TECHNICAL REPORT –
RESOURCE ESTIMATION FOR THE ENGEBOEFJELLET RUTILE/GARNET DEPOSIT, NORWAY

Prepared for

Nordic Rutile AS
(A Subsidiary of Nordic Mining ASA)

by

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1 SUMMARY

1.1 Overview

The Engeboefjellet (Engeboe) rutile deposit is owned by Nordic Rutile AS (Nordic), a subsidiary of Nordic Mining ASA. This report describes an updated resource estimation, as a result of a drilling campaign completed in 2016 by Nordic. Nordic is currently conducting a pre-feasibility study (PFS) for the Engeboe project. This resource estimation has been completed to a PFS level, according to the guidelines of the JORC code (2012). This study has been focussed on the evaluation of rutile and garnet as potential products from a mining project based at Engeboe. The deposit is considered as having potential for both open pit and underground mining.

This study has been completed by an independent mining consultant, Adam Wheeler, who has been working on the Engeboe project since 2008. He has received full access to all available data and information connected with the deposit and project development, and has received unlimited assistance from all Nordic personnel connected with the project. Adam Wheeler has visited the site several times, including 3 times during 2016, in connection with the recent drilling campaign.

The information in this report that relates to Mineral Resources for the Engebo Rutile project is based on information compiled by Mr Adam Wheeler, who is an independent mining consultant. Mr Wheeler is a Fellow of the Institute of Material, Minerals and Mining and has sufficient experience, which is relevant to the style of mineralisation and type of deposit under consideration, and to the activity he is undertaking, to qualify as a Competent Person in terms of the 'Australian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserve' (JORC Code 2012 Edition). Mr Wheeler consents to the inclusion of such information in this report in the form and context in which it appears.

1.2 Conclusions

The following conclusions have been reached:

a) The resource base has been significantly updated since 2008, with the additional drilling elevating resource category levels in the open pit area, improved and extended interpretation through the deposit.

b) The measured and indicated resources estimates for the deposit based on a 3% TiO_2 cut-off has increased by 61Mt, as compared to 2008. The inferred resource figures have increased by 15 Mt. The average TiO_2 grade, for measured and indicated resources, deposit based on a 3% TiO_2 cut-off, is now 3.89%, as compared to 3.77 % in 2008.

c) The new drilling campaign included detailed investigation of geotechnical parameters for pit stability evaluations, updated density measurements and more extensive data on chemical and mineralogical properties of the deposit.

d) The 2016 diamond drilling and surface sample data have confirmed the previous information gathered by DuPont/Conoco. This work has therefore supported the use of all available data (DuPont/Conoco and Nordic) for the update of all resource categories.

e) The drilling campaign during 2016 enabled garnet grades to be estimated from a correlation between assayed chemical data and garnet quantification from an extensive QEMSCAN programme. The garnet grade, for measured and indicated resources, is on average 43.7 % at a TiO_2 cut-off at 3%.

f) An updated pit optimisation in general supports the open pit limit that was defined and approved in the industrial zoning plan. .

1.3 Ownership and Permits

Nordic acquired claims to a mineral deposit in Engeboefjellet in the Naustdal municipality in Norway from ConocoPhillips. In October 2007, Nordic was granted a 10 year extension of the concessions for the acquisition of extraction permits for the Engeboe deposit. The permits will be either renewed in October 2017 or replaced by an application for an operation license.

The industrial area plan (zoning plan) and the discharge permit for the Engeboe project are approved and final, without possibility for further appeals. The permits were granted in 2015.

1.4 Project History

Engeboe was first recognised as a possible rutile deposit in the 1970s, after development of a local road tunnel. DuPont started a search for rutile deposits in Norway during the 1990s, in conjunction with the Geological Survey of Norway (NGU), which led to their acquisition of Engeboe and a subsequent drilling campaign from 1995-97. However, in 1998 DuPont divested its interests in Engeboe to Conoco, due to changes in corporate strategy. Conoco subsequently sold its interests in Engeboe to Nordic in 2007. No further appreciable sampling or subsequent resource estimation work was completed during the Conoco ownership period.

Nordic assigned Adam Wheeler to complete an updated resource estimation study of Engeboe, most of the work for which was completed during April, 2008. This data and information was then used as the basis for the development of a Scoping Study for Engeboe, which was produced in November, 2008, and was completed by Adam Wheeler and Bob Dowdell, both independent mining consultants. This scoping study included:

- **Preliminary mine planning.** This primarily focused on the development on a large open pit, which would feed a processing plant situated in the southern part of the project area. Future underground mining was also considered.
- **Planning of future diamond drilling.** This was aimed at enhancing the resource estimation, allowing the future estimation of open pit reserves, geotechnical assessments and garnet analysis.
- **Process engineering.** All relevant information was included on the scoping study, connected with the recovery of rutile concentrates and garnet. During the DuPont and Conoco ownership, only processing of rutile was considered. Since then the Norwegian University of Science and Technology (NTNU in Trondheim) has done some more processing rutile testwork and has done some garnet recovery testwork.
- **Preliminary economic modelling.** The resource model was used as the basis of testing various key project parameters, such as processing capacities and production constraints.

Building on this scoping study, Nordic used this as the catalyst for ongoing project development, principally to obtain the necessary permits for the project and to carry out a diamond drilling campaign over the potential open pit part of the deposit. This drilling campaign was completed between February and May, 2016, achieving 38 new diamond drillholes with a total of 6348 meters. To facilitate the drilling campaign, Nordic set up a local core logging and storage facility in Naustdal, with a team of geologists and workers. As well as the drilling campaign, other geological work included surface sampling, geotechnical mapping and surface geological mapping. Additionally, older cores from the former DuPont/Conoco drilling campaigns were obtained, relogged and resampled, to assist with verification of historical data.

1.5 Geology

The Engeboe-Vevring area is located on the northern side of the Førde fjord, and is characterized by a series of mafic rocks, intercalated with grey gneisses. The mafic rocks are predominantly eclogites and amphibolites.

The Engeboefjellet deposit forms a 2.5m km long E-W trending lenticular body. The body is believed to originally represent a Proterozoic gabbroic intrusion that was transformed to eclogites during high pressure Caledonian metamorphism, approximately 400 million years ago. During this episode, the ilmenite in the protolith was transformed to rutile, and so the titanium-rich parts are now contained in rutile.

The garnets of the Engeboefjellet deposit have chemical components of different end-members dominated by the almandine end-member.

During the previous exploration work carried out by DuPont/Conoco, three main types of eclogites were distinguished, depending primarily on iron and titanium content, as well as being visually distinctive. These broad eclogite categories were also used in the 2016 drilling campaign, and may be summarised as:

Leuco-Eclogite	<2% TiO_2, light coloured, often coarse grained.
Transitional Eclogite	2-3% TiO_2, transitional with no clear boundary.
Ferro-Eclogite	>3% TiO_2, dark, abundant garnet, visible rutile.

There is also some retrograde metamorphism of eclogite, which can cause rutile TiO_2 to convert back to ilmenite FeTiO3. This reduces the quality of the rutile ore and may influence the recoverability of the Ti-content. In previous and the current 2016 studies there have been additional laboratory measurements of acid-soluble TiO_2, which allows an estimation of the proportion TiO_2 in ilmenite (and therefore rutile).

1.6 Database

The current sample database contains data from 49 surface diamond drillholes drilled by DuPont/Conoco in the 1990s, now augmented by an additional 38 surface diamond drillholes drilled by Nordic in 2016. Additional data includes surface samples, surface mapping results and samples taken from the walls of a road tunnel which passes through the lower part of the deposit. Additional surface samples were also taken by Nordic in 2016. The 2016 drilling data was also used to help verify the DuPont/Conoco data, provide much better data and information for garnet appraisal, provide density data, geotechnical data and provide metallurgical samples.

These data were used to update the geological resource model, with estimated TiO_2 grades. The 2016 drilling was focussed on the potential open pit area of the deposit, and the holes were laid out on 60m section lines, so as provide the best opportunity for elevating resource category levels.

Garnet (GNT) grade values have been derived from estimated values of TiO_2, TiO_2 (soluble), Fe_2O_3, K_2O, SO_3 and SiO_2. The relationship between garnet and these other assayed variables was determined from QEMSCAN analysis.

1.7 Mine Planning

The current study is focussed on providing a resource estimate only. However, an updated open pit optimisation was completed as part of this study, so as to provide a logical pit constraint for the resource estimation. Consistent with the 2008 scoping study, the open pit concept was to consider ore extraction from the pit down a central ore pass, to an underground crusher station. From there the crushed ore would be transferred along an underground conveyor to the plant area in the south-east corner of the property.

1.8 Mineral Processing and Metallurgical Testing

The current processing recovery flowsheet stems largely from previous work during the period of DuPont ownership. This processing methodology has now been augmented to allow also for the recovery of garnet. Nordic has carried out some additional test work through Trondheim University (NTNU) and Outotec in Finland. A preliminary flowsheet was established to optimise rutile and garnet recoveries.

1.9 Mineral Resource Estimate

The evaluation work was carried out and prepared according to the guidelines of the JORC code (2012). The updated resource estimation is shown in Table 2 1, for different cut-off grades. All of these resource figures pertain to the end of August, 2016 and relate to overall in-situ resources.

Table 1-1. Measured and Indicated Mineral Resources
Effective Date: 31st August, 2016

TiO_2 Cut-Off	CLASS	Tonnes Mt	TiO_2 %	GNT %
3%	*Measured*	15.0	3.97	44.6
	Indicated	77.5	3.87	43.6
	Measured + Indicated	**92.5**	**3.89**	**43.7**
	Inferred	138.4	3.86	43.5

TiO_2 Cut-Off	CLASS	Tonnes Mt	TiO_2 %	GNT %
2%	*Measured*	19.0	3.68	43.9
	Indicated	105.7	3.51	43.0
	Measured + Indicated	**124.7**	**3.53**	**43.2**
	Inferred	254.5	3.22	42.5

Notes

. Grades above are for total TiO_2

. Resources below sea-level are limited to a boundary 50m from edge of fjord

2 INTRODUCTION

2.1 Terms of Reference

This Technical report was prepared according to the guidelines of the JORC code (2012), and provides a Resource estimate for the Engeboe project, as of September 2016. It represents an update to the previous estimate in the 2008 Scoping Study.

This report was prepared by Adam Wheeler, at the request of Nordic. Assistance and technical detail were supplied by the technical personnel of Nordic. Adam Wheeler visited the Engeboe site and core processing facilities in Naustdal, from February 8th-10th, March 7th-8th and June 12th-14th, 2016. Adam Wheeler also inspected the ALS sample preparation facilities in Lulea, Sweden, on March 10th, 2016.

2.2 Sources of Information

In conducting this study, Adam Wheeler has relied on data, reports and information connected with the Engeboe project. The information on which this report is based includes the references shown in Section 14.

Adam Wheeler has made all reasonable enquiries to establish the completeness and authenticity of the information provided, and a final draft of this report was provided to Nordic, along with a written request to identify any material errors or omissions prior to finalisation.

2.3 Units and Currency

All measurement units used in this report are metric, and currency is expressed in US Dollars unless stated otherwise.

3 RELIANCE ON OTHER EXPERTS

Adam Wheeler has reviewed and analysed data provided by Nordic and has drawn his own conclusions therefrom. Adam Wheeler has not performed any independent exploration work, drilled any holes or carried out any sampling and assaying.

While exercising all reasonable diligence in checking and confirmation, Adam Wheeler has relied upon the data presented by Nordic, and previous reports on the property in formulating his opinions.

Title to the mineral lands for the Nordic property has not been confirmed by Adam Wheeler and Adam Wheeler offers no opinion as to the validity of the exploration or mineral title claimed.

4 PROPERTY DESCRIPTION AND LOCATION

Engeboe is located close to the town of Førde in south-western Norway, with navigable access to the North Sea. It is on the northern side of the Førde fjord in the Naustdal municipality, in the Sogn og Fjordane county. Its grid reference position is 310,200m E, 6,822,750m N, on the EU89-UTM zone 32 system. Its latitude is 61^{o} 29' 35'' N with longitude 5^{o} 25' 44'' E.

The UTM coordinate system (WGS84) was been used for all the resource estimation work described in this report.

The 611 road (tarmac – single lane) which runs along the north side of the fjord also passes along a 630m tunnel which runs right through the deposit.

An aerial view of Engeboe is shown in Figure 4-1. The overall position of Engeboe within Norway is depicted in Figure 4-2, with its position within the Førde fjord being shown in Figure 4-3. A plan which also shows the topographical contours and other local features are shown in Figure 4-4. The dashed outline limits shown in Figure 4-4 indicate the limits of the land that Nordic may use for mining or processing operations.

Figure 4-1. Aerial View of Engeboefjellet from South-West

Nordic Mining has acquired claims to a mineral deposit in Engeboefjellet in the Naustdal municipality in Norway. Their current duration is up to October 2017. The current claim limits of Nordic for Engeboe are shown in Figure 4-5, and are summarised in Table 4-1. These cover a total area of 2,415,775m^2.

In 2006, Nordic Mining acquired 100 per cent of ConocoPhillips Investments Norge AS' interest in a rutile resource at Engeboe in Naustdal municipality in Norway. The purchase price was NOK 3.2 million. Additionally, the agreement specifies a fixed contingent consideration of NOK 40 million that will be paid to the seller if and when commercial production or sales of mineral from the property commence.

The assets, rights, and obligations related to the Engeboe deposit were transferred to Nordic Mining's subsidiary Nordic Rutile AS in 2011.

The Engeboe deposit and the planned production/processing plant are located adjacent to a county road and a deep water harbour facility. Shipping of products will take place from the local deep sea key directly to the customers.

The Extraction Permits are maintained and valid in accordance with the general provision of the Norwegian Mining Act. Nordic Rutile will apply for an extension of the Extraction Permits in the period up to its application for an operational licence. Extension shall in general be granted if the areas in question are considered necessary for Nordic Rutile's (planned) operations. Nordic Rutile will prior to start of large scale production apply for an operation l licence. The operating licence will replace the Extraction Permit as legal basis for the planned activity.

Figure 4-2. Position of Engeboe in Norway

Figure 4-3 Position of Engeboefjellet Relative to Førde Fjord

Figure 4-4. Location Plan of Engeboefjellet

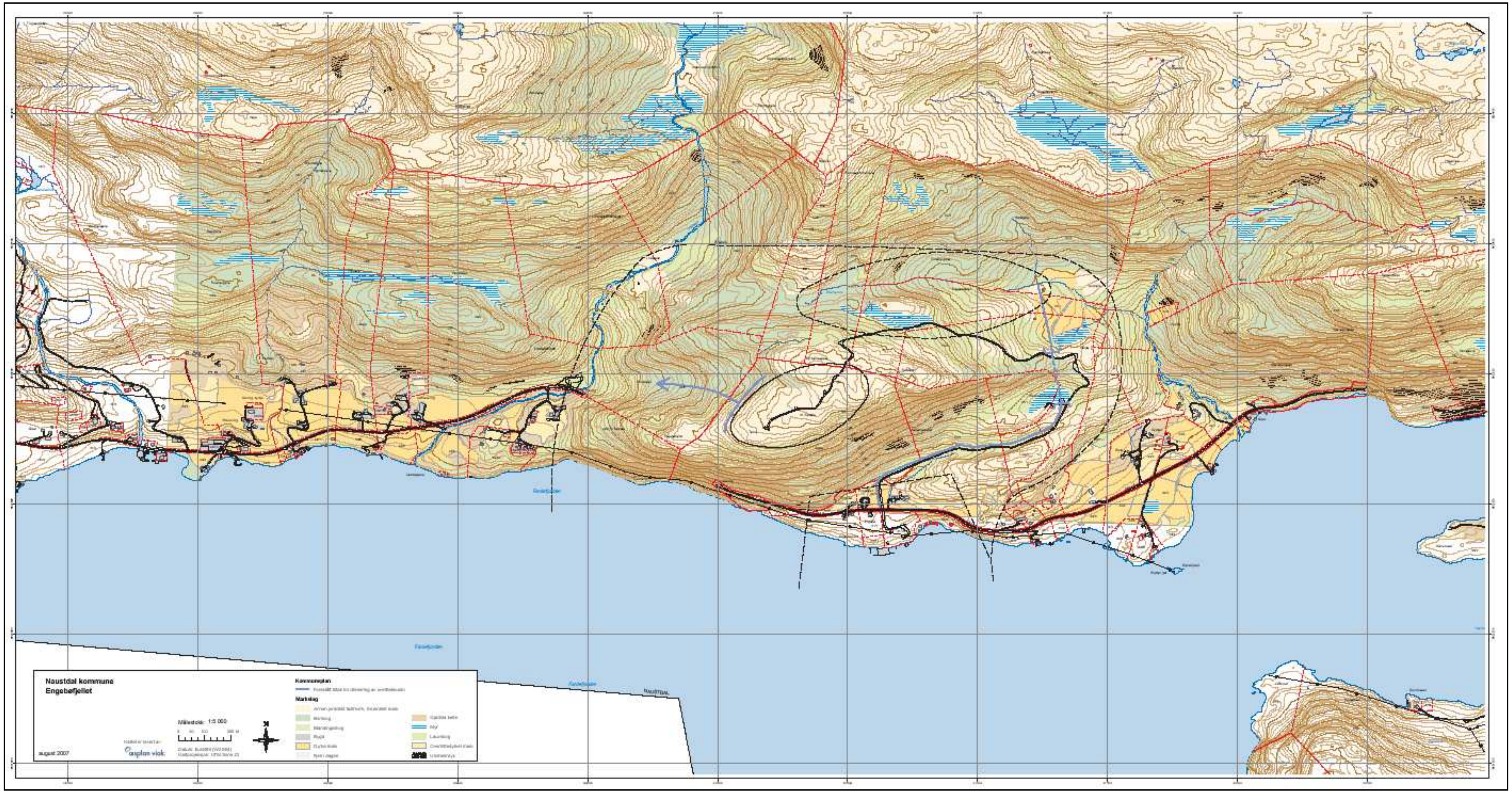


Table 4-1. Nordic extraction permits for Engeboe

Rec	Nr	Type	Name	Customer	Area	Date issued
1	0001/1997-VB	GU	ENGEBØFJELLET 1	NORDIC MINING ASA	250500	1997.11.12
1	0002/1997-VB	GU	ENGEBØFJELLET 2	NORDIC MINING ASA	297000	1997.11.12
1	0003/1997-VB	GU	ENGEBØFJELLET 3	NORDIC MINING ASA	205375	1997.11.12
1	0004/1997-VB	GU	ENGEBØFJELLET 4	NORDIC MINING ASA	291500	1997.11.12
1	0005/1997-VB	GU	ENGEBØFJELLET 5	NORDIC MINING ASA	199500	1997.11.12
1	0006/1997-VB	GU	ENGEBØFJELLET 6	NORDIC MINING ASA	299150	1997.11.12
1	0007/1997-VB	GU	ENGEBØFJELLET 7	NORDIC MINING ASA	297000	1997.11.12
1	0008/1997-VB	GU	ENGEBØFJELLET 8	NORDIC MINING ASA	276000	1997.11.12
1	0009/1997-VB	GU	ENGEBØFJELLET 9	NORDIC MINING ASA	299750	1997.11.12

Figure 4-5. Nordic extraction permits for Engeboe

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, PHYSIOGRAPHY

Engeboe is a mountain ridge located immediately to the east of the small village of Vevring on the northern side of Førde fjord. Vevring falls under the jurisdiction of Naustdal, a small town (population 2,800) located to the north-east of the deposit. The town of Førde (population 13,000) lies about 10km to the east of Engeboe. Førde has a good infrastructure, including a small airport, numerous hotels and shopping complex. The airport can be reached by regular flights from Oslo, Bergen and Stavanger, while there is also a bus and ferry service to Førde from Bergen.

The locations of Engeboe and Vevring relative to the town of Førde is shown in Figure 5-1. The road to Vevring and the coastal village of Stavang from Førde and Naustdal includes a 630m long tunnel which passes through the Engeboe deposit. Development of the lower part of the deposit may require an alternative route to be constructed. The potential open pit considered in the current study is not affected by the access tunnel.

The climate at Engeboefjellet is characterized by long, warm days in summer and cool short days in winter. Snow is common in winter, but proximity to the North Sea and the relatively low altitude result in no permanent snow accumulation. There is no time of the year when mining and processing operations would not be possible. About 200cm of rain falls each year, through all four seasons. Rivers drain down to Førde fjord at both the west and east ends of Engeboefjellet.

At the current time there is a very small access road from the public road beside the fjord, up to the top of the Engeboe ridge. The location of this access road, and the underground tunnel, are shown in Figure 5-2.

Figure 5-1. Location of Engeboefjellet and Vevring

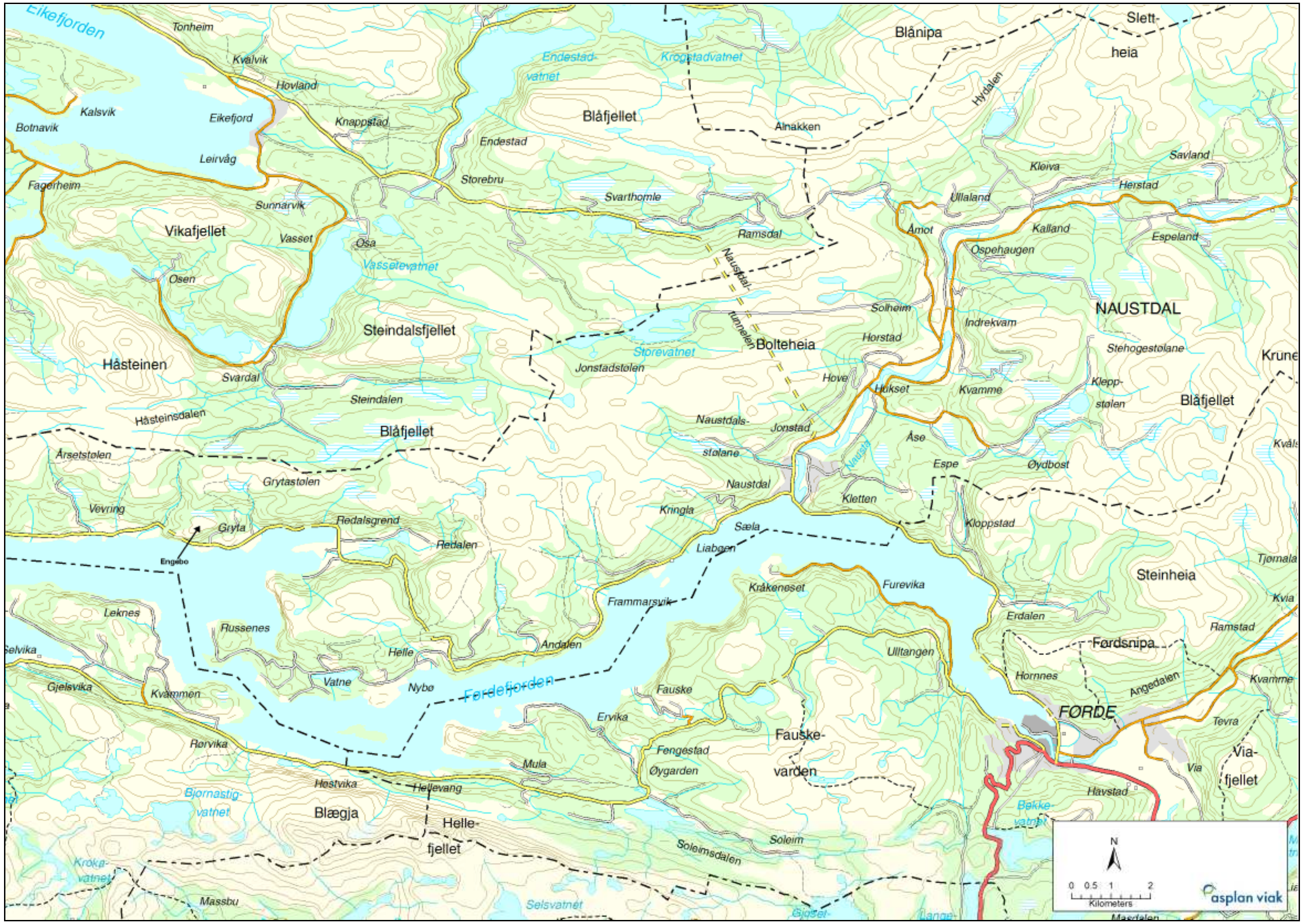


Figure 5-2. Satellite Plan View of Deposit Area


N
Current access road
Approximate extent of current
potential open pit
Underground
tunnel
Engebo
Public road
611
Image © 2016 DigitalGlobe
© 2016 Google
474 m

6 PROJECT HISTORY AND EXPLORATION

The previous exploration history of Engeboe can be summarised as follows:

- **1970s and mid-1980s.** The Engeboefjellet was recognised as a rutile deposit by Elkem. Additional sampling was done by collaboration between Elkem and NGU on various rutile-bearing eclogites in the area.

- **1989.** DuPont and NGU started an evaluation of Norwegian rutile projects, aimed at deposits suitable for DuPont's chlorination process pigment plants. Engeboefjellet was identified as the most favourable.

- **1995-97.** Conoco (then a DuPont subsidiary) and local Fjord Blokk made a joint sampling and mapping exercise, with additional core drilling and beneficiation testing. NGU was involved as an external consultant. DuPont discontinued the project after 1997 due to a change in company strategy. Conoco – now part of ConocoPhillips, maintained the mineral rights

- **2005-06**. A number of mining companies visited Engeboefjellet, partly organised by "Rutilnett", an informal working group organised through Naustdal municipality. Attention for the deposit re-emerged, and in 2006 several parties indicated their interest to purchase the Engeboefjellet deposit from ConocoPhillips. Nordic Mining was the most successful and initiated further development of the Engeboefjellet deposit.

- **2008.** Scoping Study completed for the Engeboe project completed for Nordic by Adam Wheeler and Bob Dowdell, independent mining consultants. This included an updated resource estimation, and preliminary underground and open pit mine planning. This enabled the approximate extent of a potential open pit to be defined.

- **2008-2015**. Comprehensive environmental impact assessments (EIA) carried out, and granting of zoning plan and discharge permit for the project.

- **2016**. Diamond drilling and surface sampling campaign. This campaign is described in detail in this report.

7 GEOLOGICAL SETTING AND MINERALISATION

7.1 Geological Background

The rocks found in the Engeboe area belong to the Western Gneiss Region, which is dominated by Pre-Cambrian ortho-gneisses. These rocks have been subjected to varying degrees of pressure and temperature as revealed by the stages of metamorphism exhibited. There are a number of eclogite bodies in the western part of the province, among them the massive Engeboefjellet eclogite.

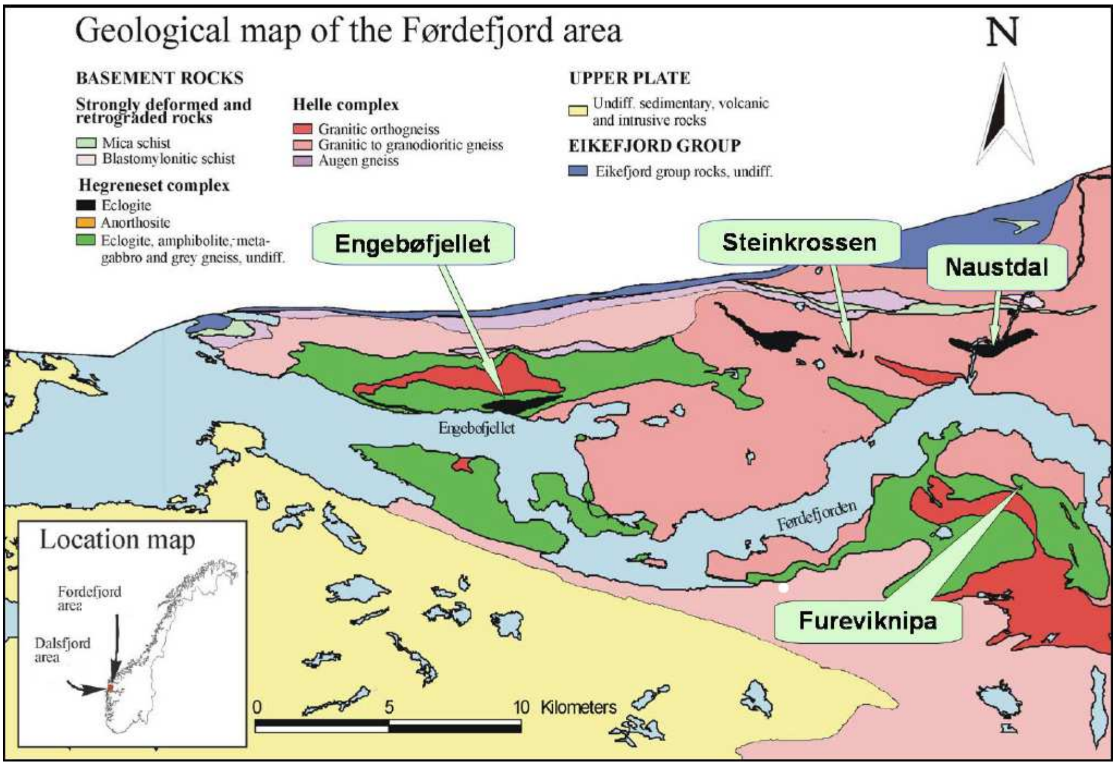
The Førde fjord area belongs to the Western Gneiss Region, structurally situated in the footwall beneath rocks of Devonian age. The area has been subject to faulting and folding, resulting in regional east-west trending folds. These folds are the result of north-south compressional forces associated with the Caledonian orogenic episode some 400 million years ago. The rocks show different and complex deformation styles, with metamorphic grade varying from amphibolite facies, through to eclogite facies.

7.2 Main Geological Units

There are two, mainly intrusive, units seen in the Førde fjord area, the Hegreneset complex and the surrounding Helle complex. A geological map of the Førde fjord area is shown in Figure 7-1. The Hegreneset complex consists of a variety of potassium-poor rocks, while Helle has more potassium-rich rocks. Hegreneset consists of basic to ultramafic, mainly eclogitic rocks with cross-cutting dioritic and granodioritic intrusives. The eclogites are best preserved in the central part of the dome structure which the complex exhibits. This is represented by the Engeb0fjellet deposit. The Helle complex is comprised of mainly granitic to granodioritic gneisses, often migmatitic or banded and red to grey in colour. The rocks have been subject to strong deformation resulting in varied structures and textures.

The Caledonian orogeny is responsible for the eclogite facies which have developed in the area. The early structures caused high-ductile deformation-zones to develop. These zones contain high amplitude, isoclinal and modified folds. The rapid emplacement of the rocks by structural means appears to have assisted in the preservation of the rutile grains. The late-Caledonian simple shear and asymmetric folding probably occurred after the eclogite was formed. The regional and local structures and general rock composition are readily evidenced on Landsat images.

Figure 7-1. Geological Map of the Førde Fjord Area (NGU)



7.3 Mineralisation

The Engeboefjellet eclogite and the surrounding undifferentiated mafic and felsic rocks belong to the Hegreneset complex. The eclogite forms a 2.5km long east-west trending lens with a distinctly massive character compared to the surrounding amphibolite facies rocks. The eclogite is believed to represent a Proterozoic gabbroic intrusion that experienced crystal fractionation processes leading to enrichment in iron and titanium, and transformed into eclogite during Caledonian high pressure metamorphism approximately 400 million years ago. In this process, ilmenite was replaced by rutile. The strike of the eclogite is generally east-west with a dip of 85° north. However, the dip varies from a steep angle northwards, through vertical to southwards, but for the most part is 60-85° to the north. Detailed structural studies reveal many episodes of complex major folding and development of foliation. In general, the eclogite may be considered an anticlinorium with a major fold axis trending about east-west. The limbs of the major fold are also highly contorted.

There is considerable exposure of eclogite on surface although the overburden increases to the east and the country rocks frequently fold into the eclogite on its extreme margins. Geological investigations have determined that the eclogite can be subdivided into different types, based primarily on iron and titanium content.

The economically significant ferro-eclogite is iron, titanium and garnet rich. Iron oxide is greater than 16%, rutile greater than 3% and garnet generally over 40%. This type is generally found in the central and western portions of the deposit.

The ferro-eclogite appears totally eclogitised and recrystallised. The central, and major, part of the eclogite lens appears to have been little affected by shearing and retrograde metamorphism, apparently acting as a massive body during post-emplacement shearing. DuPont's experience with its Italian eclogite programme led it to postulate reasons as to why regional variations exist between eclogites and explain why Engeboe is uniquely so well preserved. The thermodynamics of the mineral phases indicate that, similar to the Italian eclogites and many of the others in Norway, retrograde reactions of rutile back to Ca-bearing titanite (sphene) should be the norm. It appears that the rapid emplacement at Engeboe preserved the rutile in a competent rock matrix with no fractures.

DuPont's experience with Norwegian eclogites led it to conclude that those located within the Western Gneiss Region would have attractive rutile contents as long as they had not been greatly affected by shearing. Exploration and drilling campaigns on other Norwegian eclogites within the Western Gneiss Region were unable to indicate potentially mineable material in sufficient quantities to justify development. Engeboe became the focus of the DuPont exploration effort after the issue of mineral rights ownership was resolved, as it does have both the tonnage and grade to justify development.

7.4 Mineralogy

Engeboefjellet is a gabbroic intrusion that was metamorphosed under eclogite-facies conditions of approximately 15-17kbar pressure and approximately 600°C temperature during the peak of the Caledonian metamorphism. Eclogitisation corresponds to a complete mineralogical change. No relict magmatic minerals have been found. The principal minerals include garnet, omphacite, amphibole, quartz, dolomite, rutile and pyrite. The texture is generally equi-granular but garnets are commonly coarser than other minerals. Garnet grain size is typically between 0.1 to 0.4mm in diameter, but larger grains up of to 0.5mm are not uncommon. Larger garnet grains may contain inclusions of other minerals. Omphacite and amphibole impart the characteristic green colour to eclogite.

7.5 Waste Rock Types

Outside of the eclogite rock types, the main waste rock types are:

- **Amphibolite**. This is generally homogenous with no banding, moss-green with no garnets. It generally has a sugarish texture with no garnets.
- **Garnet Amphibolite**. This is generally homogenous with no banding, darker green than eclogite, and with visible plagioclase feldspar. Sometimes there is a corona around the garnet occurrences.
- **Gneiss**. This generally occurs as internal zones within the main eclogite bodies. It is generally foliated with continuous mica-rich rock.
- **Alternating Mafic and Felsic Rocks.** These are generally heavily deformed, with frequent quartz veins and abundant micas.
- **Quartz Veins.** There are some occasional massive quartz veins, with thicknesses up to one metre.

8 DEPOSIT TYPE

Three main types of eclogites were distinguished, depending primarily on iron and titanium content. This classification has broadly been retained for the current resource estimation work:

- **Ferro-eclogite**, which generally contain >16%Fe_2O_3 and >3% TiO_2. This has a more massive character than the other eclogite types, can show banding and extensive folding.

- **Transitional-eclogite,** which generally contains 14-16% Fe_2O_3 and 2-3% TiO_2. The contact between the leuco and ferro eclogites is gradational, and may extend over several metres of intermediate composition, which has therefore been demarcated as transitional.

- **Leuco-eclogite,** which generally contains <14% Fe_2O_3 and <2% TiO_2. The ophitic gabbro protolith texture may be preserved locally.

The rutile from Engeboefjellet is practically free of uranium, generally less than 1ppm. Figure 8-1 shows photographs of different varieties of rutile-rich ferro-eclogite. A 3D view of the eclogite outcrop at Engeboe is shown in Figure 8-2. A simplified map of the Engeboe eclogites is shown in Figure 8-3.

There is also some retrograde metamorphism of eclogite, which can cause rutile TiO2 to convert back to ilmenite $FeTiO_3$ and occasionally titanite $CaTiOSiO_5$ (sphene). This extensive alteration may reduce the quality of the rutile mineralisation and could affect the recoverability of the Ti-content. In this and previous studies there have been additional laboratory measurements of acid-soluble TiO_2 to allow an estimation of the proportion of ilmenite (and therefore rutile) present. Figure 8-4 shows a photograph of eclogite with retrograde alteration veins. Figure 8-5 shows a scanning electron microscope (SEM) image showing relic rutile in retrograde ilmenite and minor titanite.

Other major constituents of the eclogite rocks include garnet (generally 30-50% by volume, see Section 10.2.7), omphacite (pyroxene) and amphibole. Phengite and paragonite (white micas) are characteristic of leuco-and transitional eclogites, but minor amounts are also found in mafic eclogites. Other accessory minerals include epidote, carbonates (dolomite/ankerite), quartz, pyrite and apatite. Zircon occurs rarely, as tiny inclusions in rutile and garnet.

Figure 8-1. Photographs of Different Varieties of Rutile-Rich Ferro-Eclogite

Top: Homogenous undifferentiated eclogite

Middle: Heterogeneous deformed eclogite, cross-cut by late quartz-veins

Bottom: Homogenous eclogite cross-cut by late quartz clinopyroxene vein

Figure 8-2. Surface Outcrop of Eclogite, 3D View from South-West

(Scale bar lower right = 1km)

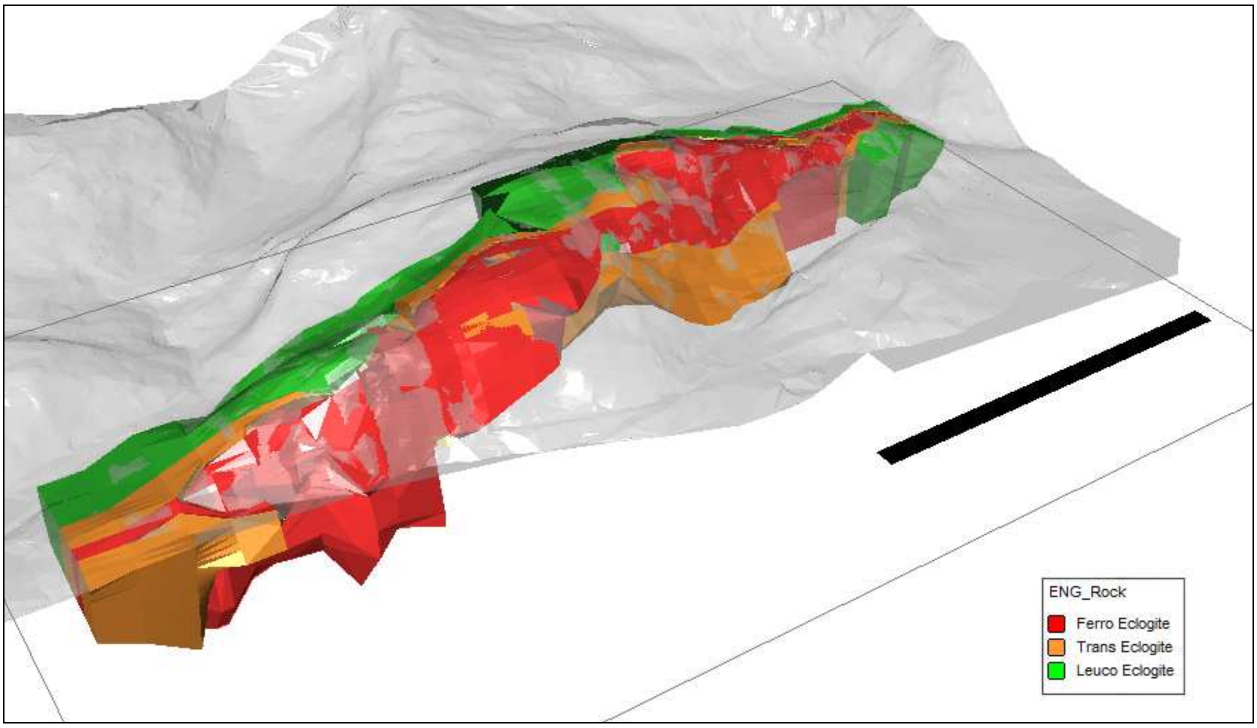


Figure 8-3. Simplified Geological Map of Engebo Eclogites

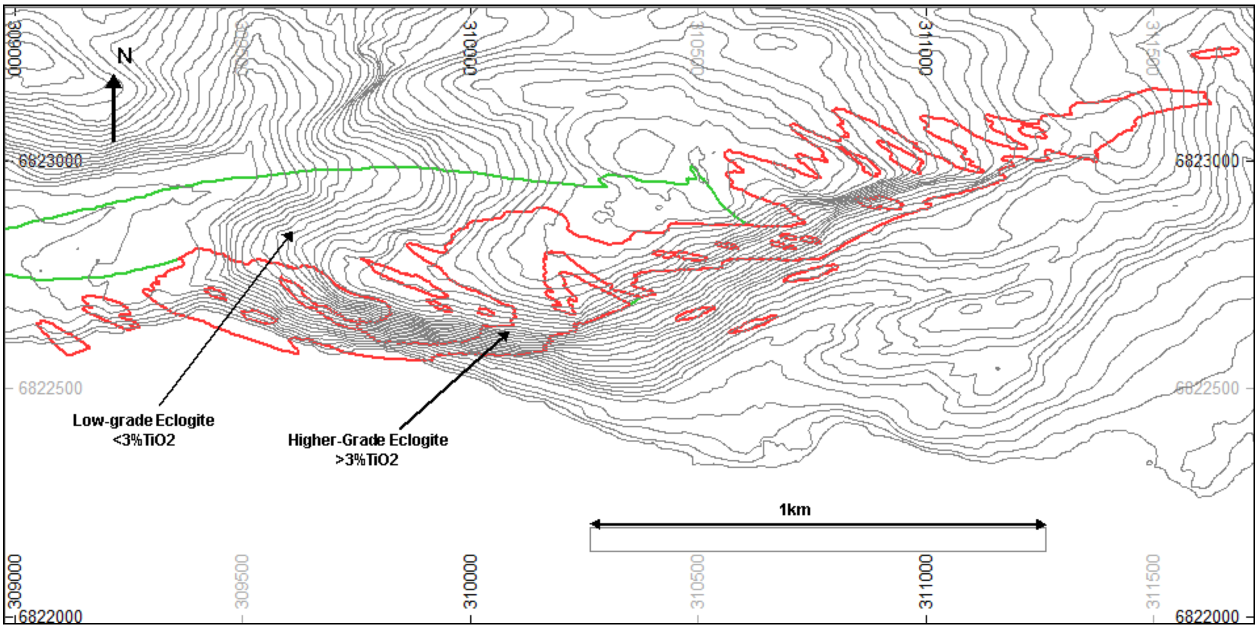


Figure 8-4. Photograph of Retrograde Alteration Veins

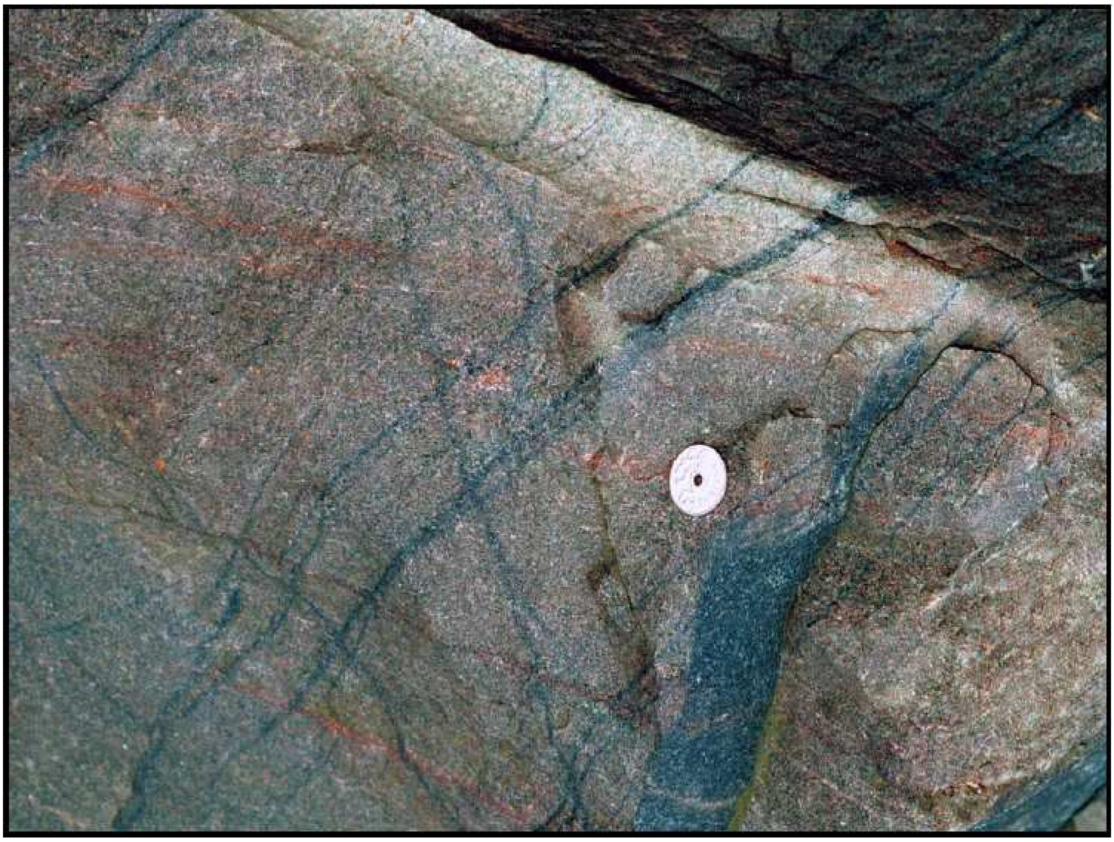
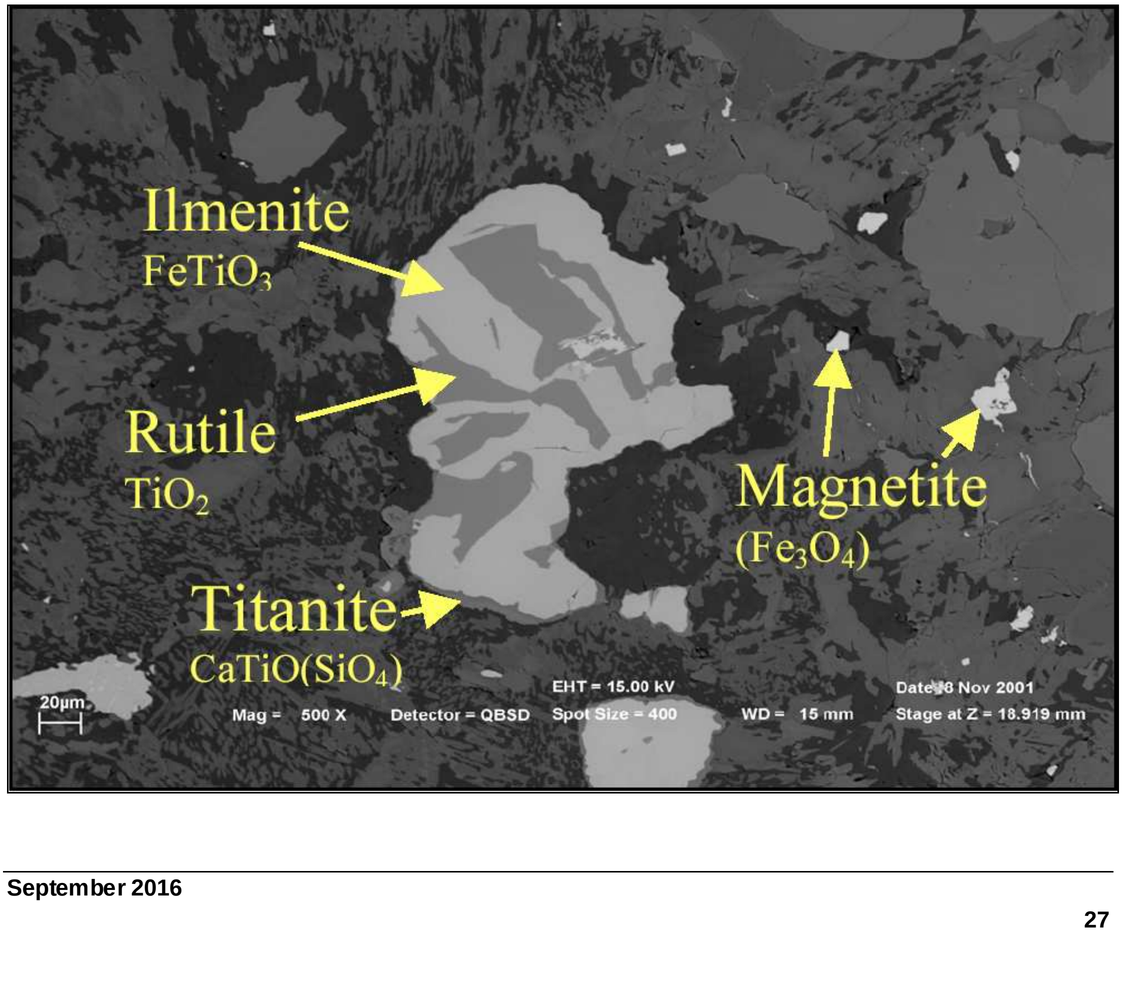


Figure 8-5. SEM Image, Showing Relict Rutile Within Retrograde Ilmenite



9 DRILLING

A summary of all the diamond drilling that has taken place at Engeboe is shown in Table 9-1. All of the DuPont/Conoco drilling produced BQ (37mm) core. All of the 2016 Nordic drilling produced NQ2 core (50.7mm).

Table 9-1. Drilling Summary

	Drillholes	Length	Average Length/Hole
		m	*m*
1997 DuPont/Conoco	49	15,198	310
2016 Nordic	38	6,348	167

The 2016 drilling was done using Finnish contractors Kati Oy, between February and April 2016. They used Sandvik DE130 and DE140 drilling rigs. Both rigs used wireline drilling. For downhole survey measurements, taken every 5m downhole, they used Reflex Gyro equipment.

The majority of the holes in the 2016 drilling were laid out on a regular 60m x 40m grid, in the area demarcated as the potential open pit area from the 2008 scoping study. These holes, referenced against the 1997 drilling, are shown in plan and section views in Figure 9-1 and Figure 9-2, respectively. 3D views of the drillholes are shown in Figure 9-3 and Figure 9-4. The principal reasons for the 2016 drilling include:

- To provide a better coverage of sample data in the prospective open pit area, and thereby achieve at least an indicated resource category for the majority of the ore in this area.
- To provide a bank of recent data which will help verify the 1997 drillhole data.
- To provide samples for metallurgical testing, in the potential open pit area.
- To provide geotechnical samples and data, to assist with selection mine and slope design parameters.
- To provide extensive additional data for assessment of garnet and different mineralisation qualities.

Example photographs of the 2016 drilling operations are shown in Figure 9-5. On completion of each hole, a casing rod was left in the hole, with a named metal cap screwed on to the top of the rod, approximately 10cm above the ground surface.

Drillhole collars were surveyed using a total station device. At the same time rods were placed in each hole, to enable the survey of the starting dip and orientation of each hole.

Figure 9-1. Plan of Drillhole Data

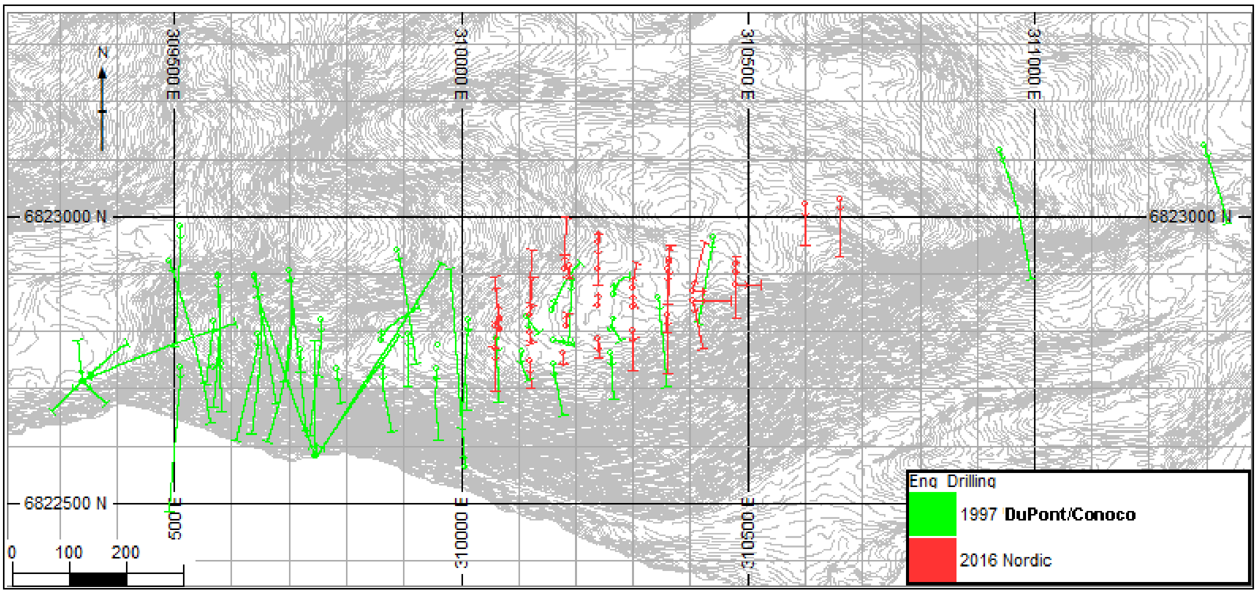


Figure 9-2. W-E Long Section of Drillhole Data

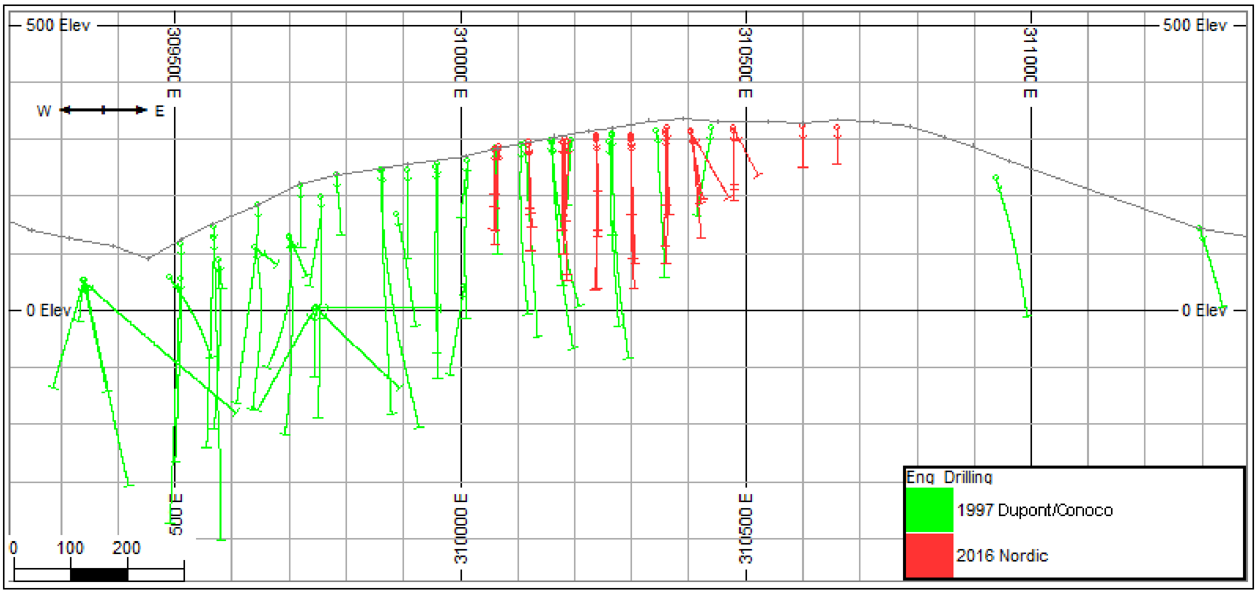


Figure 9-3. 3D View of Diamond Drilling- - Viewed from SW

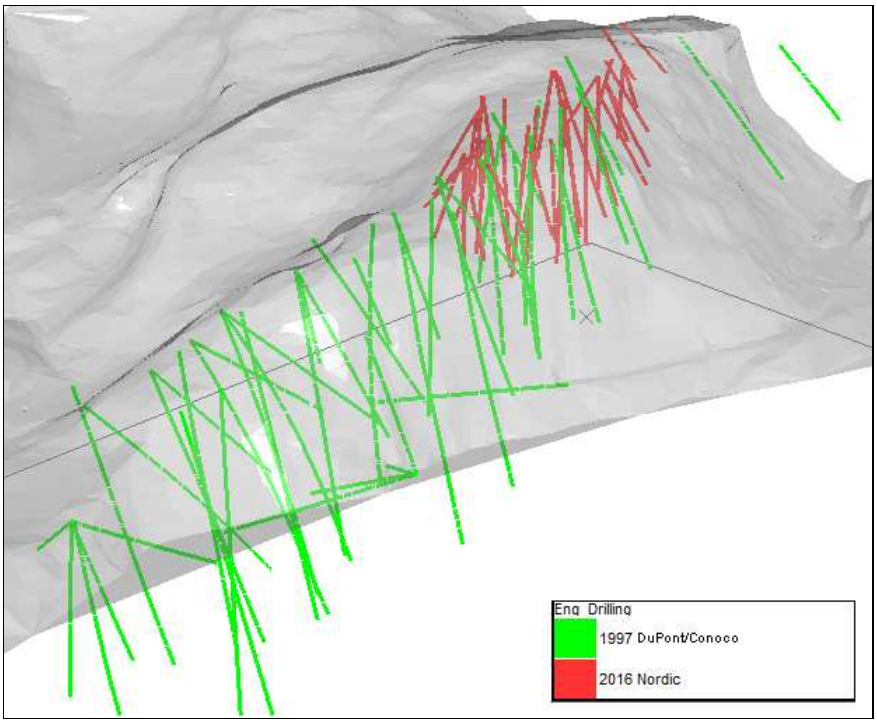


Figure 9-4. 3D View of Diamond Drilling- - Viewed from SE

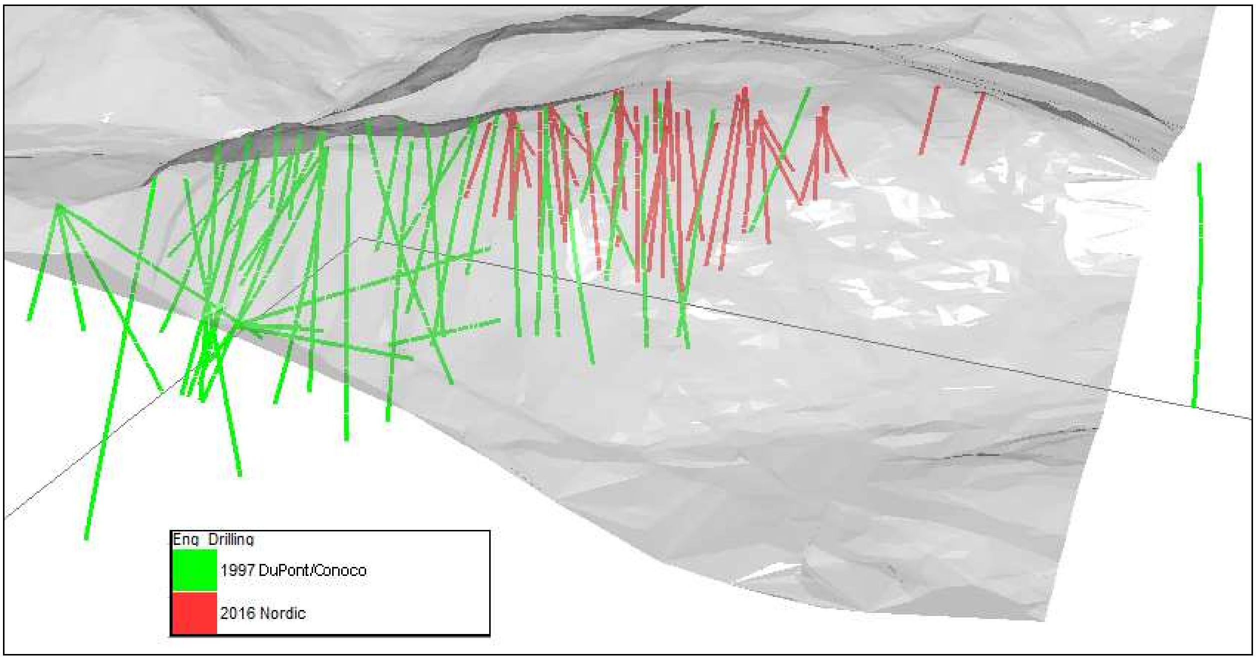


Figure 9-5. Photographs of 2016 Drilling Operations

10 SAMPLE PREPARATION, ANALYSES AND SECURITY

10.1 DuPont/Conoco 1996-97 Drilling Campaign

10.1.1 Sample Preparation and Analyses

Although some computer modelling work was done previously by DuPont, the modelling work involved in the current work for Nordic was done completely anew, starting from master database files (in Access) that were provided by DuPont/Conoco.

In terms of principal measurements carried out by DuPont/Conoco from drill core, of total TiO_2 and Fe_2O_3, there were three different sets of measurements:

- **Engeboe X-Met.** These measurements were taken directly in the field, generally at points along each hole spaced at 0.25m, using an Outokumpu X-Met portable XRF instrument.

- **Løkken X-Met.** As with the Engeboe measurements, a portable XRF measurement was made at points generally spaced at 0.25m.

- **Lab Composites.** At the Løkken NGU laboratory, a number of core composites were prepared and analysed using laboratory XRF equipment. These composites generally represented 10m of core length. These results were then used to calculate instrumental correction factors, which were subsequently applied to both the Engeboe X-Met and Løkken X-Met analyses. Of the 49 holes drilled, 34 were used to create laboratory composites, and on average there were over 3 composites per drillhole.

The X-Met core measurements were taken in different ways – sometimes as an average of 3 measurements taken at 120 degree intervals around the core, and at other times from the flat surface on cut core. There was also some variation whether these measurements were taken wet or dry.

Additional measurements of total TiO_2 and Fe_2O_3 were obtained from samples taken from the side-walls of the road tunnel that runs through approximately the middle part of the deposit. These were taken by chip sampling or by obtaining the drill cuttings from small holes drilled into the walls, less than 1 inch deep. In both cases, the cuttings were reduced to flour with a small portable grinder, and then the X-Met instrument was used to get a measurement. Samples were taken in this way approximately every 20m down the tunnel, which is approximately 630m long.

Surface samples for measurement of total TiO_2 and Fe_2O_3 were also taken, by either chip sampling, drill dust sampling or direct X-Met measurement on the ground. In the case of the chip and drill dust sampling, the X-Met measurements were taken from dust, ground from these samples.

A summary of the number of these total TiO_2 and Fe_2O_3 samples, from the 1997 campaign, is shown in Table 10-1.

A summary of all these samples, taken in the period from 1995 to 1997, is shown in Table 10-1. A plan of these samples is shown in Figure 10-2.

Table 10-1. DuPont/Conoco Sample Summary – For Total TiO_2 and Fe_2O_3 Measurements

TYPE	DESCRIPTION		HOLES	LENGTH	NUMBER SAMPLES
Drillholes	**Total Drilled**		49	15,198	
	X-Met Measurements	Lokken TIO2	29	6,033	24,133
		Lokken FE2O3	29	6,045	24,180
		Engebo TIO2	30	4,306	17,225
		Engebo FE2O3	27	3,714	14,855
		Either TIO2 measurement	49	9,431	37,726
		Either FE2O3 measurement	48	9,070	36,279
	Lab Composite XRF		34	952	116
Tunnel				660	34
Surface Samples	**Chip samples**	Chip97-NGU			229
		chip96-NGU			44
	Drilldust samples	dd95-NGU			108
		dd96-DuPont			118
		dd96-NGU			76
	Direct X-Met	xmet96-NGU			680
		xmet97-DP			104

Table 10-2. Summary of 1995-97 Additional Sampling

Sample Type	Campaign	Number	Sub-Total
Chip Samples	Chip97-NGU	229	273
	chip96-NGU	44	
Drill-dust	dd95-NGU	108	302
	dd96-NGU	76	
	dd96-DuPont	118	
XMet Measurements	xmet96-NGU	680	784
	xmet97-DP	104	
Tunnel Samples	Chips+drill cuttings	34	34
	Total		**1,393**

Additional procedures and measurements applied at Løkken include:

- **Photo-documentation** of each complete core.
- **Magnetic susceptibility** measurements, using a portable instrument.
- **Rutile content** was also determined for each laboratory composite, by additional measurement of acid-soluble TiO_2 by ICP-AES. Wt% Rutile=bulk wt% TiO_2 – acid soluble wt% TiO_2.

The laboratory analyses included a range of measurements. As well as most metallic elements, these measurements also included:

SiO2 Al2O3 Fe2O3 TiO2 MgO CaO Na2O K2O MnO P2O5

An example corelog summary is shown in Figure 10-1.

Figure 10-1. DuPont/Conoco - Example of Corelog Summary : DH1

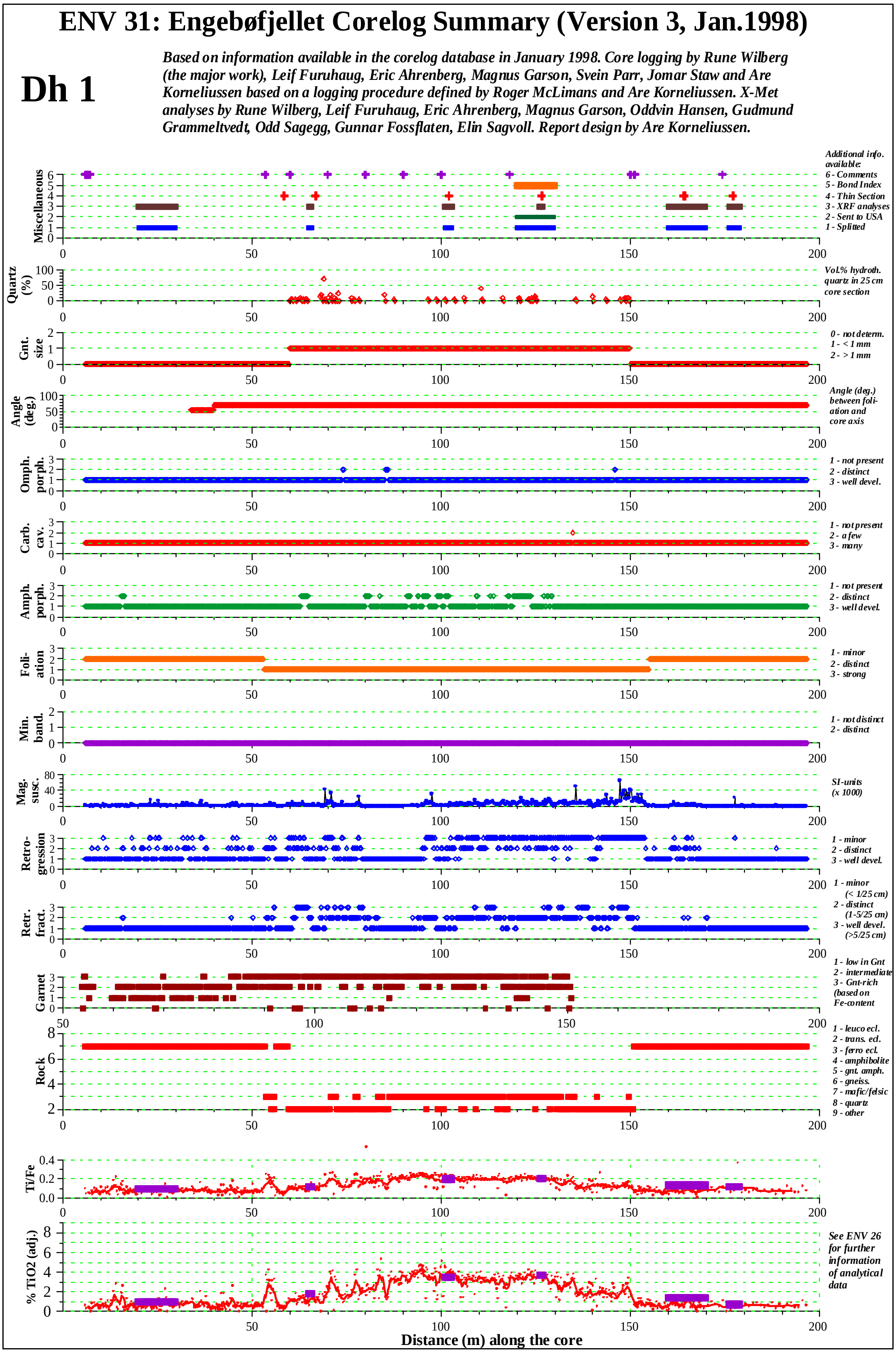
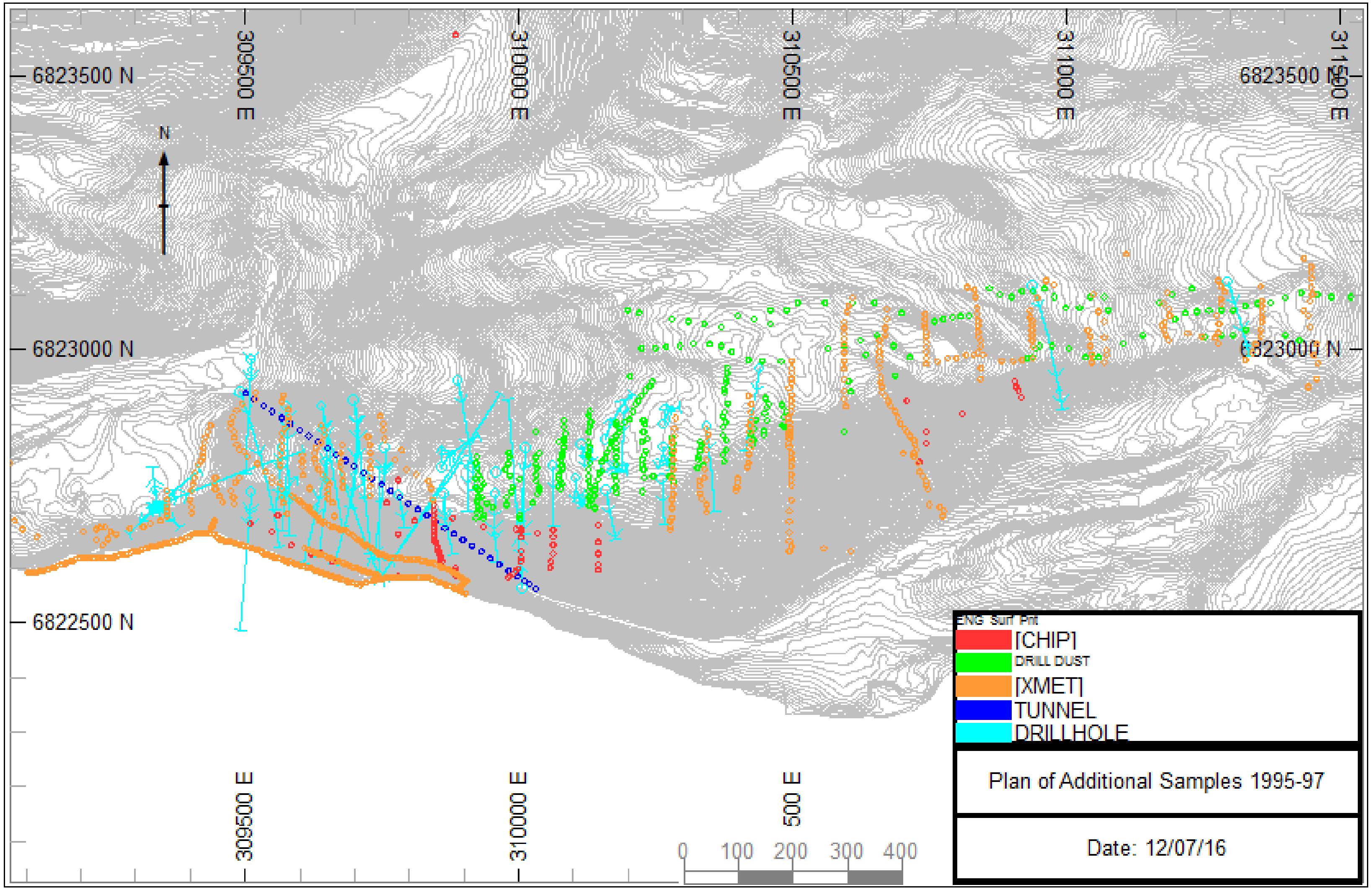


Figure 10-2. Summary of 1995-97 Additional Sampling



10.1.2 DuPont/Conoco - Review of Quality Control

Detailed core logs were prepared for each hole, recording the features which include the following:

- Quartz %
- Garnet occurrence and size
- Carbonate cavities
- Foliation
- Magnetic susceptibility
- Retrogression
- Lithology coding

Drillhole recoveries were excellent with negligible losses.

Although there was no specific QA/QC program in place, the procedures followed did include the following aspects:

- Check sampling between X-Met samples taken both at Løkken and in the field at Engeboe.
- Check sampling by detailed XRF laboratory analysis taken at Løkken of 5m composites.

As described in Section 10.1.1, there are 3 types of TiO_2 and Fe_2O_3 sample data available. The Løkken laboratory data is the highest quality, but is only applicable to 10m composites. These values have been used, however, to assign correction factors to both the Engeboe and Løkken 2,5m spaced measurements. Of these two types of X-Met measurements, it has been assumed the Løkken derived data is more reliable. Table 10-3 shows a comparison between the different sample types. It can be seen that there is rather a poor correlation between the different X-Met measurements, on a sample-by-sample basis. However, when considering the averages of these measurements over the same composite intervals as the laboratory composites, the correlations are extremely good.

Table 10-3. Comparison of Different Sample Types

Corelation Between Direct X-Met Measurements
Lokken vs Engebo

	TiO_2		Fe_2O_3	
	Correlation Coefficient	Number of Pairs	Correlation Coefficient	Number of Pairs
Leuco-Eclogite	0.44	233	0.61	597
Tran-Eclogite	0.50	189	0.43	1,418
Ferro-Eclogite	0.68	2,165	0.43	1,565

Correlation Between XRF Sample Averages
and Laboratory 10m Composites

	TiO_2		Fe_2O_3	
	Correlation Coefficient	Number of Pairs	Correlation Coefficient	Number of Pairs
Lokken X-Met	0.95	45	0.80	45
Engebo X-Met	0.93	75	0.73	61

The following procedure was therefore applied to get the most appropriate overall TiO_2 and Fe_2O_3 values for each sample:

1. The Løkken laboratory composite has been used to apply correction factors to both the Engeboe and Løkken X-Met measurements.
2. If a corrected Løkken X-Met measurement is available, then this is taken as the accepted value.
3. If there is no corrected Løkken X-Met measurement, but there is a corrected Engeboe X-Met measurement, then this is taken as the accepted value.

All of the available sample data was imported into Datamine, and the procedure described in above was applied to get a final accepted value of total TiO_2 and Fe_2O_3 for each sample. Along with these values, the drillhole data contained:

- Lithological codes, primarily for eclogite type.
- An index of magnetic susceptibility.
- %rutile (corresponding to the 10m composites)

In the 2016 Nordic drilling campaign, 709m of the old core were re-sampled and re-assayed at ALS in Sweden, specifically to assist with verification of these data. These check results were then analysed, as described in Section 11.3.

10.1.3 DuPont/Conoco - Sample Locations

All drillhole collars were surveyed, and coordinates were collated in the UTM coordinate system (WGS84). The downhole surveys were measured by a company called Devico, who used an optical instrument.

10.1.4 DuPont/Conoco - Bulk Density

A number of density measurements, taken from a number of the earlier drillhole samples were obtained, as shown below in Table 10-4 . These were measured by conventional immersion.

Table 10-4. DuPont/Conoco - Summary of Density Measurements

			Source	
Rock Type	Mean (t/m^3)	Standard Deviation	Samples	Drillholes
Eclogite	3.38	0.19	330	11
Amphibolite	3.05	0.16	55	7
Gneiss	2.88	0.13	43	7

10.2 Nordic 2016 Drilling Campaign

10.2.1 Logging

Separate logs were recorded, to hold all data and information and derived from core logging, as summarised below:

- **Lithology.** This log included principal rock types codes, colouration, lithologies, textures, alteration codes, grain sizes, pyrite and mica. The coding system, for all of these different fields is summarised in Table 10-5. The fields used for lithologies and alteration codes were grouped as to primary, secondary and tertiary levels of occurrence. The rock type coding system is summarised in Table 10-6. The eclogite coding (rocktypes 1, 2 or 3) was also assisted by sporadic handheld XMet measurements of TiO_2 grades. This XMet device, a Thermo Scientific Niton XL3t, is shown in Figure 10-3.

- **Geotechnical Log.** This log includes actual lengths for the derivation of core recovery, sum of lengths of parts greater than 10cm, RQD, length of longest piece, number of fractures, derived fracture frequency per metre and a description of the general rock quality.

- **Retro-Zone Log.** This log marks the occurrence (=2) or absence (=1) of the retrograde zones.

- **Omph-Porf Log.** This log marks the occurrence (=2) or absence (=1) of omphacite porphyryoblasts.

- **Amf-Porf Log.** This log marks the abundance (=3), occurrence (=2) or absence (=1) of amphibole porphyryoblasts.

- **Pyrite Log.** This log marks the abundance (=3), occurrence (=2) or absence (=1) of pyrite.

- **Mica Log.** This log marks the abundance (=2) or minor occurrence (=1) of mica.

- **Sample Interval Log.** This log recorded the sample intervals. Alongside each sample was recorded the number of retrofractures, the derived number of retrofractures per metre, the percentage of felsic veins and the percentage of quartz veins.

Table 10-5. Lithology Coding System

Rocktype		Colour		Lith Min		Grainsize		Texture		Alteration		Pyrite		Mica	
Leuco	1	Gy	Grey	Omph	Omphacite	F	Fine <1mm	Mass	Massive	Cbt	Carbonate	1	Minor	1	Minor
Trans	2	Wh	White	Amph	Amphibole	M	Medium 1-5mm	Bnd	Banded	Ep	Epidote	2	Present	2	Much
Ferro	3	Gn	Green	Gnt	Garnet	C	Coarse >5mm	Fol	Foliated	Goe	Goethite	3	Much		
Amphibolite	4	GyGn	GreyGreen	Qtz	Quartz			Shrd	Sheared	Sil	Silica				
Gar_Amph	5	Rd	Red	Mica	Mica			Myl	Mylonitic	Amph	Amphibole				
Gneiss	6	GyRd	Grey Red	Plag	Plagioclase			Bx	Brecciated	Qtz	Quartz				
Alternating	7	GnRd	Green Red	K-Feld	K Feldspar			Vug	Vuggy	Chl	Chlorite				
Hydrothermal quartz	8	RdGn	Red Green					Porph	Porphyroblastic	Gnt	Garnet				
Other	9	Pk	Pink					NA	Not Applicable	NA	NotApplicable				
Coreloss	10														
Overburden	11														

Table 10-6. Rocktype Descriptions

ROCKTYPE	Category	NGU Description	Nordic Description
1	**Leuco-eclogite**	<14% Fe2O3 and <2% TiO2	The rock is often light coloured, but can also be dark green (amphibolite), often more coarser grained and less homogenous appearance.
2	**Transitional-eclogite**	14-16% Fe2O3 and 2-3% TiO2	A mix between ferro and leuco, no clear boundary, a transitional change.
3	**Ferro-eclogite**	>16%Fe2O3 and >3% TiO2,	The rock is often dark and fine grained, and often has a homogenous apparance. Abundant garnet, rutile.
4	**Amphibolite**	Homogeneous, no banding	Moss green with no garnets. Sugarish texture from larger amphiboles. Massive homogenous (maybe darker zones). Low TiO_2 content.
5	**Garnet Amphibolite**	Homogeneous, no banding	Darker green than eclogite. Can also see plagioclase (best seen on wet surface). Sometimes corona around garnet.
6	**Gneiss, including miscellaneuos felsic rocks**	Usually internal zones within the main eclogite body	Heavily foliated continuous mica rich rock type, more homogenous than category 7. Also quartz vein like but with majority of gneiss
7	**Alternating mafic and felsic rocks**	Usually country rock surrounding the main eclogite body	Mixing of mafic and felsic rocks, heavily deformed, frequent quartz veins, a lot of micas
8	**Quartz**	Massive quartz vein of more than one metre	
9	**Others**		
10	**Core loss**		
11	**Overburden**		

Figure 10-3. XMet Device

Figure 10-4. Core Saw

Figure 10-5. Bench Saw

Figure 10-6. Density Measurement

10.2.2 Core Photographs

Photographs were taken of all core, using a specially built wooden frame to hold the camera above the core boxes. Example core photographs are shown for an intersection of leuco-, transitional and ferro-ecologites in hole ENG16_010, from 70m down to 97m, is shown in Figure 10-9. The location of this example intersection, is shown in the cross-section for easting 310,120mE in Figure 10-7. The sample data for the same intersection is shown in Table 10-7. The down hole pictorial log for hole ENG16_010 is shown in Figure 10-9.

Table 10-7. Hole Data for ENG16_010, for 70m to 97m

BHID	FROM	TO	ROCKTYPE	ECLOGITE	SAMPLE	FE2O3	TIO2	MnO	Al2O3	SiO2	SrO
ENG16_010	69.85	73	2	Tran	Q995049	16.6	3.59	0.21	14.2	44.0	0.02
ENG16_010	73	78	3	Ferro	Q995050	17.9	5.14	0.22	13.3	44.0	0.02
ENG16_010	78	83.05	3	Ferro	Q995051	18.2	5.09	0.22	13.2	44.5	0.02
ENG16_010	83.05	86	2	Tran	Q995052	15.8	2.42	0.21	15.5	46.5	0.03
ENG16_010	86	89.1	2	Tran	Q995053	16.3	2.76	0.21	15.9	46.2	0.04
ENG16_010	89.1	92.9	1	Leuco	Q995054	13.5	1.41	0.18	16.6	46.2	0.06
ENG16_010	92.9	96.7	1	Leuco	Q995056	13.3	1.44	0.18	17.0	46.2	0.07

Figure 10-7. N-S Section 310,120mE, Showing Drillholes with TiO2 Grades
[Bars lengths proportional to TiO2 grade]

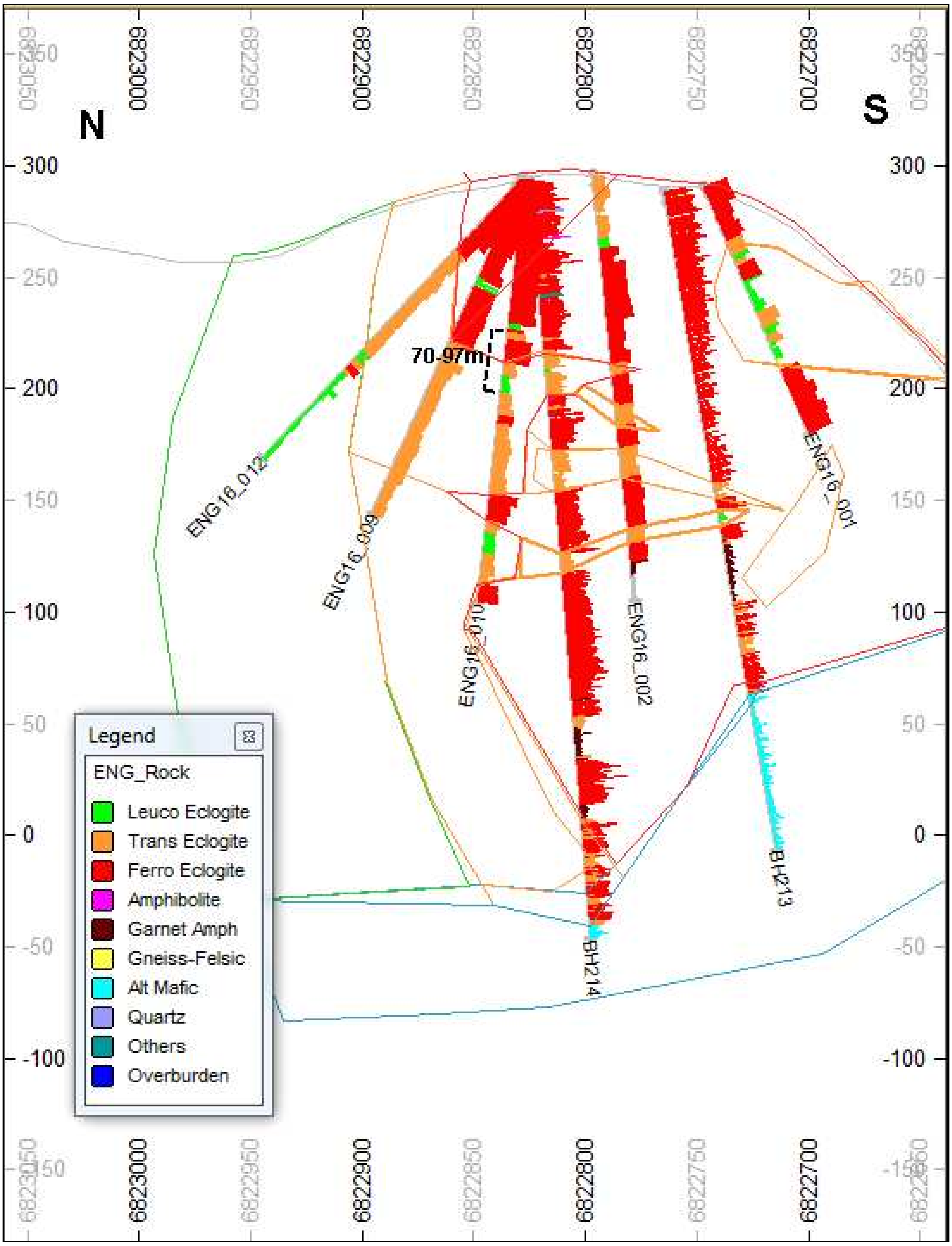
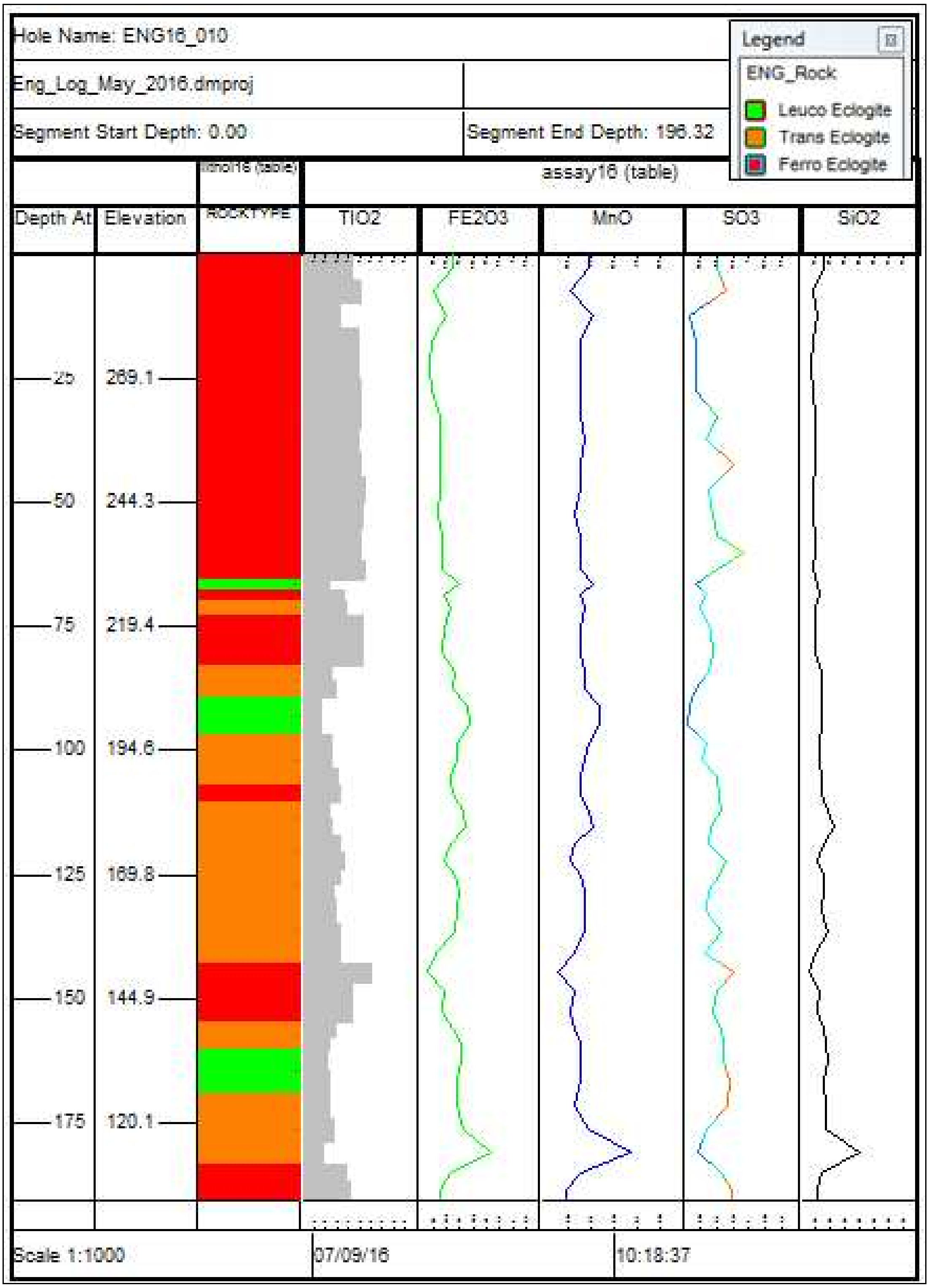


Figure 10-8. Core Photographs – ENG16_010, From 70m To 97m

Figure 10-9. Example Downhole Core Log – ENG16_010



10.2.3 Sample Preparation

Samples were selected in or adjacent to the main eclogite bodies, according to major lithological breaks, and restricting the maximum sample length to 5m. Core was sawn longitudinally in half, with one half being selected for the sample, which was then put in a strong plastic bag, with Nordic's assigned sample ID, for shipment to ALS. The NTT core saw used, is shown in Figure 10-4. This gave approximately 14 kg samples for a 5m length. Wooden crates were filled with these cut-core samples at the sample preparation site in Naustdal, and then sent by truck courier to ALS in Lulea, Sweden, for subsequent sample preparation at ALS. An opened crate of these samples, at ALS, is shown in Figure 10-11. The first step at ALS was to assign ALS's sample ID, along with a bar code onto each sample, as shown in Figure 10-12.

