CSA Global
Mining Industry Consultants
an ERM Group company

NI 43-101 TECHNICAL REPORT

Mineral Resource and Mineral Reserve Update

Chelopech Mine Chelopech, Bulgaria

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Effective Date: 30 March 2020

Report prepared for

Client Name	Dundee Precious Metals Inc.
Project Name/Job Code	Chelopech – DPMRES18
Contact Name	Ross Overall
Contact Title	Corporate Mineral Resource Manager
Office Address	26 Bacho Kiro Street, 3rd Floor, Sofia 1000, Bulgaria

Report issued by

CSA Global Office	**CSA Global (UK) Limited** (UK Office) Suite 2, First Floor, Springfield House, Springfield Road Horsham, West Sussex RH12 2RG UNITED KINGDOM T +44 1403 255 969 F +44 1403 240 896 E csauk@csaglobal.com
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Author, Qualified Person and Reviewer Signatures

Coordinating Author:	Maria O'Connor (QP) MAusIMM, MAIG	Signature:	*"signed and sealed"*
Coordinating Author:	Karl van Olden (QP) FAusIMM	Signature:	*"signed and sealed"*
Contributing Author:	Petya Kuzmanova (QP) MIMMM, CSci	Signature:	*"signed and sealed"*
Contributing Author:	Gary Patrick (QP) MAusIMM, CP (Met)	Signature:	*"signed and sealed"*
Peer Reviewer:	Galen White FAusIMM, FGS	Signature:	*"signed and sealed"*
CSA Global Authorisation:	Galen White FAusIMM, FGS	Signature:	*"signed and sealed"*

Purpose of this document

This Report was prepared for Dundee Precious Metals Inc. ("the Client") by CSA Global (UK) Limited ("CSA Global"). The quality of information, conclusions, and estimates contained in this Report are consistent with the level of the work carried out by CSA Global to date on the assignment, in accordance with the assignment specification agreed between CSA Global and the Client.

Notice to third parties

CSA Global has prepared this Report having regard to the needs and interests of the Client, for the purposes of the Client's reporting in accordance with NI 43-101 (as defined herein). This Report is not designed for any other person's needs or interests. Third party needs, and interests may be distinctly different to the Client's needs and interests, and the Report may not be sufficient nor fit or appropriate for the third party.

Results are estimates and subject to change

The interpretations and conclusions reached in this Report are based on current scientific understanding and the best evidence available to the authors at the time of writing. It is the nature of all scientific conclusions that they are founded on an assessment of probabilities and, however high these probabilities might be, they make no claim for absolute certainty.

The ability of any person to achieve forward-looking production and economic targets is dependent on numerous factors that are beyond CSA Global's control and that CSA Global cannot anticipate. These factors include, but are not limited to, site-specific mining and geological conditions, management and personnel capabilities, availability of funding to properly operate and capitalise the operation, variations in cost elements and market conditions, developing and operating the mine in an efficient manner, unforeseen changes in legislation and new industry developments. Any of these factors may substantially alter the performance of any mining operation.

Certificate of Qualified Person – Maria O'Connor

As a Qualified Person of this Technical Report on the Chelopech Mine of Dundee Precious Metals - Chelopech, Bulgaria, I, Maria O'Connor do hereby certify that:

1. I am a Principal Resource Geologist of CSA Global (UK) Limited and completed this work for CSA Global (UK) Limited, Springfield House, Suite 2 First Floor, Horsham, West Sussex, RH12 2RG, United Kingdom, telephone: (+44) 1403 255 969, email: csauk@csaglobal.com.
2. The Technical Report to which this certificate applies is titled "NI 43-101 Technical Report, Mineral Resource and Mineral Reserve Update, Chelopech Mine, Chelopech, Bulgaria" with an effective date of 30 March 2020.
3. I hold a BSc degree in Environmental Geochemistry from University College Dublin (2004) and am a registered Member in good standing of the Australian Institute of Geologists (AIG Membership Number 5931). I am familiar with NI 43-101 and, by reason of education, experience in the exploration, evaluation of high sulphide epithermal systems, and of mineral deposits in Europe, Australia and Africa, and professional registration; I fulfil the requirements of a Qualified Person as defined in NI 43-101. My experience includes over 15 years in geology and resource evaluation.
4. I have personally inspected the property that is the subject of this Technical Report mumerous times, the most recent inspection being between 11 and 12 November 2019.
5. I am responsible for Sections 1 to 9, 12, 14, 23 and 25 to 27 of this Technical Report.
6. I am independent of the issuer as described in Section 1.5 of NI 43-101.
7. I have had prior involvement with the property that is the subject of this Technical Report, in relation to the preparation of an NI 43-101 Technical Report titled "NI43-101 Technical Report, Mineral Resource and Mineral Reserve Update, Chelopech Mine, Bulgaria", report number R191.2018, with an effective date of 28 March 2018.
8. I have read NI 43-101 and the sections of the Technical Report I am responsible for have been prepared in compliance with NI 43-101.
9. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of Technical Report that I am responsible for contain all scientific and technical information that is required to be disclosed to make this report not misleading.

Dated this 30th day of March 2020.

"signed and sealed"

Maria O'Connor BSc (Hons), MAIG
Manager Resources - EMEA
CSA Global (UK) Limited

Certificate of Qualified Person – Karl van Olden

As a Qualified Person of this Technical Report on the Chelopech Mine of Dundee Precious Metals - Chelopech, Bulgaria, I, Karl van Olden do hereby certify that:

1. I am a Principal Consultant and Manager-Mining for CSA Global Pty Ltd, Level 2, 3 Ord Street, West Perth, Western Australia, 6005, Australia, telephone: +61 8 9355 1677, email: csaaus@csaglobal.com.
2. The Technical Report to which this certificate applies is titled "NI 43-101 Technical Report, Mineral Resource and Mineral Reserve Update, Chelopech Mine, Chelopech, Bulgaria" with an effective date of 30 March 2020.
3. I hold a BSc Engineering degree in Mining from the University of the Witwatersrand, Johannesburg. I am a Fellow of the Australasian Institute of Mining and Metallurgy. I am familiar with NI 43-101 and, by reason of education, experience in the evaluation and mining of vein hosted mineral deposits in, Africa and Australia, and professional registration; I fulfil the requirements of a Qualified Person as defined in NI 43-101. My work experience includes 28 years in the mining industry.
4. I completed a personal inspection of the property that is the subject of this Technical Report, between 19th and 23rd of February 2018 for a total of 4 days.
5. I am responsible for Sections 15 and 16, 18 to 22 and 24 of this Technical Report.
6. I am independent of the issuer as described in Section 1.5 of NI 43-101.
7. I have had prior involvement with the property that is the subject of this Technical Report, in relation to the preparation of an NI43-101 Technical Report titled "NI43-101 Technical Report, Mineral Resource and Mineral Reserve Update, Chelopech Mine, Bulgaria", report number R191.2018, with an effective date of 28 March 2018.
8. I have read NI 43-101, and the sections of the Technical Report I am responsible for have been prepared in compliance with NI 43-101.
9. As of the effective date of the Technical Report to the best of my knowledge, information and belief, the sections of Technical Report that I am responsible for contains all scientific and technical information that is required to be disclosed to make this report not misleading.

Dated this 30th day of March 2020.

"signed and sealed"

Karl van Olden BSc (Eng)(Mining), GDE, MBA, FAusIMM
Manager Mining
CSA Global Pty Ltd

Certificate of Qualified Person – Gary Patrick

As a Qualified Person of this Technical Report on the Chelopech Mine of Dundee Precious Metals - Chelopech, Bulgaria, I, Gary Patrick do hereby certify that:

1. I am a Senior Associate Metallurgist and carried out this assignment for CSA Global (UK) Limited, First Floor, Suite 2, Springfield House, Springfield Road, Horsham, West Sussex, RH12 2RG, United Kingdom, telephone: +44 1403 255 969, email: csauk@csaglobal.com.
2. The Technical Report to which this certificate applies is titled "NI 43-101 Technical Report, Mineral Resource and Reserve Update, Chelopech Mine, Chelopech, Bulgaria" and is dated effective 30 March 2020.
3. I hold a BSc. (Chemistry/Extractive Metallurgy) and am a registered Member of the AusIMM (CP, #108090). I am familiar with NI 43-101 and, by reason of education, experience in exploration, evaluation and mining of gold deposits and professional registration; I fulfil the requirements of a Qualified Person as defined in NI 43-101. My experience includes 25 years in operations, metallurgical testwork supervision, flowsheet development, and study work.
4. I have not visited or completed a personal inspection of the property that is the subject of this Technical Report.
5. I am responsible for Sections 13, 17 of this Technical Report.
6. I am independent of the issuer as described in Section 1.5 of NI 43-101.
7. I have had no prior involvement with the property that is the subject of this Technical Report.
8. I have read NI 43-101, and the sections of the Technical Report I am responsible for have been prepared in compliance with NI 43-101.
9. As of the effective date of the Technical Report to the best of my knowledge, information and belief, the sections of Technical Report that I am responsible for contains all scientific and technical information that is required to be disclosed to make this report not misleading.

Dated this 30th day of March 2020.

"signed and sealed"

Gary Patrick, BSc., MAusIMM, CP (Met)
Senior Associate Metallurgist
CSA Global (UK) Limited

Certificate of Qualified Person – Petya Kuzmanova

As a Qualified Person of this Technical Report on the Chelopech Mine of Dundee Precious Metals - Chelopech, Bulgaria, I, Petya Kuzmanova do hereby certify that:

1) I hold the position of Senior Resource Geologist, of Dundee Precious Metals Chelopech, 2070 Chelopech village, Sofia District, Bulgaria.
2) The Technical Report to which this certificate applies is titled "NI 43-101 Technical Report, Mineral Resource and Reserve Update, Chelopech Mine, Chelopech, Bulgaria" with an effective date of 30 March 2020.
3) I hold a MSc (Economic Geology) degree from Mining and Geology University, Sofia. I am a Chartered Professional Member of the institute of Materials, Minerals and Mining (CSci, MIMMM), Membership Number IOM/112/000534). I am familiar with NI 43-101 and, by reason of education, experience in underground mining, resource geology, exploration and geologic grade control; I fulfil the requirements of a Qualified Person as defined in NI 43-101. My work experience includes 16 years in the mining industry.
4) I have been involved with the project since 2004, and am currently employed by DPMC as Senior Resource Geologist and thereby have completed personal inspections, being based at the mine.
5) I am responsible for the following sections of this Technical Report; Sections 10 and 11.
6) I am not independent of the issuer as described in Section 1.5 of NI 43-101, being currently employed by Dundee Precious Metals Inc.
7) I have current involvement with the property that is the subject of this Technical Report as Senior Resource Geologist. My involvement with the project includes geological supervision, leading of exploration and grade control drilling, preparing the Mineral Resource estimate and guidance to the on-site technical team in the areas of technical procedures and standards.
8) I have read NI 43-101, and the sections of the Technical Report I am responsible for have been prepared in compliance with NI 43-101.
9) As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the parts of Technical Report that I am responsible for contain all scientific and technical information that is required to be disclosed to make this report not misleading.

Dated this 30th day of March 2020.

"signed and sealed"

Petya Kuzmanova MSc, MIMMM.
Senior Resource Geologist
Dundee Precious Metals Chelopech

Contents

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List of Abbreviations

%	percent
°	degrees
°C	degrees Celsius
€	Euros
µm	micrometer, or 0.000001m
1D, 2D, 3D	one-dimensiona, two-dimensional, three-dimensional (model or data)
AAS	atomic absorption spectrometry
Ag	Silver (grade measured in parts per million)
As	Arsenic (grade measured in parts per million)
ASD	analytical spectral device
Au	Gold (grade measured in parts per million)
AuEq	gold equivalent
BGN	Bulgaria's local currency, the Lev which is pegged to the Euro
CC	Correlation Coefficient
CCPC	Chelopech Copper Processing Company
CDA	Canadian Dam Association
CEFTA	Central European Free Trade Associated
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
CITA	Corporate Income Tax Act
cm	centimetre(s)
CMP	Control and Monitoring Plan
CPT	cone penetration testing
CRM	certified reference material
CSA Global	CSA Global (UK) Limited
Cu	Cu (total copper grade as a % of the sample mass, sometimes written as TCu)
CV	Coefficient of Variation; in statistics, the normalised variation value in a sample population
DCIP	Direct Current Induced Polarisation
DDP	Detailed Design Permit
DPM	Dundee Precious Metals Inc.
DPMC	Dundee Precious Metals Chelopech
DPMT	Dundee Precious Metals Tsumeb (Pty) Ltd
DTM	digital terrain model (three-dimensional wireframe surface model, e.g. topography)
E (X)	Easting. Coordinate axis (X) for meter based Projection, typically UTM. Refers specifically to meters east of a reference point (0,0)
EBITDA	earnings before interest tax, depreciation and amortisation
EFTA	European Free Trade Associated
EIA	Environmental Impact Assessment
EMIT	electromagnetic imaging technology
EU	European Union
EV	expected value
g	gram(s)
g/m³	grams per cubic metre
g/t	grams per tonne

GAAP	Generally Accepted Accounting Principles
GDP	gross domestic product
GIMS	Geological Information Management System
HQ2	Size of diamond drill rod/bit/core
hr	hours
ICP-MS	Inductively Coupled Plasma-Mass Spectrometry
ICP-OES	Inductively Coupled Plasma-Optical Emission Spectrometry
IFRS	International Financial Reporting Standards
IPA	Investment Promotion Act
IRR	Internal rate of return
ISO	International Standards Organisation
JK	JKTech (dropweight tests)
JORC	Joint Ore Reserves Committee (The AusIMM)
kg	kilogram(s)
kg/t	kilogram per tonne
klb	thousand pounds
km, km^2	kilometre(s), square kilometre(s)
KNA	kriging neighbourhood analysis
koz	thousand ounces
kt	kilotonnes (or thousand tonnes)
ktpa	kilotonnes (or thousand tonnes) per annum
kW	kilowatts
kWh	Kilowatt-hour
kWhr/t	kilowatt hours per tonne
L/hr/m^2	litres per hour per square metre
lb	pound(s)
LDL	lower detection limit
LHOS	long-hole open stoping (method of underground mining)
LiDAR	light detection and ranging (survey)
LM2	Labtechnics 2 kg (nominal) pulverising mill
LME	London Metal Exchange
LOD	limit of detection
LOM	life of mine
M	million(s)
m, m^2, m^3	metre(s), square metre(s), cubic metre(s)
m^3/s	cubic metres per second
Ma	million years
masl	metres above sea level
mBD	metres Below Datum
MCE	maximum credible earthquake
MD&A	Management's Discussion and Analysis
mE	metres East
mg	milligram(s)
ml	millilitre(s)
Mlb	million pound

mm	millimetre
mN	metres North
MoE	Ministry of Energy
MoEET	Ministry of Economics, Energy and Tourism
MoEW	Ministry of Environment and Water
Moz	million ounces
MRE	Mineral Resource estimate
mRL	metres Relative Level
MSC	management system control
Mt	million tonnes
MT	magnetotellurics
Mtpa	million tonnes per annum
MWMP	Mine Waste Management Plan
N (Y)	Northing. Coordinate axis (Y) for meter based Projection, typically UTM. Refers specifically to meters north of a reference point (0,0)
Navan	Navan Chelopech AD
NI 43-101	National Instrument 43-101 Standards of Disclosure for Mineral Projects
NPV	net present value or net present worth (NPW)
NQ	A diamond drill core diameter of 75.7 mm (outside of bit) and 47.6 mm (inside of bit)
NSR	net smelter return
OBE	operational basis earthquake
Oreas	Ore Research and Exploration
oz	Troy ounce (31.1034768 grams)
P80 -75 µm	Measure of pulverisation. 80% passing 75 microns
PAX	potassium amyl xanthate
PEA	preliminary economic assessment
ppb	parts per billion
ppm	parts per million
psi	pounds per square inch
Q1, Q2, Q3, Q4	quarter 1, quarter 2, quarter 3, quarter 4
QAQC	quality assurance/quality control
QP	Qualified Person
Q-Q	quantile-quantile plot
RIEW	Regional Inspectorates of Environment and Water
RL (Z)	Reduced Level; elevation of the collar of a drillhole, a trench or a pit bench above the sea level
RMS	root mean squared
ROM	run of mine
RQD	rock quality designation
RSG	RSG Global
S	sulphur
SAG	semi-autogenous grinding
SD	standard deviation
SFR	staged flotation reactor
SG	specific gravity
SGE	Sofia Geological Exploration

SGS	Société Générale de Surveillance International laboratory group
SLC	sublevel caving
SPI	Sag Power Index
SPT	standard penetration testing
SQL	structured query language
SSF	sample submission form
t	tonnes
tpa	tonnes per annum
tpd	tonnes per day
tph	tonnes per hour
TMF	tailings management facility
™	Trademark
UCS	unconfined compressive strength
US$	United States of America dollars
VAT	Value added tax
w:o	waste to ore ratio
Wt%	Percentage by weight
WTO	World Trade Organization
WWTP	waste water treatment plant
XGC	Xiangguang Copper Co.

1 Summary

1.1 Introduction

CSA Global (UK) Limited (CSA Global), an ERM Group company, was requested by Dundee Precious Metals Chelopech (DPMC), a subsidiary of Dundee Precious Metals Inc. (DPM), to supervise, verify and validate the Mineral Resource estimate (MRE) and Mineral Reserve estimate for its Chelopech underground copper and gold mine. The change being reported in this NI 43-101 technical report is an update to the Mineral Resource and Mineral Reserve estimates previously reported by DPM. The authors of this Technical Report do not disclaim any responsibility for any of the scientific or technical data, including the Mineral Resource and Mineral Reserve estimates presented herein.

DPM is a public company headquartered in Toronto, Canada and is listed on the Toronto Stock Exchange (TSX: DPM). This report has been prepared for DPM to fulfil the requirements of National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101), as it relates to the estimation and reporting of Mineral Resources and Mineral Reserves situated on properties owned and controlled by DPM and its subsidiaries.

The MRE reported herein is current as at 31 December 2019 and has been used as the basis for estimating the Mineral Reserve estimate as outlined in this document, current as at 31 December 2019. The mined volumes used to deplete the Mineral Resource are as at 31 December 2019.

The MRE for Chelopech is reported in Table 2. The cut-off grade was selected considering the economic sensitivities of the mine and informed by current mining practices.

1.2 Reliance on Other Experts

The authors of this Technical Report have reviewed available DPM documentation relating to the mine and other public and private information as listed in Section 27 (References) at the end of this report. In addition, this information has been augmented by first-hand review and on-site observation and data collection conducted by the authors.

CSA Global is not qualified to provide extensive comment on legal nor environmental issues associated with the Chelopech mine. Assessment of these aspects has relied on information provided by senior managers from DPMC and its advisors who act as Qualified Persons (QPs) for the chapters listed in Section 2.3.

1.3 Property Description and Location

1.3.1 Summary

The Chelopech mine is situated adjacent to the village of the same name, in the Sofia District of Bulgaria, 75 km east of the capital, Sofia. It is situated approximately 470 km west of the Black Sea port of Burgas. The village is located at the foot of the Balkan Mountains, at an elevation of approximately 700 m above sea level. The mine area is bounded to the north by the foothills of the Balkan Range, to the east by a government-owned road maintenance organisation and residential housing, and by agricultural land to the south and west.

1.3.2 Mineral Rights and Tenement Description

The Mining Licence (Chelopech Concession) covers an area of 266 hectares which includes the area of the Chelopech deposit, where extraction and additional exploration area is allowed, and the areas for the additional auxiliary activities. Further exploration is allowed within the deposit boundaries storage only. DPMC has 100% ownership of the surface land upon which the facilities are constructed. DPMC operates under a Concession Contract signed with the Council of Ministers in 1999 granting concession rights to DPMC for a period of 30 years.

Surrounding the Mining Licence to the north, east and west is the exploration area called "Sveta Petka" covering around 4.8 km^2.

DPMC pays a royalty to the State in compliance with the terms under the Concession Agreement from 1999, which is 1.5% on the value of the payable metals (copper, gold and silver) mined determined as the product of the assayed gold and silver head grades in the actual ore tonnage mined and the arithmetic mean metal prices based on the London Metal Exchange (LME) price list for the preceding six-month period.

1.3.3 Environmental Liabilities

The first requirement for obtaining approval to undertake new or major expansion projects is the approval of the appropriate Environmental Impact Assessment (EIA) procedure. Approval of expansion and modernisation of mill and mine was done by environmental authorities with letter no. OBOC-1512/25.06.2010 by the Ministry of Environment and Water (MoEW).

There are no additional environmental requirements to the property other than the existence of the current mining infrastructure, namely the underground mine, processing plant, flotation tailings management facility (TMF), ancillary workshops and administration facilities. The amount of the financial guarantee for closure and rehabilitation of the site was determined, as part of the Closure and Rehabilitation Plan, initially completed and coordinated with the Regional Inspectorates of Environment and Water (RIEW), MoEW and MoEET (currently Ministry of Energy) in April and May 2010.

In December 2015, competent authorities approved and updated the Closure and Rehabilitation Plan with a revised value. The financial guarantee was separated in two bank guarantees – one for the mine and surface infrastructure and other for the TMF closure activities. In 2018, the Chelopech TMF overall Closure and Rehabilitation Plan was updated in connection with the TMF upgrade project to level 630. The plan was approved by the Ministry of Energy. In September 2018, the Chelopech TMF overall Closure and Rehabilitation Plan was updated with a revised value of €9.4 million. The mine and surface infrastructure closure bank guarantee remains at €6.3 million. In November 2019, the financial guarantees were renewed for a year.

1.3.4 Royalties

The royalty charged to the mine as per the Concession Agreement is calculated using the base formula of 1.5% of the combined values of the metals (copper, gold and silver) mined during the previous quarterly period.

1.3.5 Risks

To the extent known, the only risk the authors of this Technical Report are aware of that may affect access, licence title or the ability to perform work on the property is COVID-19.

Covid-19 as a circumstance is determined as Force majeure (FM) in concession and exploration contracts. The definition of FM is an extraordinary event or circumstance beyond the control of the Parties occurring after the effective date of the Agreement including an intervening act of God or public enemy, such as fire, epidemic, flooding, earthquake, unfavourable weather conditions or other natural disaster, hostile acts or environment arising from or relating to acts of war or active hostilities (whether declared or not), civil commotions, revolution, strike, riot or other public disorder, lockouts, etc.

If the Company cannot perform its concession and exploration obligations as a result of COVID-19, the Company shall promptly notify Ministry of Energy (ME). The performance of the affected obligations shall be suspended for the duration of the FM. Additional agreements in writing shall be concluded to make arrangement for the period of suspension.

1.4 Accessibility, Local Resources and Infrastructure

Access to the Chelopech mine is via sealed major roads from the national capital of Sofia, approximately 75 km to the west. The principal rail and road links between Sofia and the country's largest port, Burgas, located on the Black Sea pass through the village of Chelopech and the Chelopech mine.

There has been a strong history of mining in the local region around the mine, with several large mines producing concentrate to feed a copper smelter at Pirdop, which is 10 km from the mine site.

Chelopech is well resourced, due to its proximity to major roads and rail, powerlines, communication facilities, water sources and the town of Pirdop. The mine obtains power from the Bulgarian power grid and is permitted to obtain its water requirements from nearby storage facilities. The village of Chelopech, located approximately 1 km from the mine, has a population of approximately 1,700.

Chelopech lies at the base of a range of hills on gently undulating terrain. The plant site is located at approximately 730 m above sea level. The area has the climate of Subtropical Europe, featuring markedly higher winter and substantially lower summer precipitation. Winters are mild with -2°C average temperature, but during intensive cold spells temperatures may fall to -19°C. Summers are hot, reaching 36°C in warmer spells and exceeding 40°C in some locations. Mining operations are conducted all-year round.

1.5 History

The mineral potential of the Chelopech area was first recognised in the mid-19th century and the outcrop area was worked prior to the start of the Second World War. The mineral deposit was rediscovered in 1953, following drilling by Sofia Geological Exploration (SGE). Underground development began in late 1953 to gain bulk samples and to further evaluate the mineral deposit.

In 1990, the Bulgarian Government decreed that due to the high arsenic content, the concentrates could no longer be treated. In 1994, operations were restarted by Navan Bulgarian Mining BV, a Dutch registered subsidiary of Navan Mining Plc. Navan operated the Chelopech mine until late 2002, when Navan went into receivership. The operations continued under the direct control of an administrator appointed by Deutsche Bank AG of London. Mining operations continued whilst DPM negotiated the acquisition of the Bulgarian assets from Navan, including the mine.

The acquisition of Chelopech by DPM was completed in September 2003.

1.6 Geological Setting and Mineralisation

Bulgaria is located on the southeast part of the Balkan Peninsula, which lies within the Alpine geosynclinal belt. Late Cretaceous, island-arc type, magmatic evolution resulted in the formation of the Srednogorie volcanic intrusive zone. The Chelopech mineral deposit is located within the Panagyurishte metallogenic district, a central part of the Srednogorie zone.

The geology of the Panagyurishte metallogenic district comprises a basement of Precambrian granitoid gneisses intruded by Palaeozoic granites and overlain by Upper Cretaceous magmatic and sedimentary sequences. In some parts of the district, these rocks are overlain by upper Cretaceous to Palaeogene/Neogene foreland sediments.

Within the region, the Precambrian metamorphic basement consists of gneisses, amphibolites, and metasediments with the overlying Upper Cretaceous, volcano-sedimentary sequences hosting the Chelopech formation; the primary host to mineralisation. The Chelopech Formation reaches thicknesses of up to 2,000 m and consists of Lower and Upper units.

1.7 Deposit Types

Mineralisation is hosted within the Lower Chelopech Formation and is characterised by typical epithermal, high-sulphidation alteration. Alteration and mineralisation is typically zonal with central, high-grade units associated with well-developed stockworks and massive sulphide mineralisation. These units are surrounded by lower grade haloes dominated by disseminated sulphides and pervasive silica overprinting. These two zones are respectively referred to as "Stockwork" and "Silica Envelopes" and are used as hard boundaries during the estimation of Mineral Resources.

The mineralisation occurs in a range of different morphologies, including lens-like, pipe-like and columnar bodies that typically dip steeply towards the south. In gross terms, about 45% of the copper is in the form of arsenides and sulfosalts, 50% as chalcopyrite and 5% as oxides. Gold occurs in a variety of forms but is dominated by refractory species and is typically fine-grained averaging 5–20 microns in diameter.

The epithermal class of deposits, including Chelopech, were originally classed as "massive sulphide copper pyrite deposits". Recent studies indicate that an epigenetic origin for the mineralisation formed by the replacement of volcanic rocks is more suitable (Chambefort, 2005).

1.8 Exploration

Given the long exploration and operational history at Chelopech, a variety of drilling and sampling methods have been implemented (Table 1).

Table 1: Pre-DPMC and DPMC drill exploration and operational statistics (as at 30 September 2019)

Data type	Number of drillholes	Total metres
Pre-DPMC surface drillholes	448	267,177
Pre-DPMC underground drillholes	717	55,672
DPMC surface drillholes	134	64,157
DPMC underground drillholes	2,972	636,341
TOTAL	**4,271**	**1,023,347**
Total Pre-DPMC	**1,165**	**322,849**
Total DPMC	**3,106**	**700,498**

Geophysical surveys at Chelopech include:

- In the near mine area, the Sveta Petka exploration licence has been investigated during various ground magnetic survey campaigns since 2008. Scintrex and GEM magnetometers were used by different contractors to conduct the surveys. The resultant grids were joined together, processed with Geosoft and a three-dimensional (3D) UBC magnetic model calculated.
- A total of 468 gravity survey points were measured in the Sveta Petka and Mining Concession areas. A 200 m x 200 m base grid was used with infill points over selected anomalous areas.
- Additionally, a complete Bouguer anomaly map was calculated using a combined (light detection and ranging (LiDAR) and digitised topography) DEM grid.
- Filtered gravity (residuals, upward continuation) were calculated and used to allocate areas with potential for presence of large massive sulphide bodies. A 3D UBC gravity inversion of a block model density distribution was calculated.
- A total of 148 full tensor of magnotelluric stations have been measured. The survey covers two blocks of Brevene exploration licence at an approximate grid of 250 m x 250 m. At the southern portion of the Brevene exploration licence, magnotelluric stations are allocated along line-section profiles.
- A 3D magnotelluric inversion of a block model of resistivity distribution has been calculated for the Western and Eastern blocks. A two-dimensional (2D) inversion model was also calculated along selected profiles. One-dimensional (1D) inversions were calculated for each station.
- Approximately 20 km^2 at Brevene exploration licence, surrounding Sveta Petka and Mining Concession were covered with airborne magnetic survey (Drone Mag) – total of 212.0 line-km along northeast-trending traverses at a nominal line spacing of 100 m. New results were merged with previous ground magnetic surveys including newly measured ground survey of 76 line-km and standard grids produced for analysis and interpretation. 3D inverted magnetic models were calculated over selected areas with aim to identify further potential targets.

- During 2019, two holes were surveyed with electromagnetics (BHEM). A total of 230 m in drillhole Ex_Wz_04 and 525 m in Ex_Wz_05 were logged with three component (X,Y,Z) electromagnetic imaging technology (EMIT) sensor. As a result, conductive plates were mapped as potential targets for further follow up.
- Approximately 0.35 km^2 were covered with ground Time-Domain electromagnetics (TEM) at 50 m x 50 m grid with the objective of identifying shallow conductive targets to support a drilling campaign at “Krasta” prospect, “Sveta Petka” exploration licence.
- The results of all geophysical works were incorporated into a 3D geological model for further analysis and interpretation.

1.9 Drilling

Mineral resource development drilling at Chelopech has been completed at a nominal hole spacing of between 50 m x 50 m and 25 m x 25 m. Data provided for the MRE was supplied at a cut-off date of 30 September 2019. In summary, the database consisted of a total of:

- 4,271 diamond drillholes for a total of 1,023,347 m
- 36,941 face samples
- 104,160 drillhole density samples
- 4,403 face sample density values.

1.9.1 Pre-DPMC Drilling

The Chelopech Copper Processing Company (CCPC), Navan and Homestake have completed underground diamond drilling at the Chelopech mineral deposit and SGE has carried out surface diamond drilling at the Chelopech copper-gold deposit since 1956.

1.9.2 DPMC Drilling

A total of 3,106 drillholes (surface and underground, exploration and grade control) have been drilled for a total metreage of 700,498 since 2003.

Historically, surface drilling has targeted a geophysical anomaly north of the mine on the adjacent Smolsko exploration lease. The main objective of underground drilling is resource development and grade control and currently four drill rigs are in use; two for exploration and two for grade control.

The drill core is logged by competent geological personnel in a core shed established for this purpose. All logging information is collected digitally on tablet computers using Field Marshall software and Microsoft Excel template files.

1.9.3 Core Orientation and Structural Logging

Between May 2009 and May 2015, core orientation was conducted using the Ezy-Mark™ system and an Orifinder DS1 tool has been used since May 2015.

1.9.4 Pre-DPMC Surveying

Pre-DPMC surveying of collars was undertaken using optical methods, with theodolites and survey traverses. Pre-DPMC downhole surveying was undertaken using a gyroscope, prior to 1994 and a Reflex Maxibore tool until 1999. Insignificant measured deviations resulted in dips and azimuths being measured at the collar and extended to depth between 1999 and 2002.

1.9.5 DPMC Surveying

DPMC collar surveying has previously utilised a Leica TCRA 1203 and currently utilises a Leica TS15 and TS16 total station surveying tools. The risk of significant error associated with the drill collar surveys is low.

Downhole surveys since 2003 have been undertaken using a Reflex EX Shot tool, but not all underground drilling completed since 2005 has been systematically downhole surveyed.

1.10 Sample Preparation, Analyses and Security

1.10.1 Sampling Procedure

Drill sampling methods are consistent with good industry practice and are appropriate for use in the estimation of Mineral Resources.

Face samples are taken as horizontal panel chips on a 20 cm grid over the bottom half of each development drive advance. Each sample area is an average of 3 m in length. The samples are usually chosen based on different mineralisation and geological characteristics. These are considered to have the same statistical weighting in the estimation of resources as 3 m drill composite lengths.

The underground face sampling procedures and checks are considered appropriate with field duplicates, blanks and standards submitted for analysis as per the diamond core sampling protocols.

1.10.2 Analyses Procedure

Most sample preparation has been completed on site at the Chelopech laboratory. Up to early 2003, most analyses were completed on site at Chelopech; however, between 2003 and 2004, all drill hole analyses were completed at UltraTrace in Perth, Australia. Since late 2004, most of the drill hole samples have been analysed at the SGS operated laboratory on site at Chelopech with a small amount of exploration drill hole samples analysed at SGS Bor, Serbia. A detailed list of laboratories used is provided in Table 10. Both the Chelopech and Bor laboratories are under fulltime management by SGS Bulgaria Ltd and are independent in their activities, with an SGS qualified laboratory manager on site at all times.

1.10.3 Assay QAQC

Quality assurance/quality control (QAQC) prior to DPMC's involvement in 2003 consisted of field and laboratory duplicate checks where no significant bias was noted. DPM implemented a QAQC program to provide confidence that sample assay results are reliable, accurate and precise. The following material is included in the DPMC QAQC program:

- Three non-certified blanks (quartz sand, quartzites and dolomitic limestone)
- Site-specific certified reference materials (CRMs), developed and certified by Geostats, together with commercially available Geostats and Ore Research and Exploration (Oreas) CRMs were used.
- Site field duplicate samples.
- Internal (prep-lab) duplicates sent to SGS Chelopech and SGS Bor.
- External (umpire) duplicates sent to ALS Romania.

Face sample and drill hole QAQC results in the previous reporting periods for gold, copper and sulphur were acceptable, whilst silver and arsenic had some issues which were mostly related to the analytical method detection limits and sensitivity.

Results of the QAQC program for this reporting period (1 October 2018 to 30 September 2019) have been discussed in Sections 11.3.1 and 11.3.2 and are summarised below:

- The QAQC procedures implemented at Chelopech are adequate to assess the accuracy and precision of the assay results obtained.
- Overall blank results show no significant indications of cross-contamination.
- No fatal flaws were noted with the accuracy results. Bias and failures were noted in individual CRMs, but this was not systematic (i.e. some bias is positive and some negative).

- Au, Cu and S duplicate results had acceptable precision and sporadic issues were noted with Ag and As duplicates analysed at SGS Bor. Overall SGS Bor duplicates had poorer precision and higher biases than samples analysed at SGS Chelopech and this should be monitored.

1.10.4 Security

Samples collected from underground development, underground drilling and surface drilling operations are transported to the site-based geology core shed, where the samples are geologically logged and are prepared for chemical analysis. The sampling procedures are appropriate and adequate security exists on the site to minimise any risk of contamination or inappropriate mixing of samples. Sample tagging and a laboratory barcode system is in use to digitally track sample progress through to final chemical analysis.

1.11 Data Verification

DPM implemented an acQuire GIMS (Geological Informational Management System) in 2004, for managing all the drill hole and face sampling data. Data undergoes further validation by CSA Global through a series of Datamine loading macros. The QP, who relies upon this work, has reviewed the data and believes the data verification procedures undertaken adequately support the geological interpretations and the analytical and database quality, and therefore support the use of the data in mineral resource and mineral reserve estimation.

Data collection methods, regression analysis and QAQC procedures for density data have been reviewed and are considered appropriate for use in the MRE.

The Chelopech database contains surface diamond drill holes, underground diamond drill holes and underground face samples. A series of investigations have been completed at various times to test the appropriateness of combining the datasets for grade estimation (2007, 2013) and conclusions made then remain current and relevant to this report.

Report author Maria O’Connor (CSA Global Principal Resource Geologist) completed a site visit (personal inspection) of the Chelopech Mine between 11 and 12 November 2019 to review DPMC data management and MRE workflow. Ms O’Connor is of the opinion that the DPMC data management procedure is robust and the data is suitable for use in Mineral Resource estimation.

1.12 Mineral Processing and Metallurgical Testing

A comprehensive testwork program was completed on drill core samples of representative mineralisation from each mining block of potential future material as part of the original 2005 Definitive Feasibility Study (DPM, 2005). The metallurgical testwork characterised the hardness and flotation parameters of each, and the work confirmed that the process flowsheet currently in operation was optimum to produce copper/gold concentrates, and no changes were recommended. An additional test program was completed in 2012 covering current and future material which also confirmed the current flowsheet performance for the copper circuit and developed the optimum conditions for the future recovery of pyrite from the current process plant material feed.

The expanded material treatment process facility completed in early 2012 comprises crushing the mined material in the underground primary jaw crushing circuit, grinding in a semi-autogenous grinding (SAG) milling circuit, primary rougher/scavenger and three-stage cleaner flotation and concentrate dewatering. Tailings from the concentrator are thickened at the plant, pumped and then filtered at the backfill plant, from which they are then used as underground fill. When not being directed to the backfill plant, the tailings report to the current flotation TMF.

