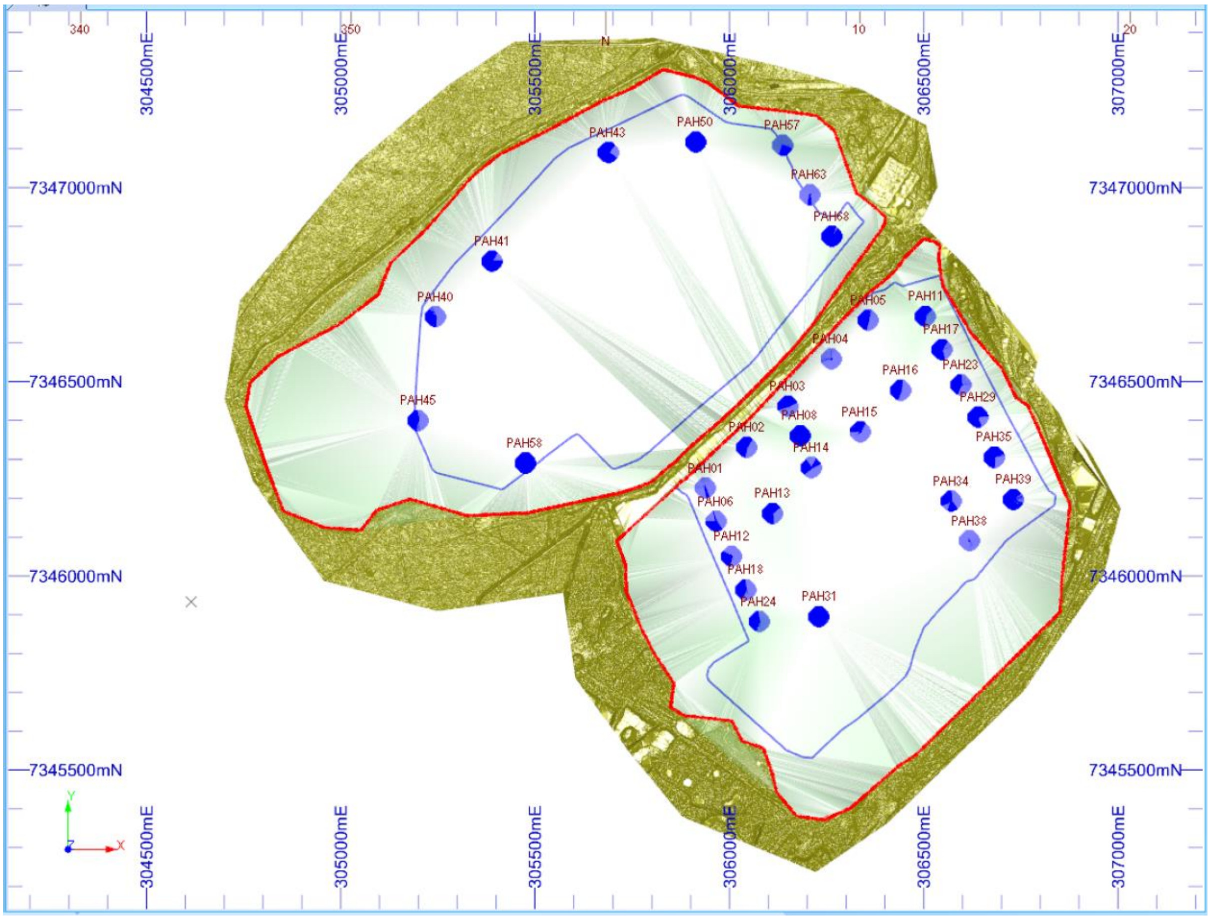


Figure 3: Basal surface beneath each stack interpolated from surrounding topography and drillhole intercepts (blue)

Drilling and Sampling

The Phase 1 resource drilling was completed during the period 2nd to 17th of December 2020. The drilling was contracted to SGS South Africa ("SGS") and was undertaken using a hand-operated power auger. In total 1,056.3m were drilled from 72 holes over the two Stacks A and B.

Stack B was mostly drilled from top to the natural topography basal surface. Unfortunately the SGS auger drill had inadequate power to drill to the bottom of Stack A from the top surface for all 8 of the planned holes in this area, with the deepest hole in Stack A only reaching 27m (Stack A is estimated to be up to 45m thick). As a result a significant portion of Stack A could not be drilled during the Phase 1 campaign.

The drill holes were located on the ground using a hand-held GPS and according to planned grids.

Stack A holes were drilled on a nominal 200 m x 150 m grid with 33 holes for 501.2 m drilled. 27 of the initially planned 29 holes were drilled, the remaining 2 planned holes being located within solution in the centre of the stack. An additional 4 holes were drilled at a right angle around PAH08 at 10m spacing to test close spaced grade variability, with a further 2 holes drilled to fill gaps in the planned grid.

Stack B holes were drilled on a nominal 150m x 100m grid with 39 holes for 555.1 m drilled. 33 holes of the original planned 41 holes were completed, 5 of the planned holes not drilled were located in areas mapped as containing rubble which prevented drilling and 3 holes were inaccessible due to solution in the centre of the dump. The 39 holes drilled included 6 which were drilled in a 10m right angle around hole PAH52 to test close spaced grade variability.

The SGS auger drill rig utilises a rotating spiral auger encased in a stainless-steel core barrel to advance into the phosphogypsum material. This method ensures that contamination of the sample is minimised, because the drilling is performed dry, under relatively stable conditions, without back-mixing of the samples or chemical alteration of the elements in the samples. The SGS rig utilises a 50 mm nominal bore drill rod producing theoretically between 3.5 and 7 kg of sample per 1.5 metre increment. On withdrawing of the core barrel, the extension rods are removed and the contents recovered in the core barrel extruded onto a 5 m plastic half-pipe located on a trestle to ensure total sample collection. The spiral is then removed from the core barrel and any remnant sample removed and added to the material on the half-pipe. The 1.5m interval samples were bagged in pre-marked and numbered plastic bags.

Auger sampling was completed on 1.5 m intervals with 702 (1,053 m) samples collected and sent for preparation and chemical analyses to SGS in Randfontein, Johannesburg. 1 sample (70600 - PAH85 4.5 to 6 m) was lost and 35 samples (70713 to 70751) did not have assay results for Tm and Thorium.

The average dry mass of the 702 auger samples was 4.375kg with an average moisture content of 18% (with 15% of the samples having a moisture content between 25% and 47%).

QAQC samples (certified standards and blanks, and duplicates) were inserted at a ratio of 12%. Umpire analysis was completed at ALS Johannesburg with 35 samples (5%) submitted. Due to the complexity of the digestion methods used to extract REEs there was some variance between standards, duplicates and umpire analysis. However, the CP is satisfied that the QAQC results adequately support the REE grade tenor and precision and the results of the sample analysis are suitable for the mineral resource estimate.

Drilling data used in the MRE derived from the Auger drilling program is presented in Table 1.

Rainbow Bosveld REE Project - Drilling used in MRE				
Prospect	Auger Drilling			
	Holes	Metres Drilled	Assay Sample Length	Assays used in MRE
Stack A	33	501.2	1.50	333
Stack B	39	555.1	1.50	369
Total	**72**	**1,056.3**	**1.50**	**702**
Note: 1.8 m of drilling was into basal gravels - samples not used for MRE. 1 sample interval was lost during processing.				

Table 1: Drilling and sampling data used in the MRE

In-situ Dry Bulk Density determination

During the Phase 1 drilling campaign 2 types of samples were collected for BD estimation from the surfaces of the two stacks:

1. 234 samples collected using a one litre volume steel mould hammered into selected surfaces of the stacks (e.g. access cuts and mining faces).
2. 33 had specimen lumps weighing in average 364 g of reasonably competent gypsum found at surface on the stacks.

The 234 1L samples yielded BD values ranging from 0.60 t/m3 to 1.45 t/m3 with an average of 1.0 t/m3. The 33 hand specimen lumps samples were dried and the BD analysed using the wax coated water immersion method. 14 had an average BD of 1.27 t/m3, the remaining 19 samples floated (BD < 1.0) . The potential issue with these 2 sample types is that they represent the weathered top 10 to 50 cm of the stacks, where weathering processes may have potentially increased sample porosity and hence reduced the bulk density, making these sample unrepresentative of the BD of the entire stacks.