Subsequent preparation steps are applied, as shown in Figure 10-10. The samples were first passed through a jaw crusher, to produce 70% less than 2mm. This was then passed through a riffle splitter, so as to allow 250g to continue. A small proportion of samples, at the request of Nordic, were flagged for coarse grind only, such that 70% less than 4mm were produced. This was so as to provide bigger material in the coarse reject, which of more use for subsequent processing testwork.

The 250g sample was then passed through a ring pulveriser, producing pulp containing 85% less than 75 µm. This sample is spread onto a rubber mat, and from this a 15-20 pulp sample was taken using a spoon. Both the pulp rejects and coarse rejects were then shipped back to Nordic in Norway, for archiving in Naustdal.

The prepared pulp sample was then shipped to ALS in Ireland, for subsequent assaying.

Figure 10-10. Sample Preparation Flowsheet

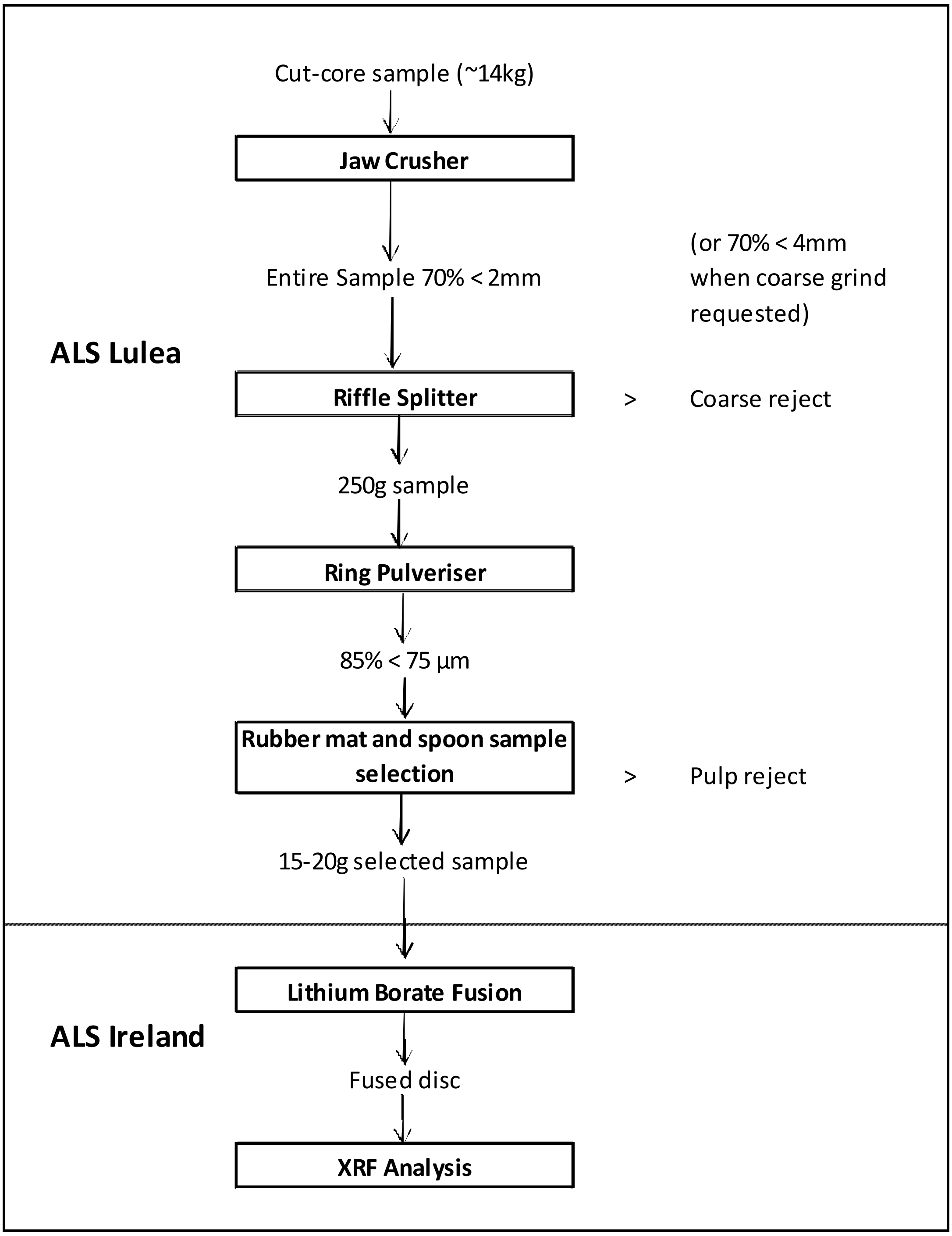


Figure 10-11. Crate of Cut-Core Nordic Samples At ALS

Figure 10-12. Assigned ALS ID and Bar Code on Sample Bag

10.2.4 Density Measurements

Density measurements were taken by cutting approximately 15cm billets out from the complete core, at approximately 25m intervals downhole. They were cut out using the bench saw shown in Figure 10-5, and they weighted dry and then in water, as shown in Figure 10-6. These measurements were then used to determine the dry density. No voids were present in the core, so the core was uncovered during weighing in water. This provided a database of some 250 density measurements, with several measurements in each rocktype, at various locations through the deposit.

10.2.5 Assaying

The pulp samples sent to ALS Ireland were used to make a fused disc, using lithium borate fusion. This fused disc was then analysed using XRF analysis, using a Panalytical Axios wavelength dispersive XRF spectrometer.

Related to titanium, the principal assays determined were TiO_2 (total) by XRF, and TiO_2 (dissolvable in HCl) by ICP. From these assayed quantities, the percentage of TiO_2 contained in ilmenite (field name given in sample data TIO2ILM).

The other grades assayed were:

Fe_2O_3 MnO Al_2O_3 BaO CaO Cr_2O_3 K2O MgO Na_2O P_2O_5
SO_3 SiO_2 SrO

10.2.6 Quality Control

Nordic used a planned out QAQC programme for all of the 2016 drilling campaign. The difference types of quality control samples taken are depicted in Figure 10-13. Most often the core was cut into 2 halves, with one half being sent to ALS as the primary sample; and the other half being left in storage. For additional metallurgical samples and/or field duplicates (FD), the core was additionally cut into four quarters, so as to be able to provide both these additional samples, and still have some core left in storage.

Coarse blanks were introduced by Nordic into the sample batches in Naustdal, using standard blank material obtained from ALS Minerals. This material is shown in Figure 10-14. Fine blank material came from the same source, after being ground by ALS for Nordic to allocate into the sample stream. Additional empty sample bags, with tagged instructions, were provided by Nordic, so that ALS would use these sample IDs for the additional control samples introduced during the e sample preparation.

A standard sample were purchased from the USGS, a Hawaiian basalt sample, code BHV0-2. This sample has certified grades of 2.73% TiO_2 and 12.3% Fe_2O_3. The frequencies in which the control samples were introduced are shown in Table 10-8. This table also shows the process being evaluated for each type of control sample along with the applied acceptance criteria.

Table 10-8. QAQC Samples – Insertion Rates and Acceptance Criteria

Evaluation Parameter	Type of Sample	CODE	Frequency %	Process being evaluated	Acceptance Criteria
Precision	Field Duplicates	FD	2	Precision of taking samples	<=10% failed samples
	Coarse Duplicates	CD	2	Precision of sample preparation	<=10% failed samples
	Pulp Duplicates	PD	2	Precision of analysis	<=10% failed samples
Accuracy	Standard Samples	STD	6	Accuracy with respect to primary lab	Bias <=5%
	External Duplicates	ED	4	Accuracy with respect to secondary lab	Bias <=5%; adjusted R^2=1
Contamination	Coarse Blanks	CB	2	Contamination during sample preparation	Contamination <=2%
	Fine Blanks	FB	2	Contamination during analysis	Contamination <=2%
	Total		**20**		

The external; duplicates (ED) were sent to the MS Analytical laboratory.

The analysis of the QAQC results, from Nordic's 2016 drilling campaign, as analysed by the Competent Person, is shown in Section 11.

Figure 10-13. QAQC Flowsheet

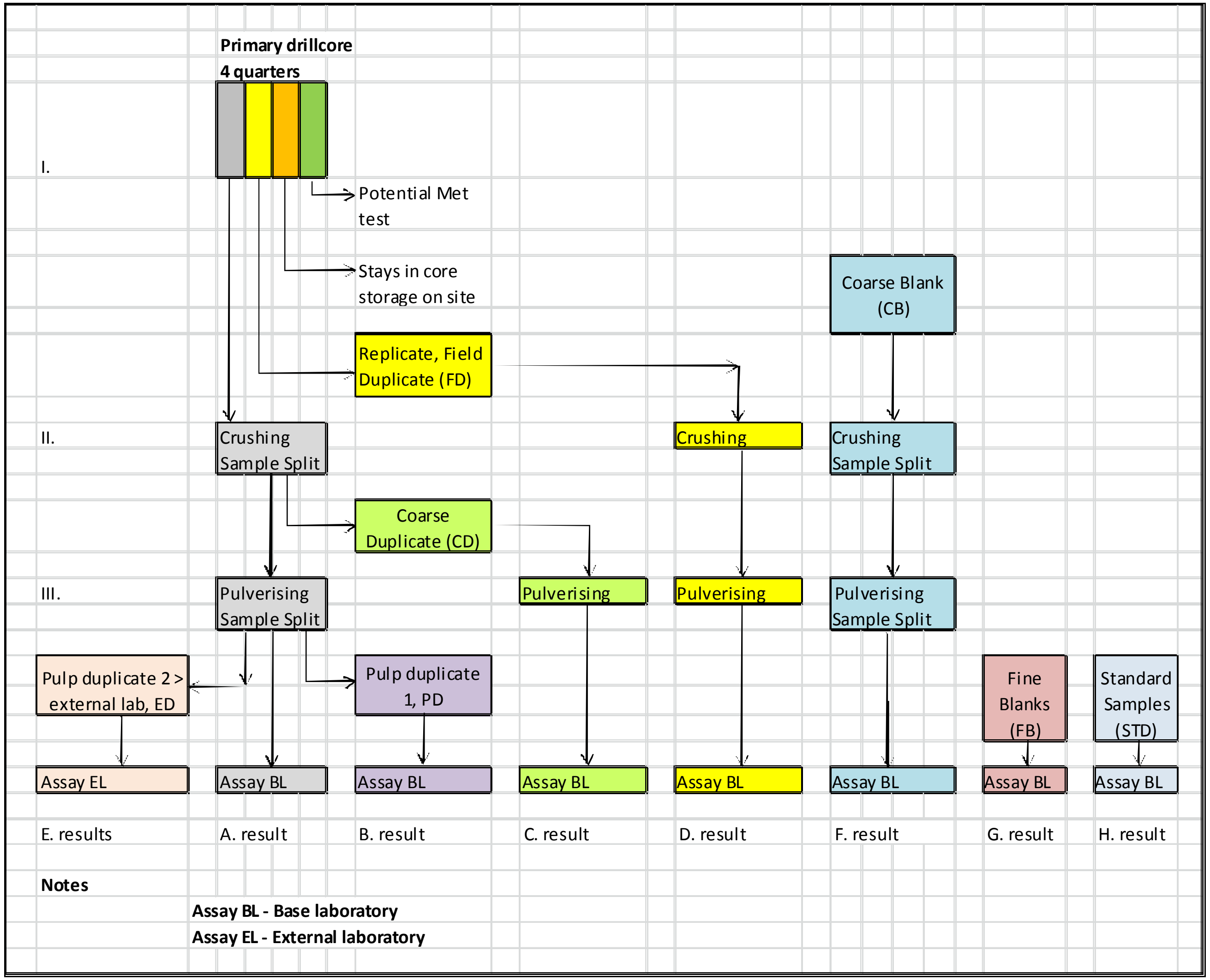


Figure 10-14. Coarse Blank Material

Figure 10-15. Fine Blank Material

10.2.7 Garnet Analysis

Associated with the 2016 drilling campaign, garnet was analysed in two ways using QEMSCAN (by SGS, Canada) measurements:

a) **Thin Sections.** 10 core billets were selected, over a range of different location throughout the drilled areas. From each of these core billets, a 3cm x 3cm part was cut-out and used for a thin section, which was analysed by QEMSCAN using a textural analysis method. Of these 10 slides, 8 were for ferro-eclogite, and 2 were for trans-eclogite. An example of one set of these results is shown in Figure 10-16.

b) **Coarse Pulp Rejects.** For the coarse rejects available from core sampling, 68 samples were selected, over a range of grades and locations. The coarse reject material was grinded carefully at SGS laboratory in Canada with the aim of liberating grains and not over grinding. Slides were prepared for each of these samples, by spreading a thin layer of pulp material onto slide. The slides were then analysed by QEMSCAN. These results gave a percentage of garnet, which could be compared with the original assay data for the same sample.

Thin section analysis allowed:

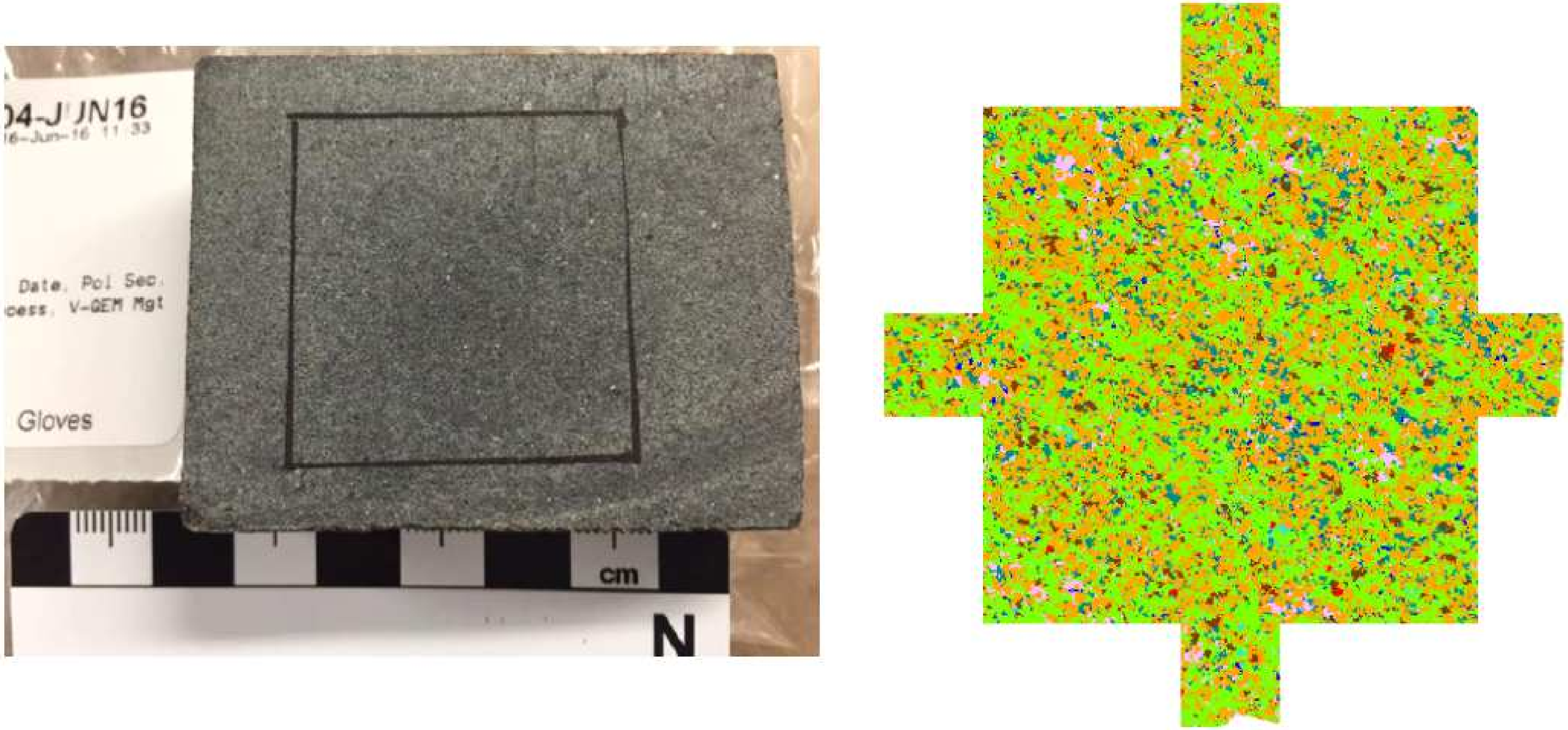
- An assessment of the grain size distribution for each sample. The QEMSCAN analysis indicates that the garnets have grain sizes typically between 0.1 to 0.4 mm (100-400µm).
- The textural feature that seems to mainly affect the distribution of garnet is retrogression of the ore.

Observations from garnet analyses in the tests included:

- Typically ferro- and transitional eclogite has between 40 and 50 % garnet, leuco ecologite has between 30 and 40%.
- The crystal shape of the garnet is euhedral to subhedral. In intensely foliated or sheared samples the grains are somewhat more elongated and irregular.
- The garnets typically have few inclusions, but the larger garnets are more likely to have mineral inclusions.
- In heavily altered zones, the garnet tends to break down and grain size is reduced. This constitutes a minor part of the deposit.
- The principal garnet type is almandine.

Figure 10-16. Example QEMSCAN Results from Thin Section of core analysis

ENG16-016 Q995323 - fresh typical ferro eclogite with high titanium content, minor veining



Sample		ENG16-016 175.65 Q995323
Fraction		As Rec'd
Mass Size Distribution (%)		100,0
Calculated ESD Particle Size		22982
Mineral Mass (%)	Pyrite	0,41
	Other Sulphides	0,00
	Garnet	44,8
	Epidote Group	0,66
	Quartz	2,66
	Plagioclase	0,01
	Muscovite/Phengite	0,00
	Biotite/Phlogopite	0,00
	Paragonite	0,07
	Amphibole	7,88
	Clinopyroxene	37,3
	Chlorite	0,02
	Titanite/sphene	0,46
	Other Silicates	0,00
	Fe-Oxides	0,00
	Ti-Magnetite	0,00
	Rutile	4,98
	Ilmenite	0,16
	Other Oxides	0,00
	Dolomite	0,39
	Calcite	0,06
	Apatite	0,10
	Other	0,01
	Total	100

A way to estimate the grade of garnet was investigated, by studying the relationship between garnet quantity from QEMSCAN data and the chemical analysis of the same sample. The best results were obtained by relating garnet to iron (Fe2O3) content. This was done using the following steps:

1. The total iron content per sample is directly available from the assayed Fe2O3.

2. As well as garnet, it is known that other minerals contain iron will be ilmenite, pyrite (reflected by the SO3 assay) and amphibole (reflected by the K2O assay).

3. Therefore, it can be reasoned that the amount of garnet will have some relationship as follows:

   Test(GNT) = Fe_2O_3 – (b x SO_3 + c x K_2O + d x Ilmenite)

The test variable will be a number which can be correlated to the measured GNT values. After some analysis, it was also found that this it was best to split the analysis between different eclogite types.

For the ferro-eclogite sample and trans-eclogite sample sets, and the best relationships were found to be:

Trans-eclogite: Test(GNT) = Fe_2O_3 – (4.1 x SO_3 + 3.0 x K_2O + 2.5 x Ilm)
Ferro-eclogite: Test(GNT) = Fe_2O_3 – (3.9 x SO_3 + 1.5 x K_2O + 2.5 x Ilm)

The %Ilmenite grade is derived from the assayed %TiO2 in ilmenite value from the relationship below:

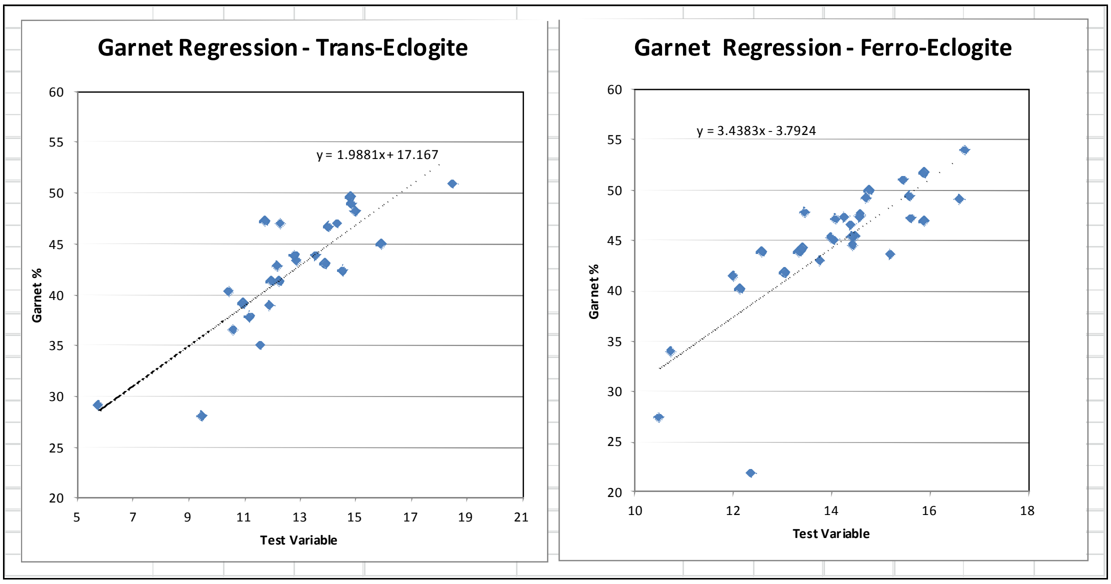
%Ilmenite = [TiO_2(total) x % TiO_2 (in ilmenite)] / 0.5265

These test variables determined for these two sample sets, plotted against the measured garnet grades, gave the graphs shown in Figure 10-17. The regression equations from these trendlines are:

Trans-eclogite: y = 1.988x + 17.167
Ferro-eclogite: y = 3.438x + 3.792

Where: y = derived Garnet wt% (GNT); x = test variable (as derived above)

Figure 10-17. Test Variable v Garnet, Ferro Eclogite



These regression coefficients were then used to derive a garnet assay for each sample. The pairs of the measured garnet and derived garnet values were then analysed using RMA (reduction to major axis) analysis, as summarised in Table 10-9 and Table 10-10.

These analyses gave correlation values (R2) and low bias values, less than 5%, when a very small number of outliers had been removed. This analysis therefore supported the use of these formulae in the derivation of garnet grades in the resource estimation.

Table 10-9. RMA Analysis – Garnet, Trans-Eclogite

	All Pairs	Without Outliers
SD Scanned GNT	5.84	5.00
SD Derived GNT	4.89	4.97
Mean Scanned GNT	42.37	43.12
Mean Derived GNT	42.37	42.85
HARD Criteria		**7%**
Maximum	51.0	

Number of Pairs			R^2	m	Error (m)	b	Bias
25			0.84	0.84	0.068	6.896	16.28%

Number Accepted	Outliers	Outliers %	R^2	m	Error (m)	b	Bias
22	3	12.0%	0.80	0.99	0.094	-0.017	0.59%

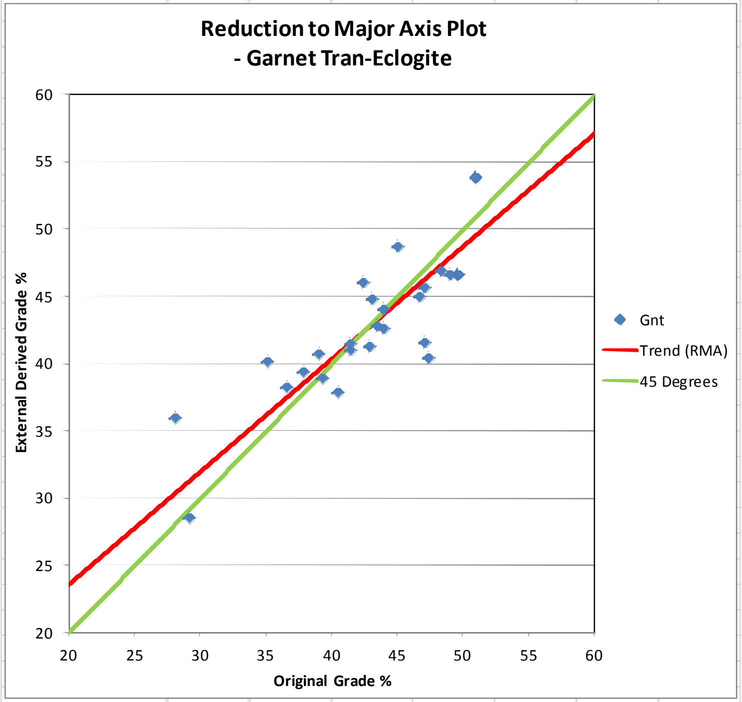
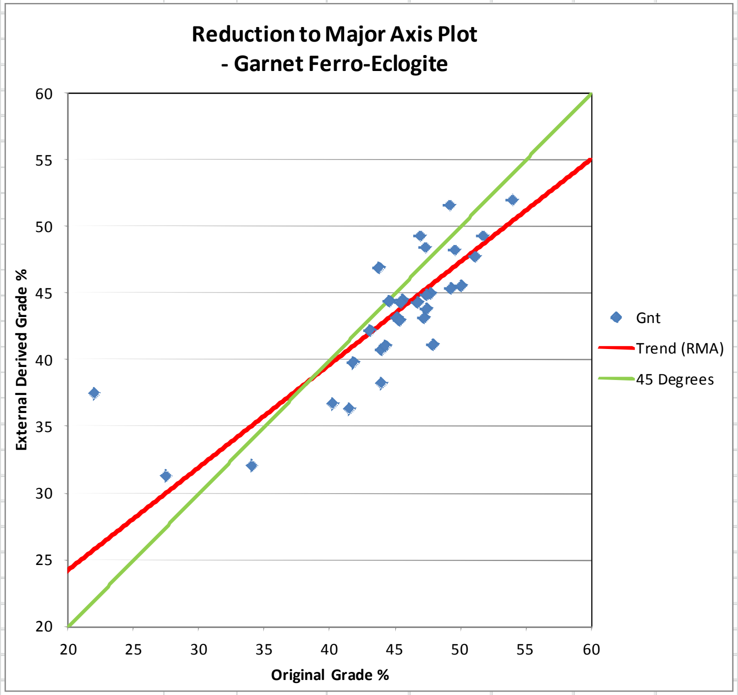


Table 10-10. RMA Analysis – Garnet, Ferro-Eclogite

	All Pairs	Without Outliers
SD Scanned GNT	6.58	5.13
SD Derived GNT	5.07	5.04
Mean Scanned GNT	44.6	45.4
Mean Derived GNT	43.3	43.5
HARD Criteria		**12%**
Maximum	54.0	

Number of All Pairs			R^2	m	Error (m)	b	Bias
31			0.79	0.77	0.063	8.882	22.87%

Number Accepted	Outliers	Outliers %	R^2	m	Error (m)	b	Bias
30	1	3.2%	0.77	0.98	0.086	-1.094	1.76%



10.3 Nordic 2016 Surface Sampling

Additional surface samples were taken by Nordic in 2016, using a handheld Makita drill (Figure 10-19). This used a 10-12mm diameter drill bit, drilling an approximately 10cm deep hole. The drill in operation is shown in Figure 10-20. The drill dust from drilling is captured in sealed container attached the drill. Three holes were drilled for each sample, giving approximately 100g per sample. This 3 holes/sample configuration is shown for 2 separate samples in Figure 10-21. The extra sample taken in this location was taken as a field duplicate for QC purposes.

Figure 10-22 shows the drill dust in the opened container after drilling, and Figure 10-23 shows how the sample is subsequently bagged. After the sample has been removed, the container and drill is cleaned with compressed air before the next sample is collected.

The reason for these samples was to provide additional surface grade information to assist with modelling, as well as to provide some verification of surface sampling from previous campaigns.

The samples were located on 60m section lines, with a spacing of 30-60m in the north-south direction, as shown in Figure 10-18.

Figure 10-18. 2016 Surface Samples

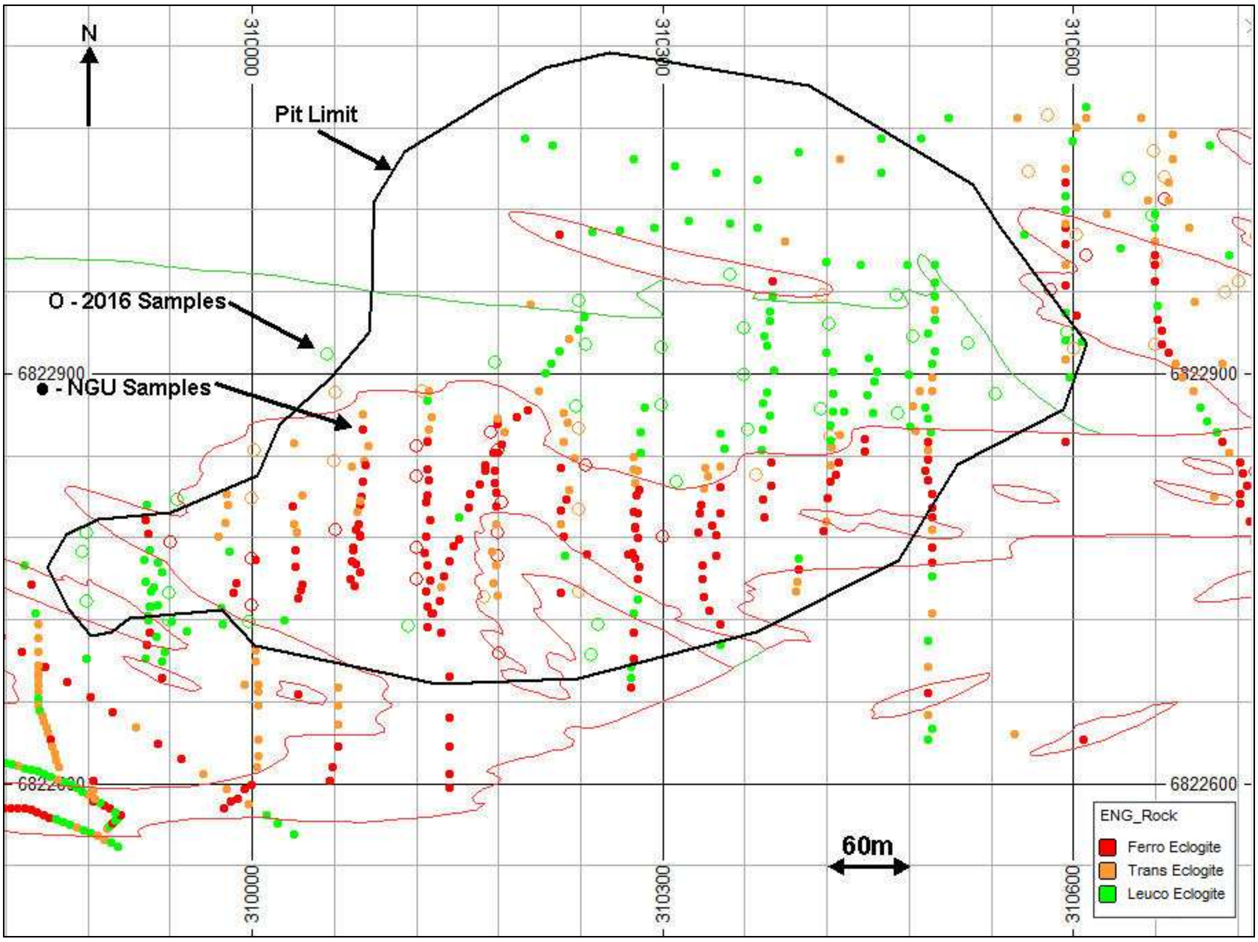


Figure 10-19. Drill for Surface Samples

Figure 10-20. Drilling of Sample

Figure 10-21. 3 Holes Per Sample

Figure 10-22. Dust Sample After Drilling

Figure 10-23. Bagging Sample

Figure 10-24. Cleaning For Next Sample

11 DATA VERIFICATION

11.1 Nordic 2016 Drilling Results

The Competent Person has reviewed all of the QAQC results from Nordic's 2016 drilling campaign. The results of this review are summarised below.

11.1.1 Precision

Precision graphs for the results of field duplicates (FD), coarse duplicates (CD) and pulp duplicates (PD) are shown in Figure 11-1, Figure 11-2 and Figure 11-3, respectively. These Max-Min plots have all been prepared, with an error line based on the hyperbolic method. The "m" slope parameter used was 1.35 for field duplicates (FD), 1.22 for coarse duplicates (CD) and 1.11 for pulp duplicates (PD), which are standard threshold levels. Based on these error lines, no failures were encountered for any of the duplicates types, which is an extremely good result. Generally up to 10% of failures would be considered a satisfactory results.

11.1.2 Accuracy

The standards' assay results for 98 submitted samples are depicted in Figure 11-4. This shows that there are only 3 outliers, and a very small bias value, well less than the 5% acceptable level.

Table 11-1. Summary of Standards' Results

							Without Outliers		
Standard	Element	Unit	Samples	Outliers	Outliers %	Best Value	Mean	Bias	CV
USGS BHVO-2	TiO2	%	98	3	3.1%	2.730	2.723	-0.3%	0.01

The results for the 68 check assays from the MS Analytical laboratory were analysed using RMA (reduction to major axis) analysis, as shown in Table 11-2. The very large (R^2) shown from these data and the low bias of 4% (lower than the 5% threshold) indicate that these results are acceptable.

11.1.3 Contamination

ALS's own assay of two of their own control blank samples were 0.11%TiO_2, so this is the lowest level of detection (LD). The highest coarse blank assay, from the 32 blank samples submitted by Nordic was 0.13 TiO_2, well inside the 3x LD limit normally considered acceptable. The highest pulp blank assay, from the 33 pulp blank samples submitted by Nordic was 0.12 TiO_2, well inside the 3x LD limit normally considered acceptable.

There is therefore no indication any contamination during sample preparation or analysis.

Figure 11-1. Precision Analysis – Field Duplicates TiO_2

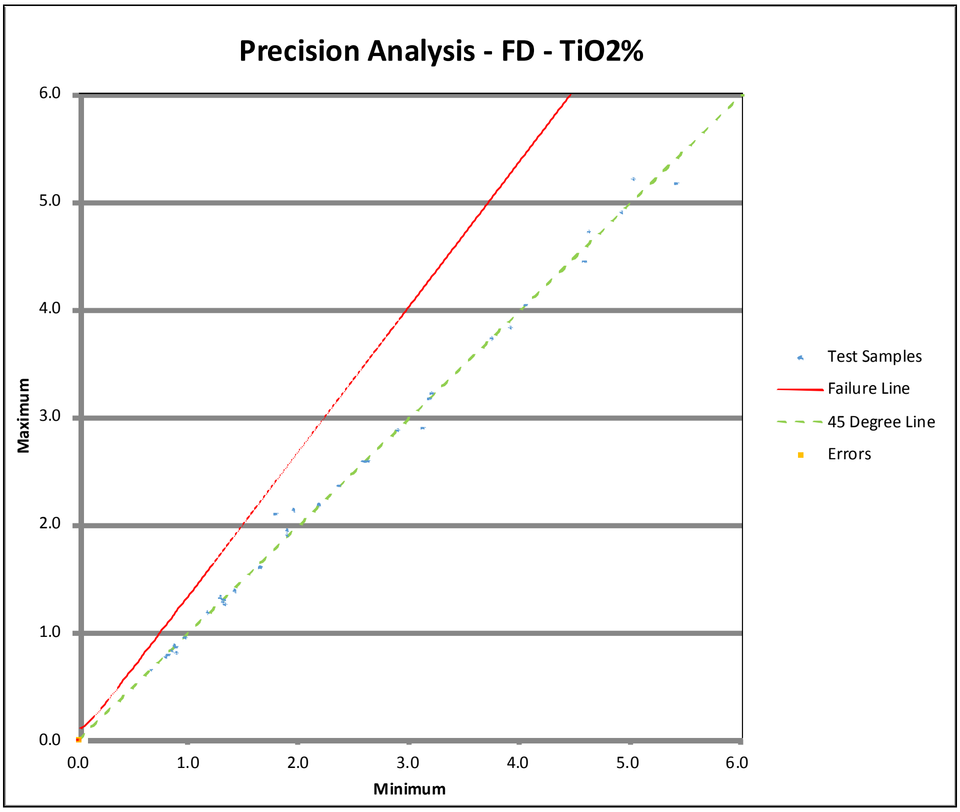


Figure 11-2. Precision Analysis – Coarse Duplicates TiO_2

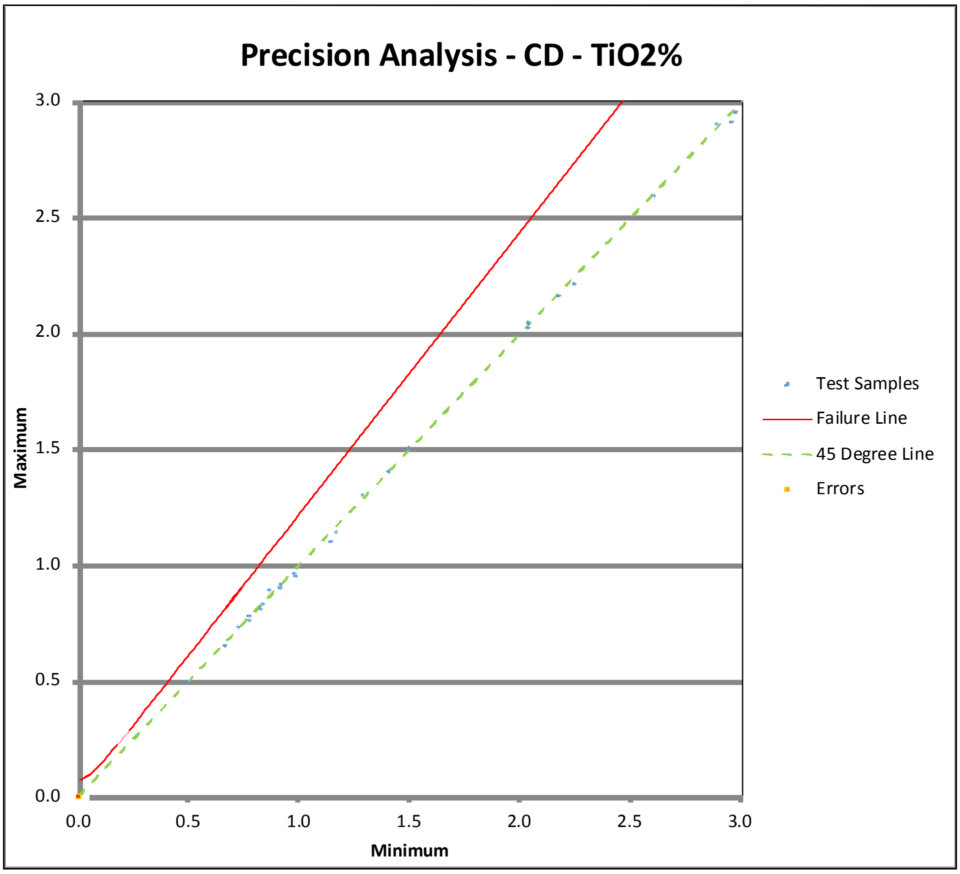


Figure 11-3. Precision Analysis – Pulp Duplicates TiO_2

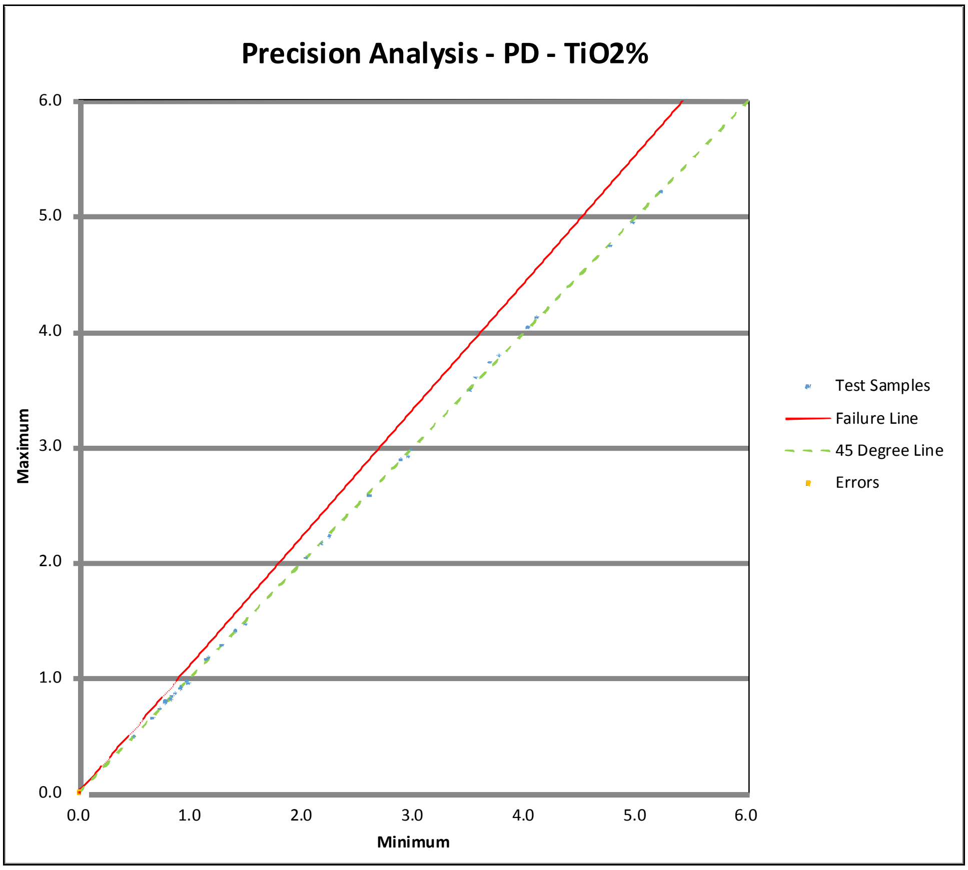


Figure 11-4. Standards' Assay Results

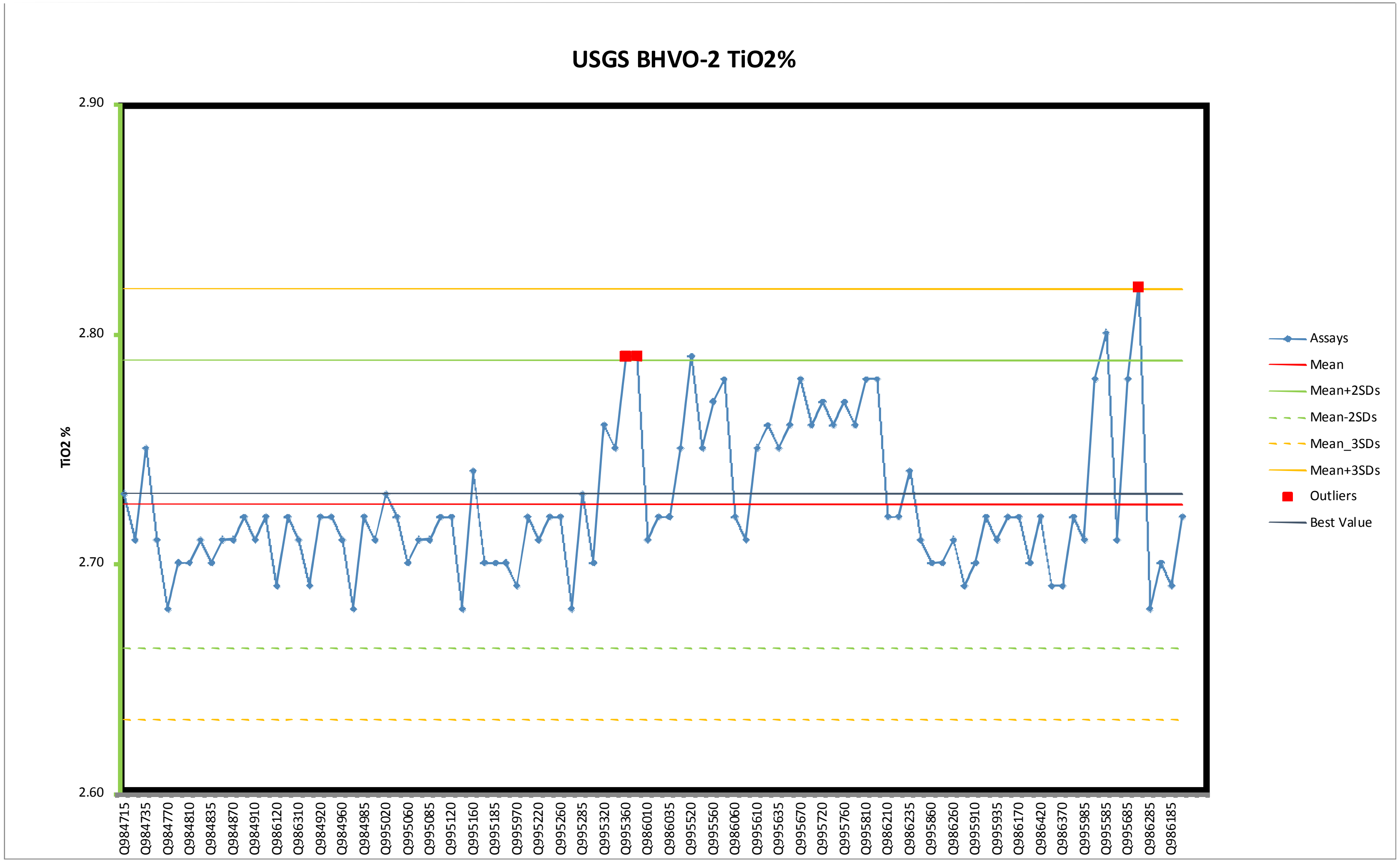
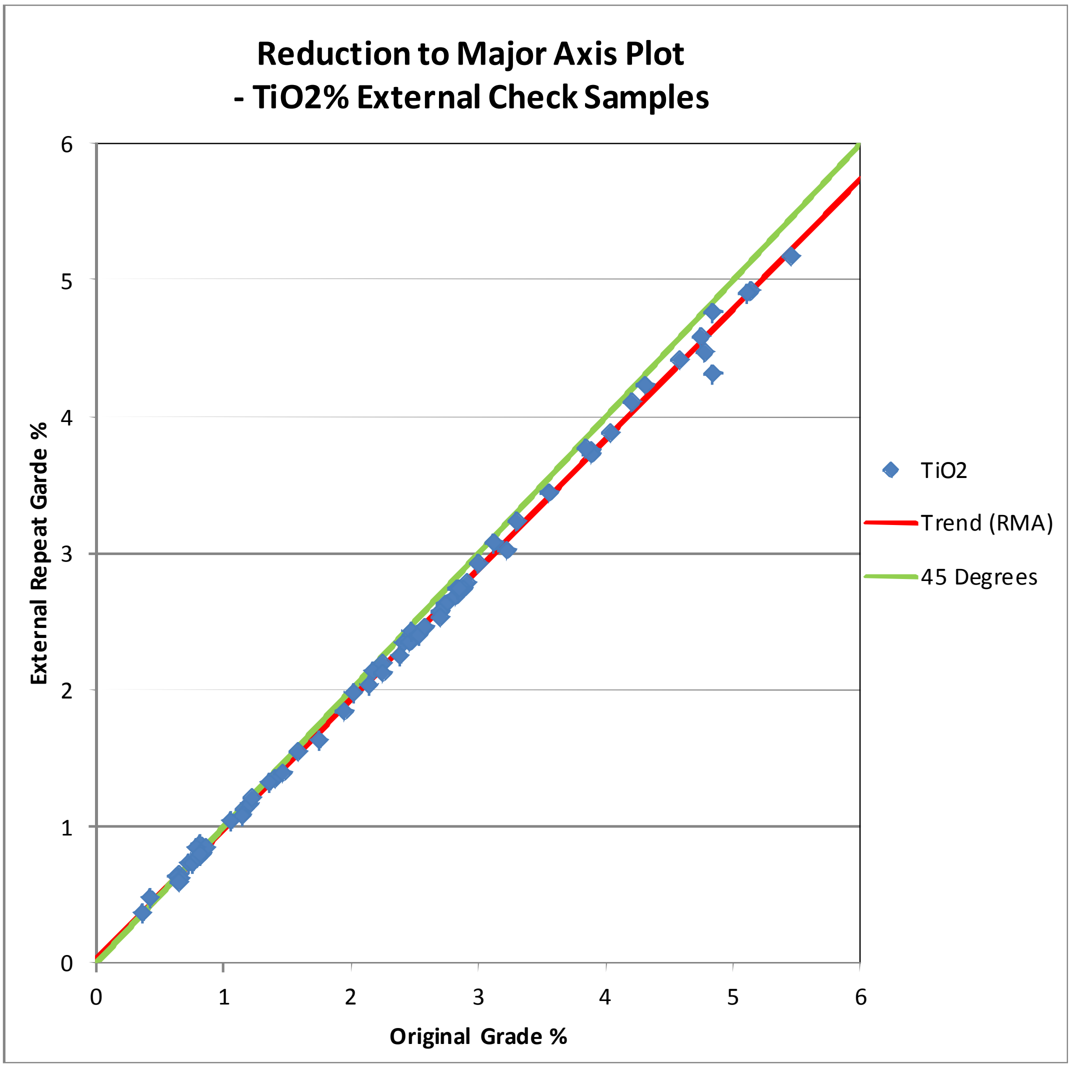


Table 11-2. External Check Sample Results

	All Pairs	Without Outliers
SD Original	1.42	1.39
SD Checks	1.35	1.33
Mean Original	2.37	2.36
Mean Checks	2.29	2.29
HARD Criteria		5%

Number of Pairs		R^2	m	Error (m)	b	Bias
68		1.00	0.95	0.005	0.030	4.74%

Number Accepted	Outliers	Outliers %	R^2	m	Error (m)	b	Bias
66	2	2.9%	1.00	0.96	0.004	0.019	4.08%

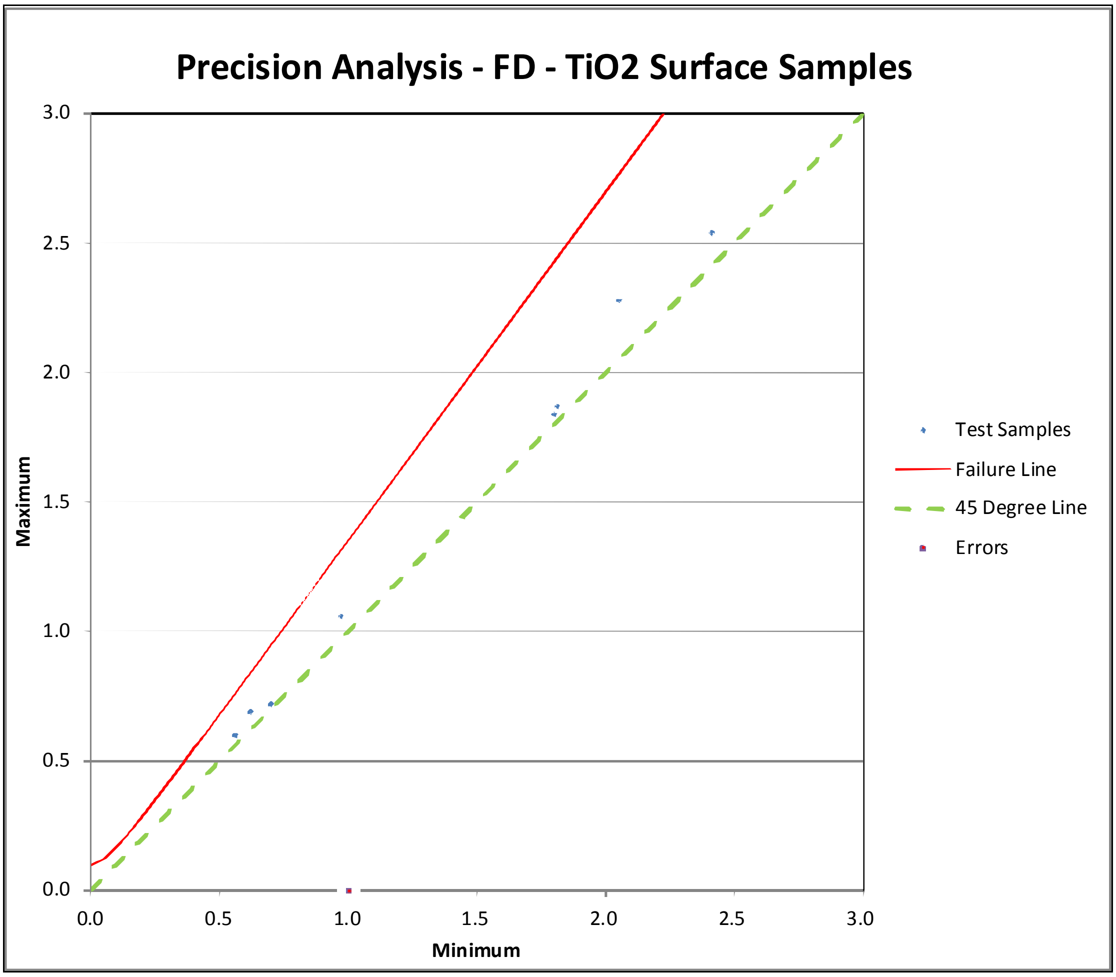


11.2 Nordic 2016 Surface Sampling

79 primary surface samples were taken, using the method described in 10.3. Along with samples, 9 field duplicates (FD) were taken (representing12%). The TiO_2 results of these FD samples, compared to the corresponding primary samples, are shown in an min-max analysis plot in Table 11-3. As shown in the graph, no samples have failed, so it can be concluded that these surface samples are acceptable for use in resource estimation.

It can also be seen in the plan in Figure 10-18 that the surface samples TiO_2 grade ranges (as shown by Eclogite type) broadly agree with the surface samples taken by DuPont/Conoco.

Table 11-3. Surface Samples – Field Duplicates' Analysis



11.3 Historical Database

To assist with verification of the historical DuPont/Conoco diamond drilling data, samples were taken from 14 of the old holes, and then prepared and re-assayed in the ALS laboratory, in the same way as the samples from the 2016 drilling campaign. This re-assaying involved 709m of core, representing approximately 6% of the eclogite core from the DuPont/Conoco drilling campaigns.

For the re-assayed results, as compared to the original DuPont/Conoco assays, have been analysed using the following steps:

- **Logs.** The data has been compiled so that one file contains both the original NGU assay data, as well as the re-assayed Nordic data. These data have been used to create pictorial logs, which are shown in Appendix A of this report. Most of these logs generally display a similar pattern of comparative TiO2 and Fe2O3 grades.

- **Composite Statistics.** The Nordic assay results are generally over sample lengths of approximately 4m. The DuPont/Conoco results, often stemming from spot XMet measurements, contain many XMet assays within the corresponding Nordic sample intervals. To make comparison possible, therefore, composites have been created over the Nordic sample intervals, with average grades also derived from the DuPont/Conoco measurements. Scatterplots, log-probability plots and resultant statistics are summarised in Table 11-4, Figure 11-6, and Figure 11-7. The scatterplot slopes, correlation coefficients and populations do not display any major differences between the different assay data sets.

- **Composite RMA Analysis.** The results for the composites were analysed using RMA (reduction to major axis) analysis, as shown in Table 11-5. The large (R^2) shown from these data and the low bias of <3% (lower than the 5% threshold) indicate that these results are acceptable.

- **HARD Comparison.** The paired composite data were also used for a Half-Absolute-Relative-Difference (HARD) analysis. HARD plots are shown in Figure 11-8. At 90% rank, HARD values for both TiO2 and Fe2O3 are 9.3% and 7.5%. These HARD levels display a high correspondence of the data. For these kinds of field duplicates, 90% rank HARD limit of 20% would generally be considered acceptable.

- **Eclogite Classification.** The assay data assets were used to set an Eclogite coding direct from the assay data, such that the categories are: 3. Ferro (TiO2>3% or Fe2O3>16%), 1. Leuco (TiO2<2% or Fe2O3<14%), 2. Tran for all other values in-between. Based on this system, applied to the DuPont/Conoco and Nordic composite grades, less than 4% of the 154 composites gave a different Eclogite classification.

Favourable results have been obtained from every aspect of this analysis of re-assay data. These results, which stem from 14 holes, represent more than 25% of all original 49 NGU holes. It is therefore concluded that the historical NGU data can be used for estimation in the updated resource estimation study, for all resource category levels.

Figure 11-5. Example of Re-Assayed Results for DuPont/Conco Hole BH208
(TiO2/Fe2O3=DuPont/Conoco Assays; RTiO2/RFE2O3=Nordic Assays)

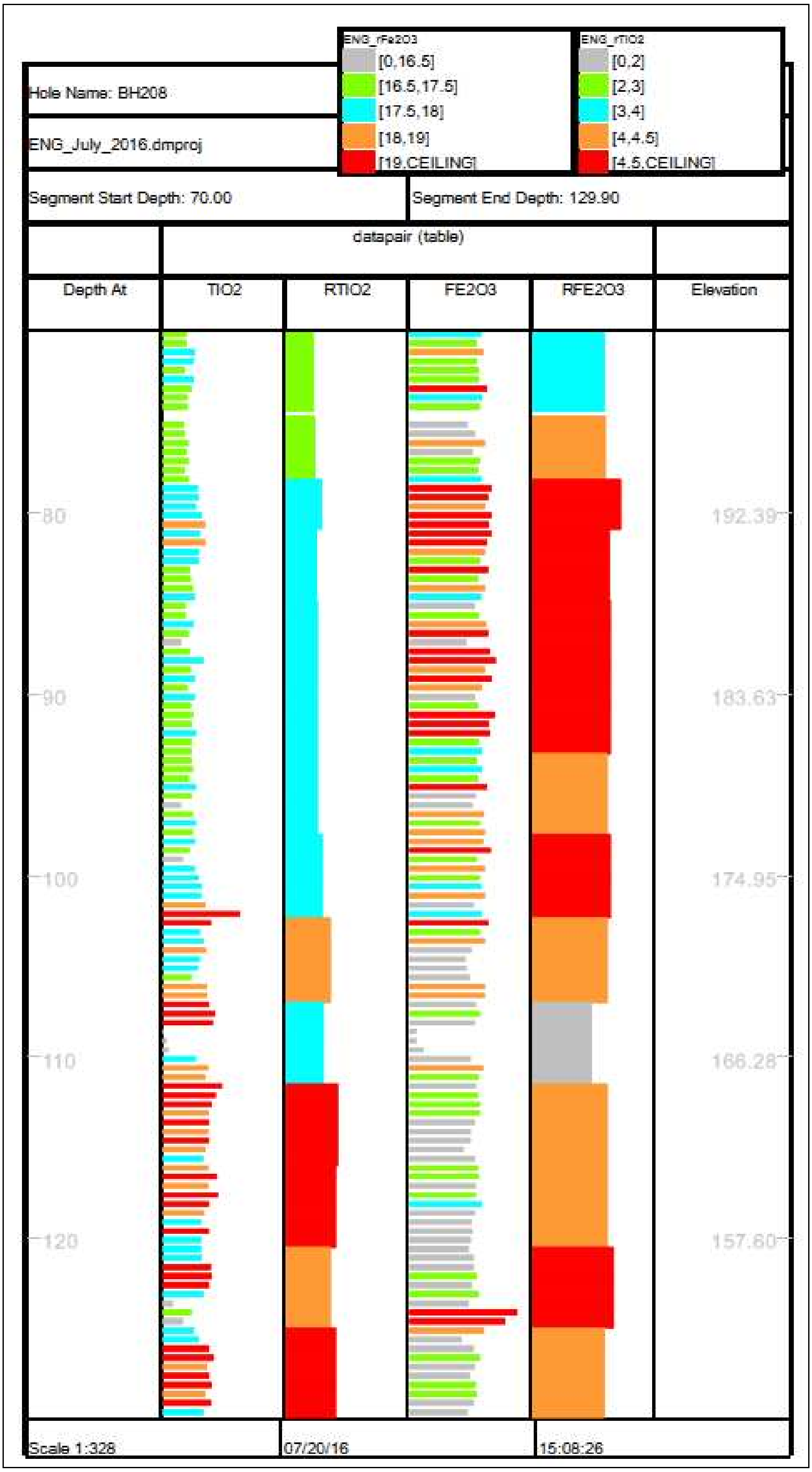


Table 11-4. Composite Statistics – DuPont/Conoco Re-Assay Comparison

	TiO2		Fe2O3	
	NGU	Nordic	NGU	Nordic
Number	169		154	
Correlation Coefficient	0.89		0.71	
Slope	0.96		0.97	
HARD Precision @ 90% Rank	9.30%		7.5%	
Average	3.81	3.67	18.1	17.7
Standard Deviation	0.95	0.93	2.22	1.73
Coefficient of Deviation	0.25	0.25	0.12	0.10

Figure 11-6. DuPont/Conoco Re-Assay Comparative Scatterplots

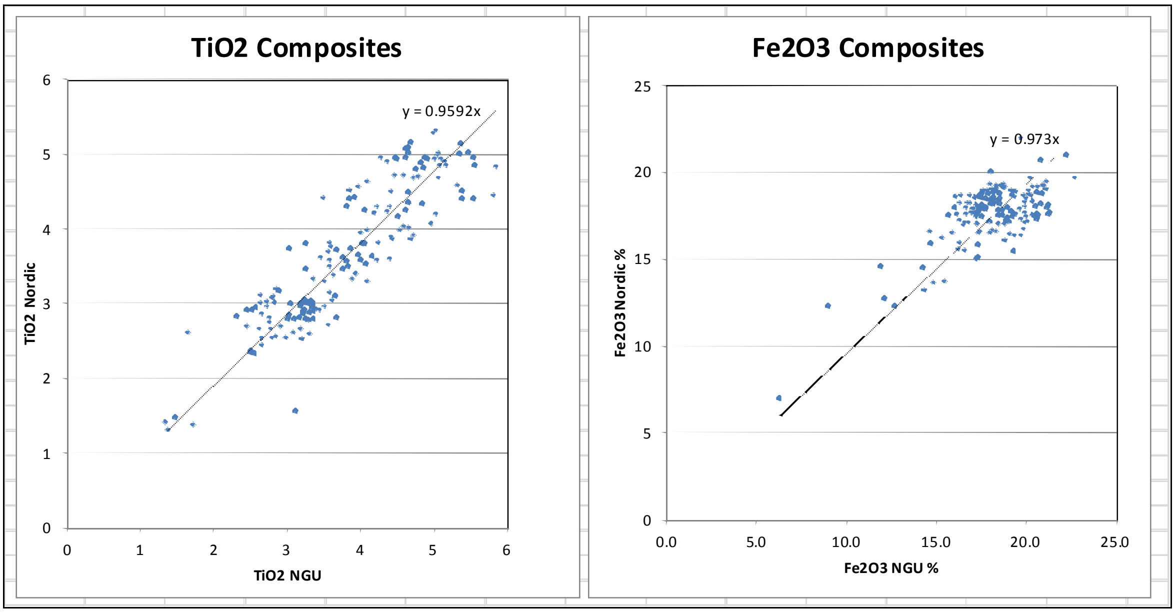


Figure 11-7. DuPont/Conoco Re-Assay Comparative Log-Probability Plots

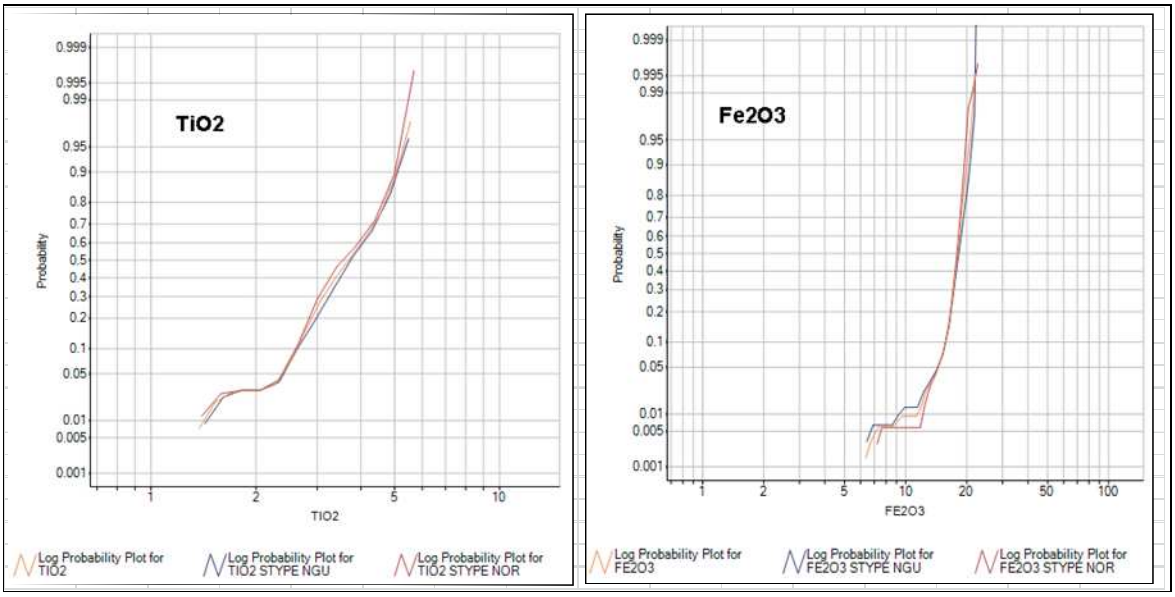


Figure 11-8. DuPont/Conoco Re-Assay Comparative HARD Plots

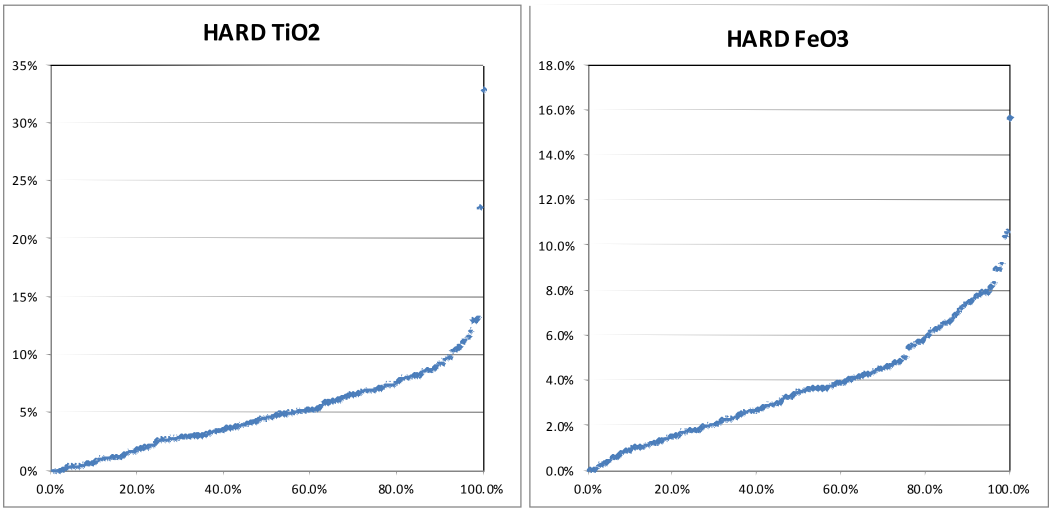
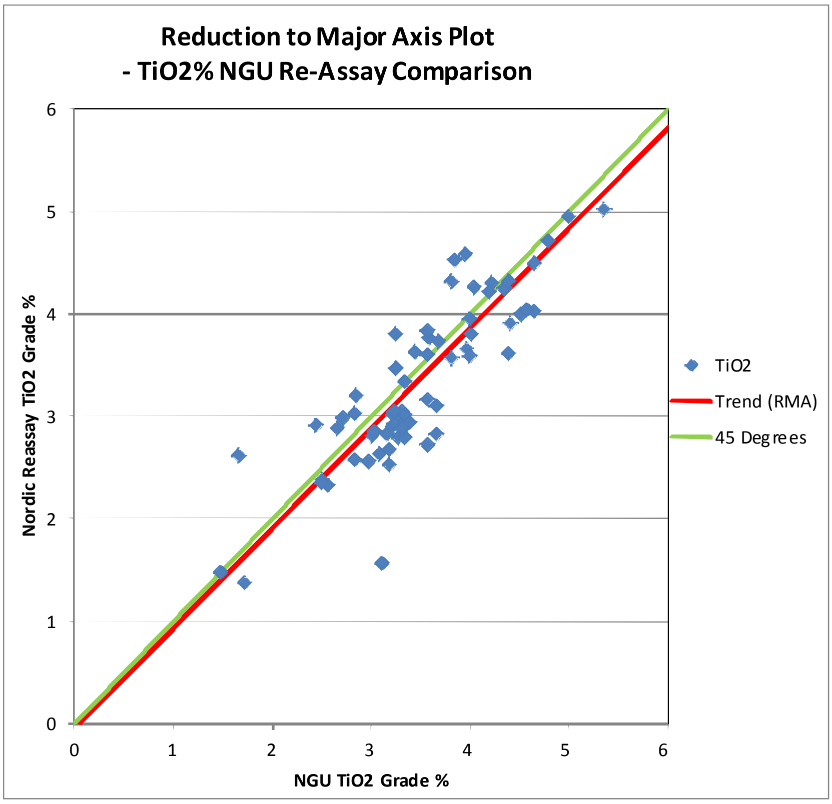


Table 11-5. DuPont/Conoco Re-Assay Comparative RMA Analysis

	All Pairs	Without Outliers
SD Original	0.95	0.94
SD Checks	0.93	0.92
Mean Original	3.81	3.83
Mean Checks	3.67	3.69
HARD Criteria		15%

Number of Pairs		R^2	m	Error (m)	b	Bias
169		0.80	0.98	0.034	-0.044	2.37%

Number Accepted	Outliers	Outliers %	R^2	m	Error (m)	b	Bias
167	2	1.2%	0.81	0.97	0.033	-0.034	2.59%



11.4 Overview

In the opinion of the Competent Person, the geological data used to inform the Engeboe resource estimation have been collected in line with good industry practice, allowing the results to be reported according to the guidelines of the JORC code. It is considered that all available data is suitable for use in the estimation of all resource categories, including:

- DuPont/Conoco diamond drillhole data
- DuPont/Conoco surface data
- 2016 Nordic diamond drillhole data
- 2016 Nordic surface sample data

12 MINERAL PROCESSING AND METALLURGICAL TESTING

12.1 Earlier DuPont Studies

During 1988-1998 the US chemical company DuPont conducted many studies for rutile recovery, and also used many independent labs for different studies. At this time a 10 million tonne per year operation was envisaged, and there were no restrictions on the size of the open pit, except for a small zone to prevent ingress of the fjord. No work was done on garnet recovery during this period.

The main conclusions from these DuPont studies included:

- An overall metallurgical recovery of rutile of appx. 50% was estimated, with the suggestion that higher recoveries ought to be possible with a closed circuit flowsheet, with re-cycling of middlings.

- The overall operation economics, based on estimated CapEx and OpEx by DuPont, were said to be financially robust. (Conoco Report)

The metallurgical results were based on a 70 tonne sample that was taken from 5 locations on surface, on top of the hill in the area of the current conceptual open pit. This was sent to Minpro AB in Sweden for comminution test work. They recommended jaw crushing - rod milling to -300 microns run in closed circuit with cyclones to minimise slimes losses. The milling circuit will be followed by de-sliming before further processing. DuPont estimated the energy consumption to be 6.5 KWhr per tonne and indicated the ore was easy to grind.

The de-slimed material was sent to DuPont's Florida Labs for more testing, with further samples being sent to many outside labs for specialised testing. This included a large sample sent to Readings in Australia. Out of all this work DuPont developed a flow sheet using 2 stages of Wet High Intensity Magnetic Separation (WHIMS) followed by gravity (spirals) to separate out the amphiboles and mica. They followed this with a final dry stage of magnetic separation to achieve a 95% rutile concentrate.

They excluded flotation at that time due to environmental concerns, caused by the use of specific or selected types of flotation agents. However, some flotation test work was undertaken later in Italy.

DuPont also did some testing of acid leaching, high pressure roller grinding (HPRG) and electrical grinding. The acid leaching, for removal of calcium, indicated very high costs. The electrical grinding involved new technology to pre-treat ore with pulses of electrical energy.

12.2 Garnet

One major change from the DuPont era is that Nordic is considering garnet as a recoverable product. It has many industrial applications, which include:

- Blasting (similar to sand blasting)
- Abrasives
- Waterjet cutting
- Water filtration

The Engeboe garnet type corresponds well with waterjet quality garnet. Almandine, the principal garnet type at Engeboe, is the preferred type of garnet for this application. In addition to this, the hard rock type garnet that could be produced from Engeboe is superior to alluvial-type garnet, as it tends to have sharper edges, which are more effective for precise cutting applications. Grain size is also important for waterjet applications. The Engeboe garnet is within the preferred grain size distribution for this application.

12.3 Nordic

Nordic has initiated processing testwork through the University of Trondheim, and specifically with the services of Professor Sandvik, who has been working on Engeboefjellet ores since 2006. The laboratory there is equipped with several crushers, milling options, gravimetric and magnetic separators, and flotation cells. This testwork has started out from the proposed DuPont process route, and other options have been tested to improve rutile recovery, and enable recovery of a sellable garnet concentrate.

The material used for this testwork was derived from 2 1-tonne batch samples, which were taken from small surface blasts in 2008 by Nordic. These were taken from areas within the potential open pit.

Important aspects of the Trondheim testwork include:

- Investigation into dividing the feed into a coarse and fine fraction at 150 microns. These then would be treated separately thus potentially improving overall recovery of garnet.

- Work to date on flotation has given good recoveries and grades of concentrate. Because of the high cost of flotation, testwork is ongoing to maximise the recovery but at the same time minimise the amount processed, so as to find the optimum balance.

- Gravimetric work is being conducted on plus 75 micron material. Below this size the heavy mineral losses of both rutile and garnet are high.

13 MINERAL RESOURCE ESTIMATION

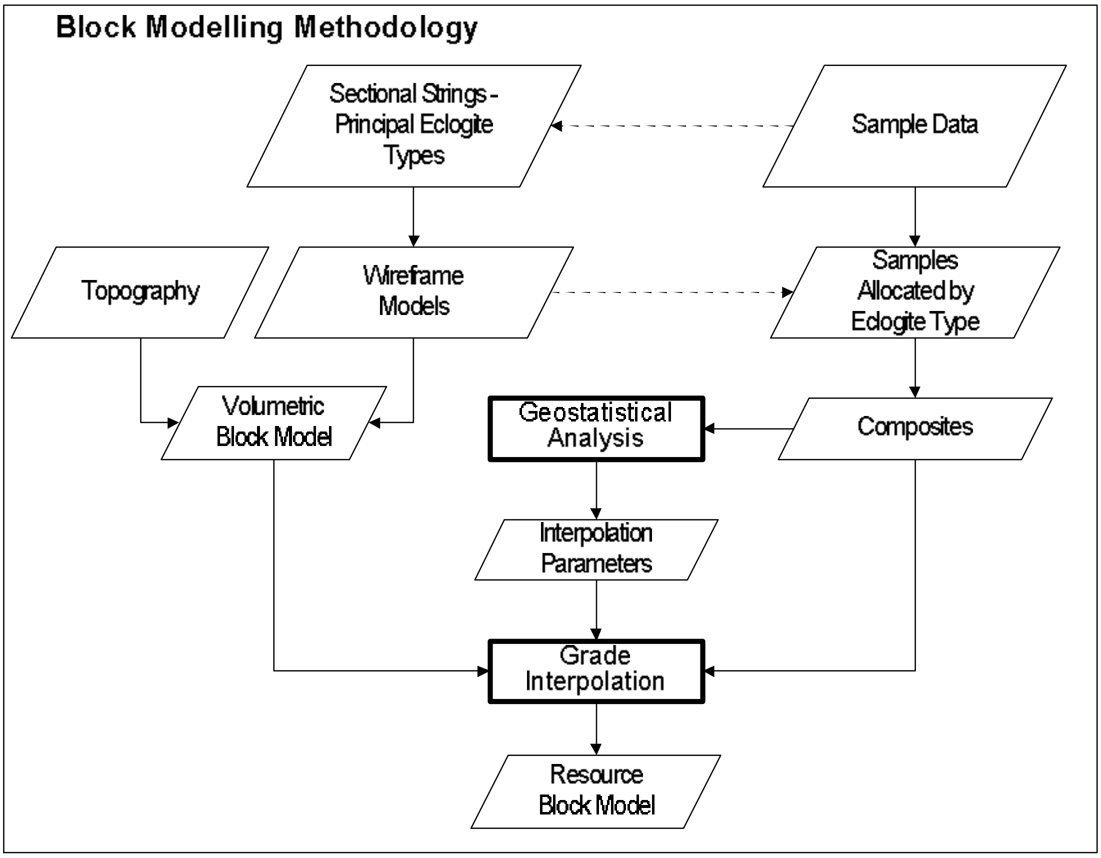
13.1 General Methodology

This mineral resource estimation was completed using a three-dimensional block modelling approach, with the application of Datamine software. The overall methodology used is depicted diagrammatically in the flowsheet in Figure 13-1.

As mentioned previously, three different principal types of eclogite have been coded during the logging of the drillhole data. For each of these principal zones, sectional strings and perimeters were defined, based on all available lithological and sample data. Where possible, these perimeters were then converted into three-dimensional wireframe envelopes. Along with topographical data, these wireframe data were used to create volumetric block models.

Samples associated with these overall interpreted zones were assigned logical codes, corresponding with the defined eclogite wireframe models. These sample data were then converted into approximately 5m composites. The composite TiO_2 and other grade values were then used to interpolate grades into the block model, according to the parent eclogite type to which they belonged. Geostatistical analysis was used to assist in the selection of interpolation parameters, as well as with subsequent resource classification.

Figure 13-1 Block Modelling Methodology



13.2 Sample Database

A summary of the complete combined database is shown in Table 13-1, and is depicted in plan and long section in Figure 13-2 and Figure 13-3.

Table 13-1. Summary of Sample Database

Origin	Type	Holes	Length	Length /Hole	Samples
			m	m	
1995-97	Drillholes	49	15,198	310	36,295
	Surface Samples				1,359
	Tunnel		660		33
2016	Drillholes	38	6,348	167	1,440
	Surface Samples				79
Total	Drillholes	87	21,546	248	

Figure 13-2. Plan of All Samples

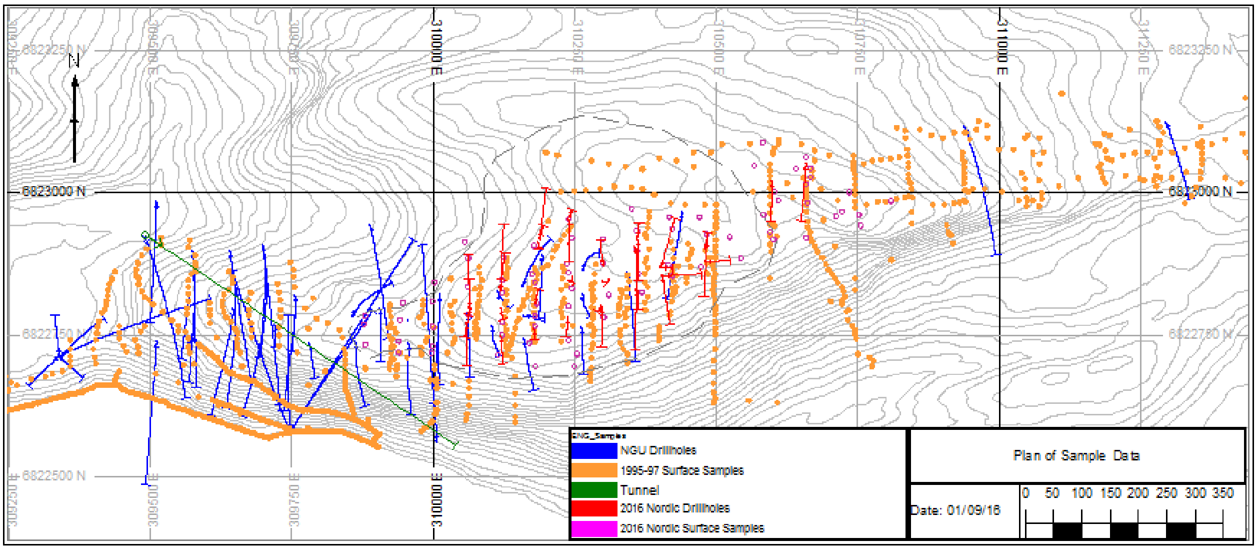
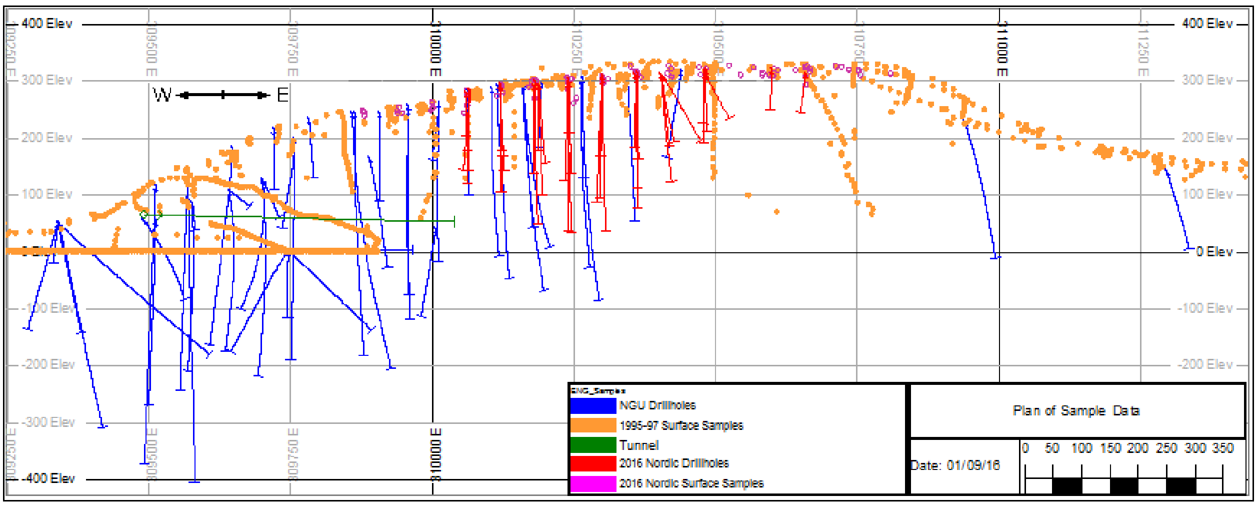


Figure 13-3. W-E Long Section of All Samples



All of the sample data was imported into Datamine. During the import of the drillhole data, any errors in terms of hole data sequence or combination mismatches were reported, and the errors were resolved in the original Excel database. The import of the 2016 drillhole data combined several different tables from the original database, which included:

- Collar data.
- Intersection data for retro-fractures, felsic vein and quartz vein data.
- Geotechnical data.
- Retro-alteration data.
- Density data.
- Assay data, with all the primary assay supplied by ALS.
- Lithology data, with different fields for lithology and texture, in order of intensity.
- Amphibole data.
- Omphacite data.
- Pyrite data.
- Mica data.