Further plant upgrades have been completed more recently, including the replacement circuit for the second and third cleaners of the copper circuit in mid-2013, and a new pyrite recovery circuit commissioned at the end of 2014.

A geomet and flowsheet optimisation flotation testwork program at XPS (Sudbury) was concluded in 2017. The geomet testwork considered the metallurgical variability of the eight identified domains at Chelopech – 151 Block Upper, Middle and Lower; 150 Block Upper and Lower; 103 Block East and West; 19 Block. The findings of the geomet testwork were inconclusive on quantifying the variability in pyrite quality between the domains. Other information gathered was nonetheless useful and further enhanced the understanding of the geo-metallurgical properties and variability between the domains.

The 2019 annual review of the recovery models vs the actual plant performance indicate that the current models are still able to accurately predict the plant recovery performance for the expected future plant feed grades.

1.13 Mineral Resource Estimates

Data provided for the MRE was supplied as at 30 September 2019. Mineral Resources were estimated by DPMC personnel under the supervision of report author Maria O'Connor (CSA Global Principal Resource Geologist). Validation of the MRE was completed by CSA Global.

A 3D block model using 10 mE x 10 mN x 10 mRL cell dimensions was created. This model honours wireframe volumes and was based on geological interpretations for the two styles of mineralisation. Grade estimation of copper, gold, silver, sulphur and arsenic was completed using ordinary kriging. Block tonnage was estimated from the material in-situ dry bulk density by using ordinary kriging where adequate density samples were available, and from the positive relationship to sulphur grade where density sampling was limited.

In addition to the geological model, a void model was constructed to represent the underground development and production as at 31 December 2019. This volume was depleted from the MRE. Material assumed to be sterilised through previous mining, to a distance of 3 m around existing depletion is also removed from the reported Mineral Resource estimate.

Mineral Resources have been classified in accordance with the May 2014 Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards on Mineral Resources and Mineral Reserves standards as defined in NI 43-101. Reasonable prospects for eventual economic extraction criteria used to classify the Mineral Resources were based on the robustness of the input data, the confidence in the geological interpretation, the distance from data and geostatistical service variables, such as slope of regression and estimation variance.

The MRE for the Chelopech deposit is presented in Table 2. The MRE is reported exclusive of Mineral Reserves. The MRE has an effective date of 31 December 2019 and is reported based on an operating net profit cut-off greater than US$0. Mineral Resources are based on metal prices of US$1,400/oz Au, US$17/oz Ag and US$2.75/lb Cu.

Table 2: Chelopech MRE with an effective date as at 31 December 2019

Chelopech MRE as at 31 December 2019									
Resource category	**Mt**	**Grades**					**Metal content**		
		Au (g/t)	**Ag (g/t)**	**Cu (%)**	**S (%)**	**As (%)**	**Au (Moz)**	**Ag (Moz)**	**Cu (Mlb)**
Measured	9.0	2.95	7.92	0.98	11.97	0.27	0.856	2.301	196
Indicated	5.2	2.72	8.13	0.87	10.45	0.22	0.453	1.355	100
Total Measured + Indicated	**14.2**	**2.86**	**8.00**	**0.94**	**11.41**	**0.25**	**1.308**	**3.656**	**296**
Inferred	1.9	2.02	6.57	0.84	9.86	0.09	0.123	0.399	35

Notes:
- *MRE is reported based on an operating net profit cut-off of US$0.*
- *Tonnages are rounded to the nearest 1,000 tonnes to reflect this as an estimate.*
- *Metal content is rounded to the nearest 100 tonnes or 100 ounces to reflect this as an estimate.*
- *The Mineral Resources are reported exclusive of Mineral Reserves.*
- *Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.*

It is the QP's opinion that the Chelopech MRE has a low risk of being affected by factors such as geological understanding, data management, estimation methodology or classification strategy. The deposit geology is well understood, has been appropriately modelled in 3D and has adequate sampling data to support the grade and tonnage estimates. Recent reconciliation with production has verified the quality of the MRE.

CSA Global does not believe that the estimate of Mineral Resources may be materially affected by metallurgical, environmental, permitting, legal, title, taxation, socio-economic, marketing or political issues. However, CSA Global relies on information (as presented in Section 3) of this Technical Report in relation to legal and environmental considerations.

Comparison of the 2019 MRE with the previously reported 2018 MRE, after depletion of Mineral Reserves, is presented in Table 47. The updated MRE shows an increase of 14% in Measured and Indicated Mineral Resources.

This increase in Measured and Indicated Mineral Resources is largely attributed to:

- New net smelter return (NSR) assumptions.
- A new reporting approach (retaining an operating net profit cut-off of US$0 but excluding gold equivalent (AuEq) as a reporting criteria). Ongoing infill and resource development drilling programs which have defined and reclassified resources in blocks 17,18, 19, 103 and 151
- Additional mineral resources – Block 148 and Block 7 – were defined.

1.14 Mineral Reserves Estimates

The Mineral Reserves statement effective as at 31 December 2019 is presented in Table 3. Depletion due to mining has been completed to the end of December 2019. Mineral Reserves are reported using a NSR methodology.

There are numerous benefits of a NSR model compared to a single metal cut-off grade approach, such as:

- Polymetallic ore can be converted into a profitability variable expressed in terms of US$/t
- Investigation of the potential viability of selected Mineral Reserves blocks can be quickly assessed
- The profitability of planned stopes can be assessed
- The effect of commodity price fluctuations can be quickly applied to the Mineral Reserves model.

Table 3: Chelopech Mineral Reserves with an effective date as at 31 December 2019

Chelopech Mineral Reserves as at 31 December 2019											
Classification		kt	Grades					Metal content		
			Au (g/t)	Ag (g/t)	Cu (%)	S (%)	As (%)	Au (koz)	Ag (koz)	Cu (klb)
Proven	Stopes	8,498	2.80	7.12	0.92	12.86	0.28	766	1,945	171,770
	Broken Stocks	31	3.25	3.97	0.53	11.70	0.19	3	4	370
	Stockpiles	24	3.11	4.10	0.79	11.71	0.22	2	3	420
Probable	Stopes	7,727	3.19	8.00	0.87	11.85	0.26	793	1,987	147,717
	Ore Development	577	4.30	8.13	1.22	13.47	0.37	80	151	15,538
Total Proven*		**8,553**	**2.81**	**7.10**	**0.92**	**12.85**	**0.28**	**771**	**1,952**	**172,560**
Total Probable		**8,304**	**3.27**	**8.01**	**0.89**	**11.96**	**0.27**	**873**	**2,138**	**163,255**
TOTAL*		**16,857**	**3.03**	**7.55**	**0.90**	**12.41**	**0.27**	**1,644**	**4,089**	**335,815**

**Including Broken Stocks and Stockpiles.*
Mineral Reserves are based on long-term metal prices of US$1,250/oz Au, US$17/oz Ag and US$2.75/lb Cu.
Tonnage figures have been rounded to the nearest 10,000 tonnes to reflect this as an estimate.

Net changes in tonnes and contained metals from the 2018 to the 2019 Mineral Reserves estimate show reductions of 1.2 million tonnes (Mt) in tonnage, 132,000 ounces of gold and 19 million pounds (Mlb) of copper. Corresponding percentage reduction are respectively 7% in tonnes, 7% in metal content for gold, and 5% in metal content for copper. The decrease can be attributed to 2019 mining depletion, which has been partially offset by addition of new stope and redesign of existing stopes.

The Mineral Reserves at Chelopech have been estimated by including several technical, economic and other factors. A change to any of the inputs would therefore have some effect on the overall results. CSA Global is comfortable that sufficient work has been done by DPM to ensure that minor changes in the mining and metallurgy factors are not likely to have any material effect on Mineral Reserves. CSA Global relies on information as presented in Section 3 of this Technical Report with respect to legal and environmental considerations.

CSA Global does not believe that the estimate of Mineral Reserves may be materially affected by metallurgical, environmental, permitting, legal, title, taxation, socio-economic, marketing or political issues. However, CSA Global relies on information (as presented in Section 3) of this Technical Report in relation to legal and environmental considerations.

1.15 Development and Operations

With the Chelopech mine having reached its mine/mill expansion design rate of 2.2 million tonnes per annum (Mtpa) in late 2015, the mine is expected to produce, in gold-copper concentrate, a total of 0.82 million ounces of gold, 1.56 million ounces of silver and 124,486 tonnes of copper for the years 2020 through 2027. In addition, pyrite concentrate is expected to be produced, containing 0.35 million ounces of gold.

Planned mining operations incorporate conventional long-hole open stoping (LHOS) with pastefill. The mine is developed beneath the existing sublevel caving (SLC) operation and uses a conveyor belt from the underground workings to surface for ore transport.

Current ore treatment processes comprise conventional crushing of run-of-mine (ROM) ore in a primary jaw crushing circuit, grinding in a SAG milling circuit, rougher/scavenger and three-stage cleaner flotation and concentrate dewatering to produce the copper/gold concentrate, while the pyrite is recovered from the copper circuit cleaner tails. Copper concentrate is shipped to the DPM Tsumeb Smelter in Namibia with a portion being sold to Xiangguang Copper Co. (XGC).

Tailings from the concentrator are thickened and directed to the mine backfill plant, with the balance discharged to the flotation TMF.

The concentrator operates 24 hours per day, seven days per week, and is designed to process 275 tonnes per hour (tph) at an operating availability of 92%, with an average annual ore throughput capacity of 2.2 Mt.

1.16 Mine/Mill Expansion

The first phase of the concentrator upgrade commenced operations in February 2011. Ore was passed through the existing primary jaw crushing circuit and conveyed to the wet grinding circuit. The processing operation included a single-stage semi-autogenous mill (8.2 m diameter SAG), a new rougher/scavenger flotation circuit (4 x 100 m^3 tank cells), with three stage cleaning, and concentrate dewatering. Subsequent phases to complete the concentrator upgrade (a new tailings water recovery thickener, concentrate filter, and upgraded water recovery systems) came on stream through 2011, to ultimately match the designed mine capacity of 2.2 Mtpa.

Tailings from the concentrator are thickened at the plant, pumped and then filtered at the backfill plant, from which it is then used as underground fill. This was completed in August 2010. The tailings report to the current flotation TMF when not being directed to the backfill plant.

The final upgrade to the copper circuit (cleaner circuit conditioning, and the replacement of the second and third cleaner stages) was installed progressively from late 2012 and completed in Q3 2013. Optimisation of the circuit continued though to June 2014, as the volumes of the rougher/scavenger (bulk) concentrate containing the additional pyrite increased prior to the separation in the cleaner stages.

The pyrite recovery circuit was commissioned during the Q1 2014, producing approximately 90% of the 169,000 t of pyrite produced in 2014. The upgrade of the site concentrates materials handling system enabling direct loading onto trains from the site stockpiles was operational by the end of the Q2 2014.

1.17 Financial Summary

Based on the projected 2020–2027 ore production schedule, operating costs and metal prices of US$1,250 per troy ounce price for gold, US$2.75 per pound for copper, and US$23 per troy ounce for silver, the LOM after-tax net present value (NPV) is estimated at US$307 million when using a discount rate of 5.0%.

1.18 Interpretations and Conclusions

1.18.1 Geology and Sampling Procedures

During site visits by CSA Global in 2013, 2014, 2015, 2016 and 2017 and 2019 meetings have been held with DPM staff and the SGS laboratory manager. Data and procedures were reviewed in the mine office, underground operations, core yard, processing plant and SGS laboratory. Conclusions based on these site visits were that procedures are consistent with good mining industry practice.

1.18.2 Underground Face Sampling Data

Development face samples are taken as horizontal panel chips on a 20 cm grid over the bottom half of each development drive advance. Each round is an average of 3 m in length. The samples are usually chosen based on different mineralisation and geological characteristics. The practice of shotcreting, which commenced in 2018, may have a deleterious effect on the quality of samples and this should be reviewed for the subset of samples it affects. However, this practice terminated in January 2020, with shotcreting only to take place on capital work.

1.18.3 Geological Model

CSA Global believes the current understanding of geology and mineralisation controls is good, and that the current MRE model adequately predicts the in-situ grades and tonnes realised during underground development and mine production. Good comparison between the short-term planning model, incorporating updated grade control geology mapping, sampling and drilling data with the MRE model, demonstrates the robustness of the MRE model.

1.18.4 Assay QAQC

Outcomes from the QAQC results for gold, copper, silver, arsenic and sulphur samples for assays completed since the previous MRE have been reviewed and are summarised below:

- The QAQC procedures implemented at Chelopech are adequate to assess the accuracy and precision of the assay results obtained.
- No fatal flaws were noted with respect to cross contamination or assay accuracy (blank or standard analysis respectively).
- Field, preparation and laboratory duplicates show good repeatability with no significant bias for all elements at SGS Chelopech. Sporadic issues were noted with Ag and As duplicates analysed at SGS Bor and SGS Bor duplicates had poorer precision and higher biases than samples analysed at SGS Chelopech.
- The over reporting bias observed in the previous MRE external gold checks (umpires) has been resolved, but a bias to the copper duplicates was observed and will be investigated.

1.18.5 Database Validation

DPMC captures data daily into the acQuire GIMS, ensuring that the data is validated using constraints and triggers. Verification checks are also conducted on surveys, collar coordinates, lithology, and assay data.

Data undergoes further validation by CSA Global through a series of Datamine loading macros. The QP has reviewed the reports and believes the data verification procedures undertaken on the data collected from DPMC adequately support the geological interpretations and the analytical and database quality, and therefore supports the use of the data in Mineral Resource and Mineral Reserve estimation.

1.18.6 Bulk Density

CSA Global concludes that the in-situ dry bulk density data is collected using appropriate sampling methods and analysis procedures. The methods used to estimate density to determine the Mineral Resource tonnage, through a combination of ordinary kriging in areas of detailed sampling, and by application of the relationship between sulphur grade and density where insufficient samples are available, are suitable for this style of deposit and mineralisation.

1.18.7 Mineral Resource Estimation

The MRE for the Chelopech deposit has been classified as Measured, Indicated and Inferred Mineral Resources following the 2014 standards specified by the CIM and in accordance with NI 43-101. The MRE has been reported using an operating net profit cut-off of >US$0 to satisfy the requirement that there be reasonable prospects for eventual economic extraction.

The Mineral Resource has been depleted for mining as at 31 December 2019. A 3 m buffer around existing depletion has also been removed from the Mineral Resource, on the assumption that if it has not already been mined out, it no longer satisfies reasonable prospects for eventual economic extraction, given its proximity to existing development.

Validation of the estimated model using swath plots, histograms and probability plots of inputs and outputs and visual validation of cross sections showed that estimated block grades reflect the grade tenor of input data.

In 2019, a total of 51,922 m of Mineral Resource development diamond drilling was completed in the Chelopech concession.

Mineral Resource development extensional drilling was concentrated on the upper levels of Target 700 and Blocks 151, 17, 18, 5, 25 and 10, with the aim to expand the current mineral resource extents and allow conversion of Mineral Resources into Mineral Reserves. Further to this, the areas down plunge of Blocks 144 and 147 were also drilled during the year.

In 2019 were metallurgical tested two targets – Target 7 and Target 148. Metallurgical testwork has shown that mineralisation to be highly amenable to the current processing flowsheet. As a result, the targets were converted into blocks (respectively Block 7 and Block 148).

DPMC's operational Mineral Resource development drilling strategy for 2019 combined resource definition drilling designed to a 30 m x 30 m drilling grid with infill grade control holes. Wider spaced Mineral Resource definition drilling was employed to define Indicated Mineral Resources. Whilst operational infill drilling on a 15 m x 15 m drilling grid is designed to upgrade Indicated Mineral Resources to the Measured Mineral Resource category, to allow detailed production design and scheduling works.

1.18.8 Mine Operations

Operations at the Chelopech mine have been updated significantly since DPM assumed ownership of the operation in 2003. The mining method has been changed, a completely new underground ore handling system has been constructed and a new mine access has been completed. The mine is now a mature steady-state operation with a high level of management control, up-to-date equipment and a workforce that can operate the systems adequately. The quality of the Mineral Reserves mean that a high level of mine planning can be instituted and complied with.

It is CSA Global's belief that operations will continue at current levels, given the quality of management and technical support. Mining equipment is expected to be replaced and updated on a regular basis to ensure planned mechanical availability.

1.18.9 Process Plant

The process plant continues to run consistently at its design parameters of 275 tph at around 92% availability, treating 2.203 Mt of ore during 2019. This resulted in a production of 105,741 tonnes of copper concentrate containing 16,896 tonnes of copper and 119,928 troy ounces of gold and 252,582 tonnes of pyrite concentrate containing 53,472 troy ounces of gold.

1.18.10 Qualitative Risk Analysis

Table 4 summarises the areas of uncertainty and risk associated with the mine, and has been prepared from reviews completed by CSA Global, and informed by the conclusions and recommendations outlined in this Technical Report.

Table 4: Project-specific risks

Project risk area	Summary	Outcome	Mitigation
Geology and data management	No significant risks.		
Resource estimation	No significant risks.		
Mining: Future crown pillar reclamation	There are several crown pillars remaining in historical mining areas that contain Mineral Resource volumes that may, in whole or part be economically extractable.	Pillar extraction in old mining areas carries a degree of geotechnical and operational risk. Geotechnical conditions in the pillars may cause difficult operational conditions, leading to premature cessation of operations.	Recent experience (2014–2016) gained in the recovery of 235,000 t of 150 block crown pillar has enabled a set of safe operating practises to be established. Additional works are required to fully assess the degree to which material proximal to other historic mining areas can be extracted.
Mining: Secondary stope filling	Filling of secondary stopes, is essential to ensure an orderly stoping sequence.	Delayed filling will affect the mining sequence and impact on the mining schedule.	Ensure the filling sequence is not delayed, or interrupted.
Pyrite Treatment Project	Confirmation of recovery predictions and capital and operating costs.	Implementation could add up to an additional 70,000 to 80,000 oz production at a cash cost of <$800/oz.	Project will only be reinstated once the long-term gold price is considered stable.
Force majeure (including COVID-19)	Could affect labour and supply chain which could impact capital and operating costs. Could affect obligations under the concession and exploration contracts	Could impact on the mining and exploration schedule	Managing inventories and reviewing alternative supply options should any disruptions occur. Focus on managing outbound supply chains, including, by considering multiple sale and transportation outlet. Written notice to MoE for temporary suspension of the concession contract for the period of Force majeure. Additional agreements for extending the exploration contract terms and extension of other contracts for land use.

1.19 Recommendations

1.19.1 Assay QAQC

A QAQC program has been implemented by DPM to provide confidence that sample assay results are reliable, accurate and precise. No fatal flaws were observed, but the following is recommended:

- The failed CRMs should be investigated (potential sample swaps).
- CRMs with bias should be investigated over a longer time period to check whether analytical drift has occurred. If results are consistent over the longer time periods, then the expected values of the DPM specific standards might require revision or checking. Note that since Geostats has certified these standards, they should be notified of the bias.
- The laboratories should be asked to investigate the change in precision and accuracy noted in CRM results from SGS Chelopech (probable recalibration of equipment).
- The notable difference in precision and bias at SGS Bor compared to SGS Chelopoech should be investigated.

1.19.2 Geology and Mineral Resources

- Additional drilling of zones above 450 level in proximity to historical cave zones is warranted and as such is part of the long-term exploration strategy at Chelopech mine. Measured and Indicated Mineral

Resources in this area were not considered in current Mineral Reserves. Drilling results in 2019 has helped to define more precisely the boundaries and shape of the cave zones above Blocks 150 and 151. In 2020, a resource drill program will continue to collect data and improve the risk estimation around cave zones and historical mining developments.

- In conjunction with exploration drilling; grade control drilling to delineate the orebody boundaries will continue to improve the location of the ore boundaries and reduce the risk ore dilution and loss.
- Continue to review and monitor the "representivity" of face samples for use in ongoing MRE work.
- Continue with structural data mapping and development of the structural model, to determine the paragenesis, pre-, syn- and post-mineralisation structures. Review the potential impact or application this structural data as an enhancement to the MRE modelling process. Near mine extensional drilling is guided by geological interpretation of actual data collected from mine developments and archive data.
- Use the understanding of structural and lithological controls on mineralisation to assist exploration drill targeting.
- Further development of lithogeochemical vectoring approaches, as used in recent DPM exploration drilling programs, to generate exploration targets in areas where geophysics has not identified anomalies. In addition, investigate if multi-element geochemistry can be used to define geotechnical domains in the mineral resource model, particularly in relation to hardness which is useful information for the plant.
- A 3 m buffer wireframe used to sterilise mined out areas is currently created using an automated process. It is recommended that moving forward, as part of end of month finalisation of mined out volumes, that the surveyor and mining engineer identify zones that are not amenable to mining, and include those in mined out volumes, so that the 3 m buffer assumption can be replaced with a more refined approach that is informed by the experience of the mining engineer.

1.19.3 Mining and Processing

- Continue attention to the planning detail that has been successful at demonstrating continuous improvement at Chelopech.
- Continue current design and operating procedures to mitigate risks in mining Block 19 and 103 crown pillars.
- Maintain the use of modern technology in equipment sourcing and utilisation.
- The positive attitude of the Chelopech personnel and their interest in continually improving should continue to be encouraged.
- Ensure designed operational practices are adhered to at all times.

1.19.4 2020 Operational Resource Development Drilling

The 2020 Mineral Resource development strategy for Chelopech will focus on the upper levels of deposit.

Based on the results from 2019, Mineral Resource development drilling in upper levels of Block 151 will continue from underground and surface drilling programs. The aim is to test the current ore contours (south boundary) and explore for extensions. The purpose of surface planned drilling program is to discover new mineralisation zones near historically mined high-grade mineralisation (block 390) in the western part of the deposit where the contact with the covering sandstones is defined as potential for massive lensoidal mineralisation bodies.

The drilling program in the upper levels of Blocks 17, 25 and 5 will continue this year. The purpose is to determine the shape and size of the mineralised zones.

Target 700 extensional drilling will continue with the aim to further delineate the target volume and to begin establishing continuity between drillholes. The Target 700 area coincides with the southwest-northeast structural trend which has been assessed as having high potential for hosting mineralisation. The mineralisation is presented as quartz-barite-sulphide veins coincident with a wide silica alteration zone and is primarily enriched with gold-silver but virtually devoid of copper.

Additionally, DPM plans to test the following targets:

- Extensional drilling:
  - Extensional diamond drilling in upper levels in northeastern direction from Block 10 and northern direction from Blocks 18 and 7. This area is poorly explored and historical drilling results in combination with structural and lithological models indicate untested mineralisation may be present in this area.
  - Extensional drilling in a target area "North", located in the northeast section of Chelopech deposit close to the boundary of Block 147 between 210 mRL and -80 mRL. The mineralisation is presented as semi-massive to massive copper-gold mineralisation constrained within steeply dipping structures. This section of the mine has been poorly explored to date.
  - A short program will be undertaken aiming to test the gap between Block 149, Block 25 and Target 4.
  - Extensional drilling in upper levels of Block 150 near the boundary of the sandstone and volcanic rocks. In a small area of Block 150 and the west boundary of Block 19, there are many high copper-gold narrow zones.
- Grade control drilling:
  - Grade control drilling in Blocks 103 and 151 between levels between 400 mRL and 300 mRL to test the current mineralisation contours and possibly extend them.
  - Grade control drilling in Blocks 144, 145, 147, and 149 to check the continuity of mineralisation, to define the contours.
  - Grade control drilling in the eastern parts of Block 19 between 320 mRL and 260 mRL.

For 2020, a total of 44,000 metres of operational Mineral Resource development drilling has been planned to cover the targets mentioned above. DPMC intends to spend US$2,200,000 for operational Mineral Resource development drilling during 2020.

2 Introduction

2.1 Issuer

CSA Global (UK) Limited (CSA Global), an ERM Group company, was requested by Dundee Precious Metals Chelopech (DPMC), a subsidiary of Dundee Precious Metals Inc. (DPM), to supervise, verify and validate the Mineral Resource estimate (MRE) and Mineral Reserve estimate for its Chelopech underground copper and gold mine. The change being reported in this technical report is an update to the Mineral Resource and Mineral Reserve estimates previously reported by DPM.

DPM is a public company headquartered in Toronto, Canada and listed on the Toronto Stock Exchange (TSX: DPM). This report has been prepared for DPM to fulfil the requirements of National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101), as it relates to the estimation and reporting of Mineral Resources and Mineral Reserves situated on properties owned and controlled by DPM and its subsidiaries.

2.2 Terms of Reference – CSA Global (UK) Limited

CSA Global is an international independent geological and mining consultancy with offices in Australia, UK, Canada, Indonesia and South Africa. CSA Global was engaged by DPMC to supervise, validate and verify the MRE and validate and verify the Mineral Reserve estimate for its Chelopech underground gold and copper mine, located at Chelopech in Bulgaria. This technical report is prepared in accordance with the disclosure and reporting requirements set forth in NI 43-101, including Companion Policy 43-101CP and Form 43-101F1.

The authors of this Technical Report do not disclaim any responsibility for the content contained herein and make appropriate caveats under Section 3 (Reliance on other Experts).

CSA Global (including its directors and employees) does not have nor hold:

- Any vested interests in any concessions held by DPM
- Any rights to subscribe to any interests in any of the concessions held by DPM either now or in the future
- Any vested interests either in any concessions held by DPM, or any adjacent concessions
- Any right to subscribe to any interests or concessions adjacent to those held by DPM either now or in the future.

CSA Global's only financial interest is the right to charge professional fees at normal commercial rates, plus normal overhead costs, for work carried out in connection with the investigations reported here. Payment of professional fees is not dependent either on project success or project financing.

DPMC technical staff used geological data and interpretations, data relating to underground development and mined areas, drilling and assay data and other relevant technical data.

2.3 Principal Sources of Information

The data used to update the MRE reported herein is current as at 30 September 2019. The Mineral Resource estimate has an effective date of 31 December 2019. The mined volumes used to deplete the Mineral Resource are as at 31 December 2019. The updated Mineral Resource has been used as the basis for estimating the Mineral Reserve estimate as outlined in this document, with an effective date of 31 December 2019.

This Technical Report is an update to the NI 43-101 Technical Report dated 31 March 2019 (DPM, 2019).

2.4 Units

All units of measurement used in this report are metric unless otherwise stated, and are contained in the List of Abbreviations in this Technical Report.

2.5 Site Visit

2.5.1 Current Personal Inspection (1) – Geology and Sampling

DPMC Senior Resource Geologist, Ms Petya Kuzmanova has worked on the Chelopech mine since 2004. Her responsibilities on site include geological supervision, drilling review, sampling oversight and mineral resource estimation and guidance to the on-site technical team in the areas of DPM technical procedures and standards.

2.5.2 Current Personal Inspection (2) - Mineral Resources

The most recent site visit to the Chelopech mining operation by CSA Global consultants was between 12 and 13 November 2019 inclusive, and was conducted by Manager of Resources (EMEA), Ms Maria O'Connor. During this site visit, the following items were reviewed and discussed with DPMC Senior Resource Geologist, and DPMC Qualified Person (QP), Petya Kuzmanova:

- Data and quality assurance/quality control (QAQC) procedures
- Review of the latest Mineral Resource estimate
- Addition of a new Blocks to the Mineral Resource estimate
- Methods to automate the generation of wireframe solids defining areas around mined out zones, that have been sterilised through mining
- Face sampling procedures (to reduce potential for contamination from shotcrete).

2.5.3 Current Personal Inspection (3) – Mining and Mineral Reserves

CSA Global Manager of Mining, Mr Karl van Olden visited the Chelopech site between 19 February 2018 and 23 February 2018 for the purposes of reviewing the mining activity, practices, equipment, facilities, mine planning processes and work management system. Mr van Olden continued following the technical processes of the mine on a regular basis through review of documentation and personal communication with key DPMC technical staff.

A site visit to the Chelopech operation was planned for the first week of March, but this was cancelled due to COVID-19 travel restrictions and safety precautions. Mr van Olden is familiar with the operation due to almost 5 years of continued association, and has held sufficient remote conversations with key personnel, and reviewed related technical information to be confident that the required amount of review for this report has been completed.

2.6 Cautionary Statements

2.6.1 Forward-Looking Statements

As set out in General Guidance (3) in the Companion Policy 43-101CP to NI 43-101 Standards of Disclosure for Mineral Projects, a mining issuer must comply with the requirements of Part 4A of NI 51-102, including identifying forward-looking information.

This Technical Report contains "forward-looking information" or "forward-looking statements" that involve several risks and uncertainties. Forward-looking information and forward-looking statements include, but are not limited to, statements with respect to the future prices of gold and other metals, the estimation of Mineral Resources and Reserves, the realisation of mineral estimates, the timing and amount of estimated future production, costs of production, capital expenditures, costs (including capital costs, operating costs, cash cost per gold and silver ounce and per copper pound and other costs) and timing of the development of new mineral deposits, success of exploration activities, permitting time lines, economic analysis, life of mine (LOM), rates of production, annual revenues, internal rate of return (IRR), net present value (NPV), currency fluctuations, requirements for additional capital, government regulation of mining operations, environmental risks, unanticipated reclamation expenses, title disputes or claims, limitations on insurance coverage, and timing and possible outcome of pending litigation.

Often, but not always, forward-looking statements can be identified by the use of words such as “plans”, “expects”, or “does not expect”, “is expected”, “budget”, “scheduled”, “estimates”, “forecasts”, “intends”, “anticipates”, or “does not anticipate”, or “believes”, or variations of such words and phrases or state that certain actions, events or results “may”, “could”, “would”, “might” or “will” be taken, occur or be achieved.

Forward-looking statements are based on the opinions, estimates and assumptions of contributors to this report. Certain key assumptions are discussed in more detail herein. Forward-looking statements involve known and unknown risks, uncertainties and other factors which may cause the actual results, performance or achievements of DPM to be materially different from any other future results, performance or achievements expressed or implied by the forward-looking statements.

Such factors include, among others: the actual results of current exploration activities; actual results of reclamation activities; conclusions of economic evaluations; changes in project parameters as plans continue to be refined; future prices of gold and other metals; possible variations in grade or recovery rates; failure of plant, equipment or processes to operate as anticipated; accidents, labour disputes and other risks of the mining industry; delays in obtaining governmental approvals or financing or in the completion of development or construction activities, fluctuations in metal prices; shortages of labour and materials, the impact on the supply chain and other complications associated with the COVID-19 (coronavirus) pandemic; as well as those risk factors discussed or referred to in this report and in DPM’s latest annual information form under the heading “Risk Factors” and other documents filed from time to time with the securities regulatory authorities in all provinces and territories of Canada and available at www.sedar.com.

There may be factors other than those identified that could cause actual actions, events or results to differ materially from those described in forward-looking statements, there may be other factors that cause actions, events or results not to be anticipated, estimated or intended. There can be no assurance that forward-looking statements will prove to be accurate, as actual results and future events could differ materially from those anticipated in such statements. Accordingly, readers are cautioned not to place undue reliance on forward-looking statements. Unless required by securities laws, the authors undertake no obligation to update the forward-looking statements if circumstances or opinions should change.

2.6.2 GAAP Measures

This Technical Report contains certain non-GAAP (Generally Accepted Accounting Principles) measures such as expected cash cost per tonne/ounce/pound and EBITDA (earnings before interest taxes, depreciation and amortisation). Such measures have non-standardised meaning under International Financial Reporting Standards (IFRS) and may not be comparable to similar measures used by other issuers. See DPM’s latest Management’s Discussion and Analysis for more information about historical non-GAAP measures reported by DPM.

3 Reliance on Other Experts

The authors of this Technical Report have reviewed available Company documentation relating to the project and other public and private information as listed in Section 27 (References) at the end of this report. In addition, this information has been augmented by first-hand review and on-site observation and data collection conducted by the authors.

The QPs take responsibility for all scientific and technical content of this Technical Report and believe it is accurate and complete in all material aspects. CSA Global was dependent on information provided by DPM relating to legal, political, environmental and tax matters relevant to this technical report.

4 Property Description and Location

4.1 Background Information

Bulgaria is a Slavic Republic in south-eastern Europe, bounded to the north by Romania, to the west by Serbia and Macedonia, to the south by Greece and Turkey, and to the east by the Black Sea. The population is largely Eastern Orthodox Christian (~85%), with a Muslim minority (~13%). The capital city is Sofia and the population is approximately 7.3 million.

Bulgaria has been a member of the European Union (EU) since 1 January 2007 and is a full member of the Central European Free Trade Association. The local currency, the Lev (BGN), has been pegged to the Euro since 1999 (1.95583 BGN/EUR).

Educational standards within the country are high. Mineral exploration and mining were important under the communist regime, resulting in a large pool of qualified technical staff and operating personnel.

Bulgaria is well serviced by facilities and infrastructure. Large towns have the normal facilities provided in western European countries. The country is serviced by an extensive network of paved roads, except in the most mountainous districts. There is also a comprehensive rail network.

4.2 Project Location and Accessibility

The Chelopech mine is adjacent to the Chelopech village, in the Sofia District of Bulgaria, (coordinates 260,360 mE; 473,130 mN, UTM 35N), 75 km east of the capital Sofia (Figure 1). Chelopech is located approximately 350 km to the west by road and rail from the Black Sea ports of Burgas and Varna. Chelopech is located at the foot of the Balkan Mountains, at an elevation of approximately 700 m above sea level. The mine area is bounded to the north by the foothills of the Balkan Range, to the east by a government-owned road maintenance organisation and residential housing, and agricultural land to the west and south, respectively.

Figure 1: Chelopech Mine Location Plan (DPMC, 2020)

4.3 Production Overview

The operation is an underground gold-copper mine and processing facility, which commenced operations in 1954 and expanded these facilities in 1975. Since DPM's acquisition of Chelopech in 2004, operations have produced on average 60,000 ounces of gold and 10,000 tonnes of copper per annum between 2004 and 2008, contained in a sulphide concentrate grading between 15% and 17% copper, 20–30 g/t gold, and approximately 5% arsenic.

In 2011, production increased due to mine and mill expansion programs (Coffey, 2011), and 1.3 Mt were mined and processed. This increased in 2013 to 2 Mt of ore mined and processed, producing 125,000 tonnes of concentrate, containing 21,000 tonnes of copper and 132,000 ounces of gold. During 2019, 2.203 Mt of ore was mined and processed, producing 105,741 tonnes of copper concentrate containing 16,896 tonnes of copper and 119,928 troy ounces of gold and 252,582 tonnes of pyrite concentrate containing 53,472 troy ounces of gold.

Due to the high arsenic content, all of the copper/gold concentrate produced is exported. Most is sent to the Tsumeb Smelter in Namibia (100% owned by DPM), and from 2014 the remainder of the production is sent to Hong Kong Xiangguang Int. Holdings Ltd. In late 2012, DPMC also entered into an agreement with XGC for the sale of pyrite concentrate produced at the mine, with first delivery completed in March 2014.

4.4 Mineral Rights and Tenement Description

4.4.1 Summary

The Mining Licence (Chelopech Concession) covers an area of 452 hectares which includes the area of the Chelopech deposit, where extraction and additional exploration are allowed, and the areas for the additional industrial facilities. DPMC has 100% ownership of the land upon which the facilities are constructed. DPMC operates under a Concession Contract signed with the Council of Ministers in 1999 granting concession rights to DPMC for a period of 30 years. Under Bulgarian regulations, the Mining Licence area is applied for based on geographical coordinates. The physical boundaries of the Mining Licence are not surveyed and marked on the ground.

Surrounding the Mining Licence to the north, east and west is the exploration area called "Sveta Petka", originally covering around 4.8 km^2. DPMC applied for an exploration permit for the "Sveta Petka" area in the beginning of 2012. In August 2012, the Council of Ministers approved granting the exploration rights to DPMC for three years with the Resolution by the Ministry of Economics, Energy and Tourism (MoEET) and a contract was signed on 29 January 2013. The contract was extended, and it was valid until 14 September 2018. A second two-year extension of the Sveta Petka licence was submitted to the Ministry of Energy (MoE) in July 2018. The agreement was signed on 30 November 2018 and the period of contract started on 12 September 2018. The new reduced area of the Sveta Petka licence is 4.32 km^2. The exploration contract was temporarily suspended due to the delay of the positive statement by the Ministry of Environmental and Water (MoEW) from 29 December 2018 to 27 May 2019 and it is valid to 8 February 2021.