A literature review of phosphogypsum tails deposits indicated a BD of around 1.3 to 1.6 t/m3, which also correlates with the estimated stack volumes and stated historical production of around 35 million tonnes of tailings. This information justified further work to obtain a representative set of samples from the stacks to estimate the BD. A Phase 2 drilling program was initiated in April 2021. The program included a Sonic drilling method used to recover competent sections of core at depth (Figure 4). The assay results of the Phase 2 drill program are still pending, but the results of the BD analysis were available for preparation of this MRE.

The recovery of intact unbroken core from the phase 2 sonic drilling was below expectation with only 19 pieces of core recovered from the drilling which were competent enough to determine BD using the measured volume of the core cylinder divided by dry mass of core method. Five of the samples were cross checked using the wax immersion method with identical results (within +/- 1 to 3%). The BD values were plotted in 3D - Figure 4 and reviewed spatially to determine if there were any obvious depth trends and statistically to review the data distribution. A histogram of the results is presented in Figure 5. The results show a normal distribution of values with a mean and median of 1.66 and 1.67 t/m3 respectively.

Based on the BD information collected to date the following logic was used to estimate an average BD for both Stacks:

1. BD of competent core is 1.66 t/m3
2. Around 50% of the material drilled was not competent and broke up with sonic drilling - a reasonable assumption is that the 'broken zones' included an additional 20% porosity and fracture space, resulting in a broken core BD of 1.33. This value is similar to BD obtained from the 'weathered' near surface competent material.
3. The weighted BD based on 50% being competent and 50% being 'broken or more porous' is 1.494 - rounded to 1.50 for the MRE.

The value of 1.5 t/m3 used for the MRE requires further validation, which is planned for a phase 3 work program later in the year.

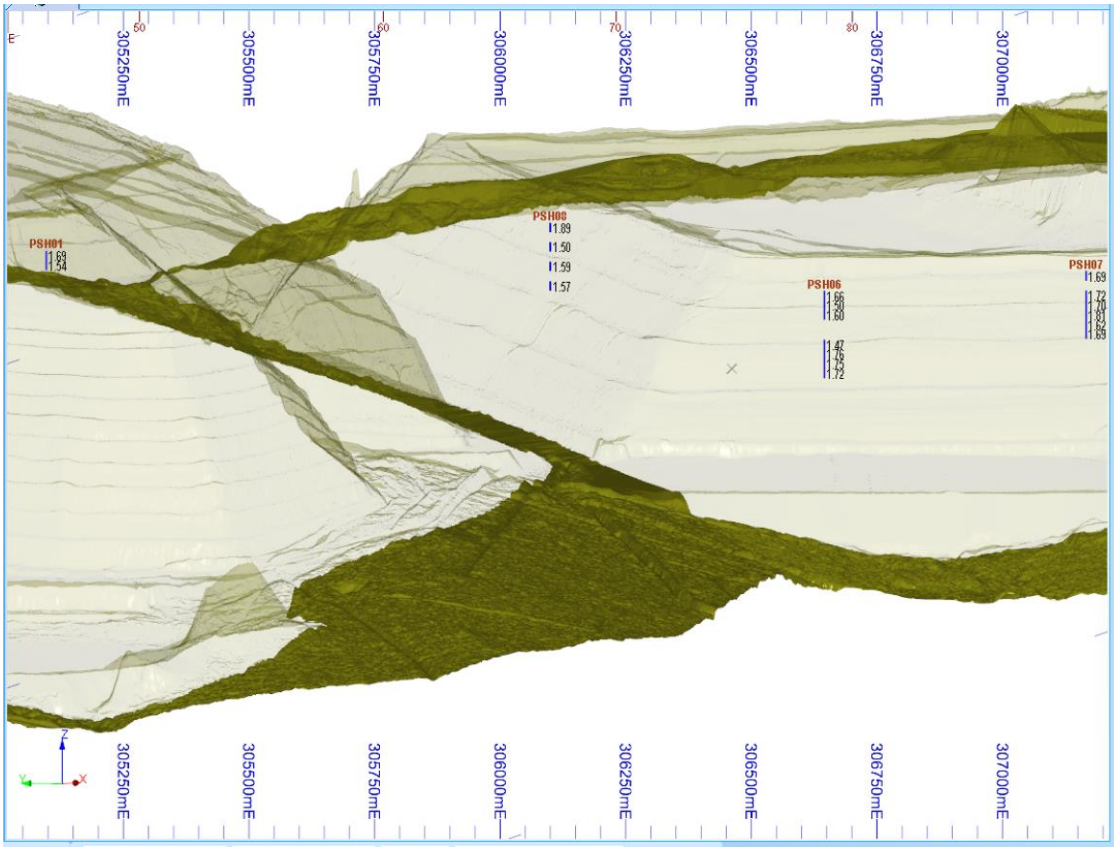


Figure 4: 5X vertical exaggeration 3D image, showing BD results from 4 sonic drillholes completed on Stack A (1 hole) and Stack B (3 holes) during the phase 2 drilling program

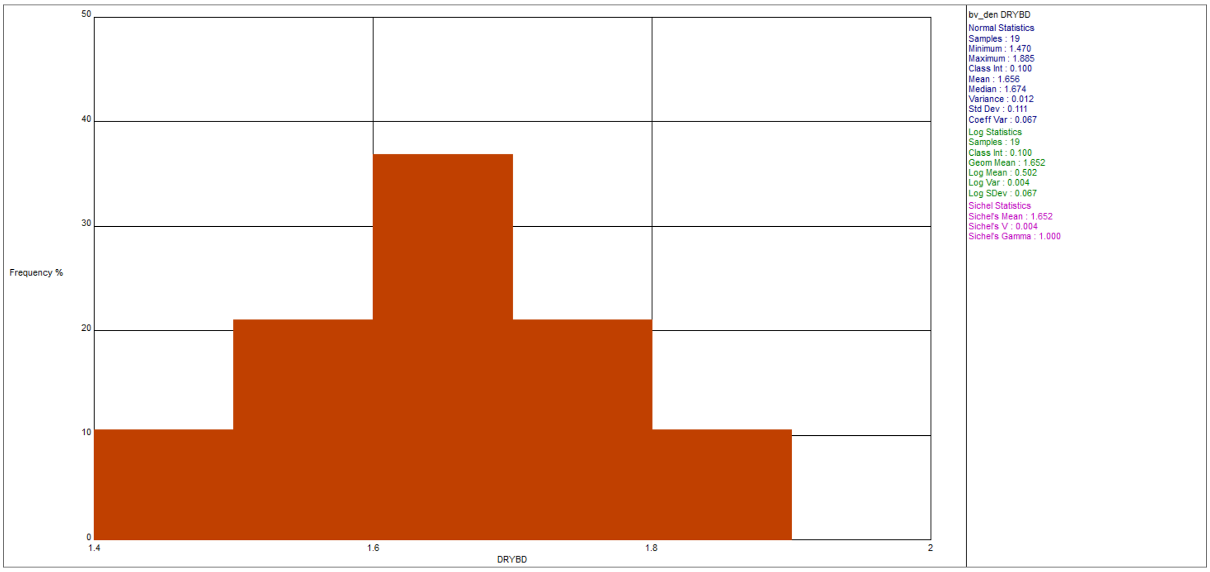


Figure 5: Histogram of BD distribution from the 19 sonic drilling core samples

The moisture content of the stacks is variable. Near surface moisture content averages around 10 - 15%, increasing with depth below 10 m to 20 - 30% with some areas being saturated near the base of the dumps and proximal to the central solution ponds.

Volume block model

Using the Lidar stack DTMs and the interpolated basal DTMs a 3D block model was constructed using Datamine mining software. The dimensions of the block models are presented in Table 2.