All of the available sample data was subsequently combined in Datamine, to create a single file that was used for subsequent processing.

13.3 Interpretation

The interpretation was done by the definition of strings on each 60m section lines, snapping onto drillhole data where possible. The objective of the interpretation was to reflect ecologite type and lithology, as described the rocktype codings summarised in Table 13-2. In the sample data, the ROCKTYPE numeric field is used. In the resultant selected samples and resultant block model the equivalent numbers are stored in a ZONE field. The colour of each string was defined according to rock type. A line type attribute was used to set each string according to whether it would subsequently used to generate 3D wireframe models, or whether the string would be used purely as string boundary on that section. An example of this sectional interpretation is shown in Figure 13-4.

Table 13-2. Modelling Rocktypes

ROCKTYPE	Category
1	Leuco-eclogite
2	Transitional-eclogite
3	Ferro-eclogite
4	Amphibolite
5	Garnet Amphibolite
6	Gneiss, (and misc' felsic rocks)
7	Alternating mafic and felsic rocks
8	Quartz
9	Others

Near the surface the strings were extended up above the surface, so as to ensure rock types would be set right up to surface. The maximum extrapolation distances used were generally 180m down-dip and 120m along-strike, unless surface mapping or surface sampling results supported longer continuity, such as in the extreme east end. The overall extent of mineralisation, as defined covered by this sample database, is summarised in Table 13-3.

Figure 13-4. Example of Interpretation Strings, Section 310,180mE

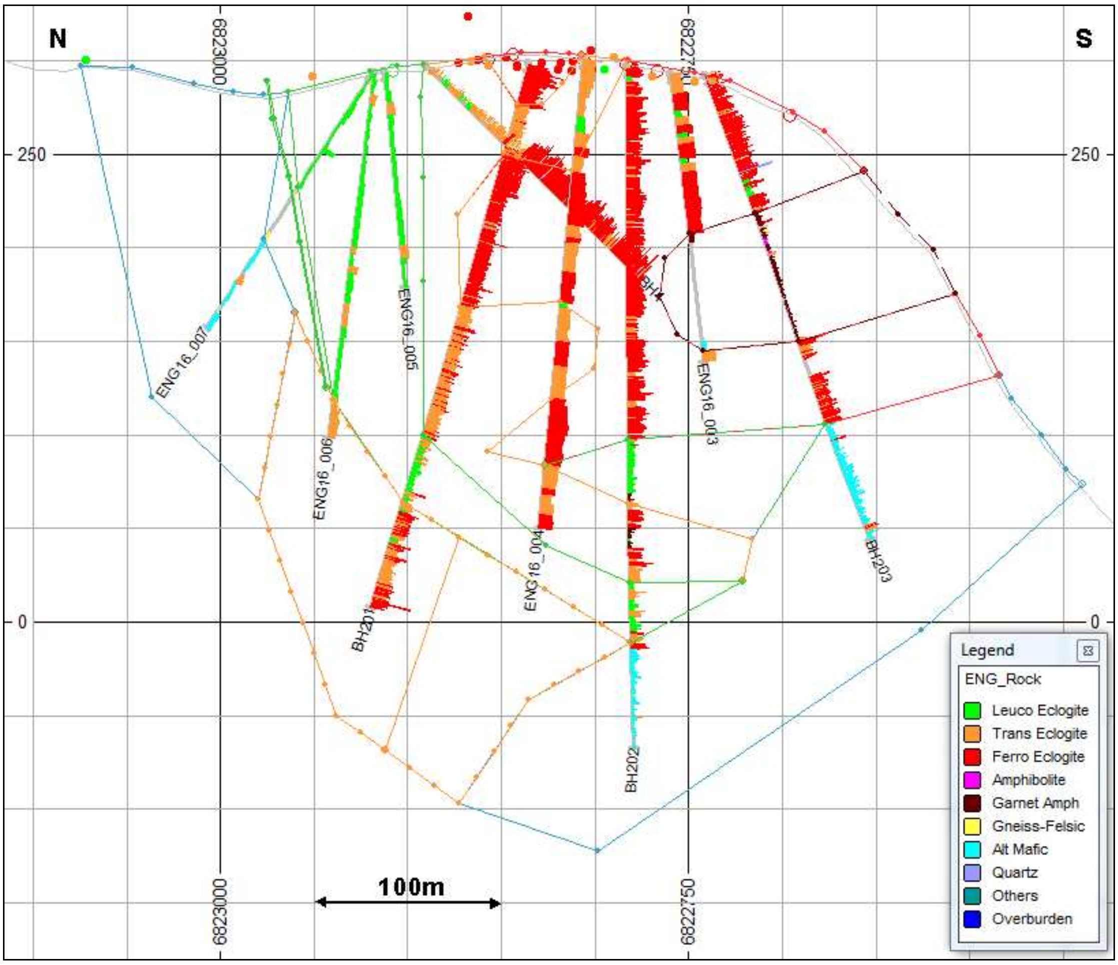
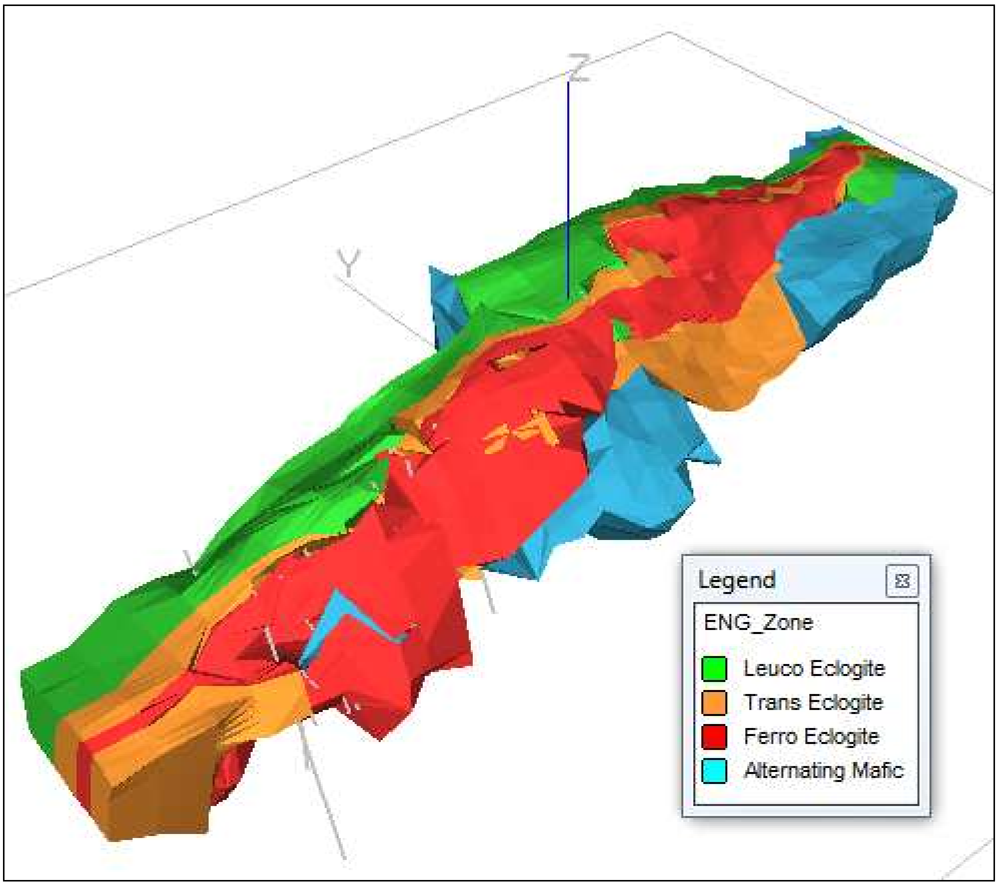


Table 13-3. Overall Mineralised Zone Dimensions

Strike Length	Overall Width of Mineralised Areas	Vertical Limits: Minimum Base Elevation	Vertical Limits: Maximum Outcrop Elevation	Vertical Limits: Max. depth	Horizontal Width	Dip Range
m	*m*	*m RL*	*m RL*	*m*	*m*	*(°)*
2,500	400	-400	320	400	120-320	70 - 90

Solid wireframe models were created for the three principal eclogite types, as well as some major zones of alternating mafic material, as shown in the 3D view in Figure 13-5. Some of the zone transitions between section are fairly sharp, which is probably due in large extent to shear zones. There are insufficiently clear fault/shear zone intersections picked up in drillholes and surface mapping to create fault models at the present time. It is therefore acknowledged that the eclogite wireframes are in some places simpler than reality, and not properly reflecting fault displacements. However, it is not considered that is adversely affecting the resource estimation work, although it is reflected subsequently in the applied resource classification.

Figure 13-5. 3D View of Interpreted Wireframe Model, from SW



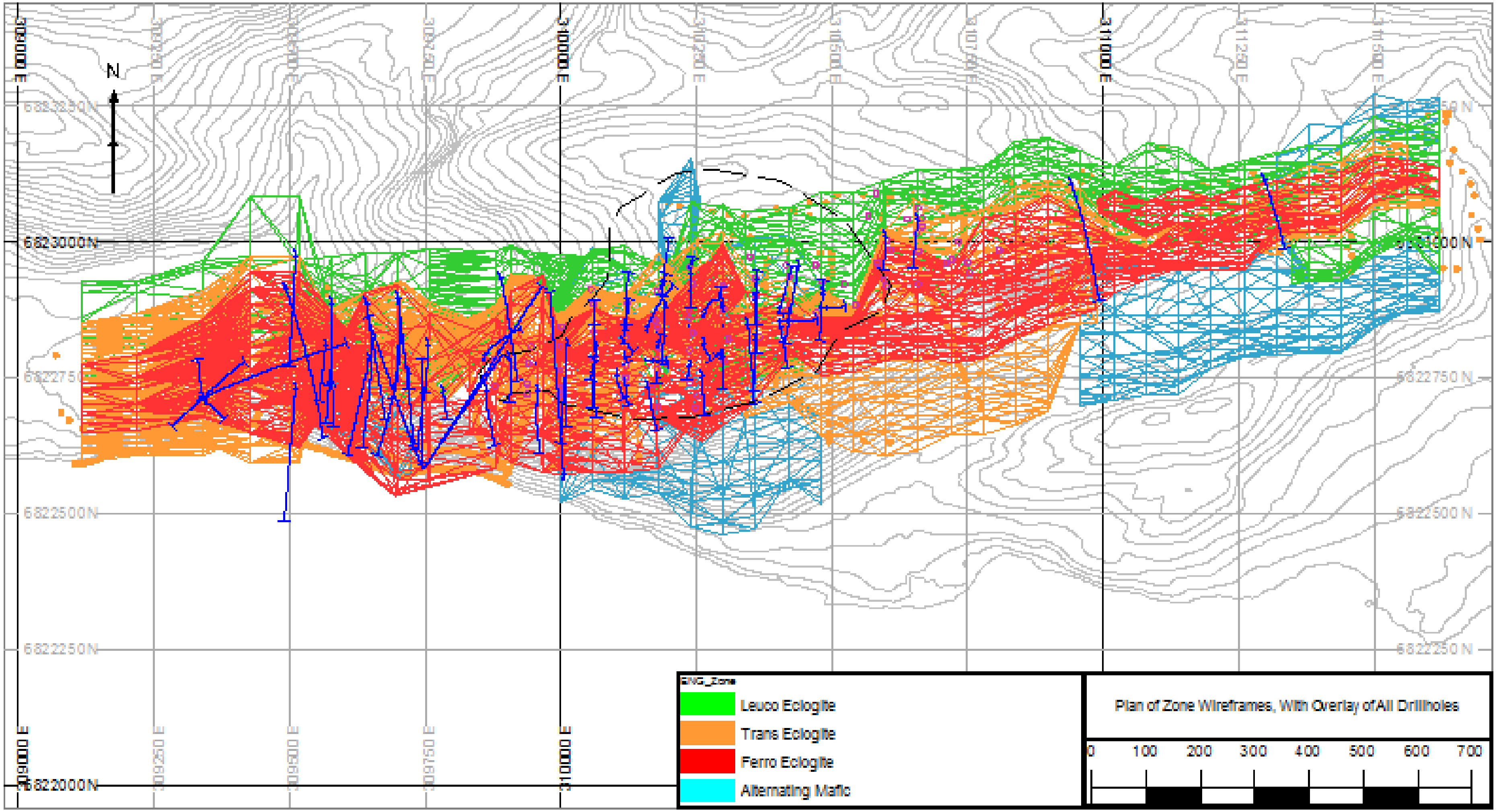
There are still some isolated intersections, particularly to the east where the drillholes are more widely spaced. These intersections were still modelled, using the surface sampling and mapping as guide to zone extrapolation.

A plan view of the interpreted wireframe models is shown in Figure 13-6. This plan also shows overlays of all drillhole data and the currently defined pit limits.

The wireframes and interpretation strings were verified:

- Verification tools within Datamine
- Checking block generation and combination problems in volumetric modelling.

Figure 13-6. Plan View of Interpreted Wireframe Zones



13.4 Sample Data Processing

Samples were selected according to the generated eclogite wireframe models, and sectional perimeters. This selection process allocated a numeric ZONE code, corresponding with the original ROCKTYPE coding used in the original drillhole data. As part of the verification procedure, check sections were generated, showing colours for the original drillhole ROCKTYPE codes on side each hole, and another bar showing the allocated ZONE coding on the other side.

A summary of the selected samples, according to ZONE coding, is shown in Table 13-4.

Table 13-4. Summary of Selected Samples

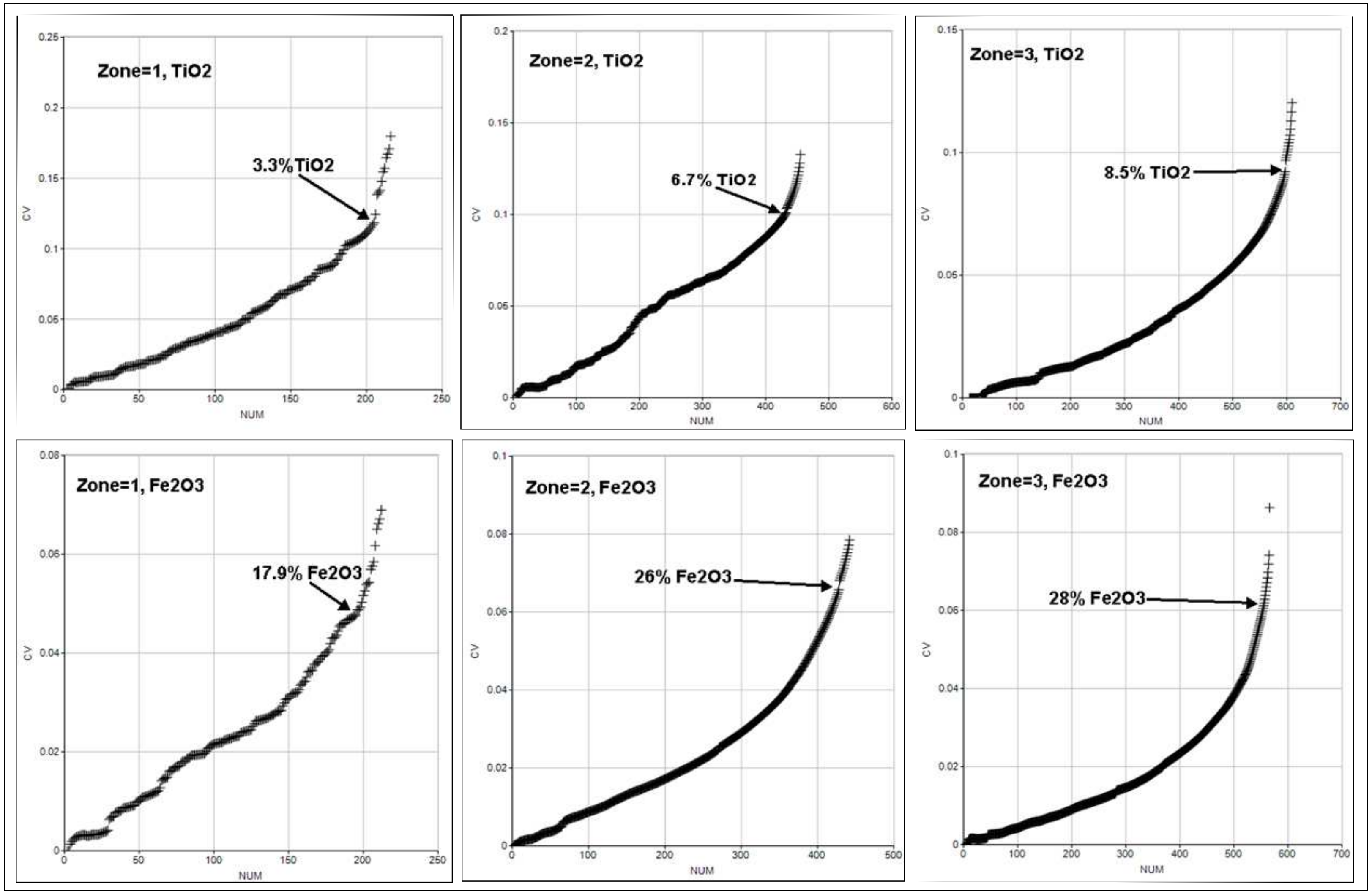
Origin	Type	Holes	Length *m*	Average Length/Hole *m*	Samples
1995-97	Drillholes	49	14,983	306	36,294
	Surface Samples				1,359
	Tunnel		660		33
2016	Drillholes	38	6,348	167	1,440
	Surface Samples				79
Total	Drillholes	87	21,331	245	

The selected sample sets for each eclogite type were analysed for outliers, using probability plots, decile analyses and coefficient of variation (cv) plots. From these analyses, top-cut levels (summarised in Table 13-5) were determined for each eclogite type, for TiO_2 and Fe_2O_3 grades, as shown in the cv plots in Figure 13-7.

Table 13-5. Top-Cut Levels

Zone	Rock Type	TiO_2 *%*	Fe_2O_3 *%*
1	Leuco-Eclogite	3.3	17.9
2	Trans-Eclogite	6.7	26.0
3	Ferro-Eclogite	8.5	28.0

Figure 13-7. Coefficient of Variation Plots



The samples were converted into 5m composites, using the following steps and parameters:

1. Top-cut levels were first applied, with the levels shown in Table 13-5. The effect of applying these top-cuts is minimal, as shown in the effect on the global composite means, summarised in Table 13-6.

2. Samples were split by type. Surface point samples were carried through unaffected. All drillhole and tunnel samples were passed onto compositing.

3. 5m downhole composites were then created, across each separate ZONE intersection, using the following parameters:

- Composite length nominally 5m, but variable so that composite lengths were equal across each intersection.
- Minimum composite length = 1m
- Minimum gap = 1m: below this any gaps will be ignored.

Table 13-6. Effect of Top-Cut Application

FIELD	ZONE	No. Of Composites	Number of TCs Applied	Prop% to which TC Applied	Mean % Uncut	Mean % With TC Applied
TIO2	1	1,299	57	4.4	1.11	1.09
TIO2	2	1,327	24	1.8	2.41	2.41
TIO2	3	2,770	33	1.2	3.80	3.80
FE2O3	1	1,283	85	6.6	11.1	11.0
FE2O3	2	1,303	32	2.5	15.4	15.4
FE2O3	3	2,679	26	1.0	17.0	17.0

13.5 Geostatistics

A statistical summary of the selected samples data is shown in Table 13-7, and of the resultant set of composites in Table 13-8. Histograms of TiO_2 and Fe_2O_3 grades for the selected samples are shown in Figure 13-8. Further histograms and probability plots of sample and composite data sets are shown in Appendix B. Features apparent from these plots include:

- Most of the samples within the separately modelled eclogite structures form single, approximately normal, populations.
- Plots comparing the populations split from the originally assigned lithological codes, as compared with the populations split by the physically defined envelopes, are extremely similar. This indicates that the modelling is reflecting these original codings fairly closely.
- For any particular eclogite type, quite similar populations are evident when comparing the drillhole samples versus the surface samples. This supports the use of the surface samples in the resource estimation.

Table 13-7. Statistical Summary of Samples In Mineralised Envelopes

FIELD	ZONE	NUMBER	MINIMUM	MAXIMUM	MEAN	VARIANCE	STANDDEV	LOGESTMN	CV
TIO2	1	6,641	0	9.65	1.05	0.38	0.62	1.08	0.59
TIO2	2	10,178	0	10.56	2.44	0.84	0.91	2.55	0.37
TIO2	3	24,566	0	13.13	3.85	1.71	1.31	4.12	0.34
TIO2ILM	1	153	0.89	31.82	7.12	51.48	7.17	7.13	1.01
TIO2ILM	2	616	0.53	38.19	5.61	30.45	5.52	5.48	0.98
TIO2ILM	3	627	0.68	37.28	5.31	33.59	5.80	5.06	1.09
FE2O3	1	6,508	0	29.72	11.06	9.68	3.11	11.24	0.28
FE2O3	2	9,963	0	36.07	15.87	12.20	3.49	16.15	0.22
FE2O3	3	23,646	0	47.67	17.41	11.21	3.35	17.77	0.19
K2O	1	1,319	0.09	4.36	0.74	0.30	0.55	0.73	0.74
K2O	2	1,823	0.02	2.62	0.52	0.13	0.36	0.53	0.69
K2O	3	2,113	0.03	2.72	0.42	0.10	0.31	0.42	0.74
SiO2	1	1,319	42.64	76.66	49.78	19.00	4.36	49.77	0.09
SiO2	2	1,823	42.22	78.09	47.00	11.16	3.34	46.99	0.07
SiO2	3	2,114	39.86	86.01	45.80	10.50	3.24	45.79	0.07
SO3	1	1,288	0.01	2.31	0.35	0.04	0.19	0.37	0.54
SO3	2	1,820	0	1.32	0.48	0.03	0.17	0.51	0.36
SO3	3	2,112	0.01	1.24	0.50	0.03	0.16	0.53	0.33
FRACPERM	1	1,079	0	2000.0	4.6	1239.0	35.2	3.2	7.66
FRACPERM	2	1,772	0	10000.0	9.7	8905.5	94.4	5.1	9.70
FRACPERM	3	2,032	0	2500.0	8.6	3971.6	63.0	4.6	7.30

Notes

. STANDEV = standard deviation
. LOGESTMN = log estimate of mean
. CV = coefficient of variation (=mean/sd)

Table 13-8. Statistical Summary of Composites

FIELD	ZONE	NUMBER	MINIMUM	MAXIMUM	MEAN	VARIANCE	STANDDEV	LOGESTMN	CV
TIO2	1	1299	0.00	3.30	1.01	0.19	0.43	1.04	0.43
TIO2	2	1327	0.39	6.70	2.43	0.57	0.75	2.45	0.31
TIO2	3	2770	0.01	8.50	3.82	0.91	0.96	3.86	0.25
TIO2ILM	1	85	0.89	31.82	7.43	52.31	7.23	7.52	0.97
TIO2ILM	2	204	0.53	38.19	5.92	37.94	6.16	5.75	1.04
TIO2ILM	3	219	0.68	37.28	5.31	30.48	5.52	5.11	1.04
FE2O3	1	1283	0.00	17.90	11.04	6.19	2.49	11.17	0.23
FE2O3	2	1303	1.42	26.00	15.79	6.96	2.64	15.82	0.17
FE2O3	3	2679	0.12	24.78	17.38	4.83	2.20	17.46	0.13
K2O	1	425	0.11	3.81	0.75	0.27	0.52	0.74	0.70
K2O	2	386	0.02	2.25	0.52	0.10	0.32	0.52	0.61
K2O	3	452	0.03	1.90	0.42	0.07	0.26	0.42	0.63
SiO2	1	425	43.62	76.66	49.84	17.00	4.12	49.83	0.08
SiO2	2	386	43.43	71.20	47.00	7.74	2.78	47.00	0.06
SiO2	3	453	41.78	65.22	45.80	6.87	2.62	45.80	0.06
SO3	1	419	0.01	2.03	0.35	0.03	0.17	0.37	0.49
SO3	2	386	0.02	1.11	0.48	0.02	0.15	0.50	0.32
SO3	3	453	0.01	1.24	0.50	0.02	0.15	0.51	0.29
FRACPERM	1	273	0.00	146	4.6	189	13.7	3.6	3.00
FRACPERM	2	338	0.00	235	9.8	838	28.9	6.5	2.97
FRACPERM	3	406	0.00	301	8.6	930	30.5	23.9	3.53

Notes

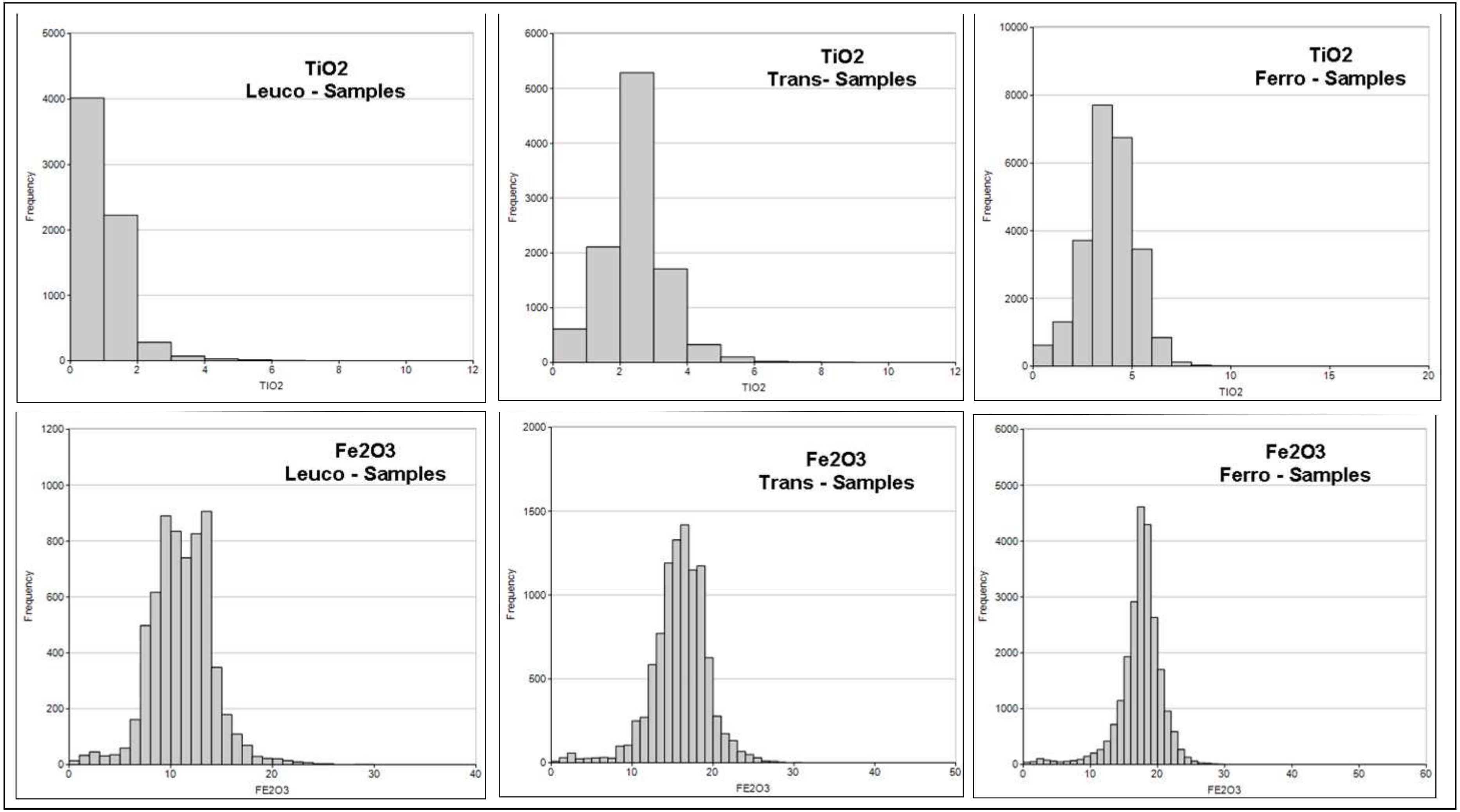
. STANDEV = standard deviation

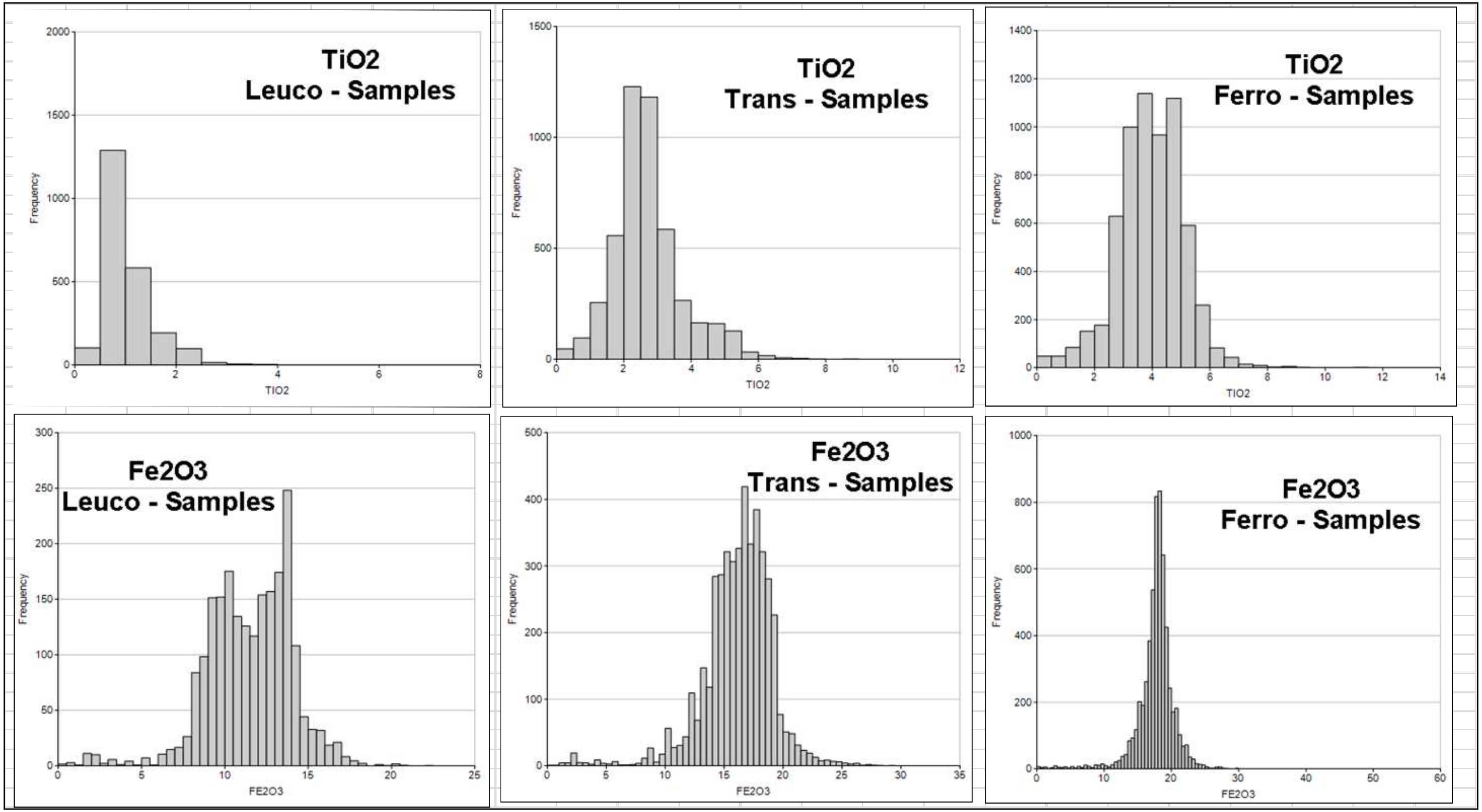
. LOGESTMN = log estimate of mean

. CV = coefficient of variation (=mean/sd)

. TIO2ILM = %TiO2 contained in ilmenite

Figure 13-8. Histograms of TiO2 and Fe2O3 Samples




TiO2
Leuco - Samples
TiO2
Trans - Samples
TiO2
Ferro - Samples
Fe2O3
Leuco - Samples
Fe2O3
Trans - Samples
Fe2O3
Ferro - Samples
Frequency
TIO2
FE2O3

Experimental variograms of the composited TiO_2 values were generated for each of the eclogite zones, in three principal directions: along-strike, down-dip and cross-strike. From these model variograms were fitted, as shown in Figure 13-9. The model variograms parameters are summarised in Table 13-9.

Figure 13-9. TiO2 Experimental and Model Variograms

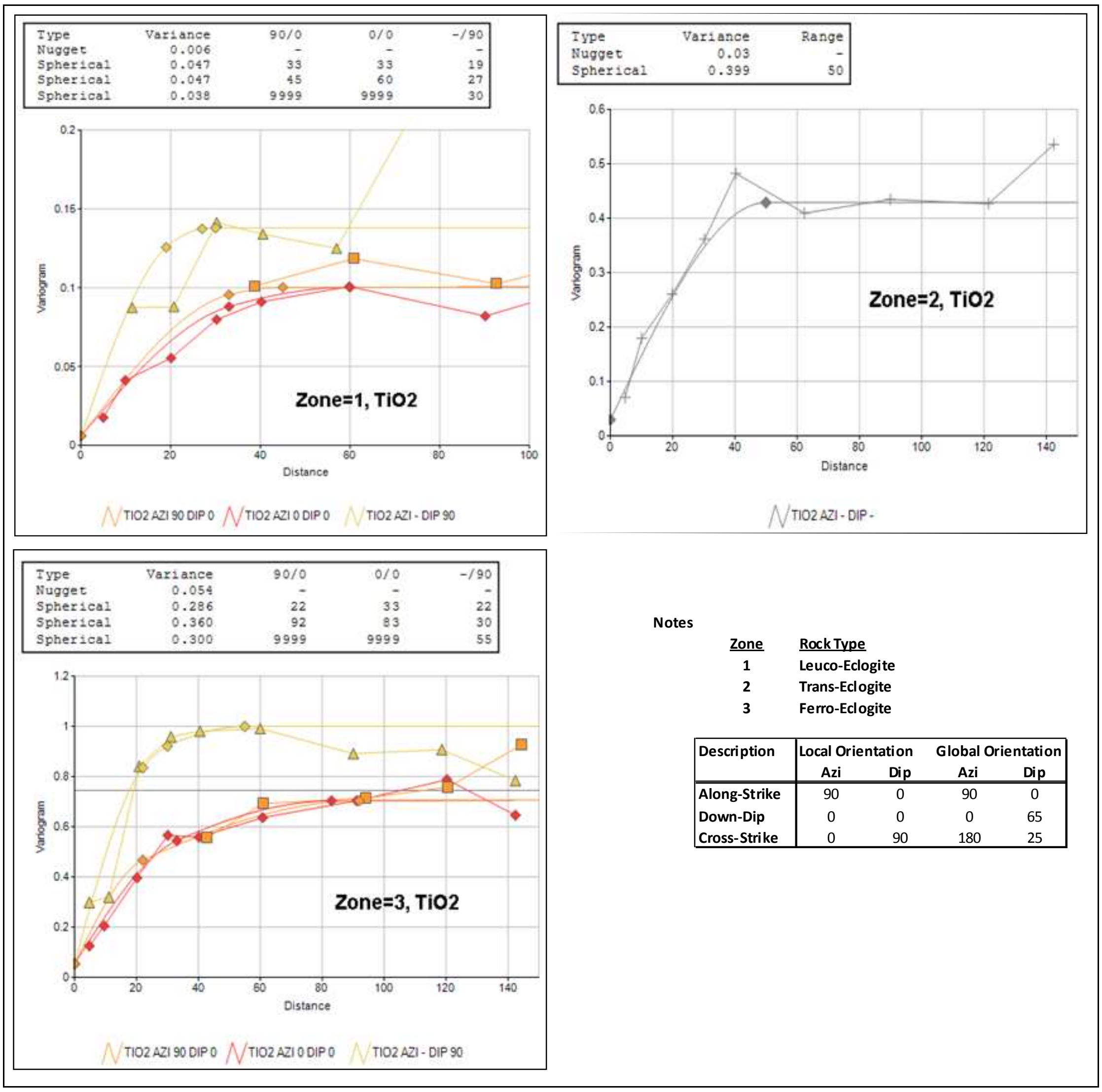


Table 13-9. Model Variogram Parameters - TiO2

Zone	Field	Nugget	Range 1 (m)			C1	Range 2 (m)			C2	Range 3 (m)			C3
			1	2	3		1	2	3		1	2	3	
Leuco-Eclogite	TiO2	0.006	33	33	19	0.047	45	60	27	0.047	9999	9999	30	0.038
Trans-Eclogite	TiO2	0.030	49	49	49	0.399								
Ferro-Eclogite	TiO2	0.054	22	33	22	0.286	92	83	30	0.360	9999	9999	55	0.300

Notes:

Direction	Description	Orientation	
		Azi	Dip
1	Along-Strike	90	0
2	Down-Dip	0	65
3	Cross-Strike	180	25

13.6 Volumetric Modelling

The various interpreted three-dimensional wireframe models and perimeters were used to construct a volumetric block model of the deposit. A parent block size of 15m x 15m x 15m was selected. These dimensions were considered appropriate in view of the principle section spacing (60m) and the currently expected open pit bench height. The block model limits were selected so as to cover the whole deposit. The overall model prototype is summarised in Table 13-10.

Table 13-10. Block Model Prototype

	Min *m*	Max *m*	Range *m*	Size *m*	Number
X	308,980	311,800	2,820	15	188
Y	6,822,430	6,823,450	1,020	15	68
Z	-450	420	870	15	58

The principal data used to control the generation of this model included:

- Surface topographical wireframe model
- 3D interpreted wireframe models for zones 1, 2, 3 and 7
- Separate 3D overall envelope model for all of the eclogite structures
- Sample data
- Plan perimeter of 50m pillar limit from edge of fjord

The steps used in the generation of the volumetric model were:

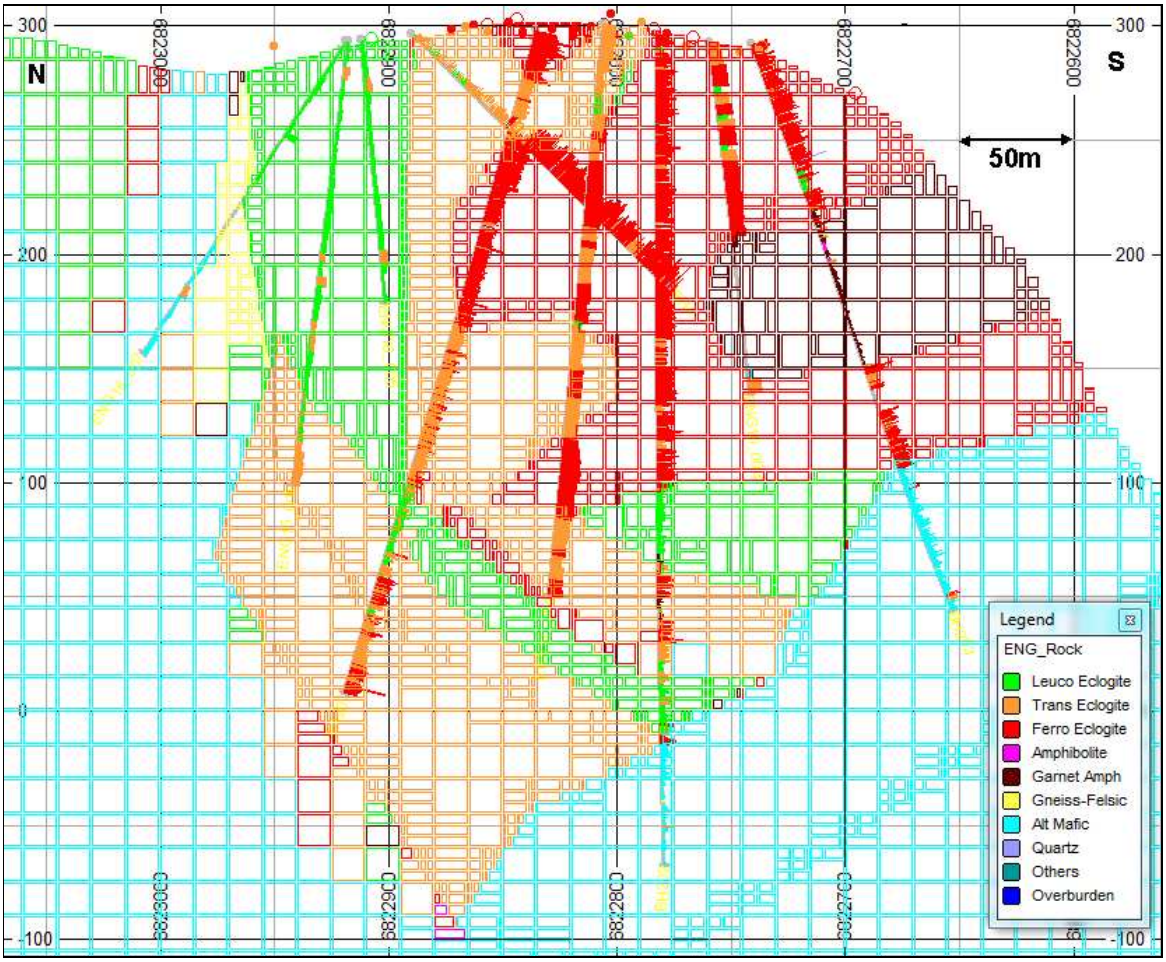
1. Generation of models inside sectional perimeters (those which do not belong to wireframe models), based on section thickness.
2. Generation of models inside the main 3D wireframe interpreted models, for leuco-eclogite (ZONE=1), for trans-eclogite (ZONE=2), for ferro-eclogite (ZONE=3) and alternating-mafic (ZONE=7).
3. Generation of blocks underneath the topographical model.
4. Flagging of blocks inside 50m pillar limit from edge of fjord, for this blocks below sea-level.
5. Combination of all the different component block models.
6. For any blocks not covered by the individual zone wireframes (due to wireframe complexity), the ZONE rock type is allocated by direct extrapolation of the ROCKTYPE in the sample data.

In the generation of blocks, control parameters were used so that sub-blocks could be generated down to 5m x 5m, with the sub-block in the perpendicular direction being resolved to the nearest 1m. The fields generated in the volumetric block model included:

STRUCT	Inside interpreted wireframe (=2), or inside interpreted perimeter (=1).
SUBSEA	Flag indicating if block is inside fjord pillar (=1) or not (=0).
ZONE	Number 1-9, as per ROCKTYPE codings in Table 10-6.

A typical cross-section through the block model, showing the sub-cell structures, is shown in Figure 13-10.

Figure 13-10. Example Cross-Section -Volumetric Model, 310,180mE



13.7 Grade Estimation

The generated composites were used to estimate grades into the volumetric block model. For each eclogite zone, the separate composite data sets were used to interpolate TiO_2, Fe_2O_3 and other grades into the corresponding blocks in each zone. The geostatistical analysis was used to help derive interpolation parameters, which are summarised in Table 13-11.

Table 13-11. Estimation Parameters

Field	Zone	Distances X:Y:Z (m)			Search	Minimum Composites	Minimum No. of Drillholes
		1	2	3			
TiO_2	Leuco-Eclogite	25	25	15	1st	9	3
		60	60	36	2nd	9	3
		120	120	72	3rd	4	1
	Trans-Eclogite	25	25	25	1st	9	3
		50	50	50	2nd	9	3
		120	120	120	3rd	4	1
	Ferro-Eclogite	25	25	15	1st	9	3
		75	75	45	2nd	9	3
		120	120	72	3rd	4	1
Other Grades	All Zones	60	60	36	1st	3	-
		120	120	72	2nd	1	-
		288	288	172.8	3rd	1	-

Notes:

- **Maximum number of composites used = 15**
- **Directions determined locally using dynamic anisotropy:**
  - **X: Along-Strike**
  - **Y: Down-Dip**
  - **Z: Cross-Strike**
- **All TiO2 grades interpolated using ordinary kriging**
- **All other grades interpolated using inverse distance weighting (^2)**
- **Other grades estimated:**
  - **FE2O3**
  - **K2O**
  - **SO3**
  - **SiO2**
  - **RQD**
  - **FRACPERM**
  - **TIO2ILM**
  - **DENSITY**

When the interpolation procedure took place for each block, a number of progressively larger searches for available composites were attempted, until sufficient composites had been found. This process also recorded which search was successful in locating samples. For TiO_2, the initial search ellipse distances stemmed from the approximate 2/3 level of the model variograms. If insufficient samples were found, then a second larger search ellipse was used, at approximately the dimensions of the model variogram ranges. Again, if insufficient samples were found, then a final 3rd search was used with very large distances, to ensure that practically all blocks within the modelled eclogite structures did receive TiO_2 grades.

An additional control was placed on the first 2 searches, which was to only allow this allocation if at least three drillholes were encountered. During the interpolation of each block, a maximum of 15 composites could be used. In all cases, grades were only interpolated from composites belong to the same corresponding eclogite type identification.

The principal method of TiO_2 grade interpolation used was ordinary kriging (OK). However, for subsequent testing and validation purposes, alternative TiO_2 grade values were also interpolated using nearest-neighbour (NN) and inverse-distance (ID) weighting methods. The estimated Fe_2O_3 and other grades in the block model were estimated using inverse-distance weighting.

For the OK estimation of TiO_2 grades in the eclogite zones, parent cell estimation was used, with discretisation of 5 x 5 x 3. The vertical x3 factor was selected from the 5m composite length and the 15m bench height.

The search ellipse used for estimation of TiO_2 grades in the eclogite zones was oriented locally in the model according to the orientation of the corresponding interpreted wireframes. This was achieved through the use of dynamic anisotropy, where the interpreted wireframe models are used to create vectors on the surface of these models, with calculated dips and dip directions. These values are then estimated into the block model, creating fields TRDIP (true dip) and TRDIPDIR (true dip direction). These local orientation data values in the block model are then subsequently used to orient the search ellipse during grade estimation.

13.8 Garnet

The estimated values of Fe_2O_3, K_2O, SO_3 and TiO_2ILM were used to derive garnet grades within eclogite zones, based on the relationship described in Section 10.2.7. This derivation involved the following steps:

1. **Handling Absent Values.** As values of K_2O, SO_3 and TiO_2ILM were only available for data associated with the 2016 drilling and surface sampling campaigns, in any block values of any of these grades values were absent, then the values shown in Table 13-12 were set.

2. **Ilmenite (ILM).** A grade value of %ilmenite was determined from the estimated TiO_2ILM (the %TiO2 contained in ilmenite), using the relationship:

   ILM (%) = TiO2 x (TiO2ILM/100)/0.5295

3. **Test Value (TV).** A test value was determined, according to the coefficients derived in Section 10.2.7, as shown below:

   TV = FE2O3 – [(SO3 x A) + (K2O x B) + ILM x C)]

4. **Garnet Value (GNT) Derivation.** The garnet grade value was then determined from the formula below, developed from the regression described in Section 10.2.7. A test for extreme values capped garnet grades at 54%, and limited minimum values to 22%. These limits were determined from the QEMSCAN data described in Section 10.2.7.

   GNT (%) = (M x TV) + D

5. **Garnet Value Assignment.** If all values of K_2O, SO_3 and TiO_2ILM were absent, it was deemed that insufficient data was available to derive garnet, in which case average garnet grades were simply assigned by zone, using the values below:

Leuco-Eclogite	35.7% GNT
Trans-Eclogite	42.4% GNT
Ferro-Eclogite	44.6% GNT

All of the parameters used in this garnet derivation are summarised in Table 13-12.

Table 13-12. Garnet Derivation Parameters

Zone	Coefficients					Assumed values if absent			
	A	B	C	M	D	TIO2ILM	SO3	K2O	GNT
Leuco-Eclogite	4.1	3	2.5	1.988	17.167	7.90	0.35	0.77	35.7
Trans-Eclogite	4.1	3	2.5	1.988	17.167	5.82	0.48	0.52	42.4
Ferro-Eclogite	3.9	1.5	2.5	3.438	-3.792	5.53	0.5	0.41	44.6

Notes

ILM (%) = TiO2 x (TiO2ILM/100)/0.5295

TV = FE2O3 – [(SO3 x A) + (K2O x B) + ILM x C)]

GNT (%) = (M x TV) + D

A comparison of the derived garnet values in the block model, as compared with the QEMSCAN test results, are shown in Figure 13-11. This shows that broadly similar distributions of garnet values.

Figure 13-11. Histograms of Model Garnet Values

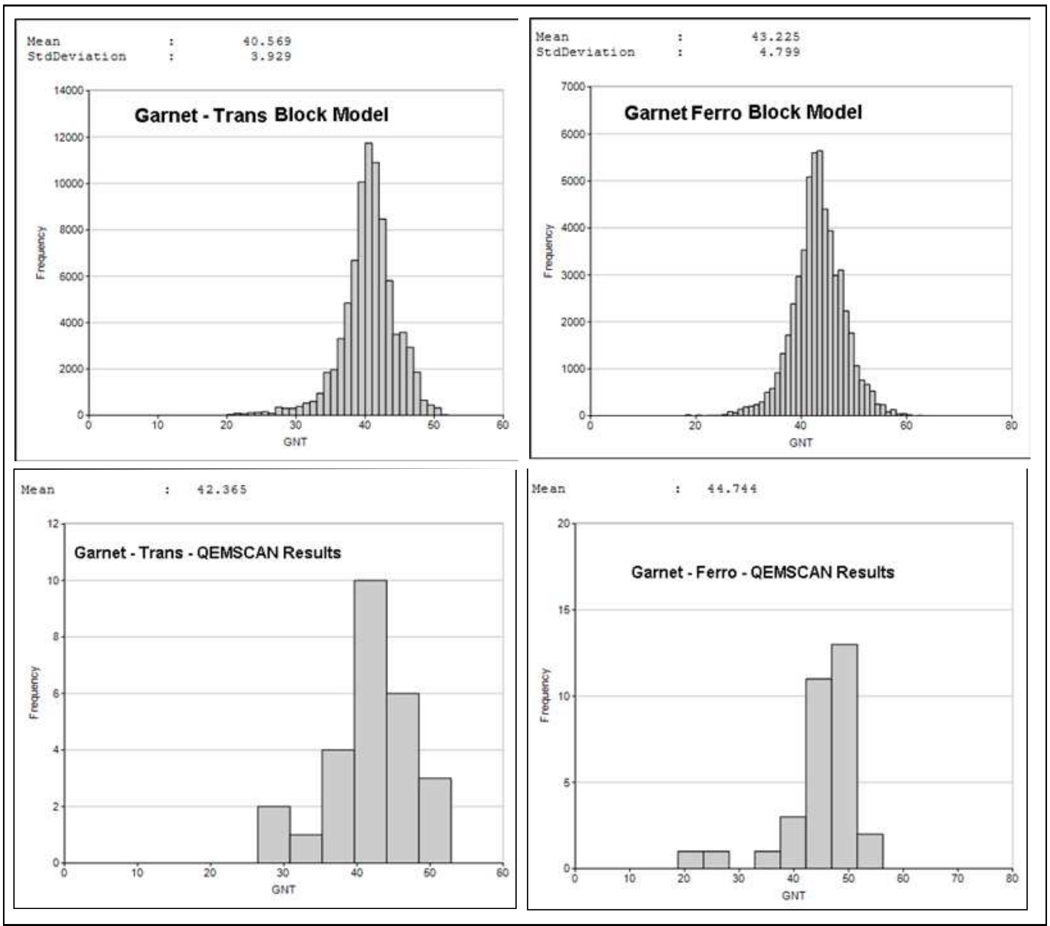
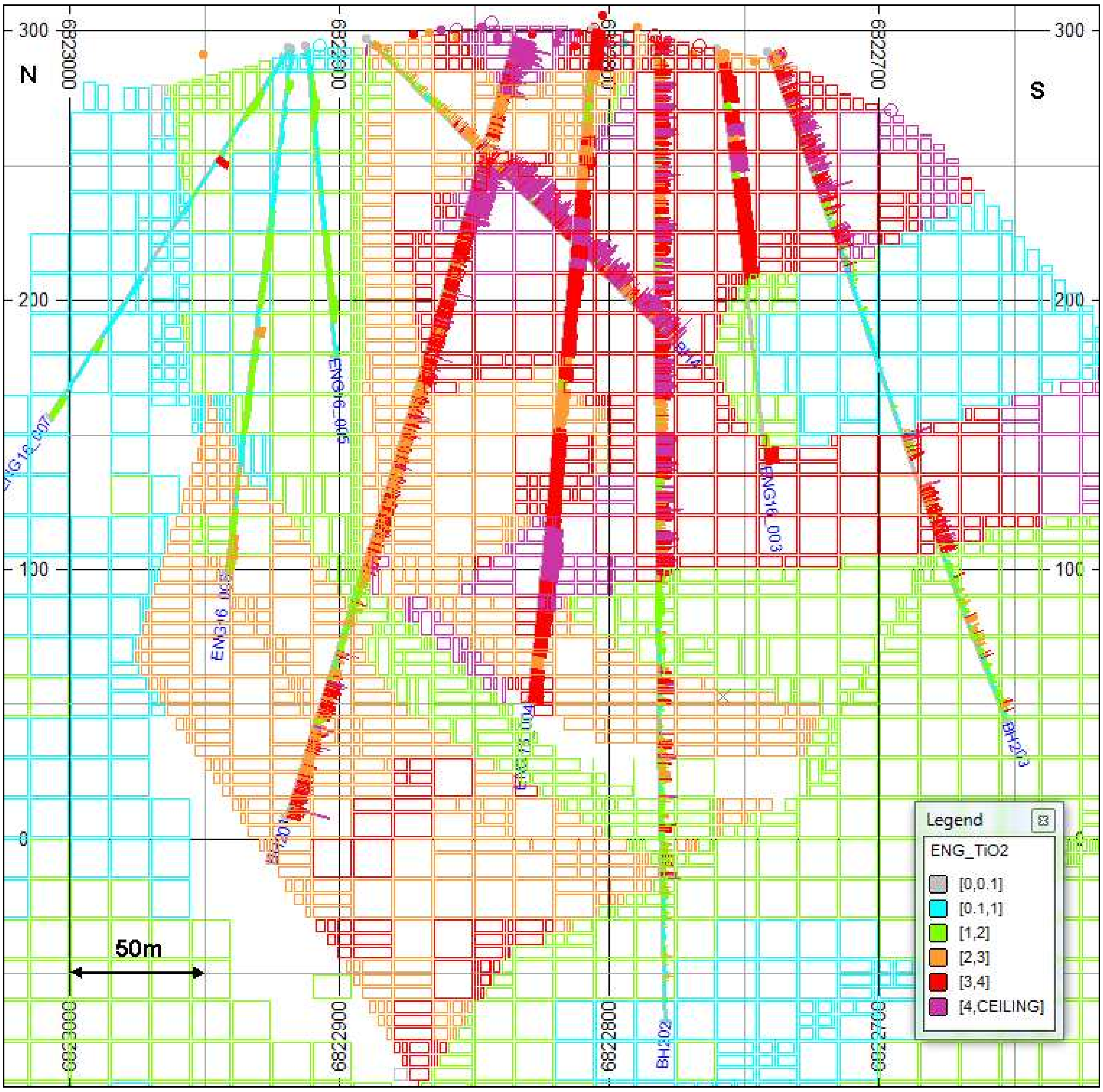


Figure 13-12. Example Cross-Section –Model TiO2 Grades, 310,180mE



13.9 Densities

A summary of the core density measurements from the 2016 drilling campaign are shown in Table 13-13.

Table 13-13. Statistics of Core Density Measurements

ZONE	ROCKTYPE	NUMBER	MINIMUM	MAXIMUM	MEAN	VARIANCE	STANDDEV
1	Leuco-eclogite	141	2.85	3.5	3.19	0.018	0.135
2	Transitional-eclogite	115	2.87	3.77	3.43	0.026	0.161
3	Ferro-eclogite	143	3.03	3.68	3.55	0.007	0.086
4	Amphibolite	7	2.96	3.31	3.13	0.015	0.123
5	Garnet Amphibolite	10	3.03	3.33	3.14	0.007	0.085
6	Gneiss	6	2.69	3.19	2.80	0.024	0.155
7	Alternating mafic	10	2.8	3.26	3.04	0.023	0.152
8	Quartz	9	2.67	3.23	2.87	0.047	0.216
9	Others	3	2.67	2.67	2.67		

Density values were estimated into the block model using inverse-distance weighting. As density values are only available from the 2016 drilling campaign, the extreme western and eastern parts of the model will be too far from available data to estimate values. For these parts, therefore, density values were assigned by rock type, based on average values from the 2016 density measurements. These values, along with average values which have been estimated in the block model, are summarised in Table 13-14.

Table 13-14. Summary of Estimated and Assigned Model Density Values

ZONE	ROCKTYPE	Average Model Estimated Value	Values Assigned
1	Leuco-eclogite	3.16	3.19
2	Transitional-eclogite	3.43	3.43
3	Ferro-eclogite	3.54	3.55
4	Amphibolite		3.13
5	Garnet Amphibolite	3.26	3.14
6	Gneiss	2.77	2.80
7	Alternating mafic	3.16	3.04
8	Quartz	3.10	2.87
9	Others		2.67

Notes

. All values in t/m^3

. Assigned values used where estimation not possible

13.10 Resource Classification

In order to test resource classification criteria, a conditional simulation, focusing on the precision of evaluation that may be obtained with different drillhole spacings, related to mining blocks containing a quantity of ore broadly equivalent to 3 months of production and 1 year of production. This analysis was completed with the following stages:

1. A block of eclogite was delineated in the central open pit area, containing approximately 750 Kt of eclogite material, which would be equivalent to roughly 3 months of production (at an annual throughput of 3Mtpa).
2. Based on composites for ferro- and trans-eclogites, normal score variograms were produced and modelled, as shown in Figure 13-13.
3. Two test panel block models were produced: one for 750Kt of ferro-eclogite material and another for 750Kt of trans-eclogite material. The panel measured 300m x 75m x 10m.
4. A theoretical set of closely spaced (5m x 5m) drillholes were produced in the panel areas. This was done from a conditional simulation run, and conforms to the available drillhole data and the normal score model variograms.
5. Different theoretical drillhole sets could then be selected: 20m x 12m, 30m x18m etc, up to 180m x 108m.
6. A conditional simulation was then run using each of the different pseudo-drilling grid sets. The parameters used for these simulation runs included:
   - **a)** Sequential gaussian simulation.
   - **b)** An internal point density of 2.5m x 2.5m x5m was used within the test panel. 50 simulation runs were completed for each test.
   - **c)** Normal transformed model variograms used.
   - **d)** Horizontal search distances 200m x 100m were used.
7. For each conditional simulation run, the distribution of overall average grades were approximately normally distributed, as shown in Figure 13-14. The standard deviation of these results was then used to calculate the relative error of the overall average grade, at the 90% probability level.
8. From these results, the relative errors at the 90% probability level were also determined for a block corresponding to approximately one year's production.

An overall summary of these results is shown in Table 13-15.

Figure 13-13. Normal Score Variograms for TiO_2

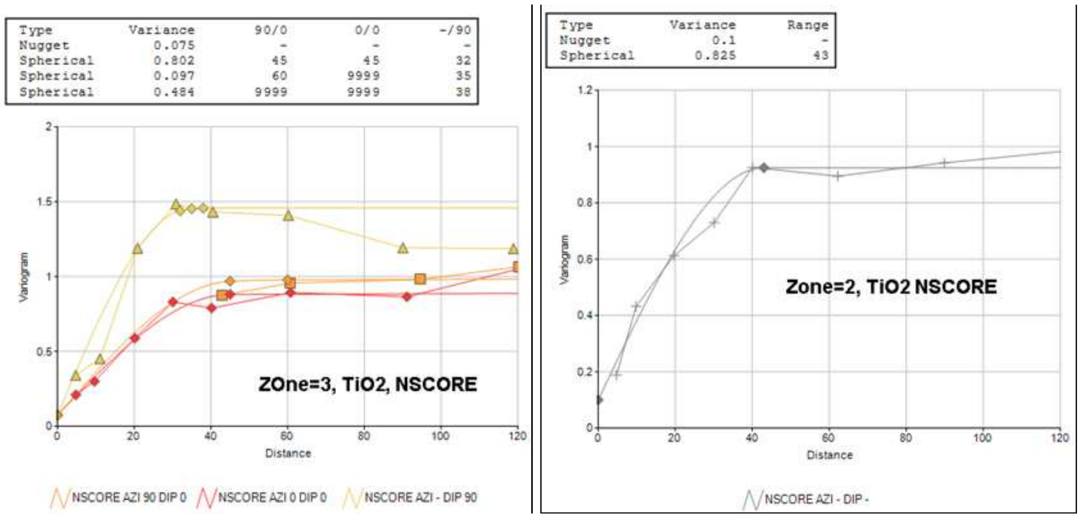


Figure 13-14. Example Histogram of Simulated Average Grades for 130m Grid

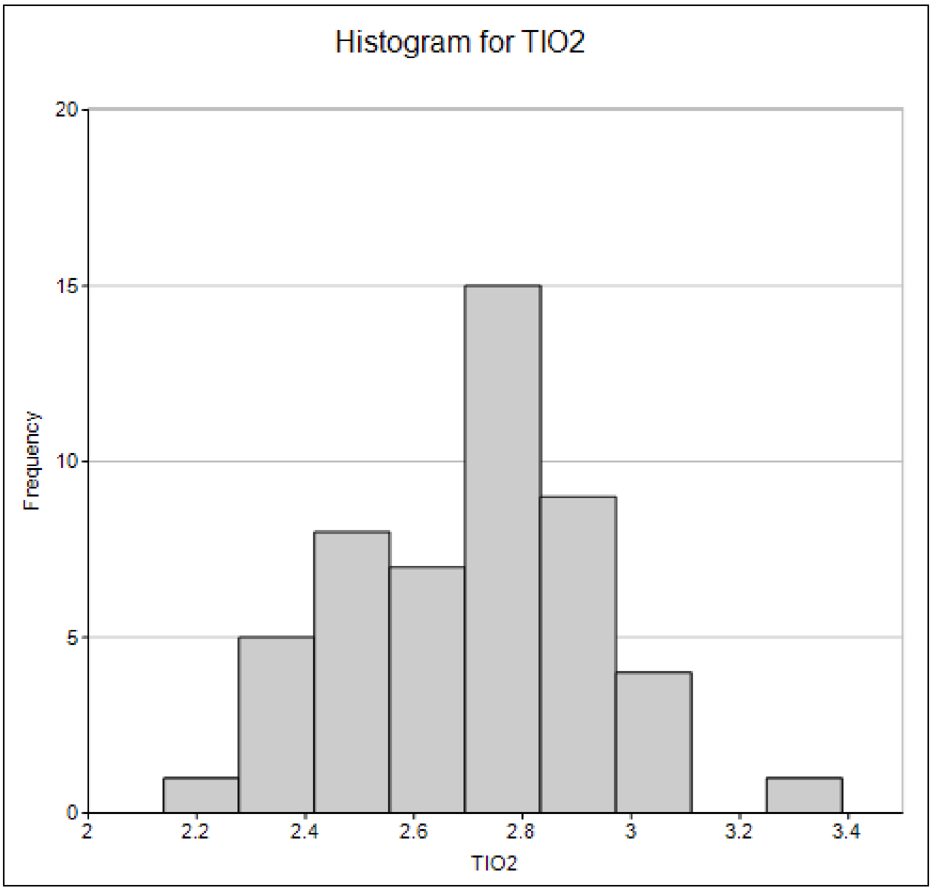


Table 13-15. Conditional Simulation Results for 3 Month and 1 Year Test Blocks

	Drilling Grid Spacing m	Results For Quarterly Mining Block Mean TiO2 %	Standard Deviation	Min	Max	+/- Tolerance at 90% Probability Level %	Relative Error %	Relative Error for Annual Block %
Trans-Eclogite	20 x 12	2.46	0.03	2.39	2.55	0.05	2.24	1.1
	30 x 18	2.45	0.07	2.32	2.65	0.11	4.39	2.2
	40 x 24	2.44	0.09	2.23	2.67	0.14	5.86	2.9
	50 x 30	2.38	0.14	2.04	2.75	0.23	9.67	4.8
	60 x 36	2.26	0.14	1.95	2.62	0.23	9.99	5.0
	70 x 42	2.52	0.17	2.17	3.01	0.27	10.76	5.4
	80 x 48	2.58	0.16	2.24	3.08	0.26	10.00	5.0
	90 x 54	2.61	0.17	2.23	3.11	0.28	10.61	5.3
	100 x 60	2.33	0.18	2.00	2.84	0.29	12.35	6.2
	110 x 66	2.42	0.18	1.97	2.94	0.29	11.99	6.0
Ferro-Eclogite	20 x 12	3.50	0.03	3.45	3.58	0.05	1.42	0.71
	30 x 18	3.51	0.06	3.40	3.70	0.10	2.88	1.44
	40 x 24	3.50	0.09	3.31	3.72	0.15	4.21	2.10
	50 x 30	3.45	0.13	3.12	3.85	0.22	6.29	3.15
	60 x 36	3.58	0.17	3.24	3.97	0.28	7.75	3.88
	70 x 42	3.59	0.20	3.03	4.12	0.33	9.32	4.66
	80 x 48	3.47	0.23	2.87	4.04	0.38	10.87	5.43
	90 x 54	3.81	0.24	3.16	4.38	0.39	10.32	5.16
	100 x 60	3.71	0.25	3.17	4.31	0.41	10.97	5.49
	110 x 66	3.85	0.28	3.10	4.55	0.46	11.82	5.91
	120 x 72	3.40	0.26	2.72	4.03	0.42	12.40	6.20

Observations from these results include:

1. For a one year mining block, the relative error increases appreciatively in going from a 70m to a 80m drilling grid, which is approximately at the extent of the variogram range of the Ferro-Eclogite. A relative error of 5% is achieved with a 75m x 45m drilling grid.
2. For the quarterly mining block, a relative error of approximately 5% is achieved with a 40m drilling grid. With the reference to the variograms used for grade estimation, 40m occurs at a point approximately equivalent to 80% of the sill height on the ferro-eclogite variogram.

However, these observations are only related to grade variability. It is also acknowledged that there some of the interpreted wireframes have extremely complicated transitions between sections, probably related to shear zones. This will be reflected in mining terms with problems connected to definition of the orebody edges during mining. Therefore, although the relative errors given by the discussed results above are quite small, close to 5%, the likely relative error will be higher when also taking into account the orebody complexity.

These results were therefore used to develop the resource classification criteria shown in Table 13-16. The key distances involved are shown with reference to TiO2 variogram for ferro-eclogite, in Figure 13-15.

Figure 13-15. Ferro TiO2 Variogram, With Respect to Resource Classification

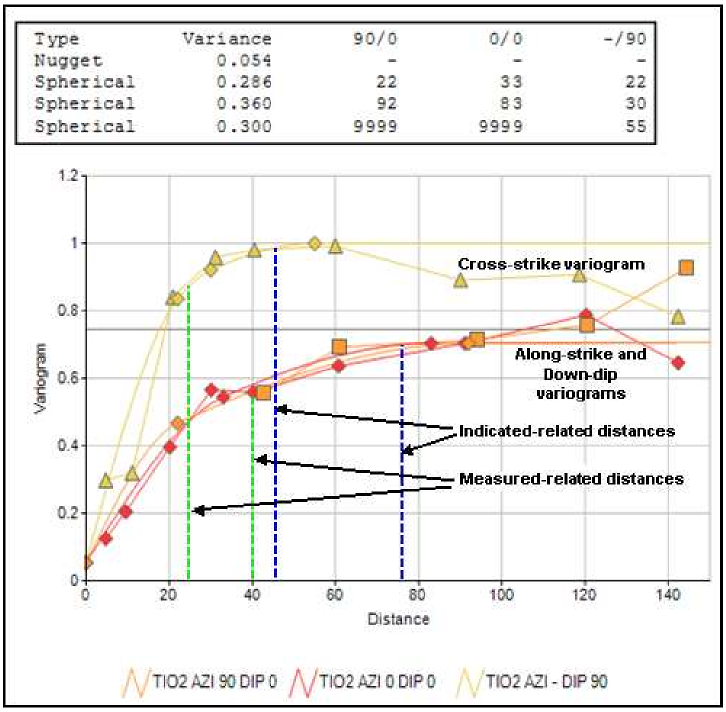


Table 13-16. Resource Classification Criteria

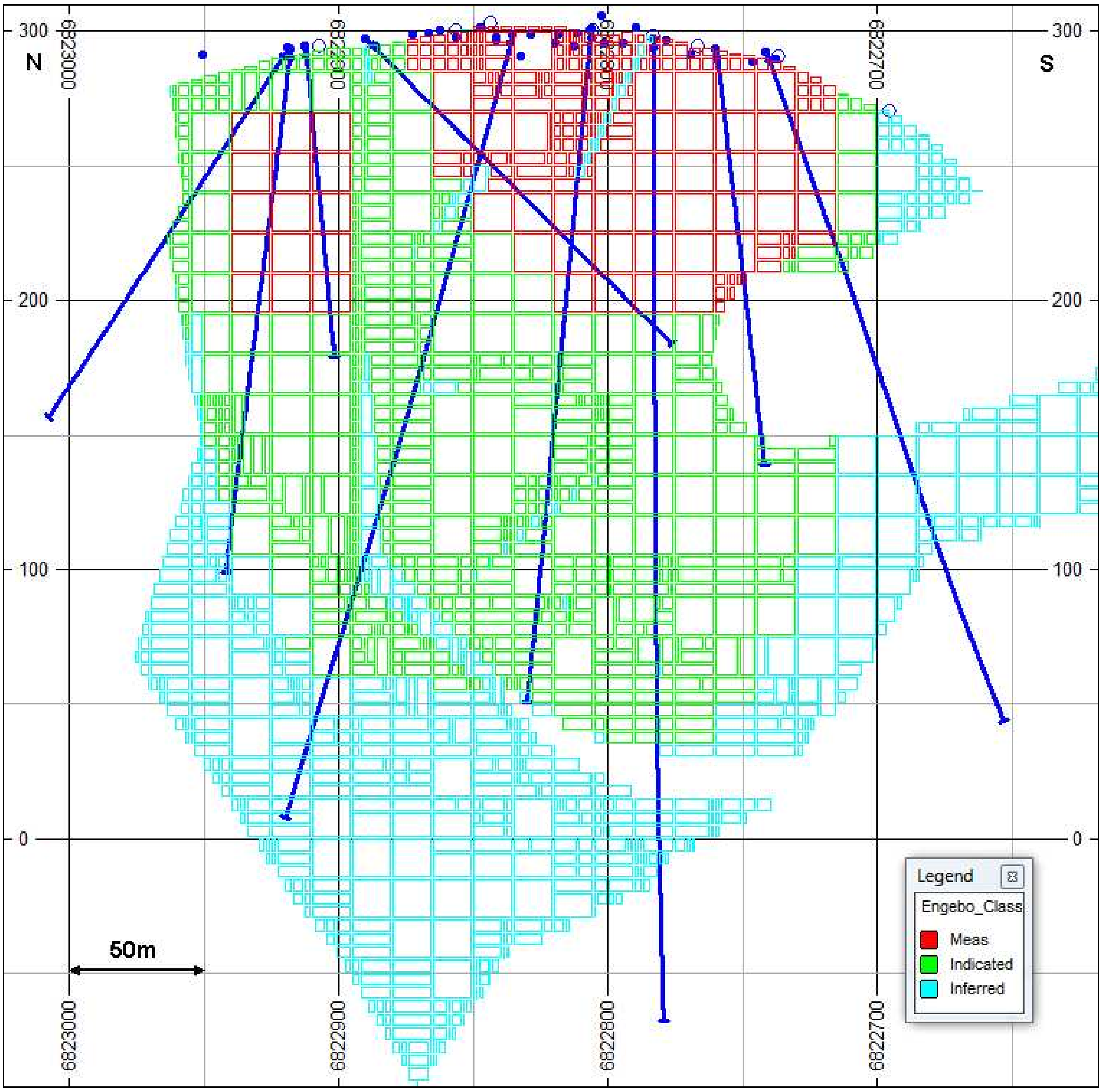
Measured	At least 3 drillholes, and samples present in at least 3 octants, within a search of 40m x 40m x 24m
Indicated	At least 3 drillholes, and samples present in at least 3 octants, within a search of 75m x 75m x 45m
Inferred	Within interpreted structures, and limited by a maxium extrapolation of 180m from available sample data

Notes

. Search distances are along-strike; down-dip and cross-strike

During the grade estimation, the control parameters summarised in Table 13-16 were used to leave a search volume flag, coded in the block model according to these criteria. Sections were then examined with this coded search volume, and practical resource classification outlines were defined. An example cross-section showing the resultant resource classification is shown in Figure 13-16.

Figure 13-16. Example Cross-Section – Resource Classification - 310,180mE



13.11 Model Validation

Model validation steps included:

- Examination of model/sample cross-sections
- Block volume checks
- Comparison of global averages
- Comparison of local averages
- Historical comparisons

Model sections were examined, so that comparisons and checks could be made between the block model, composites and original samples. Volume checks were also made, to ensure that all parent blocks did not contain more volume than is physically possible.

A **global comparison** was made of the average TiO_2, Fe_2O_3 and other model grades, for measured and indicated resource levels, with the corresponding average sample and composite grades, as summarised in Table 13-17. As the more recent 2016 drilling is concentrated in the prospective pit area, the comparison was split to the west and east of 310,000mE. To the west of 310,000mE, the drilling is only from the DuPont/Conoco drilling campaign. To the east of 310,000mE, the drilling is a combination of DuPont/Conoco and 2016 Nordic drilling. The figures shown in Table 13-17 show a very close correspondence of average sample, composite and block model grades.

A **local comparison** of grades was also made, in the form of swath plots, which compare the average grades on each 60m thick north-south slice, as shown in Figure 13-17. Separate plots were generated for each of the eclogite zones, as shown overleaf. These plots compare for each slice:

- The average ordinary kriged model grades (from measured and indicated resources).
- The average nearest neighbour model grades.
- The average inverse-distance model grades.
- The average (declustered) composite grades.
- For reference, the total (measured and indicated) tonnage on each slice.

In general all the different types of model grades, as well as the composite grades, correspond very closely, in progressing from the west to the east, indicating an absence of bias.

Table 13-17. Global Comparison of Grades

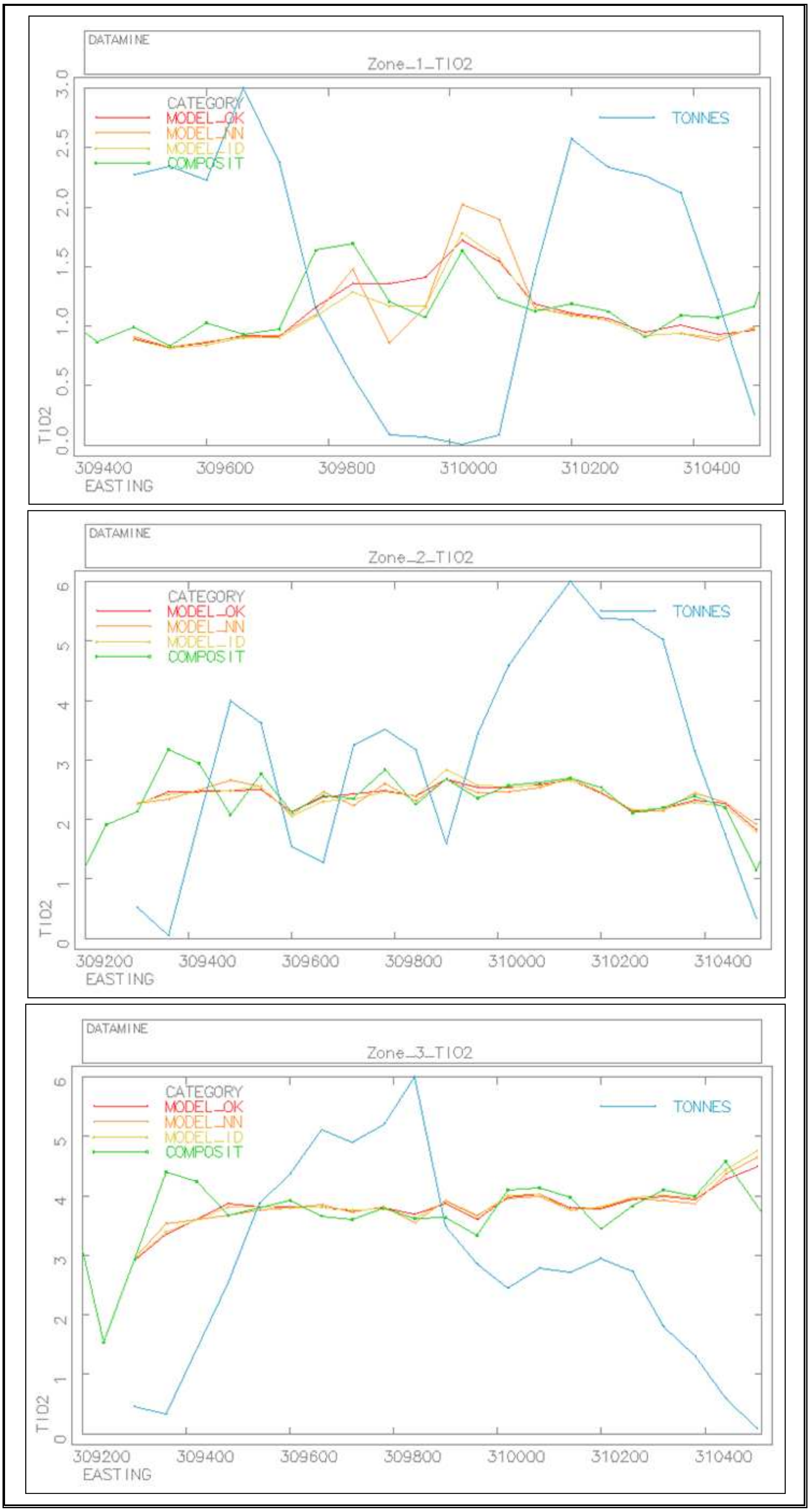
			Average	Average	Block Model		
	X Limits	ZONE	Samples	Composites	OK	NN	ID
TiO_2	<310,000mE	1	1.04	0.95	0.93	0.93	0.91
		2	2.57	2.53	2.45	2.46	2.45
		3	3.74	3.72	3.76	3.74	3.75
	>310,000mE <310,550mE	1	1.02	1.02	1.04	1.02	1.02
		2	2.42	2.40	2.41	2.41	2.41
		3	4.01	3.95	3.92	3.90	3.94
Fe_2O_3	<310,000mE	1	10.8	10.9			10.4
		2	16.4	16.1			15.1
		3	17.3	17.3			17.1
	>310,000mE <310,550mE	1	11.4	11.3			11.4
		2	16.0	15.9			15.9
		3	17.9	17.8			17.6
K_2O	>310,000mE <310,550mE	1	0.76	0.76			0.74
		2	0.52	0.52			0.52
		3	0.41	0.42			0.39
SO_3	>310,000mE <310,550mE	1	0.35	0.35			0.34
		2	0.48	0.48			0.47
		3	0.50	0.50			0.50
SiO_2	>310,000mE <310,550mE	1	49.8	49.8			50.0
		2	47.0	47.0			46.9
		3	45.8	45.8			45.6
TiO2ILM	>310,000mE <310,550mE	1	7.9	8.0			6.5
		2	6.0	6.2			5.6
		3	5.7	5.6			6.3

Notes

. ZONE: **1** Leuco-eclogite
2 Transitional-eclogite
3 Ferro-eclogite

. OK = ordinary kriging
. NN = nearest neighbour
. ID = inverse distance
. Block Model averages from measured and indicated resources only
. All grade units in %

Figure 13-17. TiO_2 Swath Plots



In general all the different types of model grades, as well as the composite grades, correspond very closely, in progressing from the west to the east, indicating an absence of bias.

A comparison between current estimation and the previous 2008 estimation is shown in Table 13-18. These figures have been collated for a cut-off of 3% TiO_2. Resource figures are shown for the sum of measured, indicated and inferred resources for the purposes of comparison only.

Features which are apparent from this comparison include:

- Overall TiO_2 grades for the updated ferro-eclogite resources are slightly higher.
- There is a significant increase in the proportion of indicated resources in the western sector, reflecting the updated resource classification criteria.
- There is a significant increase in the proportion of indicated resources, reflecting the updated resource classification criteria as well as the effect of the additional drilling in the central open pit area.
- The eastern sector, although entirely made up of inferred resources, was not evaluated previously.

Table 13-18. Historical Estimation Comparison

Previous 2008 In-Situ Estimation

CLASS	Leuco-Eclogite		Trans-Eclogite		Ferro-Eclogite		Total	
	Tonnes Mt	TiO_2 %	Tonnes Mt	TiO_2 %	Tonnes Mt	TiO_2 %	Tonnes Mt	TiO_2 %
Measured								
Indicated	0.0	0.00	0.4	3.15	31.3	3.78	31.7	3.77
Inferred	0.1	3.41	3.4	3.38	119.1	3.76	122.6	3.75
Total	0.1	3.41	3.8	3.36	150.4	3.76	154.3	3.75

Current August 2016 Estimation

CLASS	Leuco-Eclogite		Trans-Eclogite		Ferro-Eclogite		Total	
	Tonnes Mt	TiO_2 %	Tonnes Mt	TiO_2 %	Tonnes Mt	TiO_2 %	Tonnes Mt	TiO_2 %
Measured	-		0.3	3.37	14.7	3.98	15.0	3.97
Indicated	-		1.8	3.23	75.7	3.89	77.5	3.87
Inferred			15.6	3.61	122.8	3.89	138.4	3.86
Total			**17.7**	**3.57**	**213.2**	**3.89**	**230.9**	**3.87**

Notes

. Cut-off used for comparison = 3% TiO_2

. Measured, indicated and inferred resources combined for comparison purposes only

13.12 Pit Optimisation

An updated pit optimisation was completed with the updated resource model, using the NPV Scheduler software system. As well as the new model contents, new overall slope parameters were also applied. These slope angles are considered as conceptual, and more geotechnical work is planned as part of the PFS. The pit optimisation runs made were limited within the perimeter for which Nordic has permission to evaluate as a potential open pit. The optimisation parameters applied are summarised in Table 13-9. All parameters are preliminary and will be revised as part of the ongoing PFS work by Nordic.

Table 13-19. Pit Optimisation Parameters

			Run	1 and 4	2 and 5	3 and 6
	Parameter		*Unit*	2012 Parameters	Updated Slopes	Updated Slopes and Costs
Prices	Rutile		*$/t*	**1000**	**1000**	**1000**
	Garnet (assume 20% feed grade)		*$/t*	**300**	**300**	**300**
Mining Costs	Waste Mining Cost		*$/t rock*	**2.41**	**2.41**	**2.64**
	Ore Mining Cost		*$/t ore*	**2.41**	**2.41**	**2.64**
Processing/Ore Costs						
	Costs - Per Tonne Ore					
		Direct processing	*$/t ore*	**8.35**	**8.35**	**9.14**
		Additional ore mining component	*$/t ore*	*0.00*	*0.00*	*0.00*
		G&A	*$/t ore*	**0.78**	**0.78**	**0.85**
		Total Ore Cost	*$/t ore*	*9.13*	*9.13*	*10.00*
	Recoveries					
		Mill Recovery		**55%**	**55%**	**55%**
		Garnet Recovery *		**14%**	**14%**	**6%**
	Discount Rate			**10%**	**10%**	**10%**
Mining Factors	Dilution (unplanned)			**5%**	**5%**	**5%**
	Mining Recovery			**95%**	**95%**	**95%**
Cut-Off Grades	Economic Rutile cut-off grade			*1.74%*	*1.74%*	*1.91%*
	Economic Garnet cut-off grade			*22.83%*	*22.83%*	*58.32%*
Overall Slope Angles			*0*	**52°**	**56**	**56**
			90		**55**	**55**
			180		**55**	**55**
			270		**59**	**59**
Resource Enabled - Runs						
	Measured + Indicated			1	2	3
	Measured + Indicated + Inferred			4	5	6

Notes

Directly entered	**Bold**
Derived	***Italic***
Used in optimisation	**Yellow**

Run 3: . Inflated Op Costs
. Garnet recovery adjusted for ~100,000tpa garnet product

The optimisation parameters for run 1 are the same as was run in a previous test in 2012. The optimisation extent from 2012 was used as a guide placement of the open pit as part of the zoning planning for the Engeboe project. In all of the current optimisation runs the regulatory outline was applied as a hard limit. The price assumption of rutile is US$ 1000/t, based on the market conditions in 2012, and current market outlook for long term prices of natural rutile. The price of garnet has been assumed at US$300/t based on the 2012 market outlook for high quality garnet products in the water jet cutting market.

The optimisation parameters for run 2 are the same as run 1, except that the overall slope parameters have been updated to reflect the updated geotechnical parameters. The run 3 parameters have updated operating costs (reflecting an inflation rate of 2.3% per year) since 2012. The effective garnet recovery has also been reduced to run 3 to limit the garnet product to approximate 100 Kt per year, based on an assumed ore processing rate of 4.2 Mtpa.

Runs 1, 2 and 3 have only measured and indicated resources enabled. Runs 4, 5 and 6 have the same parameters as runs 1, 2 and 3, except that inferred resources have been enabled as well.

In all of the pit optimisation runs, the ore/waste criteria for each block is based on TiO_2 alone i.e. the derived TiO_2 breakeven cut-off grade in each case. The economic benefits of processed garnets are still used for block value and overall pit economics, but garnet does not assist in assigning whether any given block is mined as ore or waste.

The results summarising the maximum cashflow pits for each of these optimisation runs is shown in Table 13-20. The max cashflow pits' dimensions are summarised in Table 13-21. A plan depicting the optimisation extents is shown in Figure 13-18, and corresponding optimised pit sections and 3D view are shown in Figure 13-19 to Figure 13-21.