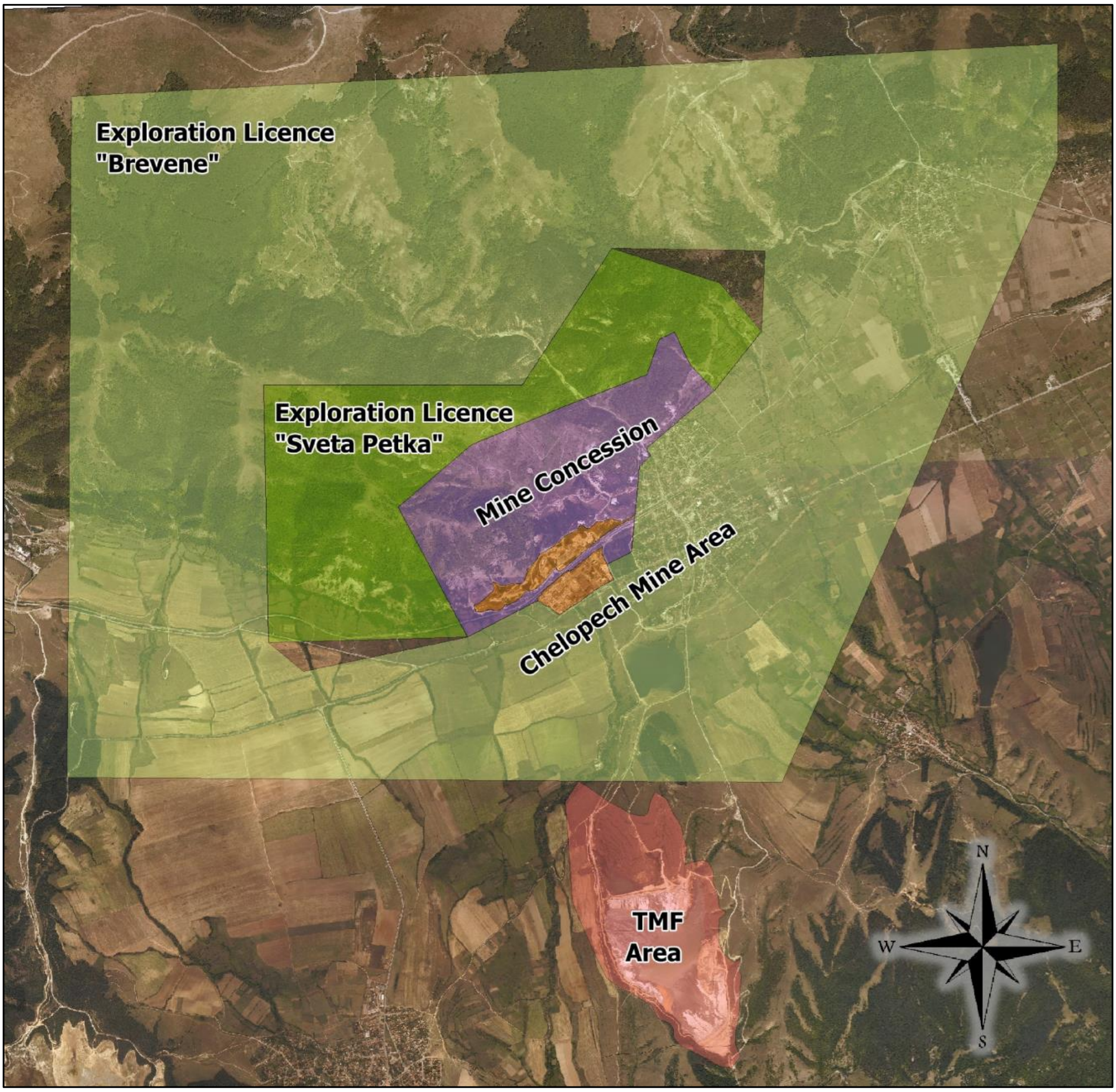


Figure 2: Plan of the Chelopech Mine licences (DPMC, 2019)

4.4.2 Mining Permit Terms and Conditions

The first requirement for obtaining approval to undertake new or major expansion projects is the approval of the appropriate Environmental Impact Assessment (EIA) procedure. The original EIA application included the expansion of the mine and mill to 3 Mtpa, combined with the installation of a metals processing facility to treat the concentrate on site. This was submitted in November 2005 and approved in July 2008.

This approval for the complete project was subsequently revoked by the Bulgarian Supreme Administrative Court on 15 April 2010. The application was resubmitted with a simplified scenario of expanding the underground mine and mill to a capacity of 2 Mtpa, and to produce copper-gold concentrate following the approval by Bulgarian Authorities of the 2010 LOM Plan. Approval of expansion and modernisation of mill and mine was done by environmental authorities with letter no. OBOC-1512/25.06.2010 by the MoEW. Additional approval of expansion of the underground mine and mill to a capacity of 2.2 Mtpa was approved by environmental authorities with letter no. 26-00-11956/16.03.2016 by the Regional Inspectorates of Environment and Water (RIEW) – Sofia.

DPMC pays a royalty to the State in compliance with the terms under the Concession Agreement equal to 1.5% on the value of the payable metals (copper, gold and silver) in the mined ore determined as the product of the assayed gold and silver head grades in the actual ore tonnage mined and the arithmetic mean metal prices based on the London Metal Exchange (LME) price list for the preceding six-month period.

4.4.3 Environmental Liabilities

There are no additional environmental requirements to the property other than the existence of the current mining infrastructure, namely the underground mine, processing plant, flotation tailings management facility (TMF), ancillary workshops and administration facilities.

The amount of the financial guarantee for closure and rehabilitation of the site was determined, as part of the Closure and Rehabilitation Plan, completed and coordinated with the RIEW, MoEW and MoEET in April and May 2010. After project coordination, DPMC established financial security for its obligations through an insurance policy for US$25 million and submitted it to the MoEET in November 2010. In 2010, the form of the financial security was changed from insurance policy to bank guarantee and was submitted to the MoEET in November 2010. In 2011, the insurance policy was transferred into bank guarantee for €20,730,687 which is renewed on an annual basis in November. In December 2015, competent authorities (MoE) approved an updated Closure and Rehabilitation Plan with a revised value of €13,949,832. The financial guarantee was separated in two bank guarantees – one for the mine and surface infrastructure and another for the TMF closure activities.

In 2018, the Chelopech TMF overall Closure and Rehabilitation Plan was updated in connection with the TMF upgrade project to level 630. The plan was approved by the Ministry of Energy. In September 2018, the Chelopech TMF overall Closure and Rehabilitation Plan was updated with a revised value of €9.4 million. The mine and surface infrastructure closure bank guarantee remains at €6.3 million. In November 2019, the financial guarantees were renewed for a year.

4.4.4 Royalties

The royalty charged to the project as per the Concession Agreement is calculated using the base formula of 1.5% of the combined values of the metals (copper, gold and silver) mined during the previous quarterly period.

4.4.5 Risks

To the extent known, the only risk the authors of this Technical Report are aware of that may affect access, licence title or the ability to perform work on the property is COVID-19.

COVID-19 as a circumstance is determined as Force majeure (FM) in concession and exploration contracts. The definition of FM is an extraordinary event or circumstance beyond the control of the Parties occurring after the effective date of the Agreement including an intervening act of God or public enemy, such as fire, epidemic, flooding, earthquake, unfavourable weather conditions or other natural disaster, hostile acts or environment arising from or relating to acts of war or active hostilities (whether declared or not), civil commotions, revolution, strike, riot or other public disorder, lockouts, etc.

If the Company cannot perform its concession and exploration obligations as a result of COVID-19, the Company shall promptly notify Ministry of Energy (ME). The performance of the affected obligations shall be suspended for the duration of the FM. Additional agreements in writing shall be concluded to make arrangement for the period of suspension.

DPM have not declared Force majeure on any major Chelopech contract due to COVID-19 at the time of filing.

5 Accessibility, Climate, Local Resources, Infrastructure and Physiography

5.1 Accessibility

The Chelopech mine is easily accessible via sealed major roads from the national capital of Sofia, approximately 75 km to the west. The principal rail and road links between Sofia and the country's largest port, Burgas, located on the Black Sea pass through the village of Chelopech and the Chelopech mine.

A recent road upgrade program connecting the major cities throughout Bulgaria has substantially improved the road system around the region, resulting in significantly improved road access to and from the site by road transport throughout the year.

Since mid-2014, all of the copper and pyrite concentrates produced are transported by rail directly from the operating site to the port of Burgas for shipment abroad.

5.2 Infrastructure

Chelopech is well serviced, due to its proximity to major roads, powerlines, communication facilities, water sources and the nearby towns of Zlatitsa and Pirdop. The site obtains power from the Bulgarian power grid and is permitted to obtain its water requirements from nearby storage.

Power is supplied from the Bulgarian national transmission and distribution system, at 110 kV, via substations at Stolnik and Zlatitza to the mine substation (110/6 kV) with two transformers (16 MVA each) located in the southeast area of the mine. Most of the distribution system consists of aboveground transmission lines.

The mine currently has permits to obtain its fresh water requirements from the local Kachulka Dam (owned by the Chelopech Municipality) and the Dushantzi Dam. Additional water requirements are supplemented by recycled water from the TMF.

5.3 Local Resources

The village of Chelopech, located approximately 1 km from the Chelopech mine, has a population of approximately 1,700, whilst the nearest major settlement of Zlatitza, some 4 km to the west of Chelopech, has a population of approximately 5,600.

Small villages are dispersed widely throughout the Sofia District. Much of the population outside the City of Sofia is involved in subsistence farming, particularly the growing of roses, lavender and sunflowers for oil production on the poorly developed soils characteristic of the region. The other main land use within Sofia District is state-controlled forestry.

There has been a strong history of mining in the local region around the mine, with several large (treated ore throughputs >15,000 tonnes per day (tpd)) mines producing concentrate to feed a significant copper smelter at Pirdop, located approximately 10 km from Chelopech.

The Chelopech mine operation currently employs approximately 865 people on site with the majority from surrounding communities.

5.4 Physiography and Climate

Chelopech site is located at approximately 730 m above sea level at the base of a range of gently undulating hills which rise to over 1,000 m above sea level. The area immediately surrounding the mine is comprised of grassland.

The area has the climate of Subtropical Europe, featuring markedly higher winter and substantially lower summer precipitation.

Winters are relatively mild with -2°C average temperature, but during intensive cold spells temperatures may fall to -19°C. Summers are hot, reaching 36°C in warmer spells and exceeding 40°C in some locations.

The average annual precipitation is 704 mm. The bulk of this falls in autumn and winter, occasionally as snow in the coldest months with highest rainfall occurring in December (96 mm average).

Average annual evaporation is 1,051 mm, similar overall to annual rainfall in magnitude, but opposite in seasonal sense.

Estimated 1:100-year rainfall events are 117 mm for 24 hours duration, and 184 mm for 72 hours. Probable Maximum Precipitation estimates are up to 383 mm for 24 hours and 605 mm for 72 hours. Mining operations are conducted all year round.

6 History

6.1 Exploration History

The mineral potential of the Chelopech area was first recognised in the mid-19th century and the outcrop area was worked prior to the start of the Second World War. The mineral deposit was re-discovered in 1953, following drilling by Sofia Geological Exploration (SGE). Underground development began in late 1953 to gain bulk samples and to further evaluate the mineral deposit.

The various mineralised bodies that constitute the Chelopech deposit (locally called "Blocks") were discovered as follows:

- Pre-1958 – Blocks 16, 17, 18 and 150
- 1960 – Block 10
- 1962 – Block 19
- 1964 – Block 103
- 1970 – Block 151.

Beginning in 1956, exploration shafts were excavated, and diamond holes were drilled, with underground production commencing in 1964. The mine, then part of several state-owned enterprises, was fully operational between 1970 and 1990, producing bulk copper-gold and pyrite concentrates.

In 1990, the Bulgarian Government decreed that due to the high arsenic content, the concentrates could no longer be treated at the nearby Aurubis copper smelter (formerly MDK-Pirdop), and the mine was put into care and maintenance. Production between 1954 and 1992 is estimated to be ~8.2 Mt, at an average grade of 1.0% copper and 2.7 g/t gold. A complete rebuild of the processing plant was carried out in the mid-1970s.

In 1994, operations were restarted by Navan Bulgarian Mining BV, a Dutch registered subsidiary of Navan Mining Plc, with the retreatment of approximately 100 kt of stockpiled low-grade concentrate. Following a number of ownership changes over the next five years, in 1999, the Council of Ministers and Chelopech EAD signed a concession agreement for the extraction of gold and copper from the mine, and the company name was changed to Navan Chelopech AD (Navan).

Navan operated the Chelopech mine until late 2002, when Navan went into receivership. The operations continued under the direct control of an administrator appointed by Deutsche Bank AG of London. Mining operations continued whilst DPM negotiated the acquisition of the Bulgarian assets from Navan, including the mine. The acquisition of Chelopech by DPM was completed in September 2003.

Annual geological reports prepared by Navan indicate ore treatment at Chelopech between 1994 to the end of 2002, to be in the order of 4.8 Mt, at an average grade of 1.4% copper and 3.9 g/t gold.

7 Geological Setting and Mineralisation

7.1 Regional Setting

Bulgaria is located on the southeast part of the Balkan Peninsula, which lies within the Alpine geosynclinal belt. In the southern Balkans two branches of this belt can be distinguished, the Carpathian-Balkan branch to the north and the Dinaric-Hellenic branch to the south (Figure 3).

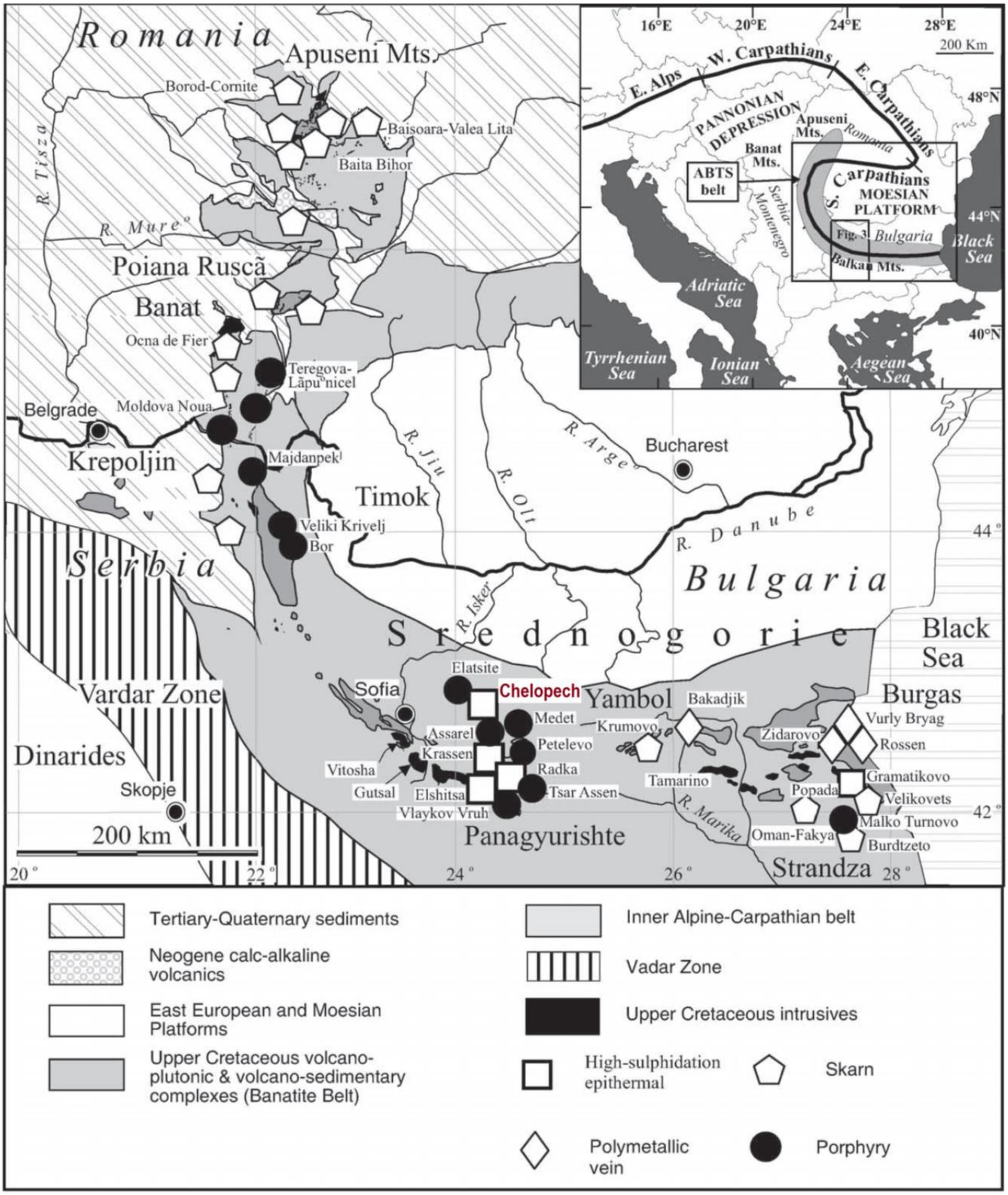


Figure 3: Apuseni–Banat-Timok–Srednogorie belt (A. von Quadt et al. 2005)

7.2 Local Geology

Late Cretaceous, island-arc type, magmatic evolution resulted in the formation of the Srednogorie volcanic intrusive zone. The Chelopech mineral deposit is located within the Panagyurishte metallogenic district, a central part of the Srednogorie zone.

The geology of the Panagyurishte metallogenic district comprises a basement of Precambrian granitoid gneisses intruded by Palaeozoic granites and overlain by Upper Cretaceous magmatic and sedimentary sequences. In some parts of the district, these rocks are overlain by upper Cretaceous to Palaeogene/Neogene foreland sediments.

Basement rocks form a series of uplifted north-east striking horsts and/or anticlinal structures between which a series of sub-parallel grabens host Cretaceous sequences. To the north and towards Chelopech, the Srednogorie massif forms the basement.

Regionally, the Panagyurishte mineral district is defined by a well-known north-northwest alignment of porphyry-copper deposits (e.g. Elatsite, Assarel and Medet) and epithermal copper-gold deposits (e.g. Chelopech, Elshitsa and Radka). These deposits lie oblique to the east-west orientation of the adjacent Srednogorie belt (Chambefort, 2005). Associated alluvial deposits (Topolnitza and Luda Yana) and minor vein-hosted gold deposits (Svishti Plas) have been previously exploited on a small scale.

The geology of the Panagyurishte metallogenic district is illustrated in Figure 4.

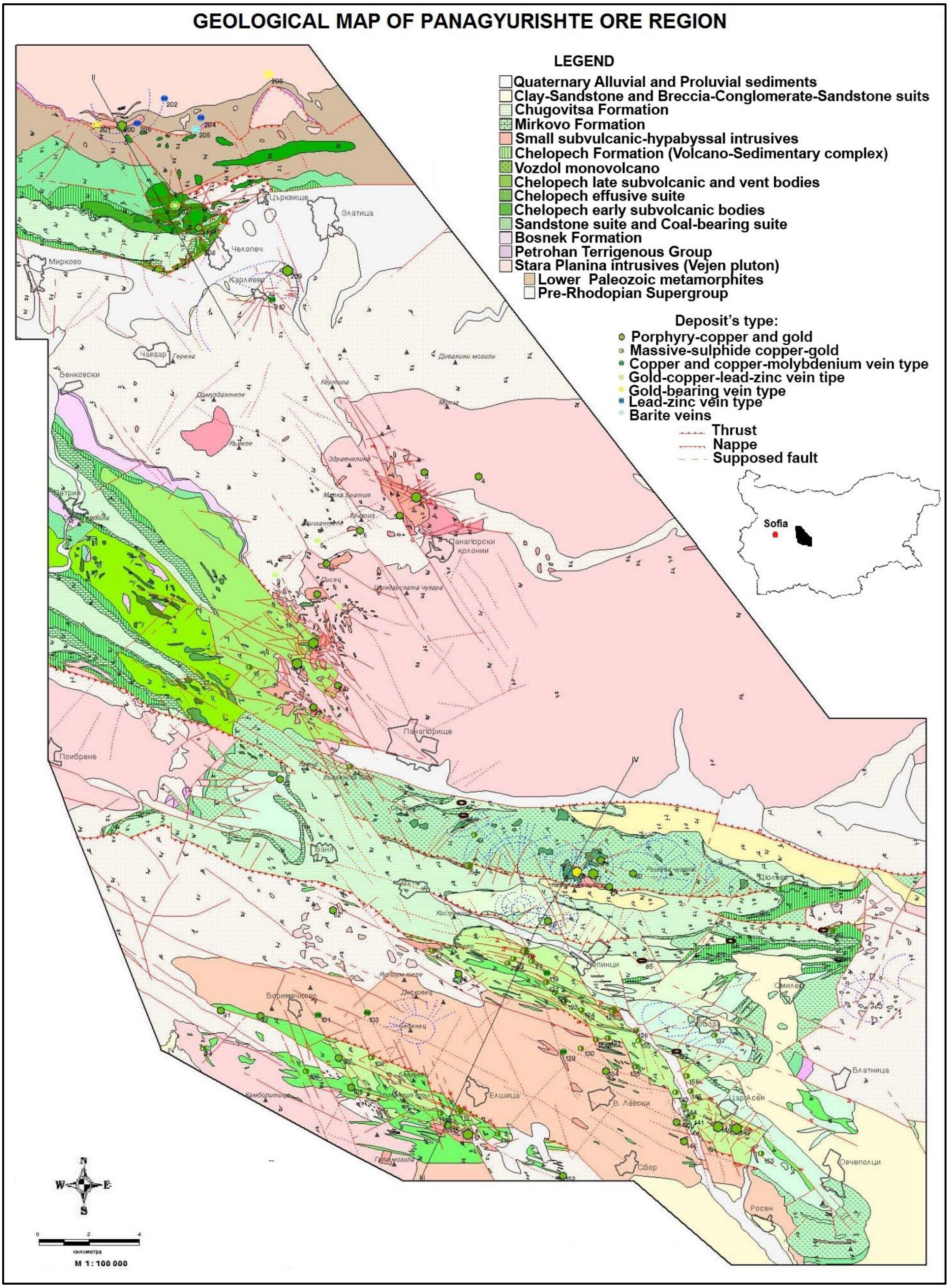


Figure 4: Regional geology of the Panagyurishte Metallogenic District (modified after P.Popov & K.Popov, 2000)

7.3 Property Geology

The Chelopech region consists of a Precambrian metamorphic basement consisting of gneisses, amphibolites, and metasediments overlain by Upper Cretaceous, volcano-sedimentary sequences which include the Chelopech Formation; the primary host to mineralisation.

The Chelopech Formation reaches thicknesses of up to 2,000 m and consists of Lower and Upper units.

The Lower Chelopech Unit is comprised of a basal sequence of siltstones and calcareous argillites with subordinate terrigenous sandstones and angular conglomerates. Upwards these sediments become intercalated and eventually superseded by volcanic sequences including andesites, andesitic agglomerates, andesitic lapilli and psammitic tuffs.

The Upper Chelopech Unit of Coniacian-Santonian age (Lower Senonian) comprises a complex of andesitic and dacitic lavas and tuffs with siliciclastic, volcaniclastic and argillaceous sediments intruded by sub-volcanic bodies of porphyritic andesites. The Upper Chelopech Formation passes up and laterally from mixed (terrigenous-volcanogenous) gritty sandstones, with volcanogenic exhalative iron-manganese oxide horizons, into volcanogenic talus breccias and agglomeratic tuffs of andesitic affinity.

Mineralisation is hosted within the Lower Chelopech Formation and occurs within sulphide-rich zones characterised by significant silica overprinting. These zones are typically surrounded by alteration haloes dominated by both silica and sericite alteration textures.

Orebodies form both complex branched units and discrete pipes and veins and are grouped into two major mining areas, the Central and Western zones (Figure 6).

The Central Zone consists of eight mineralised bodies, referred to as Blocks, namely:

- Blocks 16, 17, 18, 19, 5, 25, 10, 7 and 8.

The Western Zone consists of a further 11 blocks, namely:

- Blocks 103, 150, 151, 144, 145, 147, 148, 149, 149 South, 152 and 153.

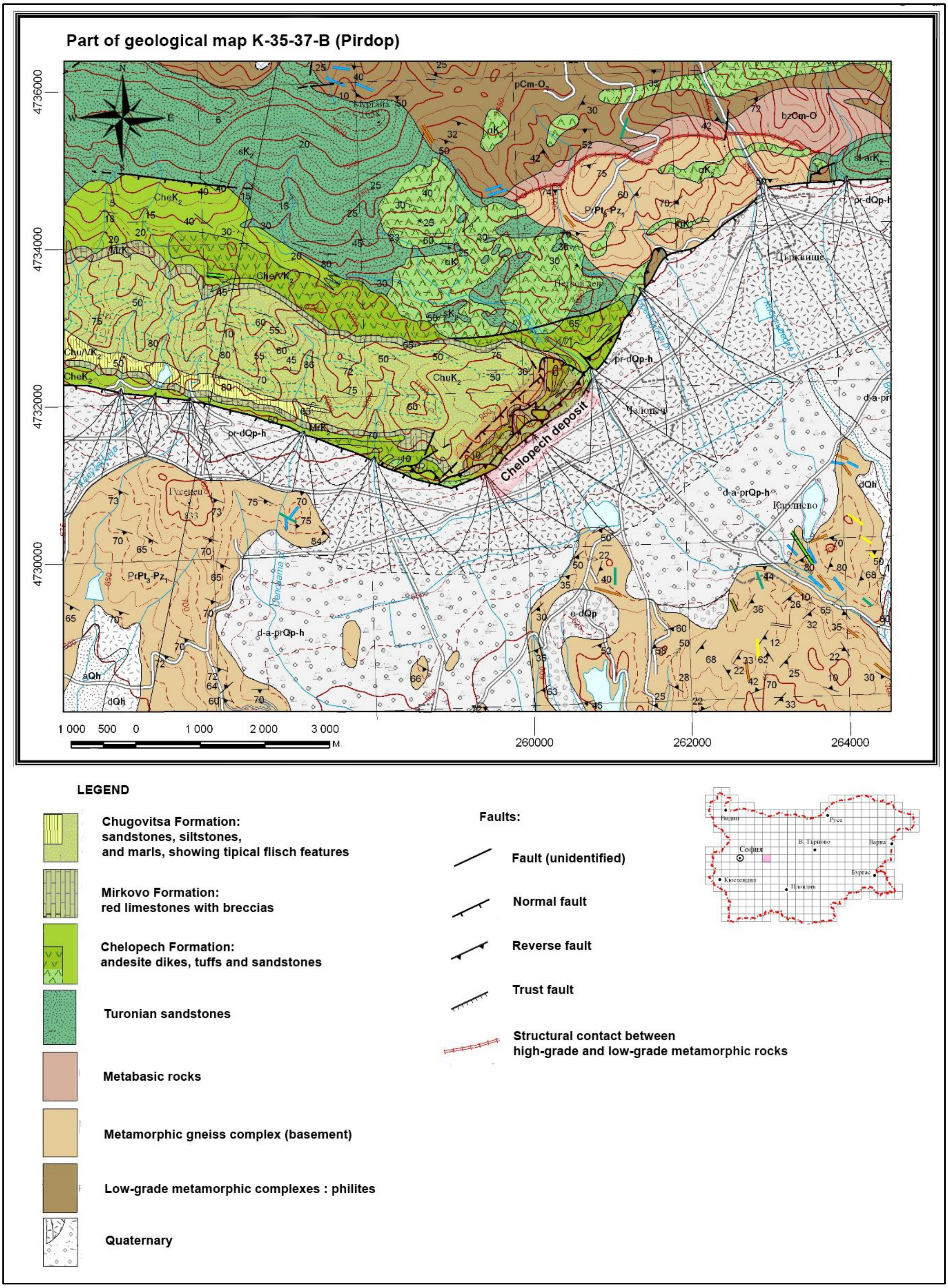


Figure 5: Geology of area surrounding the Chelopech deposit, with approximate location of the mine (M. Antonov, S. Gerdjikov, L. Metodiev et al., 2011) (with simplified legend)

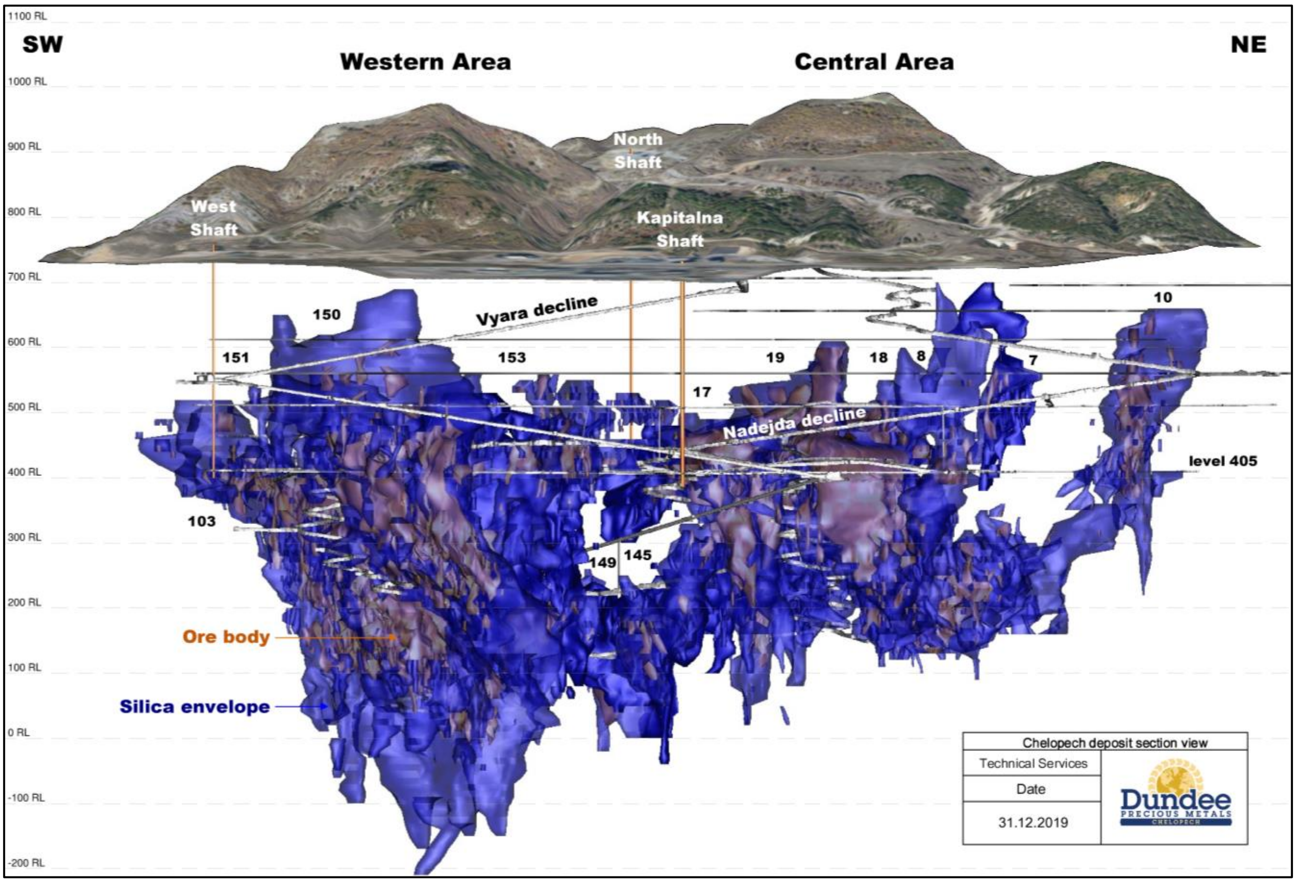


Figure 6: 3D view section of Chelopech deposit, with orebodies numbered (DPMC, 2019)

7.4 Structure

During 2007, a major synthesis of the Chelopech host rocks to a depth of greater than 2 km was completed by a team consisting of Chelopech and other DPM technical staff and the 2 Geoscience consulting group (Jigsaw, 2007).

The Jigsaw study concluded that the architecture and kinematics of the Chelopech hydrothermal system are characterised by multiple fault and fluid flow events. Mineralising fluids have entered the mineralisation system as a series of repeated pulses, with fluid physical properties evolving throughout. This pulsing nature of the fault-fluid system has created a complicated high-sulphidation epithermal mineralisation-bearing system with a series of bodies of differing geological character. Metal zonation (from lead-zinc rich in the east-northeast, to copper-gold rich in the west-southwest) suggests that deeper parts of the hydrothermal system may be located to the southwest.

Late and post-mineralisation faulting has served to modify the original shape and distribution of the epithermal mineralisation, most likely displacing it in a gross normal and sinistral sense. Based on this interpretation, several target areas have been defined in and around the Chelopech mineral deposit (Jigsaw, 2007).

In 2008, Jigsaw undertook further mapping and relogging programs to review the relationship between primary and secondary permeability controls on the steeply-plunging mineralised blocks. The kinematics and overprinting relationships of the major structures were further studied to assist with targeting (Jigsaw, 2008).

At the district scale, the main structural elements identified during this study include:

1. A series of steeply dipping, northwest-trending transfer structures which include a single strike-slip displacement on the order of hundreds of metres located within the overlying Senonian sediments.
2. North to north-northwest striking, steep, normal offsets with throw displacements of 50–150 m within the Senonian–Turonian unconformity.

3. Steeply dipping east-west trending basin margin parallel structures which domain/partition and offset the known ore blocks with copper mineralisation.

In 2009, Prestologic Pty Ltd updated the Leapfrog grade and alteration model as well as the clay minerals model for which an analytical spectral device (ASD) by Terraspect was used. The aim of those models was to confirm the current understanding of the 3D continuity of the Chelopech mineral deposit. This is the third Leapfrog modelling work conducted on the Chelopech copper-gold deposit. The first study was conducted in December 2006 and was followed up by a second study in June 2008.

The first Leapfrog geologic modelling study concluded that the 3D grade and alteration patterns could be explained in terms of a conjugate or an orthorhombic fault/shear pattern, to explain the steeply plunging prolate shape fabrics of the Chelopech orebodies.

This change in plunge within certain orebodies proved difficult to explain until the most recent study, which found that the single thrust orientation hypothesis (dipping ~23/150) was an oversimplification. The latest study confirmed that there are several shallow-dipping grade continuities while, the high-grade continuities can be explained in terms of a series of planar zones that share a common intersection line.

In 2013, the Chelopech Geology team started developing a detailed structural model of the deposit, based on all underground mapping. The structural data (dip direction, dip) is organised for the needs of different users (e.g. mine engineers, geomechanics, exploration geologist etc). All structural measurements are digitised and are represented as surfaces with interpretation between mining levels and pillars.

This work informed a reinterpretation of the silica domain and in 2014. This update included all geological observations taken from capital development along with the Chelopech 3D structural model.

7.5 Alteration

The Chelopech mineral deposit is characterised by an alteration style typical of epithermal, high-sulphidation deposits. Recent studies have recognised three principal alteration zones moving outwards from a central part of the system to its extremities. The innermost part consists of an advanced argillic zone characterised by the presence of vuggy silica, massive silica and a chalcedony. All economic mineralisation is focused in this area with mineralisation typically associated with a host dominated by 50–75% SiO_2 content. Surrounding this inner zone is a quartz sericite zone followed by a propylitic zone (Chambefort, 2005).

This zonation forms the basis of the mineral resource domains, with the central high-grade units associated with well-developed stockworks and massive sulphide mineralisation surrounded by lower-grade haloes dominated by disseminated sulphides and pervasive silica overprinting (Figure 7). These are respectively referred to as “Stockwork” and “Silica Envelopes” and form hard boundaries during the estimation of resources in Section 14.