Bosveld Block Model dimensions and block sizes												
Prospect	ORIGIN			MAXIMUM			PARENT BLOCK SIZE			BOUNDARY RESOLUTION		
	EASTING	NORTHING	ELEVATION	EASTING	NORTHING	ELEVATION	EASTING	NORTHING	ELEVATION	EASTING	NORTHING	ELEVATION
Stack A	305,150	7,346,200	350	306,350	7,347,250	430	50	50	3	5	5	0.5
Stack B	305,850	7,345,500	350	306,850	7,346,800	410	50	50	3	5	5	0.5
Combined	305,150	7,345,500	350	306,850	7,347,300	430	50	50	3	5	5	0.5
Prospect	ORIGIN			EXTENT in metres			PARENT BLOCK SIZE			BOUNDARY RESOLUTION		
Stack A	305,150	7,346,200	350	1200	1050	80	50	50	3	5	5	0.5
Stack B	305,850	7,345,500	350	1000	1300	60	50	50	3	5	5	0.5
Combined	305,150	7,345,500	350	1700	1800	80	50	50	3	5	5	0.5

Table 2: Datamine 3D block model dimensions

The model was constrained using a limiting boundary for each Stack. The limiting boundary perimeter (Figure 3 - blue outline) defined the potential mineable base of each stack and excluded areas currently affected by current and historical reclaim activity. It is important to note that the centre of each stack is currently filled with solution produced from the processing plant, which is acidic and cannot be readily pumped to alternative storage areas. This solution prevented drilling in the centre of each stack and also likely impacts the moisture content of the phophogypsum within the stacks.

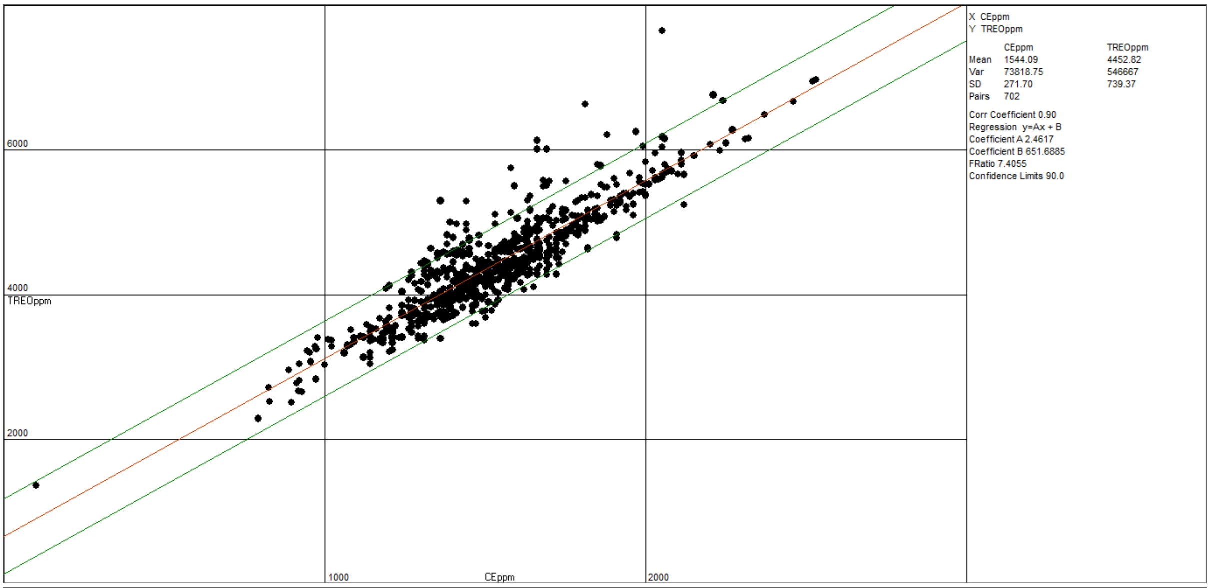
Statistics and Variography

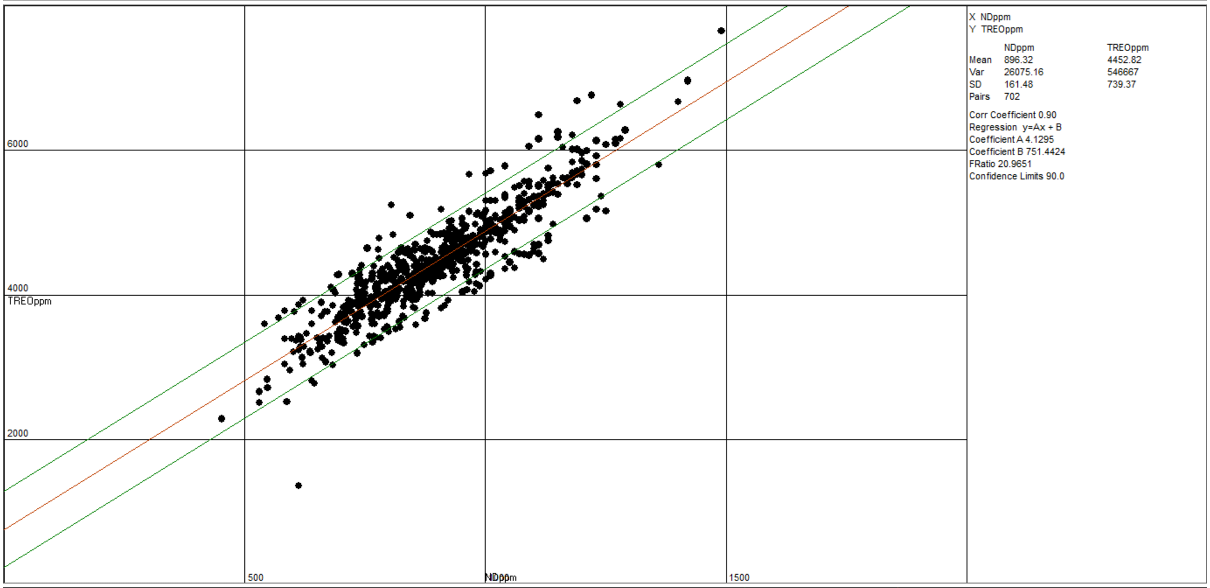
The ratio between the REE elements is relatively consistent with a reasonable correlation between the REEs and TREO. Examples are presented in Figure 6. Showing the Light REEs (LREO - Ce, La, Nd, Pr, Sm), Heavy REEs (HREO - Dy, Er, Eu, Gd, Ho, Lu, Tb, Tm, Y, Yb), Critical REEs (CREO - Dy, Eu, Nd, Tb, Y), Nd and Pr compared to the Total REO (TREO). Interestingly Pr shows an unusual correlation trend for the lower grades, possibly related to the assay analytical method. As there is adequate correlation of all elements to TREO, this was used as the master grade variable for statistical analysis, variography and grade estimation.

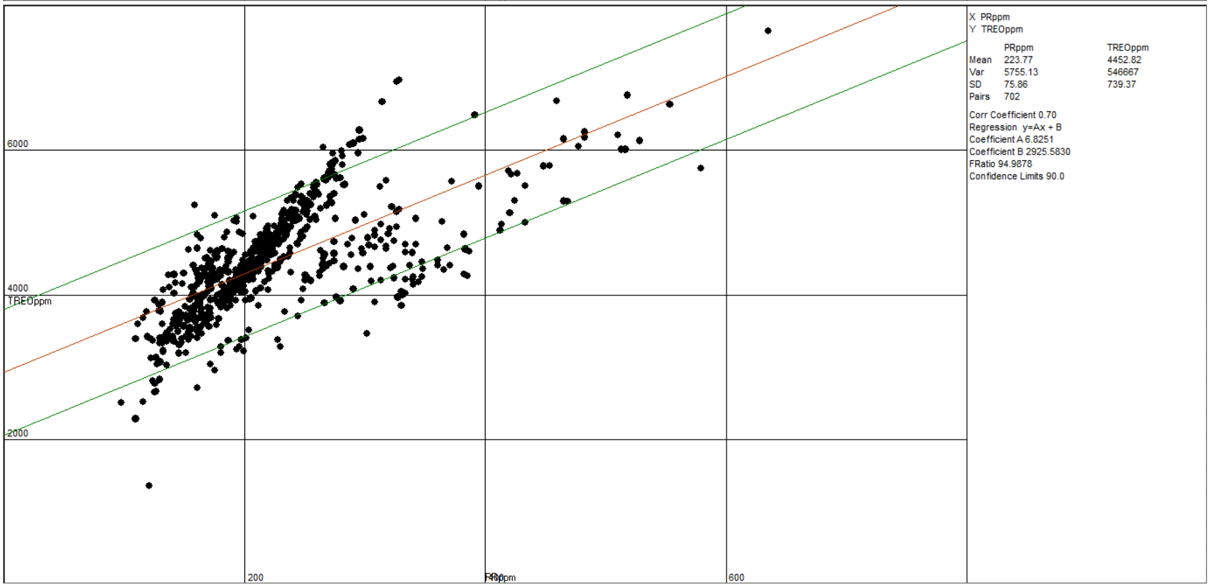
TREO was subdivided by Stack. Figure 7 present histograms of the TREO grade distribution. Stack A - MINZON 1 - contains 332 1.5 m samples with an uncut mean of 0.425%. Stack B MINZON 2 - contains 369 1.5 m samples with an uncut mean of 0.464%. Both distributions are close to normal with a small +ve skewed higher grade tail. A top cut of 0.63%TREO was applied to both distributions to avoid local grade bias, with little to no impact on the cut means of 0.424% and 0.464% respectively. Figure 8 presents the probability plots after top cutting. Figure 9 presents the location of the top cut samples. They are not clustered and relatively randomly distributed through the stacks justifying use of a top cut to remove outliers.