Table 13-20. Summary of Optimisation Results

												Recovered Products	
Run	Classes Enabled	Profit	Revenue	Processing Cost	Mining Cost	Rock	Total Ore	TiO_2	GNT	Total Waste	Strip Ratio	TiO_2	GNT
		\$M	*\$M*	*\$M*	*\$M*	*Mt*	*Mt*	*%*	*%*	*Mt*	*t/t*	*t x 1000*	*t x 1000*
1	**MI**	776	1,271	330.9	163.8	68.0	36.2	3.25	40.9	31.7	0.87	648	2,075
2	**MI**	859	1,394	363.6	171.4	71.1	39.8	3.24	40.9	31.3	0.78	710	2,279
3	**MI**	419	958	375.5	162.7	61.6	37.6	3.29	41.1	24.1	0.64	680	926
4	**MII**	847	1,390	366.1	177.3	73.6	40.1	3.20	40.6	33.4	0.83	707	2,278
5	**MII**	959	1,572	415.2	198.5	82.3	45.5	3.19	40.5	36.9	0.81	798	2,581
6	**MII**	460	1,042	411.2	170.7	64.7	41.1	3.27	40.9	23.5	0.57	739	1,009

Notes

. Max cashflow pits shown in each case
. MI = measured+indicated enabled
. MII = measured+indicated+inferred enabled

Table 13-21. Summary of Optimal Pit Dimensions

Run	Classes Enabled	High Bench	Low Bench	Depth	Max Width	Strike Length
		mRL	*mRL*	*m*	*m*	*m*
1	**MI**	338	15	323	440	710
2	**MI**	338	15	323	420	720
3	**MI**	338	30	308	390	710
4	**MII**	338	15	323	450	770
5	**MII**	338	-45	383	450	770
6	**MII**	338	15	323	390	770

Figure 13-18. Plan of Optimal Pit Extents

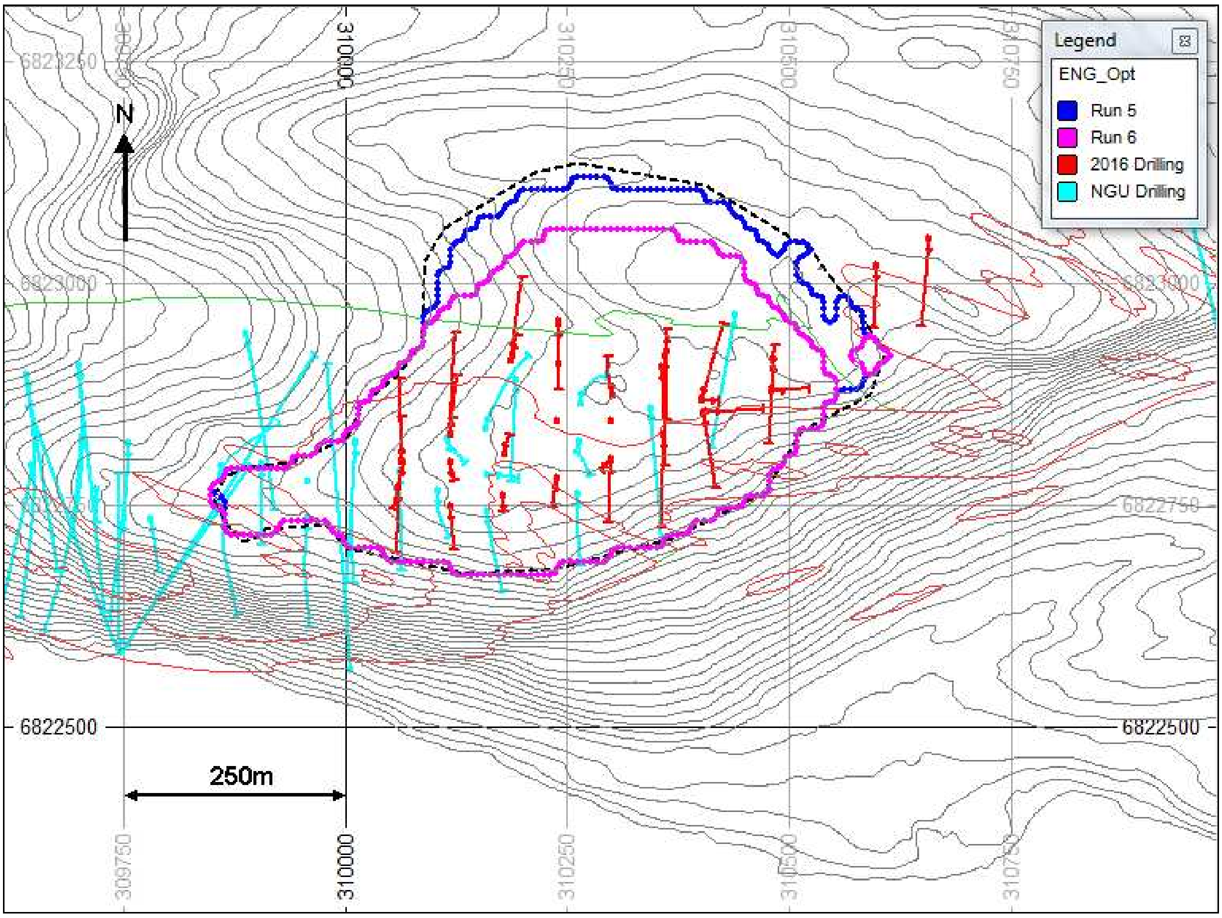


Figure 13-19. N-S Optimised Pits' Cross-Section – 310,250mE

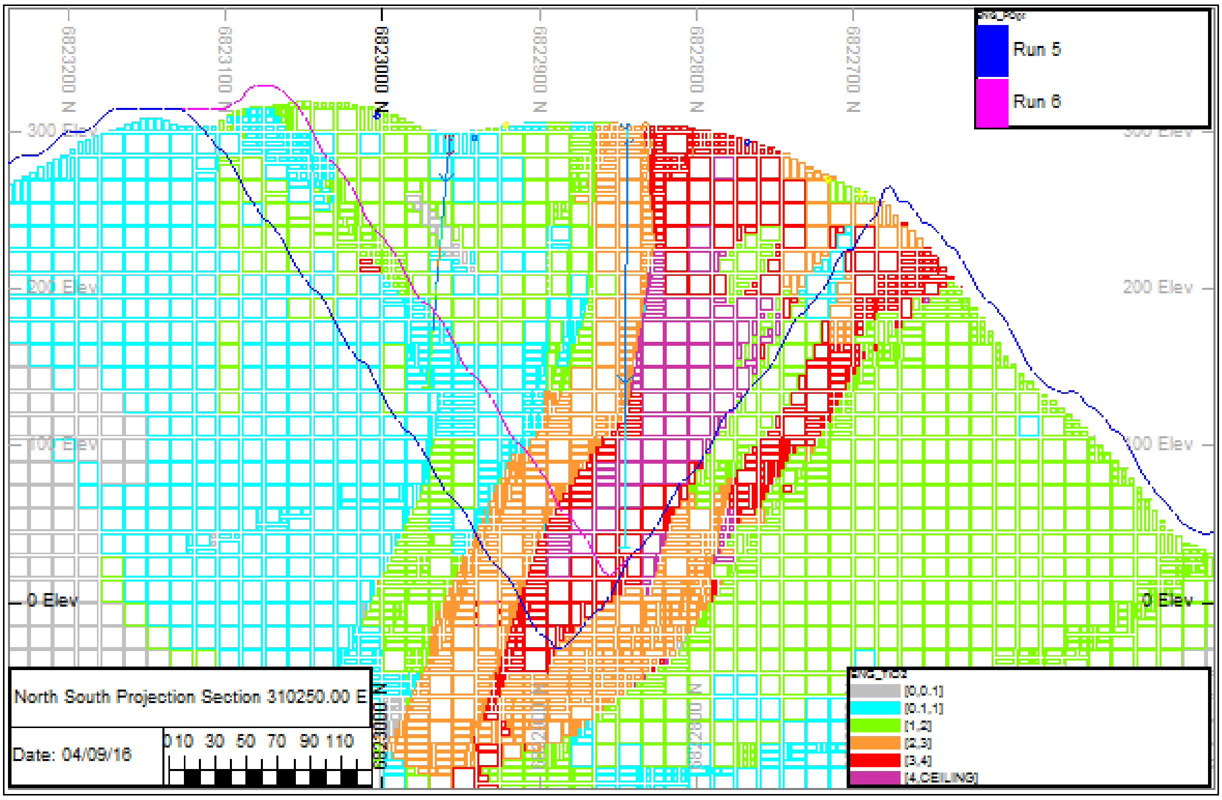


Figure 13-20. W-E Optimised Pits' Long Section

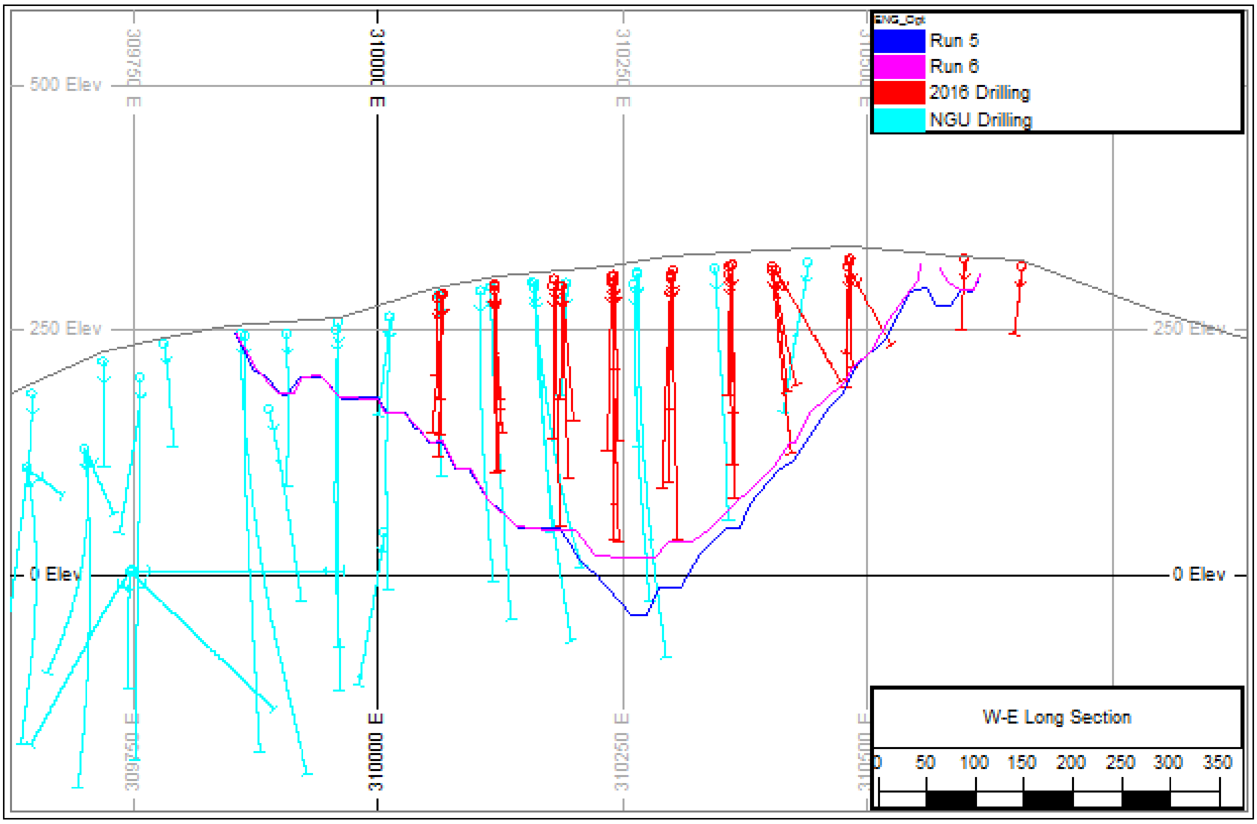
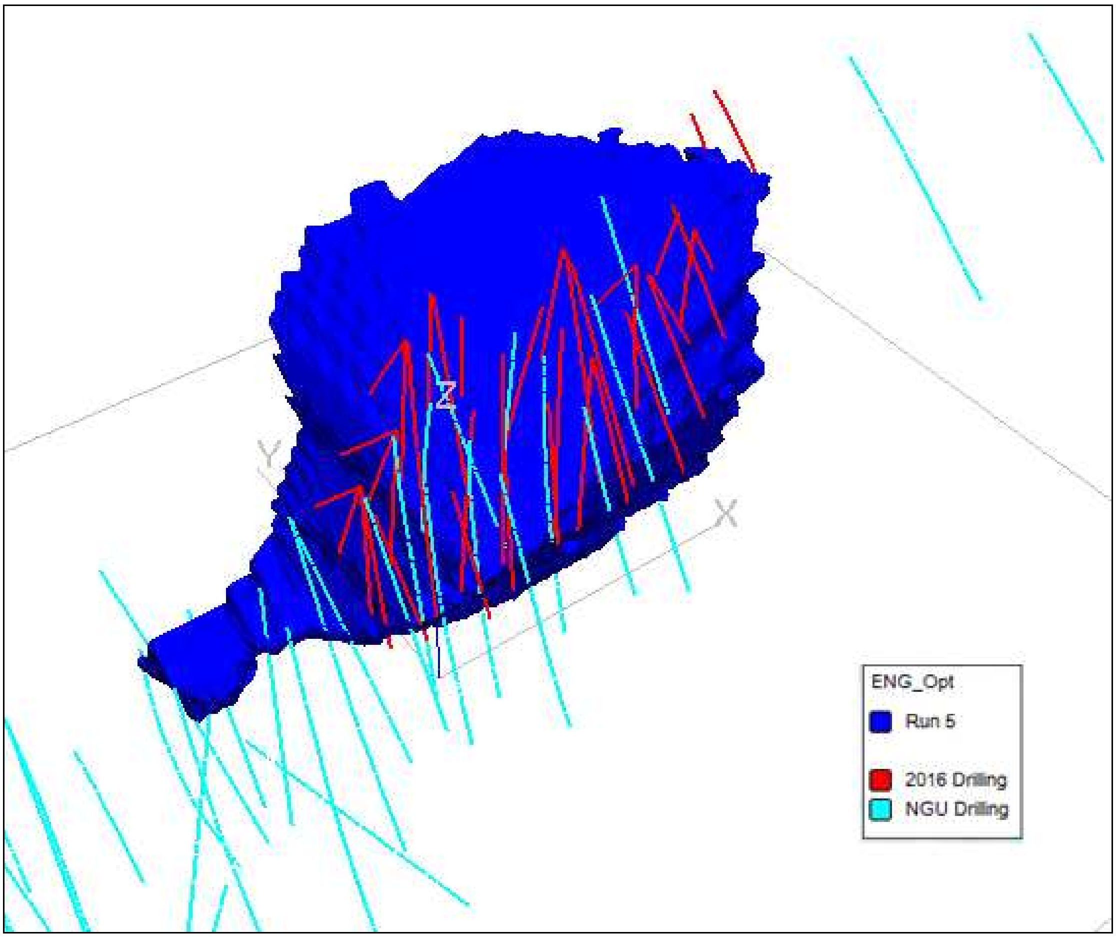


Figure 13-21. 3D View of Optimal Pit Run 5 – From SW



13.13 Mineral Resource Reporting

13.13.1 In-Situ Resources

Although the model has in parts been extended to and below and the edge of the fjord, parts of these sub-sea regions are all to intents and purposes impossible to potentially mine. In communication with Nordic, therefore, it was decided to not evaluate any resources below sea-level, which are nearer than 50m to edge of the fjord.

An overall evaluation summary of the resources, at alternative cut-offs of 3% and 2%TiO_2, is shown in Table 13-22. These cut-off levels as at the same general level as the breakeven cut-off from the optimised pit run 6 (1.91% TiO_2), as shown in in Table 13-19.

Table 13-22. Overall In-Situ Resource Evaluation Summary
As of August 31st, 2016

TiO_2 Cut-Off	CLASS	Tonnes Mt	TiO_2 %	GNT %
3%	*Measured*	15.0	3.97	44.6
	Indicated	77.5	3.87	43.6
	Measured + Indicated	**92.5**	**3.89**	**43.7**
	Inferred	138.4	3.86	43.5

TiO_2 Cut-Off	CLASS	Tonnes Mt	TiO_2 %	GNT %
2%	*Measured*	19.0	3.68	43.9
	Indicated	105.7	3.51	43.0
	Measured + Indicated	**124.7**	**3.53**	**43.2**
	Inferred	254.5	3.22	42.5

Notes

. Grades above are for total TiO_2

. Resources below sea-level are limited to a boundary 50m from edge of fjord

Other tables breakdown the overall in-situ resources in the following ways:

- Breakdown by zone and Easting Sectors in

Table 13-24

- Grade-tonnage table – measured and indicated resources in Table 13-25
Grade-tonnage table – measured and indicated resources in
- Table 13-26

The evaluation breakdown has been split into three major sectors:

1. West of 309,850mE. **Western Sector** - to the west of the prospective pit area.
2. Between 309,850mE – 310,610mE. **Central Sector** - prospective pit region.
3. East of 310,610mE. **Eastern Sector** - to the east of the prospective pit area.

All of the TiO_2grades in these tables represents total contained TiO_2. An evaluation of the contained TiO_2 in rutile is shown in Table 13-23. The rest of the TiO_2 occur primarily as ilmenite. Some parts of the deposit are affected by retrozones. In these zones the average content of TiO_2 in rutile is somewhat lower (approximately 90%). However these zones constitute only a minor part of the deposit.

Table 13-23. Summary Evaluation of TiO_2 in Rutile

	% of TiO_2 in Rutile
Leuco-Eclogite	93.3
Trans-Eclogite	96.1
Ferro-Eclogite	95.8

Table 13-24. Resource Breakdown By Eclogite Zone and Sector

				Leuco-Eclogite			Trans-Eclogite			Ferro-Eclogite			Total		
	TiO_2 Cut-Off	EASTING	CLASS	Tonnes Mt	TiO2 %	GNT %	Tonnes Mt	TiO_2 %	GNT %	Tonnes Mt	TiO_2 %	GNT %	Tonnes Mt	TiO_2 %	GNT %
Measured and Indicated Resources	3%	West	Measured	-			0.1	3.74	42.4	5.6	3.81	44.6	5.7	3.81	44.6
			Indicated				1.0	3.29	42.4	38.8	3.89	43.8	39.8	3.87	43.8
			Meas+Ind				**1.1**	**3.33**	**42.4**	**44.4**	**3.88**	**43.9**	**45.5**	**3.87**	**43.9**
		Central	Measured	-			0.2	3.19	41.4	9.1	4.09	44.7	9.3	4.07	44.6
			Indicated				0.8	3.16	42.2	36.9	3.88	43.4	37.7	3.86	43.4
			Meas+Ind				**1.0**	**3.17**	**42.0**	**46.0**	**3.92**	**43.7**	**47.0**	**3.91**	**43.6**
		All	Measured	-	-	-	0.3	3.37	41.7	14.7	3.98	44.7	15.0	3.97	44.6
			Indicated	-	-	-	1.8	3.23	42.3	75.7	3.89	43.6	77.5	3.87	43.6
			Meas+Ind	**-**	**-**	**-**	**2.1**	**3.25**	**42.2**	**90.4**	**3.90**	**43.8**	**92.5**	**3.89**	**43.7**

				Leuco-Eclogite			Trans-Eclogite			Ferro-Eclogite			Total		
	TiO_2 Cut-Off	EASTING	CLASS	Tonnes Mt	TiO2 %	GNT %	Tonnes Mt	TiO_2 %	GNT %	Tonnes Mt	TiO_2 %	GNT %	Tonnes Mt	TiO_2 %	GNT %
Measured and Indicated Resources	2%	West	Measured	-	-	-	0.4	2.79	42.4	6.0	3.76	44.6	6.4	3.70	44.5
			Indicated	0.1	2.15	36.8	7.3	2.54	42.3	42.8	3.78	43.8	50.1	3.60	43.6
			Meas+Ind	**0.1**	**2.15**	**36.8**	**7.7**	**2.55**	**42.3**	**48.8**	**3.78**	**43.9**	**56.5**	**3.61**	**43.7**
		Central	Measured	-	-	-	3.2	2.52	40.9	9.4	4.06	44.6	12.6	3.67	43.7
			Indicated	0.1	2.18	36.1	16.3	2.51	41.1	39.3	3.80	43.1	55.6	3.42	42.5
			Meas+Ind	**0.1**	**2.18**	**36.1**	**19.5**	**2.51**	**41.1**	**48.7**	**3.85**	**43.4**	**68.2**	**3.47**	**42.7**
		All	Measured				3.6	2.55	41.1	15.4	3.94	44.6	19.0	3.68	43.9
			Indicated				23.6	2.52	41.5	82.1	3.79	43.5	105.7	3.51	43.0
			Meas+Ind				**27.2**	**2.52**	**41.4**	**97.5**	**3.81**	**43.6**	**124.7**	**3.53**	**43.2**

				Leuco-Eclogite			Trans-Eclogite			Ferro-Eclogite			Total		
	TiO_2 Cut-Off	SECTOR	CLASS	Tonnes Mt	TiO2 %	GNT %	Tonnes Mt	TiO_2 %	GNT %	Tonnes Mt	TiO_2 %	GNT %	Tonnes Mt	TiO_2 %	GNT %
Inferred Resources	3%	West	Inferred	-	-	-	12.1	3.71	42.4	45.8	4.19	44.6	57.9	4.09	44.1
		Central	Inferred	-	-	-	2.6	3.24	42.8	30.8	3.82	42.4	33.4	3.77	42.4
		East	Inferred	-	-	-	0.9	3.41	42.0	46.2	3.63	43.6	47.1	3.63	43.6
		Total	**Inferred**	**-**	**-**	**-**	**15.6**	**3.61**	**42.4**	**122.8**	**3.89**	**43.7**	**138.4**	**3.86**	**43.5**

				Leuco-Eclogite			Trans-Eclogite			Ferro-Eclogite			Total		
	TiO_2 Cut-Off	SECTOR	CLASS	Tonnes Mt	TiO2 %	GNT %	Tonnes Mt	TiO_2 %	GNT %	Tonnes Mt	TiO_2 %	GNT %	Tonnes Mt	TiO_2 %	GNT %
Inferred Resources	2%	West	Inferred	0.1	2.45	35.8	32.2	2.94	42.4	51.4	4.02	44.6	83.7	3.60	43.7
		Central	Inferred	2.5	2.14	36.9	35.1	2.53	40.9	32.6	3.76	42.2	70.2	3.09	41.4
		East	Inferred	1.8	2.20	35.5	39.2	2.43	41.7	59.6	3.40	43.0	100.6	3.00	42.4
		Total	**Inferred**	**4.4**	**2.17**	**36.3**	**106.5**	**2.62**	**41.6**	**143.6**	**3.70**	**43.4**	**254.5**	**3.22**	**42.5**

Notes

West	X<309,850
Central	X>309850 < 310610
East	X > 310610

Table 13-25. Grade-Tonnage Table - In-Situ Overall Measured and Indicated Resources

TiO_2 Cut-Off %	Tonnes Mt	TiO_2 %	GNT %
1.0	141	3.28	42.2
1.1	138	3.34	42.4
1.2	135	3.39	42.6
1.3	132	3.43	42.8
1.4	131	3.45	42.9
1.5	130	3.47	42.9
1.6	129	3.48	43.0
1.7	128	3.49	43.0
1.8	127	3.50	43.1
1.9	126	3.51	43.1
2.0	125	3.53	43.1
2.1	122	3.56	43.2
2.2	120	3.59	43.3
2.3	117	3.63	43.3
2.4	113	3.67	43.4
2.5	109	3.71	43.5
2.6	105	3.75	43.5
2.7	102	3.79	43.6
2.8	99	3.82	43.6
2.9	96	3.86	43.7
3.0	92	3.89	43.7
3.1	89	3.92	43.8
3.2	86	3.95	43.8
3.3	81	3.99	43.9
3.4	76	4.03	43.9
3.5	71	4.08	44.0

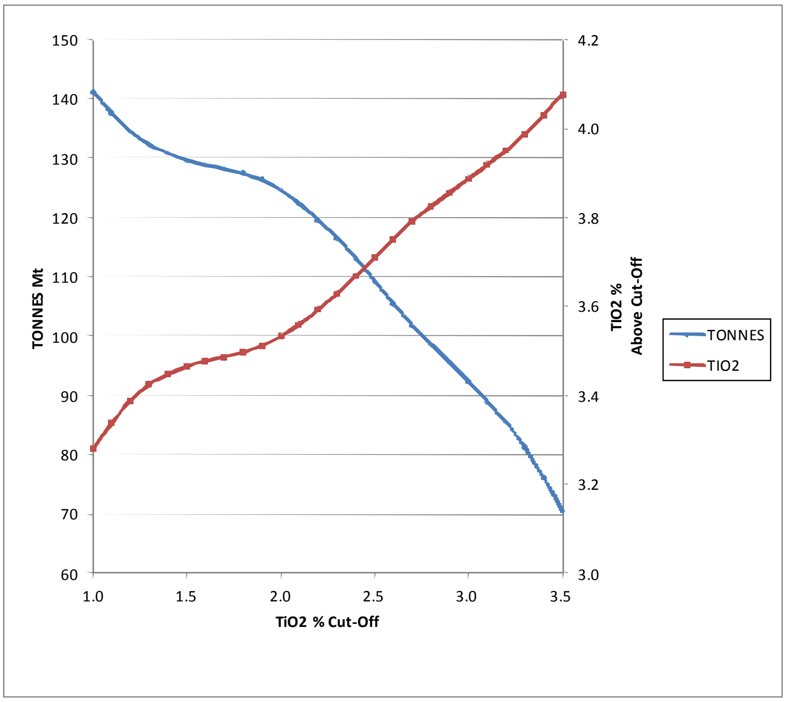
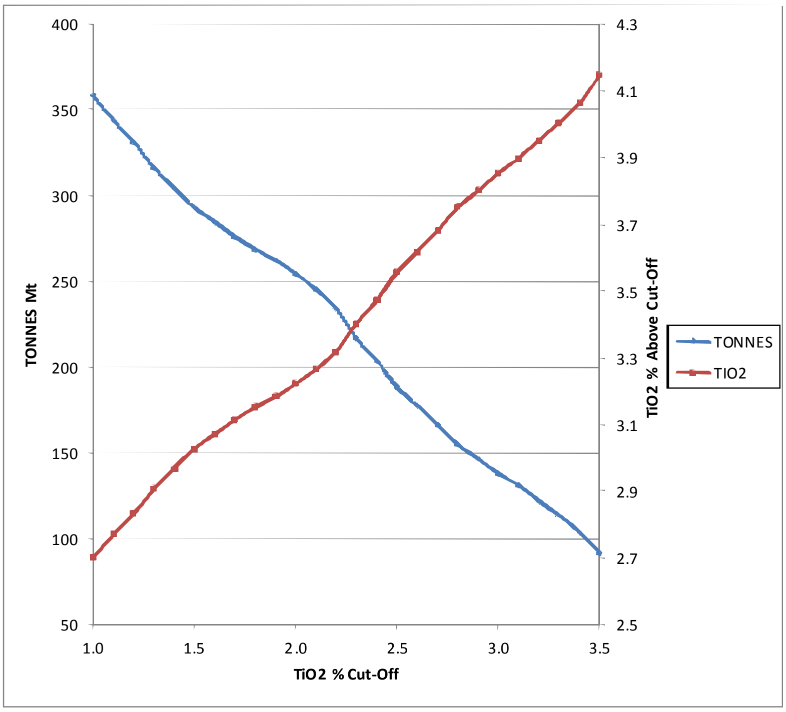


Table 13-26. Grade-Tonnage Table - In-Situ Overall Inferred Resources

TiO_2 Cut-Off %	Tonnes Mt	TiO_2 %	GNT %
1.0	358	2.70	40.7
1.1	344	2.77	40.9
1.2	331	2.83	41.1
1.3	316	2.91	41.4
1.4	305	2.97	41.6
1.5	293	3.03	41.8
1.6	285	3.07	42.0
1.7	276	3.12	42.2
1.8	269	3.15	42.3
1.9	263	3.18	42.4
2.0	255	3.22	42.5
2.1	245	3.27	42.6
2.2	234	3.32	42.7
2.3	217	3.40	42.8
2.4	204	3.47	43.0
2.5	189	3.56	43.1
2.6	178	3.62	43.2
2.7	167	3.68	43.3
2.8	155	3.75	43.4
2.9	147	3.80	43.5
3.0	138	3.86	43.5
3.1	131	3.90	43.6
3.2	122	3.95	43.6
3.3	114	4.01	43.7
3.4	104	4.07	43.8
3.5	92	4.15	43.9



13.13.2 In-Pit Resources

The contents of the maximum cashflow pit from run 6 (as described in Section 13.12) have been evaluated at various cut-off grades, as summarised in Table 13-27. A bench breakdown of the optimal pit is shown in Table 13-28. Grade-tonnage tables for the pit contents are shown in Table 13-29 and Table 13-30.

Table 13-27. Optimal Pit - Contained Resources

		Measured and Indicated			Inferred			Waste	Strip	Tonnes
TiO_2 Cut-Off	Class	Tonnes Kt	TiO_2 %	GNT %	Tonnes Kt	TiO_2 %	GNT %	Tonnes Kt	Ratio t/t	Tonnes Kt
1.91%	Measured	12,203	3.63	43.6						
	Indicated	25,834	3.37	42.9						
	Meas+Ind	**38,036**	**3.45**	**43.1**	3,190	3.17	40.2	23,433	0.6	64,660

		Measured and Indicated			Inferred			Waste	Strip	Tonnes
TiO_2 Cut-Off	Class	Tonnes Kt	TiO_2 %	GNT %	Tonnes Kt	TiO_2 %	GNT %	Tonnes Kt	Ratio t/t	Tonnes Kt
2.0%	Measured	11,997	3.66	43.7						
	Indicated	25,445	3.39	43.0						
	Meas+Ind	**37,442**	**3.48**	**43.2**	3,039	3.23	40.4	24,179	0.6	64,660

		Measured and Indicated			Inferred			Waste	Strip	Tonnes
TiO_2 Cut-Off	Class	Tonnes Kt	TiO_2 %	GNT %	Tonnes Kt	TiO_2 %	GNT %	Tonnes Kt	Ratio t/t	Tonnes Kt
3.0%	Measured	8,810	4.08	44.7						
	Indicated	16,241	3.88	44.0						
	Meas+Ind	**25,051**	**3.95**	**44.2**	1,631	3.88	41.8	37,978	1.4	64,660

Notes

. Optimal pit - max cashflow pit from run 6

Table 13-28. Optimal Pit - Bench Breakdown

	Measured			Indicated			Measured + Indicated			Inferred			Waste	Total Rock
BENCH	Tonnes	TiO_2	GNT	Tonnes	TiO_2	GNT	Tonnes	TiO_2	GNT	Tonnes	TiO_2	GNT	Tonnes	Tonnes
mRL	Kt	%	%	Kt	%	%	Kt	%	%	Kt	%	%	Kt	Kt
330	-			-			-	0.00	0.0	7	2.04	36.1	86	94
315	2	1.95	37.1	-			2	1.95	37.1	63	2.13	36.9	826	891
300	114	2.72	40.5	108	2.79	42.3	222	2.75	41.4	132	2.34	37.4	1,843	2,197
285	868	3.60	42.2	605	3.17	42.4	1,473	3.42	42.3	148	3.42	40.3	2,309	3,929
270	1,644	3.56	42.4	1,052	3.25	41.1	2,696	3.44	41.9	111	3.25	41.2	2,340	5,147
255	1,957	3.50	43.1	1,555	3.27	40.5	3,512	3.40	41.9	291	3.09	38.3	2,254	6,057
240	1,968	3.68	44.0	1,855	3.20	41.5	3,822	3.45	42.8	528	3.15	36.7	2,476	6,826
225	1,750	3.82	44.4	1,946	3.20	42.8	3,696	3.49	43.6	516	3.23	38.9	2,491	6,703
210	1,540	3.69	43.7	1,998	3.28	43.4	3,537	3.46	43.6	228	3.13	42.3	2,141	5,907
195	1,095	3.61	44.4	2,079	3.31	43.3	3,174	3.41	43.7	68	3.05	42.6	1,789	5,032
180	616	3.59	44.7	2,315	3.35	42.7	2,931	3.40	43.1	56	3.06	43.3	1,408	4,395
165	359	3.66	44.3	2,177	3.52	42.9	2,536	3.54	43.1	122	2.91	42.6	1,093	3,751
150	290	3.68	44.0	1,899	3.45	43.3	2,189	3.48	43.4	174	3.03	42.7	827	3,190
135	-			2,014	3.48	43.4	2,014	3.48	43.4	152	3.14	41.6	550	2,715
120	-			1,702	3.37	43.2	1,702	3.37	43.2	120	3.08	40.3	347	2,169
105	-			1,438	3.45	43.3	1,438	3.45	43.3	95	3.38	40.4	260	1,792
90	-			1,194	3.50	43.8	1,194	3.50	43.8	82	3.34	42.8	98	1,374
75	-			869	3.55	44.8	869	3.55	44.8	108	3.88	44.4	90	1,068
60	-			572	3.61	44.6	572	3.61	44.6	104	3.90	46.9	90	766
45	-			310	3.75	43.4	310	3.75	43.4	48	3.82	46.4	88	446
30	-			121	3.77	44.0	121	3.77	44.0	7	2.97	42.8	24	152
15	-			25	3.90	43.0	25	3.90	43.0	31	3.56	43.9	3	59
TOTAL	12,203	3.63	43.6	25,834	3.37	42.9	38,036	3.45	43.1	3,190	3.17	40.2	23,433	64,660

Notes

. Resources shown above cut-off 1.91% TiO2

. Optimal pit - max cashflow pit from run 6

Table 13-29. Grade-Tonnage - In-Pit Measured and Indicated Resources

TiO_2 Cut-Off %	Tonnes Mt	TiO_2 %	GNT %
1.0	32	2.96	41.0
1.1	31	3.06	41.5
1.2	29	3.14	41.9
1.3	28	3.22	42.3
1.4	28	3.26	42.5
1.5	27	3.29	42.6
1.6	27	3.31	42.7
1.7	26	3.33	42.7
1.8	26	3.35	42.8
1.9	26	3.37	42.9
2.0	25	3.39	43.0
2.1	25	3.42	43.0
2.2	24	3.45	43.1
2.3	23	3.49	43.2
2.4	22	3.54	43.3
2.5	21	3.60	43.5
2.6	20	3.67	43.6
2.7	19	3.72	43.7
2.8	18	3.78	43.9
2.9	17	3.84	43.9
3.0	16	3.88	44.0
3.1	16	3.91	44.0
3.2	15	3.93	44.0
3.3	15	3.96	44.1
3.4	14	3.99	44.1
3.5	13	4.02	44.1

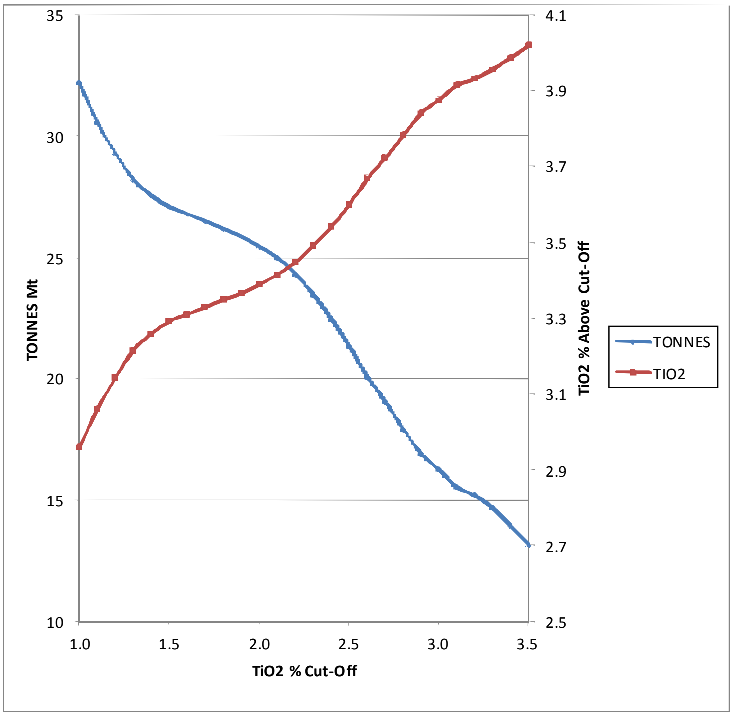
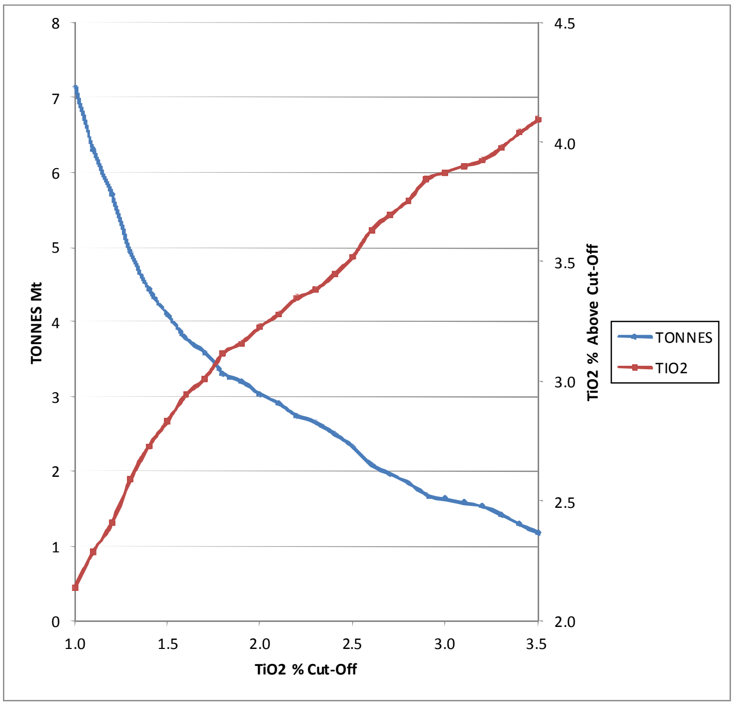


Table 13-30. Grade-Tonnage - In-Pit Inferred Resources

TiO_2 Cut-Off %	Tonnes Mt	TiO_2 %	GNT %
1.0	7	2.14	35.1
1.1	6	2.29	36.0
1.2	6	2.41	36.6
1.3	5	2.59	37.7
1.4	4	2.73	38.4
1.5	4	2.84	38.8
1.6	4	2.95	39.3
1.7	4	3.01	39.6
1.8	3	3.12	40.0
1.9	3	3.16	40.2
2.0	3	3.23	40.4
2.1	3	3.28	40.6
2.2	3	3.35	40.8
2.3	3	3.39	40.9
2.4	2	3.45	41.1
2.5	2	3.52	41.2
2.6	2	3.63	41.2
2.7	2	3.70	41.3
2.8	2	3.76	41.3
2.9	2	3.85	41.7
3.0	2	3.88	41.8
3.1	2	3.90	41.8
3.2	2	3.93	41.9
3.3	1	3.98	42.3
3.4	1	4.04	42.6
3.5	1	4.10	42.7



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Appendix A: JORC Code, 2012 Edition – Table 1

Section 1. Sampling Techniques and Data

Criteria	JORC Explanation	Commentary
Sampling techniques	Sampling overview	The principal sample method id diamond drilling. Other sample types include surface samples, surface mapping results and samples taken from the walls of a road tunnel.
	Measures for representivity and calibration of tools/systems	Drilling was oriented as far as possible, according to local geography and access, to be perpendicular to the mineralised structures, on a regular grid.
	Determination of mineralisation	Lithological changes, assisted by assay TiO_2 results, which assist with categorisation of 3 types of eclogite.
	Sampling details; non-standard aspects	The eclogite coding (rocktypes 1, 2 or 3) was also assisted by sporadic handheld XMet measurements of TiO_2 grades. This XMet device, a Thermo Scientific Niton XL3t.
Drilling techniques	Drill type and details.	All of the DuPont/Conoco (drilling 1995-97) drilling produced BQ (37mm) core. All of the 2016 Nordic drilling produced NQ" core (50.7mm). Refer to Section 9.
Drill sample recovery	Method of measurement and recording drill recovery	Drillhole recoveries were not consistently good, with the Siemcalsa drilling approximately 60% of samples achieved 90%+ recoveries and 80% of samples achieved 50%+ recoveries. The Daytal drilling results were better, with 76% of samples achieving 90%+ recoveries and 97% of samples achieving 50%+ recoveries
	Measures for recovery and representivity	Core recovery was recorded from measured sample lengths. Core recoveries were very high, generally greater than 98%.
	Relationship between sample recovery and grade	There was no evidence of sample bias or any relationship between sample recovery and grade.
Logging	Geological and geotechnical logging details.	Described in Section 10.2.1.
	Logging qualitative or quantitative, core photography	Logging both qualitative and quantitative. All core photographed, as described in Section 10.2.2.
	Total length and % of relevant intersections logged	In the current overall drillhole database, 78% of the DuPont/Conoco core (11,860m out of 15,198m) have lithological log data. 100% of the core from the 2016 drilling, 6,350m, has been logged.
Sub-sampling techniques and sample preparation	Core sawing details	For the 2016 drill core, selected samples were sawn such that one half core was sent to the laboratory.
	Non-core sample splitting details	There was no non-core drilling.
	Nature and quality of sample preparation	Described in Section 10.
	Quality Control (QC) procedures, for max representivity	All QC procedures described in Section 10.2.6.
	Measures to ensure sampling representative of in-situ material	Field duplicates taken, as described in Section 10.2.6.

Criteria	JORC Explanation	Commentary
	Samples sizes information	It is considered that the sample sizes used are appropriate for the mineralisation at Engeboe.
Quality of assay data lab tests	Assaying and laboratory procedures	Described in Section 10.2.5.
	Parameters, models for geophysical or other instruments.	An XMet device, a Thermo Scientific Niton XL3t, was used for spot assay purposes, which assisted in the classification of eclogite type.
	QC procedures, related to accuracy (lack of bias) and precision	Analysis of the QC results are described in Section 11. These results showed acceptable precision and lack of bias. Re-analysis of DuPont/Conoco core also helped verify this historical data.
Verification of sampling and assaying	Verification of key intersections - independent personnel	Re-analysis of DuPont/Conoco core also helped verify this historical data, as described in Section 11.3.
	Use of twinned holes	No specific twinned holes were drilled.
	Documentation of primary data, and entry procedures	Primary data from the DuPont/Conoco samples was stored in an Access database. Primary data for the 2016 campaign has been entered and maintained in an Excel database. Any problems encountered during the hole data import, combination and desurveying process were resolved with Nordic geologists.
	Adjustments to assay data	The only adjustment made to assay were applied top-cuts during the compositing process.
Location of data points	Accuracy and quality of drillhole and workings' surveys	Updated surveys were made of drillhole collars starting drillhole orientations.
	Specification of grid system	The UTM coordinate system (WGS84) was been used for all the resource estimation work described in this report..
	Quality and adequacy of topographic control	In the opinion of the Competent Person, the quality of the topographic data is adequate for the current study being described.
Data spacing and distribution	Spacing for reporting of Exploration Results	Historic drillhole data was broadly spaced on 60m section lines, although sporadic in certain areas. The 2016 drilling was done on regular 60m section lines, overall the middle part of the deposit, in the prospective open pit area.
	Assessment of data spacing and distribution	It is considered that the spacing of samples used is sufficient for the Mineral Resources evaluated in the current study.
	Sample compositing	Drillhole data were composited to 5m lengths, as described in Section 13.4.
Orientation of data in relation to geological structure	Sampling orientation	Most of drillhole sample lines have been aligned at right angles to the overall deposit orientation, so as achieve unbiased sampling.
	Assessment of orientation	It is not considered that the sampling orientations have introduced any sampling bias.

Criteria	JORC Explanation	Commentary
Sample security	Measures for sample security	All chain of custody procedures have been in place and followed in the exploration process
Audits or reviews	Results of any audits or reviews	The Competent Person has reviewed the sampling techniques and data and considers them adequate for resource/reserve estimation.

Section 2. Reporting of Exploration Results

Criteria	JORC Explanation	Commentary
Mineral Tenement and Land Tenure Status	License information and data, including royalites	Described in Section 4.
	Security of tenure	Described in Section 4.
Exploration Done by Other Parties	Other parties	Described in Section 6
Geology	Deposit type, setting and mineralisation	Described in Sections 7 and 8.
Drillhole Information	Drillhole Information	Described in Section 9, and in particular Table 9-1.
	Explain any excluded data	No information has been excluded.
Data Aggregation Methods	Averaging techniques/truncations	Exploration results not being reported.
	Aggregation methods	Drillhole composited (as described in Section 13.4) and from these a 3D block model was developed.
	Assumptions for any metal equivalents	No equivalent grades have been calculated.
Relationship between mineralisation widths and intercept lengths	Geometry of mineralisation with respect to drilling	Holes inclined so as get as near to perpendicular intersections as possible.
	Statement related to true width	No downhole lengths or individual intersections being reported
Diagrams	Maps/sections - discoveries, collars	Refer to Figure 9-1, Figure 9-2, Figure 9-3 and Figure 9-4.
Balanced Reporting	High/low grades and widths	Not relevant when reporting Mineral Resources
Other Substantive Data	Other exploration data.	No meaningful and material exploration data, apart from the drillhole database and surface sampling results, have been included in the report.
Further Work	Planned further work	No specific further exploration work has been planned at present.
	Diagrams of extensions, interpretations and future drilling	Not relevant.

Section 3. Estimation and Reporting of Mineral Resources

Criteria	JORC Explanation	Commentary
Database integrity	Measures for error reduction/removal between collection and use for MR	The Competent Person undertook the following validation procedures: Inspection of drillhole collars and surface outcrops, inspection of core storage and handling facility at Førde, as well as inspected the ALS sample preparation facilities in Lulea, Sweden.
	Validation procedures	Checks during import, combination and desurveying of data. Check sections and plans also produced.
Site Visits	Visit details	Adam Wheeler visited the Engeboe site and core processing facilities in Førde, from February 8th-10th, March 7th-8th and June 12th-14th, 2016. Adam Wheeler also inspected the ALS sample preparation facilities in Lulea, Sweden, on March 10th, 2016.
	Explanation if no visit	Not relevant.
Geological interpretation	Confidence in geological interpretation	The interpretation was discussed with Nordic geologists, and the cross-sectional interpretation of drillhole intersections was tied into the surface sampling data and surface mapping information as much as possible.
	Nature of data, assumptions	As well as drilling data from former and current campaigns, a road tunnel also offers mineralised exposures, which helps to support the geological interpretation. In general, the interpreted eclogite structures have a high northerly dip, and generally there is a regular sequence from ferro-eclogite, to trans-eclogite, to leuco eclogite, in going from south to north.
	Effect of alternative interpretations on MR	Effects of alternative geologic models were not tested.
	Use of geology in controlling MR estimation	The impact of geology on mineralization has been applied through the use of dynamic anisotropy controlling search envelopes during grade estimation.
	Factors affecting continuity of grade and geology	The main factors affecting continuity and grade is the general sub-parallel structure of eclogites that can be seen from surface mapping along-strike and from down-dip with the drilling data.
Dimensions	Extent and variability	Described in Table 13-3.
Estimation and modelling techniques	Estimation techniques: assumptions, software, parameters	An updated mineral resource estimation was completed by the Competent Person. This estimation employed a three-dimensional block modelling approach, using CAE Datamine software, as described in Section 13.
	Check/previous estimates	A check estimate was made by a comparison with a historical estimate.
	Assumption with respect to recovery of by-products	It has been assumed that garnet can also be produced as sellable product.
	Deleterious elements	No particular elements exist, and have therefore not been estimated.
	Block size with respect to sample spacing	The 3D block model was based on a parent block size of 15m x 15m x 15m, with sub-blocks generated down

Criteria	JORC Explanation	Commentary
		to a resolution of 1m.
	Assumption with respect to SMUs	In the X and Z directions sub-blocks were generated with a 5m x 5m size, and cross-strike direction the smallest sub-block size was 1m.
	Correlation between variables	Model garnet grades were derived from grades of correlations were made from grades of TiO_2, TiO_2 (soluble), Fe_2O_3, K_2O, SO_3 and SiO_2. The relationships between these variables were analysed and coefficients derived, as described in Section 10.2.7.
	How geology interpretation used to control resource estimates	The interpretation of mineralised zones subsequently controlled selected samples and zone composites, and then the resource block models.
	Grade capping	Grade capping was applied to TiO_2, and Fe_2O_3 grades, so as to prevent outlier high grade values from over-estimation of grades, as described in Section 13.4.
	Validation process	Mode validation steps are described in Section 13.11.
Moisture	Method of determination	Tonnages are estimated on a dry basis
Cut-off parameters	Basis and parameters	The main reference cut-offs used for resource estimation were: 2% and 3% TiO_2, were selected as being close to potentially possible open mining cut-off grades, as demonstrated by the parameters and derived cut-offs shown in Table 13-19.
Mining factors/assumptions	Mining methods: dimensions, assumptions extraction prospects	A minimum mining width of 5m was applied in the resource estimation, as being the block size at the edge of the eclogite structures, as being realistic for the envisaged open pit mining scenario. Main benches will be 15m high.
Metallurgical factors/assumptions	Assumptions re processes and parameters	The milling operation is envisaged as: crushing, grinding and Wet High Intensity Magnetic Separation (WHIMS) followed by gravity (spirals) to separate out the amphibolites and mica. Further magnetic separation will produce a 95% rutile concentrate.
Environmental factors/assumptions	Status of potential environmental impacts	The Engebø project received final approvals from the Ministry of Local Government and Modernisation related to the industrial area plan (zoning plan), and the Ministry of Climate and Environment related to the waste disposal application on 17 April 2015. Nordic Mining will focus on further development towards a bankable feasibility study with the purpose to qualify the project for commercial debt financing, and subsequently an investment decision.
Bulk Density	Basis and application	Density measurements have been made from core samples, using water immersion.
	Void spaces	No voids present.
	Assumptions with respect to the evaluation process	Density values were estimated from actual drillhole measurements. For areas in the east and west end where the only available drillhole data do not have density values, average density values were assigned by zone, as summarised in Table 13-14.

Criteria	JORC Explanation	Commentary
Classification	Basis for MR, with varying confidence categories	The basis for resource classification criteria have been described in Section 13.9
	Factors: tonnes, grades, input data, geology; quality, quantity and distribution	The resource classification criteria have taken into account all relevant factors, as summarised in Section 13.10 and Table 13-16.
	Results reflect CP's view	The resource estimation results reflect the Competent Person's view of the deposit.
Audits/reviews	Results of any previous reviews	No audit or review of the Mineral Resource estimates has been completed by an independent external individual or company. The Competent Person has conducted an internal review of all available data.
Discussion of relative accuracy/confidence	Statement re relative accuracy and confidence level	The relative accuracy of the Mineral Resource estimate is reflected in the reporting of the Mineral Resources as per the guidelines of the 2012 JORC code.
	Specifics for global and local estimates, relevant to technical and economic evaluation.	The resource statement relates to global estimates of tonnes and grade.
	Comparison with production data, where available	No mining has taken place..

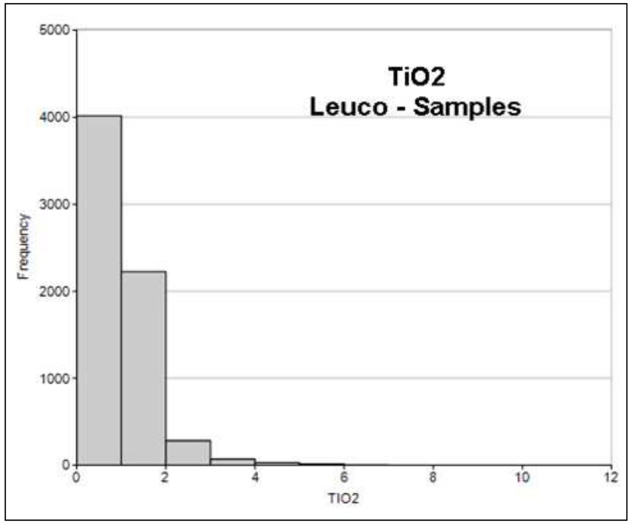
ENEGEBO RESOURCE ESTIMATION

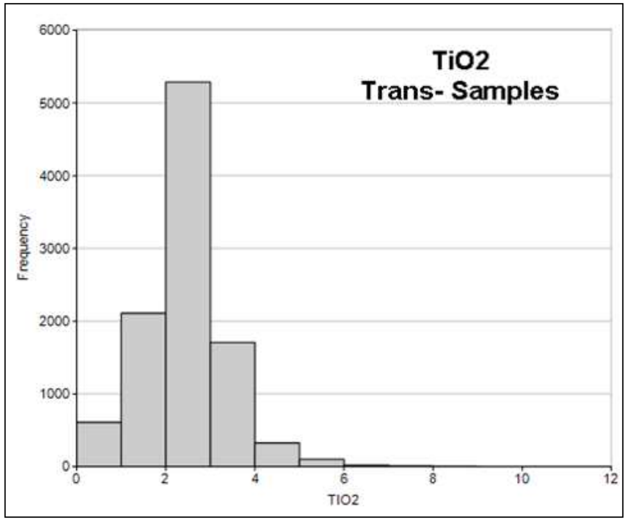
APPENDIX B:

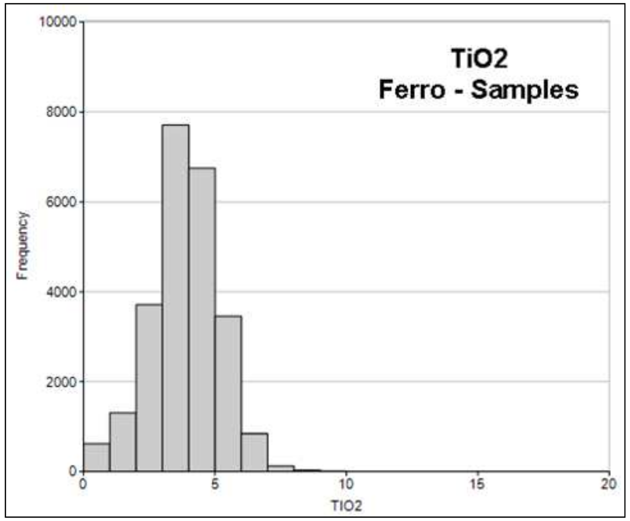
Geostatistical Plots

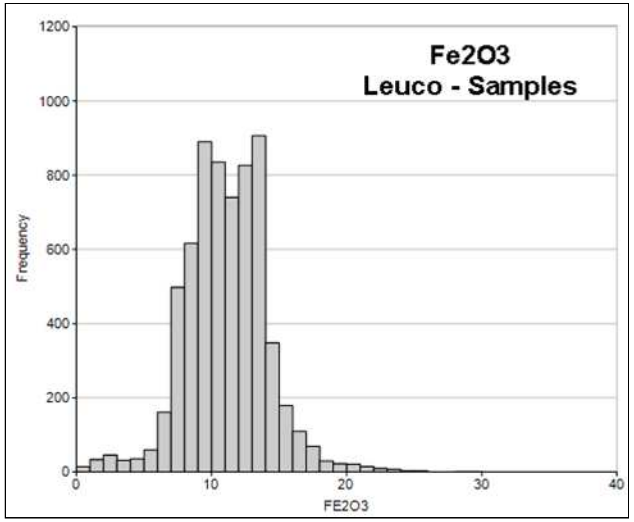
August 2016

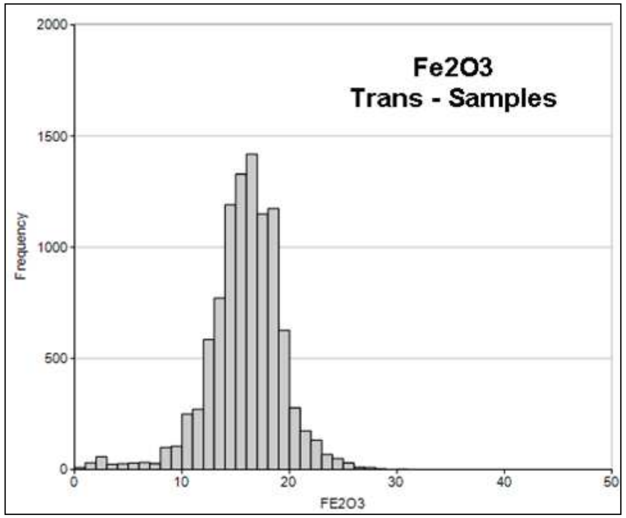
Histograms – Samples

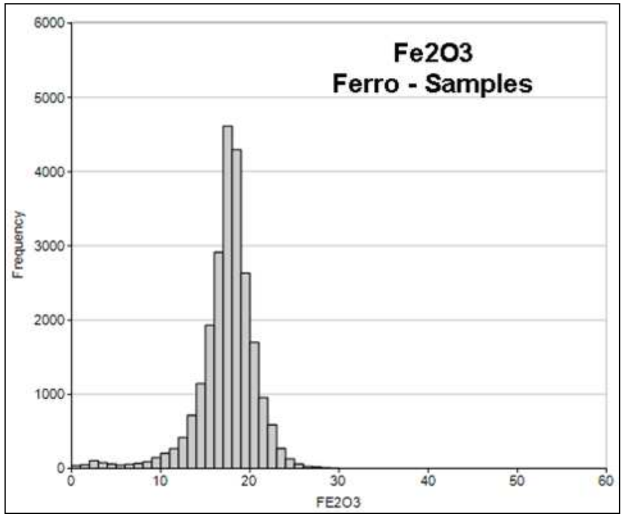


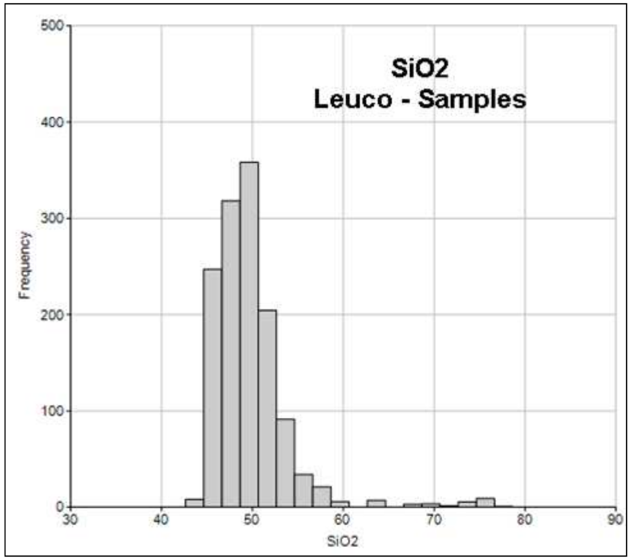


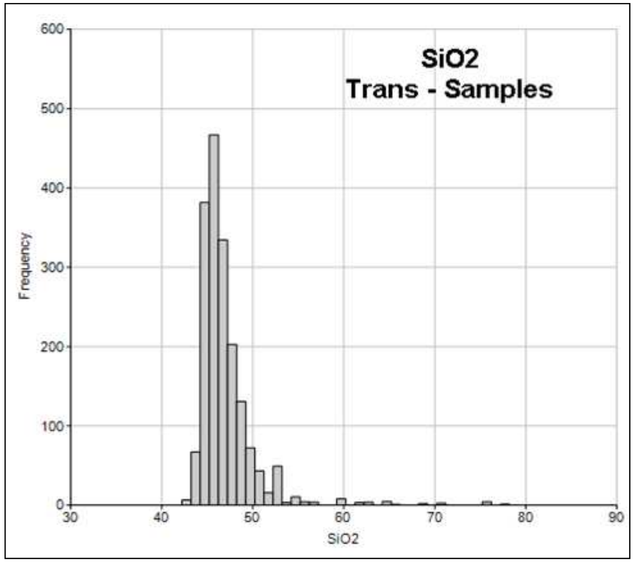


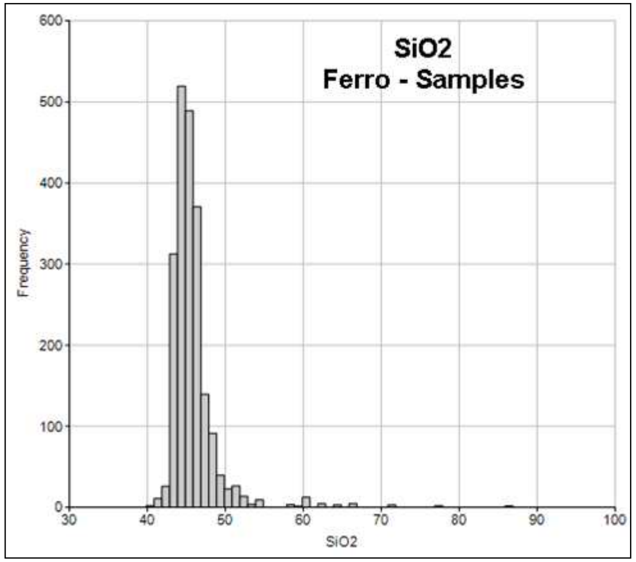




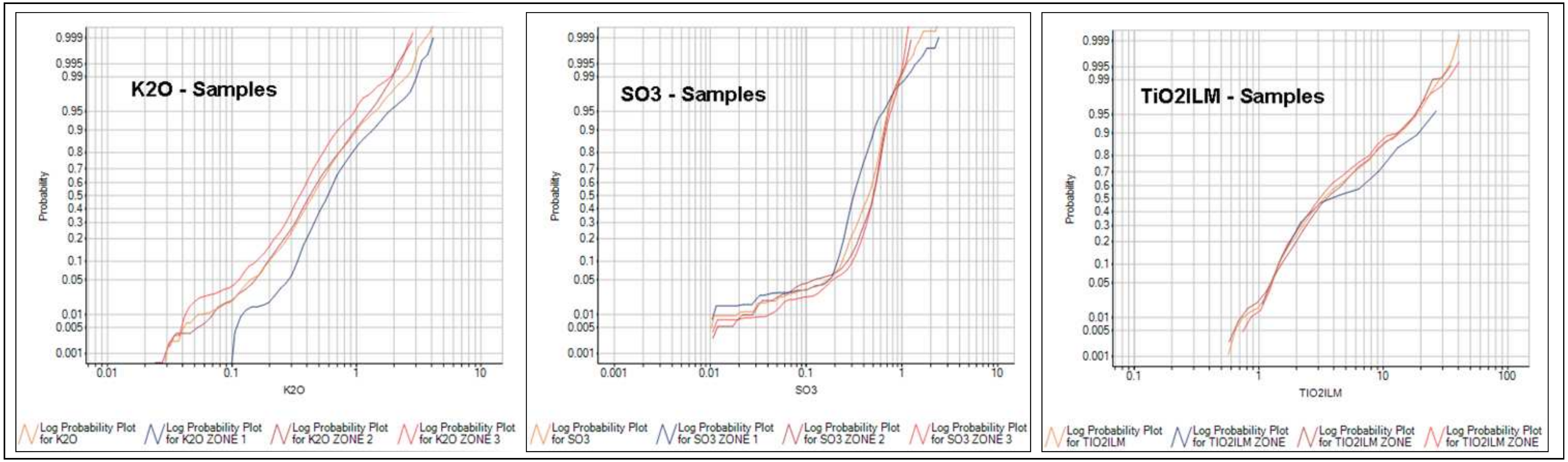



SiO2
Leuco - Samples
Frequency
SiO2
0
100
200
300
400
500
30
40
50
60
70
80
90

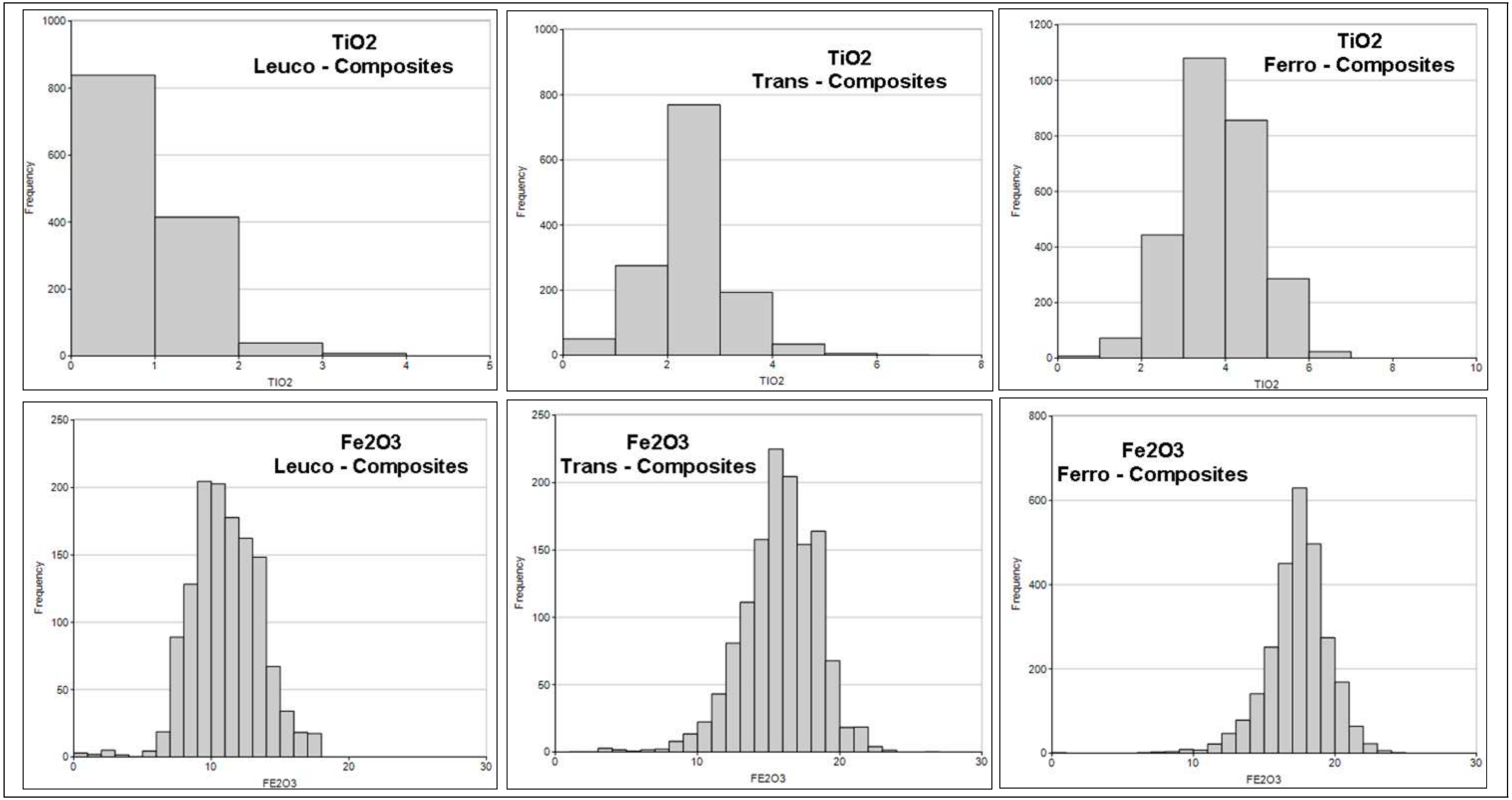

SiO2
Trans - Samples
Frequency
SiO2
0
100
200
300
400
500
600
30
40
50
60
70
80
90

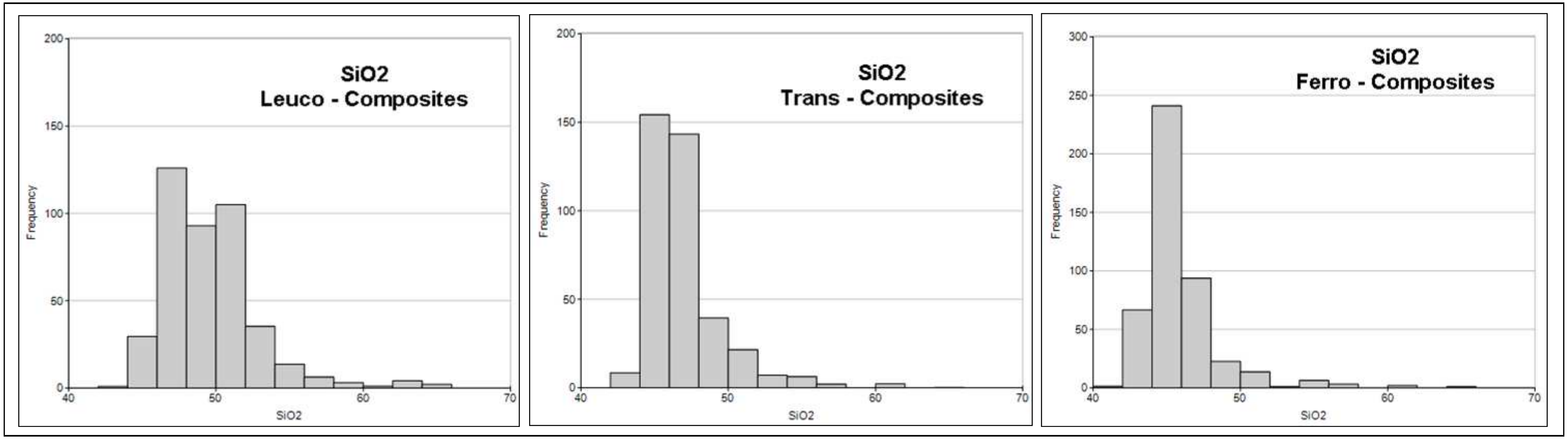

SiO2
Ferro - Samples
Frequency
SiO2
0
100
200
300
400
500
600
30
40
50
60
70
80
90
100

Log-Probability Plots – Samples



Histograms – Composites




SiO2
Leuco - Composites
Frequency
SiO2
SiO2
Trans - Composites
Frequency
SiO2
SiO2
Ferro - Composites
Frequency
SiO2

APPENDIX C:

Comparative Downhole Log Plots for Re-Assay Results

TiO_2/Fe_2O_3 – NGU Assays

$RTiO_2/RFe_2O_3$ – Nordic Re-Assays

ENG_rFe2O3	ENG_rTiO2
[0,16.5]	[0,2]
[16.5,17.5]	[2,3]
[17.5,18]	[3,4]
[18,19]	[4,4.5]
[19,CEILING]	[4.5,CEILING]

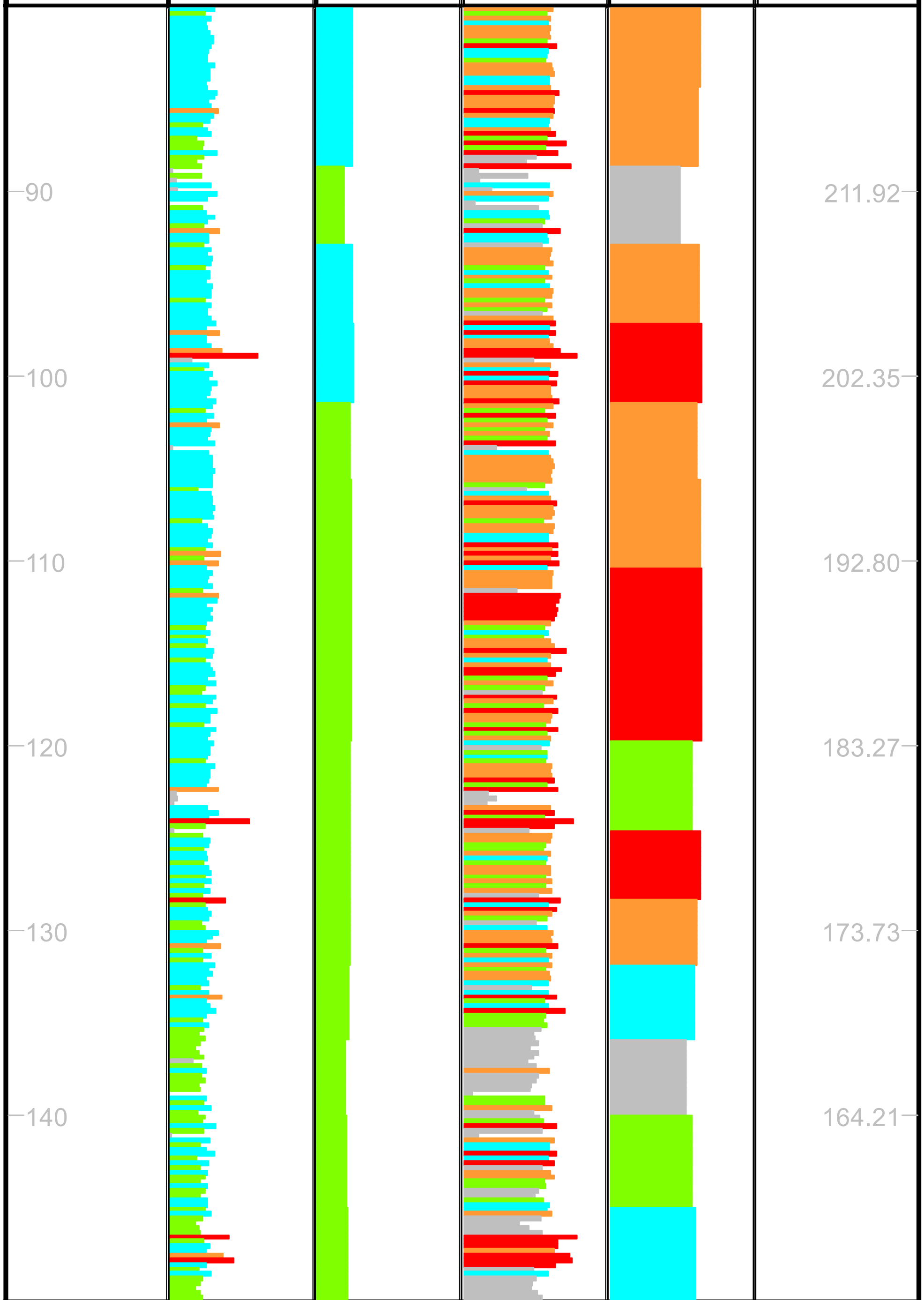
Hole Name: BH201

ENG_July_2016.dmproj

Segment Start Depth: 80.00 | Segment End Depth: 150.00

datapair (table)

Depth At	TIO2	RTIO2	FE2O3	RFE2O3	Elevation



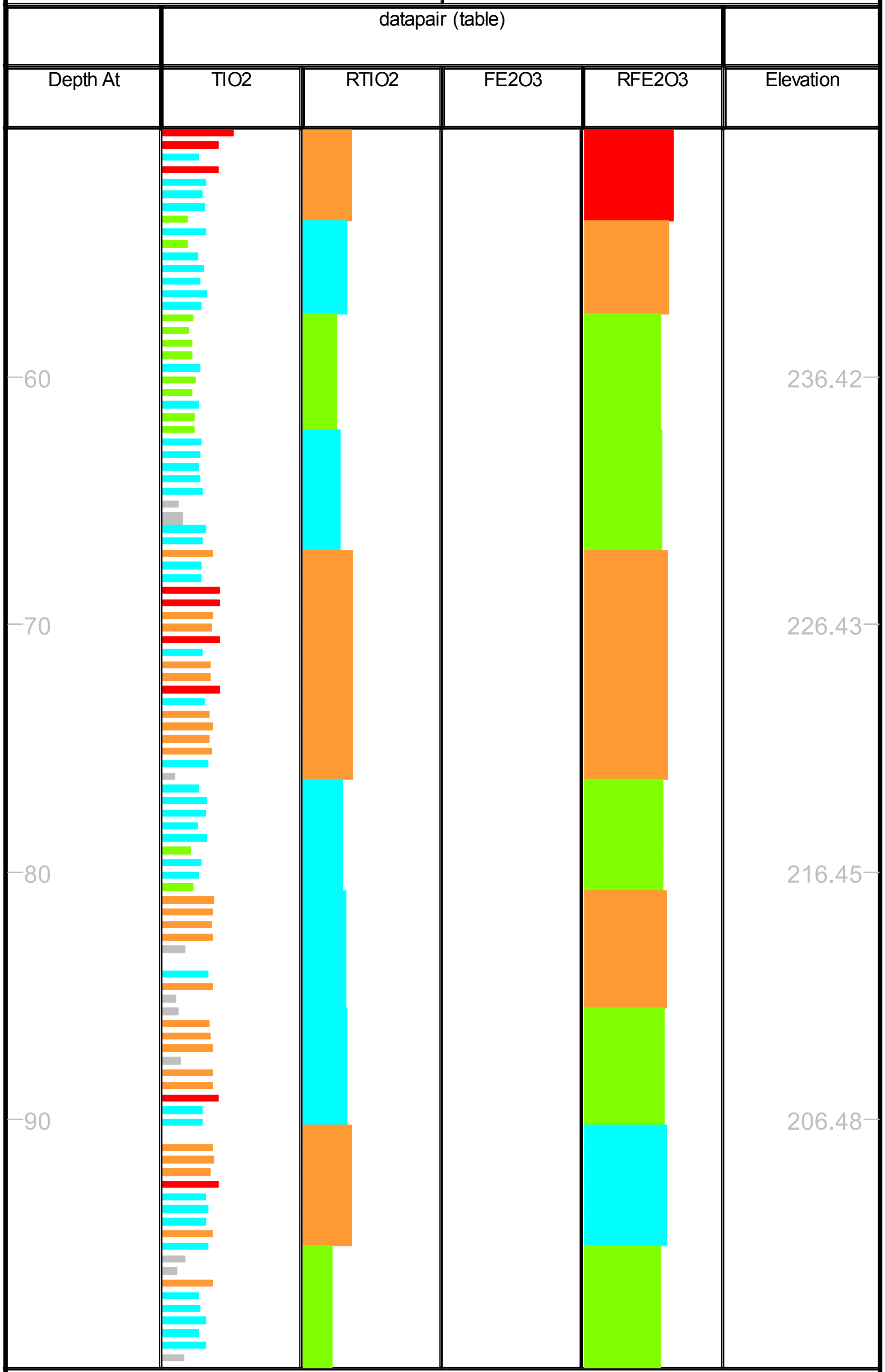
Scale 1:384 | 07/20/16 | 15:08:25

ENG_rFe2O3	ENG_rTiO2
[0,16.5]	[0,2]
[16.5,17.5]	[2,3]
[17.5,18]	[3,4]
[18,19]	[4,4.5]
[19,CEILING]	[4.5,CEILING]

Hole Name: BH202

ENG_July_2016.dmproj

Segment Start Depth: 50.00 | Segment End Depth: 100.00



Scale 1:274 | 07/20/16 | 15:08:25

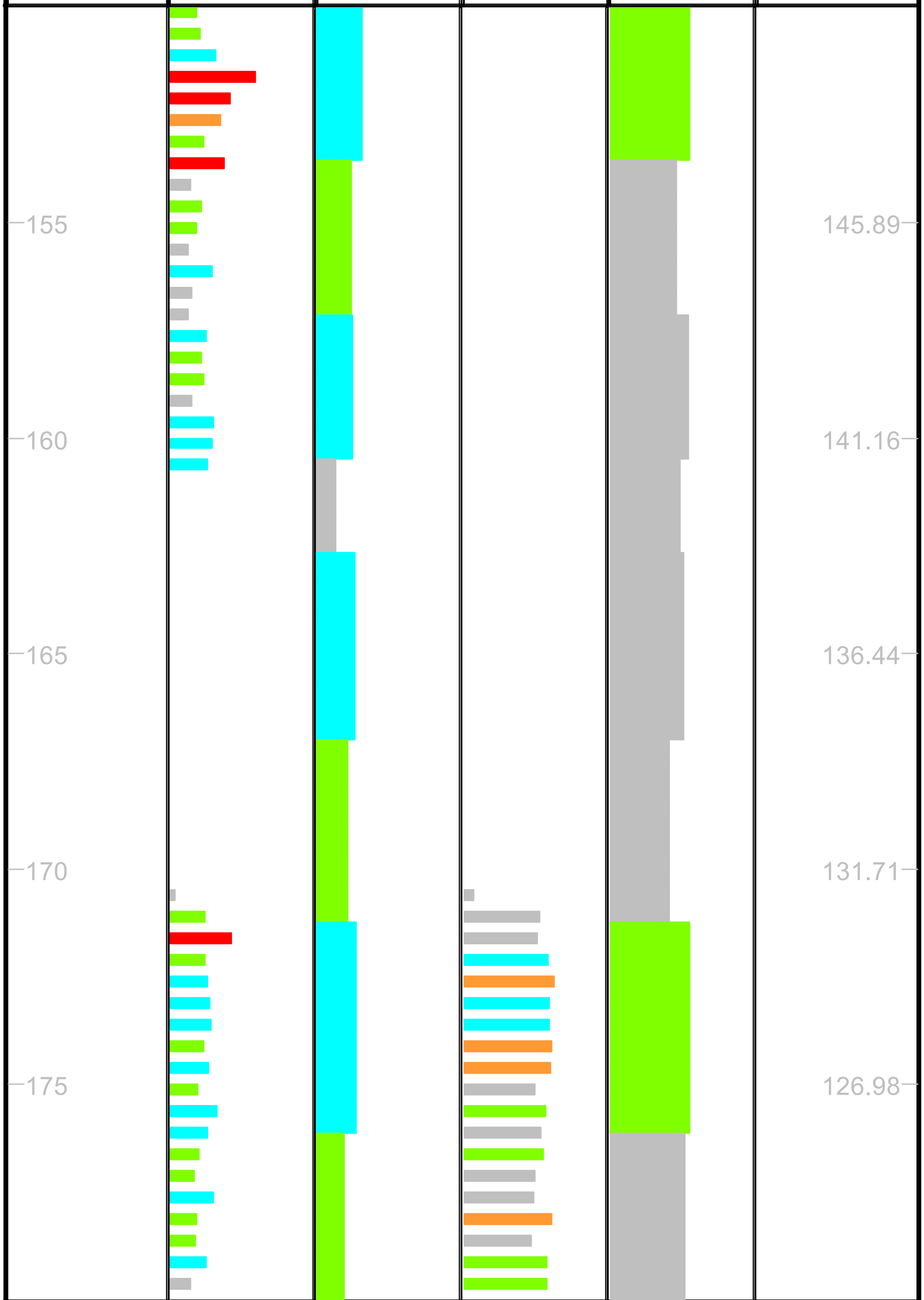
ENG_rFe2O3		ENG_rTiO2	
(grey)	[0,16.5]	(grey)	[0,2]
(green)	[16.5,17.5]	(green)	[2,3]
(cyan)	[17.5,18]	(cyan)	[3,4]
(orange)	[18,19]	(orange)	[4,4.5]
(red)	[19,CEILING]	(red)	[4.5,CEILING]

Hole Name: BH203

ENG_July_2016.dmproj

Segment Start Depth: 150.00	Segment End Depth: 180.00

	datapair (table)				
Depth At	TIO2	RTIO2	FE2O3	RFE2O3	Elevation



Scale 1:164	07/20/16	15:08:25

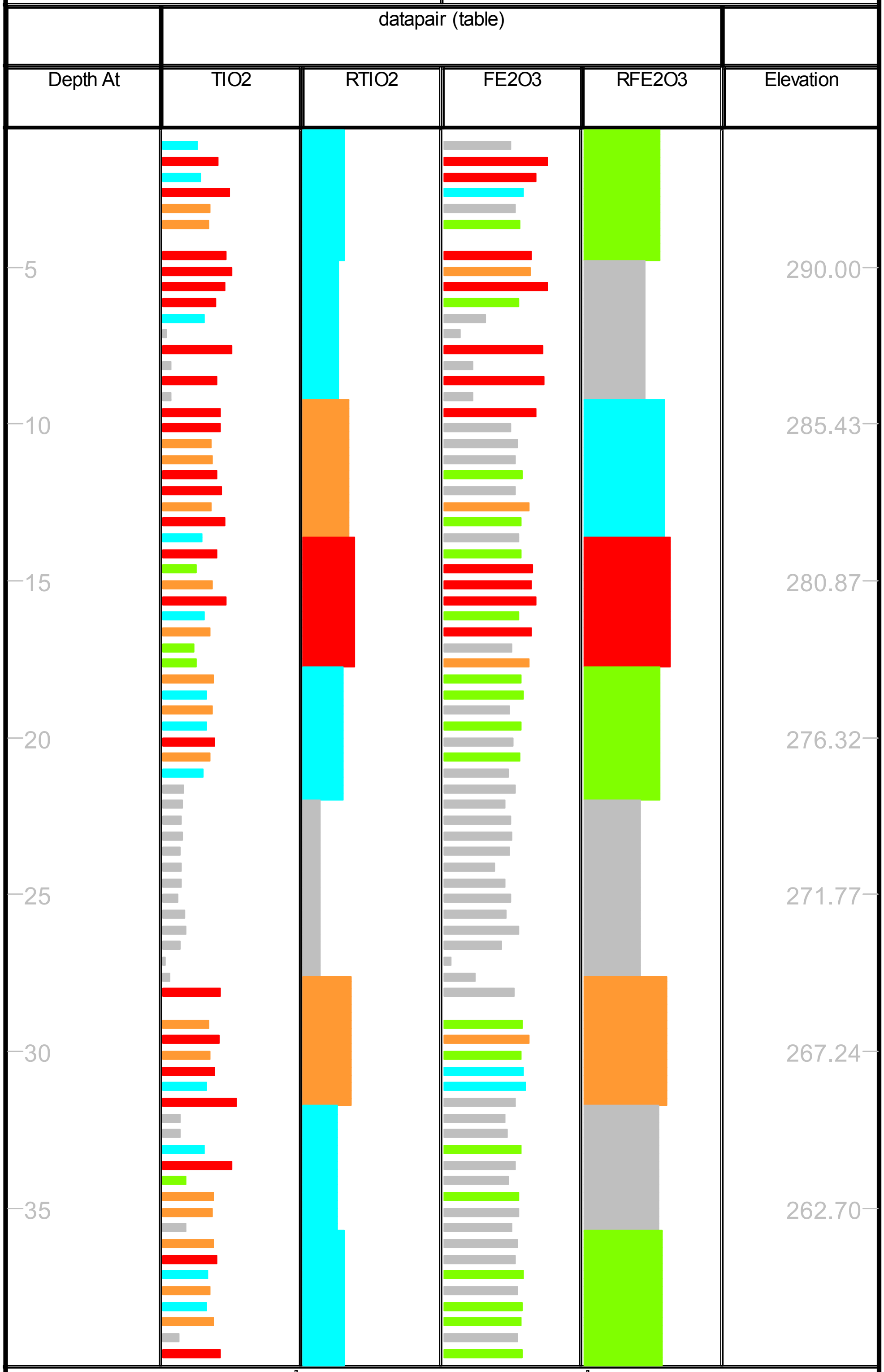
Hole Name: BH204

ENG_July_2016.dmproj

ENG_rFe2O3	ENG_rTiO2
[0,16.5]	[0,2]
[16.5,17.5]	[2,3]
[17.5,18]	[3,4]
[18,19]	[4,4.5]
[19,CEILING]	[4.5,CEILING]