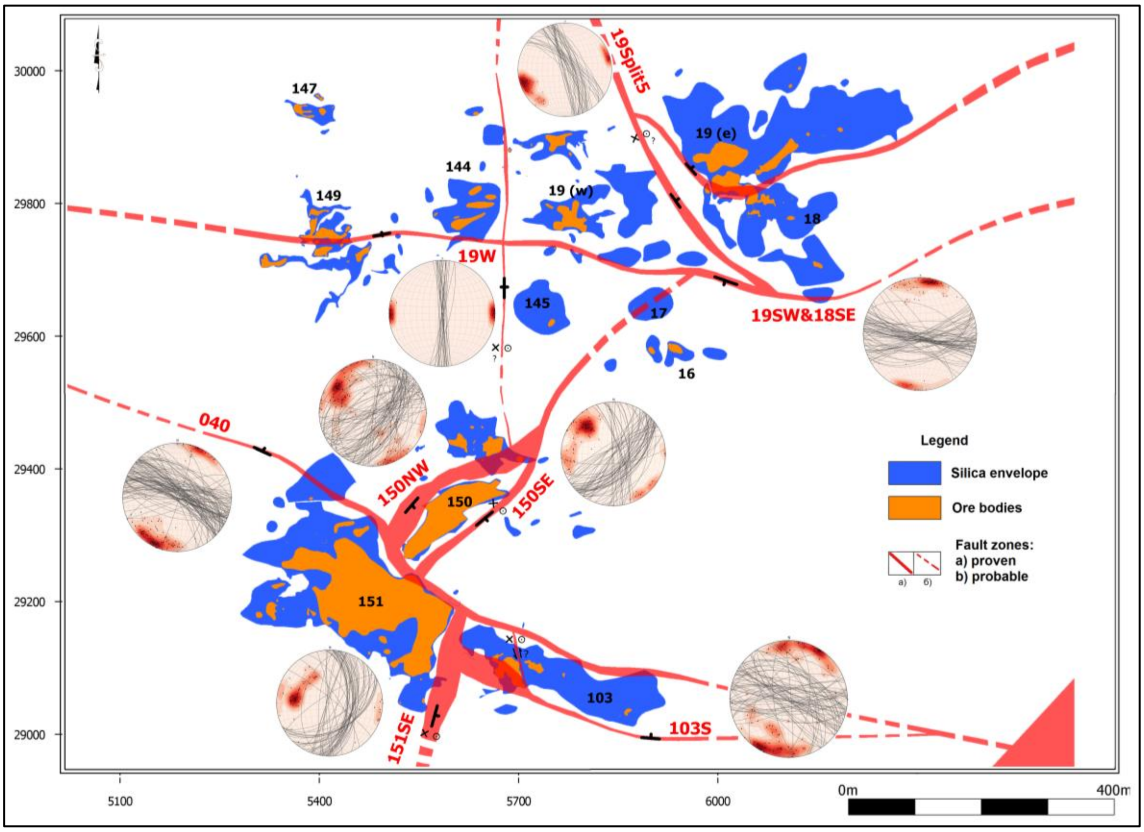


Figure 7: Plan of level 220 with major mineralised trends and major fault zones in the deposit (DPMC, 2017)

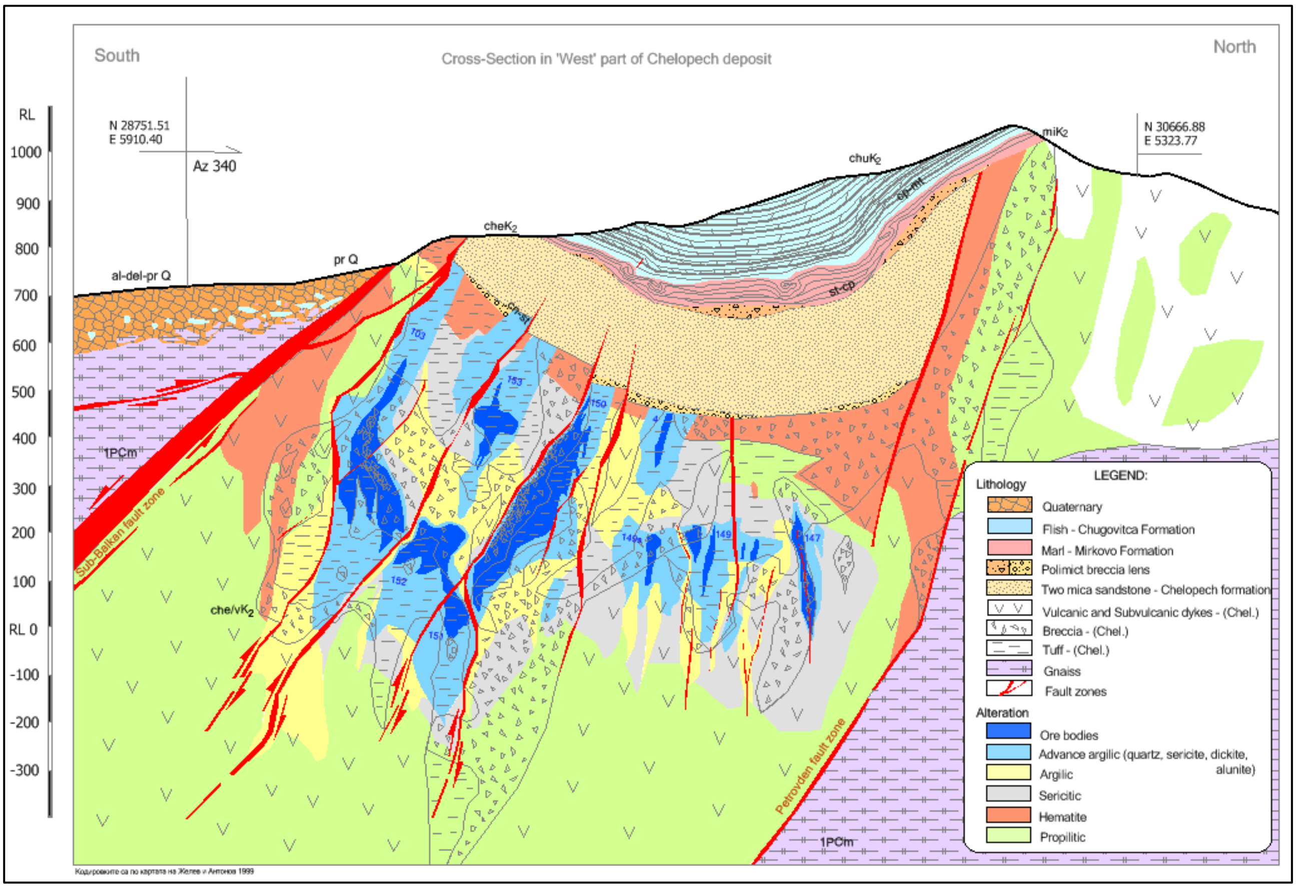


Figure 8: Vertical cross-section through Western Zone (looking west) with alteration, lithology and mineralisation (blue) (DPMC, 2019)

7.6 Mineralisation

Three successive mineralisation stages have been recognised at Chelopech, including an early iron-sulphur stage consisting mainly of disseminated and massive pyrite, a second copper-arsenic-sulphur stage which is the economic copper and gold stage, and a late lead-zinc stage. These display different geometries, including veins, breccias, massive and disseminated sulphides.

The mineralisation occurs in a range of different morphologies, including lens-like, pipe-like and columnar bodies that typically dip steeply towards the south. The mineralised zones vary from 40 m to 200 m in length, are 20–130 m thick, and can extend at least 390 m down plunge. Sub-vertical vein mineralisation is volumetrically the most important mineralisation style at Chelopech (Chambefort, 2005).

Definitions to quantify the textural features were developed for the 2004 RSG Global estimate, as presented in Table 5 and Table 6. These codes are used to generate the silica and stockwork envelopes during modelling and leading up to estimation. The codes have since been updated to include the presence, or absence, of sulfosalts (enargite, tennantite, luzonite).

Table 5: Copper mineralisation styles

Mineralisation style	Description/Definition
Massive/Semi-Massive Sulphide (MS)	> 80% sulphide pyrite + veins of Tennantite (TN) and/or Enargite (EN).
Massive/Semi-Massive Sulphide (PMS)	> 80% sulphide veins of pyrite (PY) only.
Normal Stockwork Sulphide (NS)	Sulphide veins with TN and/or EN occurring less than (on average) 0.3 m apart. And the average width of the veins is greater than 1 cm.
Normal Stockwork Sulphide (PNS)	Sulphide veins with PY only occurring less than (on average) 0.3 m apart (>30%vol) and average width >1 cm.
Weak Stockwork Sulphide (WS)	Sulphide veins with TN and/or EN occurring greater than (on average) 0.3 m apart and average width <1 cm.
Weak Stockwork Sulphide (PWS)	Sulphide veins with PY only occurring greater than (on average) 0.3 m apart (<30%vol) and average width <1 cm.
Disseminated Sulphide (DS)	Less than 40% TN and/or EN in replacement or disseminated form.
Disseminated Sulphide (PDI)	Less than 40% pyrite in replacement or disseminated form. No Tennantite (TN) and/or Enargite (EN) veins.
Gold (AU)	Visible Au and/or >80% sulphide veins of TN and/or EN.
Silica Envelope (SE)	Silica envelope without MS, NS and WS.

Table 6: Types of mineralisation and geometry of orebodies

Block	Type of mineralisation	Width/Horizontal extent/Vertical extent (m)
bl. 5	Normal stockwork	40/50/40
Bl. 7	Disseminated Sulphide	20/55/120
bl. 8	Normal stockwork	30/60/70
bl. 10	Massive sulphide to normal stockwork	40/50/300
bl. 16	Normal and weak stockwork	25/50/150
bl. 17	Normal stockwork	40/130/230
bl. 18	Normal stockwork	75/160/380
bl. 19	Normal to weak stockwork	130/250/440
bl. 25	Massive sulphide to normal stockwork	20/50/40
bl. 103	Weak stockwork and disseminated	70/260/280
bl. 144	Normal to weak stock stockwork	5-20/100/110
bl. 145	Normal to weak stockwork and disseminated	5-20/80/110
bl. 147	Normal stockwork	5-15/90/220
Bl. 148	Disseminated Sulphide and Normal stockwork	10-25/10-80/10-100
bl. 149	Massive sulphide to normal and weak stockwork	5-20/180/230

Block	Type of mineralisation	Width/Horizontal extent/Vertical extent (m)
bl. 149 South	Normal to weak stockwork and disseminated	10-20/70/120
bl. 150	Massive sulphide to normal and weak stockwork	20-70/250/420
bl. 151	Massive sulphide to normal stockwork	100/230/480
bl. 152	Normal stockwork	50/100/80
bl. 153	Normal stockwork	50/100/70

Sulphide mineralogy is dominated by pyrite, marcasite, melnikovite, tennantite, enargite-luzonite, and chalcopyrite, together with subordinate famatinite, sphalerite and galena. In gross terms, about 45% of the copper is in the form of arsenides and sulfosalts, 50% as chalcopyrite and 5% as oxides.

Quartz, barite and kaolinite are the dominant gangue minerals with chlorite, ankerite and gypsum subordinate.

Gold occurs in a variety of forms, both as native metal with admixed silver in a stoichiometric form approximating to Au_3Ag and in auriferous tellurides. The gold is fine grained (5–300 microns, with 5–20 microns the norm). Metallurgical studies have shown a significant proportion of the gold is refractory, typically:

- 45% intergrown within pyrite, chalcopyrite and sphalerite
- 25% intergrown with enargite, luzonite, tennantite, tetrahedrite and bornite
- 20% finely intergrown with chalcedonic silica
- 10% as free gold.

Silver-bearing rock and native silver are usually spatially associated or finely intergrown with pyrite and galena (62%) with enargite, tennantite and tetrahedrite (15%) and as electrum (23%).

Other major sulphides and arsenides exhibit simple crystalline and intergrown forms with the pyrite and occur in intra-crystal spaces as replacements, as replacements of pyrite, as crosscutting veinlets and as overgrowths. Intergrowths of the cupriferous minerals are commonplace, both as aggregates and as complex textures with several intergrown minerals.

8 Deposit Types

Bulgaria can also be subdivided into several structural and metallogenic zones. These structural-metallogenic zones are separated from each other by major structural discontinuities or deep faults. Within these zones, specific mineralisation types and ages are found:

- Mineralisation in the Rhodope zone is typically characterised by:
  - Vein and replacement-type lead-zinc and fluorite deposits (the most common)
  - Low sulphidation epithermal gold deposits
  - Alpine-type chromite deposits
  - Granite skarn-type scheelite deposits.
- Mineralisation in the Srednogorie zone is typically characterised by:
  - Porphyry copper
  - Cupriferous skarns
  - Volcanogenic massive pyrite deposits
  - Massive sulphide copper pyrite deposits.
- Mineralisation in the Kraishtide zone is characterised by granite associated vein gold-arsenopyrite deposits.
- Mineralisation in the Moesian zone is characterised by sedimentary salt, gypsum, kaolin and manganese deposits.
- Mineralisation in the Balkan zone is typically characterised by:
  - Bleiberg-type sediment-hosted polymetallic deposits
  - Vein-type gold deposits.

The epithermal class of deposits (including Chelopech) were originally classed as "massive sulphide copper pyrite deposits". Recent studies indicate that an epigenetic origin for the mineralisation formed by the replacement of volcanic rocks is more suitable (Chambefort, 2005).

Current models (e.g. Hedenquist *et al.,* 1994) for high sulfidation epithermal systems suggest silification was early and related to initial gas expansion (SO_2, HCl) that separated from a denser, metal-bearing brine at depth. This gaseous solution mixed with meteoric waters to produce sulphuric acid. At Chelopech, multiple events related to both silification and mineralisation, were probably driven by pressure fluctuations, degassing and fault-valve activity above a metal-bearing brine fluid at depth.

Lack of stockwork chalcopyrite-bornite bearing quartz veins with sequential potassic–phyllic to propylitic alternation haloes, felsic intrusives and abundance of copper-arsenides at Chelopech suggests porphyry copper mineralisation is not present.

High arsenic-sulphur systems represent a change in fluid conditions which have commonly been observed in the youngest paragenetic stages of porphyry copper mineralisation. The fluids responsible at Chelopech are of a different character and are more acidic and possibly more reduced remnants of a de-gassed brine material, capable of chloride-gold transport. Therefore, porphyry copper conditions may have occurred further out in the Chelopech district, and (if not exposed) may be preserved at depth (RSG Global, 2007).

9 Exploration

9.1 Introduction

Given the long exploration and operational history at Chelopech, a variety of drilling and sampling methods have been implemented. A summary of the drilling and sampling completed to date is presented in Table 7 and Table 8. A description of the current exploration activities is provided in subsequent subsections.

9.2 Underground Face Sampling

Underground face sampling has been routinely performed since the commencement of mining development (Table 7). All mine developments; both capital and operational are sampled. In addition to being used for production, underground face sampling results are used in resource estimation. For more details about sampling procedure, refer to Section 11.1.2.

A comparative study of underground face samples against other sample types at Chelopech, was completed in 2007. This review work was re-assessed in 2013 by DPMC staff and no significant bias between face samples and other sample types was observed. For more details of this review, refer to Section 12.10.

Table 7: Underground face sampling data (as at 30 September 2019)

Period	Company	Samples	Assays
June 1956 to February 1992	State owned (including Polimet)	7,220	27,494
Mine closed March to December 1992			
March 1992 to August 2003	Navan (including) Homestake	8,494	41,017
DPMC September 2003 to September 2019	DPMC	21,227	105,940
TOTAL		**36,941**	**174,451**
Total – Pre-DPMC		**15,714**	**68,511**
Total – DPMC		**21,227**	**105,940**

9.3 Underground Mapping

Underground mapping is a routine activity and is performed by qualified mine geologists. Mapping of underground levels is completed during and following the completion of development, and prior to mining. Detailed lithological, alteration, textural and structural data is collected and transferred onto 1:200 scale plans and then digitised into GEMS mining software for interpretation and creation of the structural model. The structural model is used as the basis of geological interpretation for the mineral resource model.

9.4 Geophysics

9.4.1 Geo-Electric Surveys

Titan-24 Distributed Array surveys using Direct Current Induced Polarisation (DCIP) and Magnetotellurics (MT) were undertaken on the Chelopech mine property, by Quantec Geoscience Inc. between 4 September and 10 October 2004. A total of 38.4 line-km of MT and DCIP were surveyed on thirteen, 200 metre spaced, 2.4–4.8 km long, northwest-southeast profiles, and one 2.4 km long baseline.

Data acquisition was followed by 2D inversion of DCIP and MT dataset performed by Quantec. Additional 3D inverted model for chargeability and resistivity delivered from DCIP was calculated in-house.

During 2019, two holes were surveyed with BHEM. A total of 230 m in Ex_Wz_04 and 525 m in Ex_Wz_05 were logged with three component (X,Y,Z) electromagnetic imaging technology (EMIT) sensor. As a result, conductive plates were mapped as potential targets for further follow up.

Approximately 0.35 km^2 were covered with ground Time-Domain electro-magnetic survey (TEM) at 50 m x 50 m grid with aim to identify shallow conductive targets to support drilling campaign at “Krasta” prospect, “Sveta Petka” exploration licence.

The results of all geophysical works were incorporated into a 3D geological model for further analysis and interpretation.

9.4.2 Ground Gravity and Magnetic Surveys

In the near-mine area, the Sveta Petka exploration licence has been investigated during various ground magnetic survey campaigns since 2008. Scintrex and GEM magnetometers were used by different contractors to conduct the surveys. The resultant grids were joined together, processed with Geosoft and a 3D UBC magnetic model calculated.

A total of 468 gravity survey points were measured in Sveta Petka and Mining Concession areas. A 200 m x 200 m base grid was used with infill points over selected anomalous areas.

Additionally, a complete Bouguer anomaly map was calculated using combined (light detection and ranging (LiDAR) and digitised topography) DEM grid.

Filtered gravity (residuals, upward continuation) were calculated and used to allocate areas with potential for presence of large massive sulphide bodies. A 3D UBC gravity inversion of a block model density distribution was calculated.

A total of 148 full tensor of magnetotelluric stations have been measured. The survey covers two blocks of Brevene exploration licence at an approximate grid of 250 m x 250 m. At the southern portion of the Brevene exploration licence, magetotelluric stations are allocated along line-section profiles.

A 3D magnetotelluric inversion of a block model of Resistivity distribution have been calculated for the Western and Eastern blocks. A 2D inversion model was also calculated along selected profiles. 1D inversions calculated for each station.

Approximately 20 km^2 at Brevene exploration licence, surrounding Sveta Petka and Mining Concession were covered with airborne magnetic survey (Drone Mag) – a total of 212 line-km along northeast-trending traverses at a nominal line spacing of 100 m. New results were merged with previous ground magnetic surveys including newly measured ground survey of 76 line-km and standard grids produced for analysis and interpretation. 3D inverted magnetic models were calculated over selected areas with aim to identify further potential targets.

The results of all geophysical works were incorporated into a 3D geological model for further analysis and interpretation.

10 Drilling

10.1 Introduction

Resource development drilling at Chelopech has been completed at a nominal hole spacing of between 50 m x 50 m and 25 m x 25 m. Most surface holes are vertical or steeply inclined and average 600–700 m in depth, with some holes exceeding 1,000 m. Underground drilling, originally horizontal, is now inclined in all orientations to achieve the best angle of intersection. The data cut-off date for update of mineral resources was 30 September 2019. Data consists of both historical and DPMC drilling data and is summarised in Table 8 and presented graphically in Figure 9.

Table 8: Drilling data details (as at 30 September 2019)

Operator	Period	Company	Size	Number	Average length	Total metres
Pre-DPMC surface drilling	June 1956 to February 1992	State owned (including Polimet)	Various sizes	435	609	265,014
	Mine closed March to December 1992					
	January 1993 to August 2003	Navan (including Homestake)	Various sizes	13	166	2163.4
	Total – pre-DPMC surface drilling			**448**	**596**	**267,177**
Pre-DPMC underground drilling	June 1956 to February 1992	State owned (including Polimet)	Various sizes	216	124	26,858
	Mine closed March to December 1992					
	January 1993 to August 2003	Navan (including Homestake)	BQ, NGM	501	58	28,813
	Total – pre-DPMC underground drilling			**717**	**78**	**55,672**
DPMC surface drilling	September 2003 to September 2019	Exploration	Various sizes	134	479	64,157
DPMC underground drilling	September 2003 to September 2019	Exploration	BQ, NQ, NQ-2, HQ, LTK60, NGM	1341	288	386,118
		Grade control drilling	BQ, NQ, NQ-2	1631	153	250,223
	Total – DPMC underground drilling			**2,972**	**214**	**636,341**
TOTAL				**4,271**	**240**	**1,023,347**

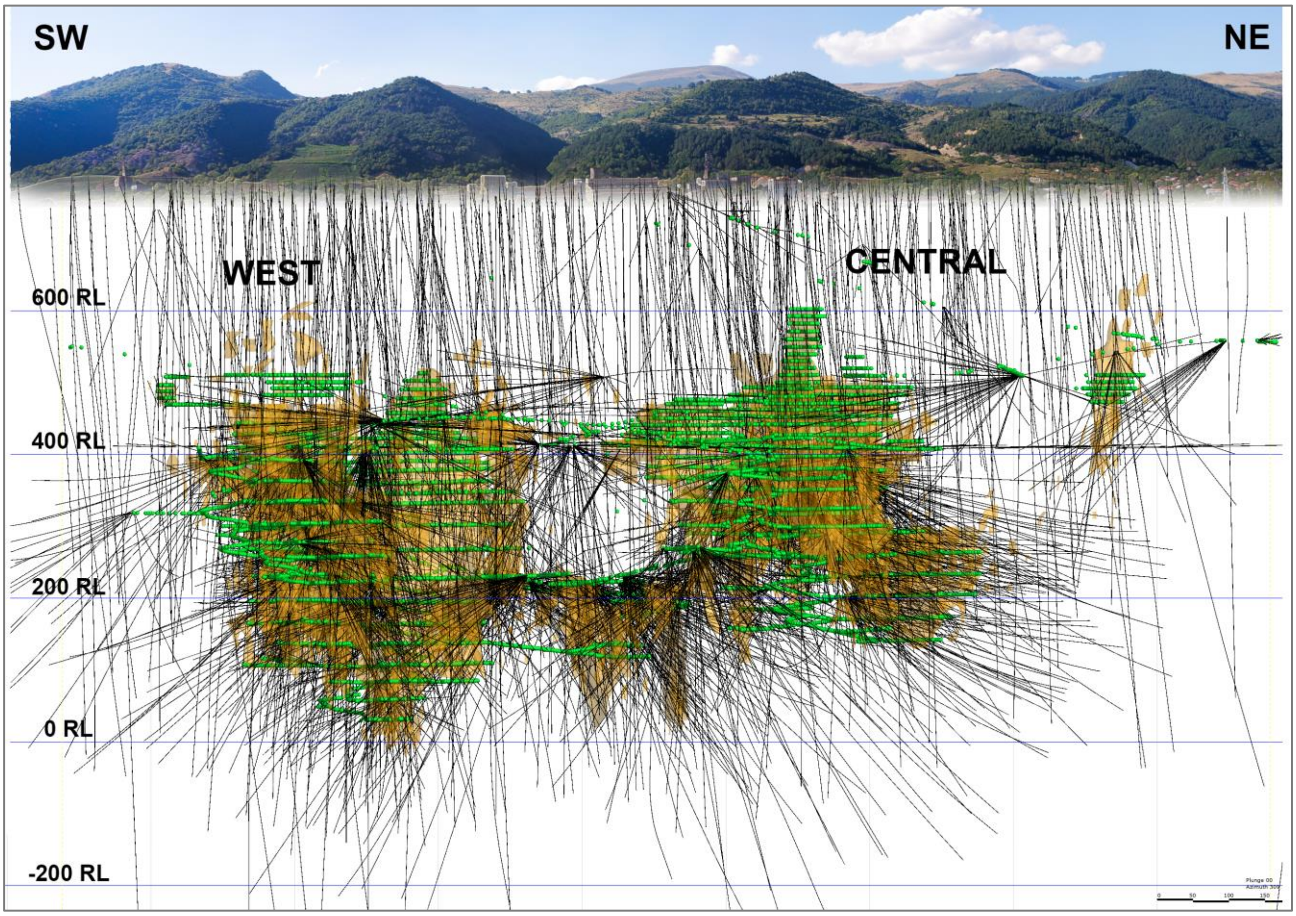


Figure 9: 3D representation of the Chelopech deposit with diamond drillholes and underground face samples in green, looking northwest (DPMC, 2019)

10.2 Pre-DPMC Drilling

10.2.1 Surface Drilling

SGE has carried out surface diamond drilling at the Chelopech copper-gold deposit since 1956. Their surface holes were drilled at various sizes and core recovery was reportedly routinely measured during the drilling process. A historical recovery of 87% in the waste and 97% in the mineralised zones is reported, though there is no data to verify these figures.

10.2.2 Underground Diamond Drilling

The Chelopech Copper Processing Company (CCPC), Navan and Homestake have completed underground diamond drilling at the Chelopech mineral deposit during the pre-DPMC period.

The early underground diamond drilling completed by CCPC, was dominantly horizontal, and designed to locate the lateral boundaries of mineralisation interpreted from the surface drilling.

Since Navan's involvement, modern diamond drills have been introduced with better capabilities with drilling inclined normal to mineralisation and along section lines.

Homestake drilled 18 holes between 1995 and 1998. All holes were drilled using formalised standards and procedures. Core recoveries were measured for Homestake drilling and it is reported that appropriate care was taken to achieve high core recoveries.

Up until the start of 2003, a Longyear LM22 (TT-46, 34 mm core) and two Diamec 262 (NGM, which is 56.1 mm core diameter) drilling rigs, with NGM wire lines, were in use. For more details, refer to Table 8.

10.2.3 Diamond Drilling Logging

Historically, core was logged either underground or at surface in a logging facility. Geological logs were created primarily by using a graphical schematic strip log with lithology, mineralogy and structural annotations added. Core descriptions recorded lithology, texture, alteration and mineralisation style.

10.3 DPMC Drilling

10.3.1 Surface Diamond Drilling

External to the immediate resource development area, DPMC completed the first phase of surface drilling on a 200 m x 200 m grid in 2006 and 2007, targeting a geophysical anomaly north of the mine. This is on the adjacent Smolsko exploration lease, which was transferred from Balkan Mineral and Mining EAD to Chelopech Mining EAD. The surface diamond drilling was completed using CM 1000, CM 1200 and DT 1000 drill rigs provided by Bulgarian Drilling Services Ltd. For more details, refer to Table 8.

Follow-up surface drilling from August to September 2010, on a 100 m infill grid, defined the presence of five separate narrow 3–10 m mineralised brecciated and silicified volcanic zones hosting sulphides and ±sulfosalts. The surface diamond drilling was completed using Cristensen C5-10, Cristensen C5-14 and Knebel drill rigs provided by contract drilling company Geops Ltd. The opportunity to convert these new zones into mineral resources with further drilling has been deferred.

During 2019, surface diamond drilling was completed by a company drill rig LM75 and two additional drill rigs – Christensen CS10-02 and Mustang 5 provided by Geops Ltd, that were contracted to DPMC. A total of 4,359 m were drilled towards target 700 and the upper levels of Block 151.

The Target 700 area coincides with a southwest-northeast structural trend which has been assessed as having high potential for hosting mineralisation. The mineralisation is presented as quartz-barite-sulphide veins coincident with a wide silica alteration zone and is primarily enriched with gold-silver but virtually devoid of copper.

The upper levels of Block 151 are a key area for further resource development drilling activities in the western part of the concession. The purpose of the surface planned drilling program was to discover new HG zones above historically mined high grade area called “Block 390”. This area is viewed as being attractive due to the presence of poorly tested mineralisation hosted within a wide advanced-argillic alteration zone between 610 mRL and 440 mRL.

10.3.2 Underground Diamond Drilling

The main objective of underground drilling is resource development and grade control with geological logging and grade analysis. Geotechnical assessment and metallurgical evaluation are completed when required. For more details, refer to Table 8.

During 2004, two Diamec 262 drilling rigs, owned by DPMC and two Major Drilling (LM55 and LM75, NQ core) drill rigs were in use.

In mid-2005, the Major Drilling rigs were purchased by Dundee while, at the end of the year, one of the Diamec 262 (D1) drill rigs was decommissioned. In 2006 and 2007, three drill rigs were operating until December 2007, when DPMC purchased and commissioned a new LM55 with LM75 power pack.

In early 2010, DPMC commissioned an additional LM55 with LM75 power pack specifically to drill grade control holes. This rig is smaller and lighter than the others and was purchased with a telehandler for quick manoeuvrability. Once this rig was operational the last of the Diamec rigs was decommissioned.

In July 2014, DPMC commissioned a mobile grade control drill rig, LM30SS. This is a compact, mobile unit that ensures quick setup time and ease of moving from site to site. It uses a CAT 346C Skid Steer carrier to power and transport the drill components.

During 2019, four additional contractor's drill rigs were used and a total of 10,470 m were drilled from seven drill pads in the DPMC concession area.

Currently, four drill rigs are in use; two drill rigs for exploration and two for grade control, drilling a total of approximately 44,000 metres drilled annually.

10.3.3 Diamond Drilling – Core Logging

Diamond drilling and core logging at Chelopech is performed to a high standard. The key technical criteria observed by the drillers are:

- Inner tube splits and core lifters are washed prior to reuse in successive drill runs.
- Drill core is orientated on 3 m intervals (or on smaller intervals in zones) using an Ezy-Mark™ core orientation mechanical tool and Orifinder DS1 (using from May 2015). Core orientations are also undertaken immediately after poor orientations.
- Wooden core blocks are placed between runs, recording the length of the run and core loss (if any).
- Forced breaks made by the drillers must be marked on the core on the both sides of the breaks with a red cross.
- Core is washed clean, free of surface mud or other drilling fluids.
- The core trays are clearly labelled with the hole ID and depth, from and to, tray number.
- Transportation from the drilling site to the core yard is undertaken with great care to avoid disturbance of the core.

The drill core is logged by competent DPMC geological personnel in a core shed established for this purpose. All logging information is collected digitally on tablet computers using Field Marshall software.

The use of tablet computers ensures use of consistent logging using deposit specific codes. The presence of type lithology and alteration style boards supports good logging practice and ensures methodical training of new staff.

The geological logging of the core is carried out at 1.5 m intervals through a system of codes for lithology, alteration, veins, mineralisation etc, which are entered into a Geological Logging Sheet in tablets in Field Marshall. In practice, the code system covers all possible variations of rocks, minerals, alteration and oxidation processes, veins and textures, mineralisation, etc. Once the logging is completed, the finished files are copied and placed on the geology server.

All core is photographed, both dry and wet, using a digital camera, and the photos are saved on the geology server. Core logging workflow is presented in Figure 10.

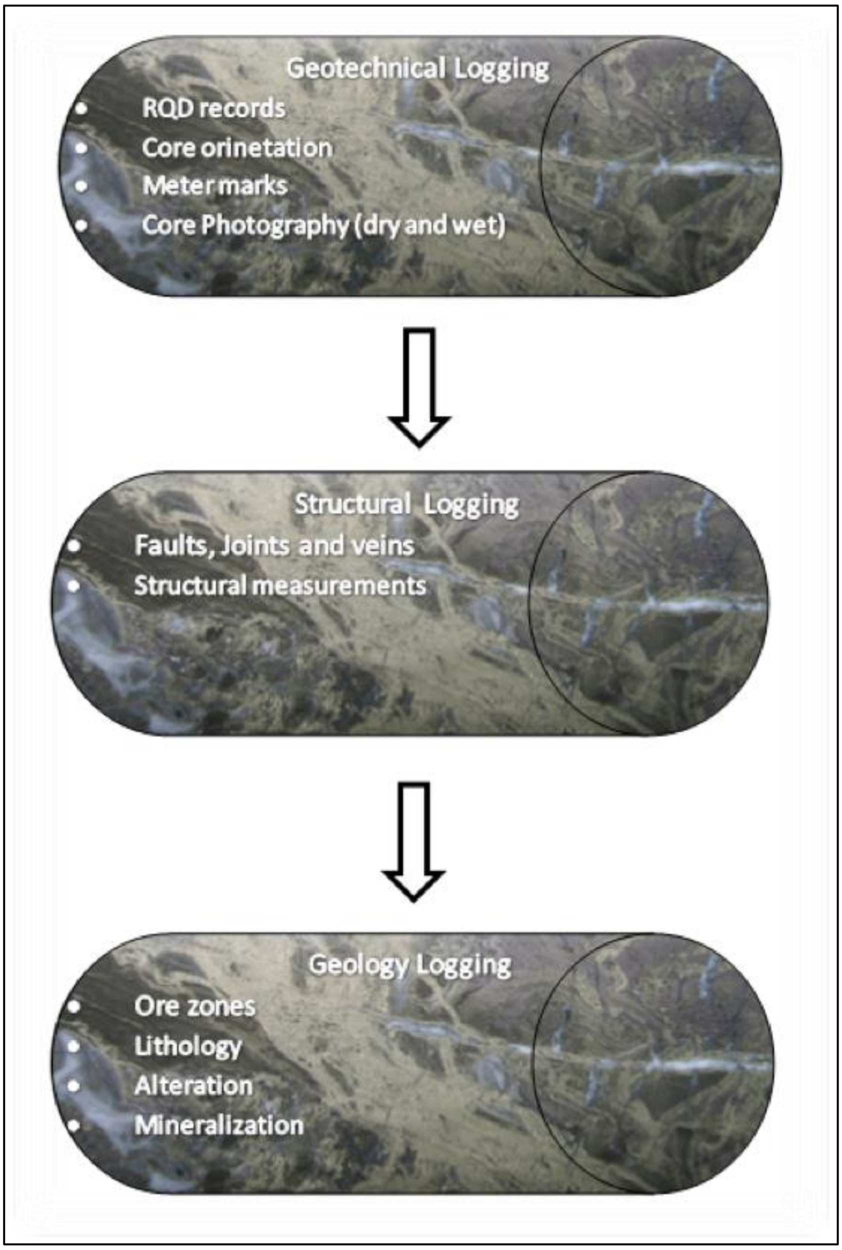


Figure 10: DPMC drill core logging flowchart (DPMC)

10.3.4 Rock Quality Designation Records

Summary geotechnical logging consists of recording Rock Quality Designation (RQD) and measuring recovery per drill run (complete core loss is recorded as "0" RQD). RQD is defined as the percentage cumulative length of core pieces longer than 10 cm in a run divided by the total length of the drill run converted to % (only the naturally broken pieces are measured; breaks made by the drillers are ignored).

10.4 Core Orientation and Structural Logging

10.4.1 Core Orientation using Ezy-Mark™

Between May 2009 and May 2015, core orientation was conducted using the Ezy-Mark™ system which works by giving a gravity-based bottom of the hole line using a series of orientation pins. The processing of the core is identical to the workflow outlined below, in Section 10.4.2.

Before orienting the drill core with the Ezy-Mark™ core orientation mechanical tool, the geotechnician checks the quality of the orientation marks to ensure that they can be used to confidently orient the core.

Figure 11: Check on core orientation by Geotechnician using the Ezy-Mark™ system (DPMC, 2013)

10.4.2 Core Orientation using Orifinder DS1

The Orifinder DS1 tool has been used since May 2015 and remains in use. The use of this tool increases the quality of core orientation, saves time when checking the quality of core orientations and reduces orientation errors via the audit check feature. The tool acquires data wirelessly making it a "no manual required" drill core orientation system designed for a one-man drilling operation in harsh environments.

Figure 12: Process of core orientation at underground drill site by a driller using Orifinder controller (DPMC, 2015)

The orientation marks are connected with a thick black line for the intervals with high confidence when at least two marks are within a tolerance of 10° of the orientation, and with a broken line for uncertain orientation, e.g. if there is a discrepancy between the directions of the marks or when some of the core pieces do not fit well together, or when at least two marks are within a tolerance between 10° and 15° of the orientation.

The alpha, beta and gamma angles for geological structures in the drill core are measured for:

- Planar structures – bedding, foliations, veins, joints, faults
- Linear structures – fold axes (hinges), intersection lineations, stretching (extension) lineations and slickenlines.

Structural logs are captured in acQuire with alpha, beta and gamma angles converted to real space. These are then transferred through Structured Query Language (SQL) scripts into GEMS.

10.5 Pre-DPMC Surveying

10.5.1 Drillhole Collars

Hole surveys were undertaken using optical methods consistent with good industry practice, using theodolites and survey traverses. Up to 1998, drillhole collars were surveyed with a theodolite (Theo 010 or Theo 020). Between 1998 and 2002, surveys were conducted using an electronic theodolite (Sokkia). Since 2002, a Leica 305 total station has been used. This equipment is used for both surface and underground drillhole collars.

10.5.2 Downhole Surveys

Prior to 1994, a gyroscope was used to survey downhole traces. Between 1996 and approximately 1999, a (Reflex) Maxibore tool was used for downhole surveying. From this, it was established that the drillholes on average, deviated less than 0.7 m over the total hole lengths. With such small magnitudes of downhole deviation, when the lengths of subsequent holes were reduced, downhole surveying was discontinued. Between 1999 and 2002, the dip and azimuth of the holes were measured at the collar and the data extended to the base of the hole.

10.6 DPMC Surveying

10.6.1 Grid Control

Both surface and underground survey control networks are based on the national triangulation network, with the development of local area survey network. Coordinates are transferred from the national triangulated grid 1970 to local mine grid and UTM WGS84 using a two-point transformation (Table 9).

Table 9: Two-point transformations

Point ID	Point 1	Point 2
NAT Grid X	4603331.8	4605477.5
NAT Grid Y	8558286.5	8561697.7
NAT Grid Z	700	700
Mine Grid X	4365.666	7791.299
Mine Grid Y	28800.663	30923.104
Mine Grid Z	700	700
UTM X*	258500	262000
UTM Y*	4731000	4733000
UTM Z*	700	700

**UTM Zone WGS1984 Zone35N*

10.6.2 Drillhole Collars

The Survey Department is responsible for setting out the collar positions, directions, and inclination/declination of both surface and underground drillholes, and for surveying the actual position, direction and inclination/declination upon completion. The latter coordinates are entered in the drillhole database. The Survey Department utilises a Leica TS15 and TS16 total stations surveying tools. The risk of significant error associated with the drill collar surveys is considered to be low.