Variography was completed for TREO for each stack. Downhole variograms used to determine the nugget and close spaced vertical continuity were completed for both stacks independently. The resulting variogram models were very similar, so the data was combined which produced the same result. Figure 10 presents the combined downhole variogram which has a nugget of 40% and a vertical range of 8.6m. Note that 70% of the sample variance occurs at 4m.

Directional variograms were modelled by Stack with the results presented in Table 3. An example of a modelled directional variogram is presented in Figure 11 for Stack B. The variogram directions of major continuity were reviewed visually and appeared to make geological sense - being generally horizontal with a small dip following the dip of the basal topography.







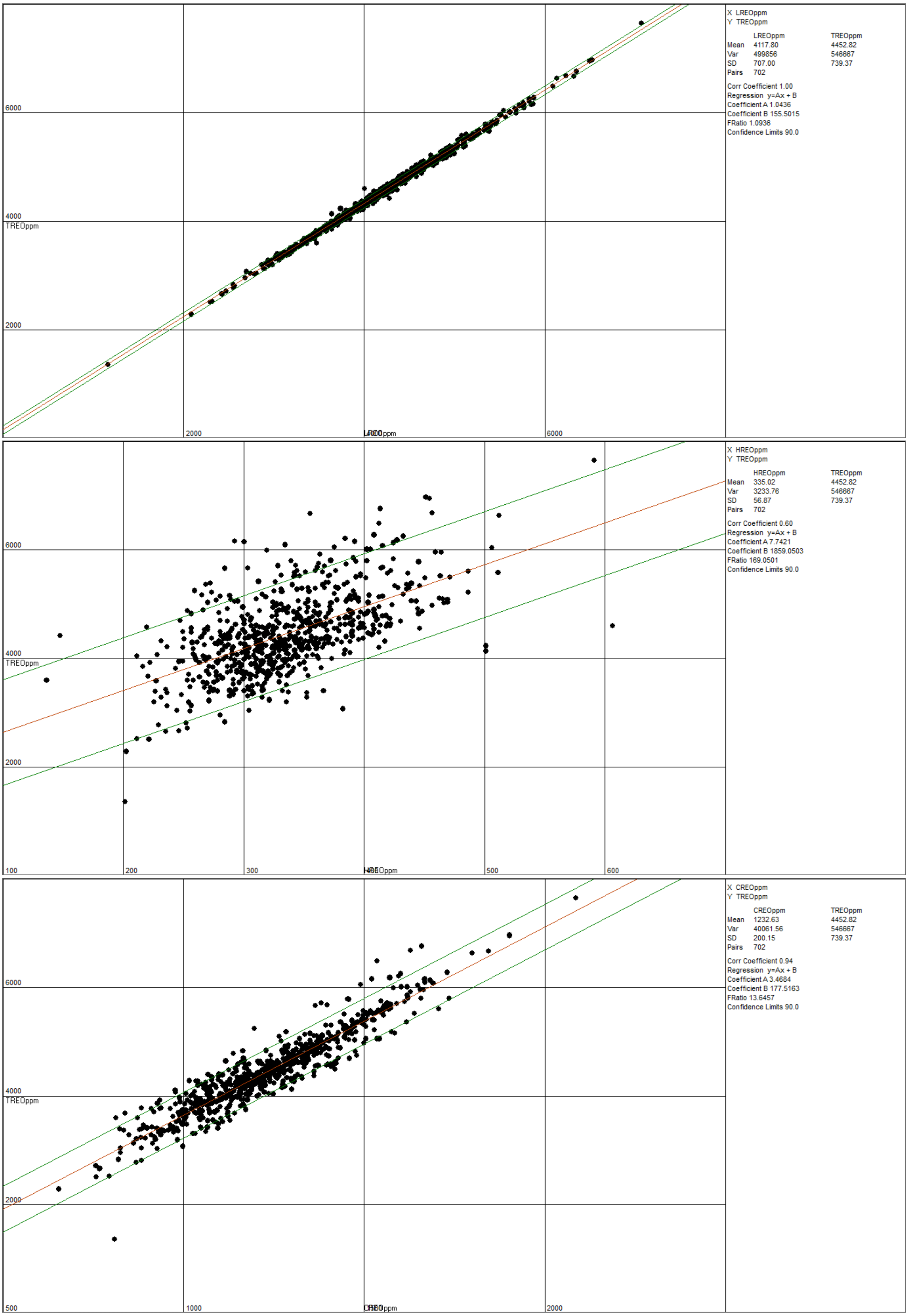


Figure 6: Correlation of various REEs with TREO

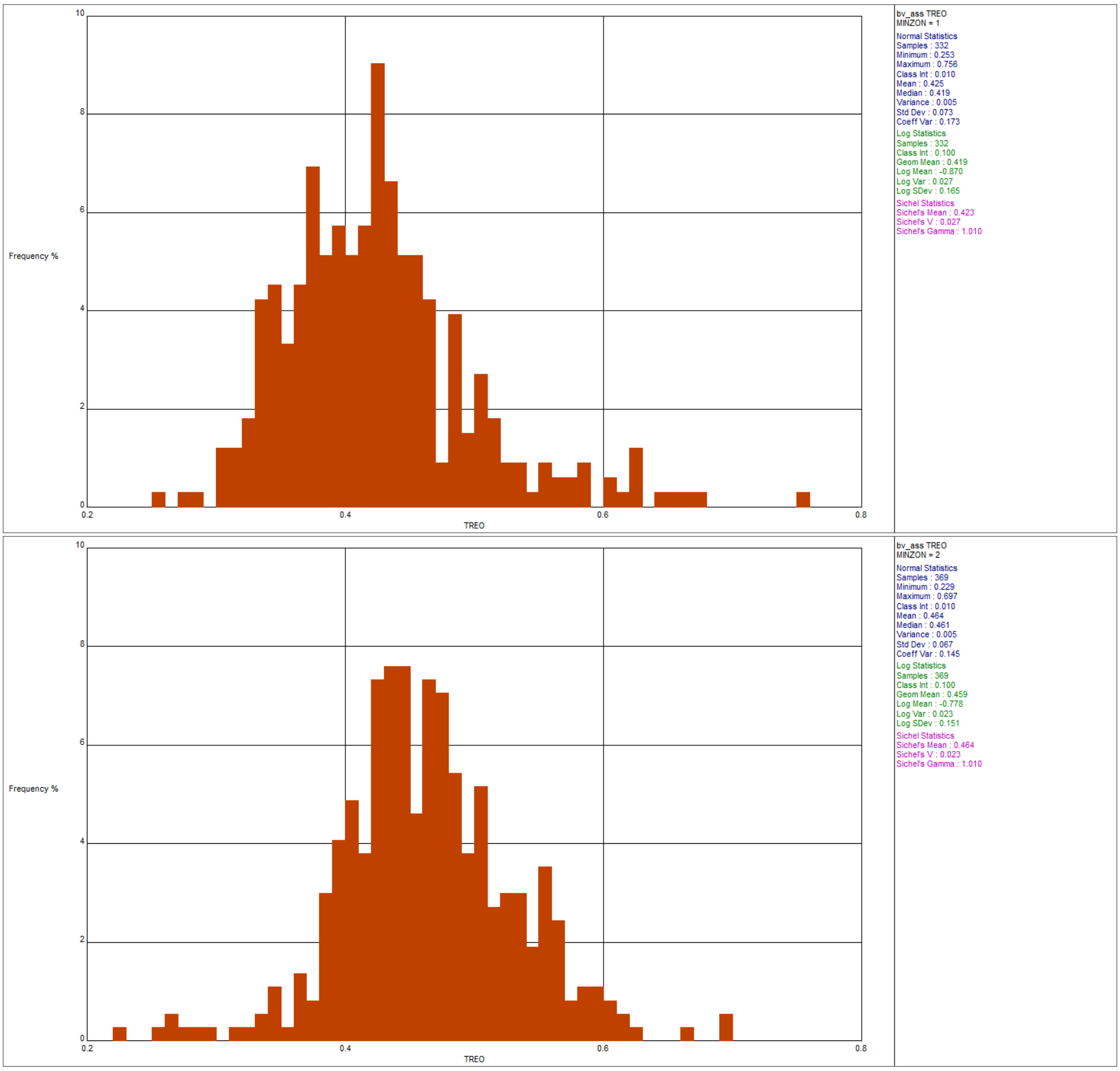


Figure 7: Histograms showing distribution of TREO for Stack A (MINZON 1) and Stack B (MINZON 2)

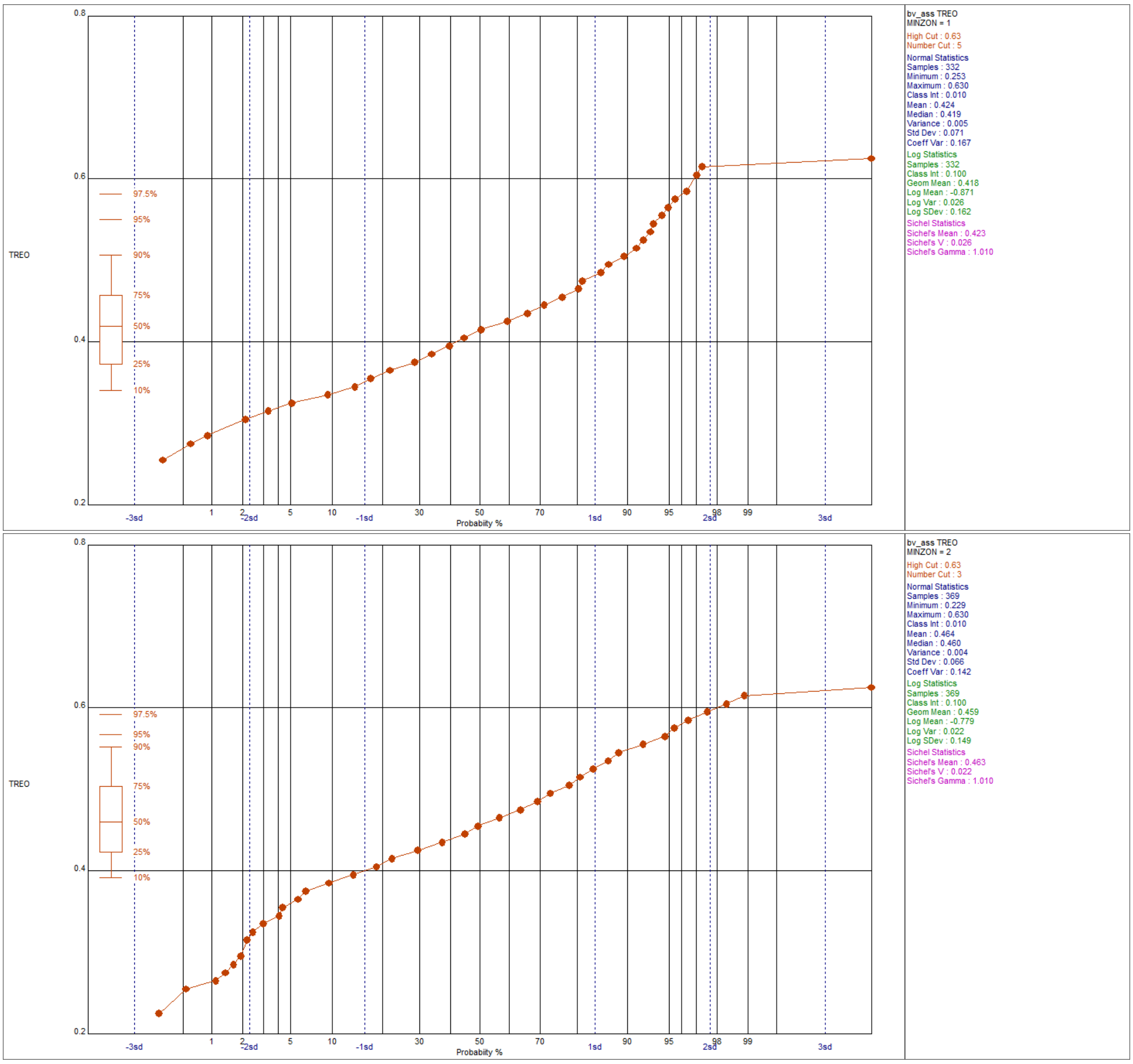


Figure 8: Probability plots showing TREO after top cutting at 0.63%

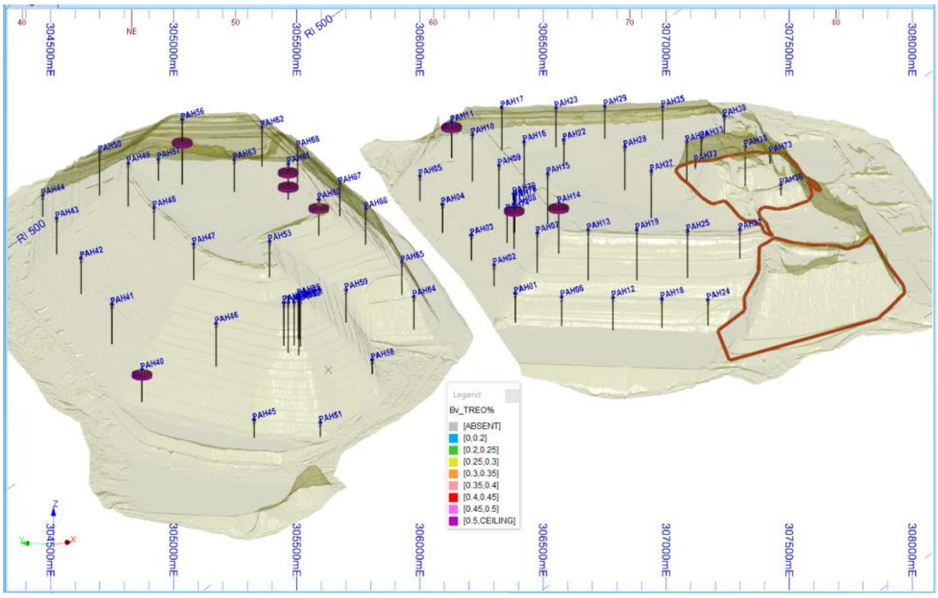


Figure 9: 3D view with 5x vertical exaggeration showing location of samples top cut in purple