Segment Start Depth: 0.60

Segment End Depth: 40.00

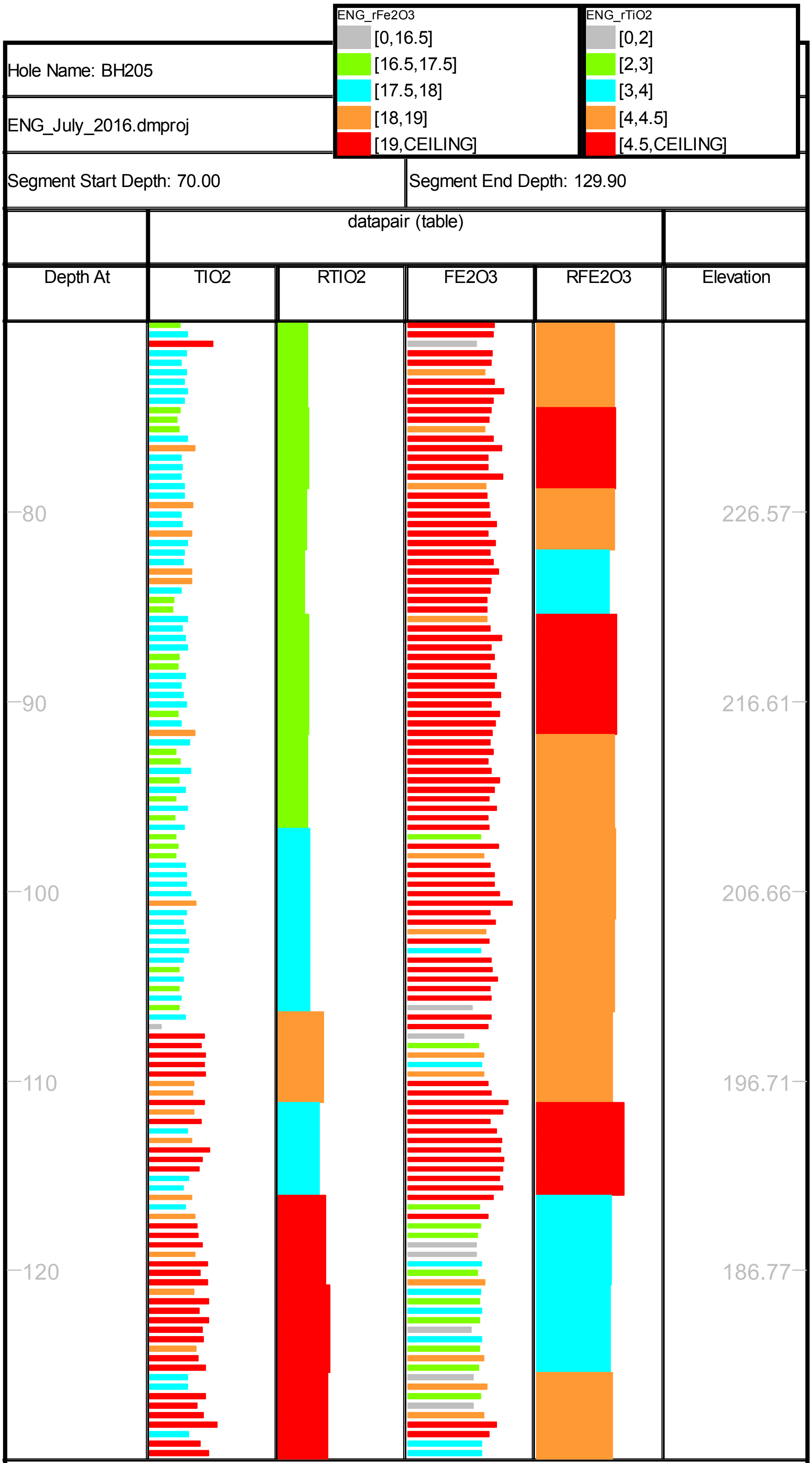


Scale 1:216

07/20/16

15:08:25

Hole Name: BH205	
ENG_July_2016.dmproj	
Segment Start Depth: 70.00	Segment End Depth: 129.90



Scale 1:328 | 07/20/16 | 15:08:25

ENG_rFe2O3
[0,16.5]
[16.5,17.5]
[17.5,18]
[18,19]
[19,CEILING]

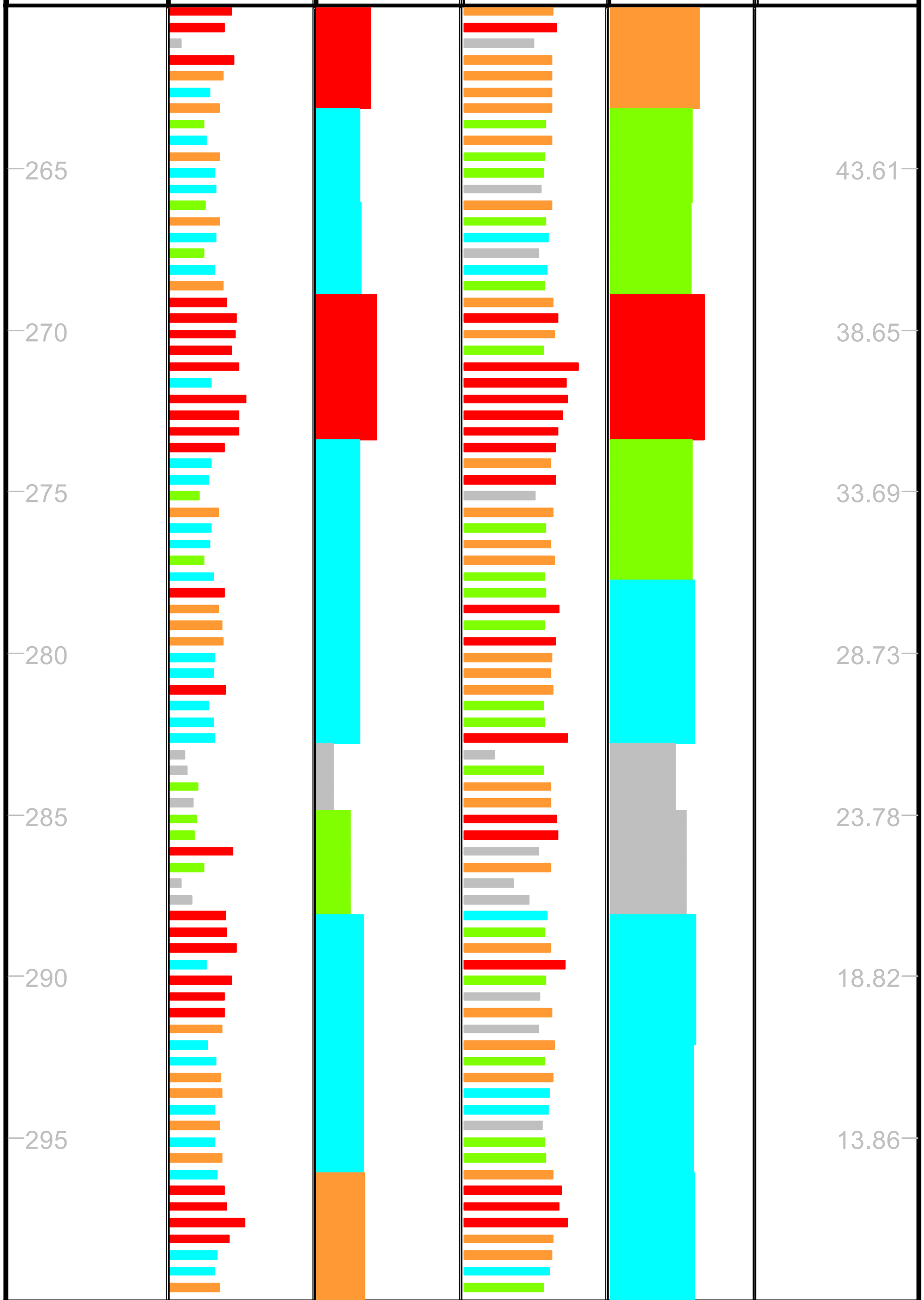
ENG_rTiO2
[0,2]
[2,3]
[3,4]
[4,4.5]
[4.5,CEILING]

Hole Name: BH206

ENG_July_2016.dmproj

Segment Start Depth: 260.00	Segment End Depth: 300.00

	datapair (table)				
Depth At	TIO2	RTIO2	FE2O3	RFE2O3	Elevation



Scale 1:219 | 07/20/16 | 15:08:25

ENG_rFe2O3	ENG_rTiO2
[0,16.5]	[0,2]
[16.5,17.5]	[2,3]
[17.5,18]	[3,4]
[18,19]	[4,4.5]
[19,CEILING]	[4.5,CEILING]

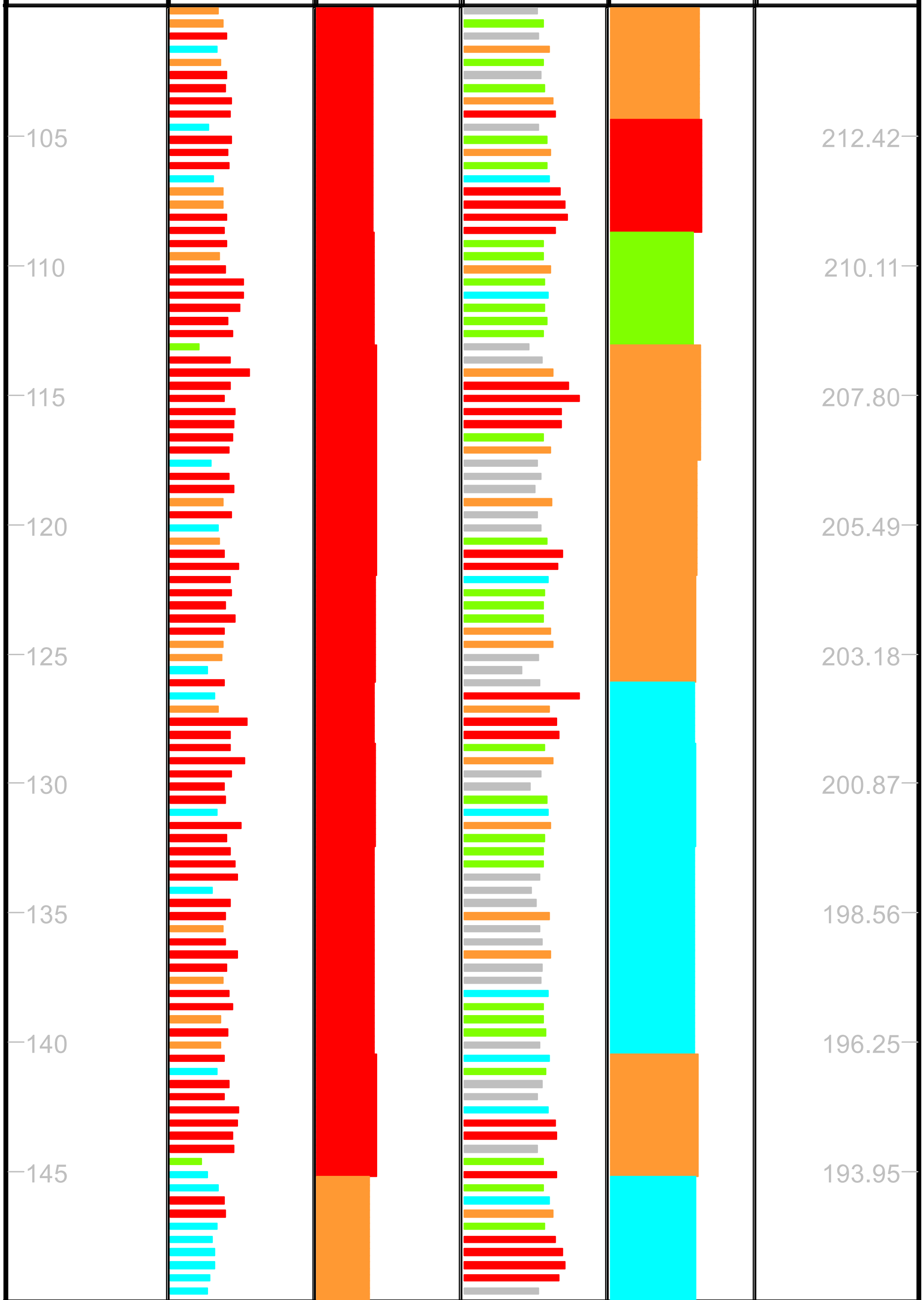
Hole Name: BH207

ENG_July_2016.dmproj

Segment Start Depth: 100.00 | Segment End Depth: 149.95

datapair (table)

Depth At	TIO2	RTIO2	FE2O3	RFE2O3	Elevation



Scale 1:274 | 07/20/16 | 15:08:26

ENG_rFe2O3	ENG_rTiO2
[0,16.5]	[0,2]
[16.5,17.5]	[2,3]
[17.5,18]	[3,4]
[18,19]	[4,4.5]
[19,CEILING]	[4.5,CEILING]

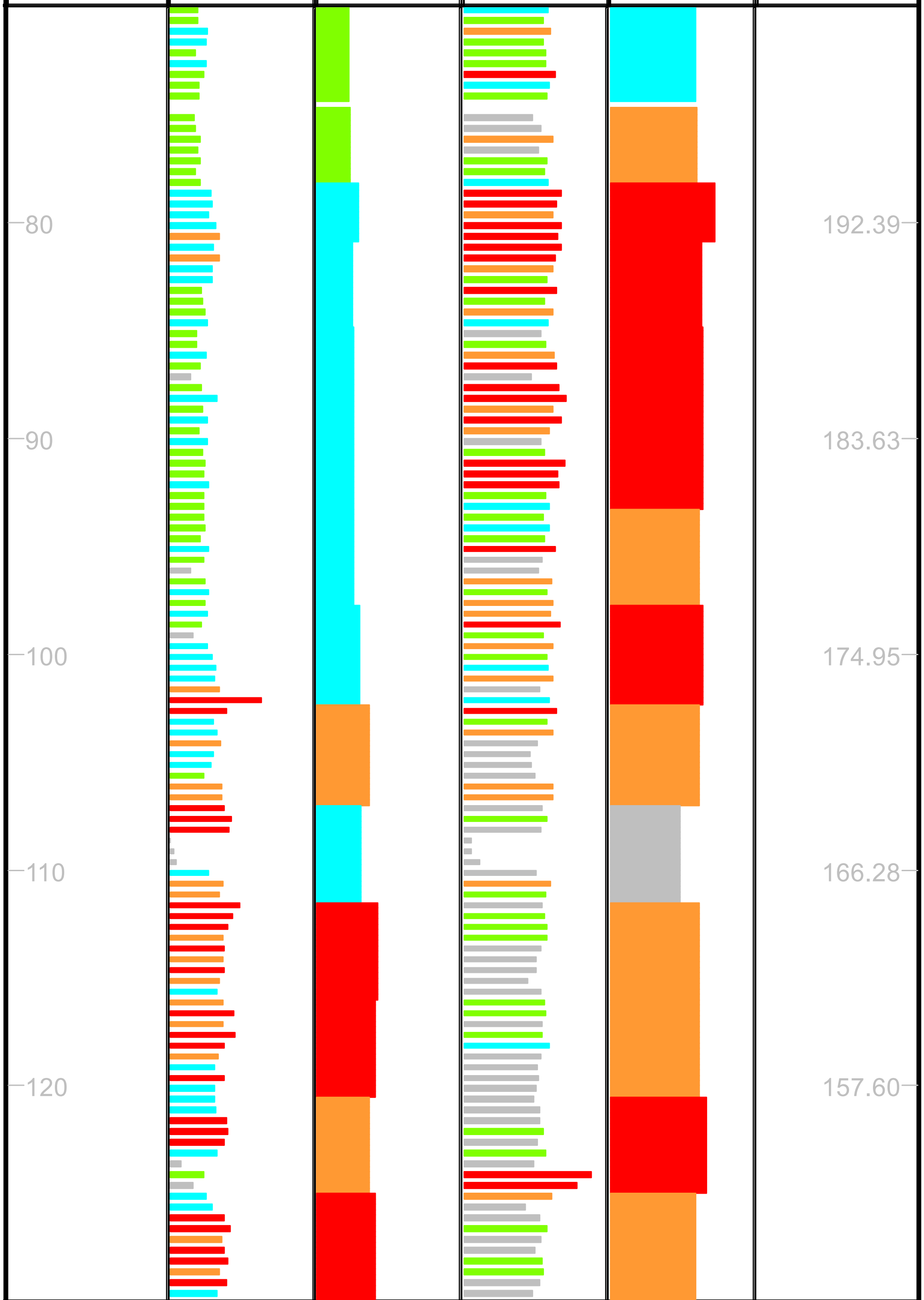
Hole Name: BH208

ENG_July_2016.dmproj

Segment Start Depth: 70.00 | Segment End Depth: 129.90

datapair (table)

Depth At	TIO2	RTIO2	FE2O3	RFE2O3	Elevation



Scale 1:328 | 07/20/16 | 15:08:26

Hole Name: BH209

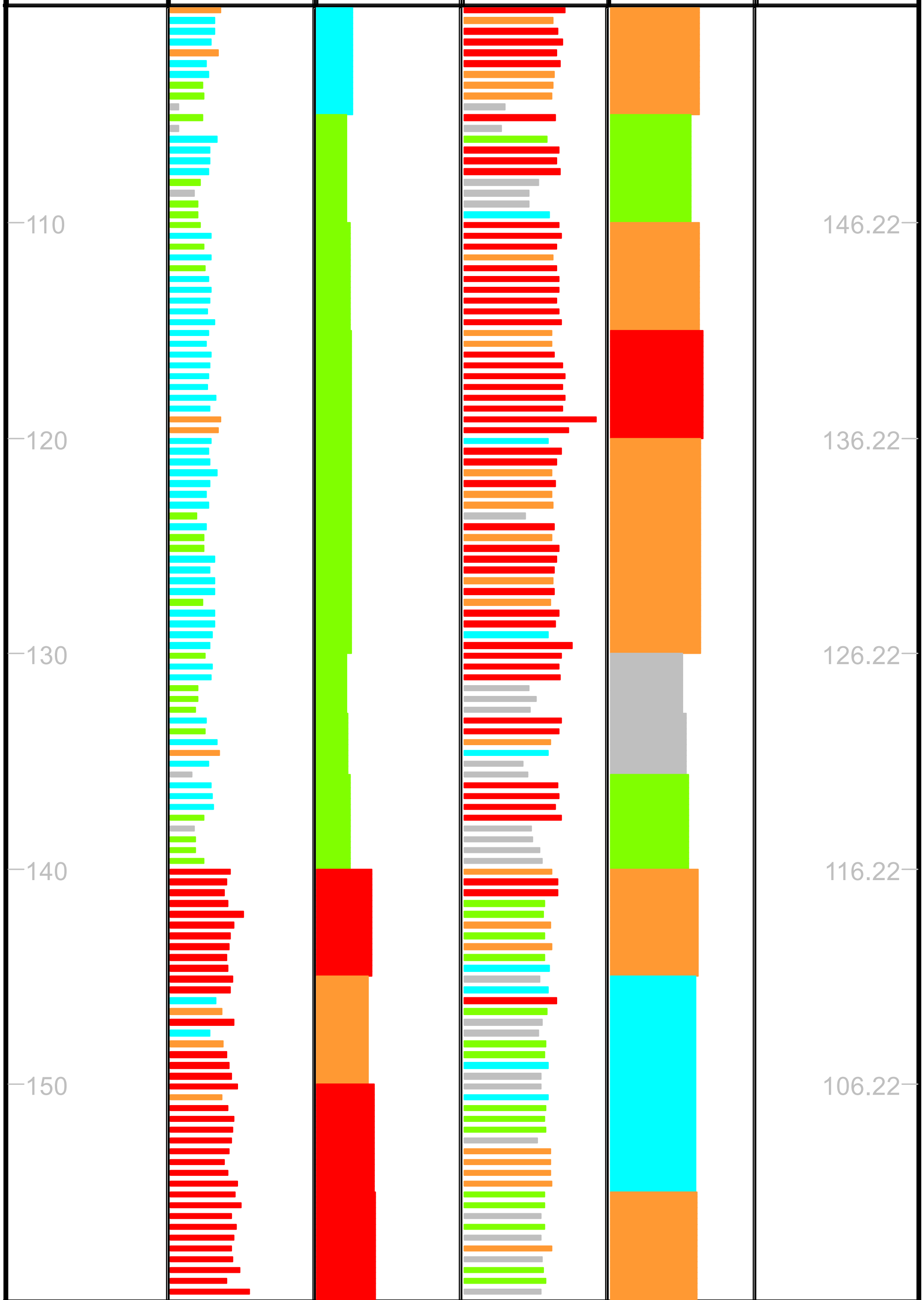
ENG_July_2016.dmproj

ENG_rFe2O3	ENG_rTiO2
[0,16.5]	[0,2]
[16.5,17.5]	[2,3]
[17.5,18]	[3,4]
[18,19]	[4,4.5]
[19,CEILING]	[4.5,CEILING]

Segment Start Depth: 100.00

Segment End Depth: 160.00

	datapair (table)				
Depth At	TIO2	RTIO2	FE2O3	RFE2O3	Elevation



Scale 1:329

07/20/16

15:08:26

Hole Name: BH213

ENG_July_2016.dmproj

ENG_rFe2O3
[0,16.5]
[16.5,17.5]
[17.5,18]
[18,19]
[19,CEILING]

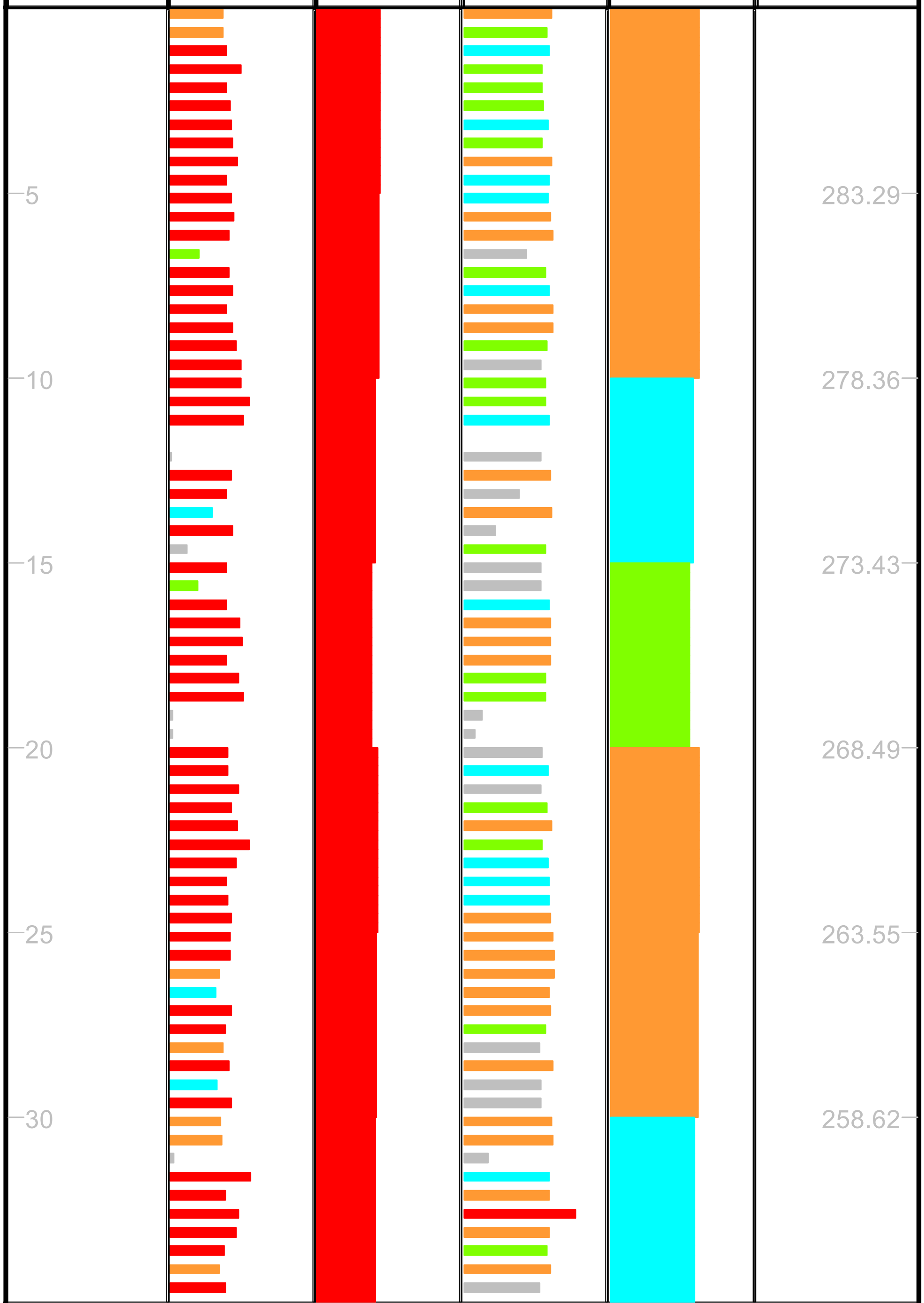
ENG_rTiO2
[0,2]
[2,3]
[3,4]
[4,4.5]
[4.5,CEILING]

Segment Start Depth: 0.00

Segment End Depth: 35.00

datapair (table)

Depth At	TIO2	RTIO2	FE2O3	RFE2O3	Elevation



Scale 1:192

07/20/16

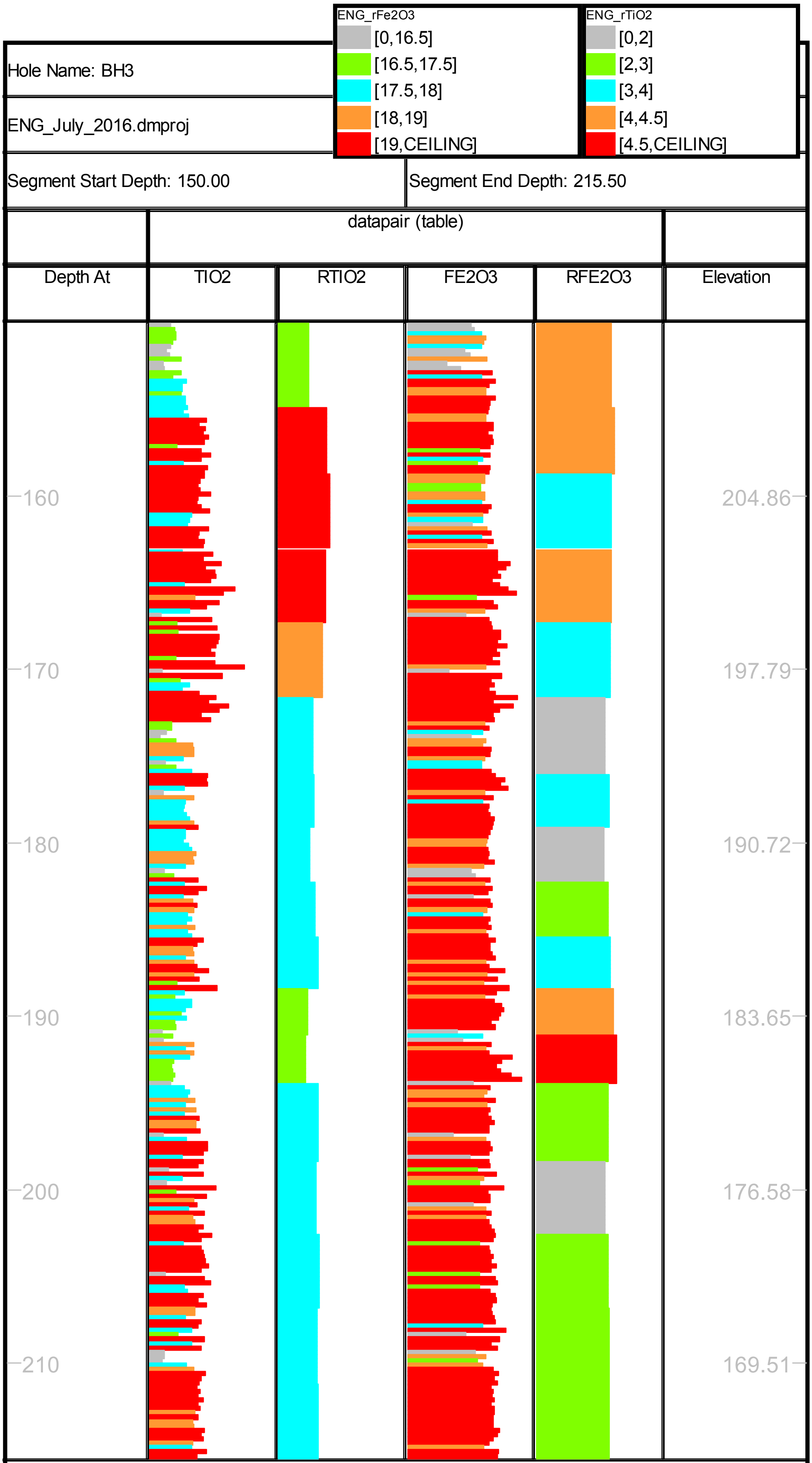
15:08:26

Hole Name: BH3

ENG_July_2016.dmproj

Segment Start Depth: 150.00

Segment End Depth: 215.50



Scale 1:359

07/20/16

15:08:26

ENG_rFe2O3
- [0,16.5]
- [16.5,17.5]
- [17.5,18]
- [18,19]
- [19,CEILING]

ENG_rTiO2
- [0,2]
- [2,3]
- [3,4]
- [4,4.5]
- [4.5,CEILING]

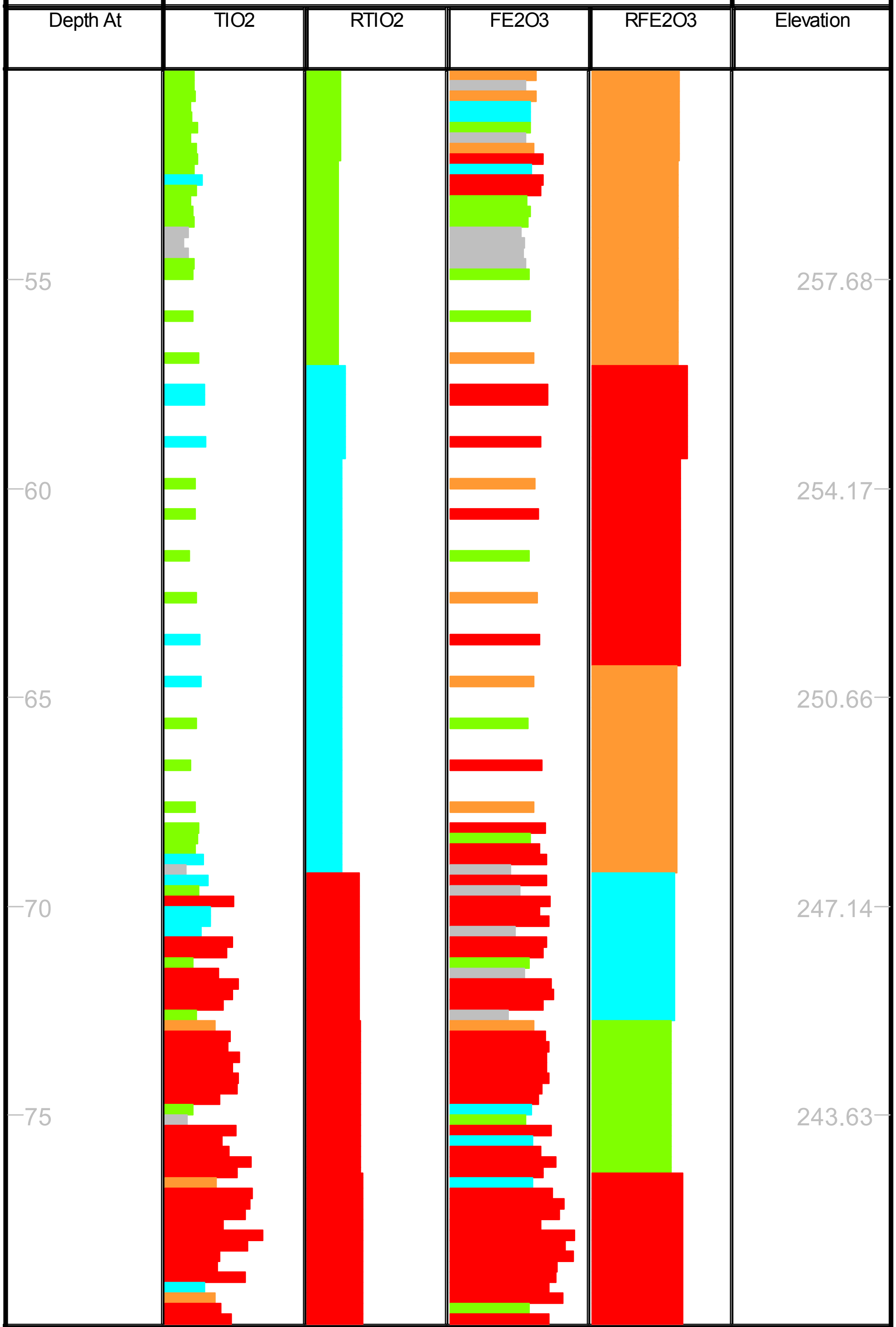
Hole Name: BH4

ENG_July_2016.dmproj

Segment Start Depth: 50.00

Segment End Depth: 80.00

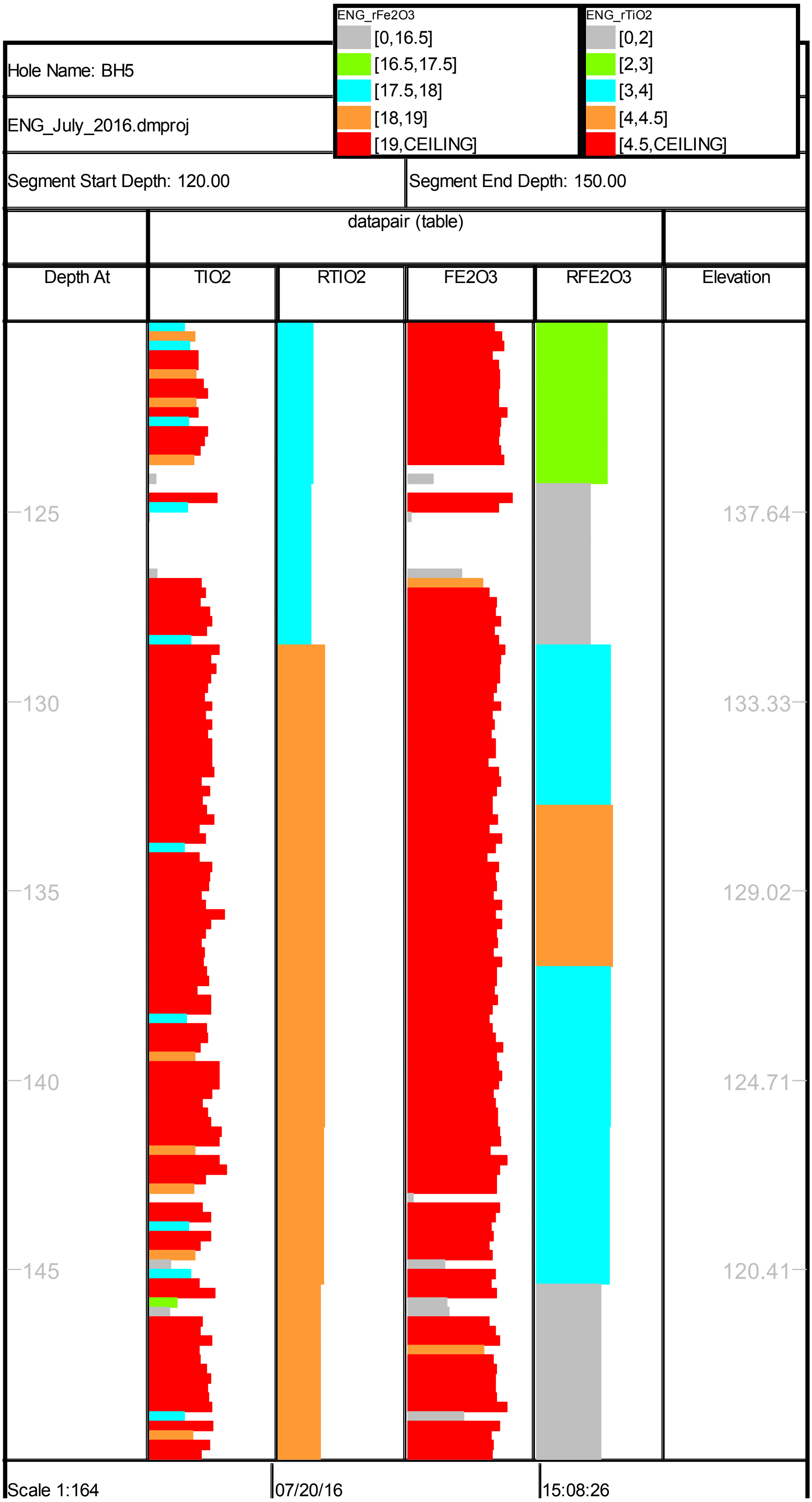
datapair (table)



Scale 1:164

07/20/16

15:08:26


ENG_rFe2O3
[0,16.5]
[16.5,17.5]
[17.5,18]
[18,19]
[19,CEILING]
ENG_rTiO2
[0,2]
[2,3]
[3,4]
[4,4.5]
[4.5,CEILING]
Hole Name: BH5
ENG_July_2016.dmproj
Segment Start Depth: 120.00
Segment End Depth: 150.00
datapair (table)
Depth At
TIO2
RTIO2
FE2O3
RFE2O3
Elevation
125
130
135
140
145
137.64
133.33
129.02
124.71
120.41
Scale 1:164
07/20/16
15:08:26

ENG_rFe2O3	ENG_rTiO2
[0,16.5]	[0,2]
[16.5,17.5]	[2,3]
[17.5,18]	[3,4]
[18,19]	[4,4.5]
[19,CEILING]	[4.5,CEILING]

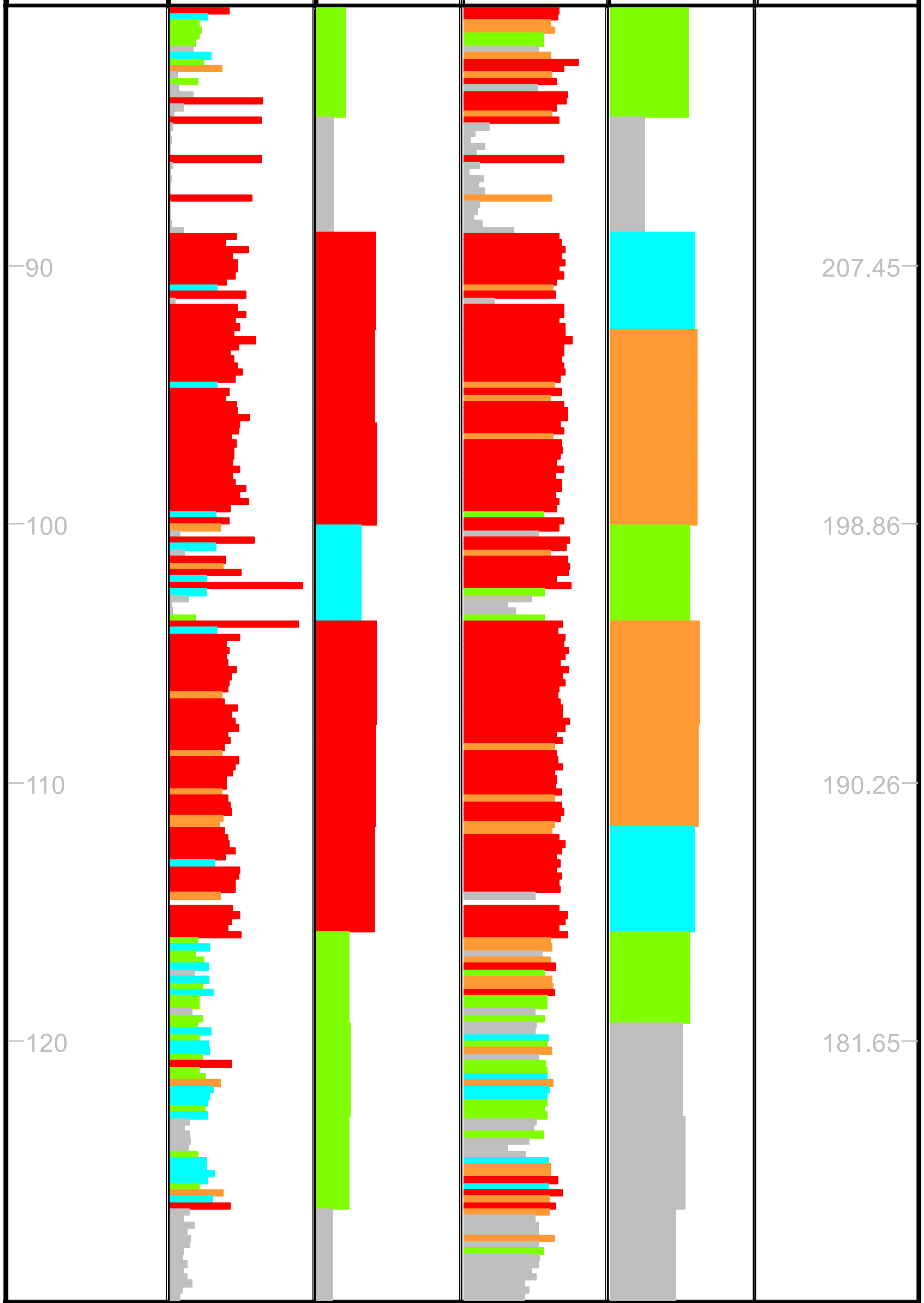
Hole Name: BH7

ENG_July_2016.dmproj

Segment Start Depth: 80.00 | Segment End Depth: 130.00

datapair (table)

Depth At	TIO2	RTIO2	FE2O3	RFE2O3	Elevation



Scale 1:274 | 07/20/16 | 15:08:26

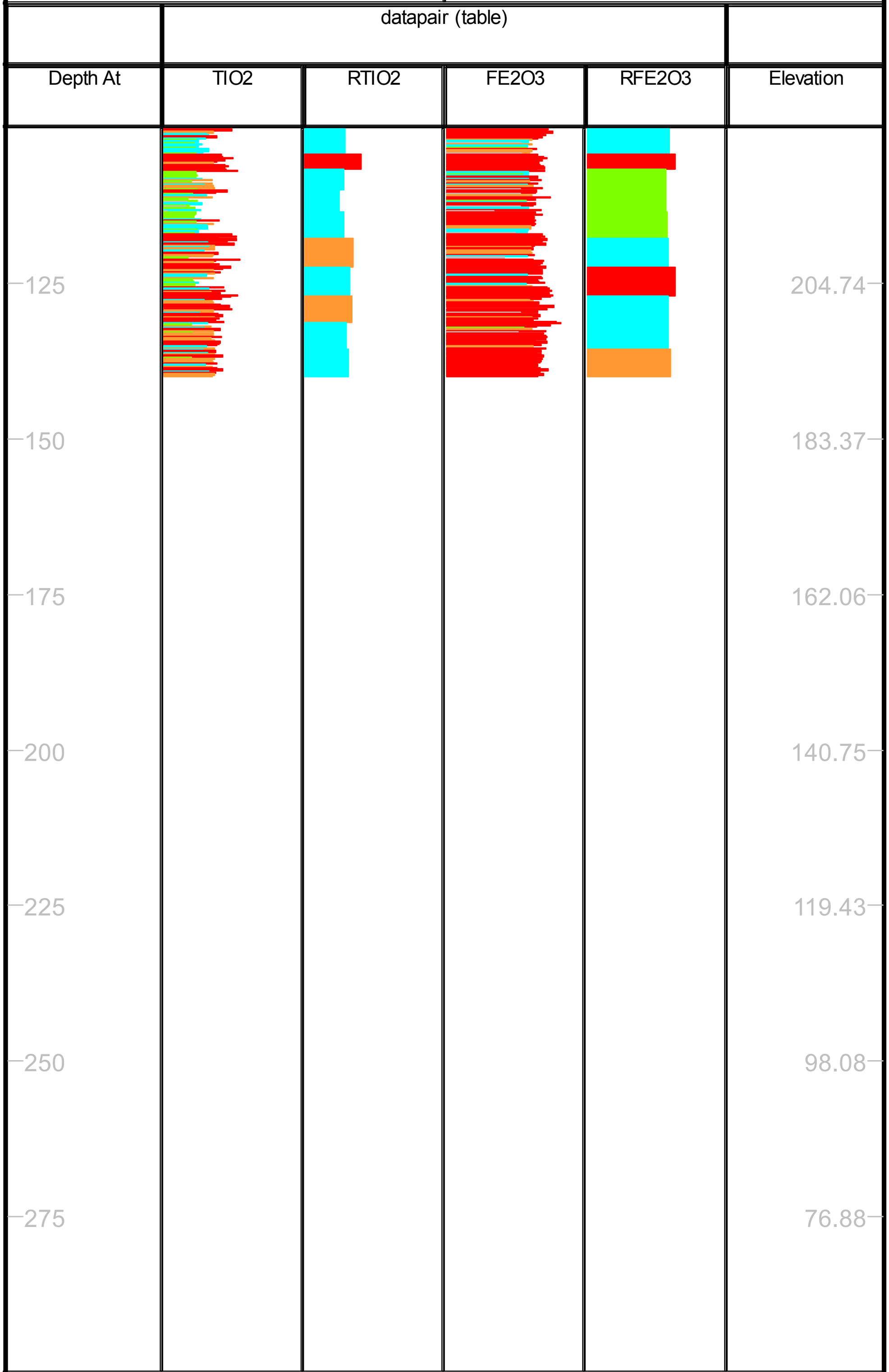
Hole Name: BH8

ENG_July_2016.dmproj

ENG_rFe2O3		ENG_rTiO2
[0,16.5]		[0,2]
[16.5,17.5]		[2,3]
[17.5,18]		[3,4]
[18,19]		[4,4.5]
[19,CEILING]		[4.5,CEILING]

Segment Start Depth: 100.00

Segment End Depth: 299.75



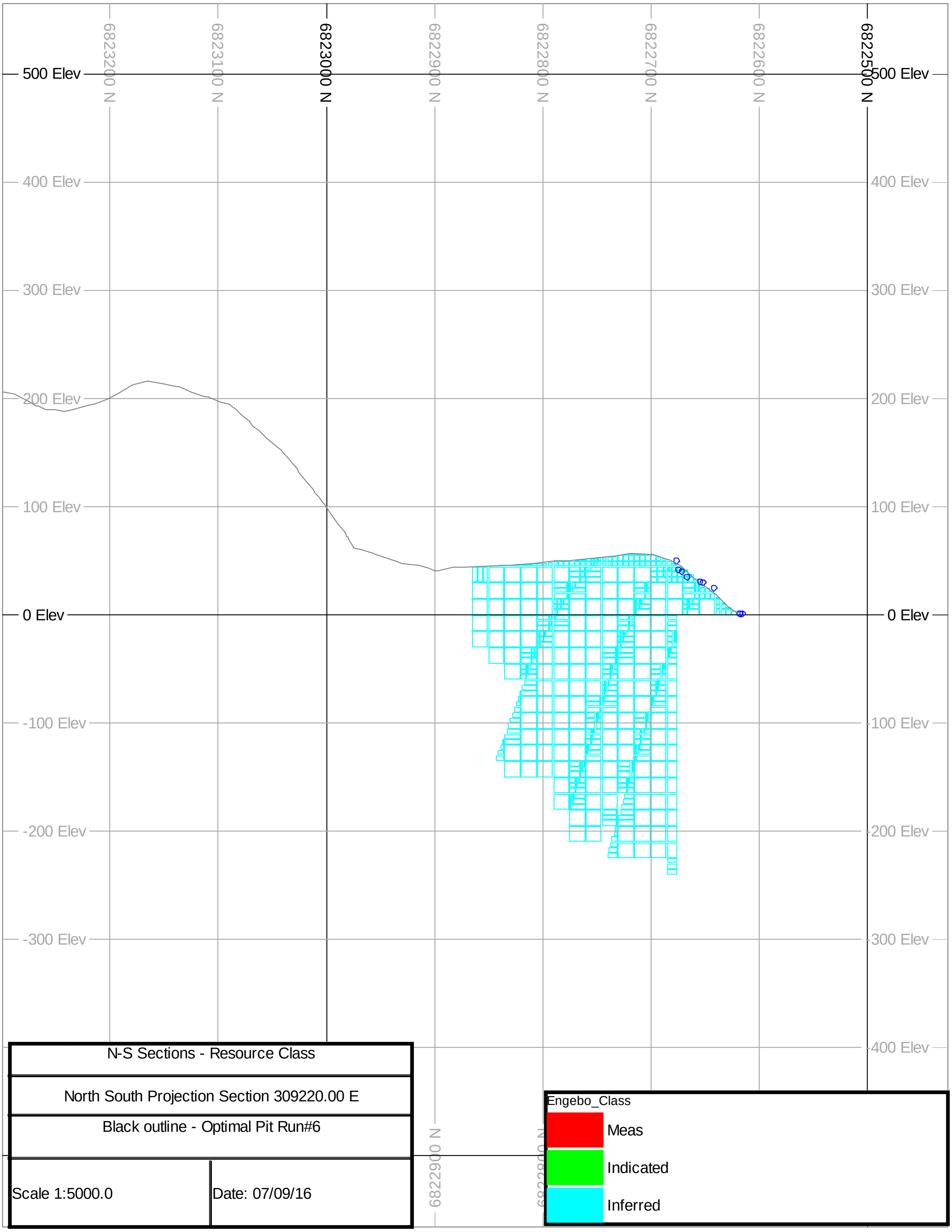
Scale 1:1095

07/20/16

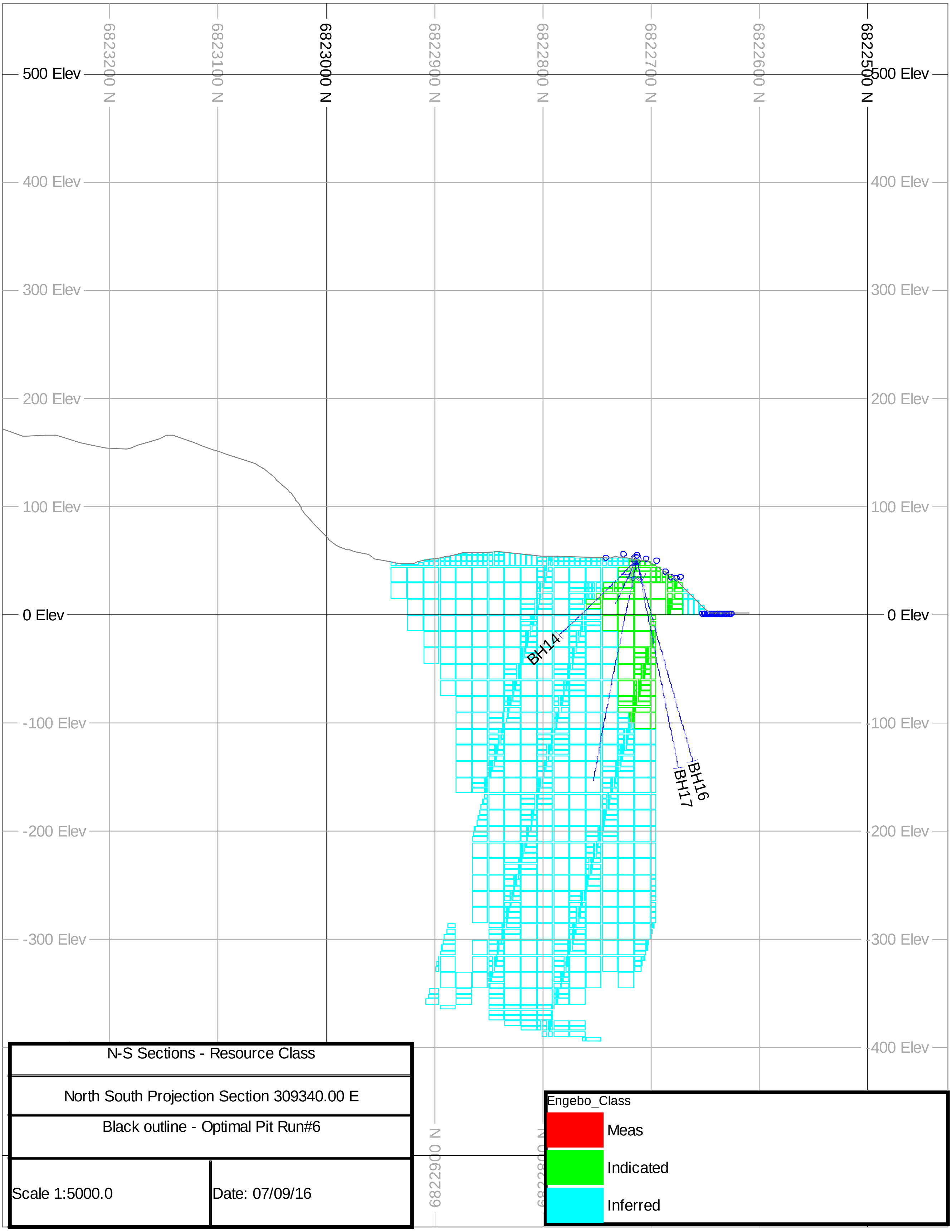
15:08:26

APPENDIX D:

N-S Cross-Sections – Resource Classification



N-S Sections - Resource Class	
North South Projection Section 309220.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 07/09/16

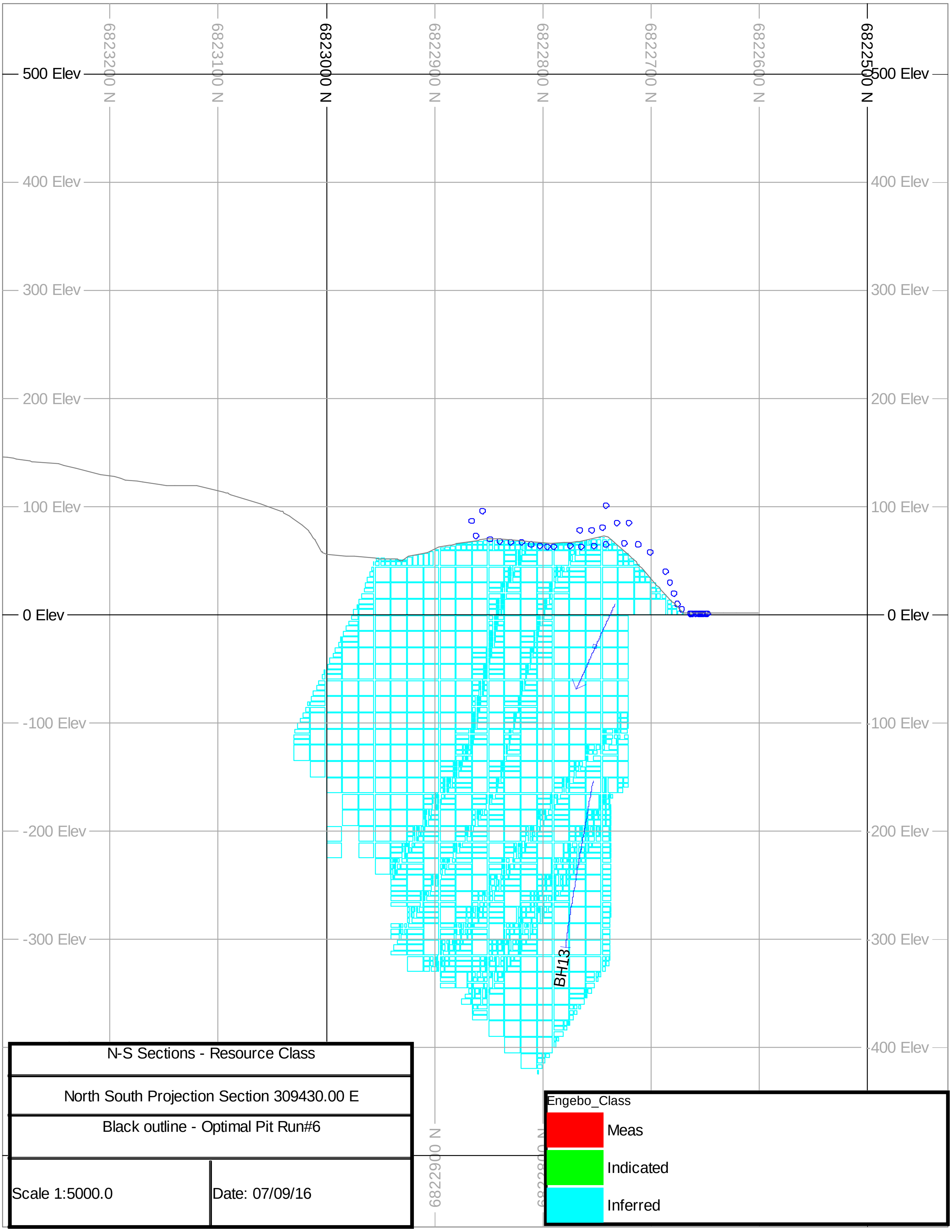


N-S Sections - Resource Class

North South Projection Section 309340.00 E

Black outline - Optimal Pit Run#6

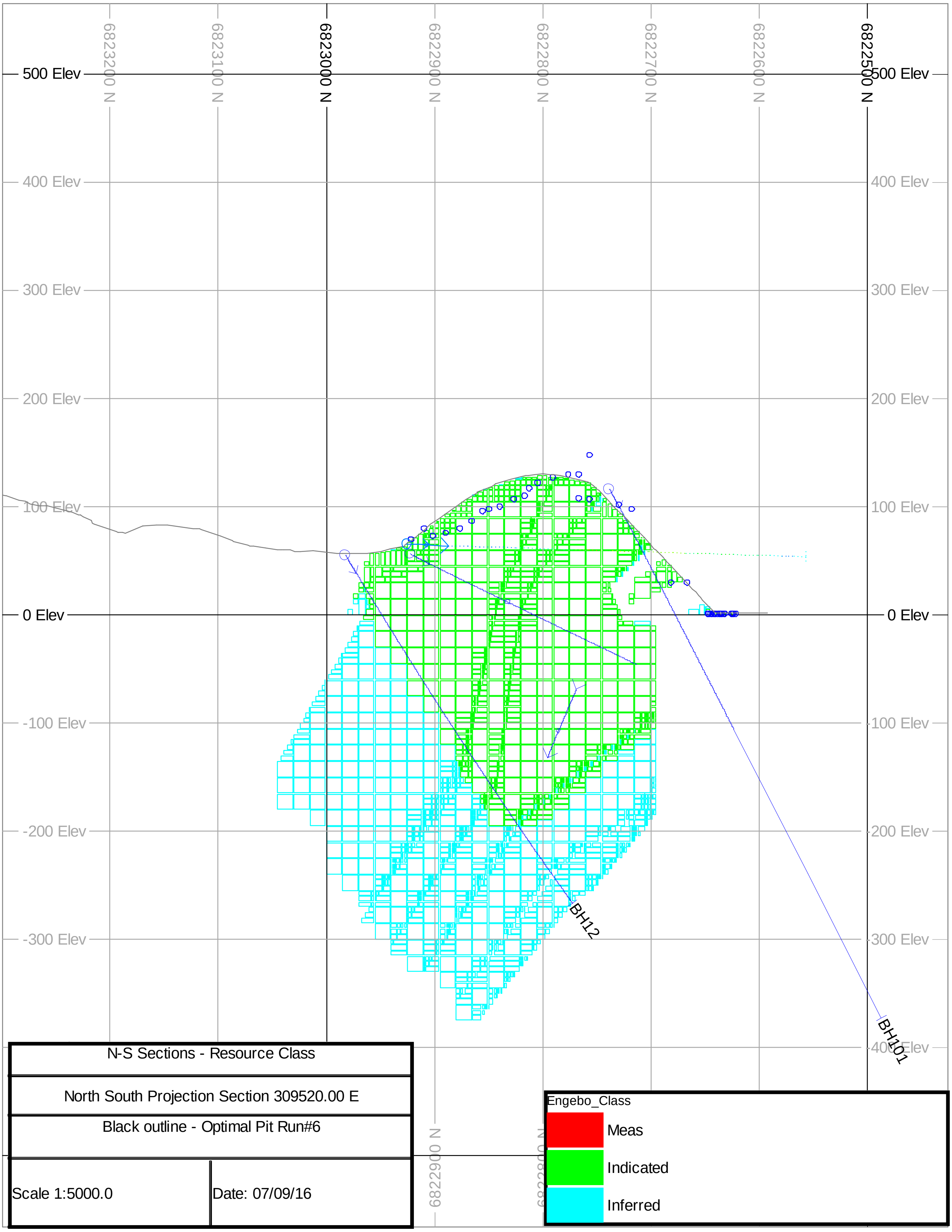
Scale 1:5000.0	Date: 07/09/16



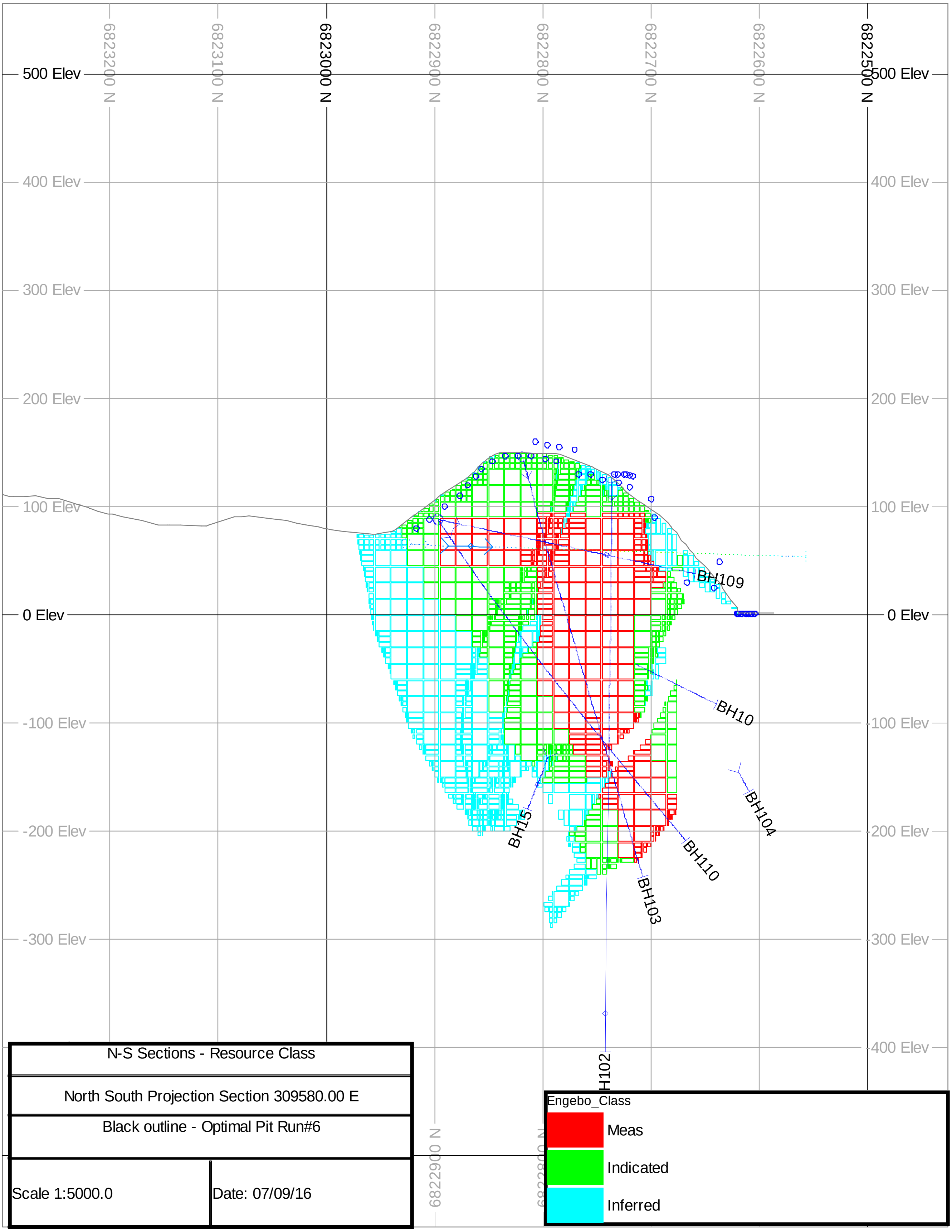
N-S Sections - Resource Class	
North South Projection Section 309430.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 07/09/16

Engebo_Class

- Meas
- Indicated
- Inferred



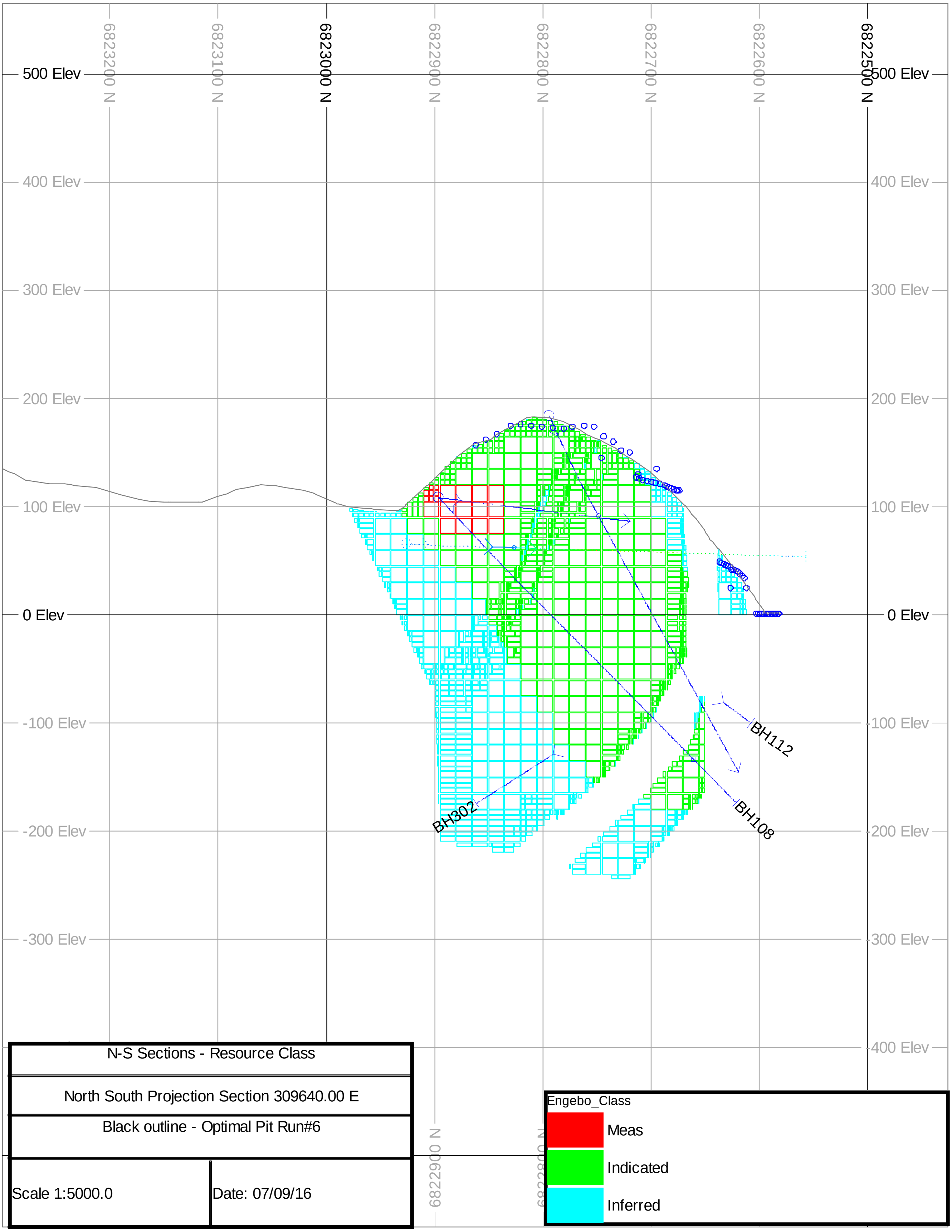
500 Elev
400 Elev
300 Elev
200 Elev
100 Elev
0 Elev
-100 Elev
-200 Elev
-300 Elev
-400 Elev
6823200 N
6823100 N
6823000 N
6822900 N
6822800 N
6822700 N
6822600 N
6822500 N
BH12
BH101
N-S Sections - Resource Class
North South Projection Section 309520.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 07/09/16
Engebo_Class
Meas
Indicated
Inferred



N-S Sections - Resource Class	
North South Projection Section 309580.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 07/09/16

Engebo_Class

- Meas
- Indicated
- Inferred



N-S Sections - Resource Class

North South Projection Section 309640.00 E

Black outline - Optimal Pit Run#6

Scale 1:5000.0

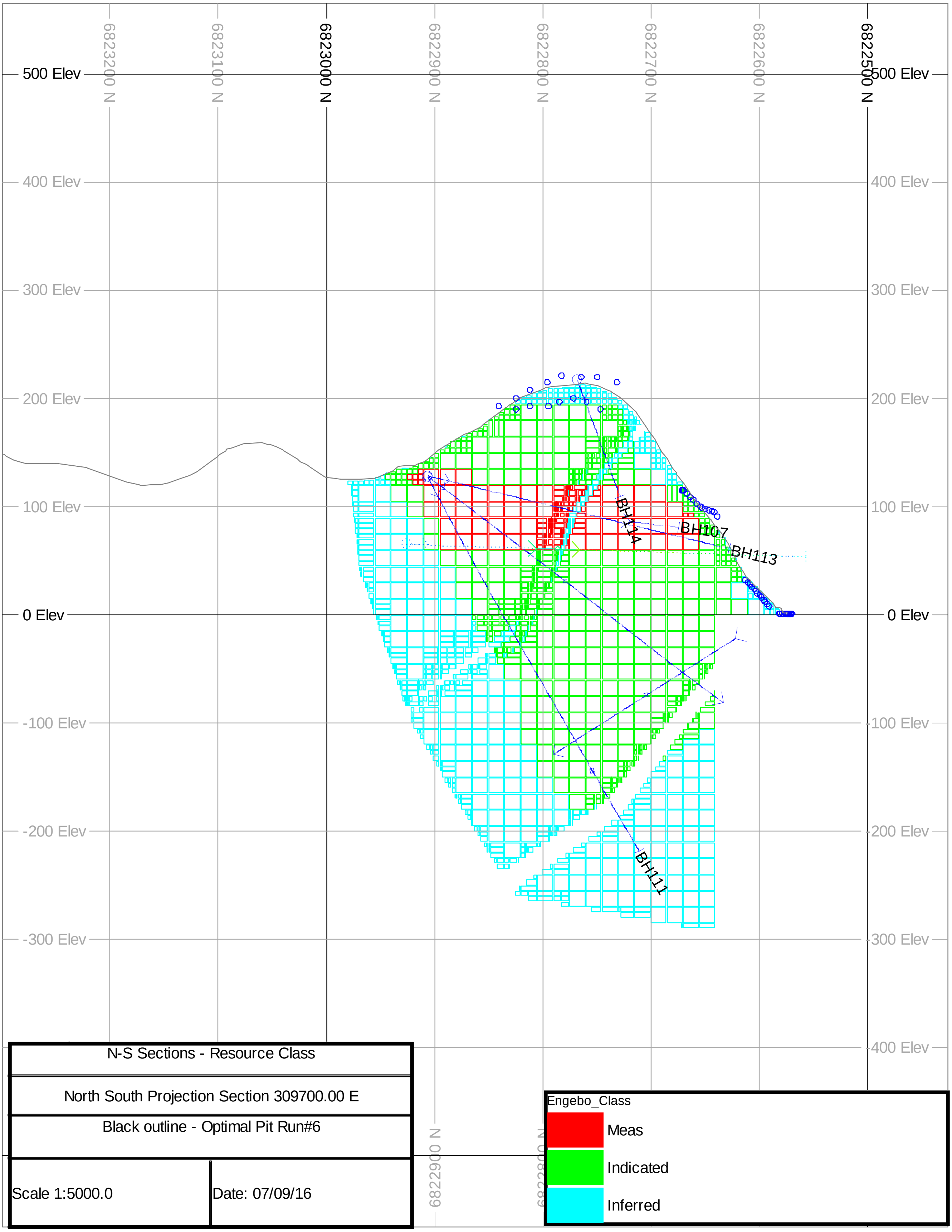
Date: 07/09/16

Engebo_Class

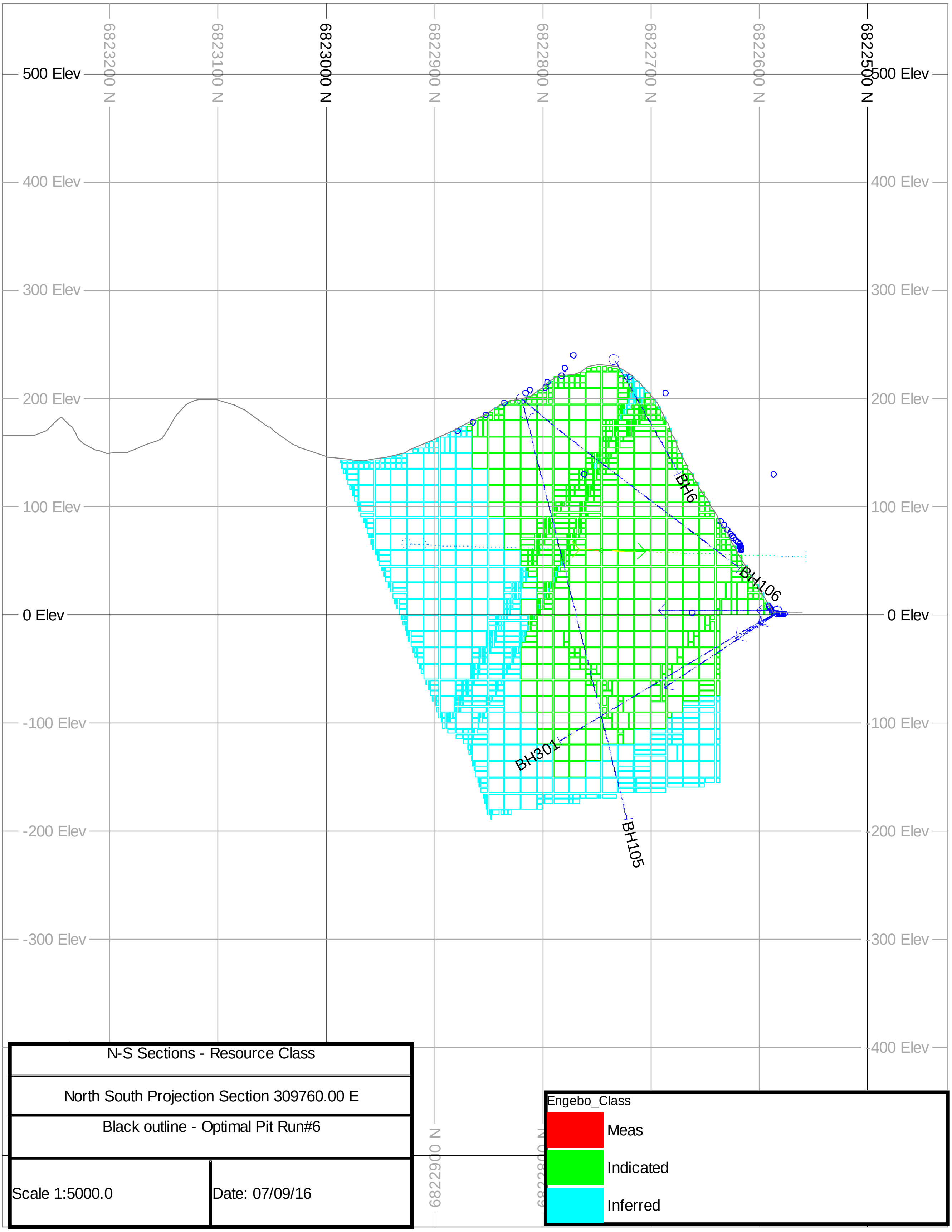
Meas

Indicated

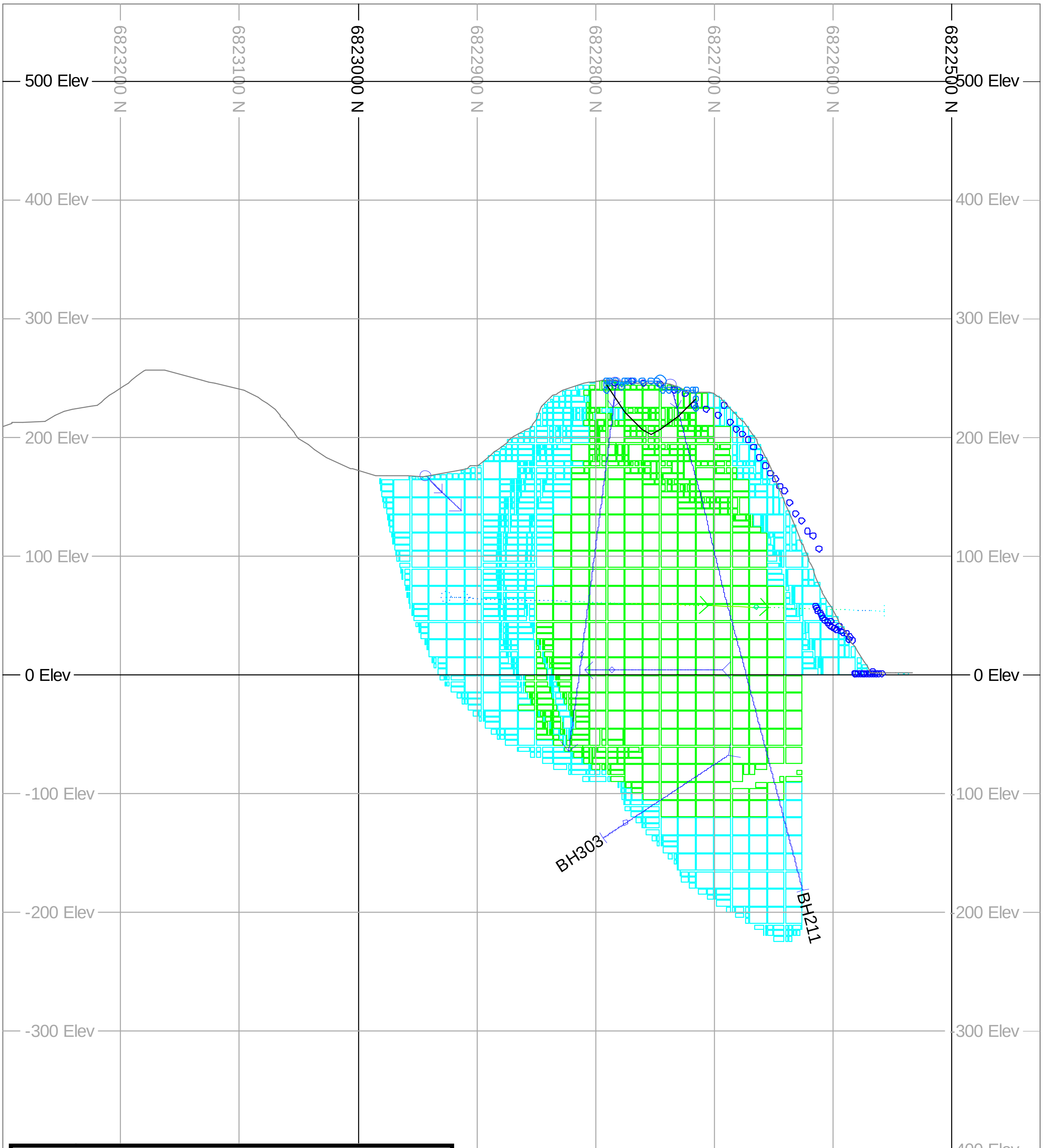
Inferred



N-S Sections - Resource Class	
North South Projection Section 309700.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 07/09/16



N-S Sections - Resource Class	
North South Projection Section 309760.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 07/09/16



N-S Sections - Resource Class

North South Projection Section 309880.00 E

Black outline - Optimal Pit Run#6

Scale 1:5000.0

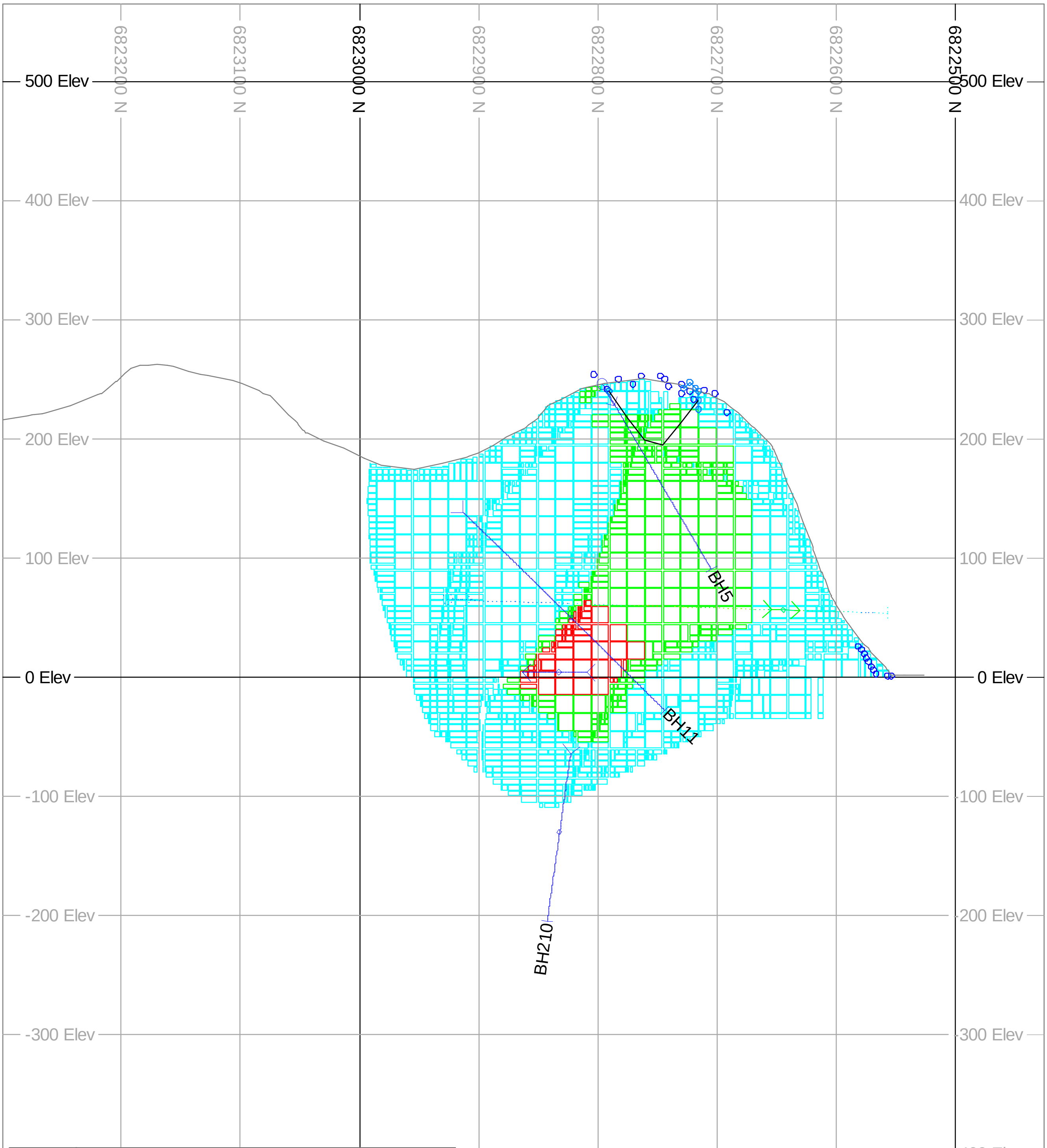
Date: 07/09/16

Engebo_Class

Meas

Indicated

Inferred



N-S Sections - Resource Class

North South Projection Section 309910.00 E

Black outline - Optimal Pit Run#6

Scale 1:5000.0

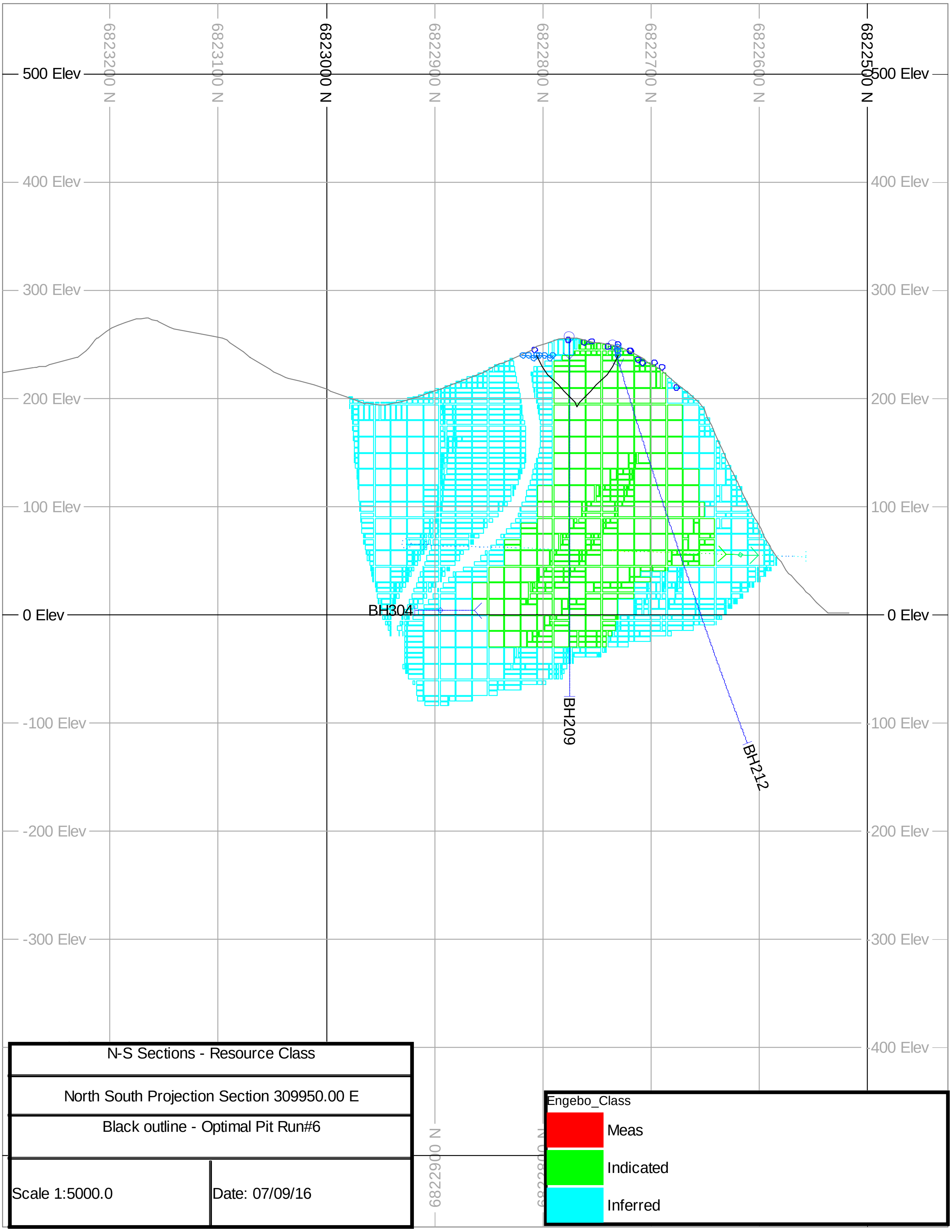
Date: 07/09/16

Engebo_Class

Meas

Indicated

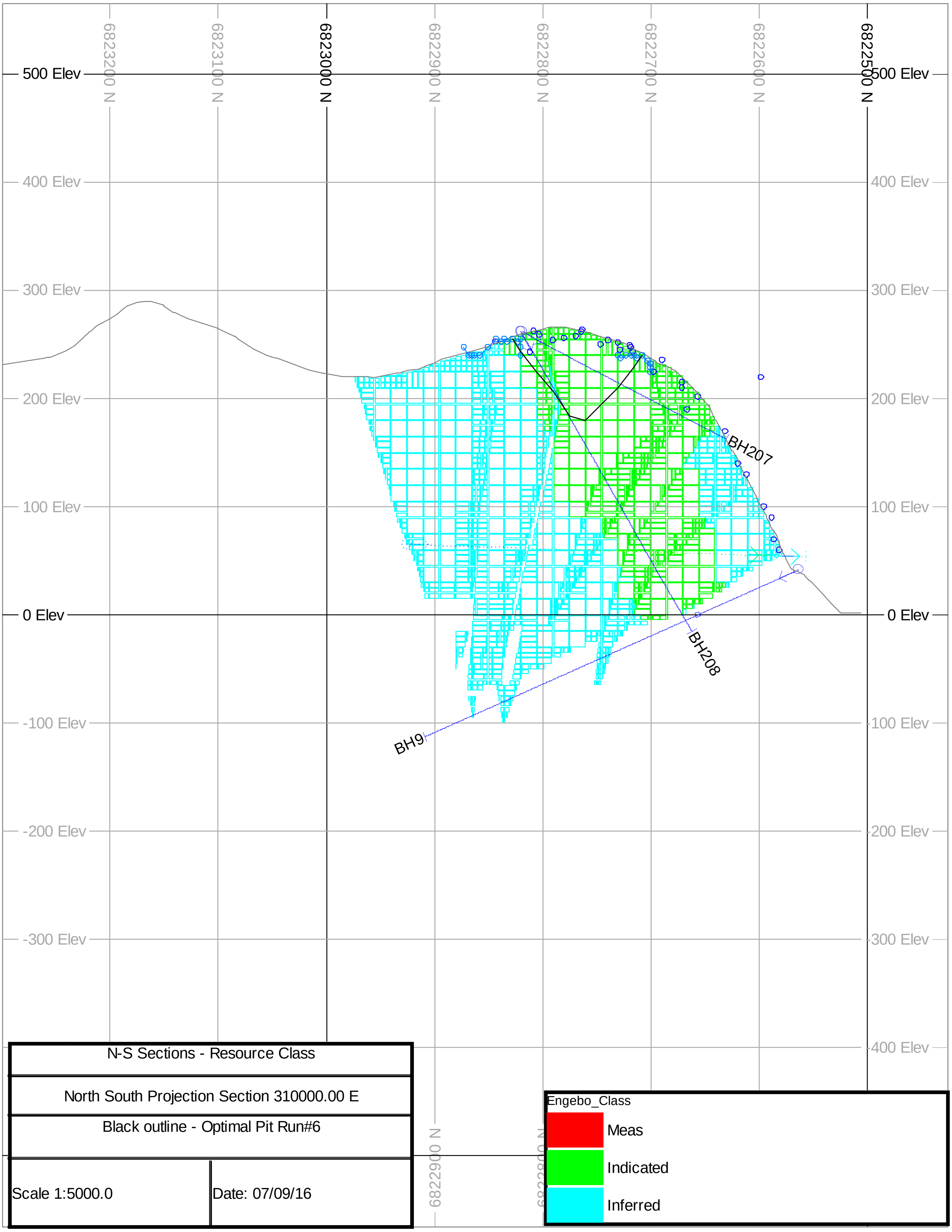
Inferred



N-S Sections - Resource Class	
North South Projection Section 309950.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 07/09/16