10.6.3 Downhole Surveys

Since 2003, the dip and azimuth of holes were measured using a Reflex EZ shot which measures magnetic north, magnetic field and temperature, and allows accurate calibration of the results (i.e. spurious results can be excluded based on the magnetic susceptibility results). During 2005, a review of the downhole surveys in the database was completed and it was found that during the original transfer of the database from GEMS to acQuire, the downhole depths were incorrectly transferred. The entire downhole survey database was checked, and all records modified to their original downhole location. This only affected holes drilled prior to 2003 and as most of the resource is defined by holes drilled after 2003, this is not considered a material issue.

Not all underground drilling completed since 2005 has been systematically downhole surveyed. While the deviation is not expected to materially change the mineralised zones, all future drillholes should be downhole surveyed to determine an accurate spatial location. Downhole surveying has been incorporated into a series of standardised DPMC procedures, which have been implemented at the Chelopech mine since 2005, with routine downhole surveys carried out every 30 m using four on-site single shot reflex tools. These tools are checked every month and calibrated when required.

10.6.4 Topography

In general, the topographic model follows the collar positions of surface drillholes. However, there are deviations due to the accuracy of the topography survey. As the mineral resource is not impacted by surface expression, this inaccuracy is not considered material. In October 2013, an orthophoto map and DSM of the terrain around the mine and industrial site was created by "Solitech" EAD using Gatewing X100 and Trimble UX5 systems. The covered area is 68 km^2. The achieved accuracy is about 300 mm in 3D space.

10.7 Core Recovery

Core recovery measurements have been performed continuously since 2004 with excellent core recovery for all drillholes. A total of 913 drillholes have no core recovery details and 416 historical holes have low priority data. Diamond core recovery is measured during the core mark-up process, prior to logging and cutting.

No issues were noted with core recovery. For more details, refer to Section 12.6.

10.8 Operational Resource Development Drilling (2019)

In 2019, a total of 51,922 m of resource development diamond drilling was completed in the Chelopech concession.

Resource development extensional drilling was concentrated on the upper levels of Target 700 and Blocks 151, 17, 18, 5, 25 and 10, with the objective of expanding the current mineralisation body extents and increasing confidence of Mineral Resources. Further to this, the areas down plunge of Blocks 144 and 147 were also drilled during the year.

In 2019, two targets were subject to metallurgical testwork – Target 7 and Target 148. Metallurgical testwork has shown that mineralisation is highly amenable to the current processing flowsheet. As a result, the targets were converted into blocks (Figure 13, respectively Block 7 and Block 148) and included in the Mineral Resource.

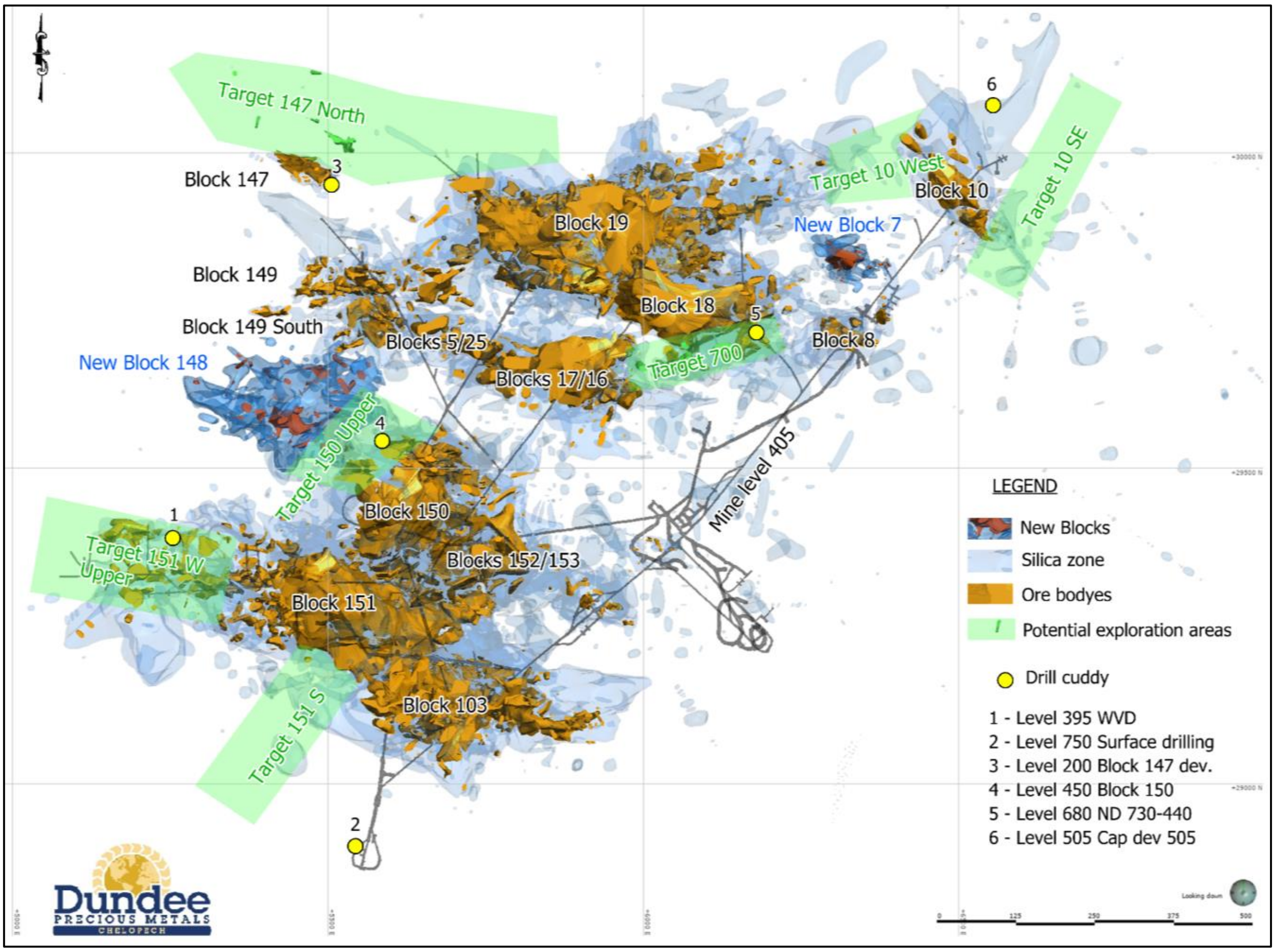


Figure 13: Overview map of the planned operational resource development drilling in Chelopech mine during 2020 (DPMC, 2019)

Currently, DPMC's operational resource development drilling strategy for 2019 combines resource definition drilling designed to a 30 m x 30 m drilling grid with infill grade control holes. Wider spaced resource definition drilling is employed to define Indicated Mineral Resources. Whilst operational infill drilling on a 15 m x 15 m drilling grid is designed to upgrade Indicated Mineral Resources to Measured Mineral Resources, to allow detailed production design and scheduling works.

The 2020 Mineral Resource development strategy for Chelopech will focus on the upper levels of deposit.

Based on the results from 2019, resource development drilling in upper levels of Block 151 will continue from underground and surface drilling programs. The aim is to test the current mineralisation contours (south boundary) and look for extensions. The purpose of the planned drill program from surface is to discover new mineralisation zones near to the historically mined high-grade mineralisation body 390 in the west where the contact with the covering sandstones is defined as potential for massive lensoidal shape mineralisation bodies.

The drill program in the upper levels of Blocks 17, 25 and 5 will continue this year. The purpose is to determine the shape and size of the mineralised zones.

Target 700 extensional drilling will continue with the aim of further delineation of the target volume and to begin establishing continuity between drillholes. The Target 700 area coincides with a southwest-northeast structural trend which has been assessed as having high potential for hosting mineralisation. The mineralisation is presented as quartz-barite-sulphide veins coincident with a wide silica alteration zone and is primarily enriched with gold-silver but virtually devoid of copper.

Additionally, DPMC plans to test the following targets:

- Extensional drilling:
  - Extensional diamond drilling in upper levels in northeastern direction from Block 10 and northern direction from Blocks 18 and 7. This area is poorly explored and historical drilling results in combination with structural and geologic models indicate untested mineralisation may be present in this area.
  - Extensional drilling in a target area "North", located in the northeast section of Chelopech deposit close to the boundary of Block 147 between 210 mRL and -80 mRL. The mineralisation is presented as semi-massive to massive copper-gold mineralisation constrained within steeply dipping structures. This section of the mine has been poorly explored to date.
  - A short program will be undertaken aiming to test the gap between Block 149, Block 25 and Target 4.
  - Extensional drilling in upper levels of 150 near to the boundary of the sandstone and volcanic rocks. In a closer space between Block 150 and the west boundary of Block 19, there are many high copper-gold narrow zones.
- Grade control drilling:
  - Grade control drilling in Blocks 103 and 151 between levels 400 mRL and 300 mRL to test the current mineralisation contours and possibly extend them.
  - Grade control drilling in Blocks 144, 145, 147, and 149 to check the continuity of mineralisation, to define the orebody contours.
  - Grade control drilling in eastern parts of Block 19 between 320 mRL and 260 mRL.

For 2020, in total 44,000 m of operational resource development drilling has been planned to cover the targets mentioned above. DPMC intends to spend US$2,200,000 for operational resource development drilling during 2020.

11 Sample Preparation, Analyses and Security

11.1 Sample Preparation

11.1.1 Pre-DPMC: Sample Preparation

Pre-DPMC diamond drilling and underground face sampling procedures did not differ significantly from the current DPMC procedures. See Section 11.1.2 for further details of current procedures.

Bulk Density Sampling

The previous approach to the estimation of resource tonnage, prior to estimation of bulk density by using ordinary kriging and the relationship with sulphur grade, was to use a single bulk density assigned to each identified mineralised block.

11.1.2 DPMC: Sample Preparation

Resource Development Diamond Drilling Sampling

All drill core is sampled in intervals up to a maximum of 2.2 m, with 1.5 m sample intervals being the most common length. Where there is a change of mineralisation type or structural contact within a mineralised zone, shorter intervals may be used, but not less 0.80 m (due to the requirement for a minimum quantity weight of the sample for analysis). Three sizes of core are drilled at the Chelopech mine, NQ and LTK60 for exploration and BQ for grade control drilling. NQ and LTK60 core is cut by diamond saw, with half-core samples submitted for laboratory analysis and the residual half core retained in galvanised sheet iron core trays, while all BQ core samples are submitted for analysis as whole core.

The core is cut in the core cutting facility along orientation lines (when no orientation line is present, it is noted on the core) and the right-hand side of the core looking downhole is sampled and the left-hand side of the core is retained in the core tray for reference.

Samples are placed in heat resistant cotton bags which have dimensions of 35 cm x 25 cm. Sample tickets are uniquely numbered and placed in the bags with the samples. The weight of a diamond drill-core sample varies between 3 kg and 7 kg. The sample bags are arranged in order on mobile racks and dried in the oven at 105°C for 8–10 hours. After drying, the bags are loading onto a 4x4 pick-up truck and then delivered directly to the on-site sample preparation and analytical laboratory where they are routinely assayed for Cu, Au, Ag, S, As, Pb and Zn.

Upon completion of the core logging, a sample submission form (SSF) containing a list of samples, standards and duplicates is prepared for each batch. This is documented in the Diamond Drilling Sample Journal on the server. Each SSF has unique number and two copies are prepared – one signed copy for the Laboratory and one for the DPMC archive.

The majority of the core drilled since 2003 has been photographed. The photographs are named, catalogued and saved on the geology server.

Diamond Drilling Sampling for Exploration Projects

The drillcore is sampled in intervals up to a maximum of 1.5 m, with 1 m sample intervals being the most common length. Where there is a change of mineralisation type or structural contact within a mineralised zone, shorter intervals may be used, but not less 0.50 m (due to the requirement for a minimum quantity weight of the sample for analysis). Three sizes of core are drilled at the Exploration Projects, PQ, HQ and NQ. The core is cut by diamond saw, with half core samples submitted for laboratory analysis and the residual half core retained galvanised sheet iron core trays.

The core is cut in the core cutting facility along orientation lines (when no orientation line is present, it is noted on the core) and the right-hand side of the core looking downhole is sampled and the left-hand side of the core is retained in the core tray for reference.

Samples are placed in heat resistant cotton bags which have dimensions of 35 cm x 25 cm. Sample tickets are uniquely numbered and placed in the bags with the samples. The weight of a diamond drill-core sample varies between 3 kg and 7 kg. The sample bags are arranged in plastic bags and tied with a uniquely numbered plastic link. About 10 samples are placed in a sack which is tied with a plastic link with a unique number (different numbering) and sent by truck to SGS Bor Laboratory.

Upon completion of the core logging, a unique SSF containing a list of samples, standards and field duplicates is prepared for each batch. This is documented in the sample journal on the server. After receiving the samples, the laboratory sends a reconciliation form back to DPMC.

The majority of the core drilled since 2003 has been photographed. The photographs are named, catalogued and saved on the geology server.

Underground Face Sampling

Development face samples are taken as horizontal panel chips on a 20 cm grid over the bottom half of each development drive advance. Each round is an average of 3 m in length. The samples are usually chosen based on different mineralisation and geological characteristics.

The underground face sampling procedures and checks are considered appropriate with field duplicates, blanks and standards submitted for analysis as per the diamond core sampling protocols. The face samples have unique sample numbers and a unique SSF for each batch which are recorded in the Face Sample Journal on the server. All SSFs are saved in the DPMC archive.

Sample tickets are placed in the bags and have a numbering system which reconciles sample and assayed results in the database. The average weight of a face sample varies between 3 kg and 5 kg.

Bulk Density Sampling

Bulk density measurements have been routinely completed since the start of 2003 at the (ISO 9002 rated) Eurotest-Kontrol facility in Sofia using an appropriate wax coating followed by water immersion method. The collection of bulk density data has recently been incorporated into DPMC's standard procedures which are applied to all diamond drilling, drives and stopes.

Bulk density measurements are collected as fist sized grab samples from underground, or 10 cm billets every 3 m along the length of the drillhole, including both mineralisation and waste. Since the last MRE, bulk density samples are taken after a preliminary review of the proximity and density of neighbouring samples in the first few metres of a drill fan. This preliminary check ensures that oversampling of a particular area does not occur, since many holes are typically collared from one drill cubby due to the drilling patterns employed at the Chelopech mine.

For exploration drillholes, bulk density measurements are collected by means of 10 cm billets every 5 m.

All bulk density measurements are assigned coordinates or to a bulk density table in the drillhole database.

In 2009, on-site density analysis was introduced and incorporated in the SGS managed on-site laboratory services. The determination of bulk density for rock or core samples is by paraffin wax and water immersion.

The underground bulk density grab samples are allocated unique numbers. Each batch of density samples has a unique SSF recorded in the Sample Diamond Drilling Journal for core samples and Bulk Density Journal for face samples.

QAQC Sampling

The procedure for internal QAQC sample submission is as follows:

- Certified reference materials (CRMs), also referred to as standards, are inserted in a ratio of 1:20

- Blanks are inserted in a ratio of 1:50
- Duplicates – field and crushed are inserted in a ratio of 1:20
- A naming convention for standards is used for QAQC samples, so although the laboratory will know which samples are standard samples, they will not be able to identify which actual standard has been inserted
- The samples are dispatched to the Laboratory with a unique SSF

The procedure for internal control QAQC sample submission is as follows:

- Approximately 5–10% of face and drill core pulp duplicates are sent for internal control
- The internal control samples have the same rules as the original samples with respect to standards, blank standards and SSF.

The procedure for external (umpire) QAQC sample submission is as follows:

- All internal control pulp duplicates are submitted for umpire analysis
- Every 20th core sample is submitted for umpire analysis
- Samples that have discrepancies between the geological description and chemical analysis are also submitted for umpire analysis
- Certified standards are inserted in a ratio of 1:20 for umpire analysis
- Blanks are inserted in a ratio of 1:50 for umpire analysis
- A naming convention for blanks and standards is used for QAQC samples whereby standards are inserted into the sample stream with sequential sample numbers so that the laboratory will not be able to distinguish the standard samples from the umpire samples
- The samples are sent, via courier, to the Laboratory with a unique SSF

QAQC Sample Submission for Exploration Projects

Since 24 May 2017, DPM has implemented new procedures for the exploration projects. The sample submission procedure is as follows:

- CRMs, also referred to as “standards”, are inserted in a ratio of 1:20 (every 20th sample with a Sample ID that ends in 20, 40, 60, 80, or 100 in the Sampling Journal).
- Crushed blanks are inserted are inserted in a ratio of 1:20 (every 20th sample with a Sample ID that ends in 10, 30, 50, 70, or 90 in the Sampling Journal). Pulp blanks are only used when additional quality control monitoring of the analytical stage is required.
- Duplicates – field and coarse crush are inserted in a ratio of 1:20 (every 20th sample with a Sample ID that ends in 15, 35, 55, 75, 95 in the Sampling Journal).
- All routine samples and quality control samples are numbered consecutively, therefore each project uses a standard batch size of 45 samples for laboratory submissions. Every batch must contain 38 or 39 routine samples as well as six or seven quality control samples and in addition SGS Bor will add five internal quality control samples.
- The samples are dispatched to the Laboratory with a unique SSF. Each batch has a separate SSF in a sample shipment using the first sample number in the batch as a name.

11.2 Analyses

11.2.1 Summary

Since 2004, SGS has operated an onsite laboratory at Chelopech under the name “Chemical Laboratory Dundee Precious Metals Chelopech managed by SGS” (herein referred to as “SGS Chelopech”). At present, the majority of sample preparation (drying, crushing, pulverisation and splitting) is completed on site at SGS Chelopech with a small number of exploration drill holes analysed at SGS Bor, Serbia. However, in the past, sample analysis has been undertaken at a variety of laboratories. The sequence of laboratories used is listed in Table 10 below.

Table 10: Sample analyses and laboratories engaged (1956–2019)

Period	Laboratory	Type of samples	Number of samples	Number of assays
June 1956 to 2/1/1992	State owned (including Polimet)	Drillholes	49,008	213,256
		Underground face samples	7,220	27,494
January 1993 to 8/31/2003	Bondar Clegg, Canada	Drillholes	4,419	24,017
		Underground face samples	0	0
	OMAC, Ireland	Drillholes	1,319	6,595
		Underground face samples	0	0
	Navan	Drillholes	12,906	72,480
		Underground face samples	8,494	41,017
September 2003 to 1/1/2004	Ultra Trace, Perth, Australia	Drillholes	287	1,435
	SGS, Chelopech, Bulgaria	Drillholes	1,244	6,220
		Underground face samples	438	2,190
January 2004 to 9/30/2019	Ultra Trace, Perth, Australia	Drillholes	16,863	84,303
	ALS, Perth, Australia	Underground face samples	8	56
	SGS, Chelopech, Bulgaria	Drillholes	389,930	2,690,588
		Underground face samples	20,777	110,713
	SGS, Bor, Serbia	Drillholes	39,994	277,563
Total			**552,907**	**3,557,927**

11.2.2 SGS: Sample Preparation and QAQC Procedures

SGS Chelopech operates its own sample preparation facility. The sample preparation rooms are clean and well maintained and compressed air is used to clean the crushing and pulverising equipment. The sample preparation procedure is presented in Figure 14.

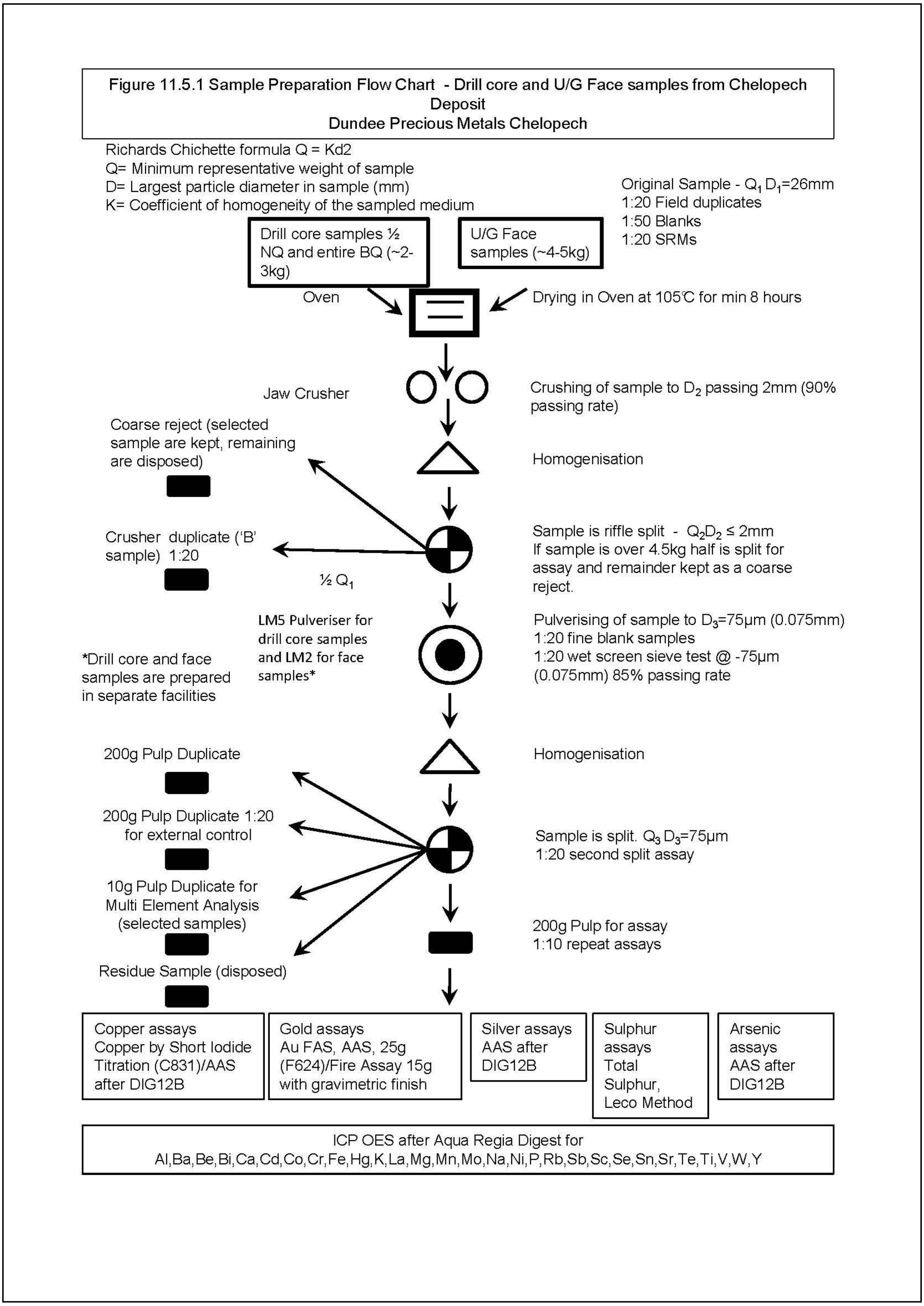


Figure 14: Sample preparation flowchart for drill core and underground face samples (DPMC, 2015)

11.2.3 SGS: Sample Analyses

SGS Chelopech assay methods are tabulated in Table 11, and are summarised as follows:

- Au <20 ppm: 25 g fire assay with atomic absorption spectrometry (AAS) finish
- Au >20 ppm: 15 g fire assay with gravimetric finish
- Ag, As, Pb, Zn: Charge of 0.1 g in 15 ml solution – AAS with aqua-regia digest
- Cu <3%: Charge 0.1 g in 15 ml solution – AAS with aqua-regia digest
- Cu >= 3%: Acid digestion with a titration finish.

Table 11: SGS Chelopech Laboratory assay methods

Element	Method	Detection limit	Upper limit	Procedure	Description
Copper	CON13V	0.01%	60.00%	Copper by Short Iodide Titration (C831)	Short Iodide Titration (C831)
	AAS12B	2 ppm	100,000 ppm	AAS after DIG12B	AAS after two-acid digests (with the designation “12” is based on a combination of 3:1 $HCl:HNO_3$)
Gold	FAA25	0.01 ppm	1,000 ppm	Au FAS, AAS, 25 g (F624)	25 g, fire assay, AAS finish
	FA15G	3 ppm	1,000 ppm	Fire assay 15 g with gravimetric finish	15 g, fire assay, gravimetric finish
Silver	AAS12B	1 ppm	100 ppm	AAS after DIG12B	AAS after two-acid digests (with the designation “12” is based on a combination of 3:1 HCl:HNO3)
	AAS43B	50 ppm	40,000 ppm	AAS after DIG12B	AAS after four-acid digestion, with higher elemental concentrations/High Grade
Sulphur	CSA06V	0.05%	55.00%	Total sulphur, LECO method	Total sulphur, LECO method (V829), Furnace/IR (Infrared) combustion
Arsenic	AAS12B	0.01%	10.00%	AAS after DIG12B	AAS after two-acid digests (with the designation “12” is based on a combination of 3:1 $HCl:HNO_3$)
Lead	AAS12B	5 ppm	25,000 ppm	AAS after DIG12B	AAS after two-acid digests (with the designation “12” is based on a combination of 3:1 $HCl:HNO_3$)
Zinc	AAS12B	2 ppm	25,000 ppm	AAS after DIG12B	AAS after two-acid digests (with the designation “12” is based on a combination of 3:1 $HCl:HNO_3$)

SGS Bor assay methods are tabulated in the table below.

Table 12: SGS Bor Laboratory assay methods

Element	Method	Detection limit	Upper limit	Procedure	Description
Copper	CON13V	0.01%	60.00%	Copper by Short Iodide Titration (C831)	Short Iodide Titration (C831)
	ICM40B	0.5	10,000 ppm	ICP-MS	49 elements by four-acid digestion/ICP-MS
	IMS40B	0.5	10,000 ppm	ICP-OES and ICP-MS	36 elements by two-acid digestion/ICP-OES and ICP-MS
Gold	FAA505	0.01 ppm	1,000 ppm	Au FAS, AAS, 50 g	Fire assay, AAS
Silver	AAS12B	1 ppm	100 ppm	AAS after DIG12B	AAS after two-acid digests (with the designation “12” is based on a combination of 3:1 $HCl:HNO_3$)
	ICM40B	0.02 ppm	10 ppm	ICP-MS	49 elements by four-acid digestion/ICP-MS
	IMS40B	0.05 ppm	10 ppm	ICP-OES and ICP-MS	36 elements by two-acid digestion/ICP-OES and ICP-MS

Element	Method	Detection limit	Upper limit	Procedure	Description
Sulphur	ICM40B	0.01%	5.00%	ICP-MS	49 elements by four-acid digestion/ICP-MS
	IMS40B	0.5%	5.00%	ICP-OES and ICP-MS	36 elements by two-acid digestion/ICP-OES and ICP-MS
Arsenic	ICM40B	1 ppm	10,000 ppm	ICP-MS	49 elements by four-acid digestion/ICP-MS
	IMS40B	1 ppm	10,000 ppm	ICP-OES and ICP-MS	36 elements by two-acid digestion/ICP-OES and ICP-MS
Lead	ICM40B	0.5 ppm	10,000 ppm	ICP-MS	49 elements by four-acid digestion/ICP-MS
	IMS40B	2 ppm	10,000 ppm	ICP-OES and ICP-MS	36 elements by two-acid digestion/ICP-OES and ICP-MS
Zinc	ICM40B	1 ppm	10,000 ppm	ICP-MS	49 elements by four-acid digestion/ICP-MS
	IMS40B	0.5 ppm	10,000 ppm	ICP-OES and ICP-MS	36 elements by two-acid digestion/ICP-OES and ICP-MS

11.2.4 SGS: Laboratory Accreditation

On the basis of long-term contracts, both of the lab facilities at DPM Chelopech/Bulgaria and DPM Exploration in Bor/Serbia (AVALA doo) are under the full management of SGS Bulgaria Ltd and are independent of DPMC and DPM, with an SGS qualified laboratory manager on site at all times.

Management system control (MSC) accreditation procedures have been implemented in the Chelopech lab since 2004 and in the Bor lab since 2008.

Both of the laboratories operate to SGS Global and international standards under SGS's international accreditation. All methods and procedures are implemented together with international quality control protocols.

The lab facility in Chelopech has been ISO 9001:2008 certified since April 2013, updated to ISO 9001:2015 in April 2019 and recertified until 4 April 2022.

11.2.5 SGS: Round Robin Analyses

Participation in the monthly SGS global and international round-robin program is usual practice for both of lab facilities managed by SGS. These regular surveys are used as a tool for the maintenance of high standards in mining and analytical industries and involve over 100 laboratories from all parts of the world.

The DPM Chelopech lab facility has participated in the Geostats' round robin analysis programs since 2008, always placing in the top 30 for Au, Cu, Ag, As, S, Pb and Zn and several times has held first place for S, Cu and Au accuracy.

11.3 QAQC

11.3.1 Pre-DPMC QAQC: Pre-2003

Drill Core and Face Sample Assaying

The QAQC undertaken prior to DPM's involvement consisted of analysis of field duplicates and laboratory pulp duplicates. In summary, review of the available historical data showed:

- Poor precision for field duplicates, but due to the small number of pairs, a meaningful conclusion was not possible
- Laboratory pulp duplicates exhibited an acceptable level of precision; although gold and silver pairs performed more poorly than copper, sulphur and arsenic pairs
- Neither field nor laboratory duplicates exhibited significant bias.

11.3.2 DPMC QAQC: 2003 to 30 September 2018

During the period from 2003 to 2018, DPMC followed a detailed QAQC program which included field duplicates, prep-lab pulps, coarse duplicates and CRMs. The quantity of QAQC material analysed has increased with each reporting period and where issues were noted, these were generally resolved timeously. Overall, gold, copper and sulphur blanks and CRM performed well, whilst silver and arsenic had some bias issues which were mostly related to the analytical method detection limits and sensitivity.

In addition, laboratory duplicates, pulp repeats and laboratory standards were analysed and reviewed, and no significant precision issues were noted.

Face Sample QAQC: 2003 to 30 September 2018

From 2003 to 2010, QAQC results showed:

- Acceptable accuracy and precision for copper, gold, silver and sulphur.
- Arsenic pairs indicated poor inter-laboratory precision which could possibly be attributed to their different assaying techniques.

During the period from 2010 to 2018, face sample QAQC undertaken consisted of analysis of field duplicates, crush duplicates, pulp duplicates and laboratory pulp splits. The pulp duplicates were taken every three months, amounting to 7–9% of face samples. In summary, results showed:

- Assay results from the field duplicates suggested poor precision, but due to the small number of pairs, a meaningful conclusion was not possible.
- Assay results for the laboratory pulp splits exhibited an acceptable level of precision; although silver pairs performed more poorly than copper, gold, sulphur and arsenic pairs. Duplicates exhibited no significant bias.

Umpire (External Check) Analyses

Prior to 2003, the primary laboratories for the face and drillhole samples were Chelopech Site Laboratory and OMAC (Loughrea, Co. Galway, Ireland), now called ALS Loughrea. Evrotest-Kontrol, Sofia, Bulgaria was used as the umpire laboratory. A small number of internal CRMs, which exhibited a high level of accuracy, were available for the Chelopech Site Laboratory data.

Reasonable precision levels were shown by the umpire assaying, although the Chelopech Site Laboratory assay values were marginally higher than the Evrotest-Kontrol, Sofia, Bulgaria assay results. No quality control data was available for the Evrotest-Kontrol, Sofia, Bulgaria assaying; therefore, the relative differences in the assay populations could not be quantified.

ALS in Vancouver, Canada and SGS Welshpool, Perth, Australia were used as the umpire laboratories between 2003 and 2012 and the primary laboratory was SGS Chelopech. No significant bias was observed, and the data was considered precise and accurate.

From 2012, on a three-monthly basis, approximately 5–10% of all face and drillhole samples were sent to ALS, Rosia Montana, Romania for umpire analysis. Reasonable repeatability was observed for gold and copper results and these data are considered precise. Instances of bias between SGS Chelopech and ALS Rosia Montana were noted in both the external check copper and gold assay results. The gold bias of 6% in the 2015 MRE update was investigated and reduced to 2–3% in 2016. A mean grade copper bias of 4% in 2017 and 3–4% in 2018 has been noted and requires investigation. However, the SGS Chelopech results under-report relative to the external laboratory results and therefore would not appear to be overstating these grades.

11.3.3 DPMC QAQC: 1 October 2018 to 30 September 2019

Introduction

A QAQC program has been implemented by DPMC to provide confidence that sample assay results are reliable, accurate and precise.

DPMC Blanks (Cross Contamination)

Blanks (non-certified) used by DPM were BLANK_BEACH (quartz sand) for controlling the pulverisation stage, BLANK_BOR (quartzites) for controlling the sample crushing stage and BLANK_MIAL (dolomitic limestone). BLANK_SGS_CHE was used as a laboratory blank.

No laboratory blank failures were noted.

Low grade Cu and Ag failures noted but not deemed material as these were in uncertified blanks and the assayed values at a relatively low level compared to economic concentrations.

Table 13: Au Blank data

Laboratory	Sample type	Blank type	Method	No. of samples	Mean Au	Expected value	No. of failures (>10 x LDL)
ALS RO	DRILL	BLANK_BEACH	Au_AA23_ppm	15	0.0048	0.01	0
	DRILL	BLANK_BEACH	Au_AA25_ppm	64	0.0069	0.01	0
	FS	BLANK_BEACH	Au_AA25_ppm	3	0.0067	0.01	0
SGS_BO	DRILL	BLANK_BEACH	Au_FAA25_ppm	134	0.0055	0.01	0
	DRILL	BLANK_BEACH	Au_FAA505_ppm	794	0.0052	0.01	0
	DRILL	BLANK_BOR	Au_FAA505_ppm	239	0.0051	0.01	0
	DRILL	BLANK_MIAL	Au_FAA25_ppm	3	0.0050	0.01	0
SGS_CH	DRILL	BLANK_BEACH	Au_FAA25_ppm	673	0.0051	0.01	0
	DRILL	BLANK_MIAL	Au_FAA25_ppm	158	0.0052	0.01	0
	FS	BLANK_MIAL	Au_FAA25_ppm	87	0.0050	0.01	0

Table 14: Cu Blank data

Laboratory	Sample type	Blank type	Method	No. of samples	Mean Cu	Expected value	No. of failures (>10 x LDL)
ALS RO	DRILL	BLANK_BEACH	Cu_AA46_pct	64	0.000875	0.001	0
	DRILL	BLANK_BEACH	Cu_ICP61_ppm	15	10	1	2
	FS	BLANK_BEACH	Cu_AA46_pct	3	0.001	0.001	0
SGS_BO	DRILL	BLANK_BEACH	Cu_IMS40B_ppm	928	3.209	2	0
	DRILL	BLANK_BOR	Cu_IMS40B_ppm	239	2.919	0.5	0
	DRILL	BLANK_MIAL	Cu_IMS40B_ppm	3	28.767	0.5	1
SGS_CH	DRILL	BLANK_BEACH	Cu_AAS12B_ppm	673	1.086	2	1
	DRILL	BLANK_MIAL	Cu_AAS12B_ppm	158	1.114	2	0
	FS	BLANK_MIAL	Cu_AAS12B_ppm	87	1.379	2	0

Notes:

- *Marginal failures in BLANK_BEACH (SGS Chelopech and SGS Bor), but relatively low level compared to economic concentrations, therefore not deemed material.*
- *One failure in BLANK_MIAL.*

Table 15: Ag Blank data

Laboratory	Sample type	Blank type	Method	No. of samples	Mean Ag	Expected value	No. of failures (>10 x LDL)
SGS_BO	DRILL	BLANK_BEACH	Ag_IMS40B_ppm	928	0.026	0.05	0
	DRILL	BLANK_BOR	Ag_IMS40B_ppm	239	0.048	0.05	1
	DRILL	BLANK_MIAL	Ag_IMS40B_ppm	3	0.09	0.05	0
SGS_CH	DRILL	BLANK_BEACH	Ag_AAS12B_ppm	673	0.5	1	0
	DRILL	BLANK_MIAL	Ag_AAS12B_ppm	158	0.5	1	0
	FS	BLANK_MIAL	Ag_AAS12B_ppm	87	0.534	1	0

Note: One failure in BLANK_BOR (SGS Bor), but relatively low level compared to economic concentrations, therefore not deemed material.