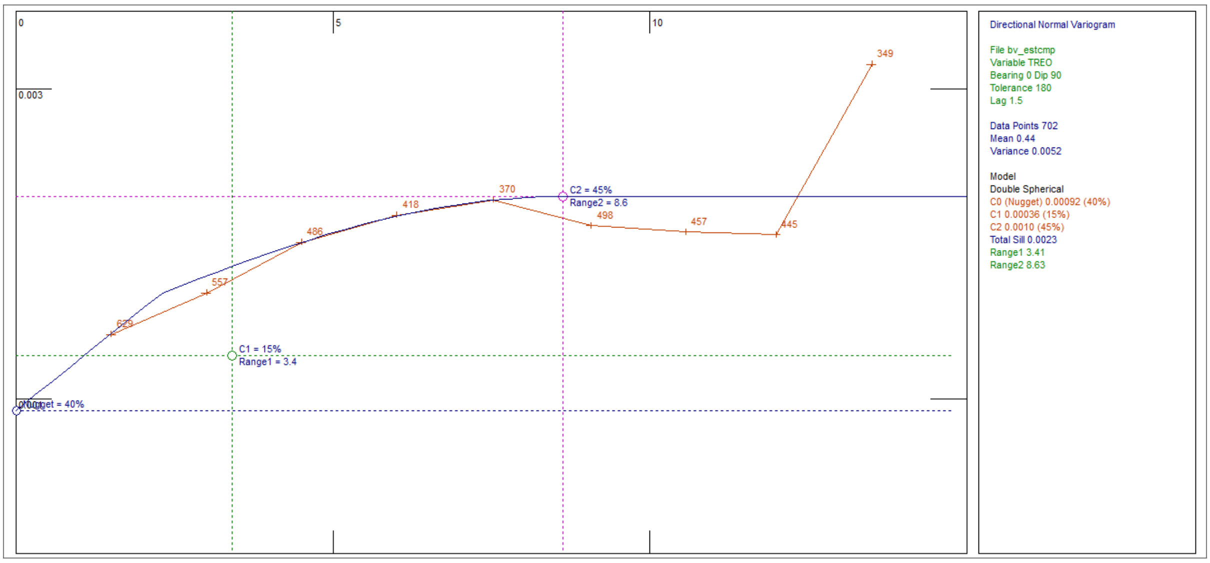


Figure 10: Combined downhole variogram for Stack A + B

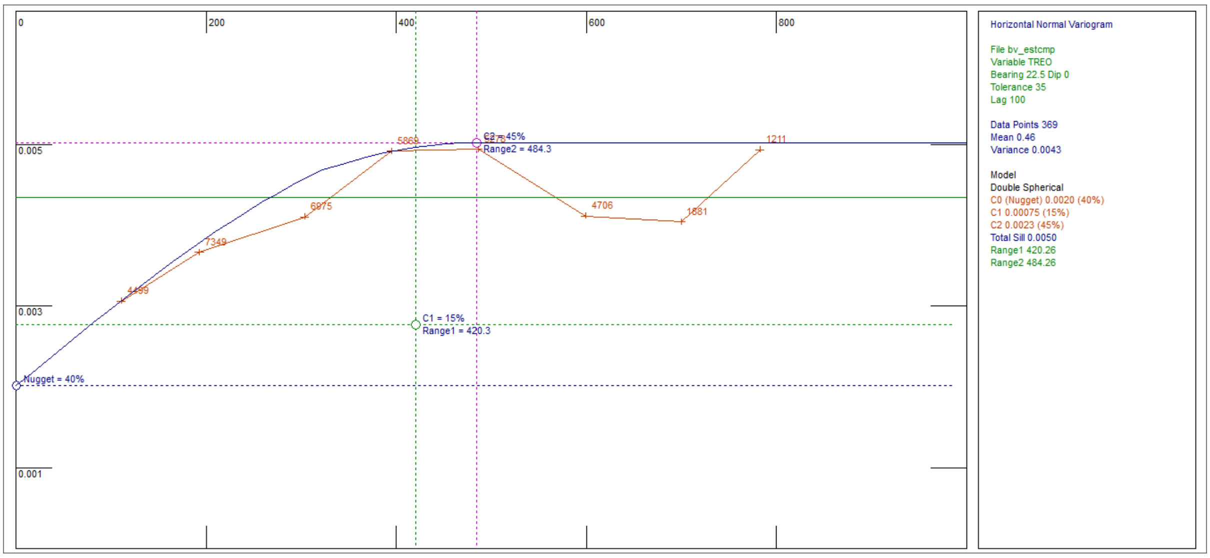


Figure 11: Example of a Major Direction variogram - Stack B MINZON 2

Variogram Models using 1.5 m Composites by Stack										
Deposit	Grade	Nugget	Structure 1				Structure 2			
			Sill 1	Range 1	Range 2	Range 3	Sill 2	Range 1	Range 2	Range 3
Stack A	TREO	0.40	0.15	313	317	3.4	0.45	445	347	8.6
Stack B	TREO	0.40	0.15	420	258	3.4	0.45	484	309	8.6
Variogram Axis Rotation - based on variography and visual validation, DIP DIR, DIP and PLUNGE										
DEPOSIT	Axis 1	Axis 2	Axis 3	Rotation 1	Rotation 2	Rotation 3				
Stack A	Z	X	Z	67.5	0.0	0.0				
Stack B	Z	X	Z	20.0	3.0	0.0				

Table 3: Modelled variogram parameters

Grade Estimation

TREO, Thorium ("Th") and Uranium ("U") grades plus ratios of REEs to TREO were estimated using Ordinary Kriging ("OK"). The advantage of estimating the ratio and then back-calculating the individual REE grade is that the sample relationship between the elements is maintained at the estimation panel size. Table 4 presents the OK search neighbourhood parameters used to estimate all grade data. The ratios were estimated for Nd, Pr, Dy, Tb, LREO, HREO and CREO using the same variogram and search parameters as for TREO %.

Ordinary Kriging Grade Estimation Search Ellipse Parameters								
Deposit	**Grade**	**Range 1**	**Range 2**	**Range 3**	Search Ellipse rotation defined based on variogram DIP DIRECTION, DIP and PLUNGE.	**Min Sample**	**Max Sample**	**Search Factor 2 & 3**
Stack A	TREO	350	320	10		15	21	2, 5
Stack B	TREO	450	300	10		15	21	2, 5
Kriging Panel Size 50x50x3 m; Discretisation to 5x5x1.5 m; Maximum of 3 samples allowed from each drillhole.								

Table 4: Ordinary Kriging sample search parameters

Model Verification

The volume and grade model was validated by visual checks of the block volume against the LiDAR DTM surface, by comparing the average composite grades with the block model grades and through the use of swath plots and visual correlation of drillhole grades with block model grades.

Figure 12 to Figure 15 present plan and cross section views with 5X vertical exaggeration showing the grade model, drillhole data and LiDAR DTM.

Figures 16 and 17 present an example of the validation swath plots comparing model grade with weighted drillhole grade by Northing, Easting and Elevation.

Table 5 presents the statistical comparison comparing mean sample grades with the mean block model grades for all grades and proportions estimated.

The biggest variance between the block model averages and the input samples is U ppm for Stack A with a 14% difference, most likely due to clustering of lower U grades. Most other comparisons are within +/-1% with a few difference up to +/-3 to 5 %.

The CP concludes that the tonnage and grade estimate for the Bosveld Stacks A and B appropriately represent the volume, tonnage and grade of the input data. The spatial distribution appropriately follows the grade trends where adequate drilling data exists. At the central lower portions of Stack A where limited drilling was completed, the grade estimate is extrapolated horizontally between the available drill data. Further drilling is required to improve the confidence in the grade estimates for this zone.