Engebo_Class

- Meas
- Indicated
- Inferred



N-S Sections - Resource Class

North South Projection Section 310000.00 E

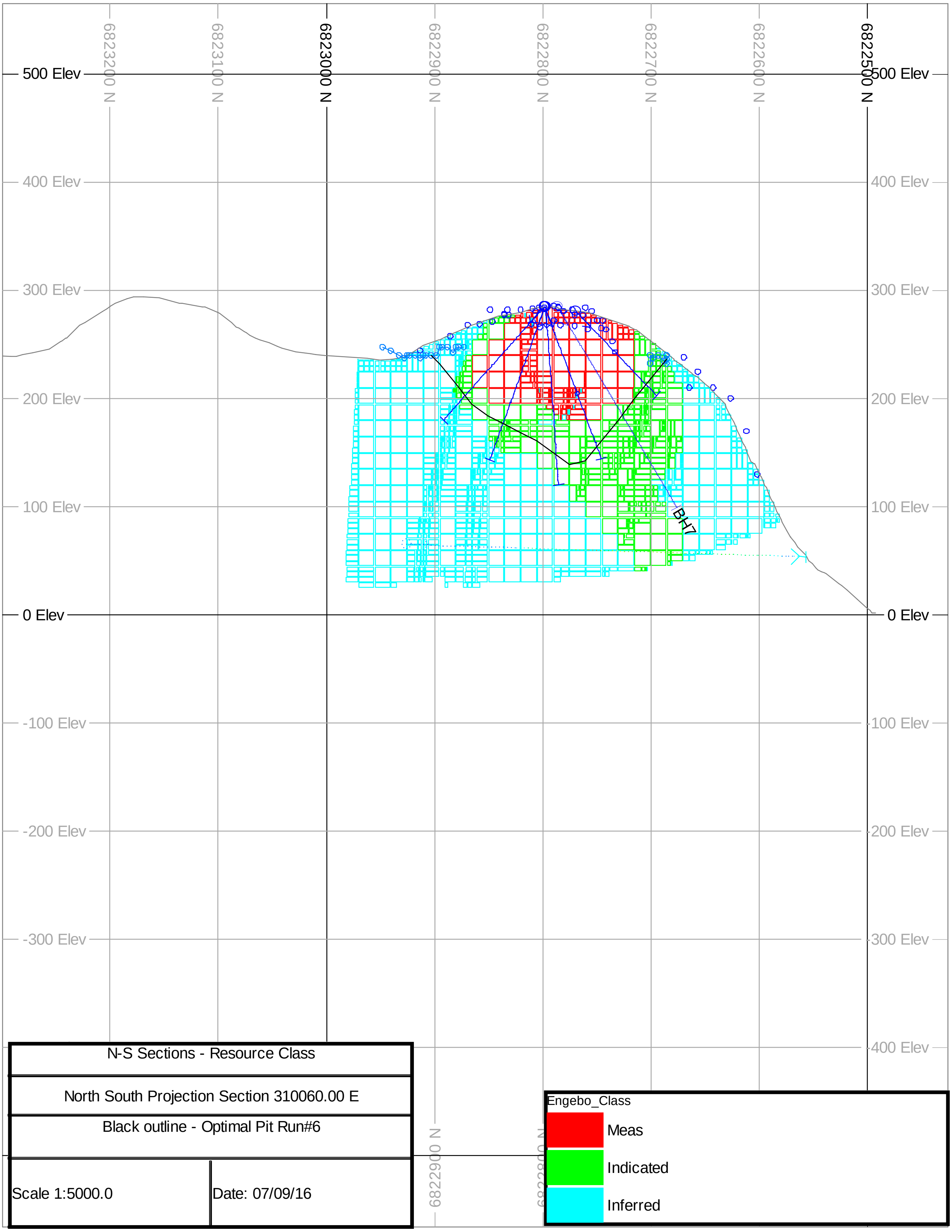
Black outline - Optimal Pit Run#6

Scale 1:5000.0

Date: 07/09/16

Engebo_Class

- Meas
- Indicated
- Inferred



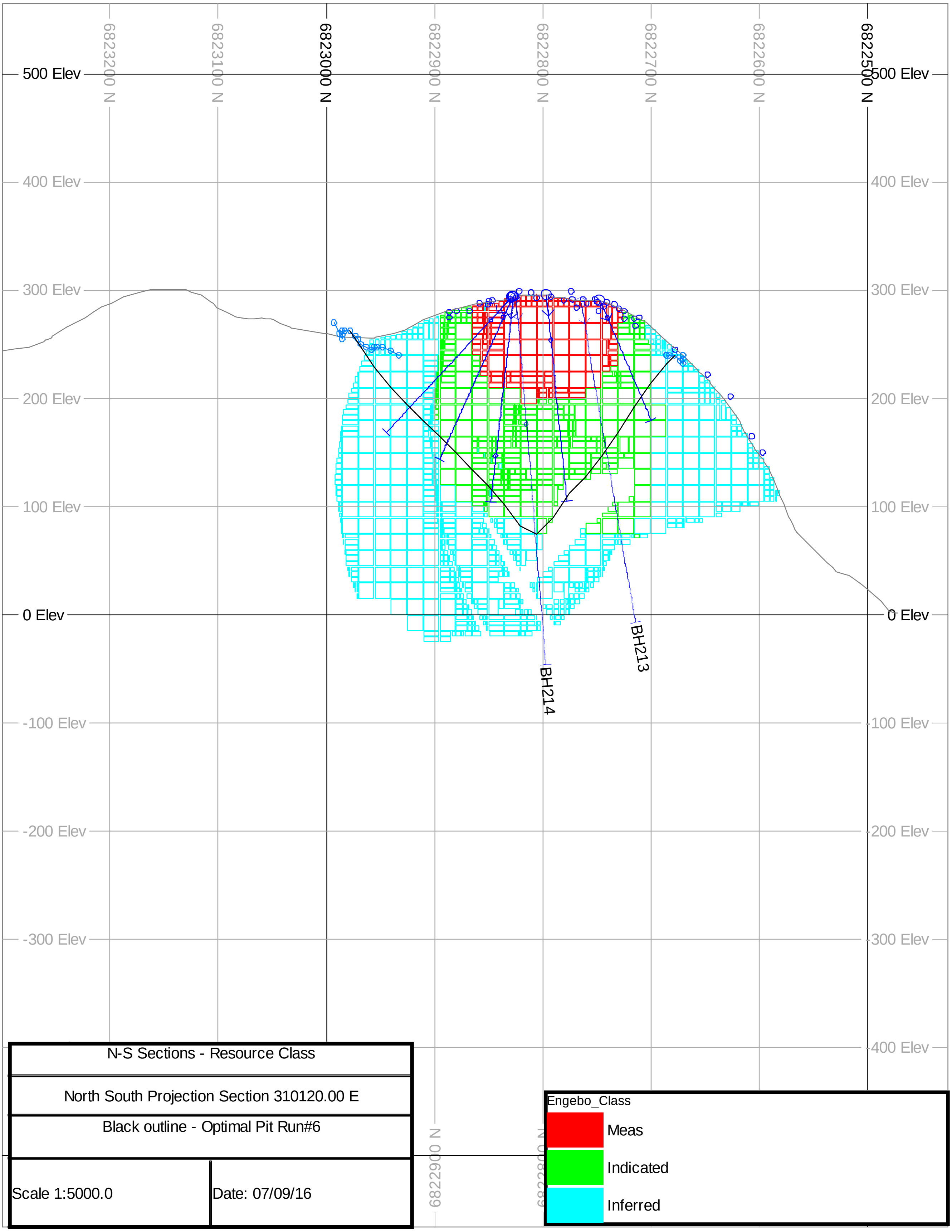
N-S Sections - Resource Class

North South Projection Section 310060.00 E

Black outline - Optimal Pit Run#6

Scale 1:5000.0

Date: 07/09/16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6822900 N
6822800 N
6822700 N
6822600 N
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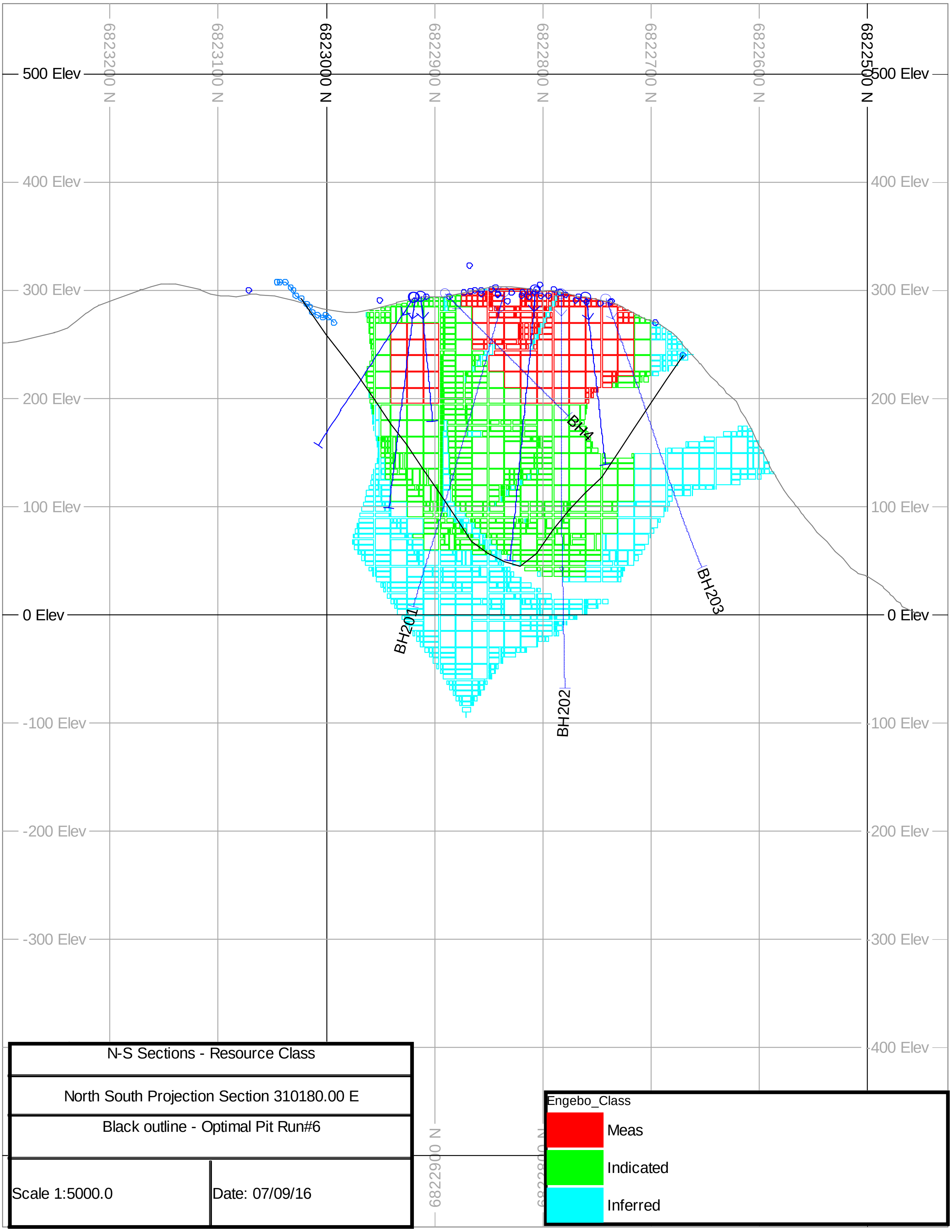
400 Elev
300 Elev
200 Elev
100 Elev
0 Elev
-100 Elev
-200 Elev
-300 Elev
-400 Elev
BH213
BH214
N-S Sections - Resource Class
North South Projection Section 310120.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 07/09/16
Engebo_Class
Meas
Indicated
Inferred



N-S Sections - Resource Class

North South Projection Section 310180.00 E

Black outline - Optimal Pit Run#6

Scale 1:5000.0

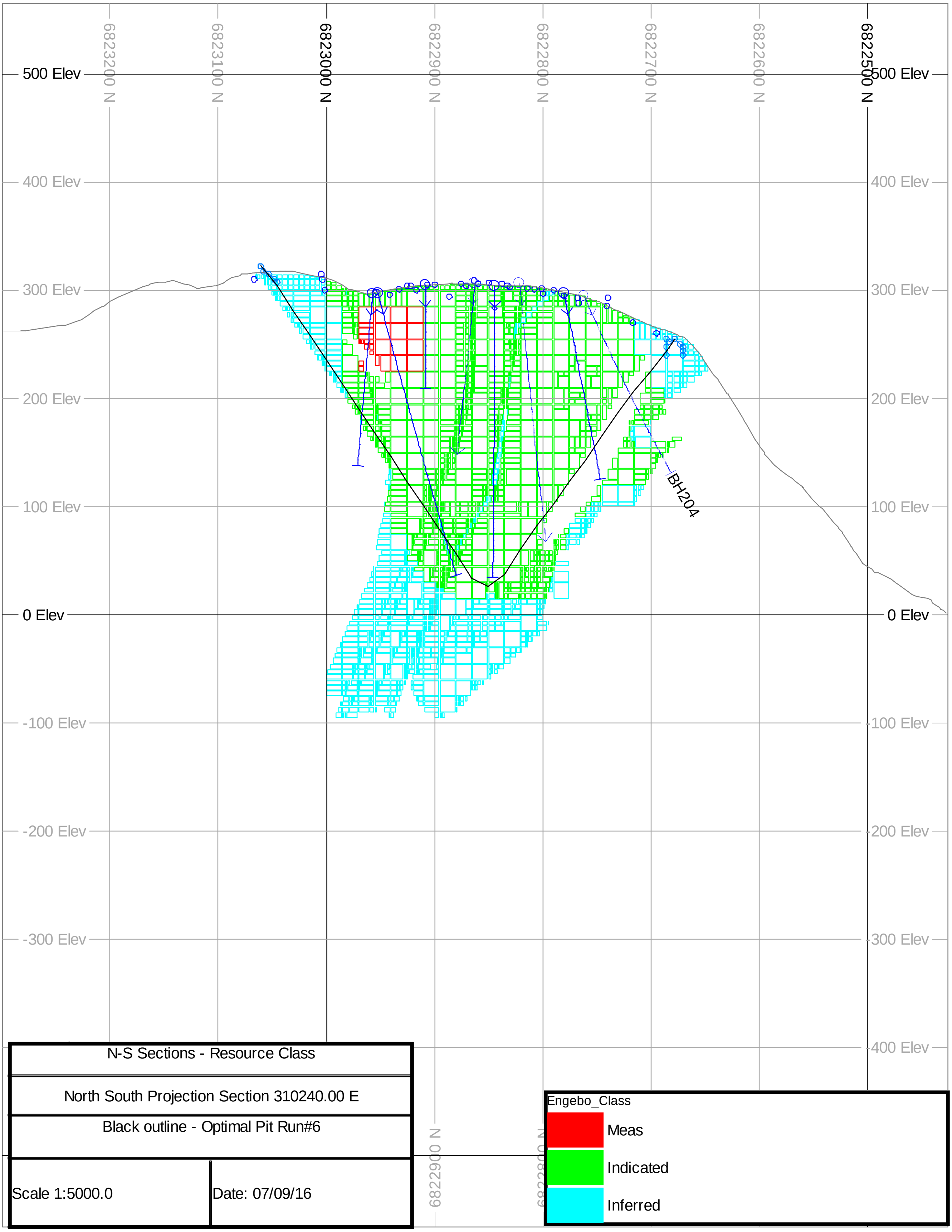
Date: 07/09/16

Engebo_Class

Meas

Indicated

Inferred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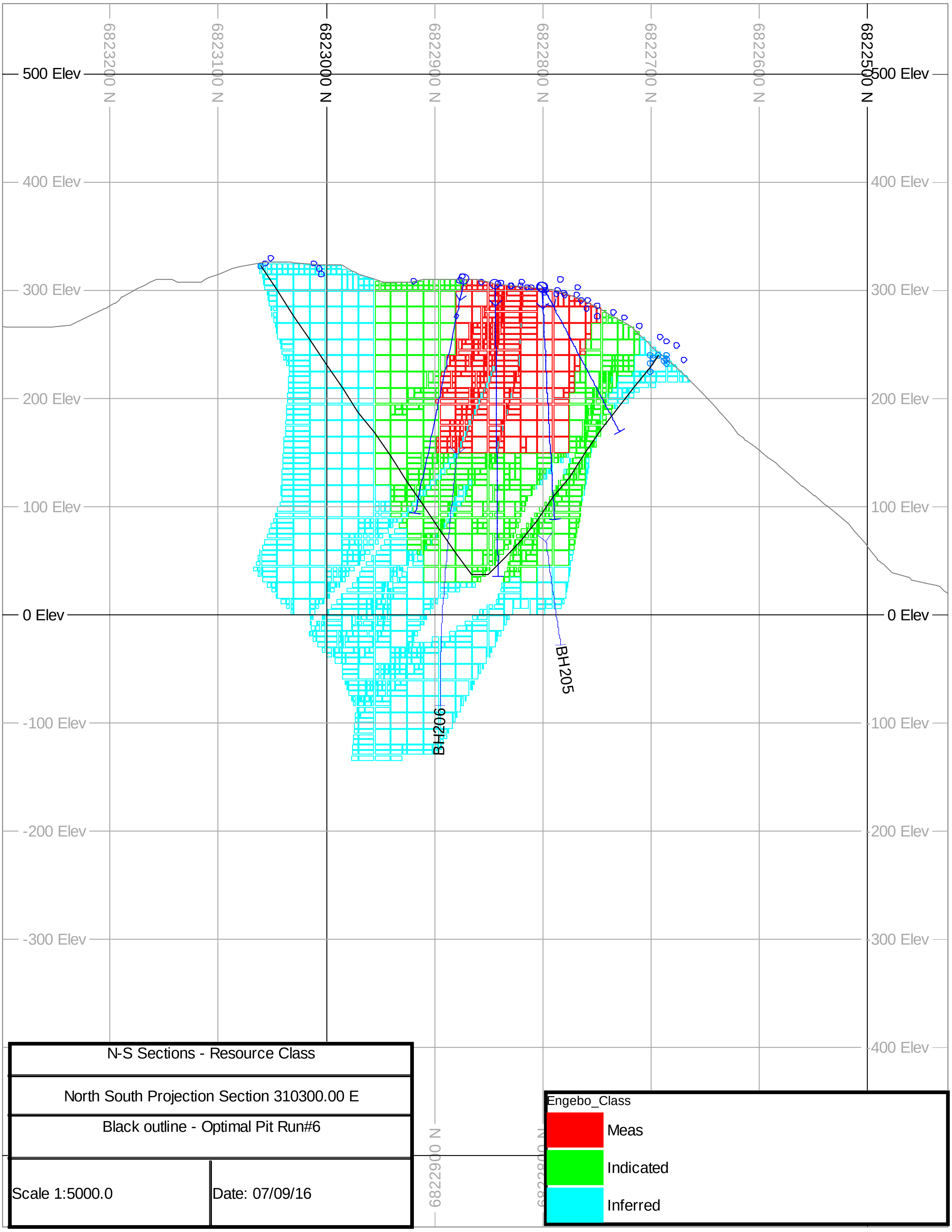
400 Elev
300 Elev
200 Elev
100 Elev
0 Elev
-100 Elev
-200 Elev
-300 Elev
-400 Elev
6823200 N
6823100 N
6823000 N
6822900 N
6822800 N
6822700 N
6822600 N
6822500 N
BH204
N-S Sections - Resource Class
North South Projection Section 310240.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 07/09/16
Engebo_Class
Meas
Indicated
Inferred



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6823000 N
6822900 N
6822800 N
6822700 N
6822600 N
6822500 N
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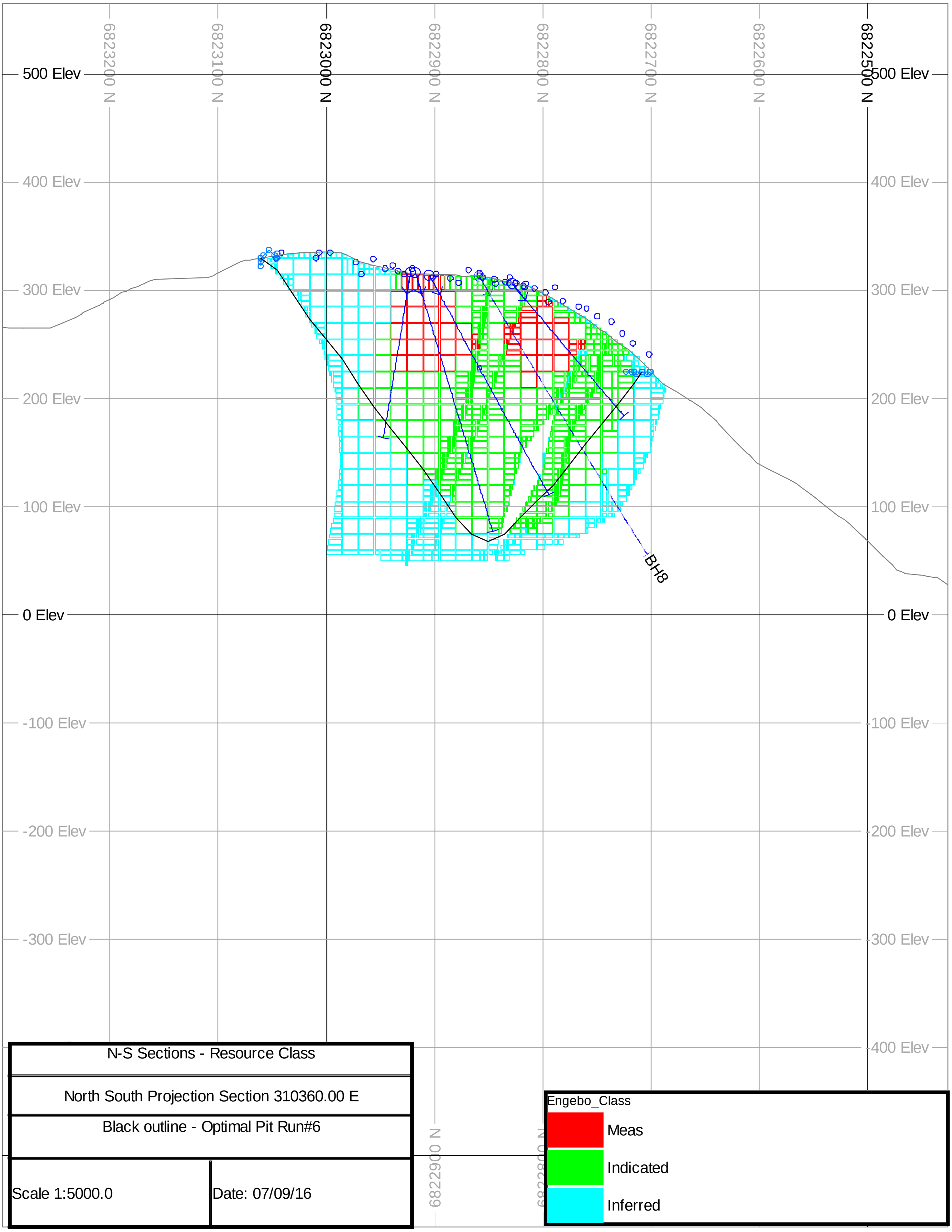
400 Elev
300 Elev
200 Elev
100 Elev
0 Elev
-100 Elev
-200 Elev
-300 Elev
-400 Elev
BH206
BH205
N-S Sections - Resource Class
North South Projection Section 310300.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 07/09/16
Engebo_Class
Meas
Indicated
Inferred



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6822900 N
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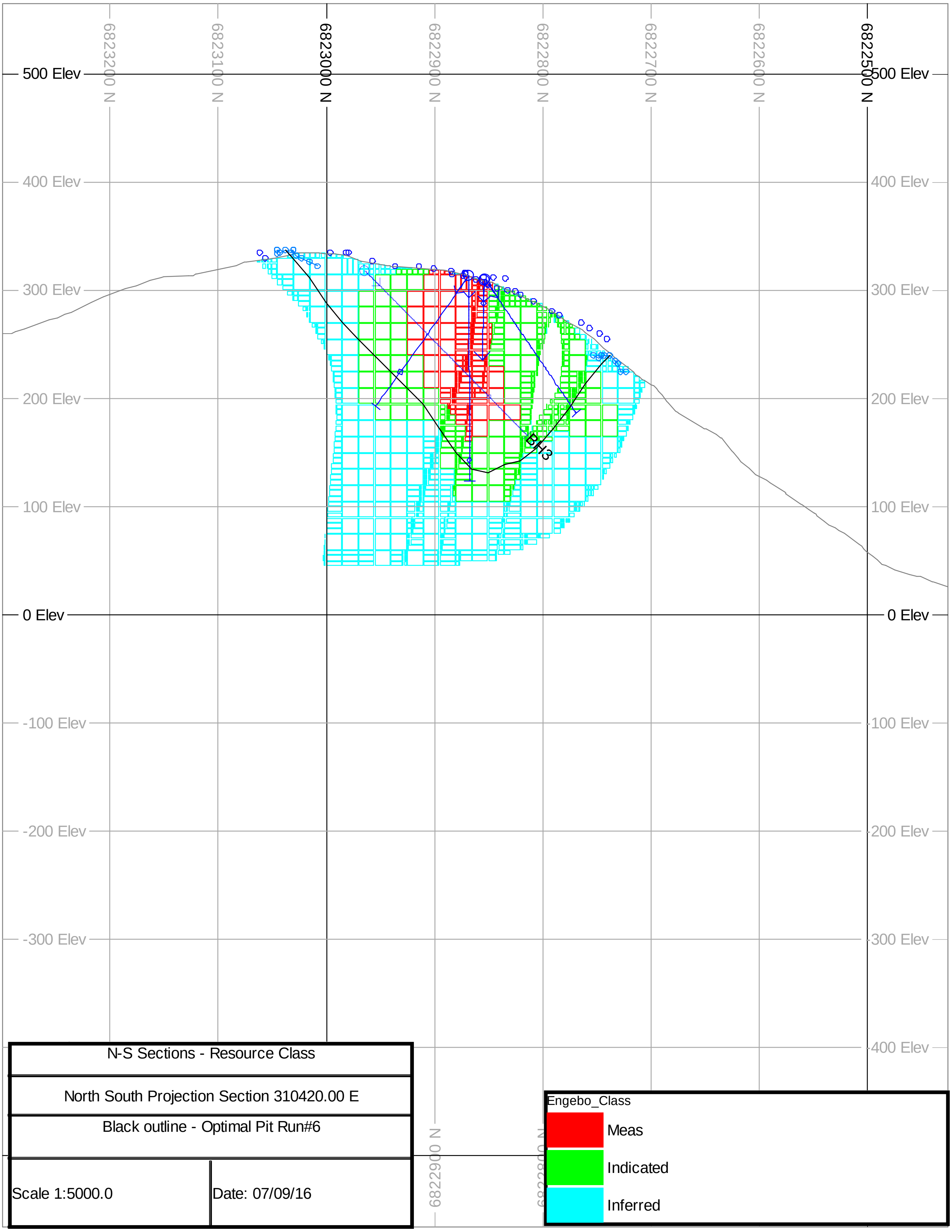
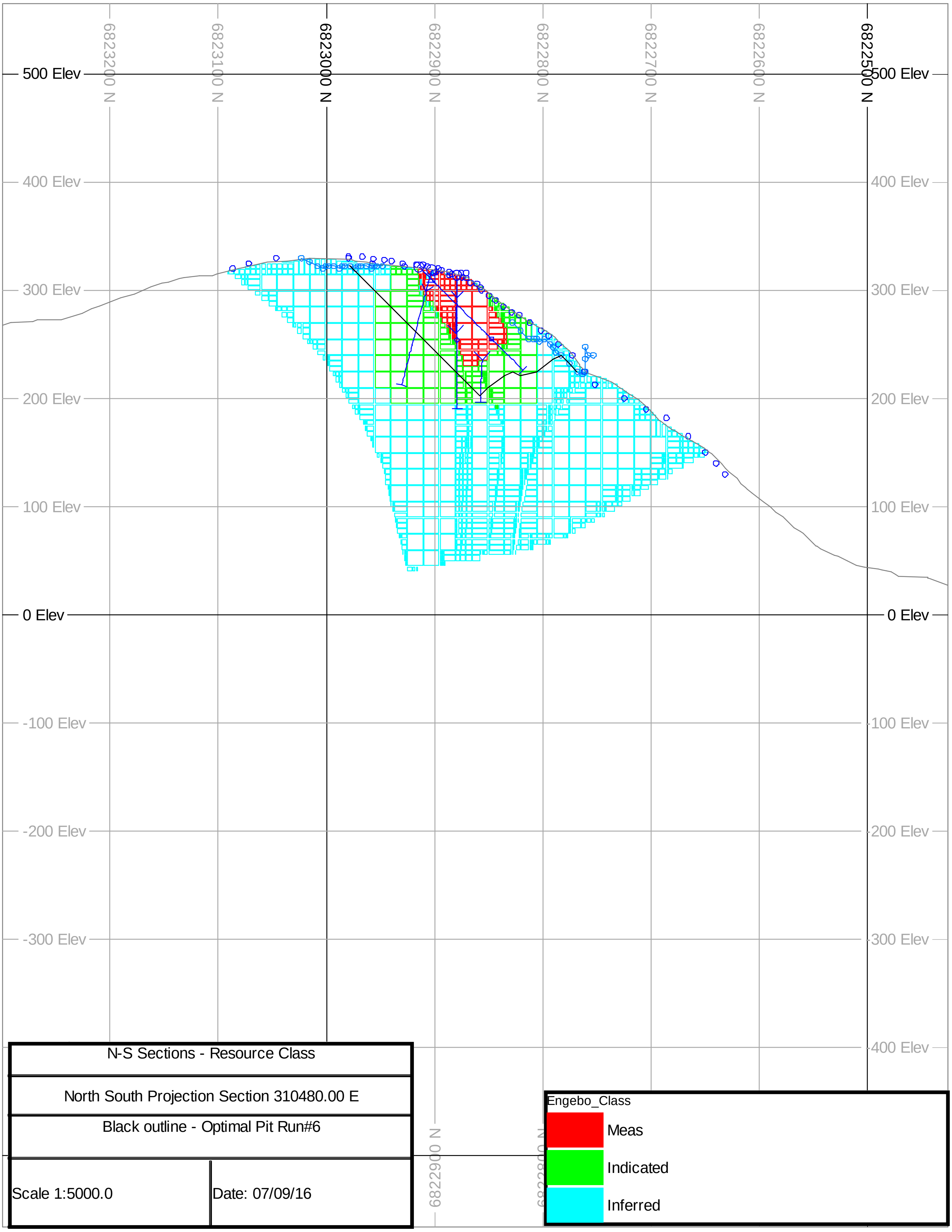
6822700 N
6822600 N
6822500 N
500 Elev
400 Elev
300 Elev
200 Elev
100 Elev
0 Elev
-100 Elev
-200 Elev
-300 Elev
-400 Elev
BH8
N-S Sections - Resource Class
North South Projection Section 310360.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 07/09/16
Engebo_Class
Meas
Indicated
Inferred



N-S Sections - Resource Class	
North South Projection Section 310420.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 07/09/16

Engebo_Class

- Meas
- Indicated
- Inferred

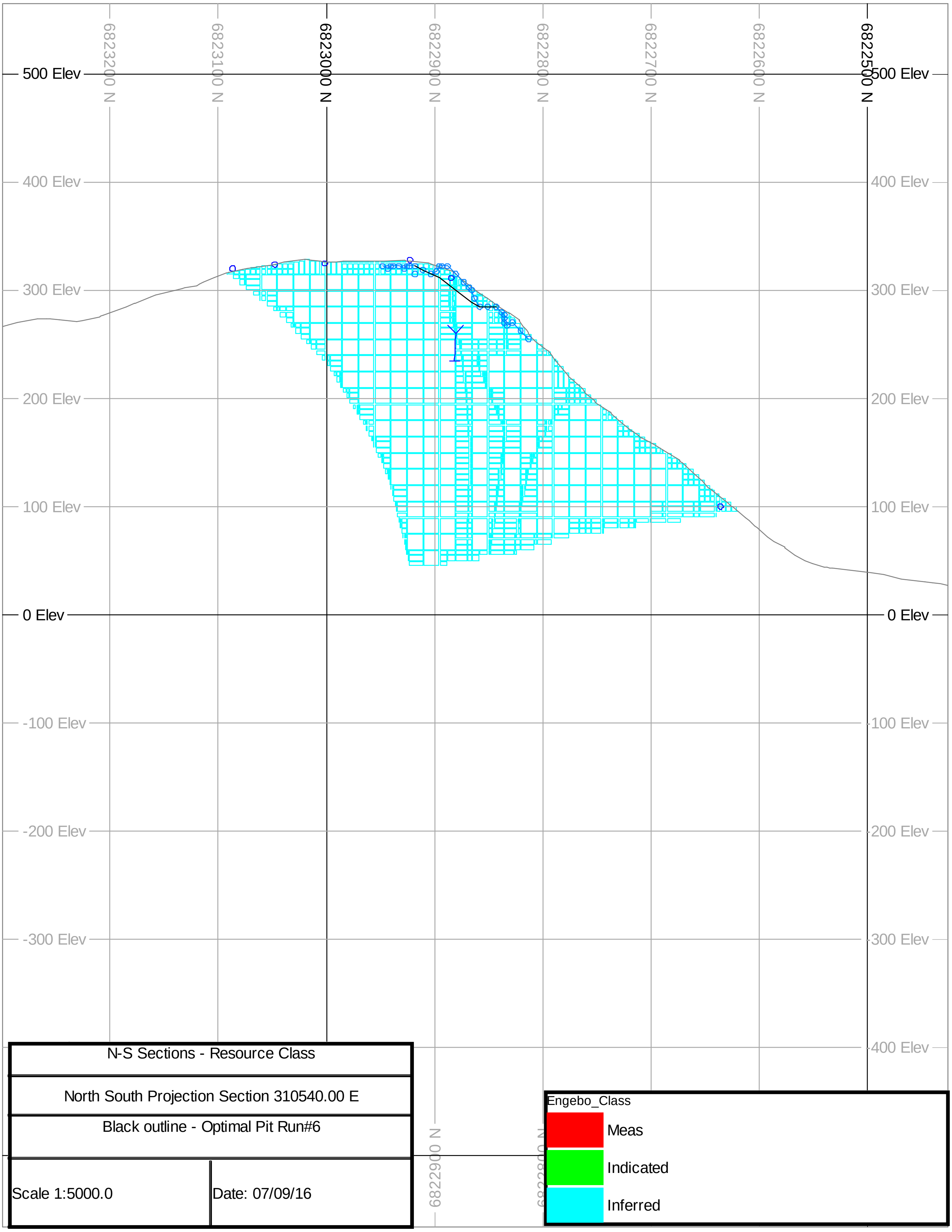


N-S Sections - Resource Class

North South Projection Section 310480.00 E

Black outline - Optimal Pit Run#6

Scale 1:5000.0	Date: 07/09/16



N-S Sections - Resource Class

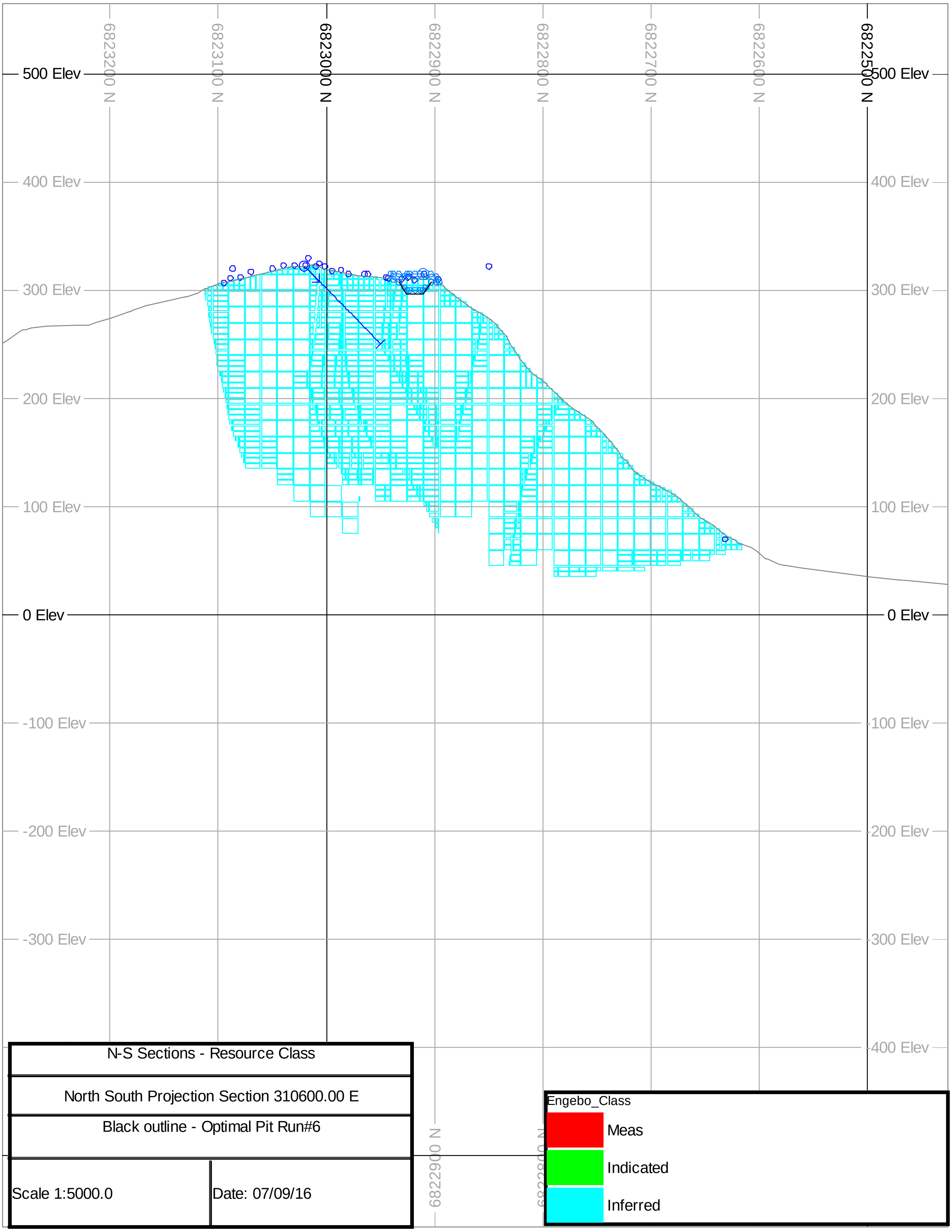
North South Projection Section 310540.00 E

Black outline - Optimal Pit Run#6

Scale 1:5000.0	Date: 07/09/16

Engebo_Class

- Meas
- Indicated
- Inferred



N-S Sections - Resource Class

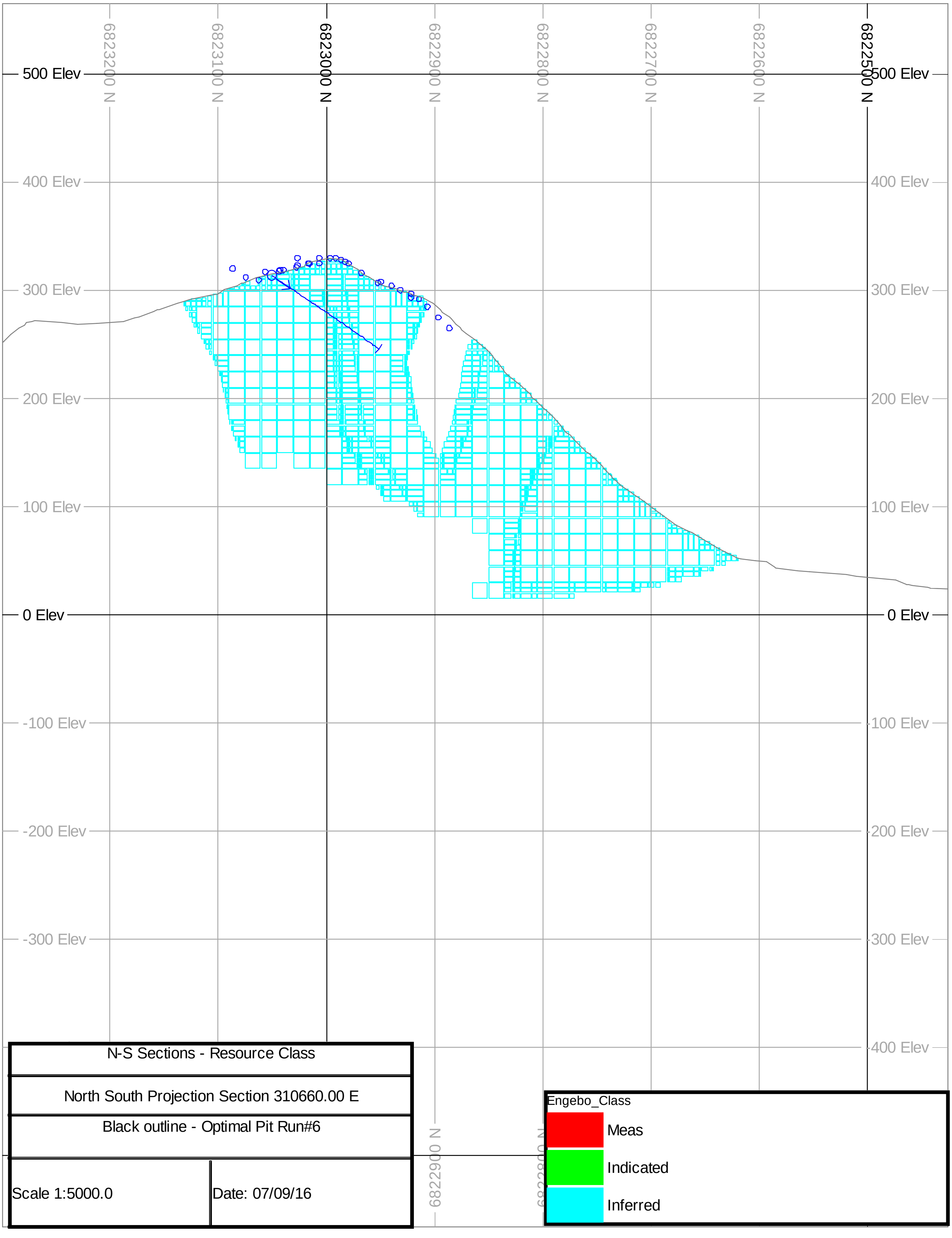
North South Projection Section 310600.00 E

Black outline - Optimal Pit Run#6

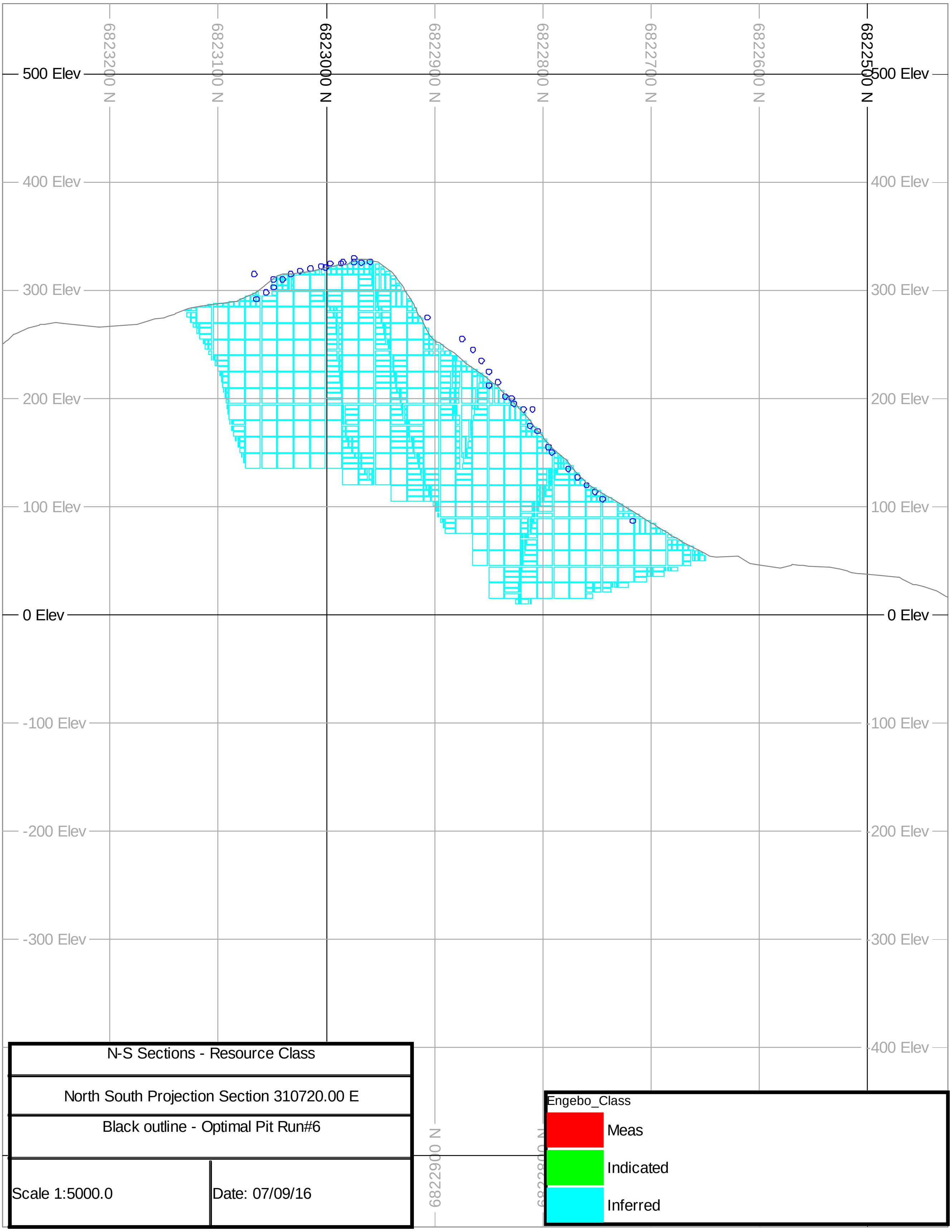
Scale 1:5000.0	Date: 07/09/16

Engebo_Class

- Meas
- Indicated
- Inferred



N-S Sections - Resource Class	
North South Projection Section 310660.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 07/09/16



N-S Sections - Resource Class	
North South Projection Section 310720.00 E	
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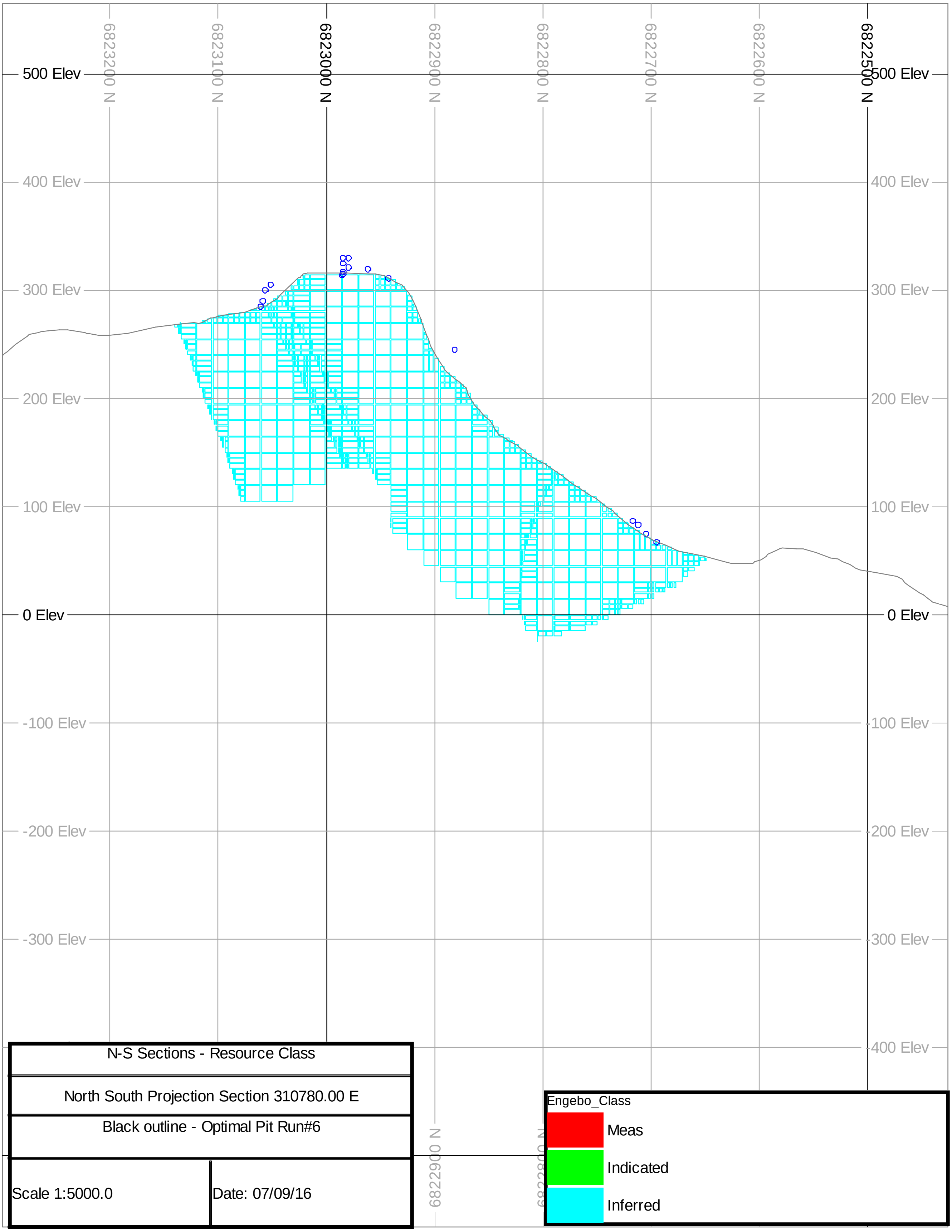
Scale 1:5000.0	Date: 07/09/16

Engebo_Class

- Meas
- Indicated
- Inferred



N-S Sections - Resource Class	
North South Projection Section 310780.00 E	
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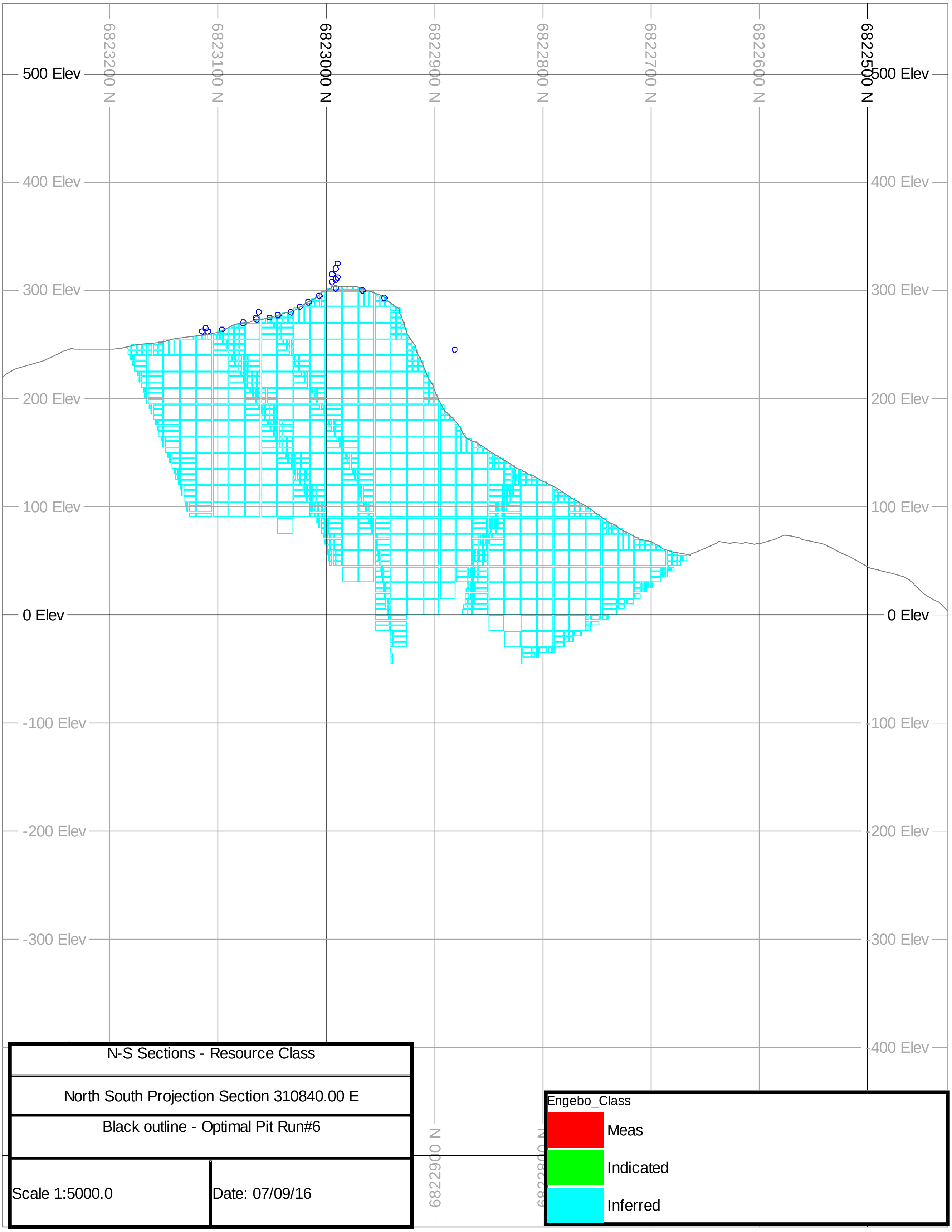
Scale 1:5000.0	Date: 07/09/16

Engebo_Class

- Meas
- Indicated
- Inferred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300 Elev
200 Elev
100 Elev
0 Elev
-100 Elev
-200 Elev
-300 Elev
-400 Elev
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6823000 N
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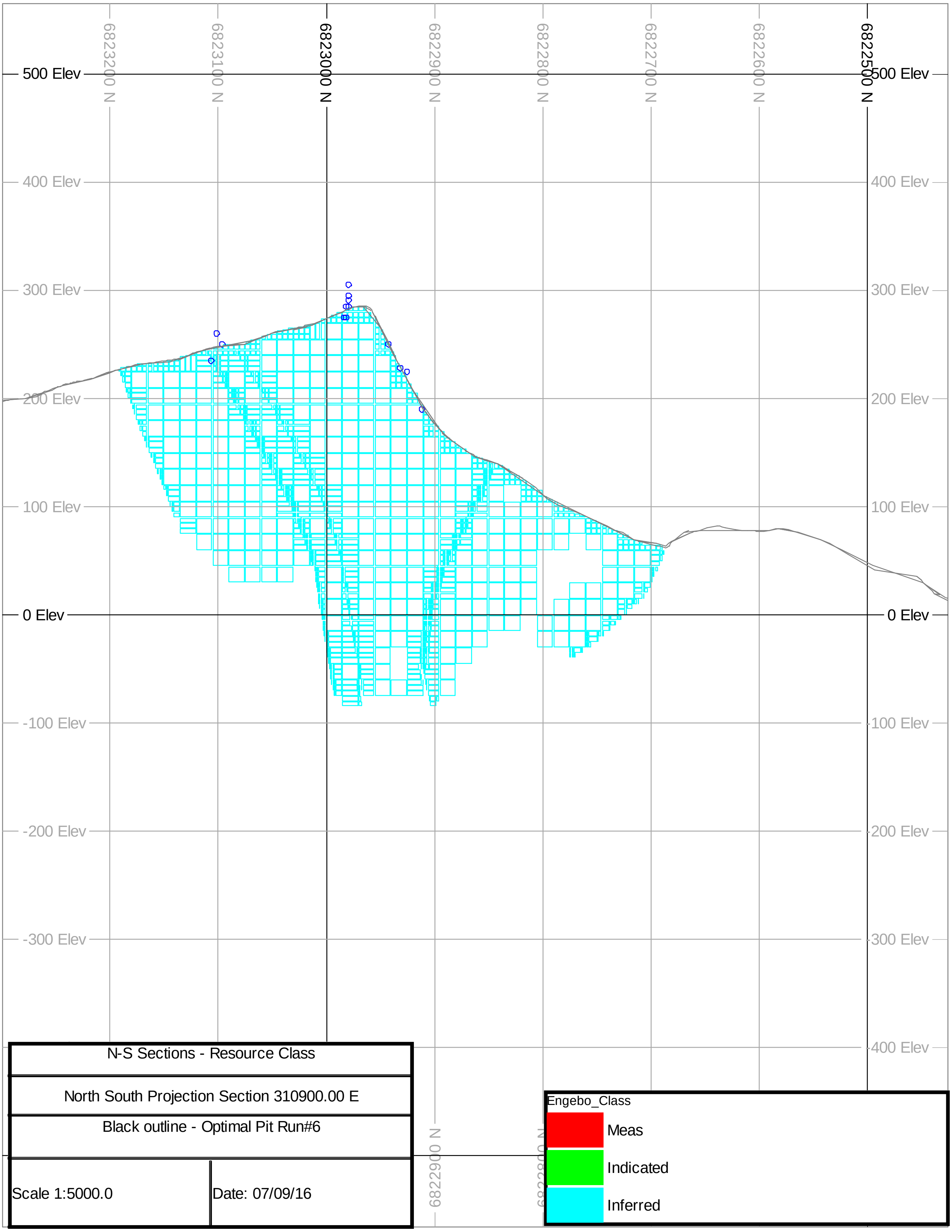
6822700 N
6822600 N
6822500 N
N-S Sections - Resource Class
North South Projection Section 310840.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 07/09/16
Engebo_Class
Meas
Indicated
Inferred



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6822500 N
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400 Elev
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200 Elev
100 Elev
0 Elev
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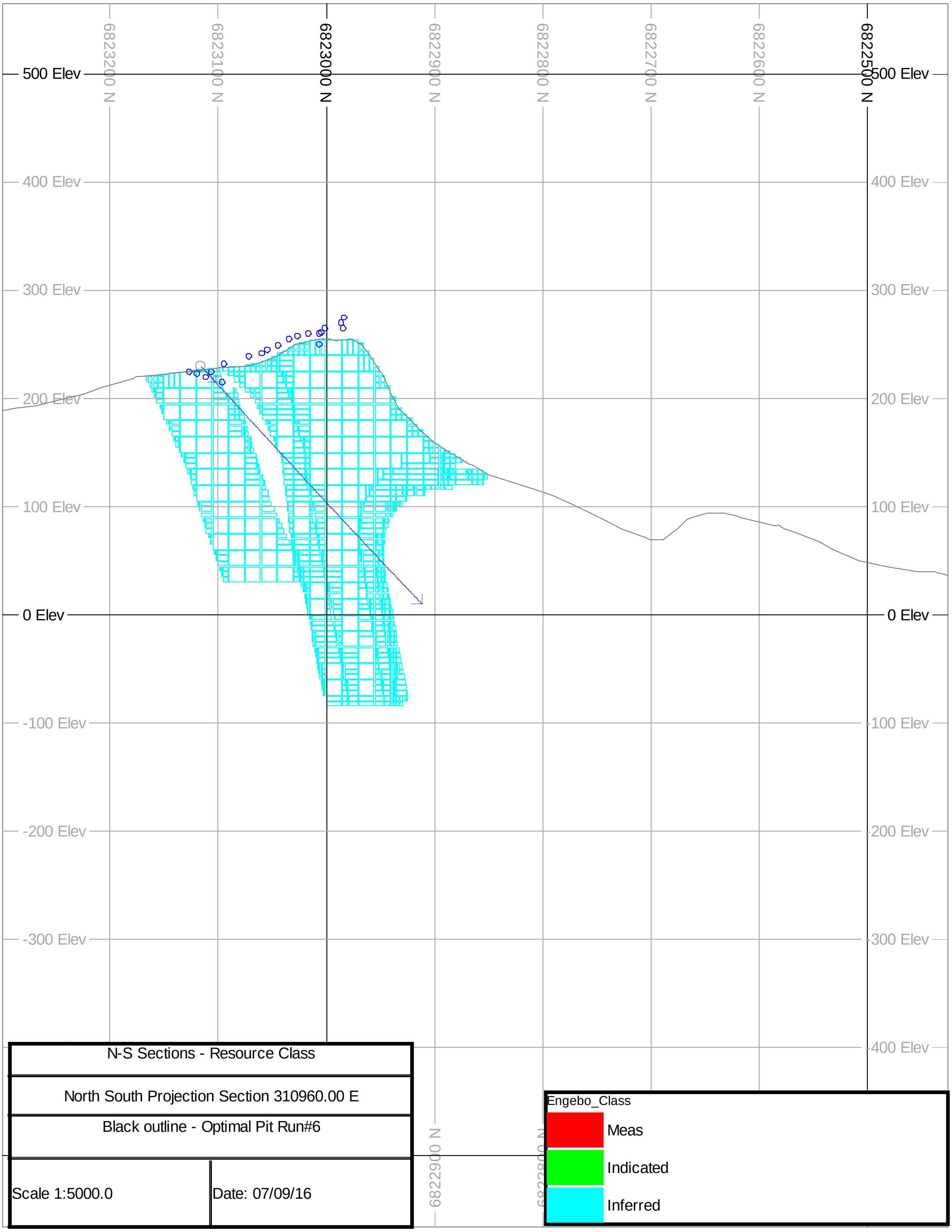
-200 Elev
-300 Elev
-400 Elev
N-S Sections - Resource Class
North South Projection Section 310900.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 07/09/16
Engebo_Class
Meas
Indicated
Inferred



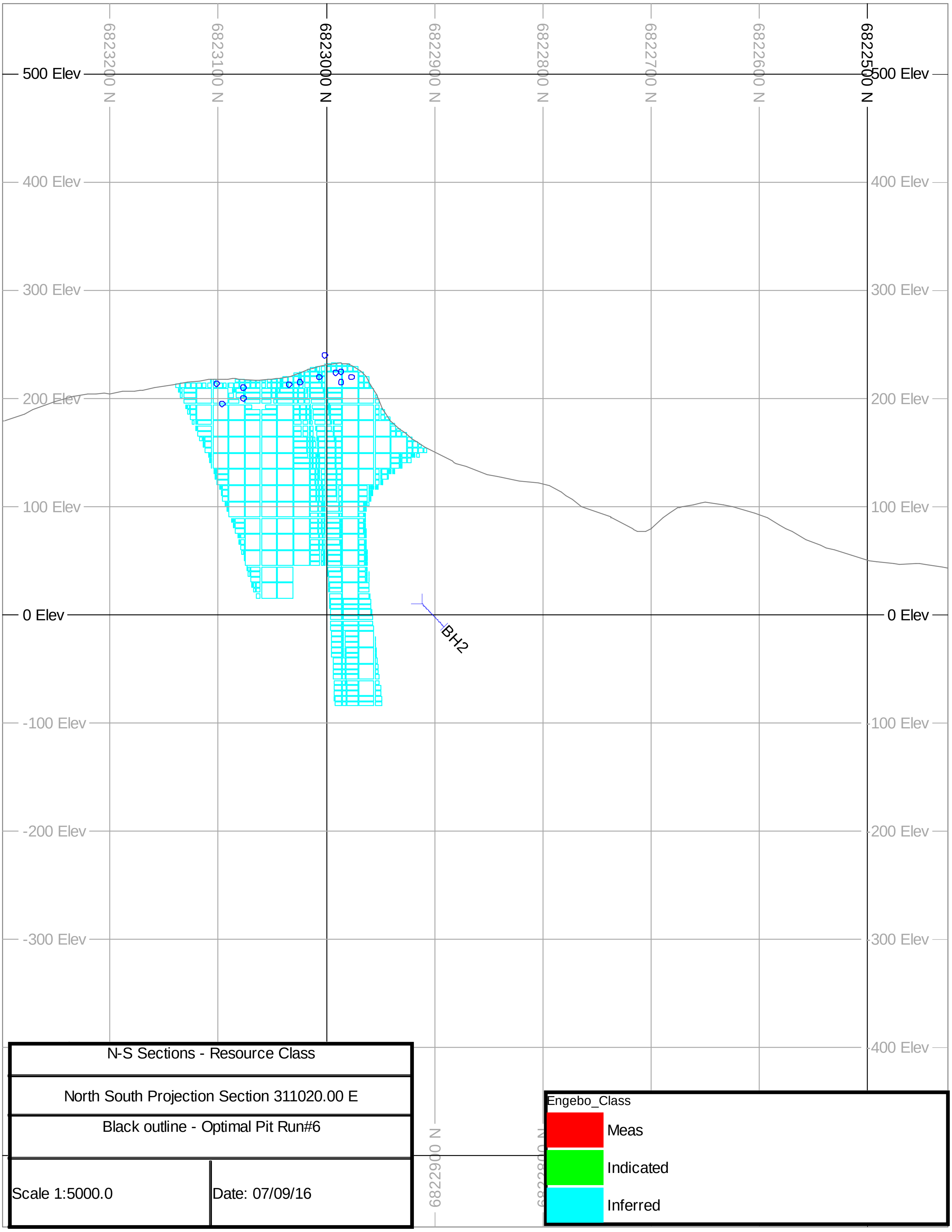
N-S Sections - Resource Class

North South Projection Section 310960.00 E

Black outline - Optimal Pit Run#6

Scale 1:5000.0

Date: 07/09/16



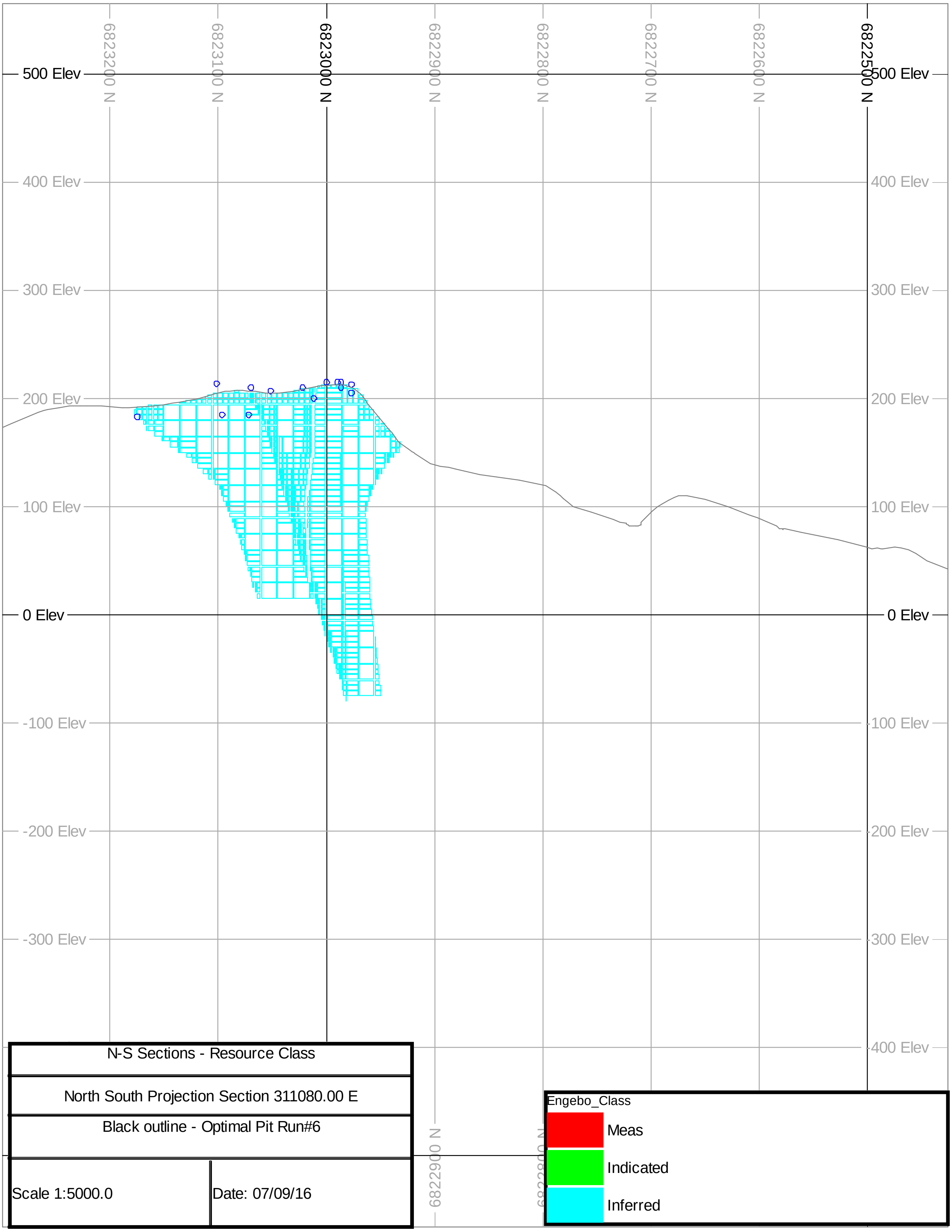
N-S Sections - Resource Class

North South Projection Section 311020.00 E

Black outline - Optimal Pit Run#6

Scale 1:5000.0

Date: 07/09/16



N-S Sections - Resource Class

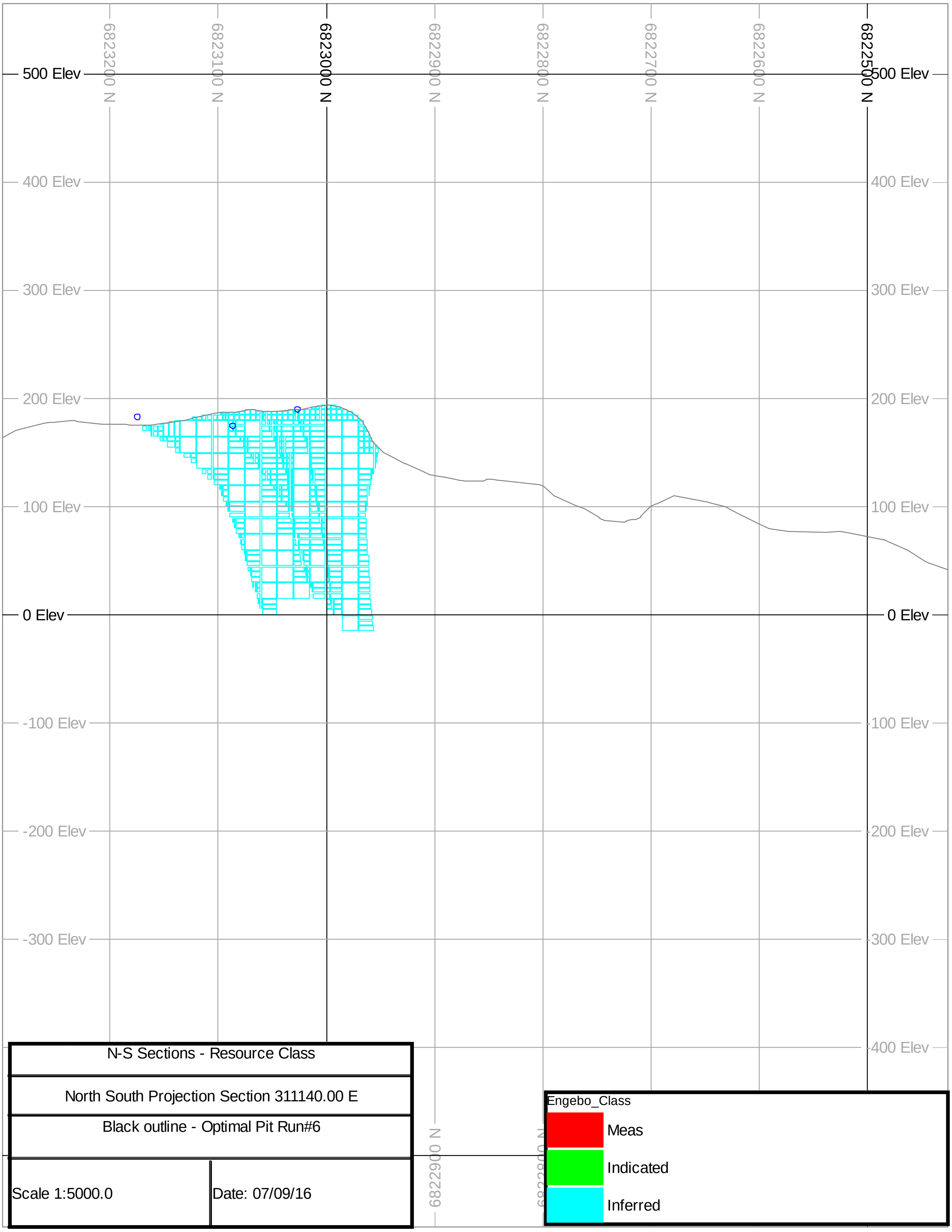
North South Projection Section 311080.00 E

Black outline - Optimal Pit Run#6

Scale 1:5000.0	Date: 07/09/16

Engebo_Class

- Meas
- Indicated
- Inferred



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6822600 N
6822500 N
500 Elev
400 Elev
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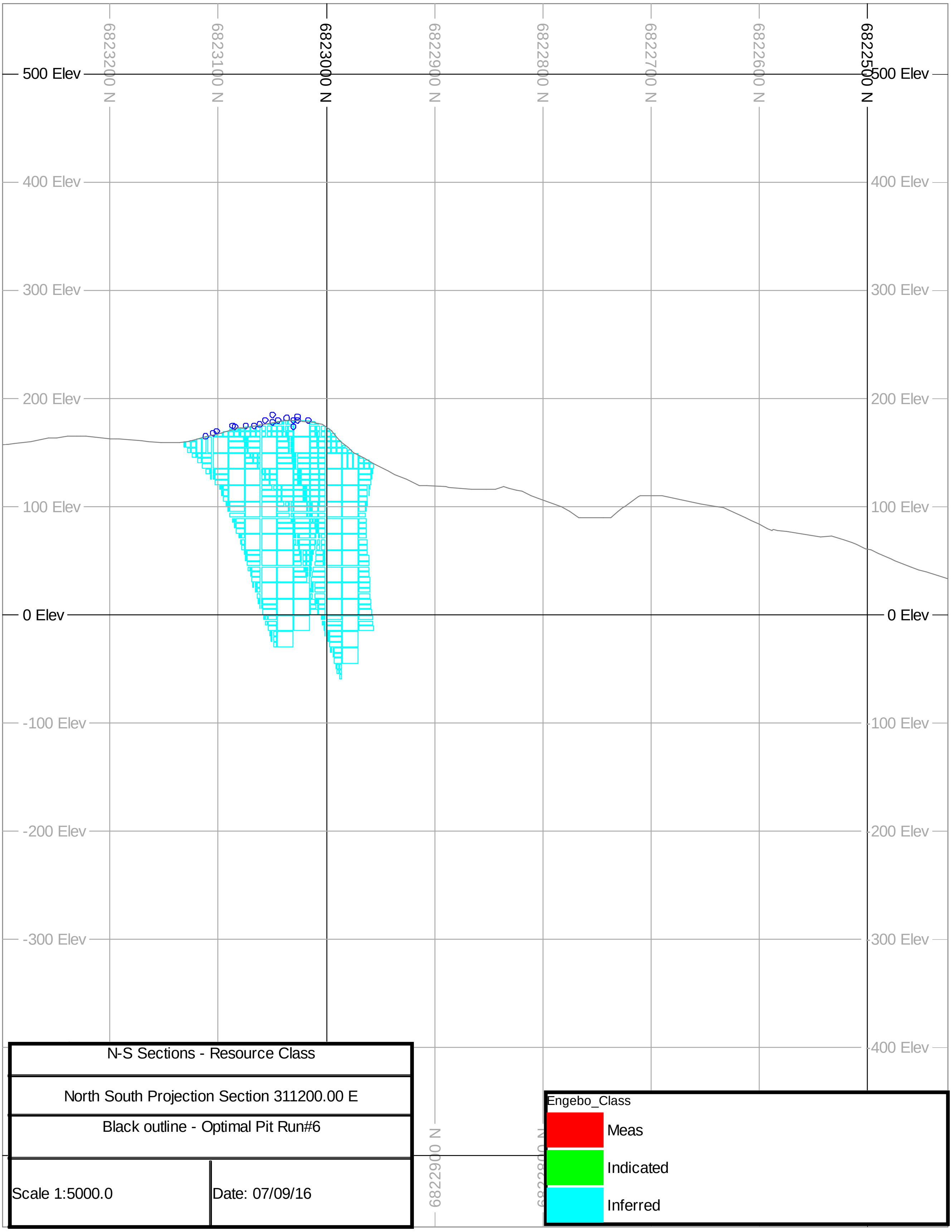
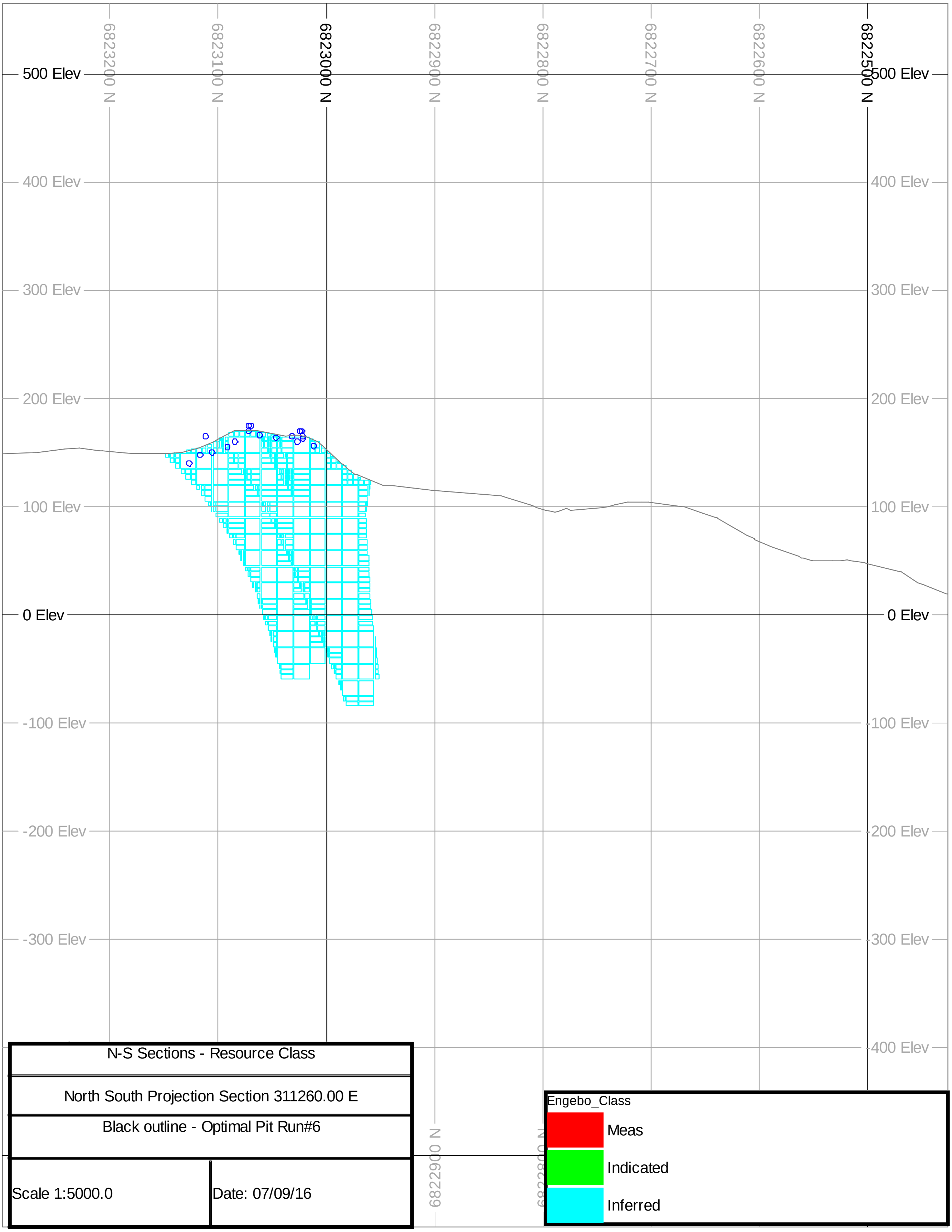
200 Elev
100 Elev
0 Elev
-100 Elev
-200 Elev
-300 Elev
-400 Elev
N-S Sections - Resource Class
North South Projection Section 311140.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 07/09/16
Engebo_Class
Meas
Indicated
Inferred



N-S Sections - Resource Class	
North South Projection Section 311200.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 07/09/16