Table 16: As Blank data

Laboratory	Sample type	Blank type	Method	No. of samples	Mean As	Expected value	No. of failures (>10 x LDL)
SGS_BO	DRILL	BLANK_BEACH	As_IMS40B_ppm	928	0.588	1	0
	DRILL	BLANK_BOR	As_IMS40B_ppm	239	0.608	1	0
	DRILL	BLANK_MIAL	As_IMS40B_ppm	3	2	1	0
SGS_CH	DRILL	BLANK_BEACH	As_AAS12B_pct	673	0.005	0.01	0
	DRILL	BLANK_MIAL	As_AAS12B_pct	158	0.005	0.01	0
	FS	BLANK_MIAL	As_AAS12B_pct	85	0.005	0.01	0

Table 17: S Blank data

Laboratory	Sample type	Blank type	Method	No. of samples	Mean S	Expected value	No. of failures (>10 x LDL)
SGS_BO	DRILL	BLANK_BEACH	S_CSA06V_pct	928	0.025	0.05	0
	DRILL	BLANK_BEACH	S_IMS40B_pct	3	0.5833	0.05	0
	DRILL	BLANK_BOR	S_CSA06V_pct	239	0.025	0.05	0
	DRILL	BLANK_BOR	S_IMS40B_pct	1	0.25	0.05	0
	DRILL	BLANK_MIAL	S_CSA06V_pct	3	0.025	0.05	0
SGS_CH	DRILL	BLANK_BEACH	S_CSA06V_pct	673	0.0250	0.05	0
	DRILL	BLANK_MIAL	S_CSA06V_pct	158	0.0253	0.05	0
	FS	BLANK_MIAL	S_CSA06V_pct	87	0.025	0.05	0

Blank results show no indication of significant contamination. Where failures were noted, these tend to be in non-certified blanks or at low grades relative to economic levels of mineralisation and laboratory lower detection limits.

DPMC Certified Reference Materials (Assay Accuracy)

CRMs have a certified value and expected minimum and maximum values (which are twice the standard deviation from the certified value). DPMC's procedure for dealing with QAQC failures is to re-assay the failed blank and five samples either side of it or re-assay the failed CRM and 10 samples either side of it.

A total of 4,882 standard samples were submitted by DPMC in this review period. Site-specific CRMs, developed and certified by Geostats, together with commercially available Geostats and Ore Research and Exploration (Oreas) CRMs have been used and results are summarised in Table 18.

Table 18: DPMC CRMs used in sampling

Standard ID	Element	Units	Expected value	Expected standard deviation	Expected minimum	Expected maximum
DPMA	Ag	ppm	6.43	0.4	5.63	7.23
	As	pct	0.15	0.0073	0.1354	0.1646
	Au	ppm	2.176	0.094	1.988	2.364
	Cu	ppm	5,474	342	4,790	6,158
	S	pct	12.4	0.4	11.6	13.2
DPMC	Ag	ppm	10.01	0.337	9.336	10.684
	As	pct	0.64	0.0122	0.396	0.884
	Au	ppm	5.815	0.291	5.233	6.397
	Cu	ppm	20,101	941	18,219	21,983
	S	pct	16.4	0.5	15.4	17.4
DPMD	Ag	ppm	6.04	0.274	5.492	6.588
	As	pct	0.275	0.0177	0.2396	0.3104
	Au	ppm	3.223	0.149	2.925	3.521
	Cu	ppm	9,025	492	8,041	10,009
	S	pct	11.3	0.4	10.5	12.1
DPME	Ag	ppm	11.64	0.789	10.1	13.2
	As	pct	1.136	0.0898	0.96	1.32
	Au	ppm	7.115	0.544	6.027	8.203
	Cu	ppm	36,562	1,924	32,714	40,410
	S	pct	19.7	0.6	18.5	20.9
DPMF	Ag	ppm	20.63	0.998	18.634	22.626
	As	pct	2.512	0.1165	2.279	2.745
	Au	ppm	17.486	1.545	14.396	20.576
	Cu	ppm	80,666	2,637	75,392	85,940
	S	pct	31.4	0.8	29.8	33
DPMU	Ag	ppm	10.04	0.8	8.44	11.64
	As	pct	0.1066	0.00665	0.0933	0.1199
	Au	ppm	0.87	0.131	0.61	1.13
	Cu	ppm	4,050	145.3	3,759	4,341
	S	pct	8.02	0.126	7.77	8.27
DPMV	Ag	ppm	8.2	0.722	6.76	9.65
	As	pct	0.1116	0.00705	0.0975	0.1257
	Au	ppm	1.89	0.113	1.66	2.11
	Cu	ppm	4,586	207.2	4,172	5,000
	S	pct	9.05	0.272	8.51	9.6
DPMW	Ag	ppm	4.6	0.478	3.65	5.56
	As	pct	0.1385	0.00856	0.1214	0.1556
	Au	ppm	2.69	0.105	2.48	2.9
	Cu	ppm	6,347	287.5	5,772	6,922
	S	pct	12.74	0.391	11.96	13.52
DPMX	Ag	ppm	5.97	0.579	4.82	7.13
	As	pct	0.1924	0.00882	0.1747	0.21
	Au	ppm	3.36	0.193	2.97	3.75
	Cu	ppm	6982	333	6316	7648
	S	pct	10.72	0.288	10.14	11.29
DPMY	Ag	ppm	8.71	0.974	6.76	10.66
	As	pct	0.8155	0.04739	0.7208	0.9103
	Au	ppm	2.91	0.064	2.79	3.04
	Cu	ppm	22,200	820	20,552	23,839
	S	pct	12.97	0.412	12.14	13.79

Standard ID	Element	Units	Expected value	Expected standard deviation	Expected minimum	Expected maximum
DPMZ	Ag	ppm	4.02	0.461	3.1	4.94
	As	pct	0.1441	0.00721	0.1297	0.1585
	Au	ppm	5.48	0.258	4.97	6
	Cu	ppm	6,442	355.7	5,731	7,153
	S	pct	22.7	1.047	20.6	24.79
GBMS304-1	Ag	ppm	1.4	0.5	0.4	2.4
	As	pct	0.0168	0.002	0.0128	0.0208
	Au	ppm	3.06	0.14	2.78	3.34
	Cu	ppm	3,156	151	2,854	3,458
	S	pct	1.33	0.07	1.19	1.47
GBMS304-4	Ag	ppm	3.4	0.9	1.6	5.2
	As	pct	0.0535	0.0048	0.0439	0.0631
	Au	ppm	5.67	0.31	5.05	6.29
	Cu	ppm	9,786	378	9,030	10,542
	S	pct	6.27	0.26	5.75	6.79
GBMS911-1	Ag	ppm	11.9	1	9.9	13.9
	As	pct	0.0337	0.0052	0.0233	0.0441
	Au	ppm	1.04	0.11	0.82	1.26
	Cu	ppm	10,034	399	9,236	10,832
	S	pct	1.4	0.07	1.26	1.54
GBMS911-2	Ag	ppm	12.4	0.7	11	13.8
	As	pct	0.0062	0.0014	0.0034	0.009
	Au	ppm	2.88	0.11	2.66	3.1
	Cu	ppm	1,417	67	1,283	1,551
	S	pct	1.3	0.1	1.1	1.5
GBMS911-3	Ag	ppm	1.7	0.4	0.9	2.5
	As	pct	0.0013	0.0002	0.0009	0.0017
	Au	ppm	1.33	0.12	1.09	1.57
	Cu	ppm	7,652	370	6,912	8,392
	S	pct	0.99	0.05	0.89	1.09
GBMS911-4	Ag	ppm	17.9	1.4	15.1	20.7
	As	pct	0.0036	0.0007	0.0022	0.005
	Au	ppm	6.78	0.27	6.24	7.32
	Cu	ppm	900	58	784	1,016
	S	pct	0.79	0.06	0.67	0.91
OREAS 503c	Ag	ppm	0.83	0.089	0.652	1.008
	As	pct	0.00345	0.000205	0.00304	0.00386
	Au	ppm	0.698	0.015	0.668	0.728
	Cu	ppm	5,380	150	5,080	5,680
	S	pct	0.586	0.028	0.53	0.642
OREAS 503d	Ag	ppm	1.34	0.066	1.21	1.47
	As	ppm	87.16	5.83	75.50	98.81
	Au	ppm	0.666	0.015	0.64	0.70
	Cu	ppm	5,240	100	5,040	5,440
	S	pct	0.798	0.027	0.744	0.852
OREAS 620	Ag	ppm	38.5	1.53	35.44	41.56
	As	pct	0.005	0.00044	0.00412	0.00588
	Au	ppm	0.685	0.021	0.643	0.727
	Cu	ppm	1,730	40	1,650	1,810
	S	pct	2.47	0.067	2.336	2.604

The following issues were noted with the CRM analysis and were investigated by the DPMC database administrator. The main issues with comments are listed below:

- A notable change in precision at the end of February 2019 (e.g. Figure 15) was noted in the CRMs analysed at SGS Chelopech. Comment was obtained from the laboratory and this precision change was due to a change in CRM assaying procedure at the laboratory. Up to 20 February 2019, suspected or observed CRMs were analysed four to five times and the result averaged. From this date, CRMs were only analysed once, reducing variance and increasing precision. This change in procedure explains the differences in precison observed and is acceptable.
- CRMs with bias should be investigated over a longer time period to check whether analytical drift has occurred. If results are consistent over the longer time periods, then the expected values of the DPM specific standards might require revision or checking.
- A notable difference in precision and bias at SGS Bor compared to SGS Chelopech was observed and should be investigated.

CRM results are presented in Table 19 to Table 23 and examples of precision changes and bias are shown in Figure 15 to Figure 17 below.

Table 19: Table showing DPMC Au CRM results (failures and bias >5% shown in red)

Laboratory	Sample type	Standard caode	Element	No. of samples	Mean Au	Expected value	Mean bias	No. of failures (>3 x SD)
ALS RO	DRILL	DPME	Au_AA23_ppm	3	7.620	7.115	7%	0
ALS RO	DRILL	DPMU	Au_AA25_ppm	8	0.944	0.870	8%	0
ALS RO	DRILL	DPMV	Au_AA25_ppm	24	1.838	1.890	-3%	0
ALS RO	DRILL	DPMW	Au_AA25_ppm	31	2.745	2.690	2%	0
ALS RO	DRILL	DPMX	Au_AA25_ppm	30	3.397	3.360	1%	0
ALS RO	DRILL	DPMY	Au_AA25_ppm	33	2.932	2.910	1%	0
ALS RO	DRILL	DPMZ	Au_AA25_ppm	34	5.506	5.480	0%	0
ALS RO	DRILL	GBMS304-1	Au_AA23_ppm	2	2.905	3.060	-5%	0
ALS RO	DRILL	GBMS304-4	Au_AA23_ppm	3	5.693	5.670	0%	0
ALS RO	DRILL	GBMS911-1	Au_AA23_ppm	5	1.017	1.040	-2%	0
ALS RO	DRILL	GBMS911-2	Au_AA23_ppm	12	2.880	2.880	0%	0
ALS RO	DRILL	GBMS911-3	Au_AA23_ppm	12	1.255	1.330	-6%	1
ALS RO	FS	DPMU	Au_AA25_ppm	2	0.840	0.870	-3%	0
ALS RO	FS	DPMV	Au_AA25_ppm	1	1.860	1.890	-2%	0
ALS RO	FS	DPMW	Au_AA25_ppm	3	2.737	2.690	2%	0
ALS RO	FS	DPMX	Au_AA25_ppm	1	3.250	3.360	-3%	0
ALS RO	FS	DPMY	Au_AA25_ppm	3	2.987	2.910	3%	0
ALS RO	FS	DPMZ	Au_AA25_ppm	2	5.375	5.480	-2%	0
SGS Bor	DRILL	DPMA	Au_FAA505_ppm	2	2.255	2.176	4%	0
SGS Bor	DRILL	DPMC	Au_FAA505_ppm	16	5.844	5.815	0%	0
SGS Bor	DRILL	DPMD	Au_FAA505_ppm	20	3.213	3.223	0%	0
SGS Bor	DRILL	DPME	Au_FAA505_ppm	24	7.262	7.115	2%	0
SGS Bor	DRILL	DPMF	Au_FAA505_ppm	11	18.478	17.486	6%	0
SGS Bor	DRILL	DPMU	Au_FAA25_ppm	46	0.90	0.87	3%	0
SGS Bor	DRILL	DPMV	Au_FAA25_ppm	24	1.99	1.89	5%	0
SGS Bor	DRILL	DPMW	Au_FAA25_ppm	35	2.71	2.69	1%	0
SGS Bor	DRILL	DPMX	Au_FAA25_ppm	10	3.61	3.36	7%	0
SGS Bor	DRILL	DPMY	Au_FAA25_ppm	15	2.85	2.91	-2%	0
SGS Bor	DRILL	DPMZ	Au_FAA25_ppm	7	5.47	5.48	0%	0
SGS Bor	DRILL	GBMS304-1	Au_FAA505_ppm	65	3.02	3.06	-1%	0

Laboratory	Sample type	Standard caode	Element	No. of samples	Mean Au	Expected value	Mean bias	No. of failures (>3 x SD)
SGS Bor	DRILL	GBMS304-4	Au_FAA505_ppm	26	5.71	5.67	1%	0
SGS Bor	DRILL	GBMS911-1	Au_FAA505_ppm	238	1.05	1.04	1%	0
SGS Bor	DRILL	GBMS911-2	Au_FAA505_ppm	146	2.90	2.88	1%	0
SGS Bor	DRILL	GBMS911-3	Au_FAA505_ppm	264	1.34	1.33	0%	0
SGS Bor	DRILL	GBMS911-4	Au_FAA505_ppm	19	6.76	6.78	0%	0
SGS Bor	DRILL	OREAS 503c	Au_FAA505_ppm	122	0.70	0.70	0%	0
SGS Bor	DRILL	OREAS 503d	Au_FAA505_ppm	20	0.67	0.67	0%	1
SGS Bor	DRILL	OREAS 620	Au_FAA505_ppm	72	0.70	0.69	2%	0
SGS Chelopech	DRILL	DPMU	Au_FAA25_ppm	367	0.89	0.87	2%	0
SGS Chelopech	DRILL	DPMV	Au_FAA25_ppm	305	1.89	1.89	0%	0
SGS Chelopech	DRILL	DPMW	Au_FAA25_ppm	328	2.62	2.69	-2%	0
SGS Chelopech	DRILL	DPMX	Au_FAA25_ppm	161	3.42	3.36	2%	0
SGS Chelopech	DRILL	DPMY	Au_FAA25_ppm	195	2.88	2.91	-1%	0
SGS Chelopech	DRILL	DPMZ	Au_FAA25_ppm	215	5.27	5.48	-4%	0
SGS Chelopech	DRILL	G917-1	Au_FA15G_ppm	8	48.80	48.52	1%	0
SGS Chelopech	FS	DPMU	Au_FAA25_ppm	13	0.91	0.87	4%	0
SGS Chelopech	FS	DPMV	Au_FAA25_ppm	16	1.91	1.89	1%	0
SGS Chelopech	FS	DPMW	Au_FAA25_ppm	21	2.71	2.69	1%	0
SGS Chelopech	FS	DPMY	Au_FAA25_ppm	35	2.91	2.91	0%	0
SGS Chelopech	FS	DPMZ	Au_FAA25_ppm	6	5.34	5.48	-3%	0
SGS Chelopech	FS	G917-1	Au_FA15G_ppm	3	48.63	48.52	0%	0

Notes:

- *Bias noted in individual standards, but overall bias not systematic (i.e. positive and negative bias).*
- *Failures noted in GBMS911-3 (ALS RO) which fails for Au and Cu, and OREAS 503d (SGS Bor) which should be investigated.*

Table 20: Table showing DPMC Cu CRM results (failures and bias >5% shown in red)

Laboratory	Sample type	Standard code	Element	No. of samples	Mean Cu	Expected value	Mean bias	No. of failures (>3 x SD)
ALS RO	DRILL	DPME	Cu_AA46_pct	3	3.4767	3.6562	-5%	0
	DRILL	DPMU	Cu_AA46_pct	8	0.4096	0.4050	1%	0
	DRILL	DPMV	Cu_AA46_pct	24	0.4628	0.4586	1%	0
	DRILL	DPMW	Cu_AA46_pct	31	0.6473	0.6347	2%	0
	DRILL	DPMX	Cu_AA46_pct	30	0.7013	0.6982	0%	0
	DRILL	DPMY	Cu_AA46_pct	33	2.2943	2.2200	3%	0
	DRILL	DPMZ	Cu_AA46_pct	34	0.6463	0.6442	0%	0
	DRILL	GBMS304-1	Cu_ICP61_ppm	2	3,185	3,156	1%	0
	DRILL	GBMS304-4	Cu_ICP61_ppm	3	9,717	9,786	-1%	0
	DRILL	GBMS911-1	Cu_AA46_pct	5	1.0246	1.0034	2%	0
	DRILL	GBMS911-2	Cu_ICP61_ppm	12	1,444	1,417	2%	0
	DRILL	GBMS911-3	Cu_ICP61_ppm	12	7,101	7,652	-7%	1
	FS	DPMU	Cu_AA46_pct	2	0.4015	0.4050	-1%	0
	FS	DPMV	Cu_AA46_pct	1	0.4710	0.4586	3%	0
	FS	DPMW	Cu_AA46_pct	3	0.6497	0.6347	2%	0
	FS	DPMX	Cu_AA46_pct	1	0.7120	0.6982	2%	0
	FS	DPMY	Cu_AA46_pct	3	2.2947	2.2200	3%	0
	FS	DPMZ	Cu_AA46_pct	2	0.6455	0.6442	0%	0

Laboratory	Sample type	Standard code	Element	No. of samples	Mean Cu	Expected value	Mean bias	No. of failures (>3 x SD)
SGS Bor	DRILL	DPMA	Cu_IMS40B_ppm	2	5,436	5,474	-1%	0
	DRILL	DPMC	Cu_AAS42S_pct	16	2.0038	2.0101	0%	0
	DRILL	DPMD	Cu_IMS40B_ppm	20	9,100	9,025	1%	0
	DRILL	DPME	Cu_AAS42S_pct	24	3.6517	3.6562	0%	0
	DRILL	DPMF	Cu_AAS42S_pct	11	8.0436	8.0666	0%	0
	DRILL	DPMU	Cu_IMS40B_ppm	46	3,962	4,050	-2%	0
	DRILL	DPMV	Cu_IMS40B_ppm	24	4,643	4,586	1%	0
	DRILL	DPMW	Cu_IMS40B_ppm	35	6,578	6,347	4%	0
	DRILL	DPMX	Cu_IMS40B_ppm	10	7,052	6,982	1%	0
	DRILL	DPMY	Cu_AAS42S_pct	14	2.2564	2.2200	2%	0
	DRILL	DPMZ	Cu_IMS40B_ppm	7	6,742	6,442	5%	0
	DRILL	GBMS304-1	Cu_IMS40B_ppm	65	3,243	3,156	3%	0
	DRILL	GBMS304-4	Cu_IMS40B_ppm	26	9,730	9,786	-1%	0
	DRILL	GBMS911-1	Cu_AAS42S_pct	150	1.0124	1.0034	1%	0
	DRILL	GBMS911-1	Cu_IMS40B_ppm	88	9,978	10,034	-1%	0
	DRILL	GBMS911-2	Cu_IMS40B_ppm	146	1,430	1,417	1%	0
	DRILL	GBMS911-3	Cu_IMS40B_ppm	264	7,711	7,652	1%	0
	DRILL	GBMS911-4	Cu_IMS40B_ppm	19	915	900	2%	0
	DRILL	OREAS 503c	Cu_IMS40B_ppm	123	5,366.12	5,380	0%	0
	DRILL	OREAS 503d	Cu_IMS40B_ppm	20	5,186.50	5,238.82	-1%	1
	DRILL	OREAS 620	Cu_IMS40B_ppm	73	1,746.29	1,730	1%	0
SGS Chelopech	DRILL	DPMU	Cu_AAS12B_ppm	367	3,947	4,050	-3%	0
	DRILL	DPMV	Cu_AAS12B_ppm	305	4,496	4,586	-2%	0
	DRILL	DPMW	Cu_AAS12B_ppm	328	6,600	6,347	4%	0
	DRILL	DPMX	Cu_AAS12B_ppm	161	7,225	6,982	3%	0
	DRILL	DPMY	Cu_AAS12B_ppm	195	22,166	22,200	0%	0
	DRILL	DPMZ	Cu_AAS12B_ppm	215	6,812	6,442	6%	0
	FS	DPMU	Cu_AAS12B_ppm	13	3,946	4,050	-3%	0
	FS	DPMV	Cu_AAS12B_ppm	16	4,480	4,586	-2%	0
	FS	DPMW	Cu_AAS12B_ppm	21	6,402	6,347	1%	0
	FS	DPMY	Cu_AAS12B_ppm	35	22,004	22,200	-1%	0
	FS	DPMZ	Cu_AAS12B_ppm	6	6,944	6,442	8%	0

Notes:

- *Bias noted in individual standards, but overall bias not systematic (i.e. positive and negative bias).*
- *Failures noted in GBMS911-3 (ALS RO) which fails for Au and Cu, and OREAS 503d (SGS Bor) which should be investigated.*

Figure 15 and Figure 16 show the Shewhart plots for CRMs DPMU and DPMZ (bias of -3% and 6% respectively) from SGS Chelopech. A change in precision can be observed and comment should be obtained from the laboratory regarding whether any adjustments or recalibration occurred.

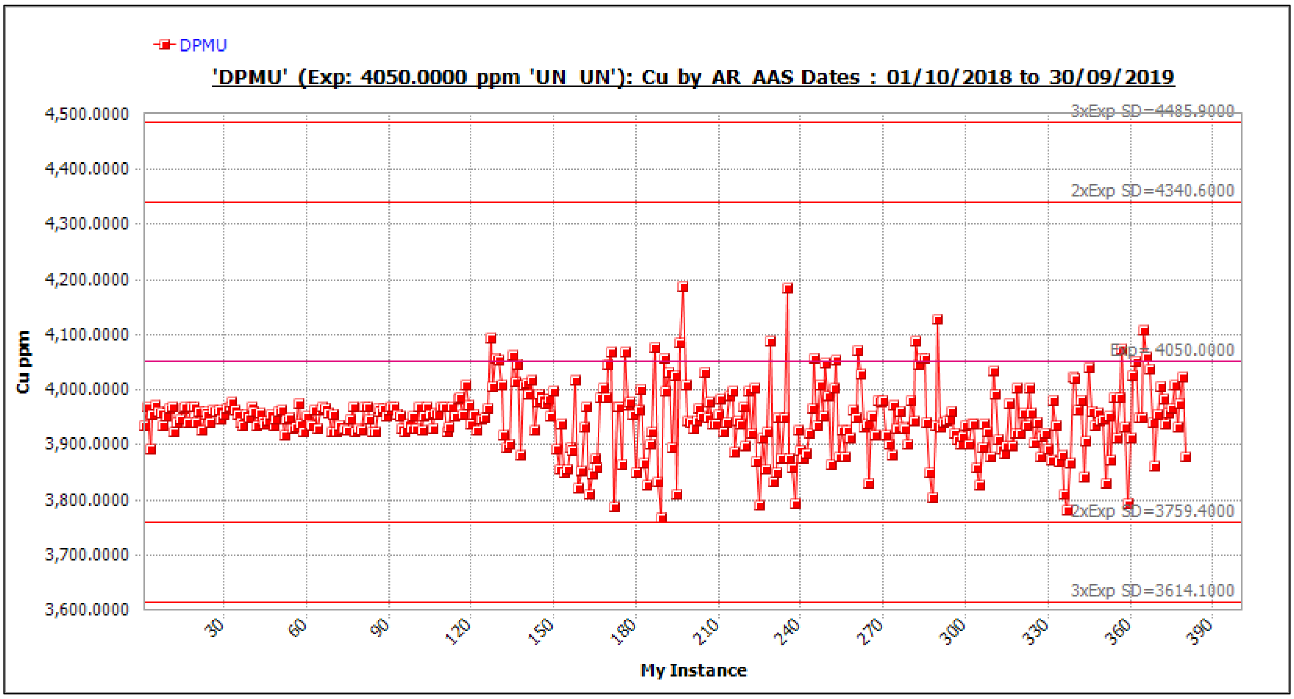


Figure 15: Shewhart plot showing -3% bias for Cu CRM results for DPMU (note the change in precision after 120 samples)

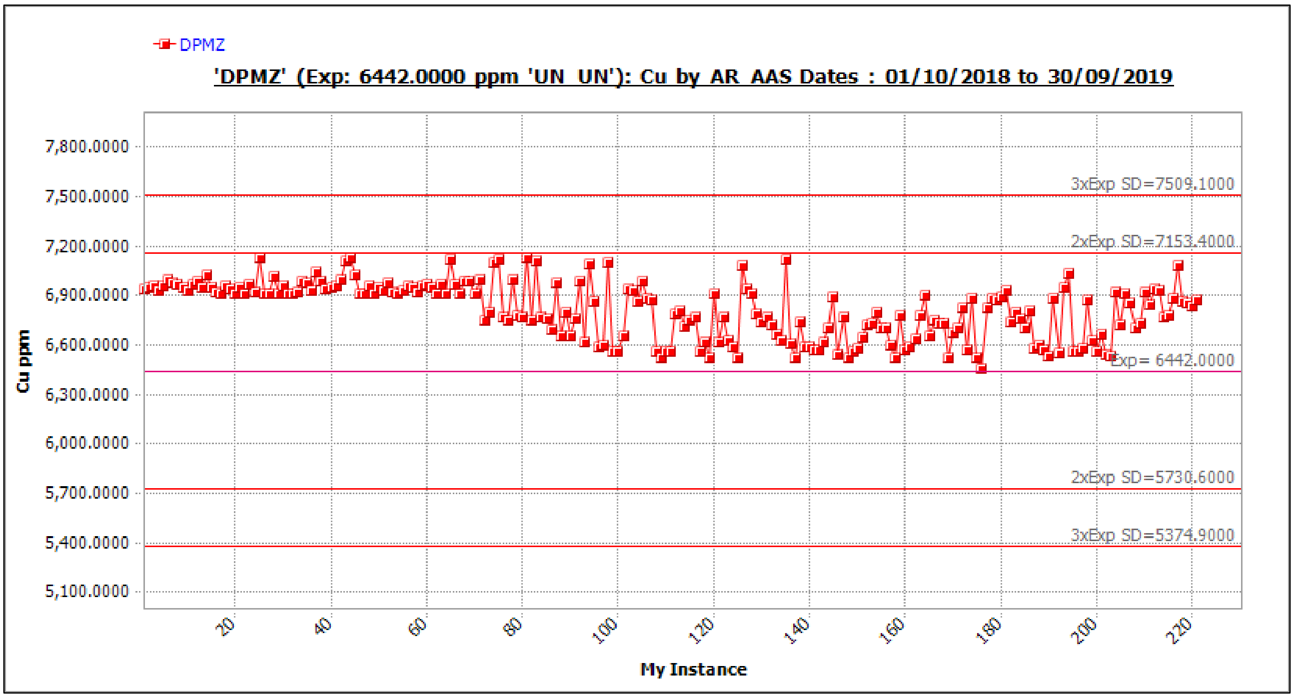


Figure 16: Shewhart plot showing 6% bias for Cu CRM results for DPMZ (note the change in precision and accuracy after 70 samples)

Table 21: Table showing DPMC Ag CRM results (failures and bias >5% shown in red)

Laboratory	Sample type	Standard code	Element	No. of samples	Mean Ag	Expected value	Mean bias	No. of failures (>3 x SD)
SGS Bor	DRILL	DPMA	Ag_IMS40B_ppm	2	6.28	6.43	-2%	0
	DRILL	DPMC	Ag_AAS42S_ppm	9	10.00	10.01	0%	0
	DRILL	DPMC	Ag_IMS40B_ppm	7	9.79	10.01	-2%	0
	DRILL	DPMD	Ag_IMS40B_ppm	20	6.17	6.04	2%	0
	DRILL	DPME	Ag_AAS42S_ppm	24	11.21	11.64	-4%	0
	DRILL	DPMF	Ag_AAS42S_ppm	11	21.18	20.63	3%	0
	DRILL	DPMU	Ag_IMS40B_ppm	46	9.43	10.04	-6%	0
	DRILL	DPMV	Ag_IMS40B_ppm	24	8.54	8.20	4%	0
	DRILL	DPMW	Ag_IMS40B_ppm	35	4.62	4.60	0%	0
	DRILL	DPMX	Ag_IMS40B_ppm	10	6.15	5.97	3%	0
	DRILL	DPMY	Ag_IMS40B_ppm	15	8.61	8.71	-1%	0
	DRILL	DPMZ	Ag_IMS40B_ppm	7	4.50	4.02	12%	0
	DRILL	GBMS304-1	Ag_IMS40B_ppm	65	1.51	1.40	8%	0
	DRILL	GBMS304-4	Ag_IMS40B_ppm	26	3.50	3.40	3%	0
	DRILL	GBMS911-1	Ag_AAS42S_ppm	238	12.62	11.90	6%	0
	DRILL	GBMS911-2	Ag_AAS42S_ppm	142	12.62	12.40	2%	0
	DRILL	GBMS911-3	Ag_IMS40B_ppm	264	1.72	1.70	1%	0
	DRILL	GBMS911-4	Ag_AAS42S_ppm	18	17.22	17.90	-4%	2
	DRILL	OREAS 503c	Ag_IMS40B_ppm	123	0.83	0.83	0%	2
	DRILL	OREAS 503d	Ag_IMS40B_ppm	20	1.33	1.34	-1%	3
	DRILL	OREAS 620	Ag_AAS42S_ppm	73	39.41	38.50	2%	0
SGS Chelopech	DRILL	DPMU	Ag_AAS12B_ppm	367	9.86	10.04	-2%	0
	DRILL	DPMV	Ag_AAS12B_ppm	305	8.38	8.20	2%	0
	DRILL	DPMW	Ag_AAS12B_ppm	328	4.77	4.60	4%	0
	DRILL	DPMX	Ag_AAS12B_ppm	161	5.94	5.97	0%	0
	DRILL	DPMY	Ag_AAS12B_ppm	195	8.74	8.71	0%	0
	DRILL	DPMZ	Ag_AAS12B_ppm	215	4.16	4.02	3%	0
	FS	DPMU	Ag_AAS12B_ppm	13	10.20	10.04	2%	0
	FS	DPMV	Ag_AAS12B_ppm	16	8.62	8.20	5%	0
	FS	DPMW	Ag_AAS12B_ppm	21	4.61	4.60	0%	0
	FS	DPMY	Ag_AAS12B_ppm	35	8.93	8.71	2%	0
	FS	DPMZ	Ag_AAS12B_ppm	6	3.63	4.02	-10%	0

Notes:

- *Failures and bias noted, but mostly at low grades.*
- *OREAS CRM failures should be investigated.*

Figure 17 shows an example of the change in precision and accuracy in CRM results from SGS Chelopech which should be investigated.

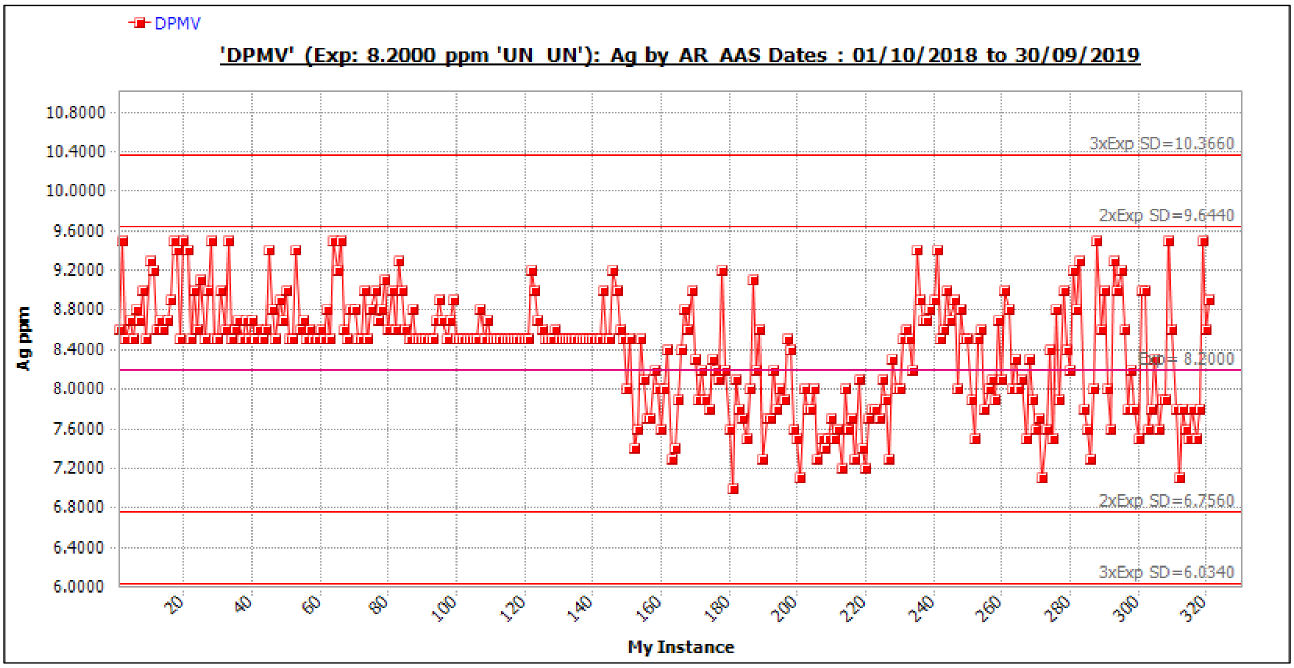


Figure 17: Shewhart plot for Ag CRM results for DPMV (note the change in precision after 140 samples)

Table 22: Table showing DPMC As CRM results (failures and bias >5% shown in red)

Laboratory	Sample type	Standard code	Element	No. of samples	Mean As	Expected value	Mean bias	No. of failures (>3 x SD)
SGS Bor	DRILL	DPMF	As_AAS42S_pct	10	2.53	2.51	1%	0
	DRILL	DPMU	As_IMS40B_ppm	46	1,066	1,066	0%	0
	DRILL	DPMV	As_IMS40B_ppm	24	1,111	1,116	0%	0
	DRILL	DPMW	As_IMS40B_ppm	35	1,399	1,385	1%	0
	DRILL	DPMX	As_IMS40B_ppm	10	1,832	1,924	-5%	0
	DRILL	DPMY	As_IMS40B_ppm	15	8,462	8,155	4%	0
	DRILL	DPMZ	As_IMS40B_ppm	7	1,441	1,441	0%	0
	DRILL	GBMS304-1	As_IMS40B_ppm	65	166	168	-1%	0
	DRILL	GBMS304-4	As_IMS40B_ppm	26	549	535	3%	0
	DRILL	GBMS911-1	As_IMS40B_ppm	238	330	337	-2%	2
	DRILL	GBMS911-2	As_IMS40B_ppm	146	64	62	3%	0
	DRILL	GBMS911-3	As_IMS40B_ppm	264	13	13	1%	0
	DRILL	GBMS911-4	As_IMS40B_ppm	19	36	36	1%	0
	DRILL	OREAS 503c	As_IMS40B_ppm	123	35.73	34.50	4%	1
	DRILL	OREAS 503d	As_IMS40B_ppm	20	81.85	87.16	-6%	2
	DRILL	OREAS 620	As_IMS40B_ppm	73	51.83	50.00	4%	0
SGS Chelopech	DRILL	DPMU	As_AAS12B_pct	367	0.1084	0.1066	2%	0
	DRILL	DPMV	As_AAS12B_pct	305	0.1164	0.1116	4%	1
	DRILL	DPMW	As_AAS12B_pct	328	0.1418	0.1385	2%	0
	DRILL	DPMX	As_AAS12B_pct	161	0.1914	0.1924	-1%	0
	DRILL	DPMY	As_AAS12B_pct	195	0.8768	0.8155	8%	0
	DRILL	DPMZ	As_AAS12B_pct	215	0.1451	0.1441	1%	0
	FS	DPMU	As_AAS12B_pct	13	0.1100	0.1066	3%	0
	FS	DPMV	As_AAS12B_pct	16	0.1144	0.1116	2%	0
	FS	DPMW	As_AAS12B_pct	21	0.1405	0.1385	1%	0
	FS	DPMY	As_AAS12B_pct	35	0.8860	0.8155	9%	0
	FS	DPMZ	As_AAS12B_pct	6	0.1500	0.1441	4%	0

Notes:
- *Bias and failures noted in individual standards, but overall bias not systematic (i.e. positive and negative bias).*
- *OREAS CRM failures should be investigated.*

Table 23: Table showing DPMC S CRM results (failures and bias >5% shown in red)

Laboratory	Sample Type	Std Code	Element	No. of Samples	Mean S	Exp Value	Mean Bias	No of Failures (> 3 x SD)
SGS Bor	DRILL	DPMA	S_CSA06V_pct	2	12.35	12.40	0%	0
	DRILL	DPMC	S_CSA06V_pct	16	16.42	16.40	0%	0
	DRILL	DPMD	S_CSA06V_pct	20	11.35	11.30	0%	0
	DRILL	DPME	S_CSA06V_pct	24	19.61	19.70	0%	0
	DRILL	DPMF	S_CSA06V_pct	11	31.29	31.40	0%	0
	DRILL	DPMU	S_CSA06V_pct	46	8.15	8.02	2%	0
	DRILL	DPMV	S_CSA06V_pct	24	9.31	9.05	3%	0
	DRILL	DPMW	S_CSA06V_pct	35	13.26	12.74	4%	0
	DRILL	DPMX	S_CSA06V_pct	10	11.09	10.72	3%	0
	DRILL	DPMY	S_CSA06V_pct	15	13.27	12.97	2%	0
	DRILL	DPMZ	S_CSA06V_pct	7	23.13	22.70	2%	0
	DRILL	GBMS304-1	S_CSA06V_pct	65	1.31	1.33	-2%	0
	DRILL	GBMS304-4	S_CSA06V_pct	26	6.29	6.27	0%	0
	DRILL	GBMS911-1	S_CSA06V_pct	238	1.38	1.40	-2%	0
	DRILL	GBMS911-2	S_CSA06V_pct	146	1.29	1.30	-1%	0
	DRILL	GBMS911-3	S_CSA06V_pct	264	1.00	0.99	1%	0
	DRILL	GBMS911-4	S_CSA06V_pct	19	0.79	0.79	-1%	0
	DRILL	OREAS 503c	S_CSA06V_pct	122	0.56	0.59	-5%	0
	DRILL	OREAS 503d	S_CSA06V_pct	20	0.76	0.80	-5%	2
	DRILL	OREAS 620	S_CSA06V_pct	72	2.52	2.47	2%	0
SGS Chelopech	DRILL	DPMU	S_CSA06V_pct	367	8.21	8.02	2%	0
	DRILL	DPMV	S_CSA06V_pct	305	9.37	9.05	3%	0
	DRILL	DPMW	S_CSA06V_pct	328	13.22	12.74	4%	0
	DRILL	DPMX	S_CSA06V_pct	161	11.08	10.72	3%	0
	DRILL	DPMY	S_CSA06V_pct	195	13.45	12.97	4%	0
	DRILL	DPMZ	S_CSA06V_pct	215	23.42	22.70	3%	0
	FS	DPMU	S_CSA06V_pct	13	8.21	8.02	2%	0
	FS	DPMV	S_CSA06V_pct	16	9.33	9.05	3%	0
	FS	DPMW	S_CSA06V_pct	21	13.24	12.74	4%	0
	FS	DPMY	S_CSA06V_pct	35	13.49	12.97	4%	0
	FS	DPMZ	S_CSA06V_pct	6	23.47	22.70	3%	0

Notes:

- *No significant bias noted.*
- *Failures in OREAS 503d requires investigation.*

Laboratory Internal CRMs

CRMs are inserted into the sample stream by SGS Chelopech and SGS Bor and include various standards. A total of 11,102 laboratory CRMs have been included by SGS Chelopech in this review period. A total of 5,160 standards and blanks were inserted into the sample stream by SGS Bor, Serbia.