Stack A	Num Samples	Sample Mean %	Num Blocks	Model Mean	% Compare to Samples	Num Blocks 1st Search	Model 1st Search Mean	% Compare to Samples
TREO %	333	0.424	3,311	0.422	99.5%	1,460	0.433	102.1%
Nd Prop %		23.3		23.3	99.9%		23.6	101.1%
Pr Prop %		5.7		5.8	101.0%		5.7	100.4%
Dy Prop %		1.0		1.0	100.9%		1.0	101.6%
Tb Prop%		0.4		0.4	99.7%		0.4	99.7%
LREO Prop %		92.1		92.1	99.9%		92.2	100.1%
HREO Prop %		7.9		7.9	101.0%		7.8	99.3%
CREO Prop %		27.7		27.7	100.0%		27.9	100.7%
Th ppm		46.0		49.2	106.8%		48.5	105.3%
U ppm		1.5		1.8	114.3%		1.7	112.8%

Stack B	Num Samples	Sample Mean %	Num Blocks	Model Mean	% Compare to Samples	Num Blocks 1st Search	Model 1st Search Mean	% Compare to Samples
TREO %	369	0.464	2,000	0.450	97.0%	1,333	0.462	99.6%
Nd Prop %		23.7		23.6	99.7%		23.7	100.1%
Pr Prop %		5.9		5.8	98.3%		5.7	96.7%
Dy Prop %		1.0		1.0	102.6%		1.0	99.4%
Tb Prop%		0.3		0.3	99.7%		0.3	97.8%
LREO Prop %		92.6		92.6	100.0%		92.7	100.1%
HREO Prop %		7.4		7.4	100.3%		7.3	99.2%
CREO Prop %		27.8		27.8	100.0%		27.8	100.1%
Th ppm		45.2		44.4	98.3%		44.6	98.8%
U ppm		2.0		2.0	98.7%		2.0	100.2%

Table 5: Comparison of mean grades between model and sampling data

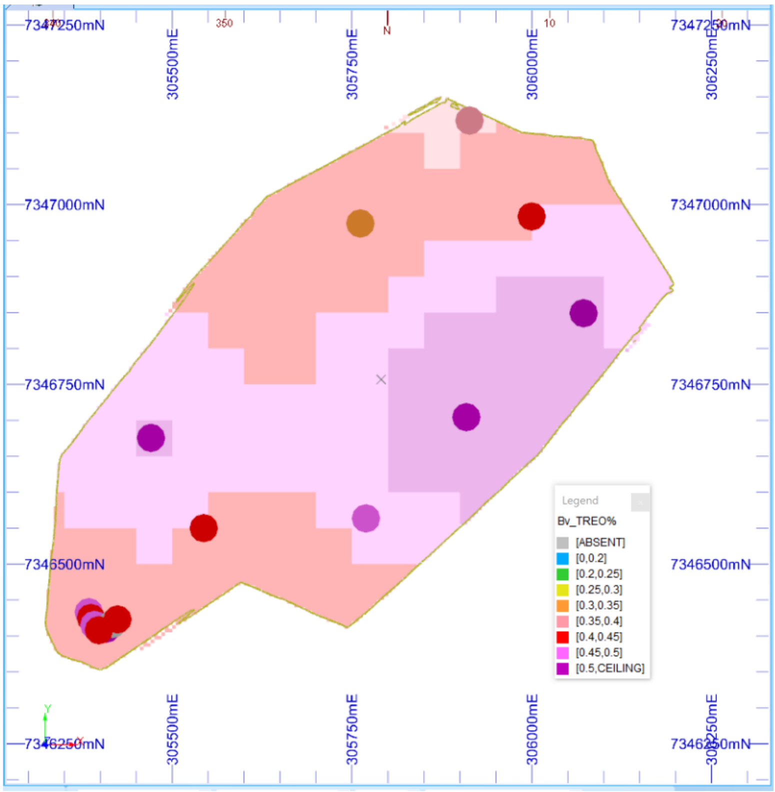


Figure 12: Plan section through the Stack A block model - Elevation 397 m

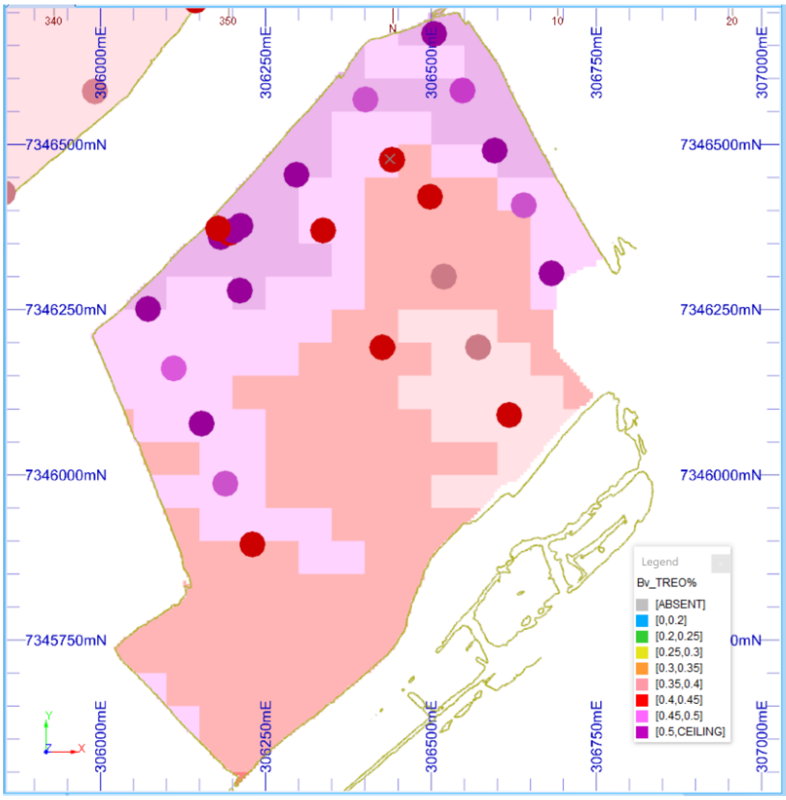


Figure 13: Plan section through the Stack B block model - Elevation 382 m

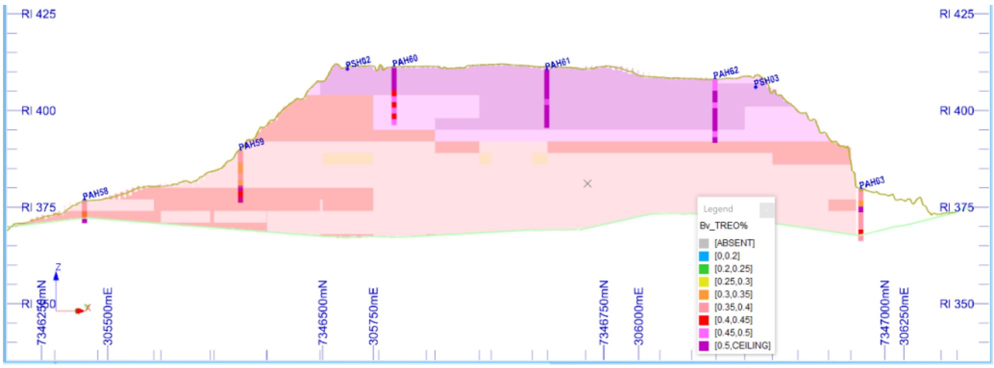


Figure 14: Cross section through the Stack A block model 5X vertical exaggeration - Azimuth 316

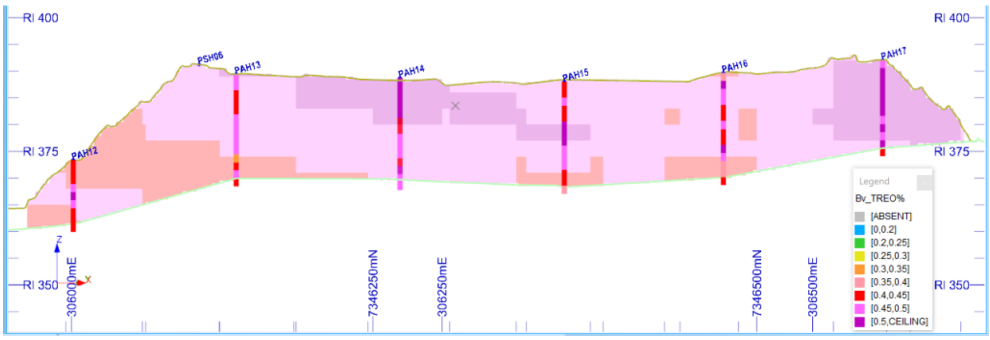


Figure 15: Cross section through the Stack B block model 5X vertical exaggeration - Azimuth 316