Engebo_Class

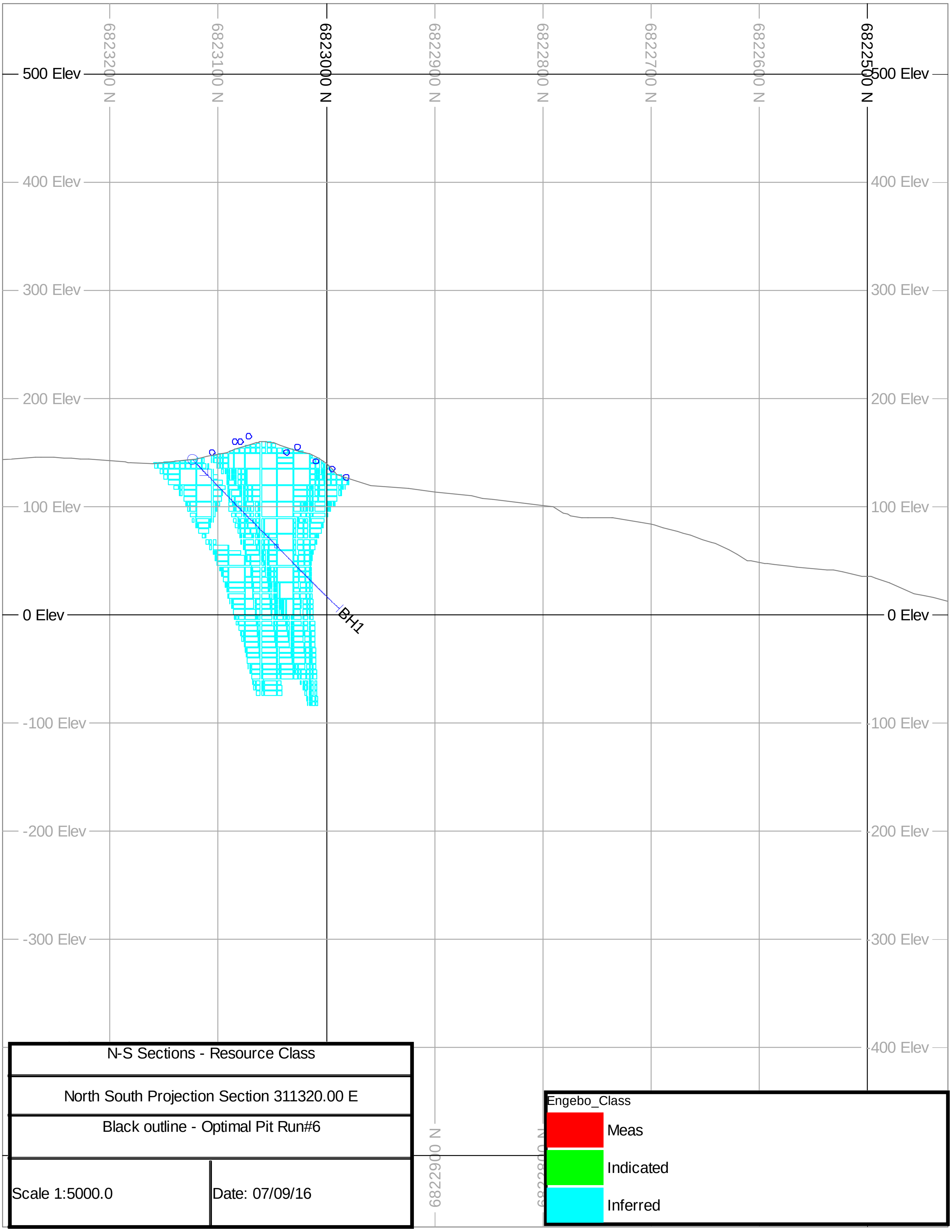
- Meas
- Indicated
- Inferred



N-S Sections - Resource Class	
North South Projection Section 311260.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 07/09/16

Engebo_Class

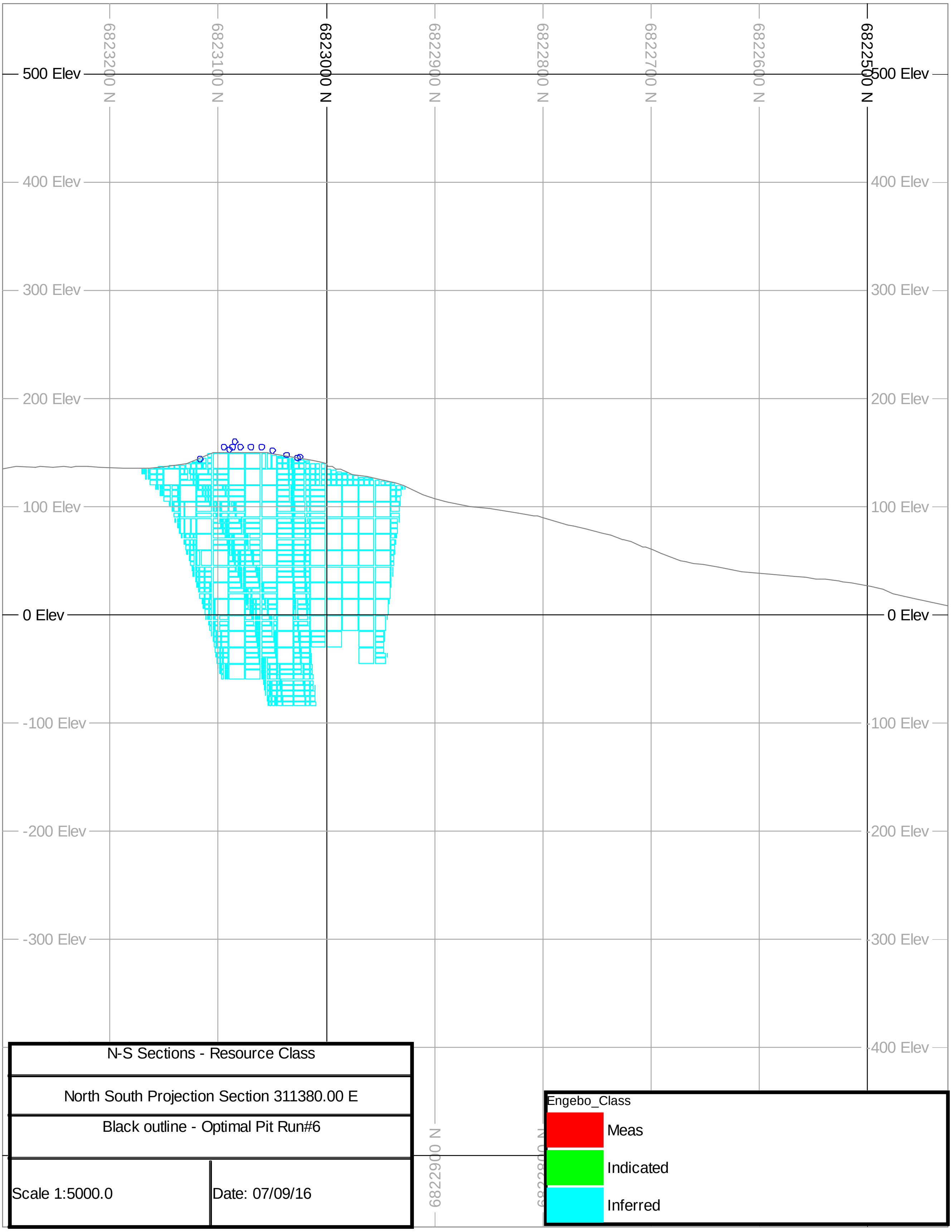
- Meas
- Indicated
- Inferred



N-S Sections - Resource Class	
North South Projection Section 311320.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 07/09/16

Engebo_Class

- Meas
- Indicated
- Inferred



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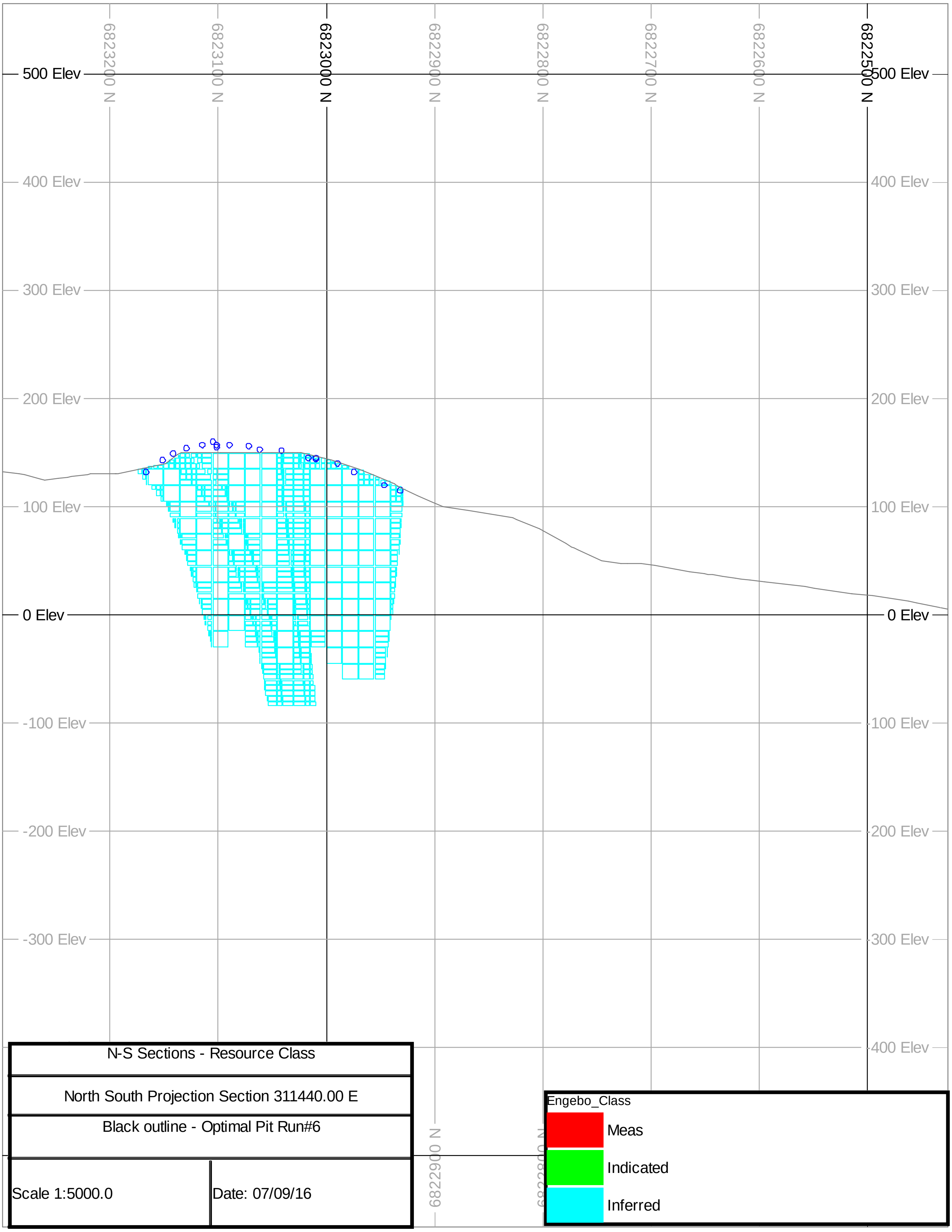
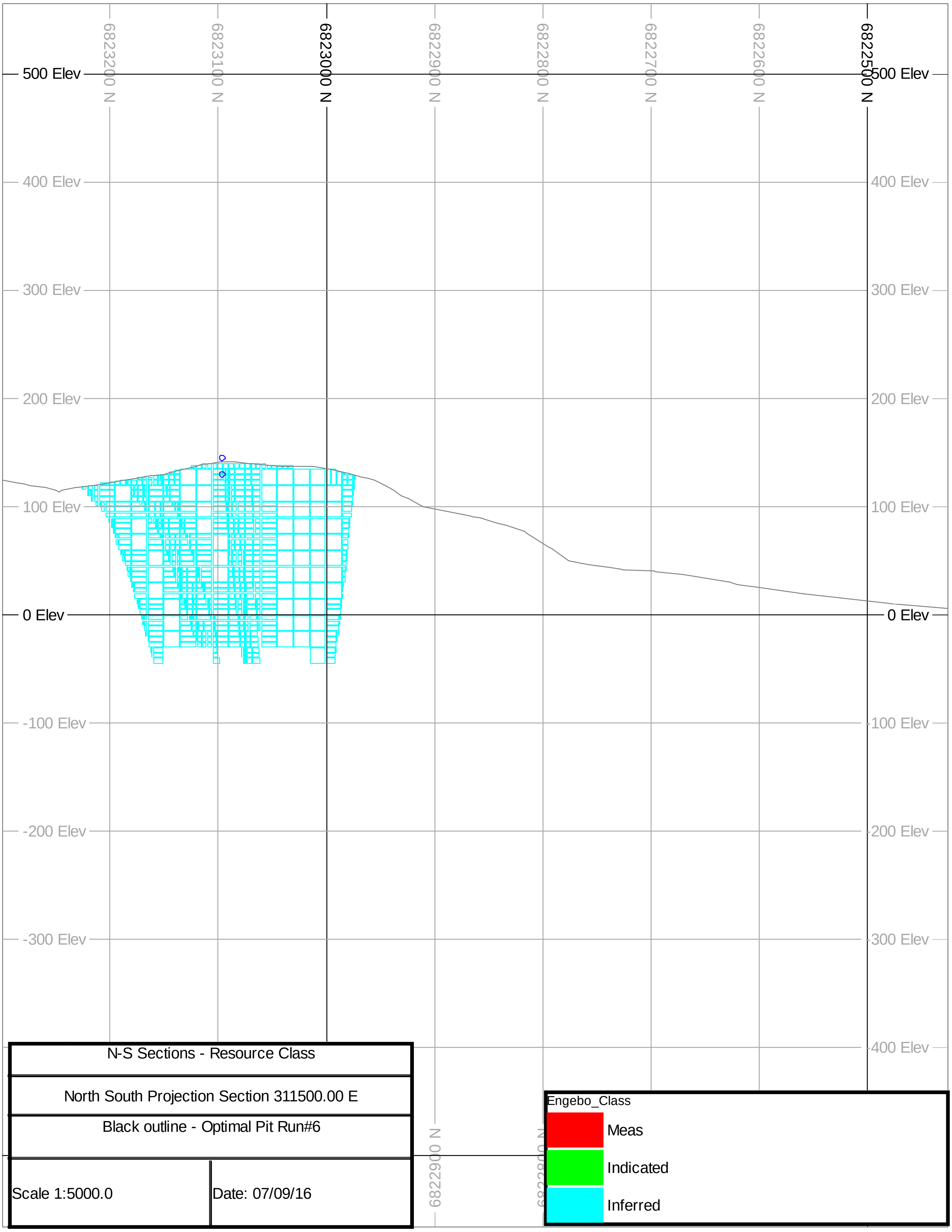
North South Projection Section 311380.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 07/09/16



N-S Sections - Resource Class	
North South Projection Section 311440.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 07/09/16

Engebo_Class

- Meas
- Indicated
- Inferred



N-S Sections - Resource Class

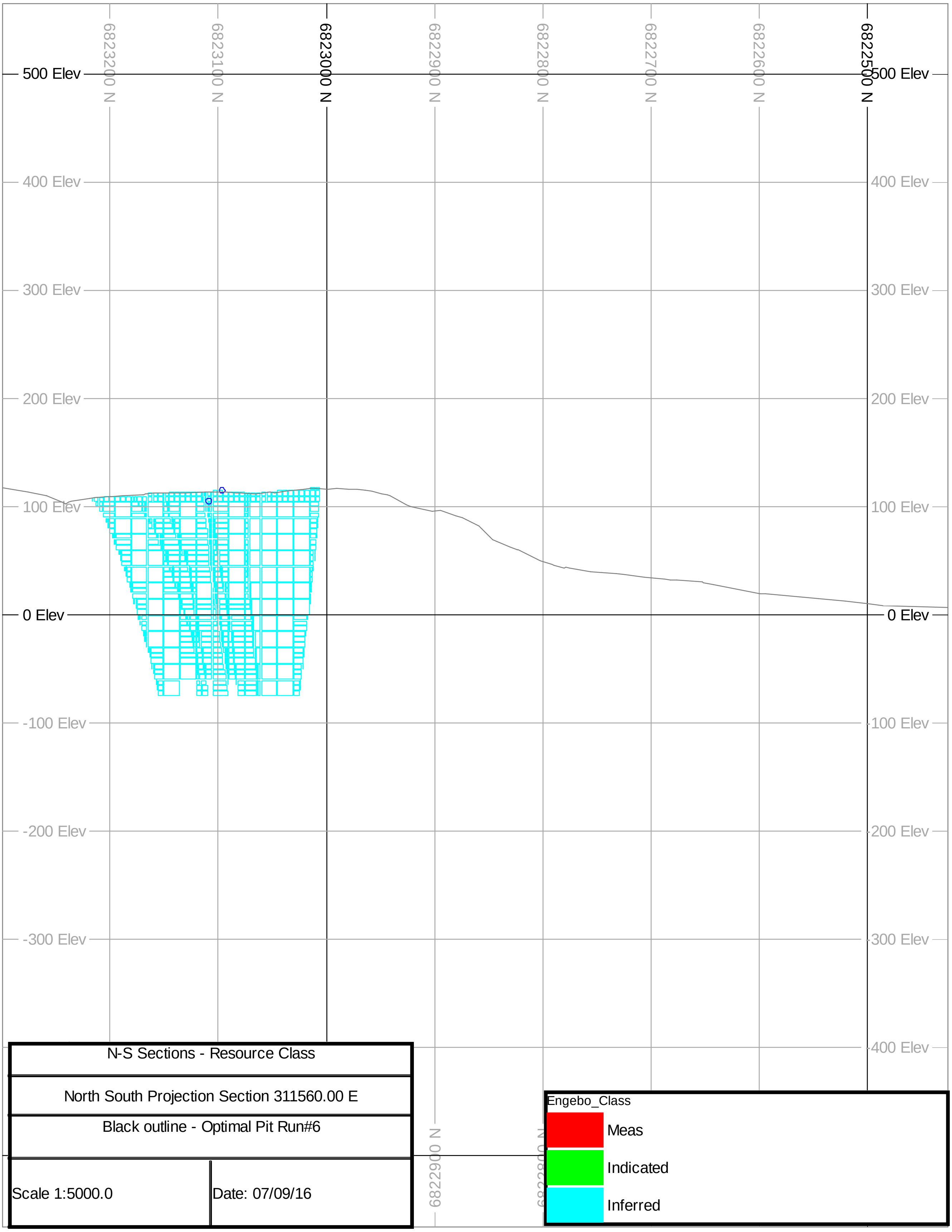
North South Projection Section 311500.00 E

Black outline - Optimal Pit Run#6

Scale 1:5000.0	Date: 07/09/16

Engebo_Class

- Meas
- Indicated
- Inferred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6822900 N
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6822600 N
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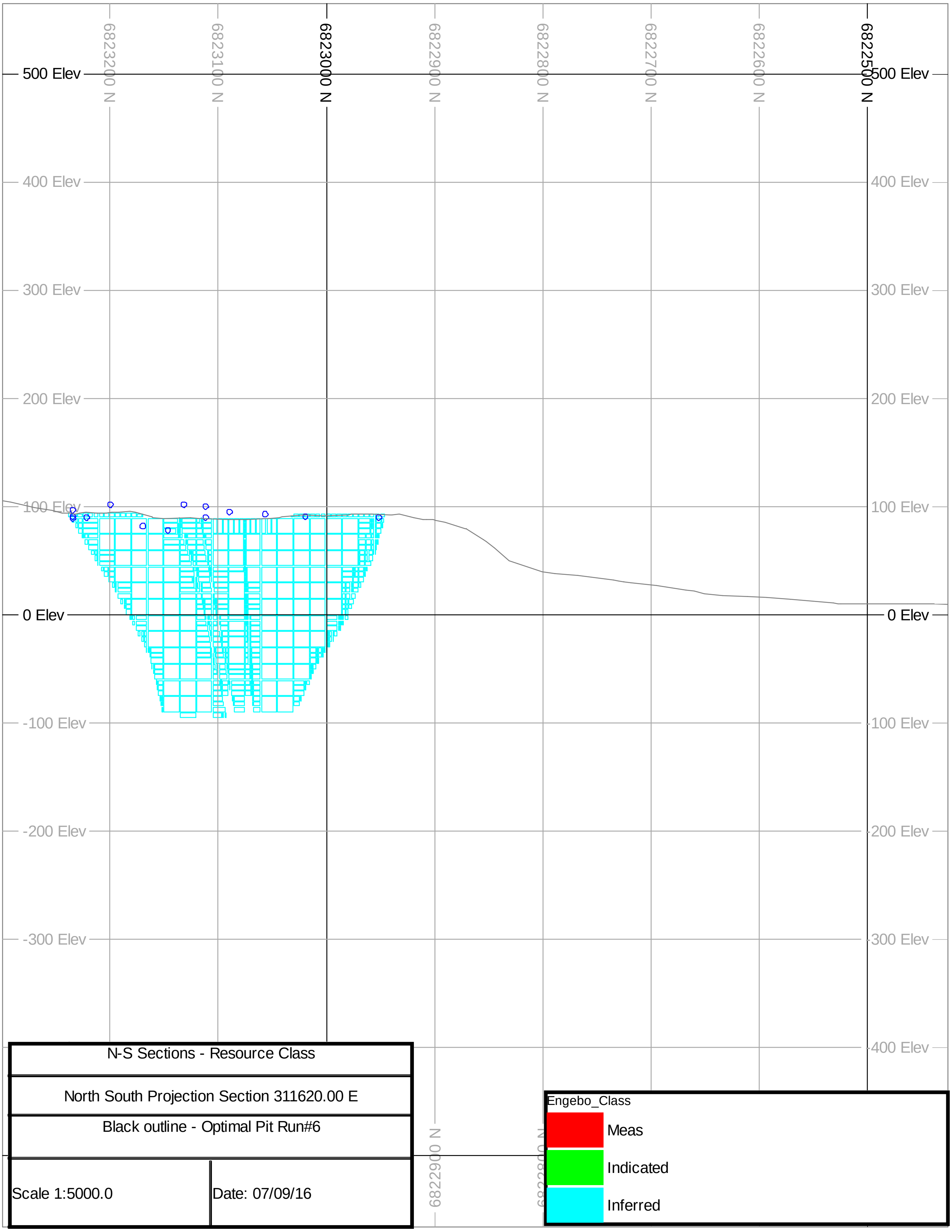
N-S Sections - Resource Class
North South Projection Section 311560.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 07/09/16
Engebo_Class
Meas
Indicated
Inferred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6822700 N
6822600 N
6822500 N
500 Elev
400 Elev
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100 Elev
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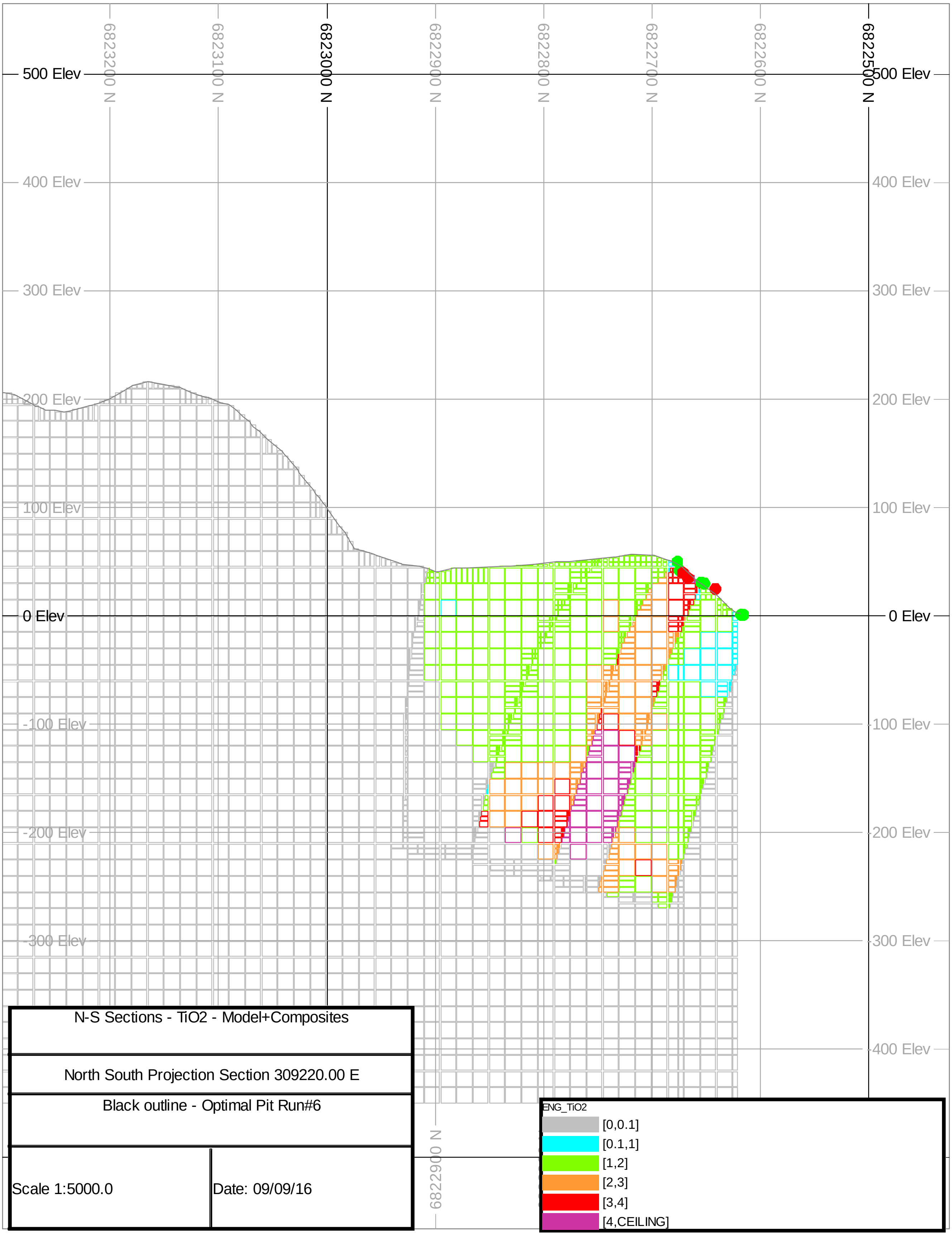
-200 Elev
-300 Elev
-400 Elev
N-S Sections - Resource Class
North South Projection Section 311620.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 07/09/16
Engebo_Class
Meas
Indicated
Inferred

APPENDIX E:

N-S Cross-Sections –

TiO2 – Model and Composites



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500 Elev
400 Elev
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-200 Elev
-300 Elev
-400 Elev
N-S Sections - TiO2 - Model+Composites
North South Projection Section 309220.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
ENG_TiO2
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[3,4]
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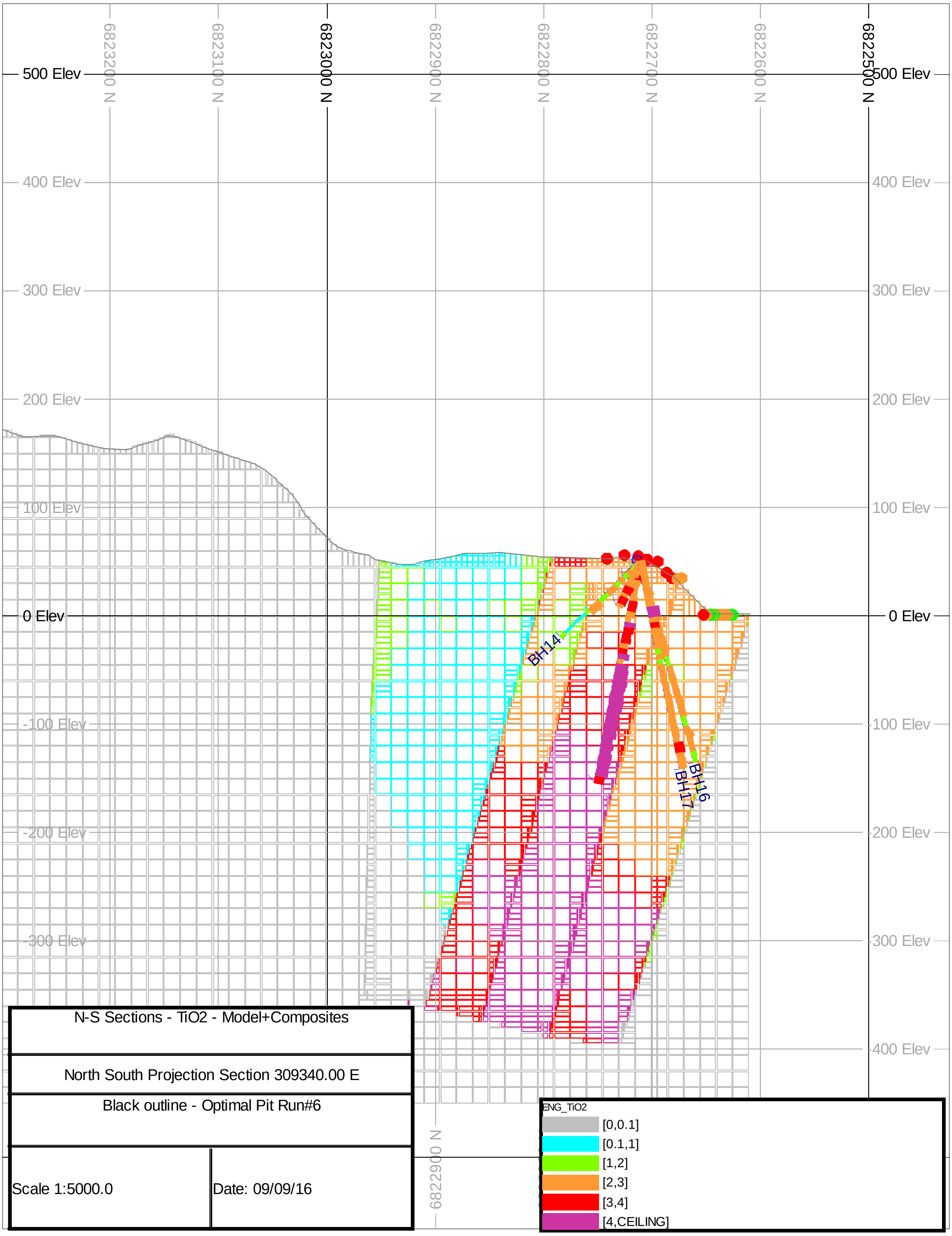

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400 Elev
300 Elev
200 Elev
100 Elev
0 Elev
-100 Elev
-200 Elev
-300 Elev
-400 Elev
6823200 N
6823100 N
6823000 N
6822900 N
6822800 N
6822700 N
6822600 N
6822500 N
BH14
BH16
BH17
N-S Sections - TiO2 - Model+Composites
North South Projection Section 309340.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
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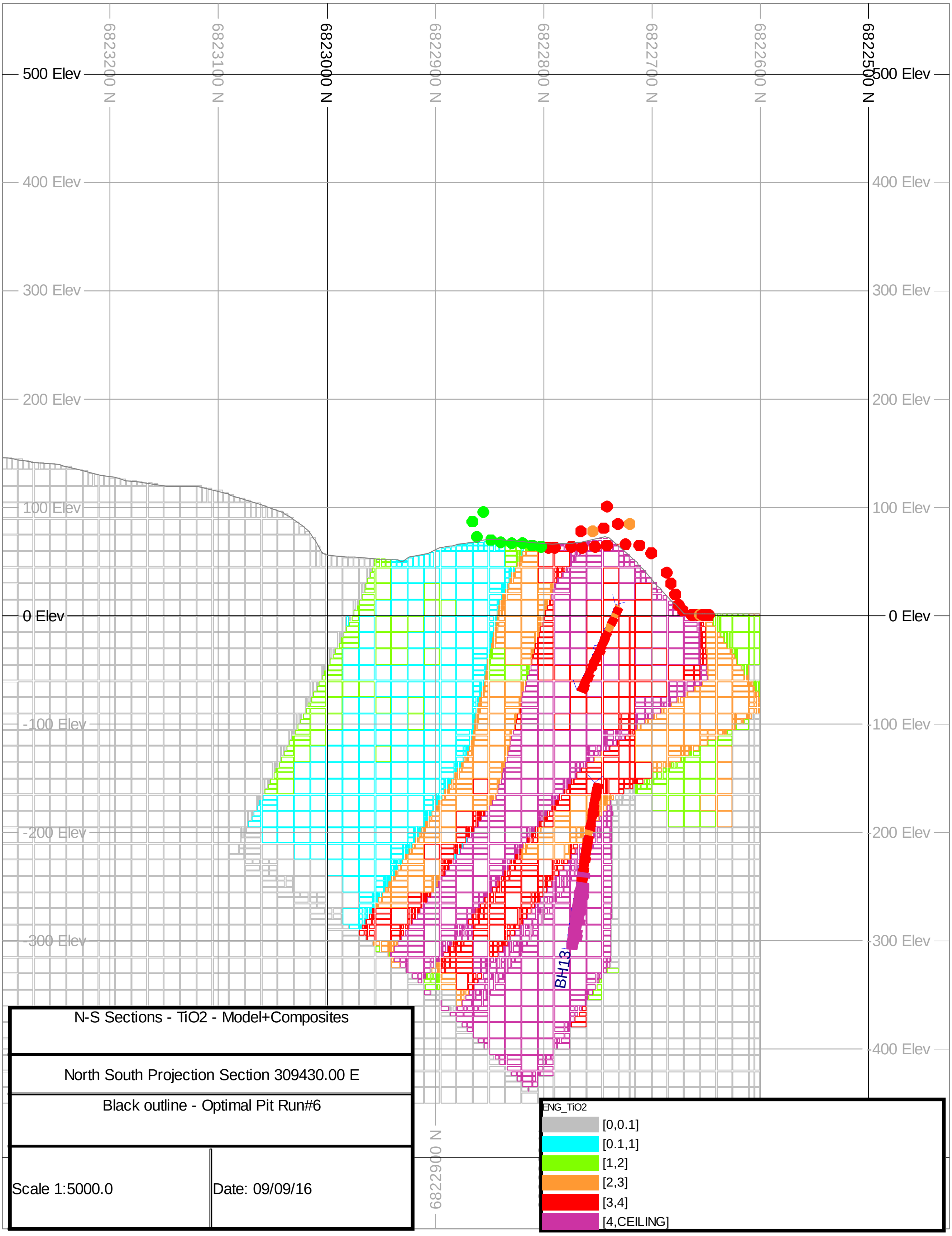
[2,3]
[3,4]
[4,CEILING]



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6822900 N
6822800 N
6822700 N
6822600 N
6822500 N
500 Elev
400 Elev
300 Elev
200 Elev
100 Elev
0 Elev
-100 Elev
-200 Elev
-300 Elev
-400 Elev
BH13
N-S Sections - TiO2 - Model+Composites
North South Projection Section 309430.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
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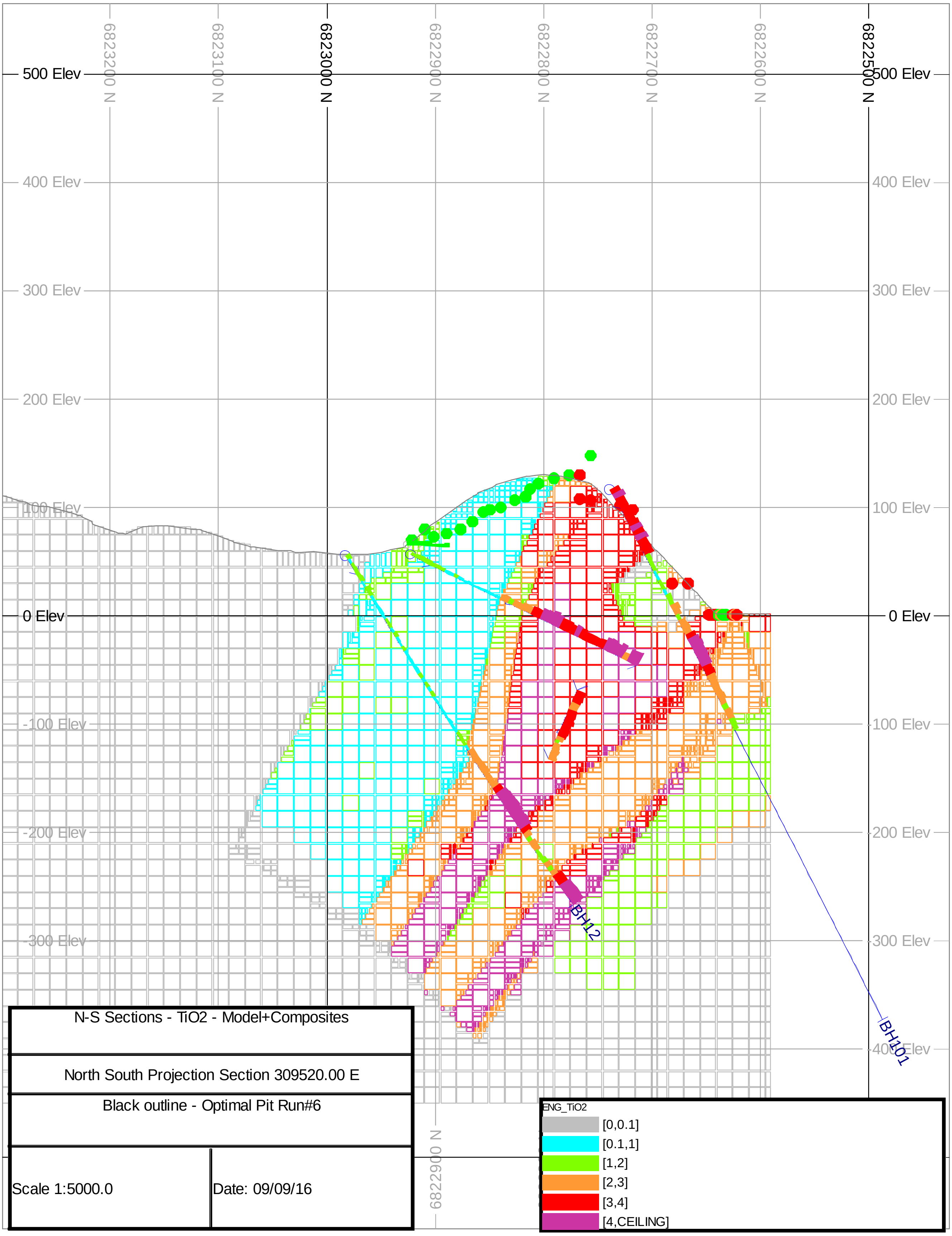
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400 Elev
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0 Elev
-100 Elev
-200 Elev
-300 Elev
-400 Elev
BH12
BH101
N-S Sections - TiO2 - Model+Composites
North South Projection Section 309520.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
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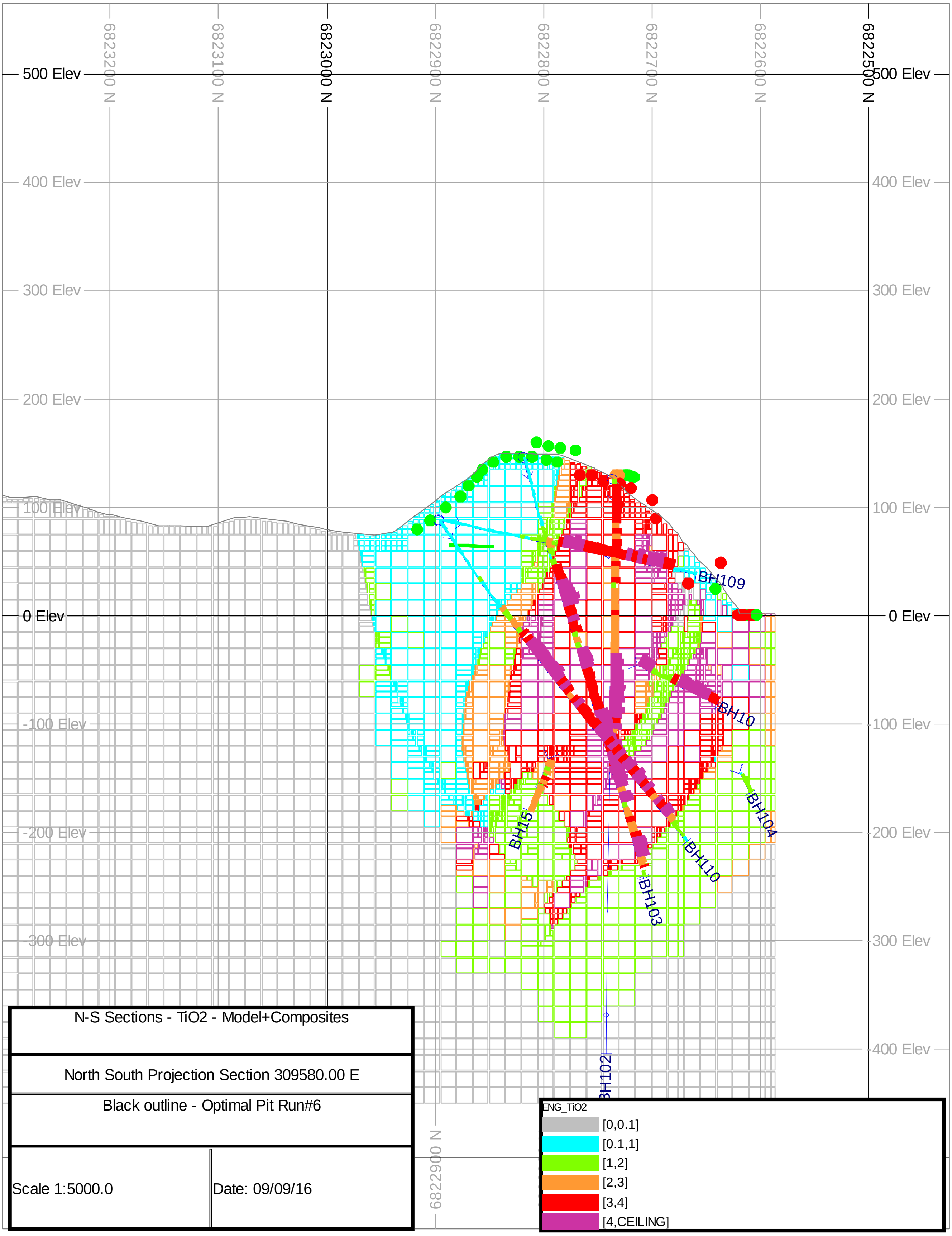
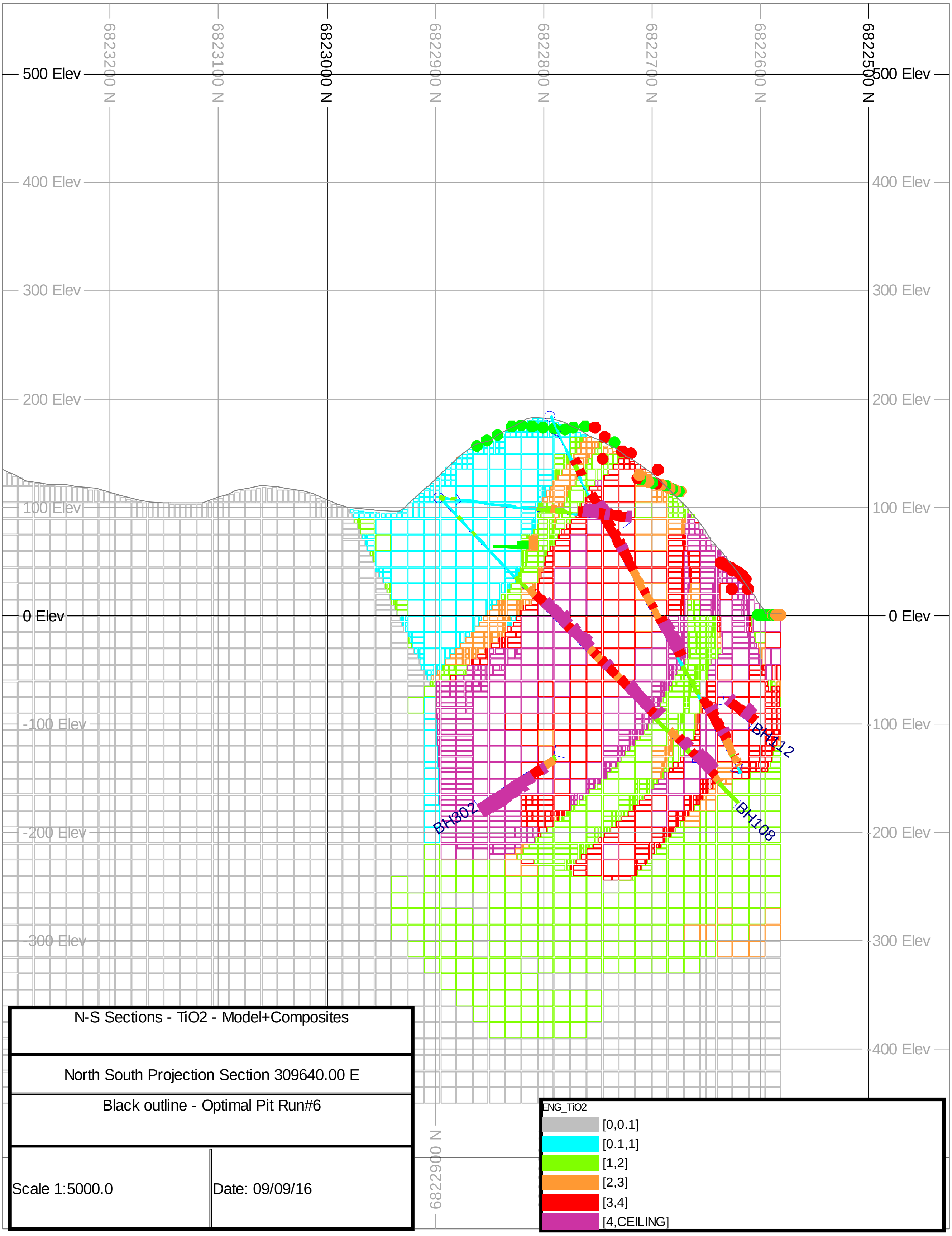


N-S Sections - TiO2 - Model+Composites	
North South Projection Section 309580.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 09/09/16



N-S Sections - TiO2 - Model+Composites	
North South Projection Section 309640.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 09/09/16

ENG_TiO2
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- [2,3]
- [3,4]
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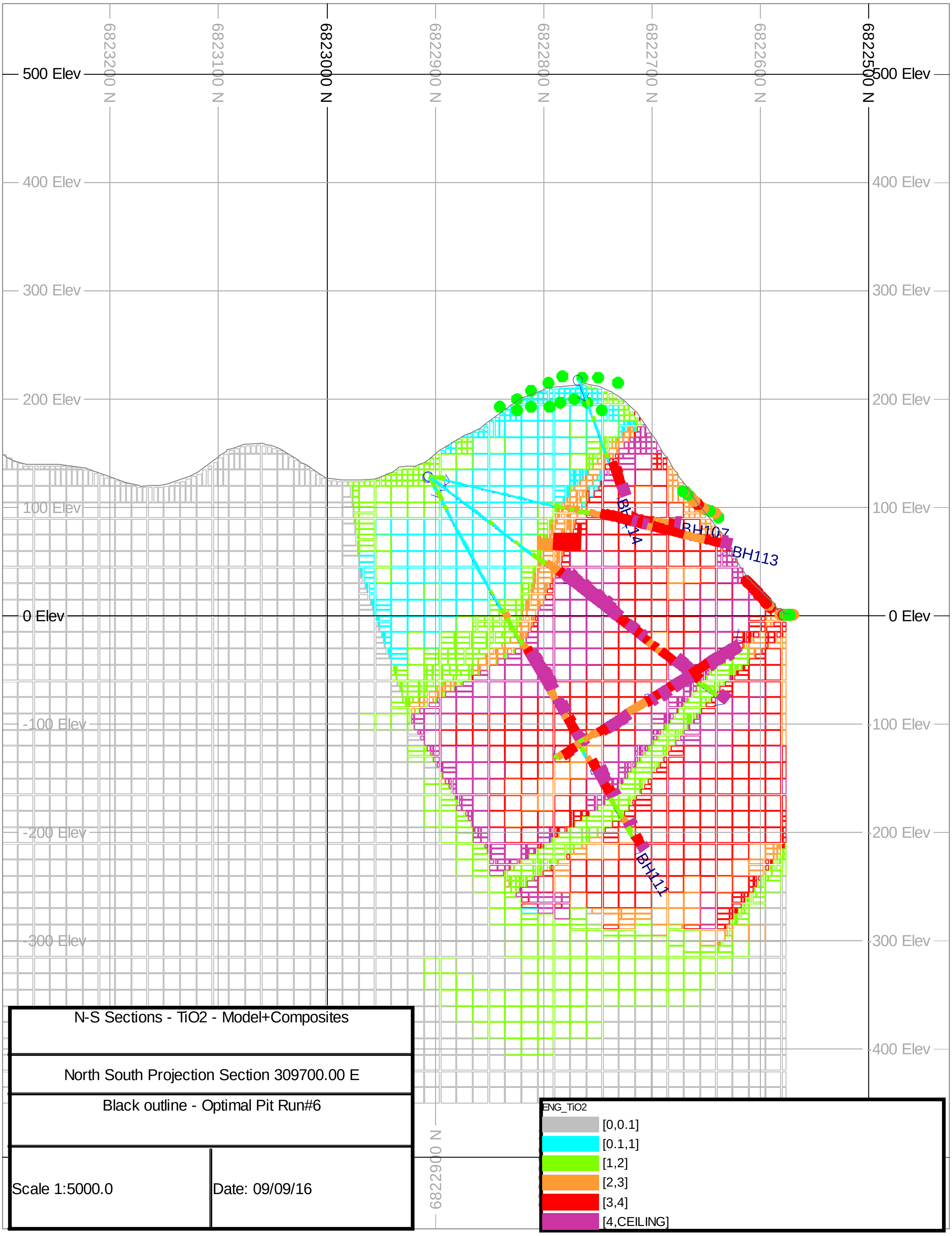

N-S Sections - TiO2 - Model+Composites

North South Projection Section 309700.00 E

Black outline - Optimal Pit Run#6

Scale 1:5000.0	Date: 09/09/16

ENG_TiO2

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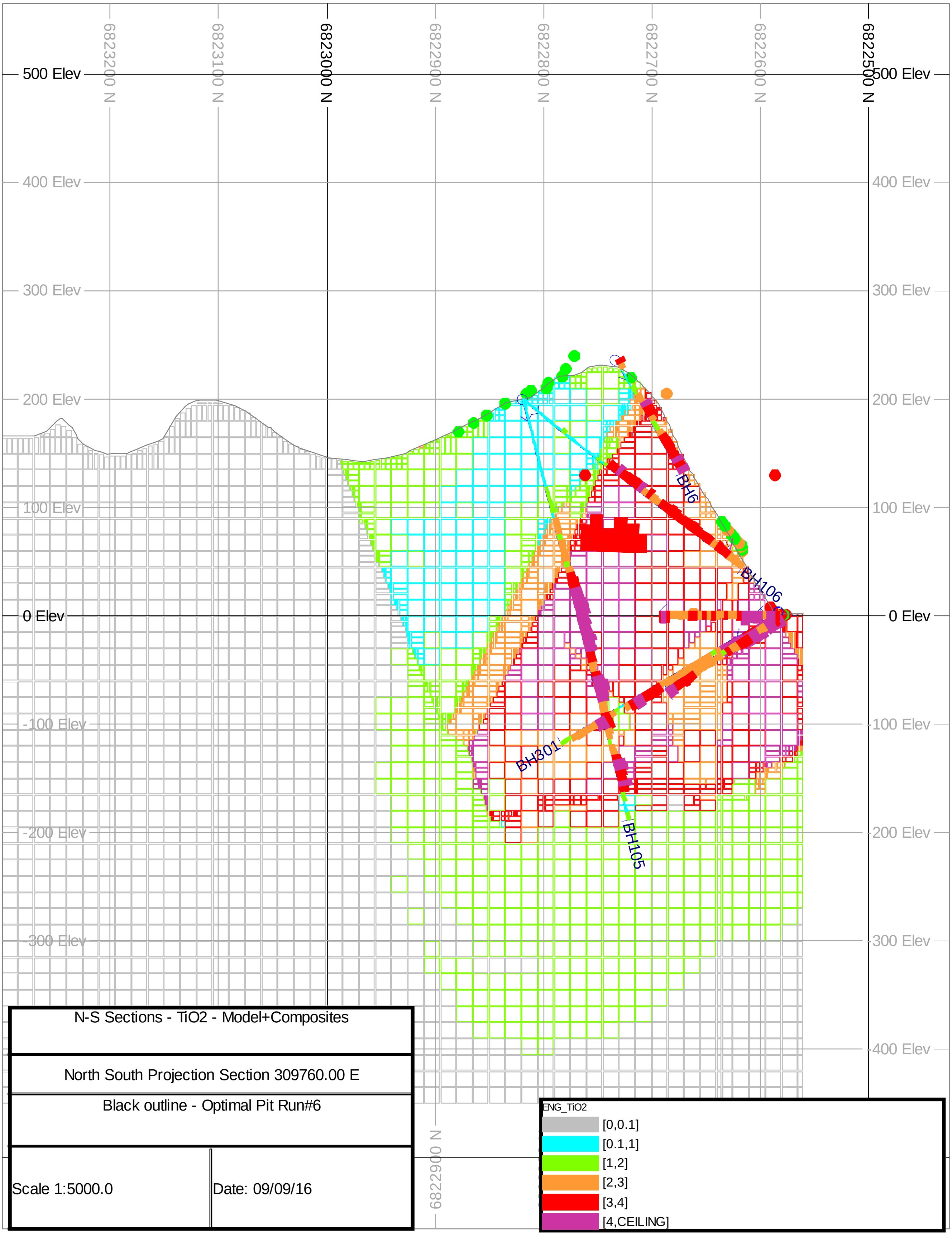
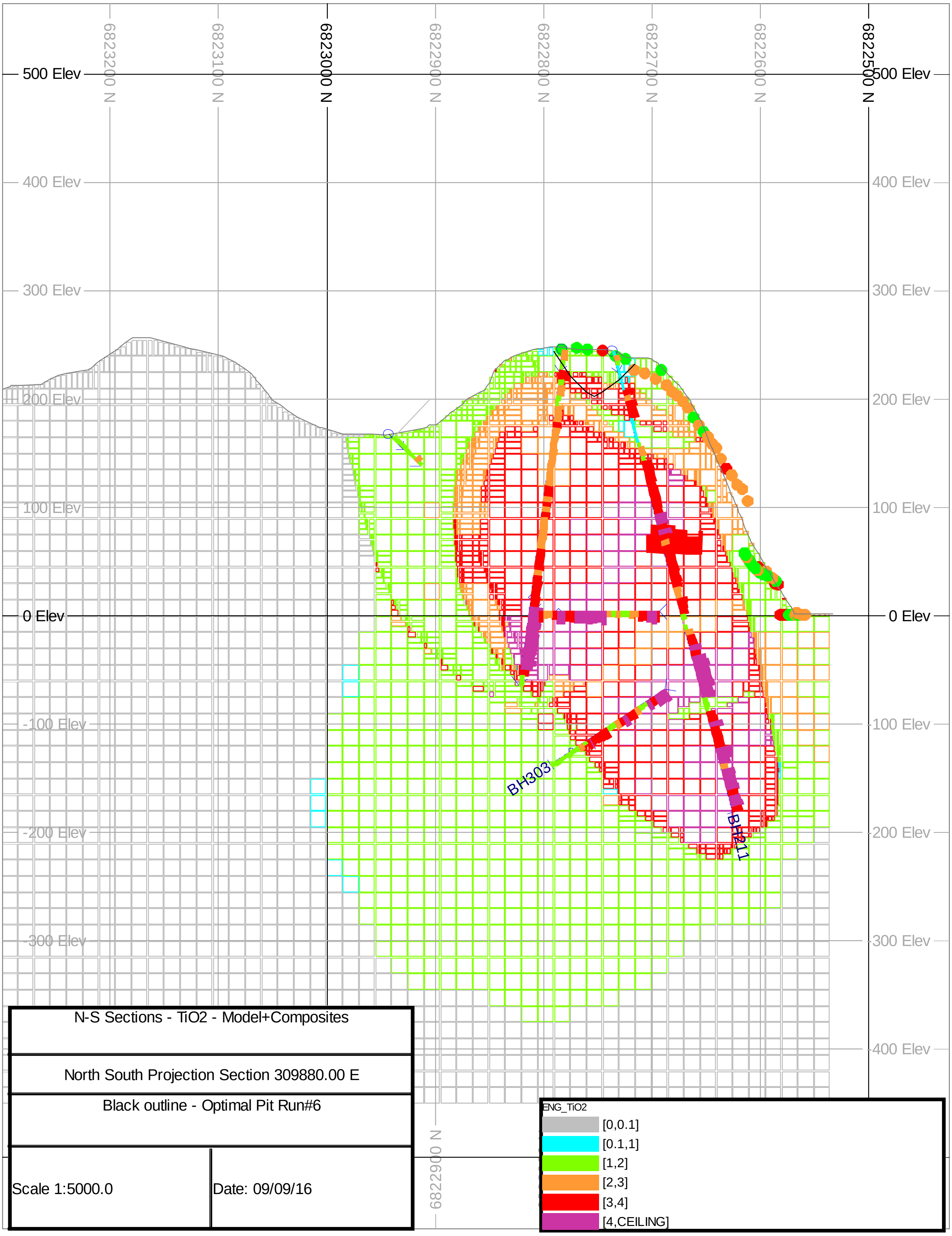
- [2,3]
- [3,4]
- [4,CEILING]



N-S Sections - TiO2 - Model+Composites	
North South Projection Section 309760.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 09/09/16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200 Elev
100 Elev
0 Elev
-100 Elev
-200 Elev
-300 Elev
-400 Elev
BH303
BH211
N-S Sections - TiO2 - Model+Composites
North South Projection Section 309880.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
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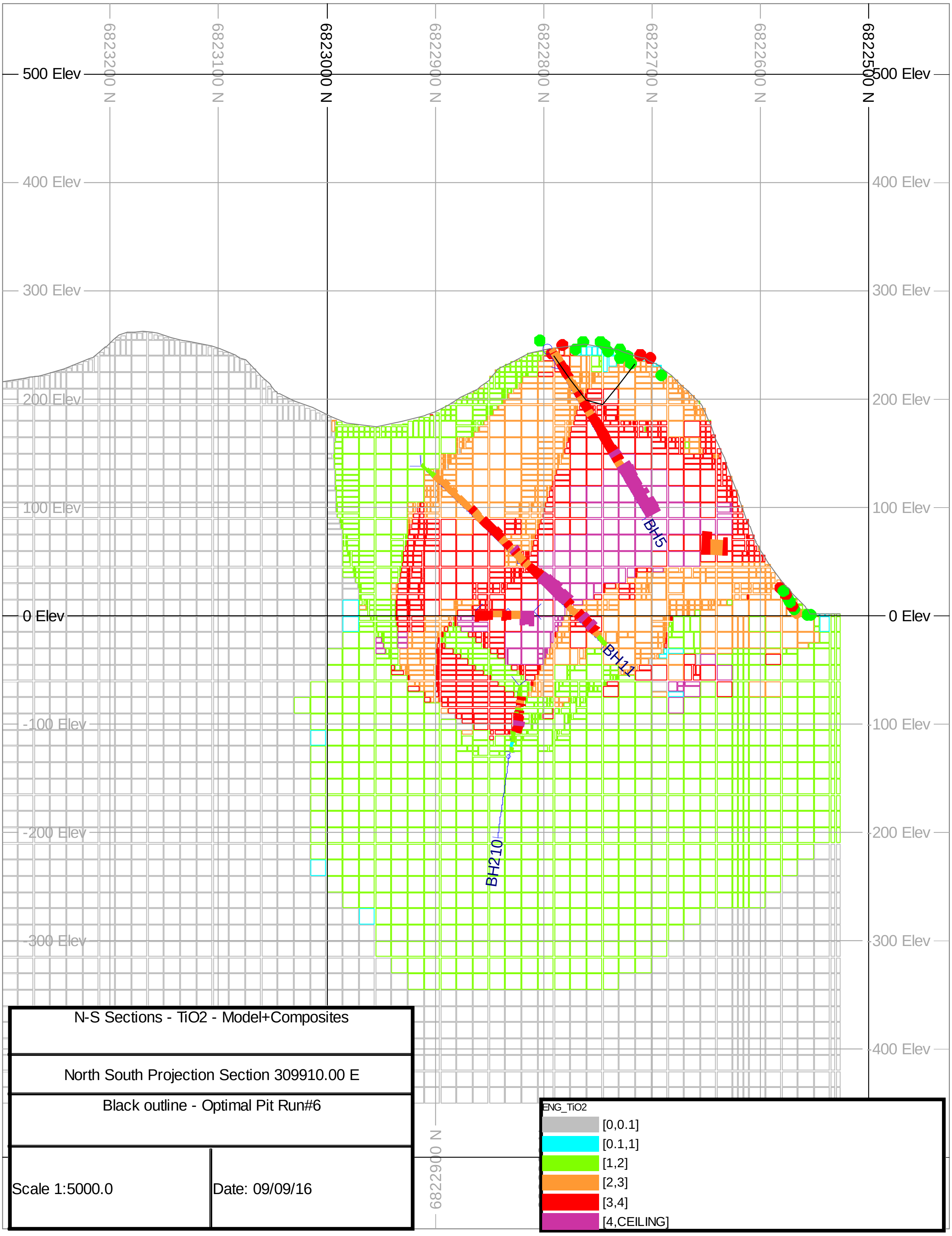

N-S Sections - TiO2 - Model+Composites
North South Projection Section 309910.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
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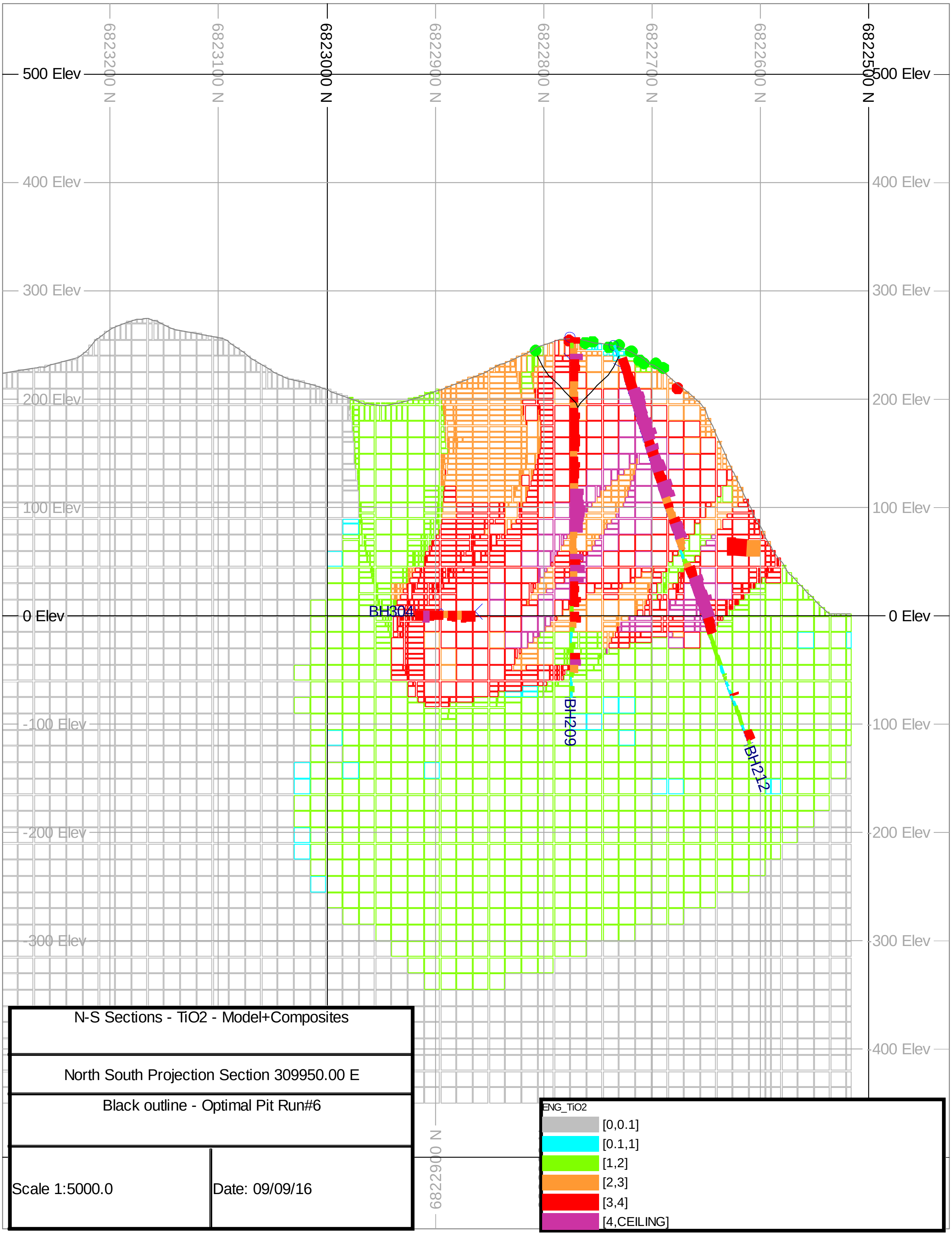
BH5
BH11
BH210



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300 Elev
200 Elev
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-100 Elev
-200 Elev
-300 Elev
-400 Elev
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6823000 N
6822900 N
6822800 N
6822700 N
6822600 N
6822500 N
BH304
BH209
BH212
N-S Sections - TiO2 - Model+Composites
North South Projection Section 309950.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
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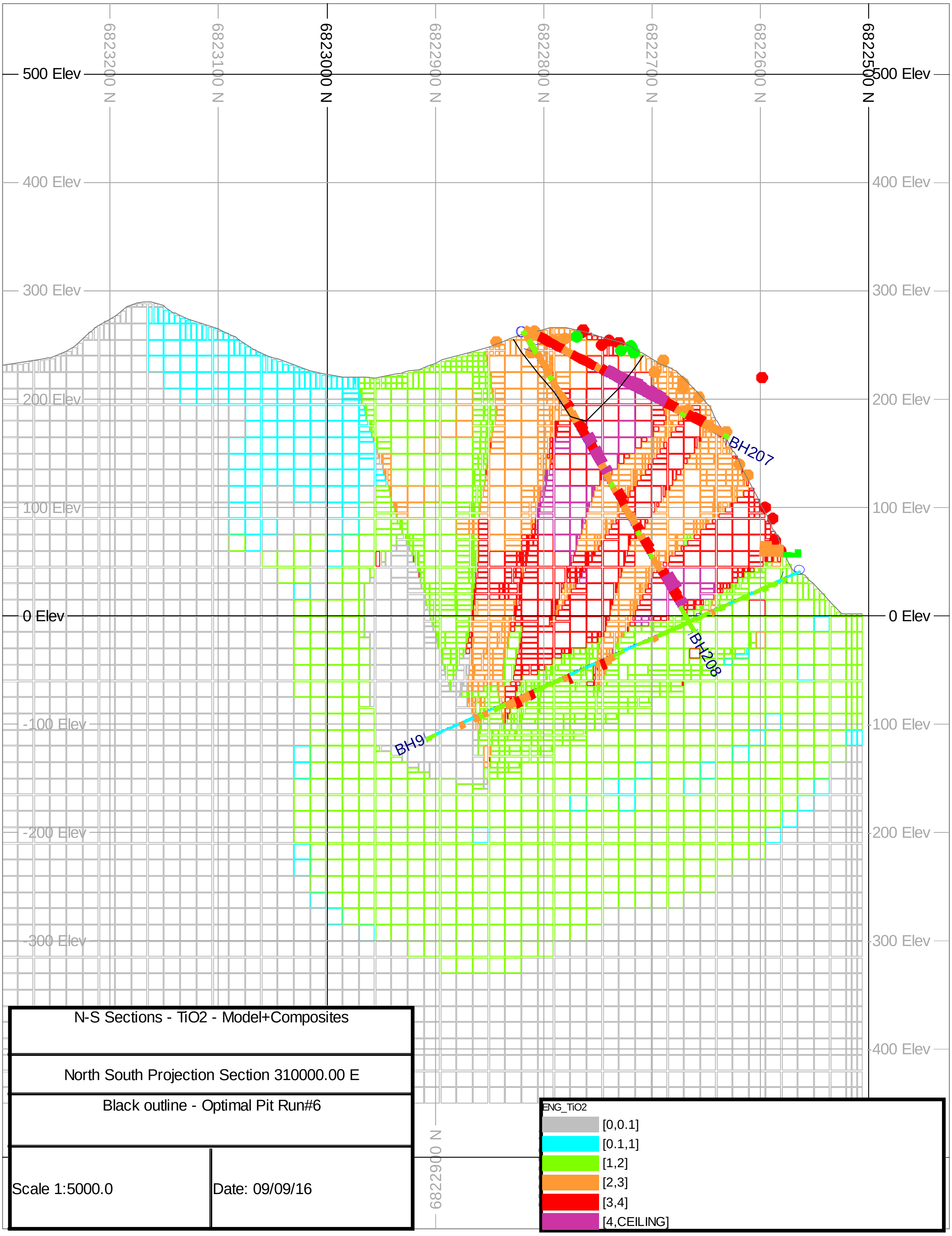
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200 Elev
100 Elev
0 Elev
-100 Elev
-200 Elev
-300 Elev
-400 Elev
BH207
BH208
BH9
N-S Sections - TiO2 - Model+Composites
North South Projection Section 310000.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
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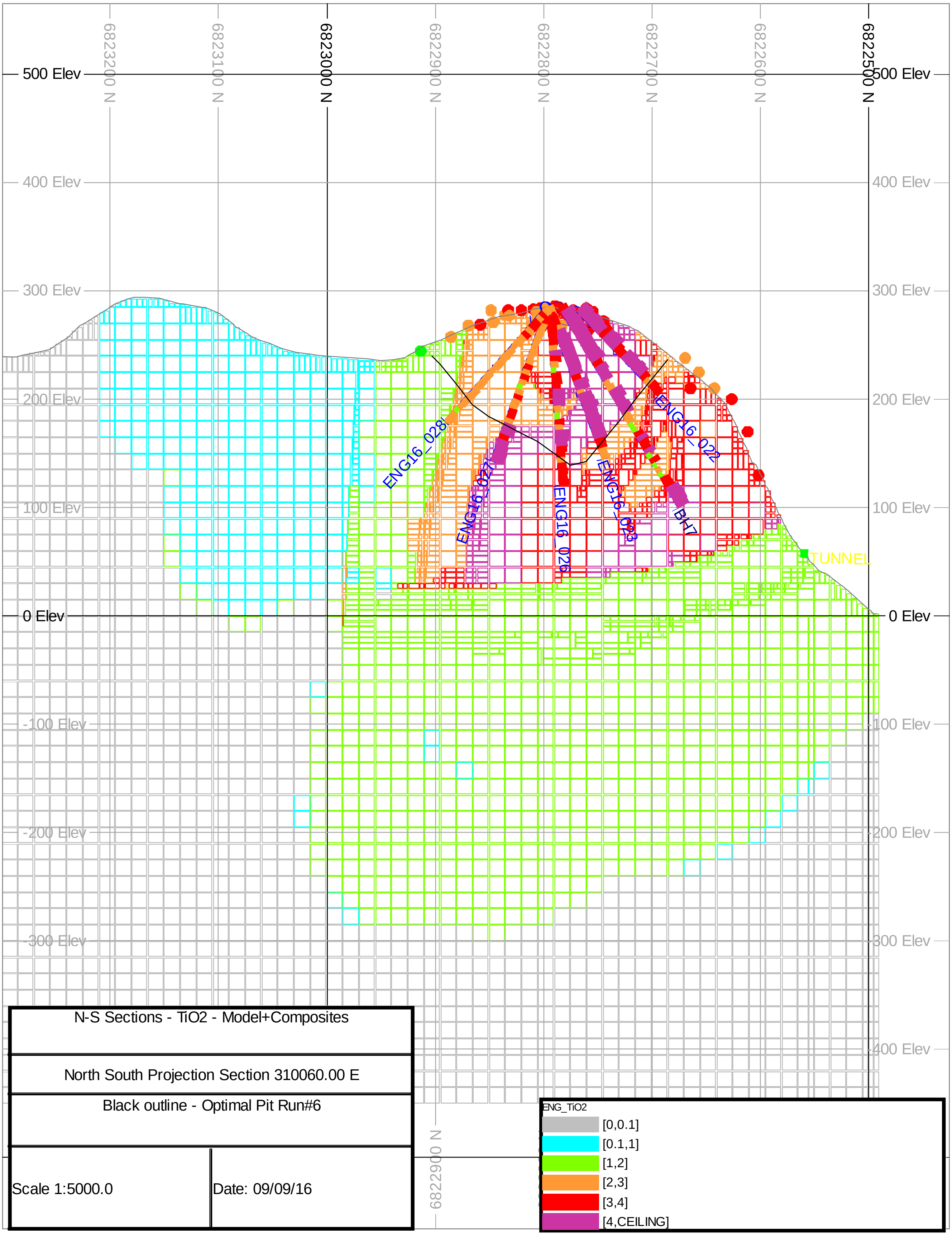

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ENG16_028
ENG16_027
ENG16_026
ENG16_023
ENG16_022
BH7
TUNNEL
N-S Sections - TiO2 - Model+Composites
North South Projection Section 310060.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
ENG_TiO2
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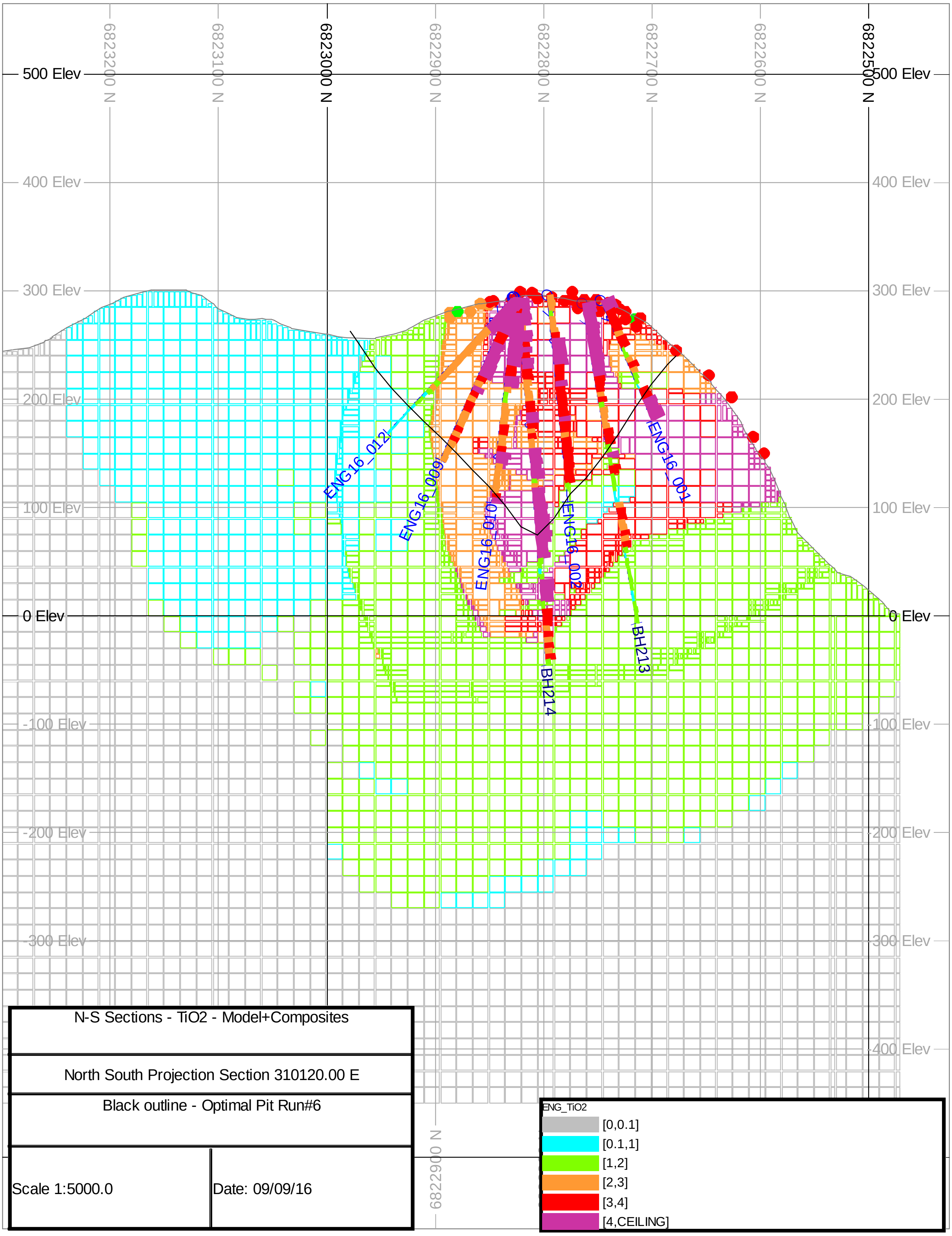
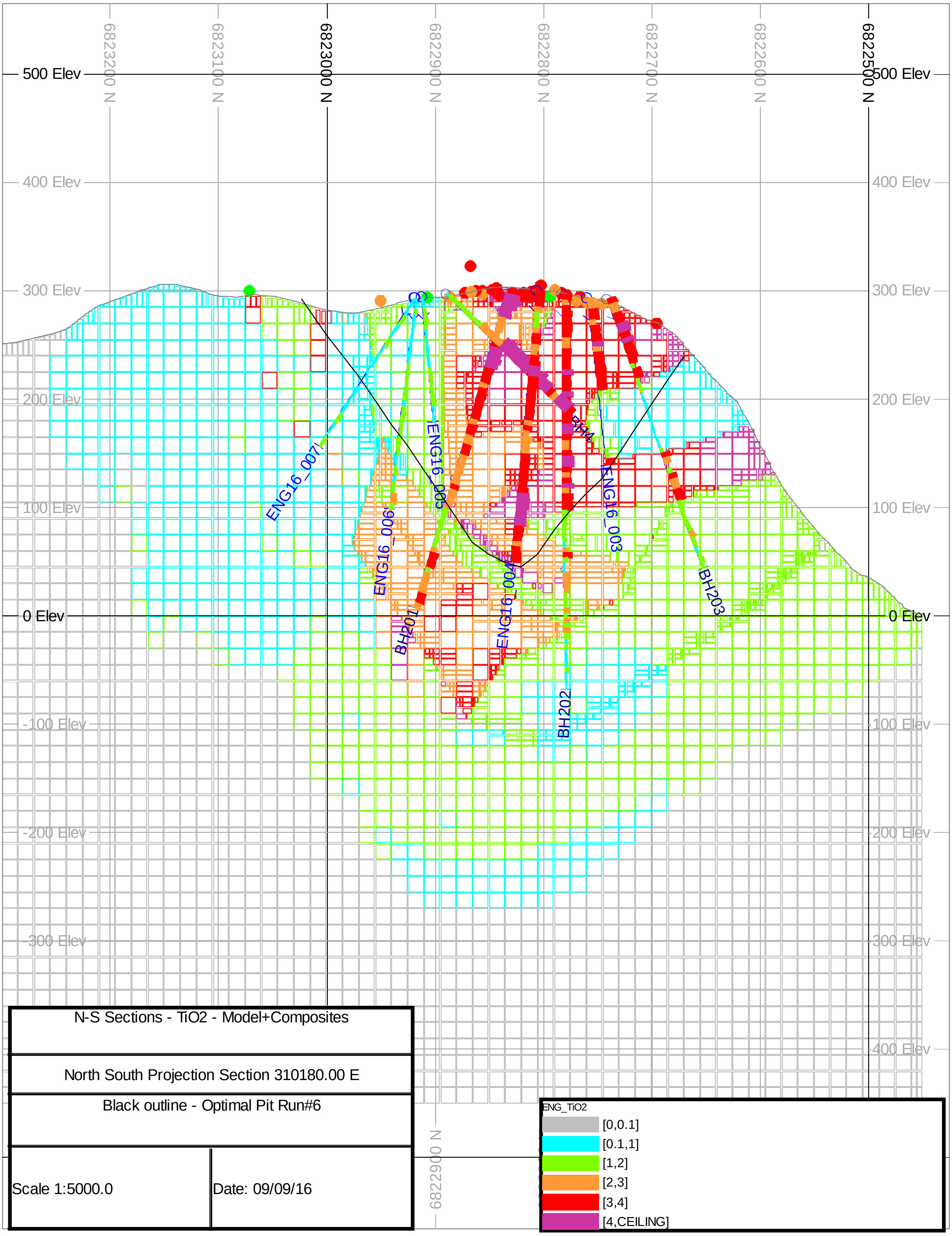


N-S Sections - TiO2 - Model+Composites	
North South Projection Section 310120.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 09/09/16



N-S Sections - TiO2 - Model+Composites

North South Projection Section 310180.00 E

Black outline - Optimal Pit Run#6

Scale 1:5000.0

Date: 09/09/16

ENG_TiO2

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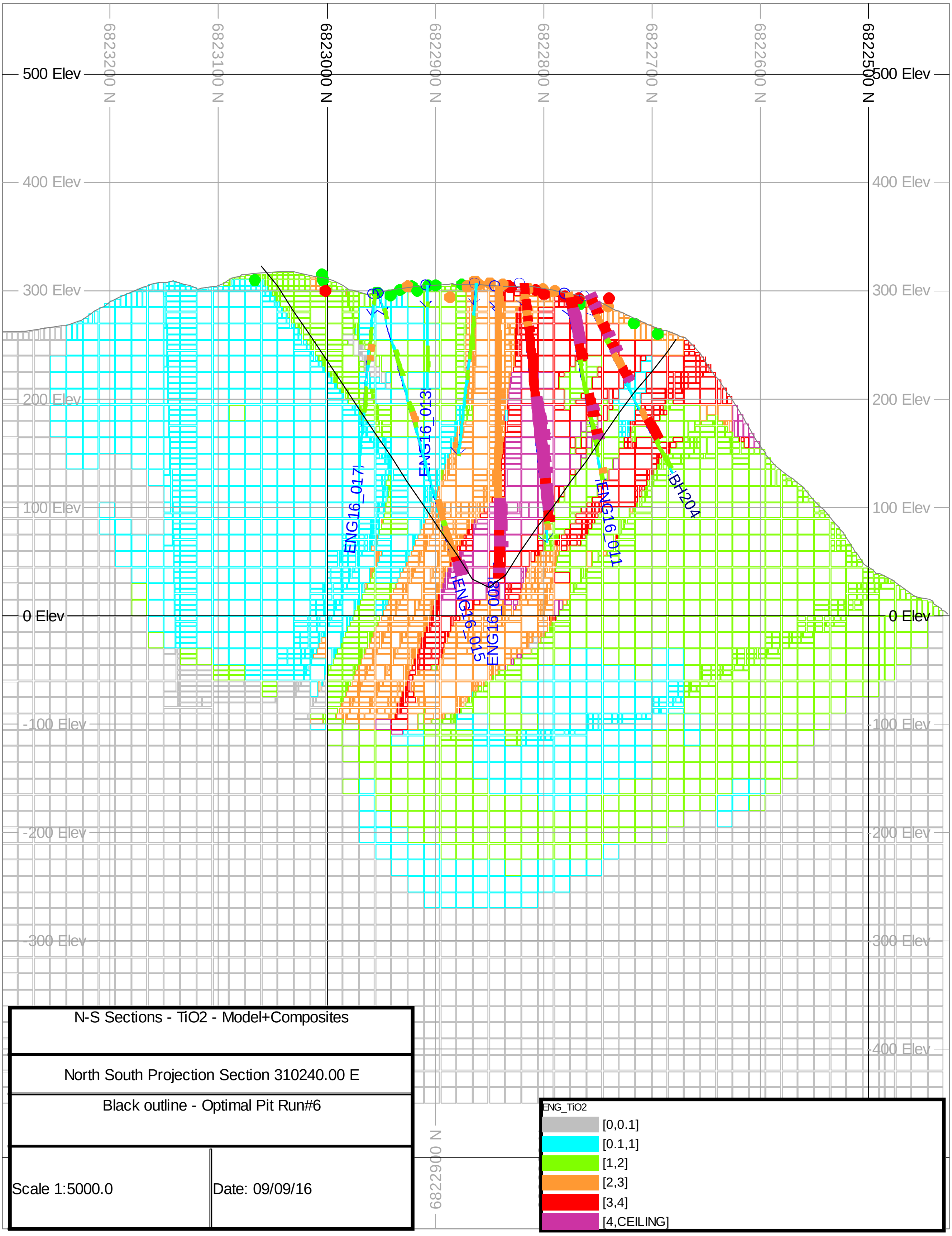

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400 Elev
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-100 Elev
-200 Elev
-300 Elev
-400 Elev
ENG16_017
ENG16_013
ENG16_015
ENG16_008
ENG16_011
BH204
N-S Sections - TiO2 - Model+Composites
North South Projection Section 310240.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
ENG_TiO2
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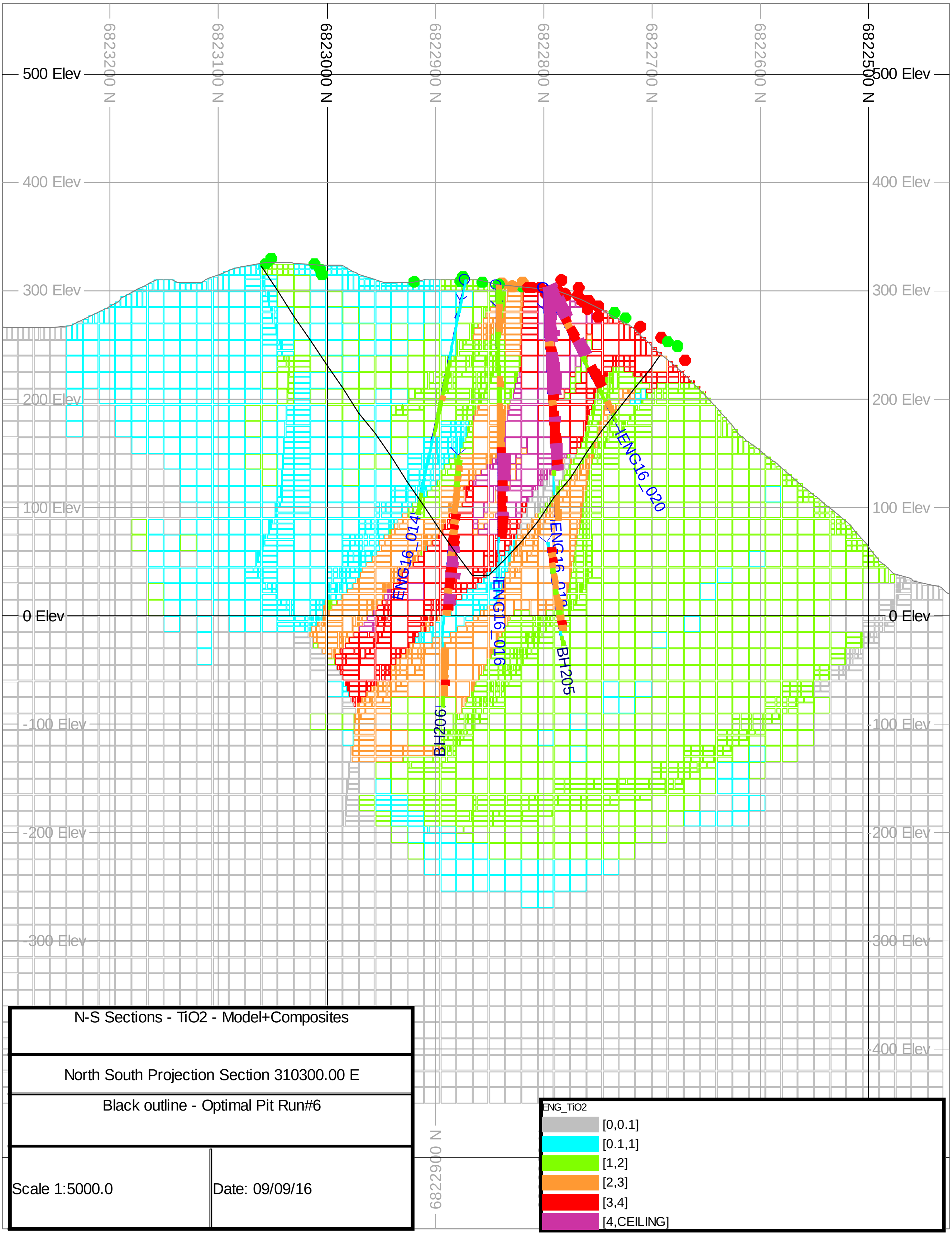