Most laboratory standards showed acceptable accuracy and precision, with the only failures being attributed to the expected values being close to the detection limit which is not deemed a material issue.

Duplicate Samples (Precision)

During the current MRE period, 1,700 field duplicate and 14,325 laboratory duplicate samples were analysed for Ag, As, Au, Cu and S both by SGS Chelopech, Bulgaria and SGS Bor, Serbia. The duplicate sample types are:

- FD – field duplicate
- LD – laboratory (crusher) duplicate
- LR – laboratory replicate
- LS – laboratory split.

The duplicate data were assessed using average coefficients of variation ($CV_{AVR}\%$ = standard deviation/average presented as a percentage – also known as relative standard deviation) calculated from individual duplicate pairs and averaged using the RMS (root mean squared) approach. This approach is recommended by Abzalov (2008) as a way of defining a fundamental measure of data precision using duplicate paired data. Only pairs with a mean grade > 10 x LDL were included the precision review.

Au, Cu and S duplicate results were precise with no significant issues. Sporadic issues were noted with Ag and As duplicates analysed at SGS Bor. Overall, SGS Bor duplicates had poorer precision and higher biases than samples analysed at SGS Chelopech.

Table 24 to Table 26 list the duplicate data $CV_{AVR}\%$ including acceptable and best practice limits as well as mean grade biases.

Table 24: Field duplicate data (including acceptable and best practice limits)

Duplicate type	Lab_Orig	Element	Pairs (total)	Count of pairs (>10 x DL)	$CV_{(AVR)}$ %	Acceptable	Best	Mean original (ppm)	Mean duplicate (ppm)	Bias
FIELD DUP	SGS_CH	Au	1,556	857	17	15%	10%	1.20	1.22	1%
	SGS_BO	Au	137	24	32	15%	10%	0.33	0.33	0%
	SGS_CH	Cu	1,555	1,537	15	10%	5%	1,592	1,608	1%
	SGS_BO	Cu	137	137	19	10%	5%	193	186	-3%
	SGS_CH	Ag	1,555	88	18	15%	10%	41.39	41.60	0%
	SGS_BO	Ag	136	34	35	15%	10%	2.33	2.50	7%
	SGS_CH	As	1,556	185	12	10%	5%	3,084	3,130	1%
	SGS_BO	As	137	86	19	10%	5%	148.27	123.20	-17%
	SGS_CH	S (%)	1,556	1,522	7	10%	5%	6.15	6.16	0%
	SGS_BO	S (%)	137	95	8	10%	5%	4.20	4.23	1%

Notes:

- *Results include face samples (n = 7).*
- *Results analysed at SGS Bor have poorer precision than those analysed at SGS Chelopech.*
- *Apart from As results from SGS Bor (-17%), no significant bias between original and duplicates is observed.*

Table 25: Lab Preparation duplicate data (including acceptable and best practice limits)

Duplicate type	Lab_Orig	Element	Pairs (total)	Count of pairs (>10 x DL)	$CV_{(AVR)}$ %	Acceptable	Best	Mean original (ppm)	Mean duplicate (ppm)	Bias
PREPDUP	SGS_CH	Au	908	658	6	15%	10%	4.95	4.98	1%
	SGS_BOR	Au	83	78	13	15%	10%	2.64	2.69	2%
PREPDUP AAS12B	SGS_CH	Cu	811	770	5	10%	5%	7,727	7,835	1%
PREPDUP CON13V	SGS_CH	Cu	95	95	2	10%	5%	61,439	61,377	0%

Duplicate type	Lab_Orig	Element	Pairs (total)	Count of pairs (>10 x DL)	CV(AVR) %	Acceptable	Best	Mean original (ppm)	Mean duplicate (ppm)	Bias
PREPDUP	SGS_BO	Cu	83	83	16	10%	5%	1,662	1,708	3%
	SGS_CH	Ag	903	290	6	15%	10%	44.30	44.50	0%
	SGS_BO	Ag	79	33	12	15%	10%	61.88	54.24	-12%
	SGS_BO	As	83	83	17	10%	5%	489.83	504.79	3%
	SGS_CH	As	910	612	11	10%	5%	5745.42	5725.00	0%
	SGS_CH	S (%)	910	910	2	10%	5%	12.43	12.37	-1%
	SGS_BO	S (%)	83	83	8	10%	5%	5.44	5.38	-1%

Notes:

- *Precision is acceptable in most results.*
- *Results analysed at SGS Bor have poorer precision than those analysed at SGS Chelopech.*
- *Apart from Ag results from SGS Bor (-12%), no significant bias between original and duplicates is observed.*

Table 26: Lab Pulp duplicate data (including acceptable and best practice limits)

Duplicate type	Lab_Orig	Element	Pairs (total)	Count of pairs (>10 x DL)	CV(AVR) %	Acceptable	Best	Mean original (ppm)	Mean duplicate (ppm)	Bias
LABSPLIT	SGS (CH&BO)	Au	1,955	900	5	10%	3%	1.06	1.06	0%
LABREP	SGS (CH&BO)		3,414	1,685	5	10%	3%	1.06	1.06	0%
LABDUP	SGS (CH&BO)		2,429	922	7	10%	3%	1.04	1.04	0%
LABDUP	SGS (CH&BO)	Cu	2,414	2,214	8	7.5%	3%	908	909	0%
LABREP	SGS (CH&BO)		3,021	2,855	4	7.5%	3%	1,320	1,321	0%
LABSPLIT	SGS (CH&BO)		1,517	1,436	3	7.5%	3%	1,452	1,451	0%
LABDUP	SGS (CH&BO)	Ag	2,429	100	4	10%	3%	35.05	35.37	1%
LABREP	SGS (CH&BO)		3,024	166	3	10%	3%	24.00	24.20	1%
LABSPLIT	SGS (CH&BO)		1,519	91	2	10%	3%	23.59	23.43	-1%
LABDUP (AAS12B)	SGS (CH&BO)	As	1,462	181	3	7.5%	3%	3362.43	3364.64	0%
LABDUP (IMS40B)	SGS (CH&BO)		966	602	16	7.5%	3%	122.76	125.76	2%
LABREP	SGS (CH&BO)		3,042	356	2	7.5%	3%	3477.81	3476.12	0%
LABSPLIT	SGS (CH&BO)		1,526	178	2	7.5%	3%	3848.88	3837.08	0%
LABDUP	SGS (CH&BO)	S (%)	2,429	2,056	2	7.5%	3%	5.45	5.45	0%
LABREP	SGS (CH&BO)		3,432	3,205	1	7.5%	3%	6.02	6.03	0%
LABSPLIT	SGS (CH&BO)		1,953	1,755	1	7.5%	3%	5.90	5.91	0%

Notes:

- *Laboratory duplicates have been reviewed globally for both laboratories.*
- *No significant bias or precision issues (apart from poor precision for Lab Dups for As by method IMS40B) noted.*

External QAQC (Umpire Analyses)

During the period 1 October 2018 to 30 September 2019, 2,169 drill-core and face samples from SGS Chelopech and 267 drill-core samples from SGS Bor were sent to ALS Rosia Montana for Au and Cu umpire analysis.

Gold external checks have precision within acceptable limits and no significant bias. The bias to the ALS Romania results noted in the 2016 to 2017 MRE reviews appears to have been resolved in the current external check results. Copper external checks have biases between -3% and 4% to the ALS Romania results. SGS Chelopech umpire results are precise, but SGS Bor results have poorer repeatability than expected.

Table 27: External duplicate data sent to ALS Rosia Montana (including acceptable and best practice limits)

Duplicate type	Lab_Orig	Element	Pairs (total)	Count of pairs (>10 x DL)	$CV_{(AVR)}$ %	Acceptable	Best	Mean original	Mean duplicate	Bias
FS	SGS_CH	Au (ppm)	132	132	7	10%	3%	2.05	2.09	2%
DDH	SGS_CH		2,037	1,490	10	10%	3%	2.72	2.76	1%
FS	SGS_CH	Cu (%)	132	132	4	7.5%	3%	0.6284	0.6555	4%
DDH	SGS_CH		1,725	1,175	5	7.5%	3%	0.8820	0.9068	3%
DDH	SGS_BO		267	267	17	7.5%	3%	0.2512	0.2446	-3%

The figures below show the external duplicate results for DDH drilling (ALS Romania versus SGS Chelopech). A 3% bias is at the upper limit of what would be an acceptable between laboratory bias (usually a maximum of 2–3%).

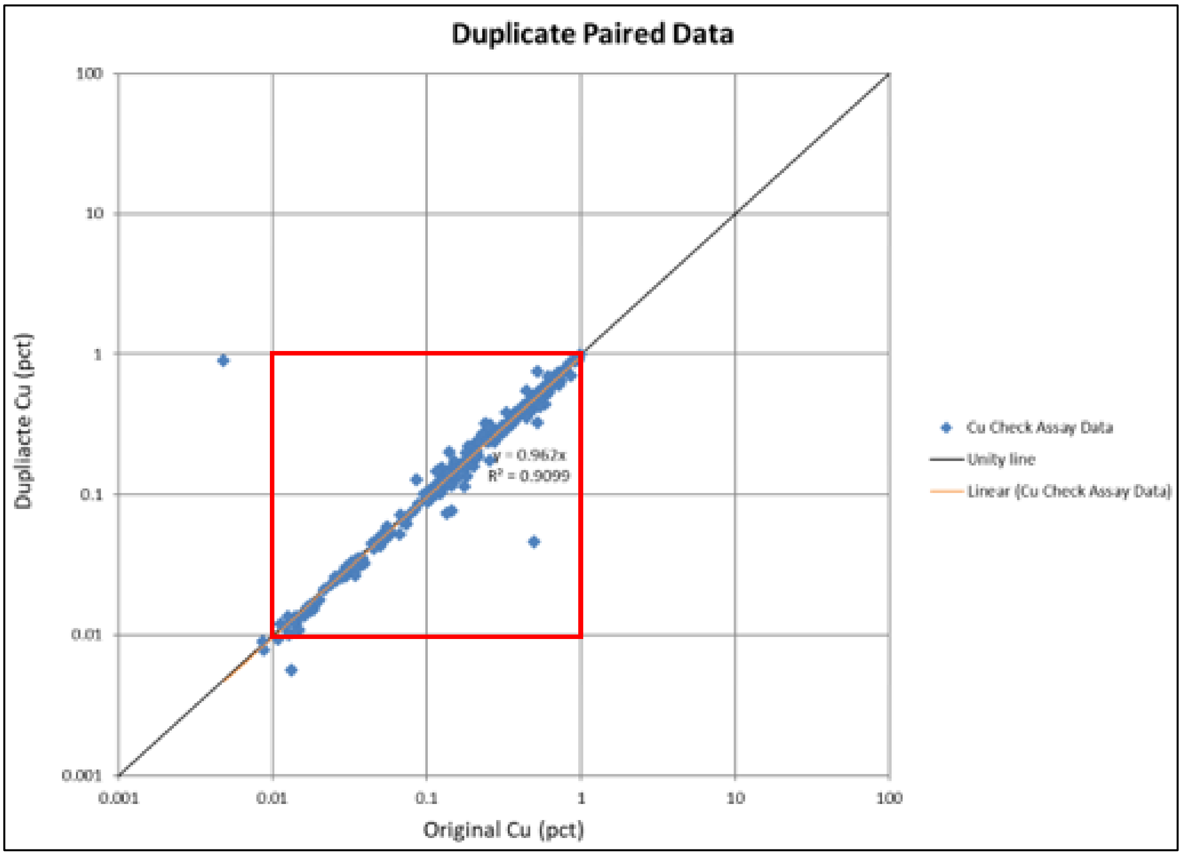


Figure 18: Scatterplot of SGS Bor External Cu duplicates. Area within red outline shown in Figure 19.

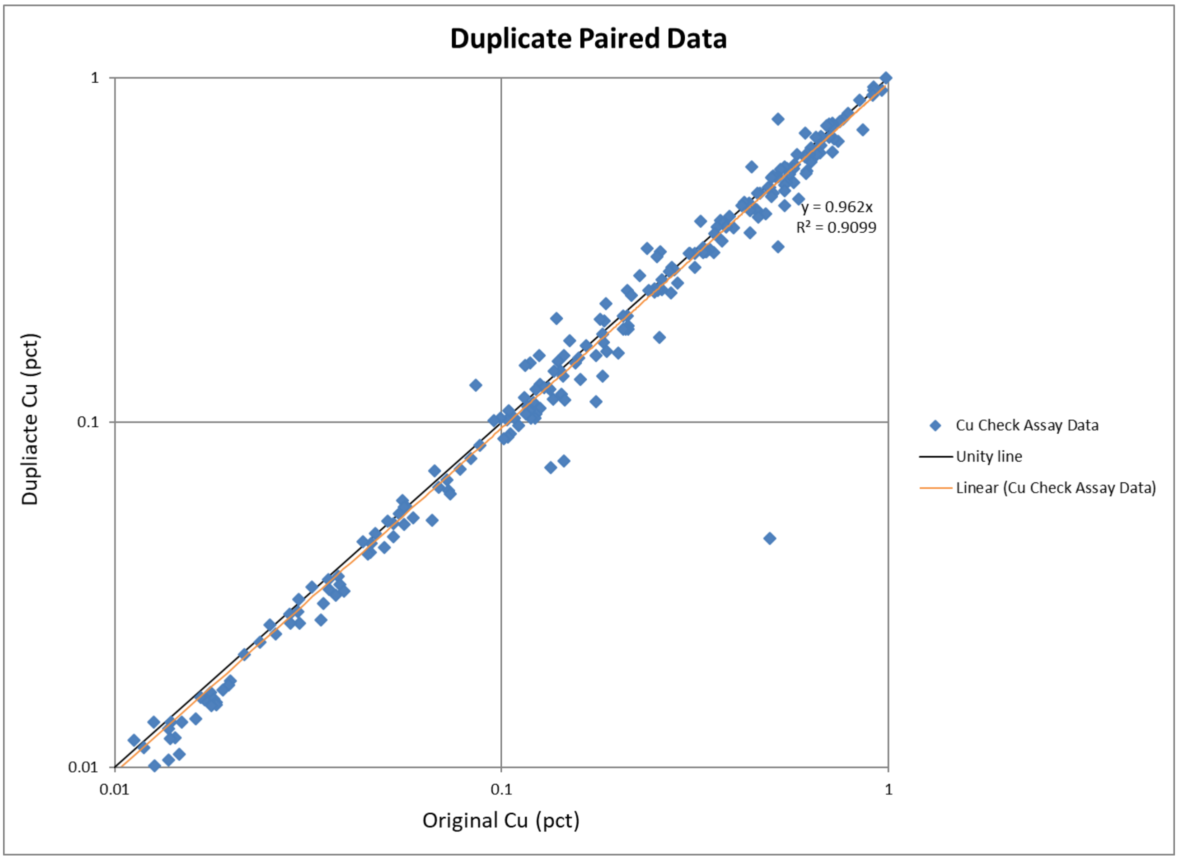


Figure 19: Scatterplot of SGS Bor External Cu duplicates showing bias (-3%) to originals; bias at grades up to 0.1% Cu (concentration of points below the one-to-one line)

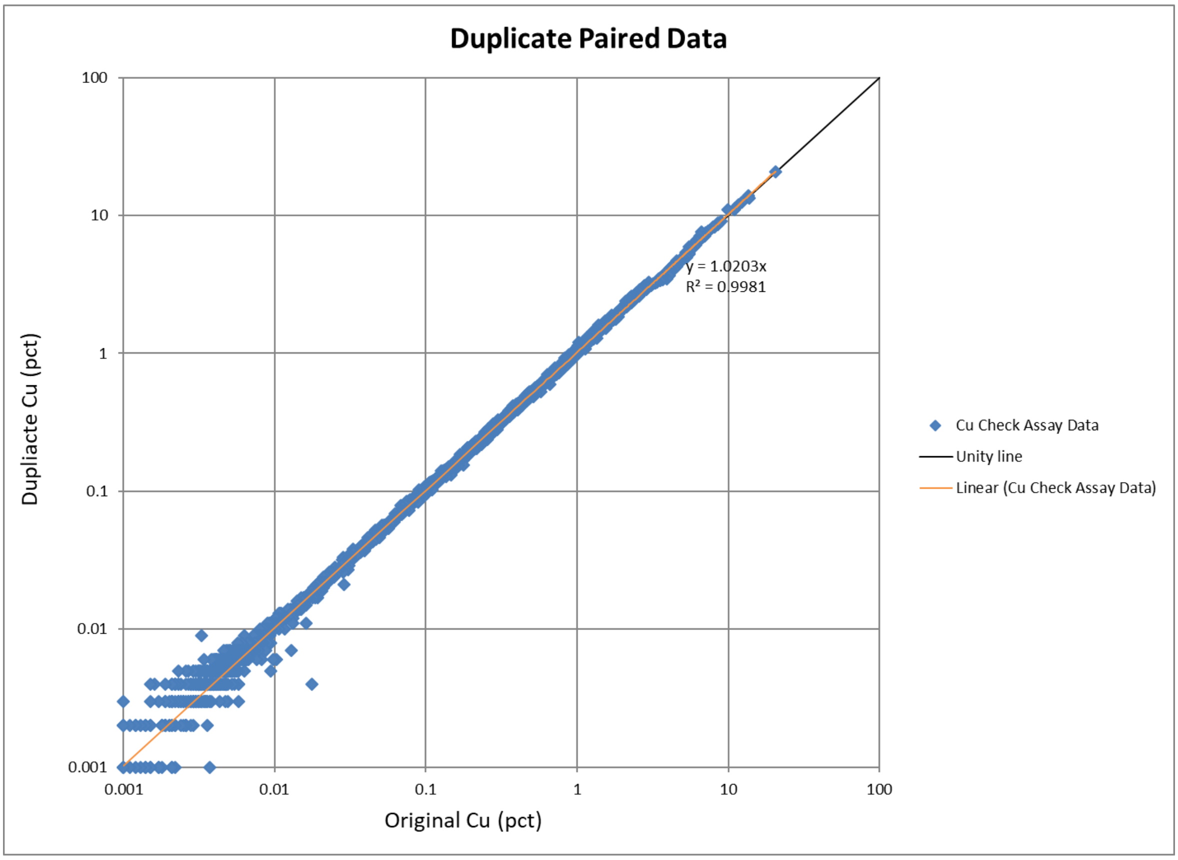


Figure 20: Scatterplot of SGS Chelopech External Cu duplicates with 3% bias to duplicates

The umpire laboratory, ALS Romania, has been ISO/IEC 17025:2005 (CAN-P-4E) certified since March 2012 and is independent of the issuer.

11.3.4 QAQC Conclusions and Recommendations

Issues were noted with some of the QAQC results which will require ongoing monitoring, but overall no fatal flaws were apparent. This indicates that the QAQC procedures implemented at Chelopech are adequate to assess the accuracy and precision of the assay results obtained and that the assay results should accurately reflect the grade of the samples. Results of the QAQC review are summarised below:

- Overall blank results show no significant indications of contamination. Where Cu and Ag failures were noted, these tended to be in non-certified blanks or at low grades relative to economic levels of mineralisation and laboratory lower detection limits.
- No fatal flaws were noted with the accuracy results. Bias and failures were noted in individual CRMs, but this was not systematic (i.e. some bias is positive and some negative). A change in analytical precision (and accuracy) is apparent and comment regarding this should be obtained from SGS Chelopech.
- Field, preparation and pulp duplicates as well as external check (umpire) results were compared for Face samples (FS) and Drill samples (DDH) for primary samples submitted to SGS Chelopech and SGS Bor and external check samples sent to ALS Rosia Montana. Gold, copper and sulphur duplicate results were precise with no significant issues. Sporadic issues were noted with silver and arsenic duplicates analysed at SGS Bor. Overall SGS Bor duplicates had poorer precision and higher biases than samples analysed at SGS Chelopech.
- Gold external checks have precision within acceptable limits and no significant bias and the bias to the ALS Romania results noted previously appears to have been resolved. Copper external checks have biases between -3% and 4% to the ALS Romania results. SGS Chelopech umpire results are precise, but SGS Bor results have poorer repeatability than expected.

CSA Global recommends the following:

- The failed CRMs should be investigated (potential sample swaps).
- CRMs with bias should be investigated over a longer time period to check whether analytical drift has occurred. If results are consistent over the longer time periods, then the expected values of the DPM specific standards might require revision or checking.
- The change in precision and accuracy noted in CRM results from SGS Chelopech (possible recalibration of equipment) should be investigated.
- The notable difference in precision and bias at SGS Bor compared to SGS Chelopoech should be investigated.

11.4 Security and Storage

All core transported from the drill rigs to the core shed and all samples carried to the preparation facility are securely transported by DPMC staff in steel boxes. Upon completion of the core logging a SSF is prepared for each batch containing a list of samples, standards and field duplicates which is documented in the Sample Journal on the server. Each SSF has a unique number and is prepared in duplicate – one signed copy for the laboratory and one for the DPMC archive. Underground face samples are transported in plastic bags from the mine to the preparation facility. The sample preparation facility and laboratory are located within the confines of the DPMC compound, which access to is secured by a locked gate and 24-hour CCTV.

Samples collected from underground development, underground drilling and surface drilling operations are transported to the site-based geology core shed, where the samples are geologically logged and are prepared for chemical analysis. The sampling procedures are appropriate and adequate security exists on the site to minimise any risk of contamination or inappropriate mixing of samples. Sample tagging and a laboratory barcode system is in use to digitally track sample progress through to final chemical analysis.

All pulp duplicates are returned from the lab in plastic vials and are stored in a facility with constant temperature and humidity. Mineralised coarse reject samples are returned in the same fabric bags and are stored in core storage near the site. The remaining half core is neatly stored in conventional pallet racking in the core storage facility.

11.5 Conclusions on Sample Preparation Analyses and Security

The QP is satisfied that the sample preparation, security and analytical procedures in place at Chelopech are adequate, and that data used in the estimation of Mineral Resources are representative of the mineralisation and fit for use.

12 Data Verification

The report authors have reviewed the data and believes the data verification procedures undertaken on the data collected from DPMC adequately support the geological interpretations and support analytical and database quality, and therefore support the use of this data in the Mineral Resource and Mineral Reserve estimates disclosed in this Technical Report.

12.1 Database Controls

DPMC implemented an acQuire GIMS (Geological Informational Management System) in 2004, for managing all of the drillhole and face sampling data.

All data, such as collar, survey, geological, geotechnical, structural, assay, etc is imported daily into acQuire from the server or via email. After validation, data is one-way synchronised with GEMS for mineral resource estimation purposes. The acQuire GIMS was also used to generate monthly, quarterly and yearly QAQC reports.

Data used to support Mineral Resource and Mineral Reserve estimates have been subjected to validation, using inbuilt acQuire GIMS triggers that automatically check data for a range of data entry errors. Verification checks on surveys, collar coordinates, lithology, and assay data have also been conducted.

Data undergoes further validation by CSA Global through a series of Datamine loading macros which flag any missing data, unmatched records, etc.

12.2 Collar Data

There are 4,271 in the collar table of the database, used in this MRE. There are no duplicate holes or coordinates. In the geological database, acQuire nomenclature and naming convention of drillholes does not allow identical naming of the drillholes.

The face samples are digitised in GEMS using survey pick-ups of the mine headings. The face samples with their unique names and coordinates are exported from GEMS to acQuire. Data validation done in acQuire considers only unique names and coordinates.

12.3 Survey Data

12.3.1 Collar Survey

Coordinates are captured at various stages using different methodologies which are ranked accordingly and those with the highest (best) ranking are captured in the "Best" field in the database. These coordinates were used in the Mineral Resource estimation.

Highest to lowest ranked methods are as follows:

DGPS->Total station->Digitizing->Transformation->Planning

Collar information was received via email from the Survey Department in pre-specified templates and imported into the acQuire database. Validations included checking for overlapping intervals or surveys beyond drillhole depths, duplicate entries, survey intervals past the specified maximum depth in the collar table, abnormal dips and azimuths.

There were no issues identified with the data in the collar table.

12.3.2 Downhole Survey

The Drilling Department is responsible for setting out the collar positions, directions, and inclination/ declination of both surface and underground drillholes, and for surveying the actual position, direction and inclination/declination upon completion. The downhole survey measurements are taken every 30 m by the drillers on shift. The first measurement is taken as near as possible to the collar, usually at 12 m or 15 m depth. Data is documented and submitted after the end of every drill shift.

If deviations from the proposed parameters are not within the permissible range, the drillhole is stopped.

The final measurements are validated and are entered in the drillhole database. Data are checked for overlapping intervals, surveys beyond drillhole depths, duplicate entries, survey intervals past the specified maximum depth in the collar table and/or any abnormal dips and azimuths.

There were no issues identified with the downhole survey records.

12.4 Geological Data

There are 363,325 lithological records in the lithology table for 4,146 drillholes and 125 drillholes have no lithological records. The geotechnical holes and those with technical issues were not logged. Also, there are some completed drillholes at the end of September 2019 which have yet to be logged. Geological information is described using a system of codes. In the database there are 96 unique field names with 1,337 unique codes.

Geotechnical and structural data validations undertaken included: checking for core recoveries greater than 100% or less than 0%, RQDs greater than 100% or less than 0%, overlapping intervals, missing collar data, negative widths and/or results past the specified maximum depth in the collar table.

12.5 Samples Summary

Unique sample numbers have been used and no issues with interval integrity such as overlapping intervals, from depths greater than to depths, and intervals greater than the specified maximum hole depth have been noted.

There are 511,905 drillhole samples and 36,941 face samples in the database of which 284 holes do not have samples. Some of the drillhole and face samples do not have associated assay values and their numbers are shown in Table 28 below. 782 drillhole and 8,742 face samples do not have associated assay values.

Table 28: Number of samples with no associated assay values

	Au	Ag	Cu	As	S
Drillhole samples	1286	1,479	1,403	51,827	14,065
Face samples	591	629	10	8,725	299

12.6 Core Recovery

Core recovery was reviewed on 193,557 samples within the defined mineralisation zones (silica and stockwork envelope).

The data comprises pre-DPMC and DPMC, surface and underground drillholes. The average drillhole recovery is 99.5% and the various phases of drill data show no issues with regards to recoveries. No relationship was evident between core recoveries and the copper assay data, or the gold assay data, as illustrated in Figure 22 and Figure 23 respectively.

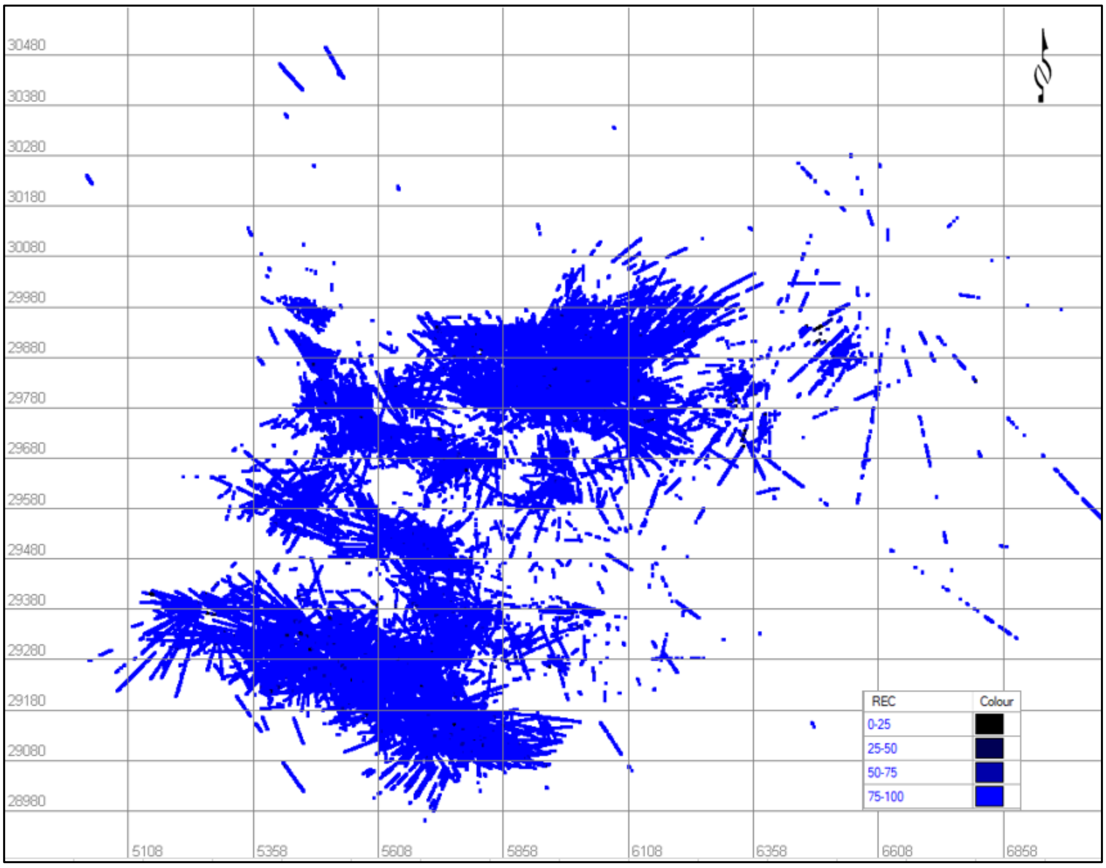


Figure 21: Plan view representing the spatial position of the recovery data used for the analysis (DPMC, 2019)

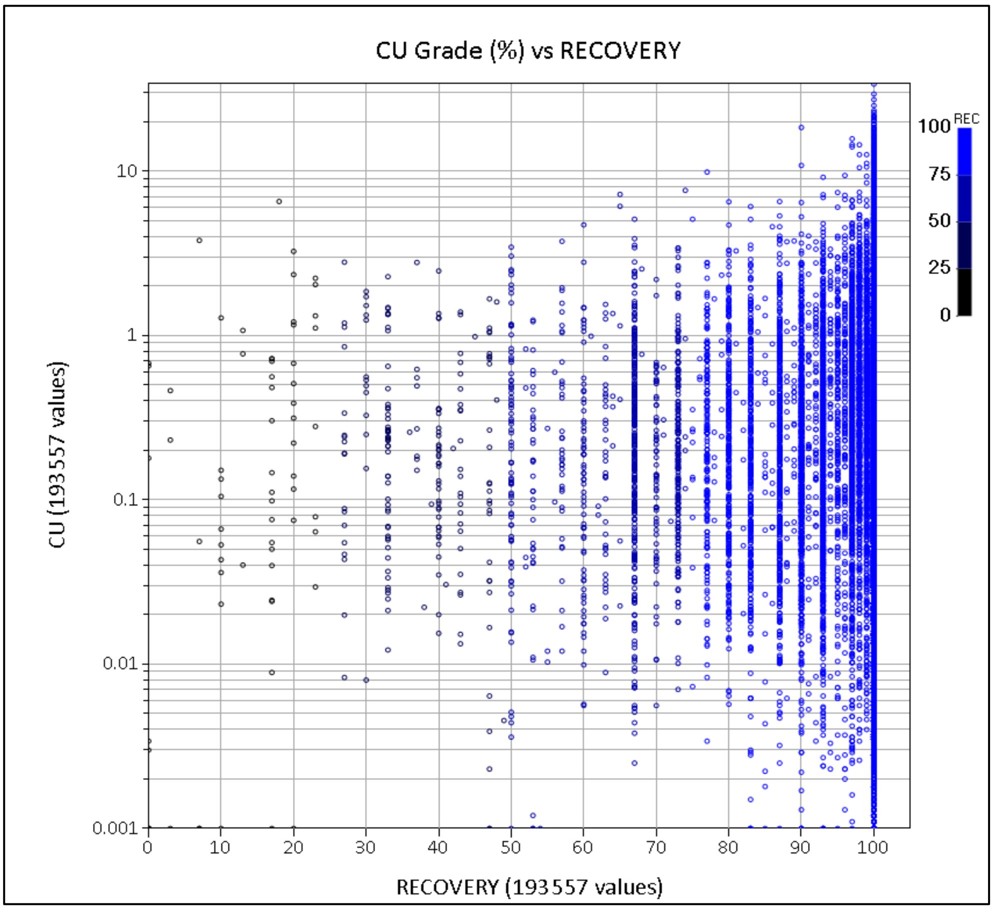


Figure 22: Cu grade (%) vs recovery (DPMC, 2019)

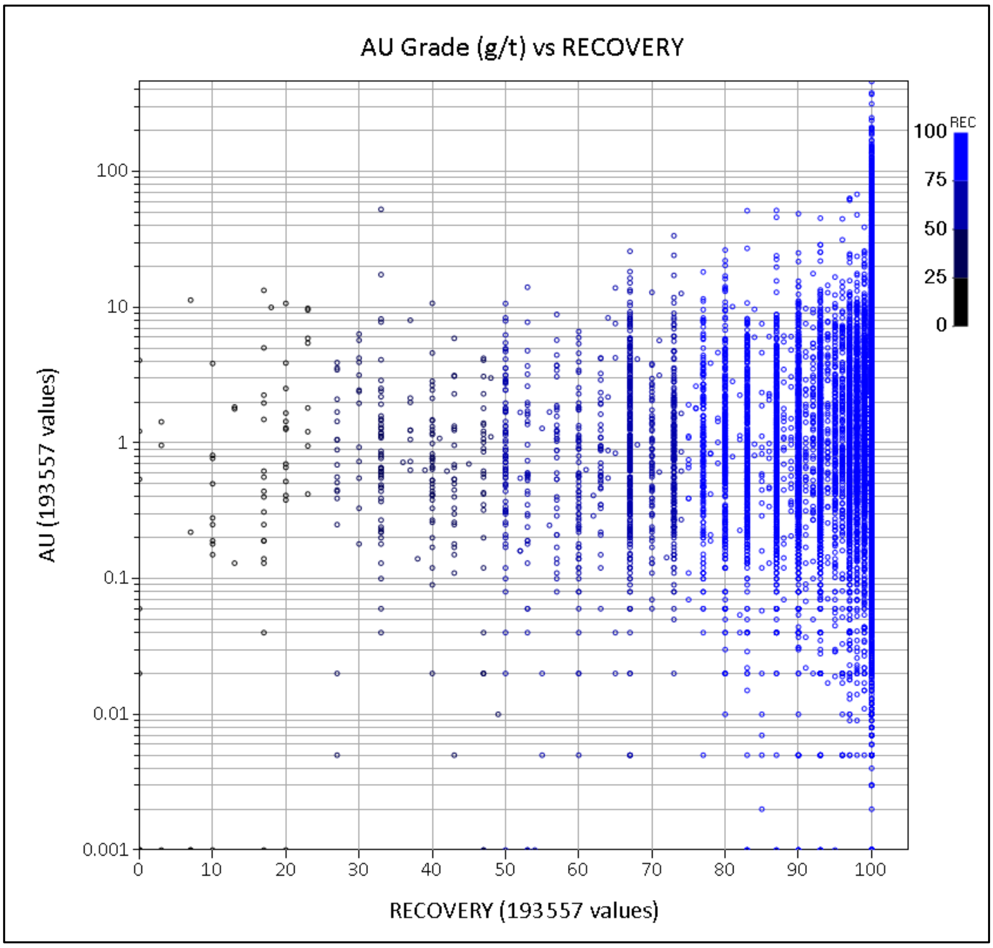


Figure 23: Au grade vs recovery (DPMC, 2019)

12.7 Umpire Sampling

There are 26,601 umpire samples (both drill hole and face samples) in the database.