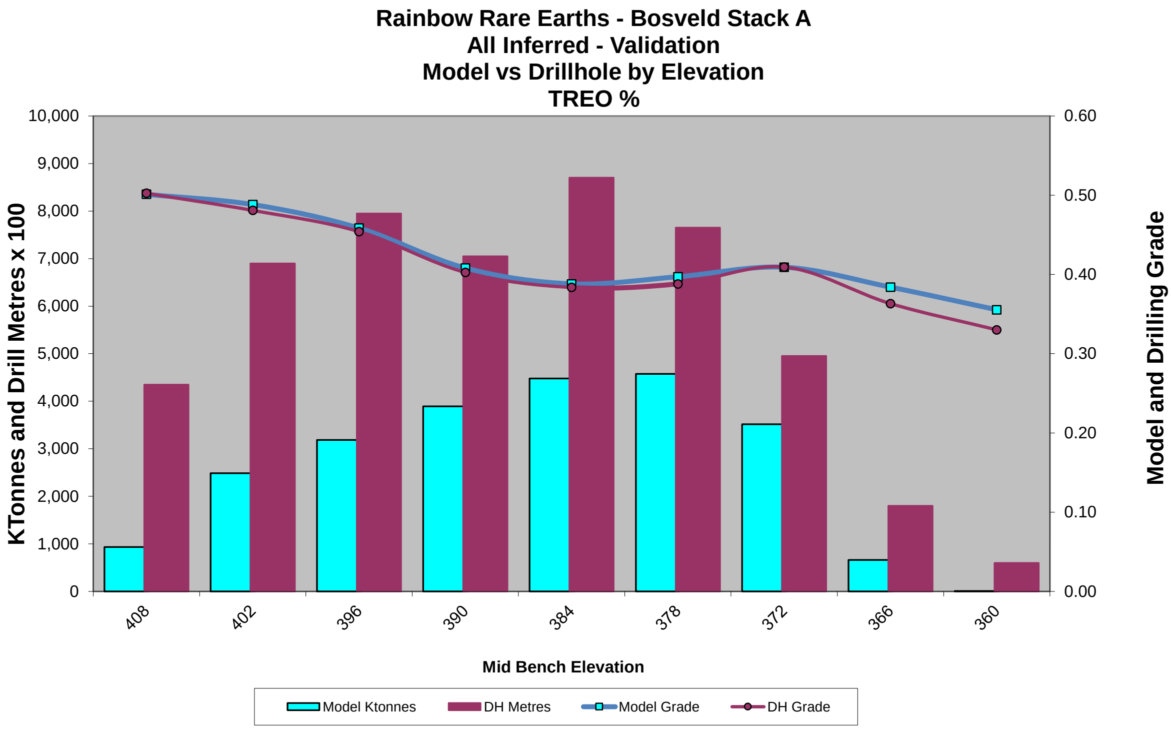


Figure 16: Stack A swath plot by elevation

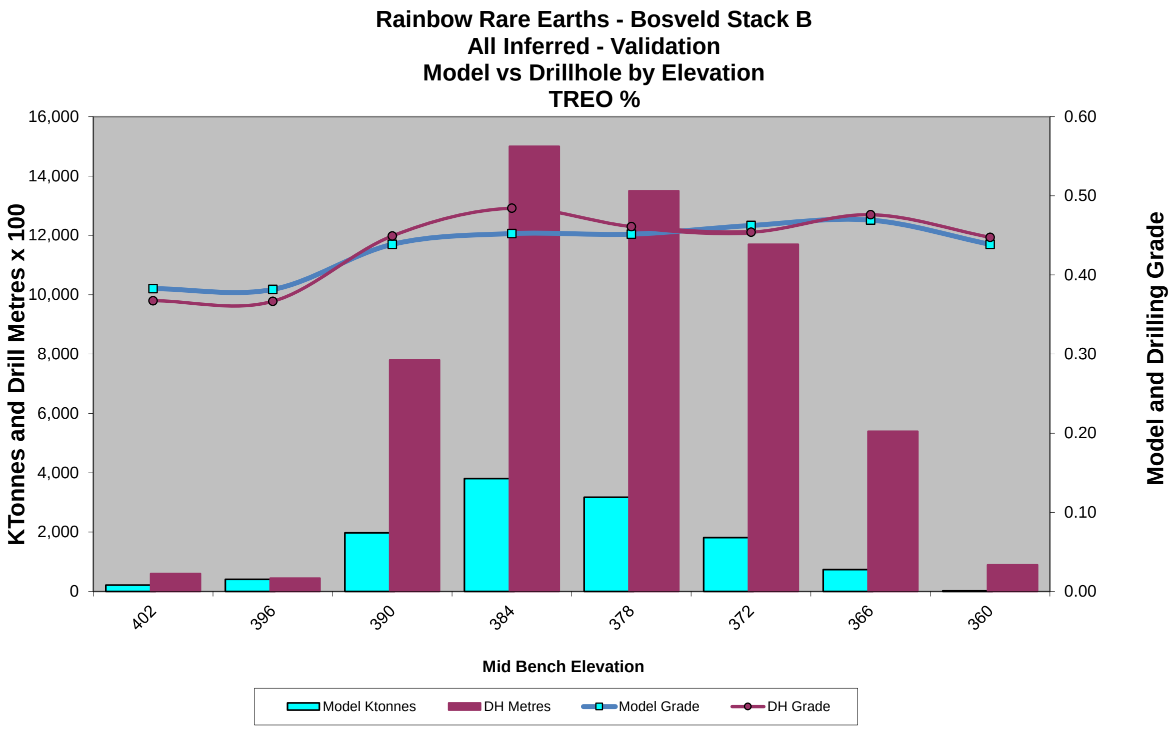


Figure 17: Stack B swath plot by elevation

JORC Classification and MRE Reporting

The mineral resource estimate for the Bosveld phosphogypsum REE Stacks A and B is presented in Table 6. The resource is classified based on the guidelines defined in JORC 2012. The resource is classified as an Inferred Mineral Resource for the following reasons:

1. Completion of site visit by the CP from 11 to 12th December 2020 for 2 days to review the suitability of the auger drilling program, the overall stack geometry and geology, and the BD surface sampling process.
2. Adequate definition of TREO and REE mineralisation continuity derived from the auger drilling and sampling program.
3. Appropriate sample assay analysis techniques with QAQC controls to define the tenor of TREO and REE grades.
4. Adequate survey control using LiDAR to define the surface topography of both Stack A and B, combined with a reasonable estimate of the pre-stacking topography at the base of the stacks using surface trends from the topography around the edge of the stacks together with results of the drilling that penetrated the basal topography, to define the volume of each stack.
5. Geological mapping used to excise areas where rubbish material was dumped together with the residue, and to excise areas currently being reclaimed for agricultural uses.
6. A reasonable estimate of the average in-situ dry bulk density used to estimate the mineral resource tonnage. The CP acknowledges further BD test work is required to improve the BD estimate based on potential variability with stacking depth, surface weathering and water saturation.
7. Adequate initial metallurgical test work and financial analysis completed to satisfy the requirement for potential eventual economic extraction ("RPEEE")

Rainbow Rare Earths - Bosveld REE Tailings Project - Phalaborwa, South Africa Mineral Resource Estimate as at May 2021														
JORC 2012 Classification	Stack Name	Tonnes (Mt)	TREO %	NdPr Prop %	Nd Prop %	Pr Prop %	Dy Prop %	Tb Prop %	LREO Prop %	HREO Prop %	CREO Prop %	Th ppm	U ppm	In Situ dry BD
Inferred	Stack A	27.4	0.42	29.0	23.3	5.7	1.0	0.4	92.1	7.9	27.8	49.0	1.8	1.50
	Stack B	10.9	0.46	29.4	23.6	5.7	1.0	0.3	92.6	7.4	27.8	44.1	2.0	1.50
Total Inferred		**38.3**	**0.43**	**29.1**	**23.4**	**5.7**	**1.0**	**0.3**	**92.2**	**7.8**	**27.8**	**47.6**	**1.8**	**1.50**
Reported at a 0.2% TREO cut-off grade. No constraining shell required as stacks above ground level. Adequate processing test work completed to satisfy RPEEE														

Table 6: Mineral Resource Estimate for the Bosveld Phosphor-Gypsum Stacks

Competent Person's ("CP") Declaration

The information in this report that relates to the Mineral Resources for the Bosveld Project is based on, and fairly represents, information compiled or reviewed by Mr Malcolm Titley, a Competent Person who is a Member of The Australasian Institute of Mining and Metallurgy and the Australian Institute of Geoscientists. Mr Titley is employed by Maja Mining Limited, an independent consulting company. Mr Titley has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr Titley consents to the inclusion of information from this report in Rainbow public releases using his information in the form and context in which it appears.