N-S Sections - TiO2 - Model+Composites
North South Projection Section 310300.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
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[2,3]
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[4,CEILING]
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400 Elev
300 Elev
200 Elev
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-200 Elev
-300 Elev
-400 Elev
6823200 N
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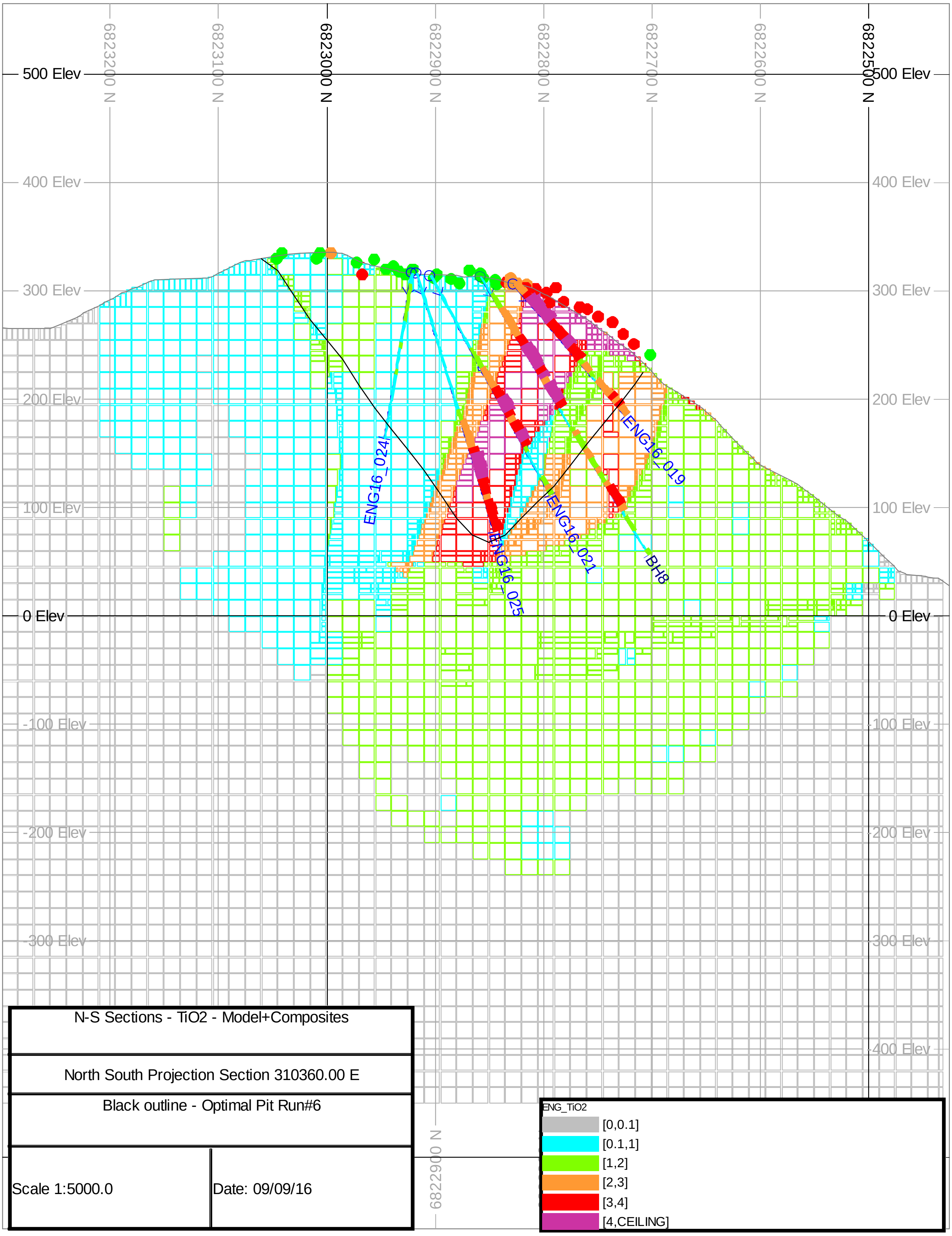
ENG16_016
ENG16_020
BH206
BH205



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-300 Elev
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ENG16_019
ENG16_021
ENG16_025
BH8
N-S Sections - TiO2 - Model+Composites
North South Projection Section 310360.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
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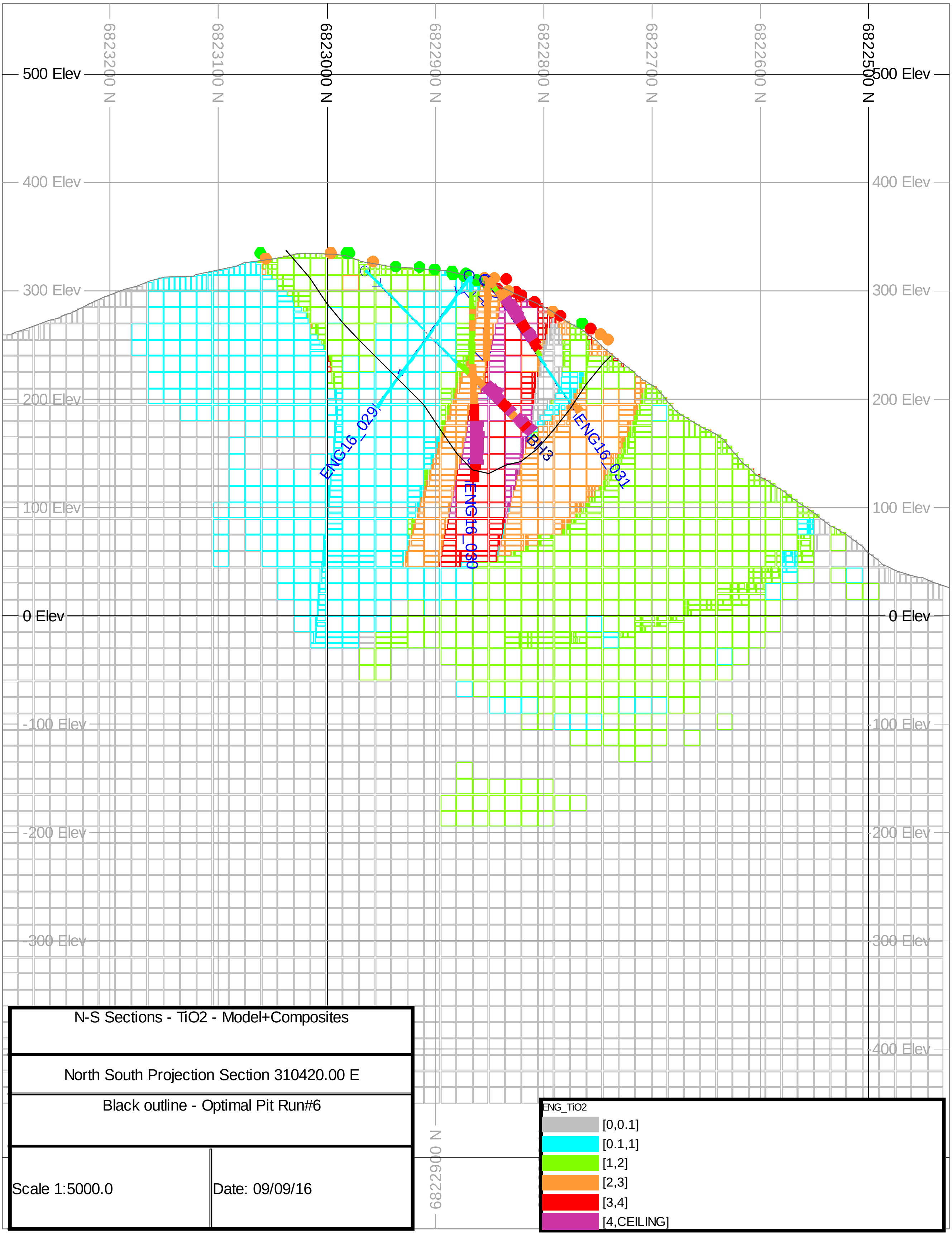

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6822800 N
6822700 N
6822600 N
6822500 N
ENG16_029
ENG16_030
ENG16_031
BH3
N-S Sections - TiO2 - Model+Composites
North South Projection Section 310420.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
ENG_TiO2
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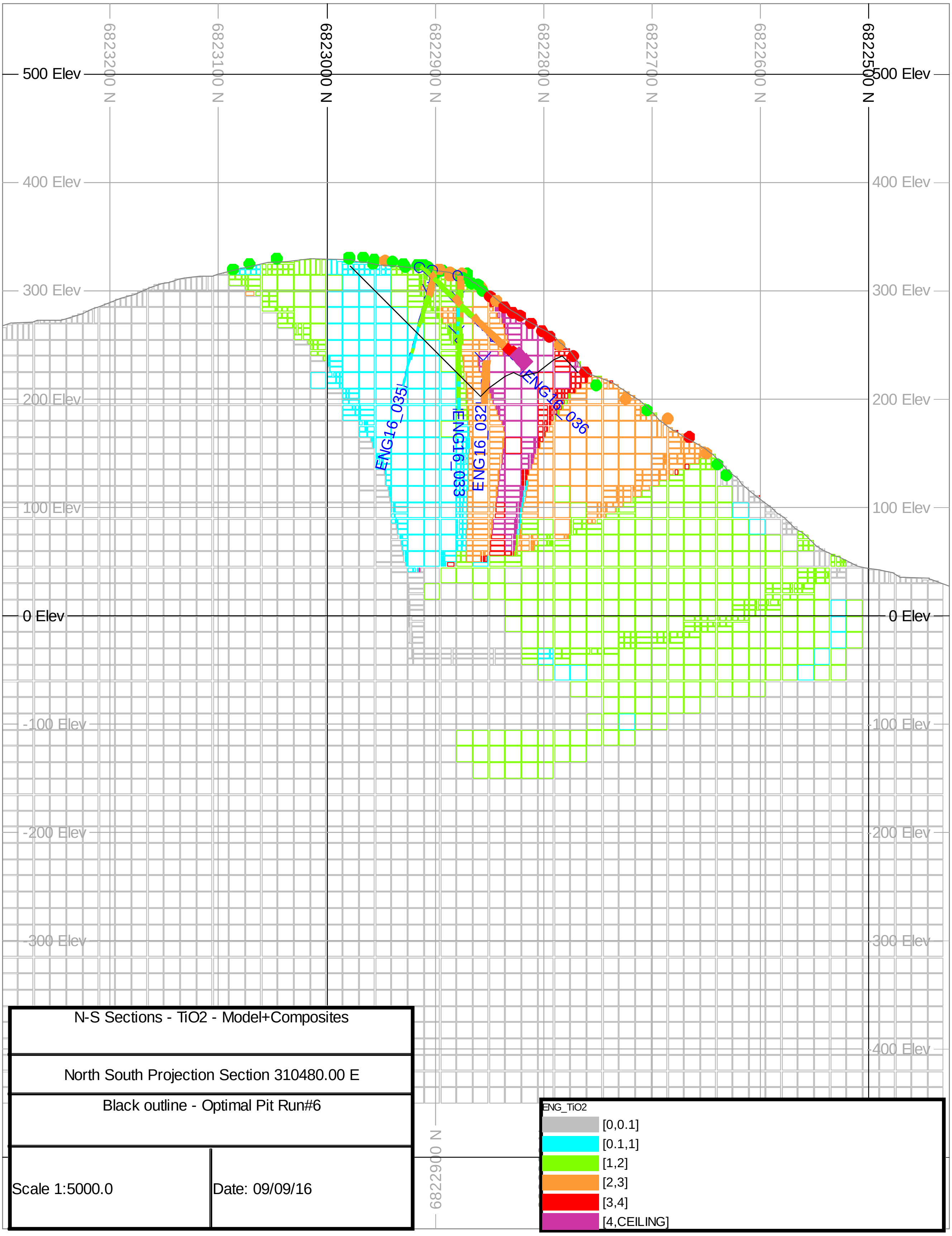

N-S Sections - TiO2 - Model+Composites

North South Projection Section 310480.00 E

Black outline - Optimal Pit Run#6

Scale 1:5000.0	Date: 09/09/16

ENG_TiO2

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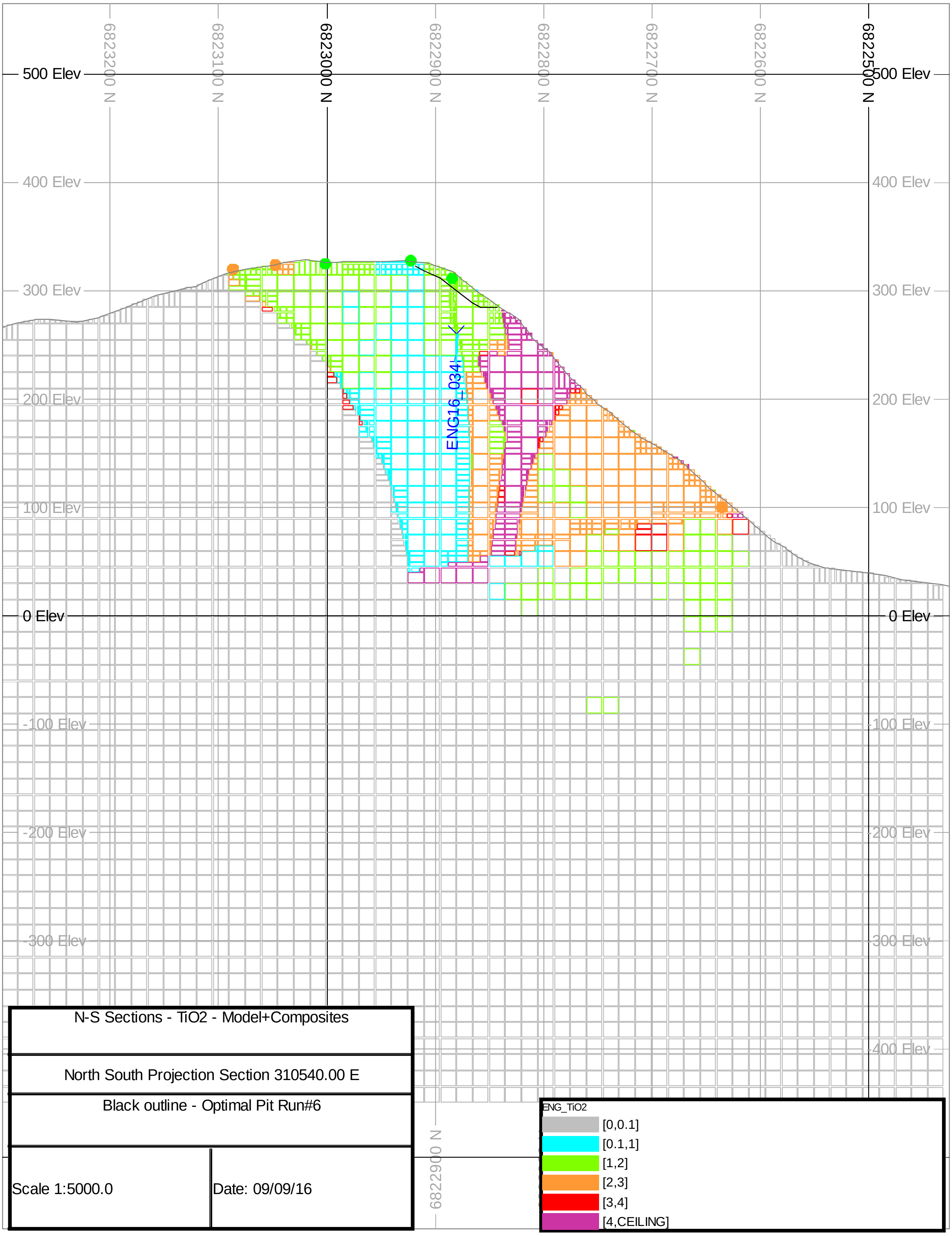

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ENG16_034
N-S Sections - TiO2 - Model+Composites
North South Projection Section 310540.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
ENG_TiO2
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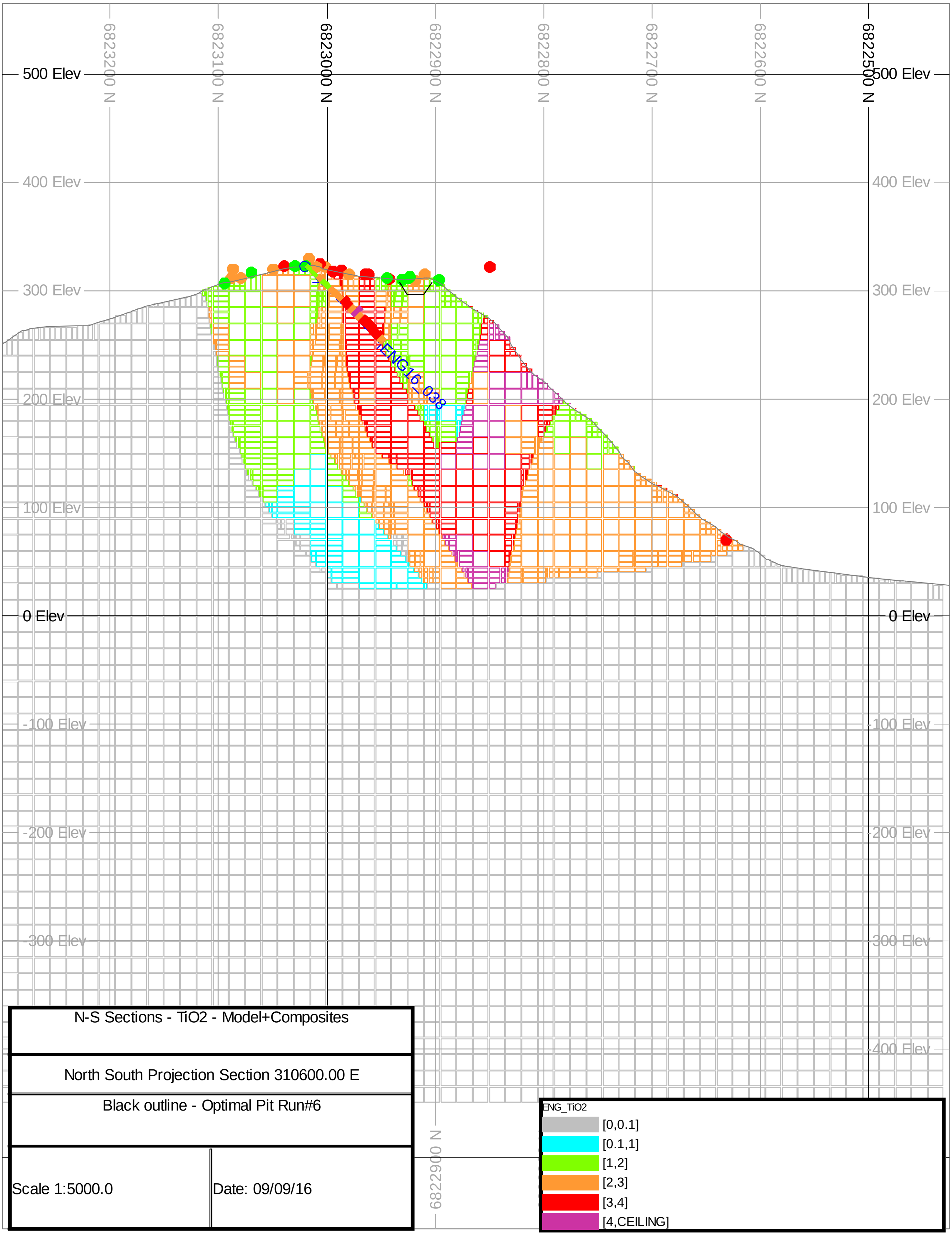
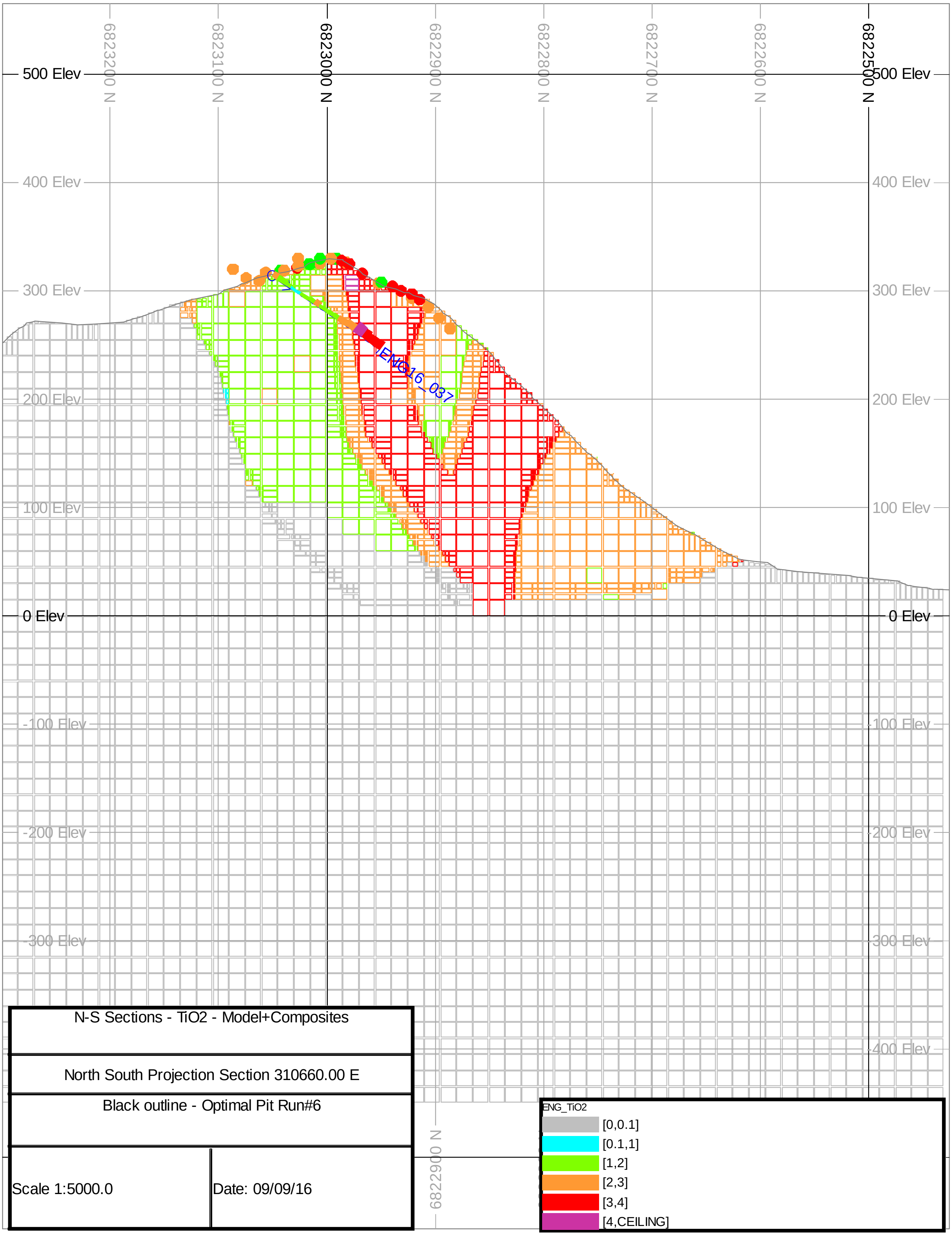


N-S Sections - TiO2 - Model+Composites

North South Projection Section 310600.00 E

Black outline - Optimal Pit Run#6

Scale 1:5000.0	Date: 09/09/16



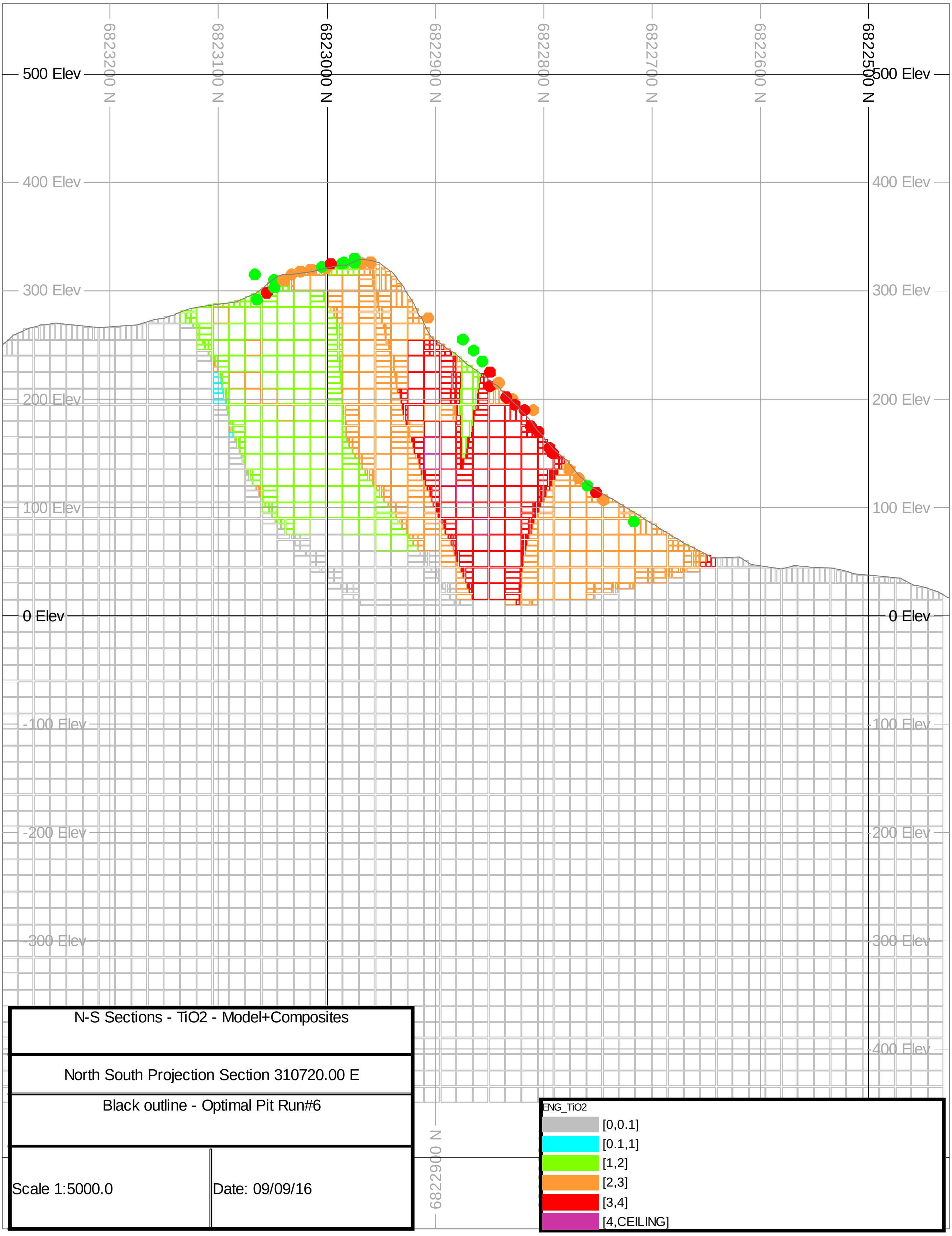
N-S Sections - TiO2 - Model+Composites

North South Projection Section 310660.00 E

Black outline - Optimal Pit Run#6

Scale 1:5000.0

Date: 09/09/16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N-S Sections - TiO2 - Model+Composites
North South Projection Section 310720.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
ENG_TiO2
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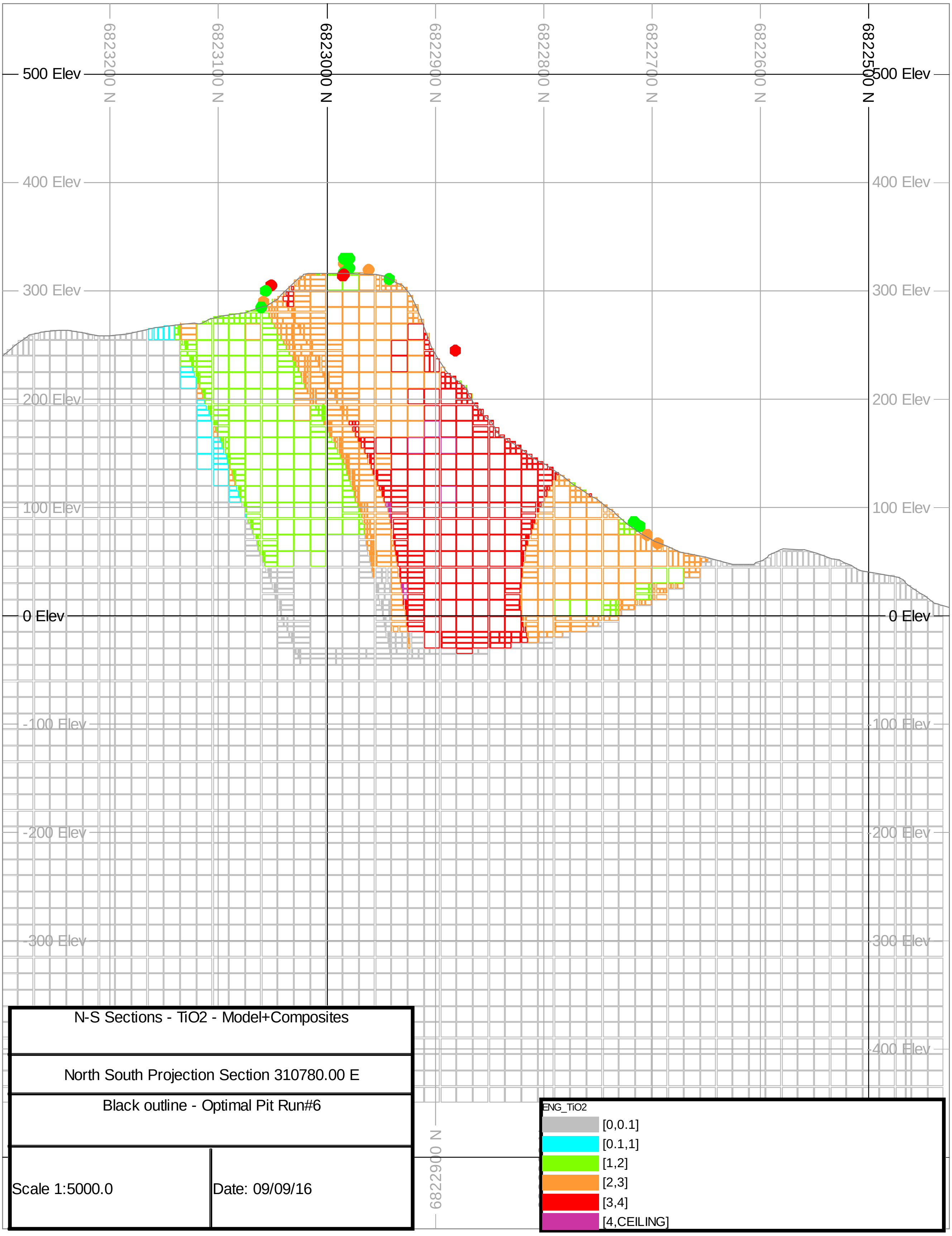

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N-S Sections - TiO2 - Model+Composites
North South Projection Section 310780.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
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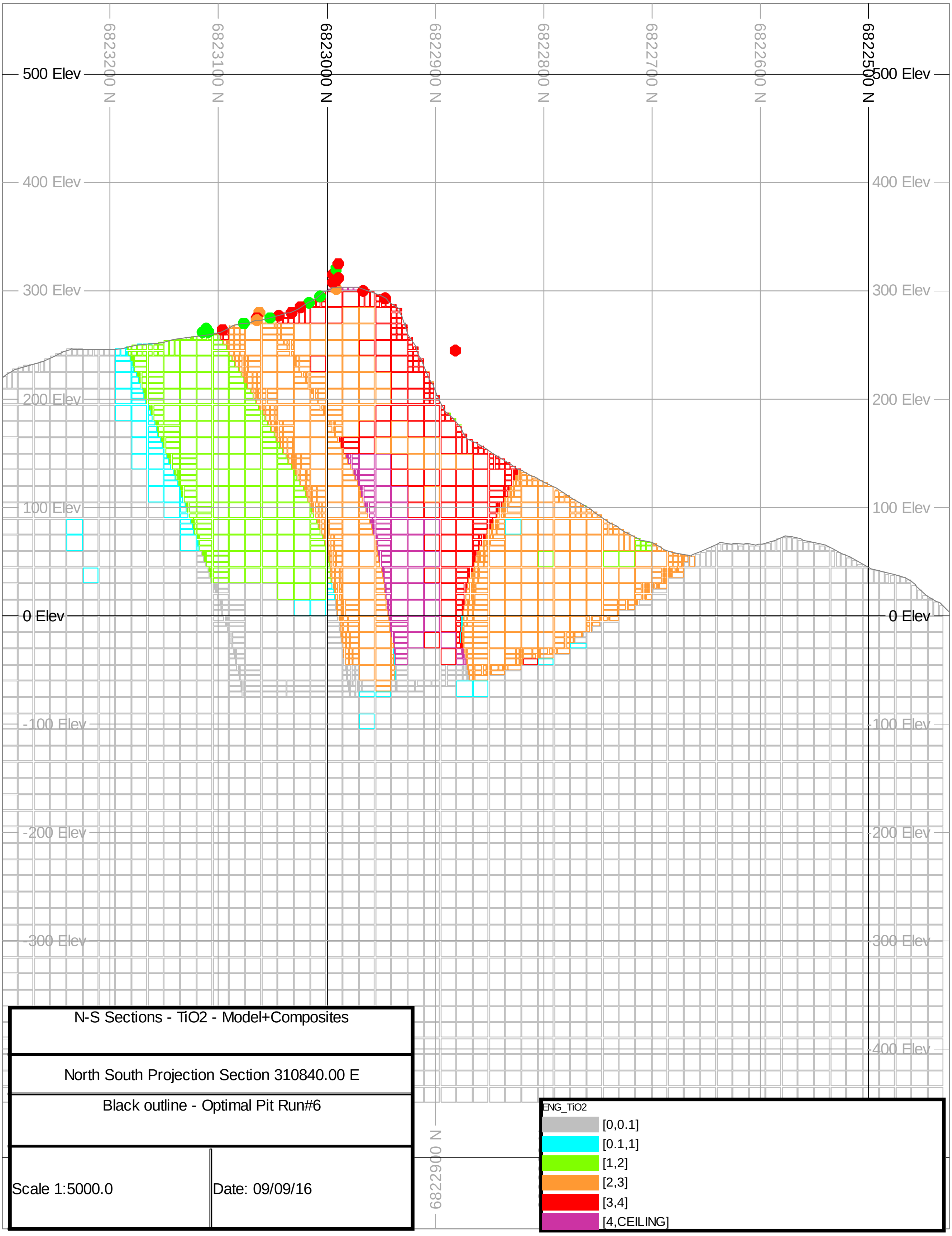

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200 Elev
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N-S Sections - TiO2 - Model+Composites
North South Projection Section 310840.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
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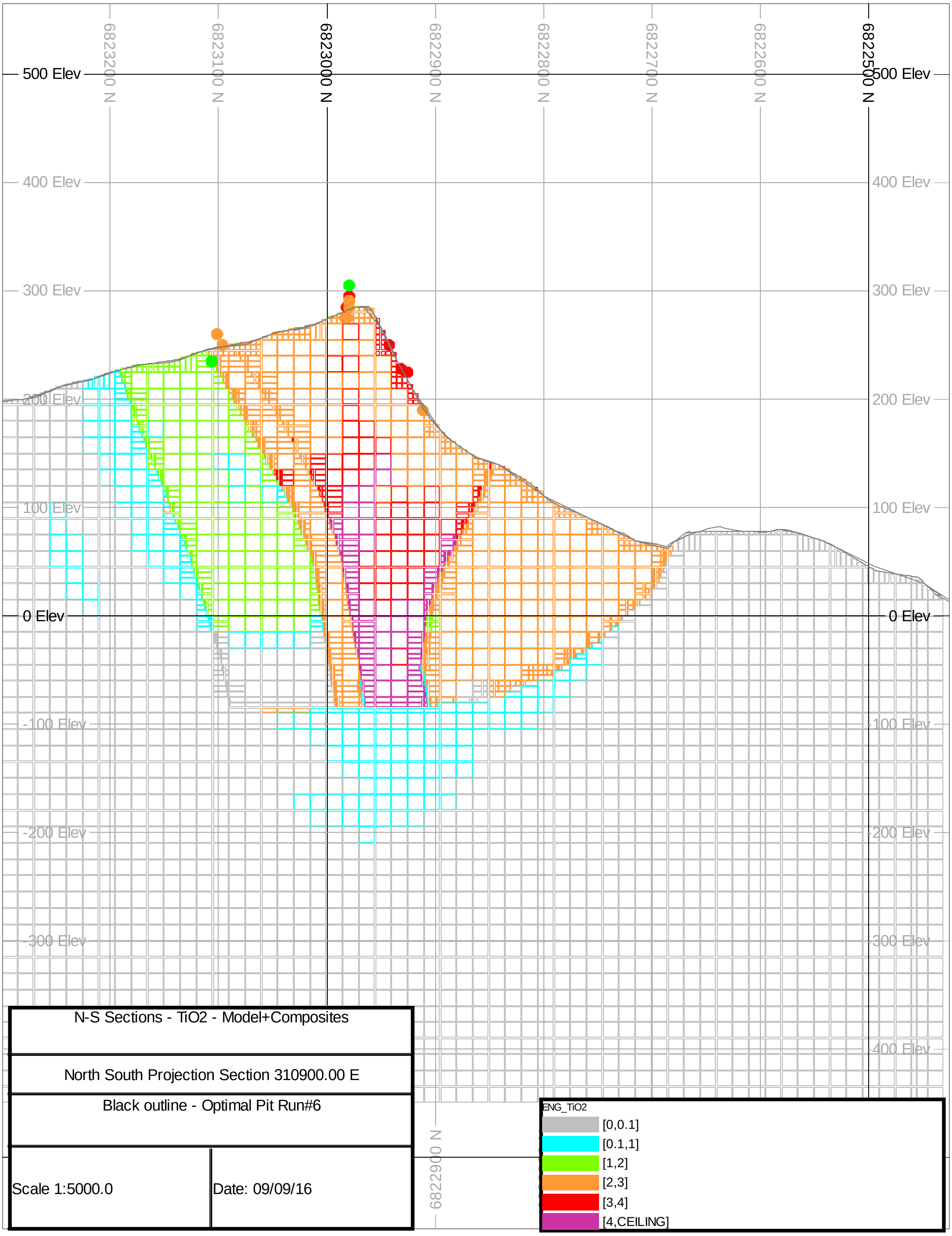
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North South Projection Section 310900.00 E
Black outline - Optimal Pit Run#6
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Date: 09/09/16
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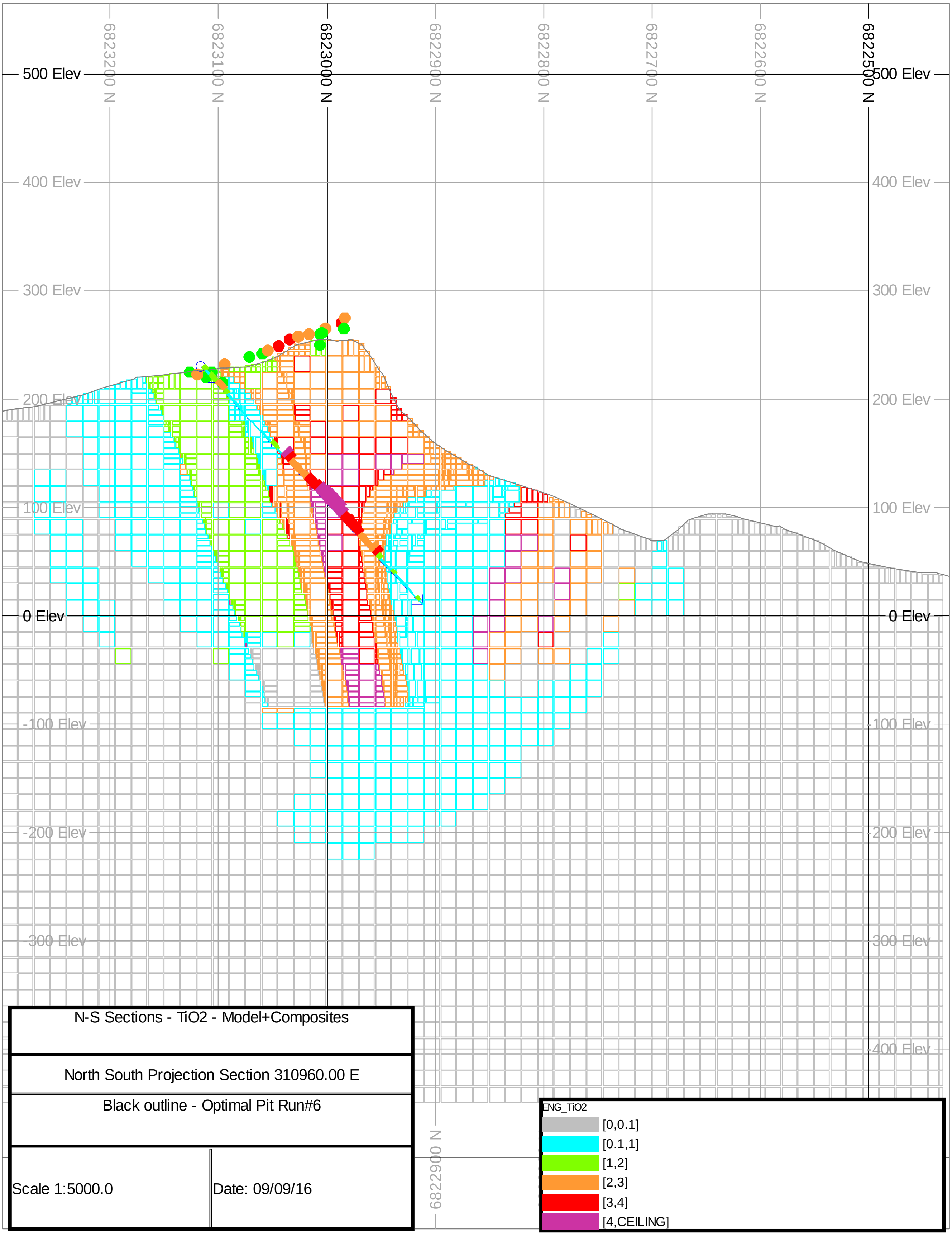
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North South Projection Section 310960.00 E
Black outline - Optimal Pit Run#6
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Date: 09/09/16
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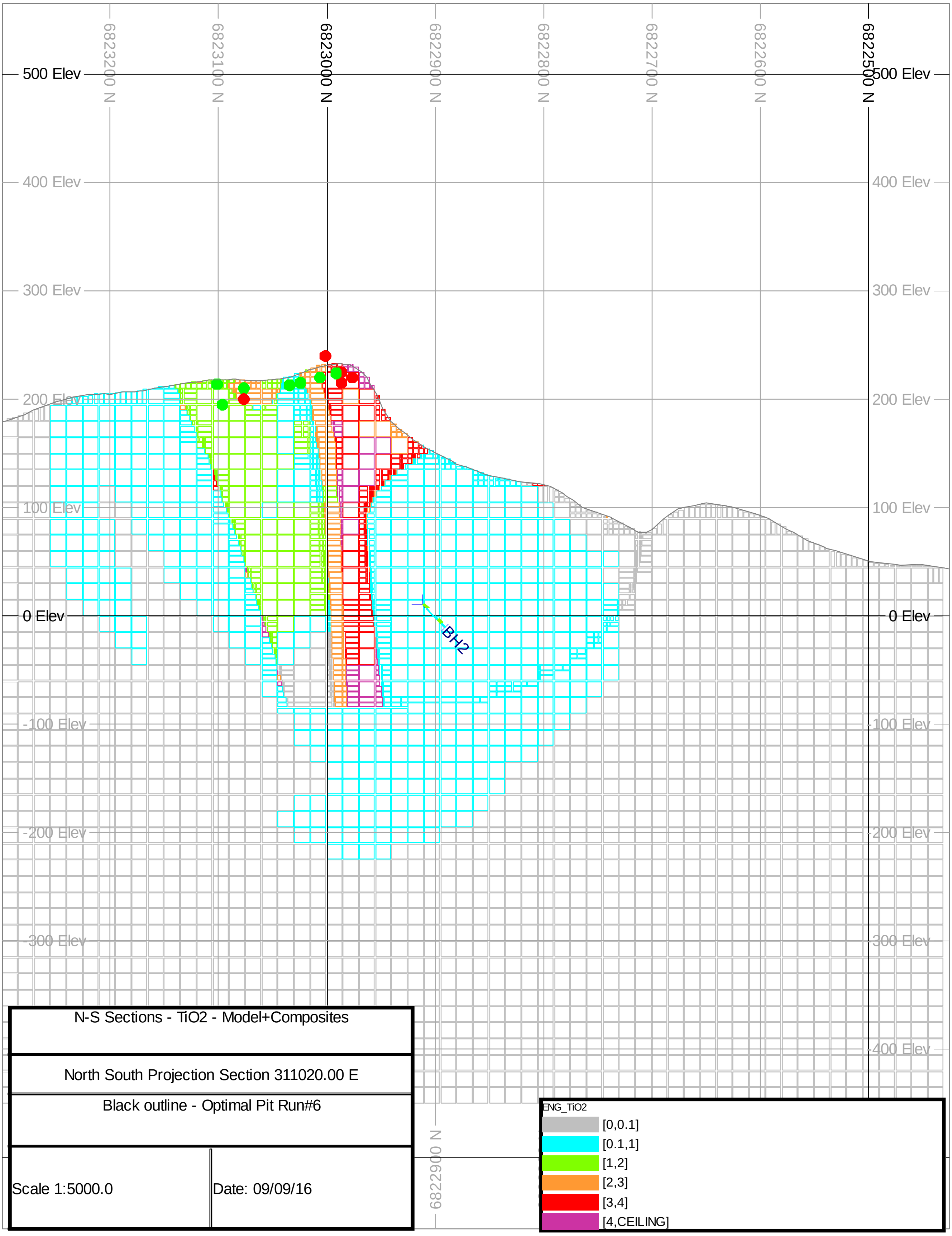
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400 Elev
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200 Elev
100 Elev
0 Elev
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BH2
N-S Sections - TiO2 - Model+Composites
North South Projection Section 311020.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
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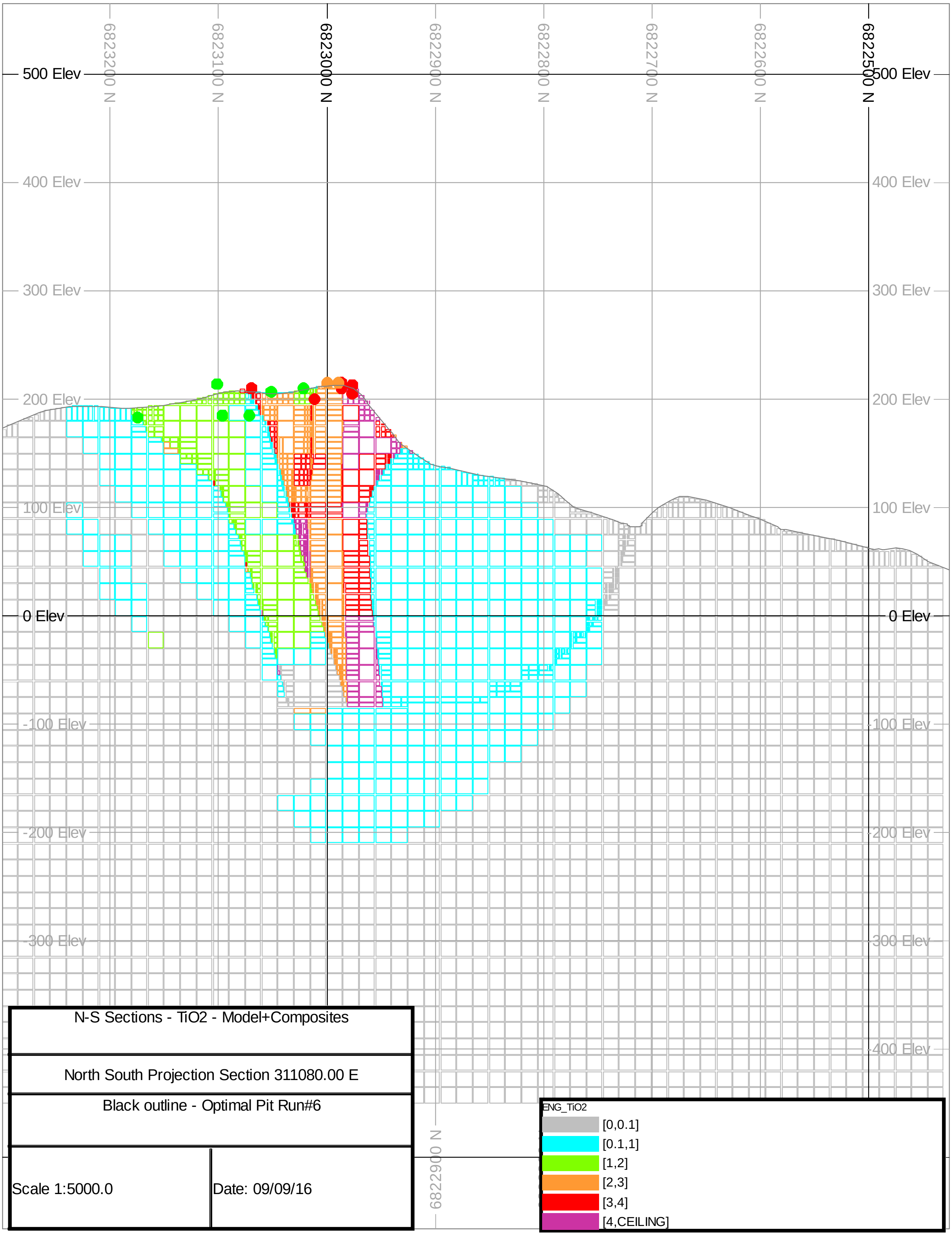

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-100 Elev
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-400 Elev
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6823000 N
6822900 N
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6822500 N
N-S Sections - TiO2 - Model+Composites
North South Projection Section 311080.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
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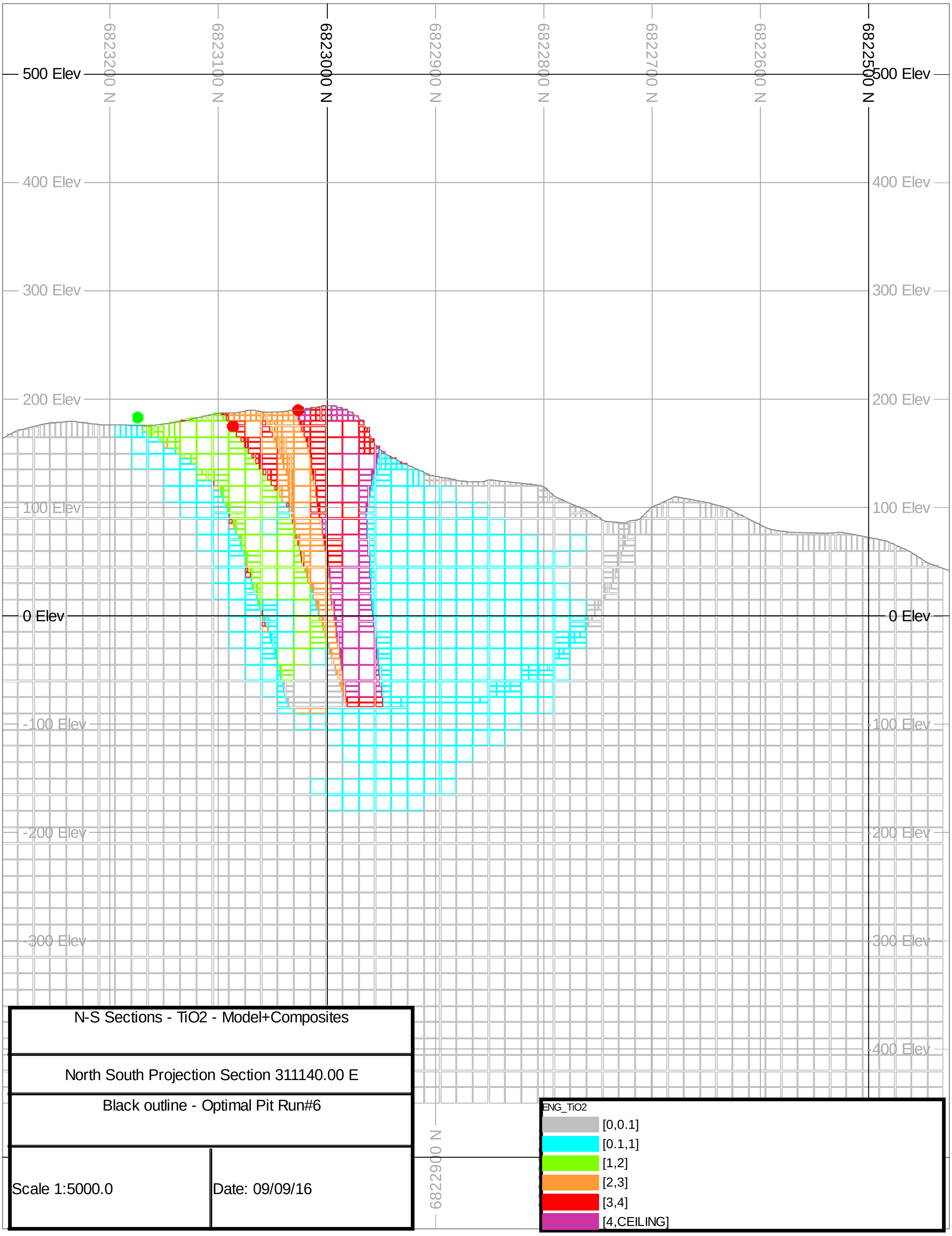

N-S Sections - TiO2 - Model+Composites	
North South Projection Section 311140.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 09/09/16

ENG_TiO2
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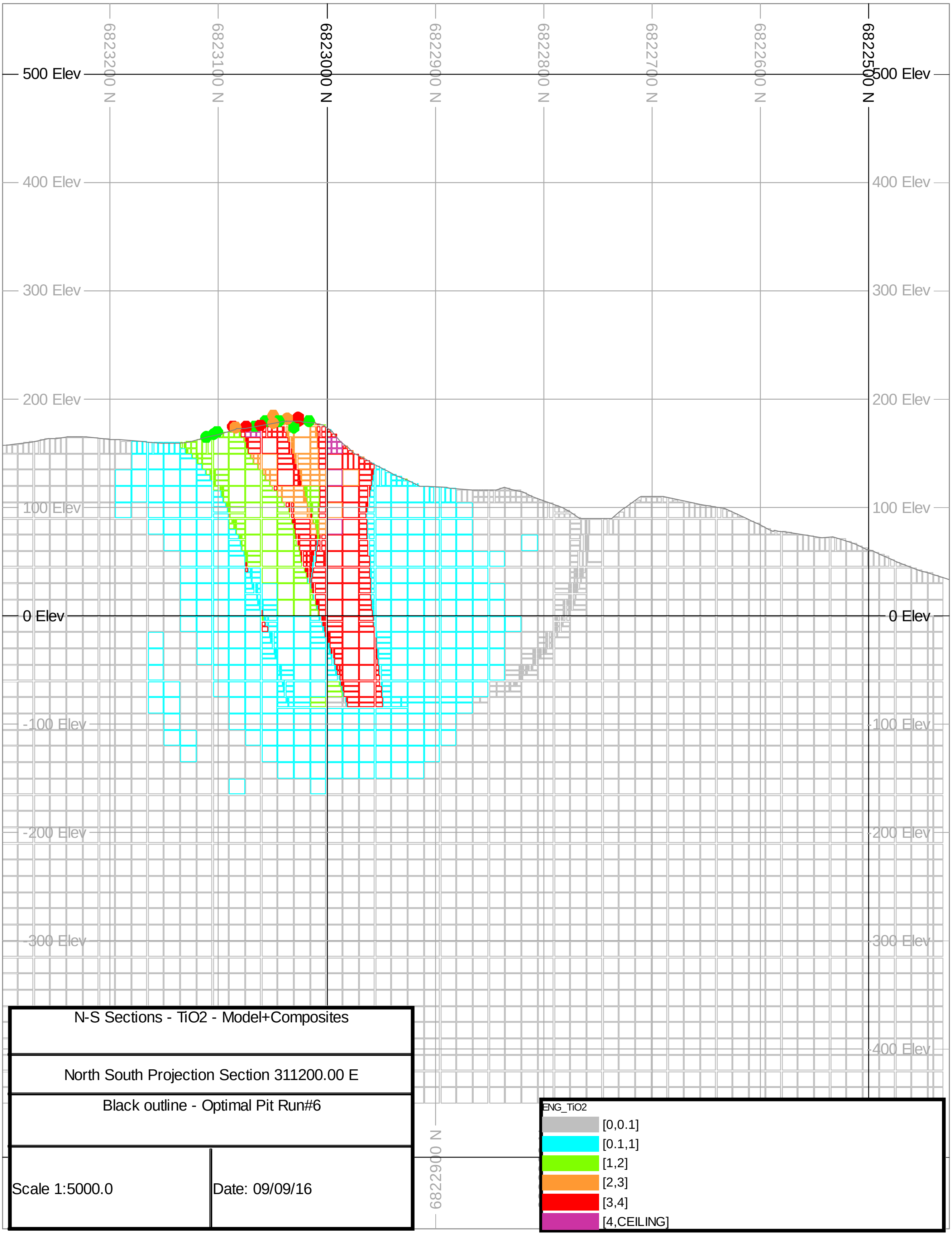
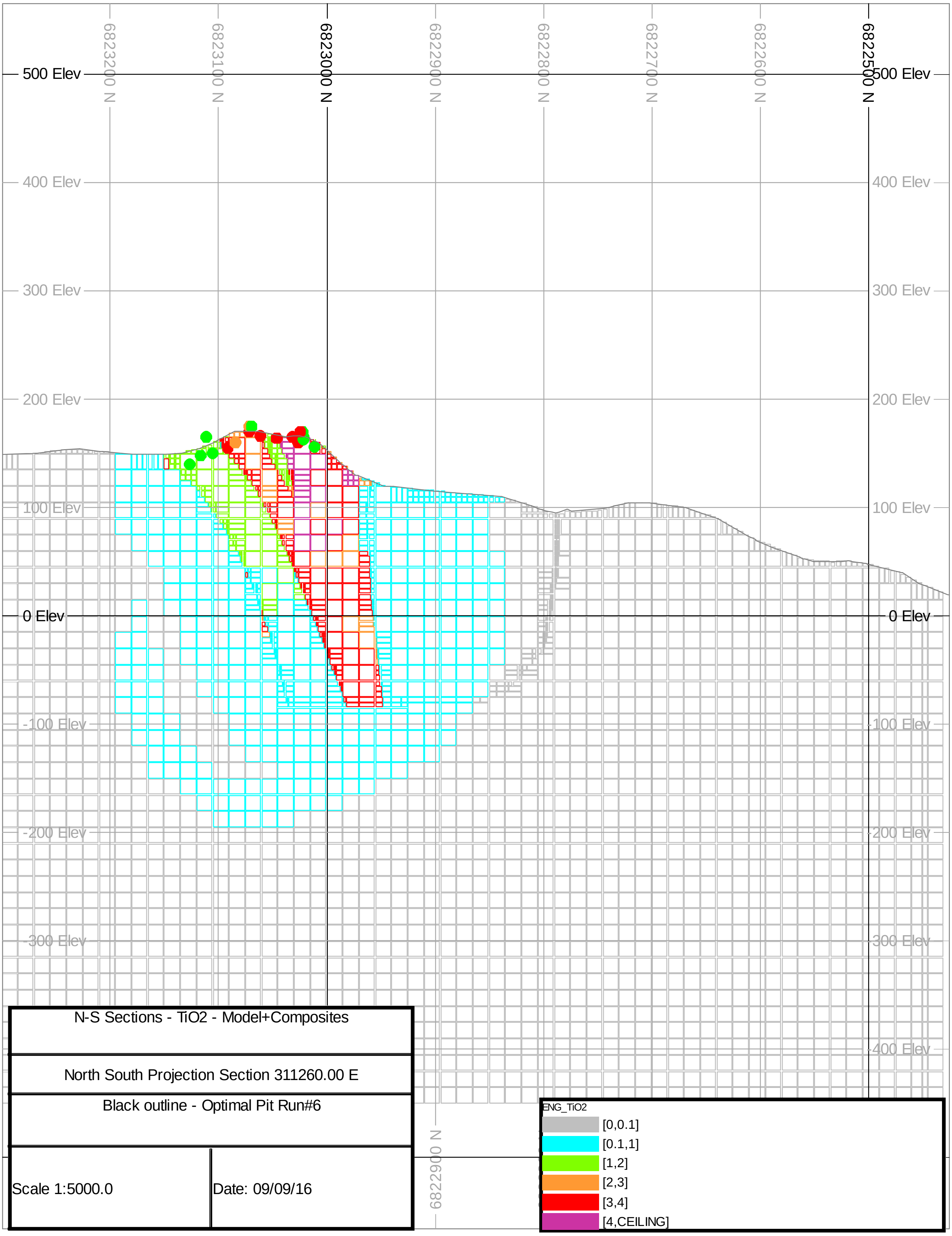


N-S Sections - TiO2 - Model+Composites	
North South Projection Section 311200.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 09/09/16



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N-S Sections - TiO2 - Model+Composites
North South Projection Section 311260.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
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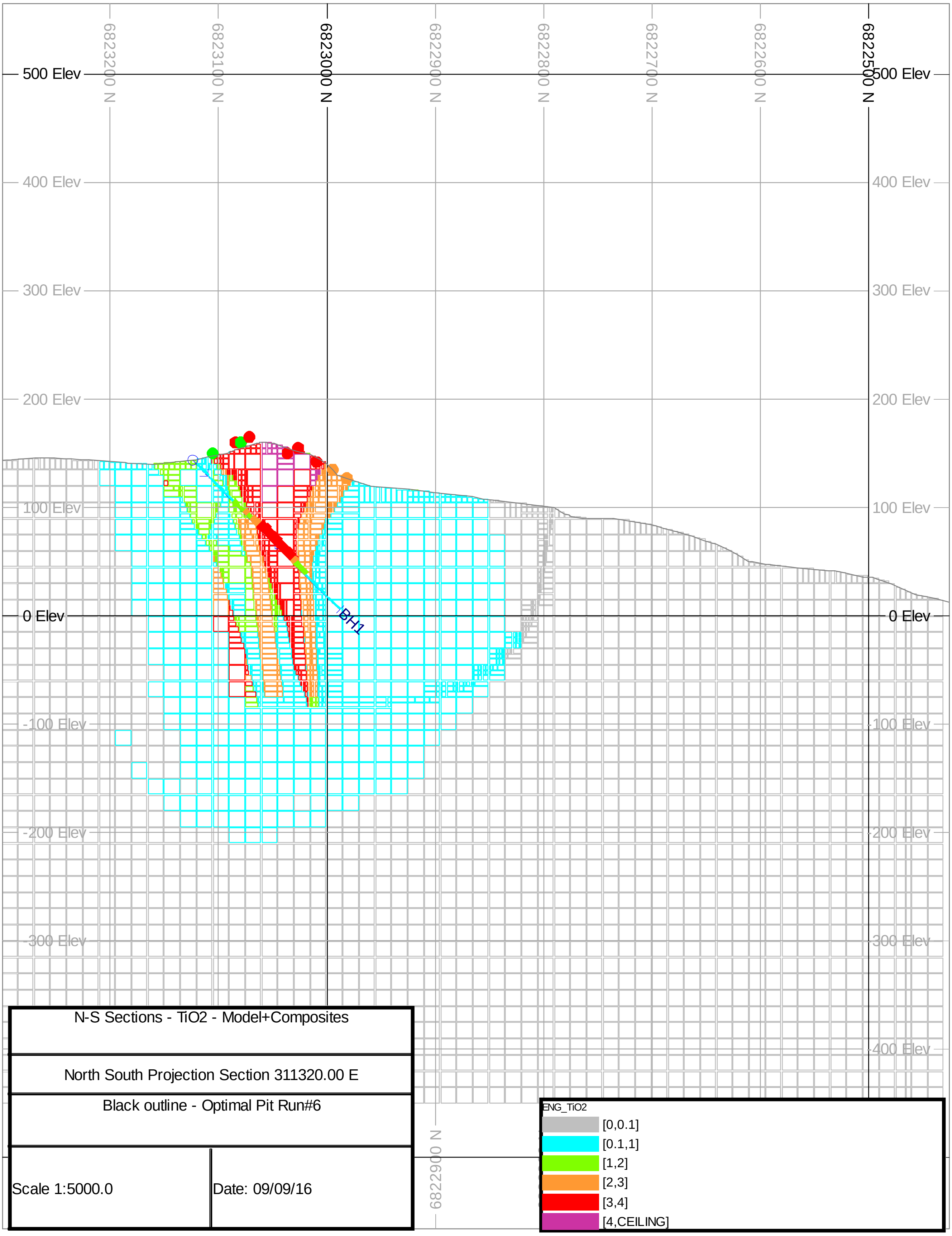

N-S Sections - TiO2 - Model+Composites	
North South Projection Section 311320.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 09/09/16

ENG_TiO2

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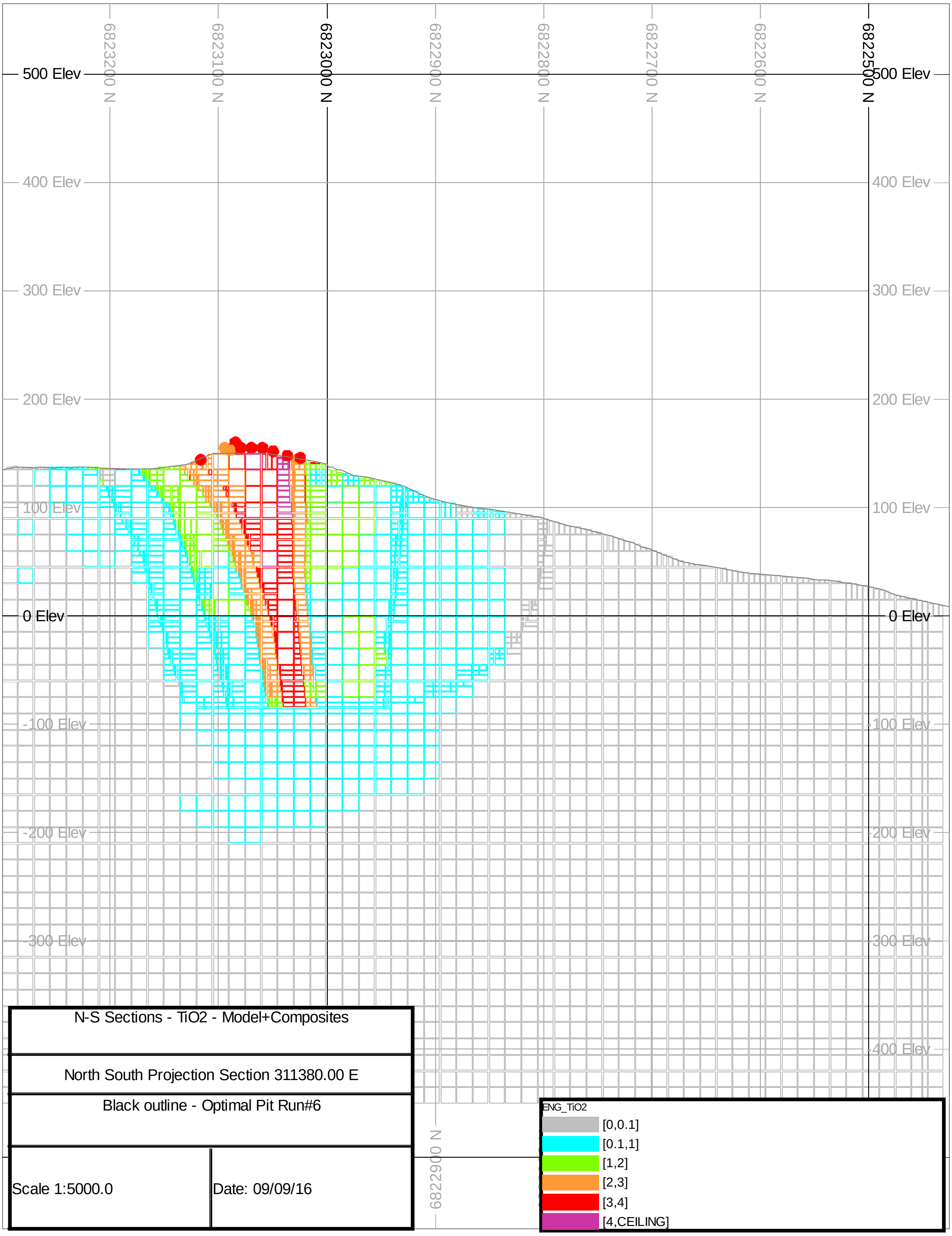
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0 Elev
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-400 Elev
N-S Sections - TiO2 - Model+Composites
North South Projection Section 311380.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
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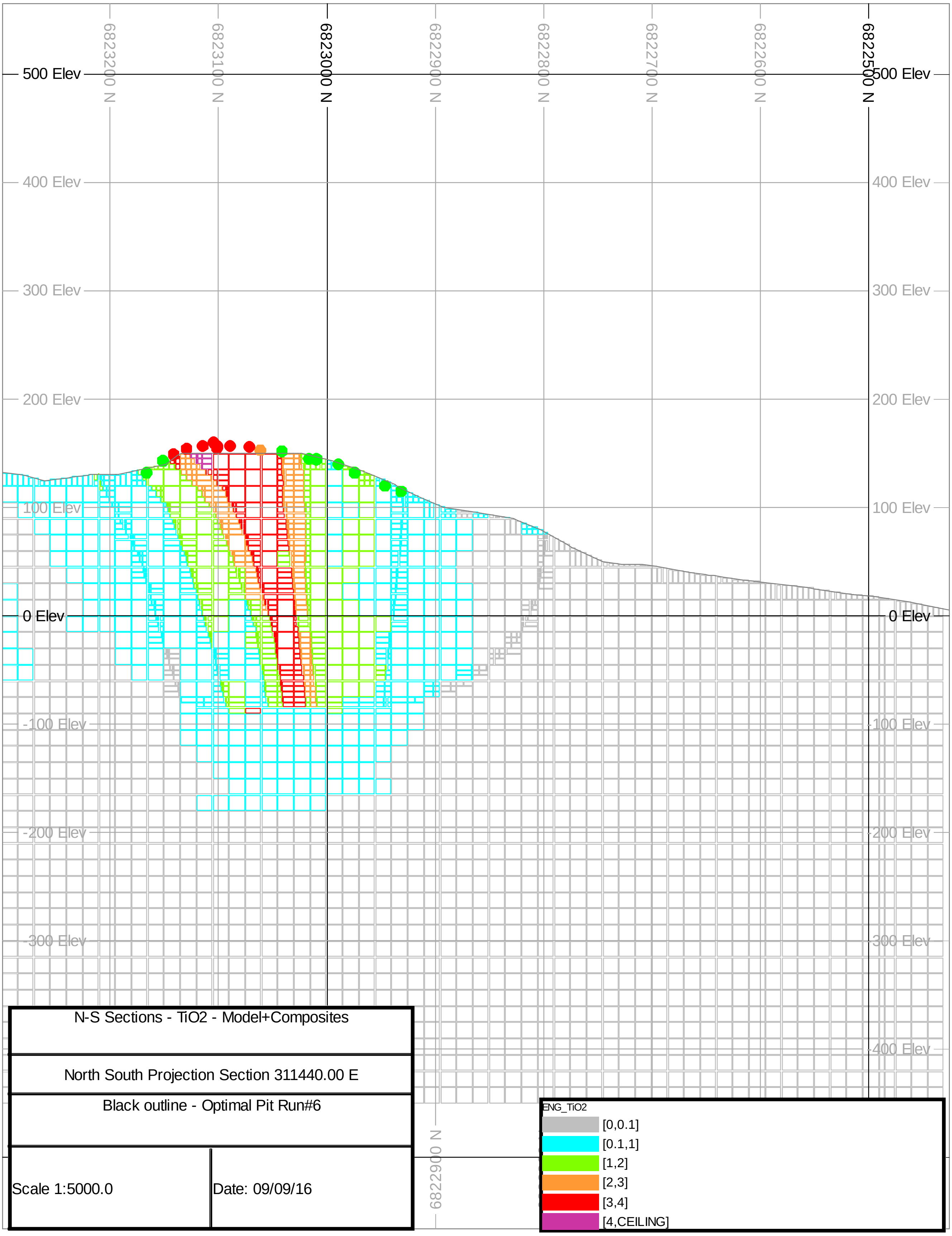

N-S Sections - TiO2 - Model+Composites

North South Projection Section 311440.00 E

Black outline - Optimal Pit Run#6

Scale 1:5000.0

Date: 09/09/16

ENG_TiO2
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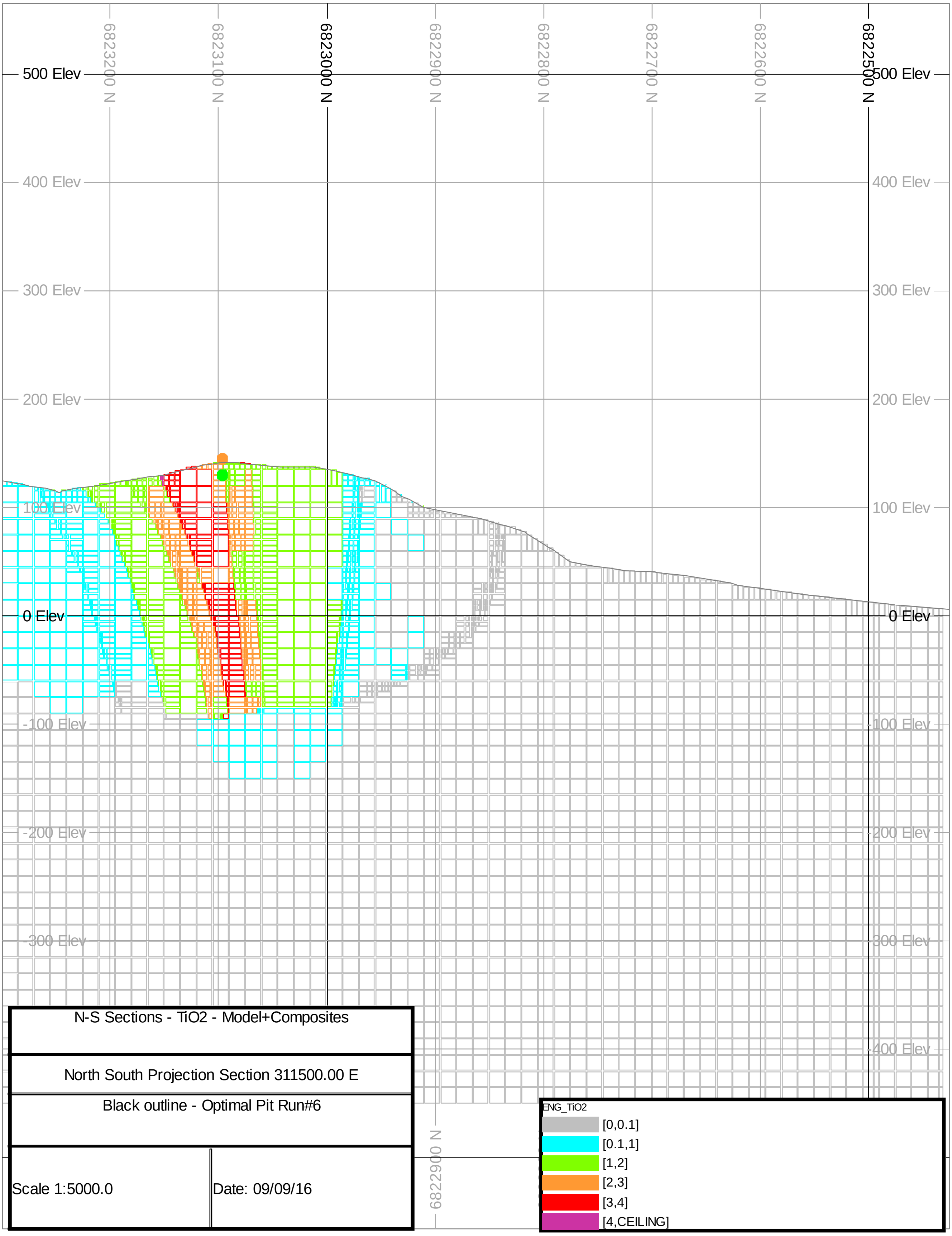
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200 Elev
100 Elev
0 Elev
-100 Elev
-200 Elev
-300 Elev
-400 Elev
N-S Sections - TiO2 - Model+Composites
North South Projection Section 311500.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
ENG_TiO2
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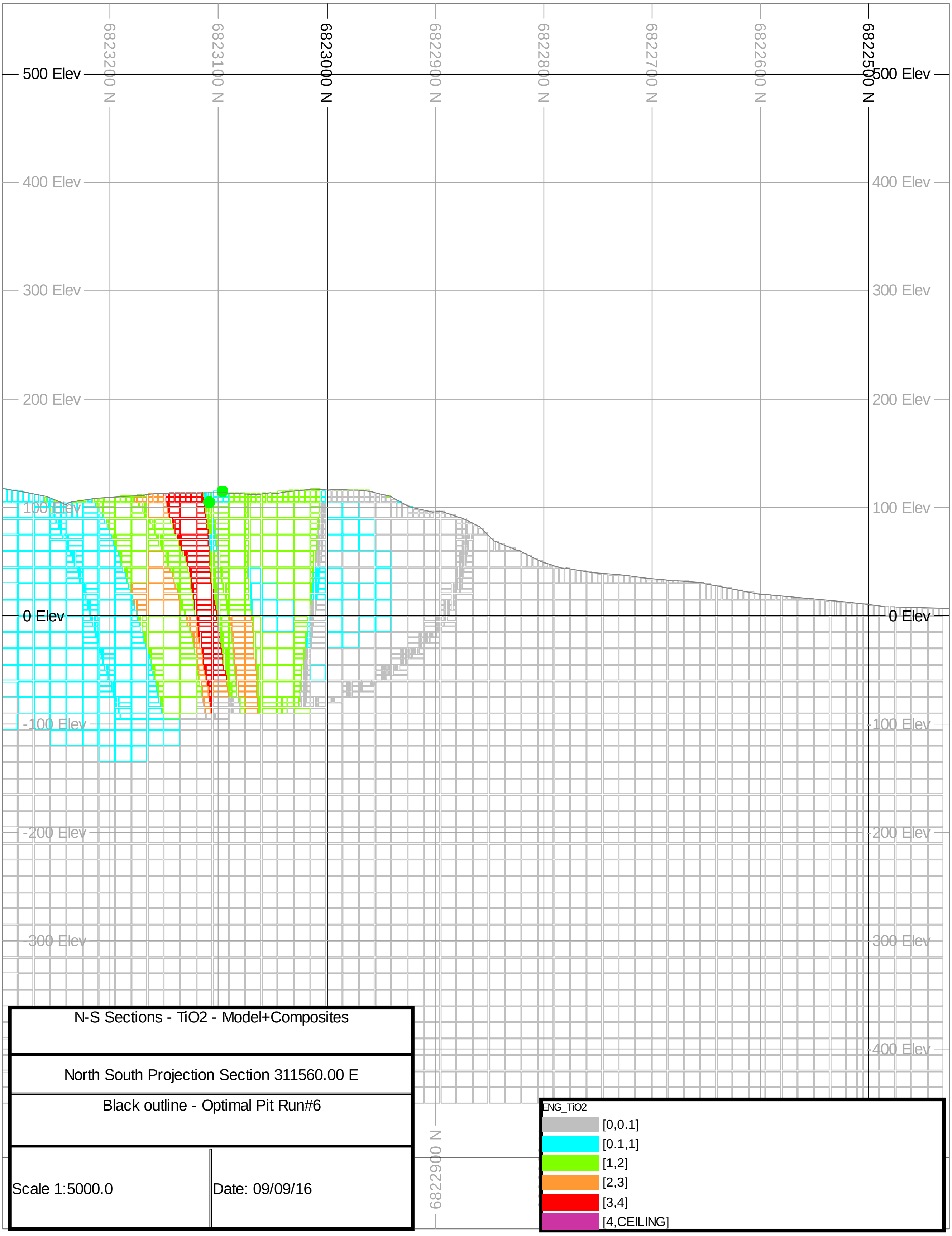
[0.1,1]
[1,2]
[2,3]
[3,4]
[4,CEILING]



N-S Sections - TiO2 - Model+Composites	
North South Projection Section 311560.00 E	
Black outline - Optimal Pit Run#6	
Scale 1:5000.0	Date: 09/09/16

ENG_TiO2

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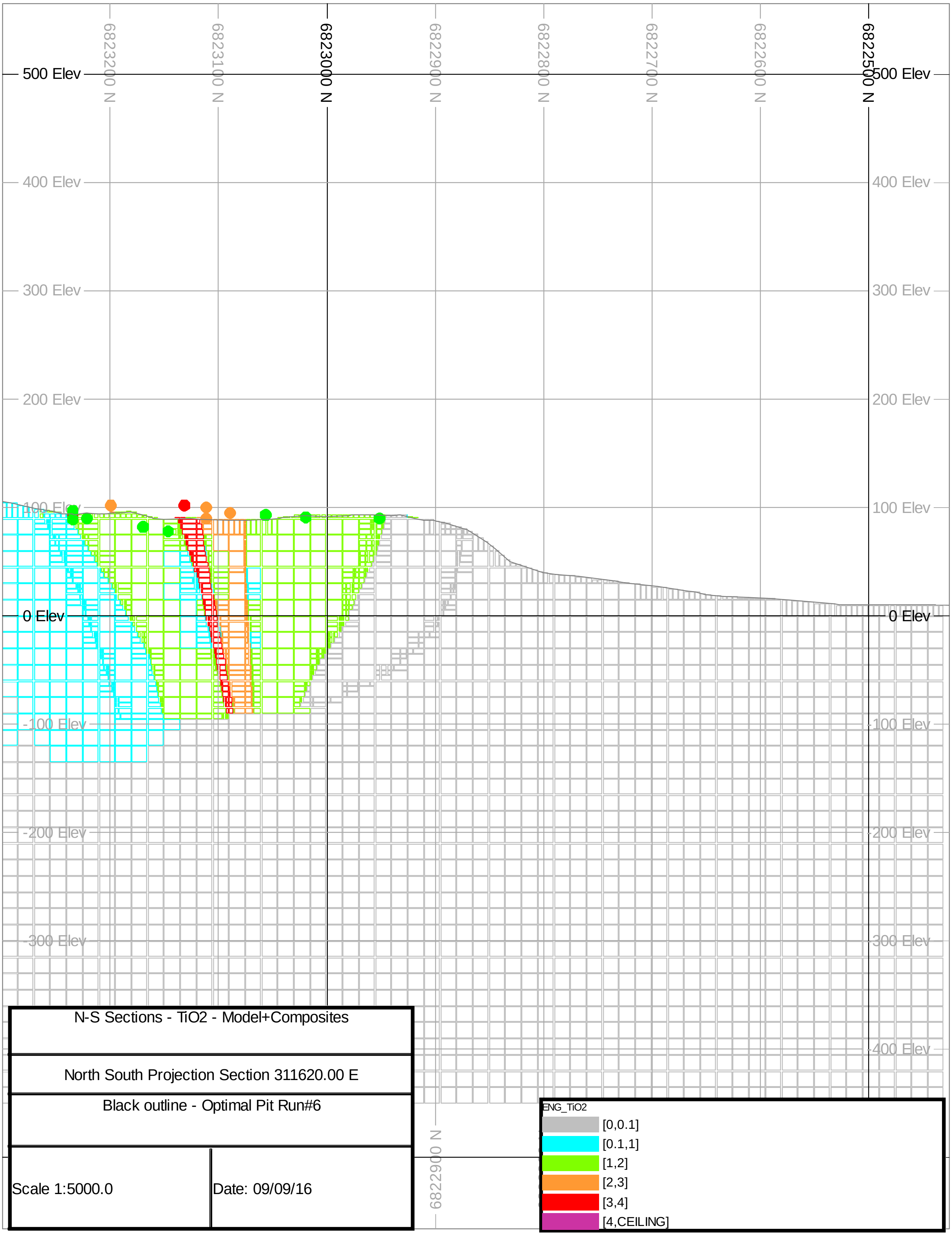
- [1,2]
- [2,3]
- [3,4]
- [4,CEILING]


6823200 N
6823100 N
6823000 N
6822900 N
6822800 N
6822700 N
6822600 N
6822500 N
500 Elev
400 Elev
300 Elev
200 Elev
100 Elev
0 Elev
-100 Elev
-200 Elev
-300 Elev
-400 Elev
N-S Sections - TiO2 - Model+Composites
North South Projection Section 311620.00 E
Black outline - Optimal Pit Run#6
Scale 1:5000.0
Date: 09/09/16
ENG_TiO2
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[0.1,1]
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[2,3]
[3,4]
[4,CEILING]