The reliability of the assay data from the primary laboratories is further assessed by comparison of the original assay results with umpire assays completed by two independent laboratories. More than 5% of samples are selected from the general assay stream to form the umpire sample suite, designed to cover the broad range of geology grade.

One "blind" certified standard is inserted every 20th sample (alternating low-grade and high-grade standards are used). One "blind" blank pulp is inserted every 50th sample.

12.8 Assay Verification and Data Capture

All incoming assay results are emailed as digital files from the lab to the database geologist. Prior to entry into the database each submission is screened using acQuire's pre-download quality control report, which checks the performance of:

- Standards – referenced against ± 2SD (standard deviations)
- Duplicates and lab splits – referenced against mean paired relative difference <±20%.

All results received from the lab are maintained by the database geologist who documents the pass or fail of each lab submission.

If a check sample needs querying (i.e. duplicate, standard, split, or repeat assays show failed or spurious results), the lab is contacted to perform 10 repeat assays either side of the anomalous check assay for standards and five repeat assays for blanks, and requested to include a lab standard within the run of repeats.

The request for the re-assay is documented via email. Assuming the repeat assays show no evidence of bias the original results are accepted, such that the submission is entered into the acQuire database including the additional lab repeats. If the repeat assays do show bias, then the complete submission must be re-assayed.

In addition, the complete lab submission must be re-assayed if any of the scenarios listed below are identified:

- If a batch shows even one failed standard
- If face samples/diamond core crusher duplicates display a consistent poor correlation (allowing for occasional spikes)
- If the company standards show a consistent positive or negative bias greater than ±2SD of the expected assigned values.

The above criteria apply to values greater than 10 times the detection limit for precious metals; 10 times the detection limit may also be applied to base metals, but this depends on the possible cut-off grades grade relative to the spectrum of analysis, or stage and type of exploration (e.g. soils vs resource drill data).

In the event of any of the above scenarios occurring, the lab is contacted in writing or emailed and requested to reply with a formal explanation as to the failure of the batch (in the correspondence with the lab, values of company standards are not revealed, only referenced as being anomalous).

Using acQuire the "failed" results are entered into the database, and priority coded to reflect their lower confidence status. The subsequent re-assayed and accepted submission is priority coded to reflect usage as the primary assay record for daily use and resource estimation. However, as it is important to ensure the re-assay work includes the re-assaying of all check samples (field duplicates, crusher duplicates, lab splits, and lab repeats), a fresh batch of company standards is also sent to the laboratory. In addition, results of the re-assay and any comments of the quality control analyses are recorded in acQuire and accepted results are priority coded.

To track the progress of each assay, the database geologist maintains a log sheet of each assay submission including the pass/fail/query outcome and follow-up action plan (if applicable).

12.9 Bulk Density

Bulk density measurements have been routinely completed since the start of 2003 at the (ISO 9002 rated) Eurotest facility in Sofia using the industry standard wax coating water immersion method. Prior to 2003, the bulk density was assigned based on a formula that used sulphide and copper assays. The collection of bulk density data has recently been incorporated into DPMC's standard procedures which are applied to all diamond drilling, drives and stopes.

Bulk density measurements are collected as fist sized grab samples from underground, or 10 cm billets every 3 m along the length of the drill hole, including both mineralisation and waste. These measurements have been assigned to a location or to a bulk density table in the drill hole database.

In 2009, on-site density analysis was introduced and made a part of the SGS managed on-site laboratory. The determination of bulk density for rock or core samples is by paraffin wax and water immersion.

A total of 108,563 (104,160 core samples and 4,403 face samples) density measurements have been collected from a range of grades, rock types, and locations within the modelled Silica Envelopes.

The density data is sufficiently distributed throughout the resource with representative samples present in each mining block (see Figure 24) to allow for its estimation by ordinary kriging to represent variations based on grade and lithology. Average density values tabulated by mineralisation block are presented in Table 29.

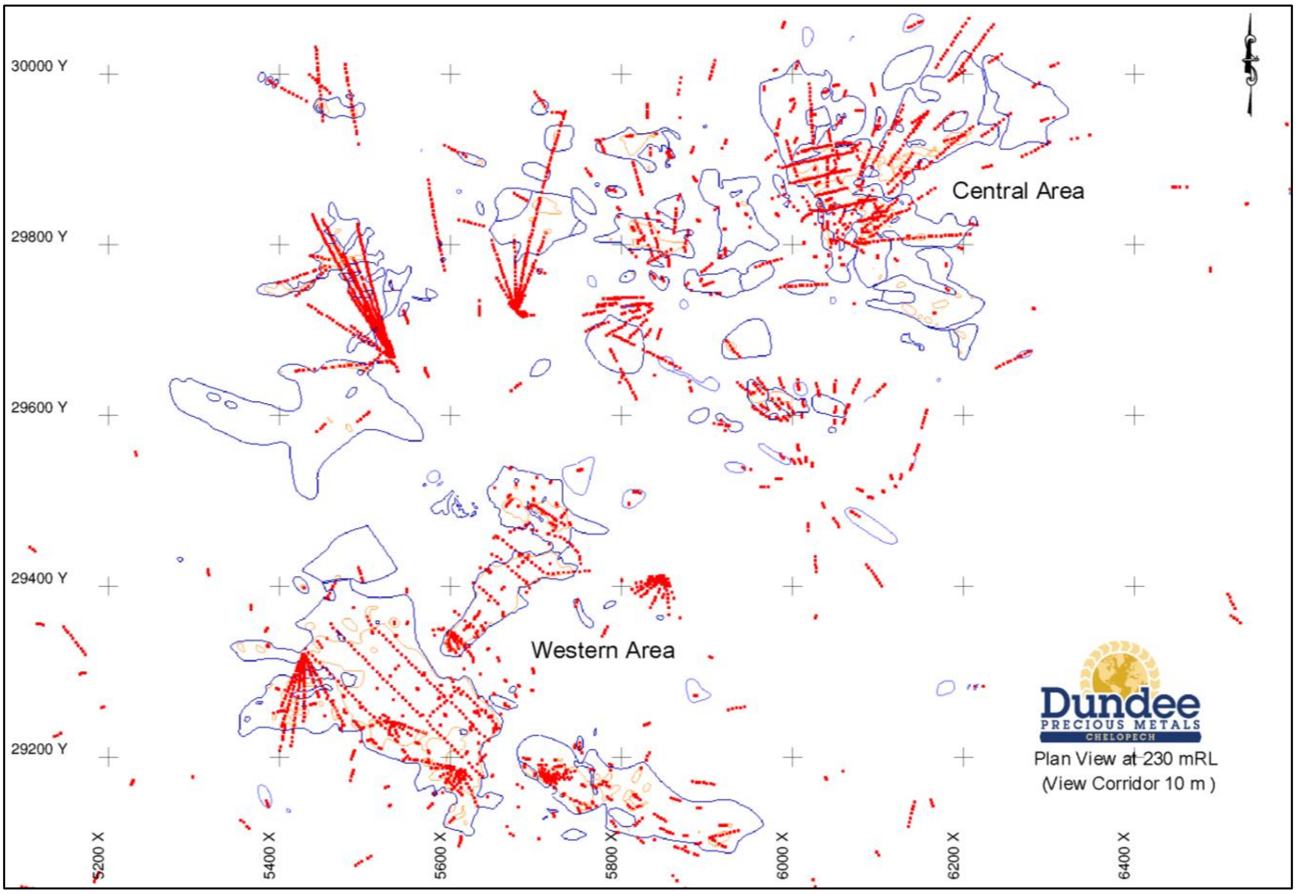


Figure 24: Density data (DPMC, 2019)

For blocks lacking density data, a third-order polynomial regression was applied based on sulphur grades:

$$Bulk\ Density\ (HG) = -0.00001125*(S\%)^3 + 0.00079678*(S\%)^2 + 0.02254154*(S\%) + 2.538$$

$$Bulk\ Density\ (SE) = -0.00011068*(S\%)^3 + 0.00479701*(S\%)^2 + 0.02283858*(S\%) + 2.730$$

This polynomial regression was validated in 2013, by comparing samples with the physically measured bulk density against density estimated from sulphur assay values, see Figure 25 for the Stockwork ("HG") and Figure 26 for the Siliceous Envelope ("SE") which show the comparison of density distributions as probability plots and histograms. The plots show a common mean grade and similar data distributions verifying the application of the regression equation. This regression is still considered current and remains in use.

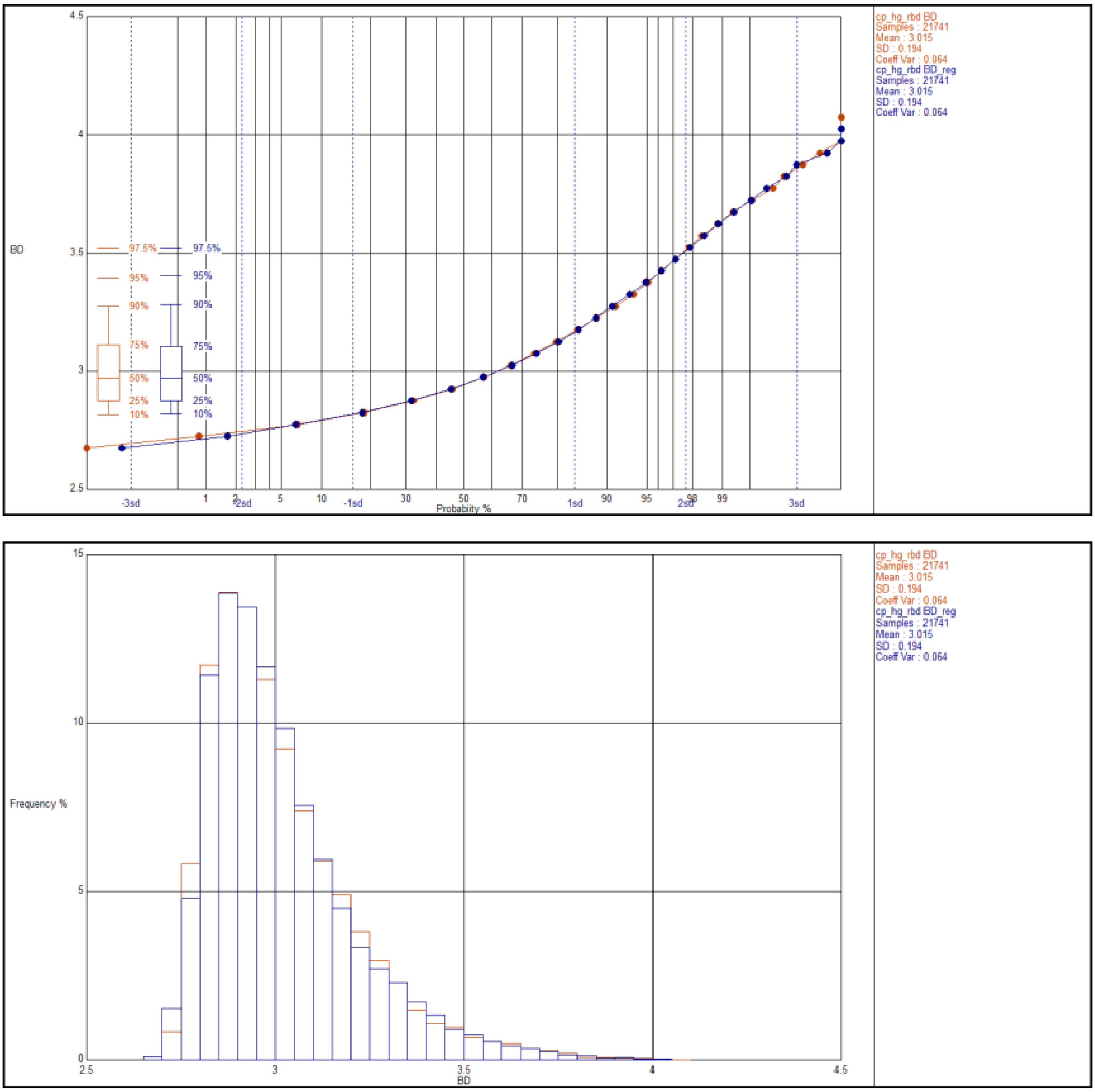


Figure 25: Probability plot and histogram comparing polynomial estimated vs actual density for Stockwork (HG) domain (DPMC, 2019)

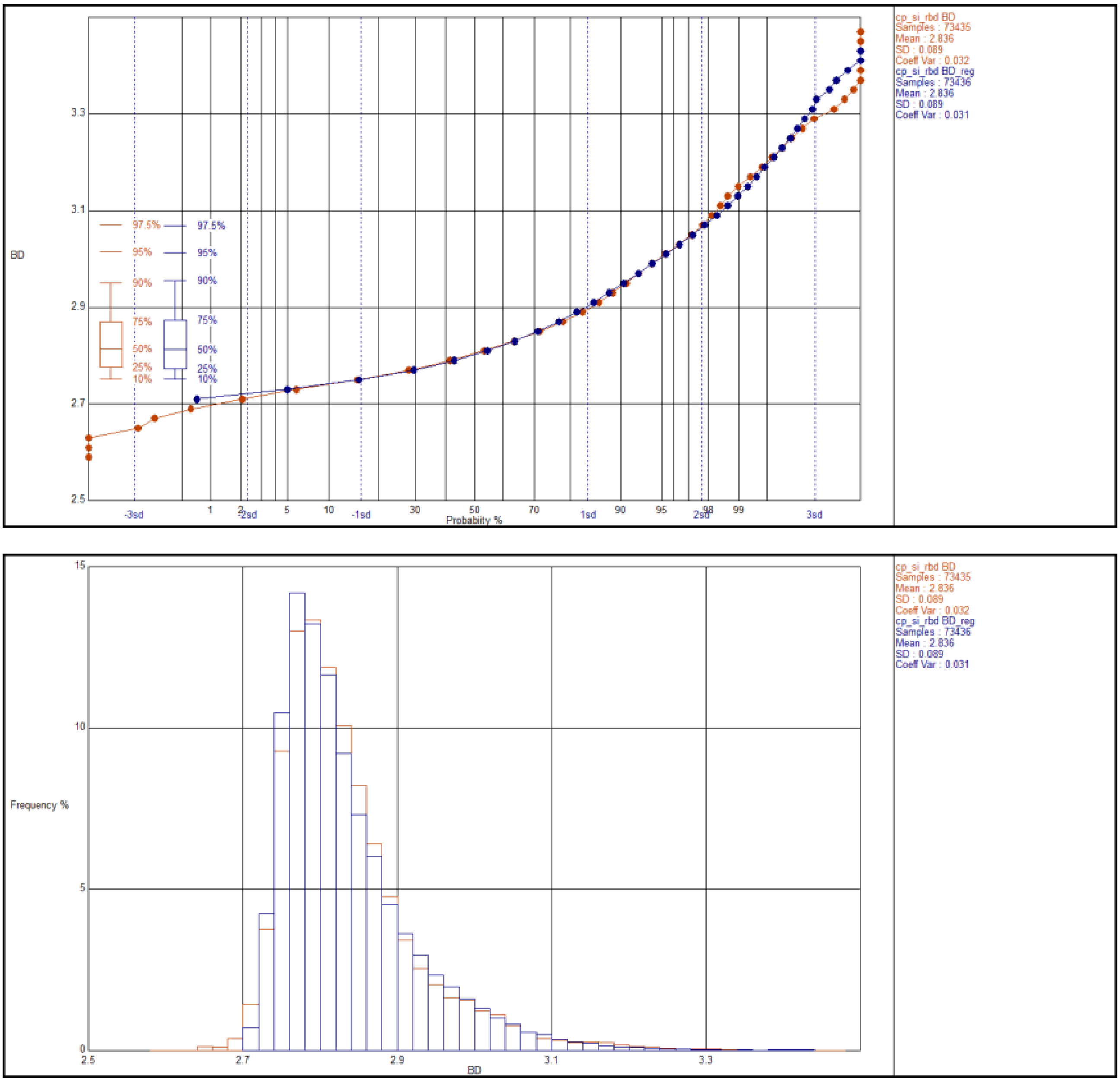


Figure 26: Probability plot and histogram comparing polynomial estimated vs actual density for Siliceous (SE) domain (DPMC, 2019)

12.10 Comparison of Data Types

The Chelopech database contains surface diamond drill holes, underground diamond drill holes and underground face samples. In a 2007 study, a series of investigations were completed to test the appropriateness of combining the datasets for grade estimation. This review work was re-assessed in 2013 by Chelopech staff and no significant bias was observed. The results of these tests remain current and relevant and are included below.

CSA Global and the authors of this Technical Report consider this combined data of an appropriate standard and adequate for use in the estimation of mineral resources and mineral reserves.

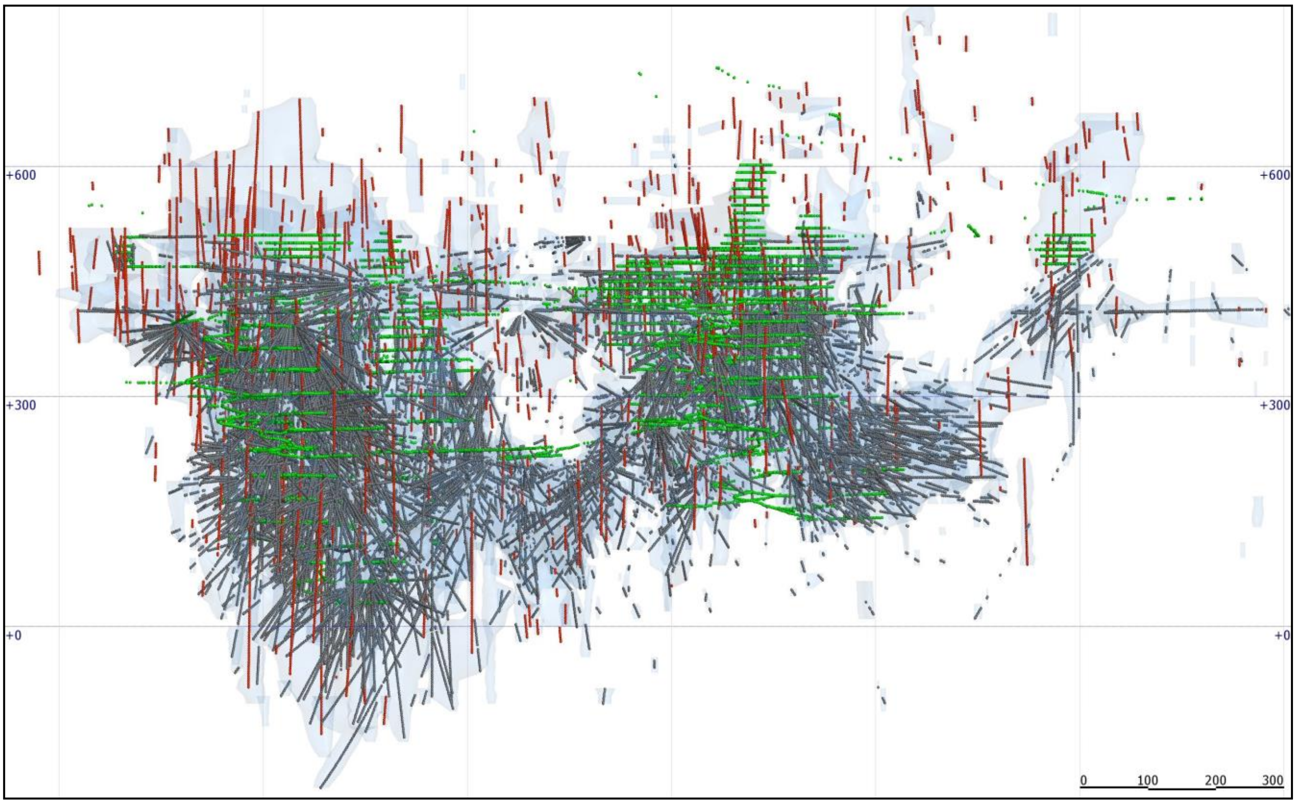


Figure 27: 3D view of Chelopech deposit, representing the distribution of different data types (DPMC, 2017)
Note: Face samples in green, surface diamond drillholes in red and underground diamond drillholes in grey presented in boundary of Silica Envelope in blue.

The tests undertaken included:

- Compilation and review of descriptive statistics by data type and owner/company
- Compilation and review of comparative declustered statistics
- Compilation and review of scatterplots and comparative declustered statistics for the data types located in close proximity to each other.

Note that this study only analysed 3 m drillhole composites, and all composites are located within the Silica Envelopes. Face samples were collected using a grid and area approach.

Underground drilling consistently has a higher mean grade than surface drilling for all elements, and face sampling has a higher mean grade than all the drilling. This has been interpreted as being due to the location of the data. Surface drillholes intersected all parts of the silica alteration, both low and high grade. Underground drillholes tend to be focused around the higher-grade regions of the silica alteration and therefore are higher in grade than the surface drillholes. Face sampling is almost exclusively located within the high-grade region of the orebody and, therefore, has a higher mean grade than the drillholes.

Most surface diamond drillholes were completed by the State-run SGE. Face samples have been collected by the State-run CCPC, Navan and Dundee. Summary statistics for the face samples grouped by company are not very meaningful as each company sampled different regions (CSA Global, 2014).

13 Mineral Processing and Metallurgical Testing

13.1 Introduction

In the years of operation since acquisition by DPM in 2004, the original crushing, grinding and flotation circuits were utilised and progressively upgraded to process up to approximately 1 Mtpa of ore. The saleable product continues to be a copper concentrate, containing on average 16.5% copper, and between 25–30 g/t gold and 5–6% arsenic. The concentrate is loaded into railway wagons, and dispatched to the port of Burgas, located on Bulgaria's Black Sea coast. From there it is transported by ship to various smelters (Peru, the Philippines and Canada until 2010), Xiangguang Copper Co. (XGC) in China and to the Dundee Precious Tsumeb smelter, via Walvis Bay, in Namibia since 2011.

Operations upgrades commenced in 2009, with the installation of the first hydraulic mine backfill plant, subsequently upgraded to the current paste plant in 2010. Process plant upgrades continued through 2010 in preparation for the increased tonnages from the upgrade of the mine. A new grinding circuit replaced the original secondary and tertiary crushing circuits, together with the installation of a new rougher/scavenger flotation bank. The existing flotation cells were converted into an expanded three-stage cleaner circuit, with the upgraded circuit commencing operations in February 2011. Flotation tailings continue either being dewatered to produce "paste" for backfilling the mined out stopes underground, or deposited in the upgraded TMF as required.

Further upgrades were completed in 2012 with replacement second and third cleaner stages in the copper circuit, a new pyrite recovery circuit, concentrate conveying and rail loadout handling system both completed in 2014.

13.2 Mineral Processing Testwork

13.2.1 Pre-Expansion Summary (Minproc Engineers, 2006)

Comminution – a comprehensive test program was undertaken to fully characterise the Chelopech ore types to design an expanded comminution circuit. Parameters including the competence, hardness and variability of the three main ore types in current production (Blocks 19, 150 and 151), and drill-core samples representing future ore from these blocks in 0 to 5, and 6 to 10-year time horizons. Specific tests included: Bond Crushing, Rod Mill and Ball Mill Work Index determinations, Unconfined Compressive Strength (UCS) measurements, JKTech (JK) drop weight tests, and Sag Power Index (SPI) measurements.

Flotation – test work completed on the same samples included batch testing to establish performance variability and four bulk flotation campaigns. The products obtained from these runs were used to provide large scale samples for subsequent pilot-scale campaigns for alternative process flowsheets.

Several samples representing material from various areas of the three main ore types were tested and illustrated variable copper and gold recoveries. In general, copper recoveries of approximately 80% and gold recoveries in the range of 40% to 50% were reported for most ore types. Block 151 samples consistently exhibited poorer gold recoveries, and additional samples of each block were submitted for a more detailed study, investigating the effect of grind size, flotation reagents and conditions. The results indicated that improved copper and gold recoveries for Blocks 19 and 150, compared with those for Block 151 should be expected under existing conditions. Assessment of the results of the overall test program were made and incorporated at plant scale where practicable.

13.2.2 Gravity Gold Recovery

Scoping level test work was undertaken on samples representing the three main ore types to evaluate the potential for gravity gold recovery from the proposed milling circuit. Whilst gold recoveries to a laboratory centrifugal concentrator ranged between 17% and 31%, the portion associated with free gold, defined by mercury amalgamation and compared to gold contained in the relatively high specific gravity (SG) sulphides, was relatively low at less than 6%, and further work in this direction was discontinued.

13.2.3 Flowsheet Development

The test programs completed in 2005 concluded that the then current process flowsheets were optimum for the treatment of the Chelopech ore types, and that no fundamental changes could be recommended. The results produced were used to design a revised comminution circuit which was integrated into the operation in early 2011. In the meantime, the previous years of continuous operation confirmed the ranges of flotation parameters predicted from the test work phase. The variations in performance produced from each block are clearly understood in relation to actual performance.

The current operation produces a copper concentrate with associated gold and silver, with historical recoveries for copper, gold and silver averaging 85%, 55% and 42%, respectively. Since 2014, the circuit also produces a gold containing pyrite concentrate from the stream that would have previously been rejected to flotation tailings.

13.2.4 Pyrite Recovery Summary

Pyrite was produced in the original Chelopech concentrator, on the industrial scale between 1995 and 1997, where up to a total of 60,000 tonnes of pyrite produced. The flowsheet utilised slurry pH modification to depress pyrite flotation from the copper minerals, followed by acidification to allow the pyrite to float from the copper tailings. A scoping-level desktop study was completed in 2011 to assess possible flotation approaches for the recovery of a separate pyrite concentrate in the expanded concentrator and confirmed by a more detailed study conducted in 2012 (Macromet, 2013).

The work was supplemented by:

- A comprehensive laboratory test program completed on components of the ore blocks representing current and future ore sources – namely Blocks 19, 150 and 151, with additional samples from Blocks 16, 103 145, 147 and 149. In addition, three target sulphur ranges were prepared for the bulk composite, while a total of 13 variability samples were selected to represent the current life of mine (LOM) block composition. The work was completed in 2012 (AMDEL, 2013).
    - Potential recovery options, combined with investigating selective collectors, various pH modification combinations and variability testing were tested. In general, the results confirmed the findings from the 2005 program for the copper recovery circuit, while each flowsheet examined produced similar performance in the pyrite circuit.
- Based on consideration of all options, the existing copper circuit flowsheet, where pyrite is rejected into the cleaner circuit tailing by raising the slurry pH to >12.0 with lime, was confirmed as the optimum process from which the subsequent pyrite separation flowsheet was to be designed. In this case, reduced requirements for pH modification compared to the alternative flowsheets, and simpler collector requirements were the main cost considerations, combined with the relative reduction in process risk as the flowsheet is well proven. This formed the basis for the Preliminary Economic Assessment (PEA) (DPM, 2012), and which confirmed the potential to recover a pyrite concentrate from the mill feed, as a separate concentrate product and in addition to the copper concentrate already produced.
- Recovery of pyrite in the plant – The new pyrite circuit was fully operational by the end of Q1, 2014 and the pyrite produced, currently about 250,000 per year, is transported to the port and sold under existing contracts.
- Past laboratory test programs and studies (AMDEL and Macromet, 2013) had demonstrated that the majority (>90%) of the pyrite in the feed will be recoverable to the bulk sulphide (rougher/scavenger) concentrate, and from there will be distributed into both the copper, and the new pyrite concentrate.
- Routine laboratory testwork carried out at Chelopech, on monthly feed composites simulating the production of pyrite from the bulk sulphide rougher/scavenger concentrate, after copper minerals separation.

Considering the above facts and the pyrite circuit capacity of 400,000 tonnes of pyrite per annum, the potential exists to produce a greater amount of pyrite, providing there is a market for it.

13.2.5 Geometallurgical and Flowsheet Optimisation Testwork

A geometallurgical and flowsheet optimisation flotation testwork program at XPS (Sudbury) was concluded in 2017. The geometallurgical testwork considered the metallurgical variability of the eight identified domains at Chelopech – 151 Block Upper, Middle and Lower; 150 Block Upper and Lower; 103 Block East and West; 19 Block. The findings of the geometallurgical testwork were inconclusive on quantifying the variability in pyrite quality between the domains. Other information gathered was nonetheless useful and further enhanced the understanding of the geometallurgical properties and variability between the domains.

The flowsheet optimisation flotation testwork indicated promising results on potential alternative flowsheets which will need to be further investigated and confirmed through laboratory testwork at site. This work will be incorporated in the initiatives that form part of the "Process Plant Optimisation Program".

The 2019 annual review of the recovery models vs the actual plant performance indicate that the current models are still able to accurately predict the plant recovery performance for the expected future plant feed grades.

14 Mineral Resource Estimates

14.1 Mineral Resource Estimate Data

The drill and face sample databases were validated prior to use in the estimation of Mineral Resources. The datasets were loaded into AcQuire following DPM QAQC procedures. The data was imported into GEMS using SQL. The following checks and validations were undertaken:

- Drillhole depths were validated against downhole sample, assay and lithology files
- Duplicate collar IDs were confirmed absent
- Any overlapping sampling intervals were resolved
- Intervals with sample type “NS” were excluded, for various reasons: e.g. geotechnical drillholes, historical drillholes and lost drilling
- Assays with undefined values, i.e. below limit of detection (LOD), were set to half LOD
- Assays that have failed QAQC criteria were removed
- Drillhole survey data were validated for extreme deviations
- Lithology and alteration codes were validated against their respective libraries.

Data provided for the MRE was supplied at a date cut-off of 30 September 2019. In summary, the database consisted of a total of:

- 4,271 diamond drillholes for a total of 1,023,347 metres
- 36,941 face samples
- 108,563 drillhole density samples
- 4,403 face sample density values.

Data is grouped into two main areas, known as the Western Zone and Central Zone, with each zone separated into mining blocks (Figure 28). In summary:

- The Western Zone is comprised of mining blocks 5, 25, 103, 144, 145, 147, 148, 149, 149 South, 150, 151, 152 and 153
- The Central Zone is comprised of mining blocks 7, 8, 10, 16, 17, 18 and 19.

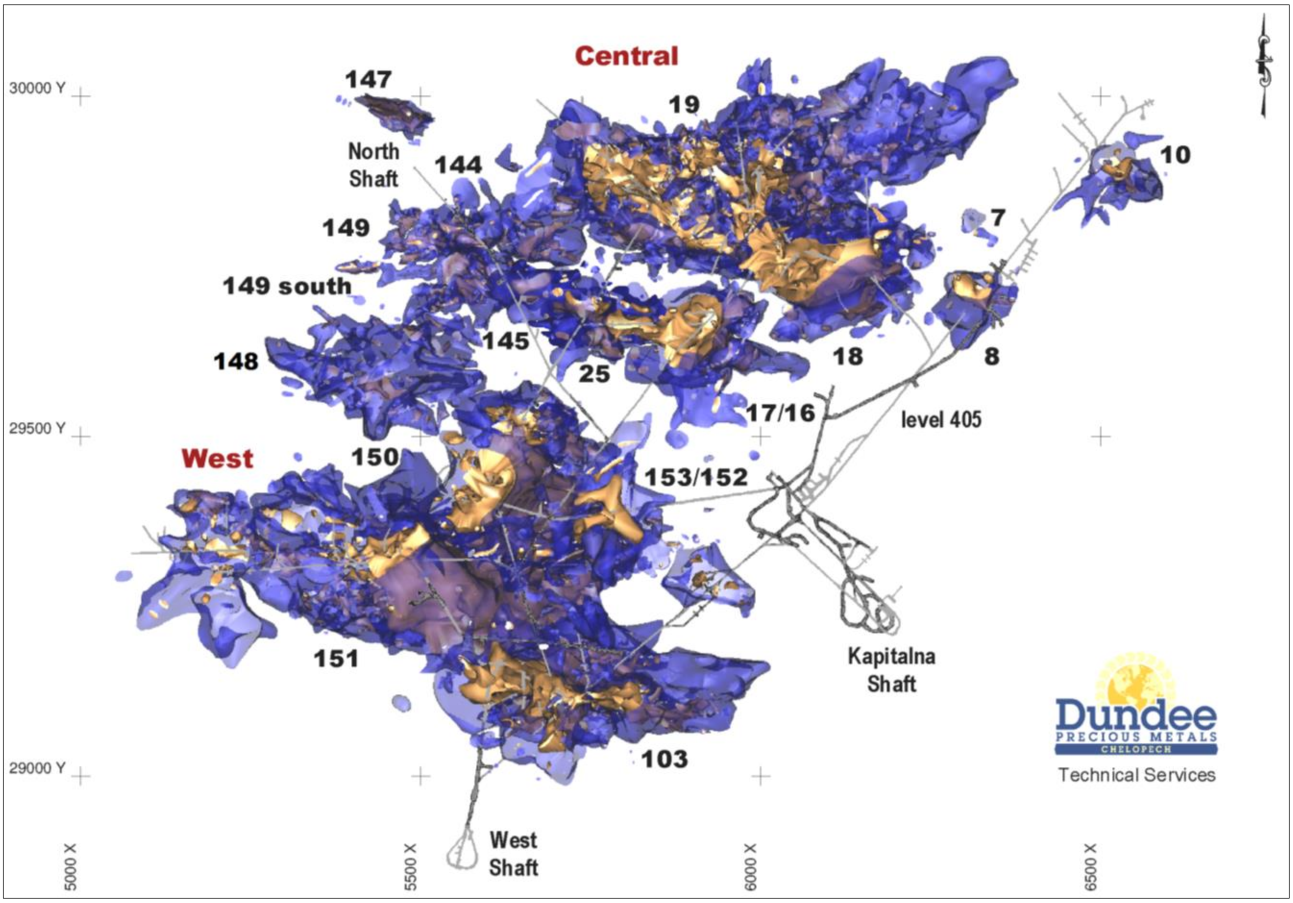


Figure 28: Plan view with projections of the mineralised blocks (Silica Envelope in blue and Stockwork Envelope in orange) (DPMC, 2019)

14.2 Bulk Density

Ordinary kriging was used to estimate density values into each model block. Refer to Section 12.9 for a full description on in-situ dry bulk density data used and Table 29 provides the search parameters. Where insufficient density data was available, a density value was estimated using the relationship between sulphur grade and density (Section 12.9). Average density values by mineralisation block are presented in Table 29. In total, approximately 15% of Silica Envelope material and 10% of High Grade envelope material was estimated using the regression due to a lack of density sampling data. (Figure 29).

Table 29: Average density values by mineralisation block

Block	Bulk density (g/cm³)			
	No. of samples	Silica Envelope	No. of samples	High Grade
103	3,327	2.81	2,516	2.95
150	1,526	2.82	1,892	3.06
151	8,544	2.83	6,401	3.03
152	318	2.86	215	3.05
149	841	2.79	414	3.16
149 South	894	2.75	272	2.86
147	147	2.77	111	2.86
145	726	2.79	68	2.83
144	519	2.8	129	2.93
19	9,113	2.77	6,770	2.87
18	629	2.77	306	2.86

Block	Bulk density (g/cm³)			
	No. of samples	Silica Envelope	No. of samples	High Grade
16	301	2.79	181	3.04
17	208	2.78	83	2.84
10	363	2.75	76	2.81
153	1,086	2.75	98	2.85
5	54	2.79	53	3.34
7	124	2.77	42	2.84
148	886	2.74	116	2.8
8	176	2.76	47	2.76
25	77	2.78	43	2.83

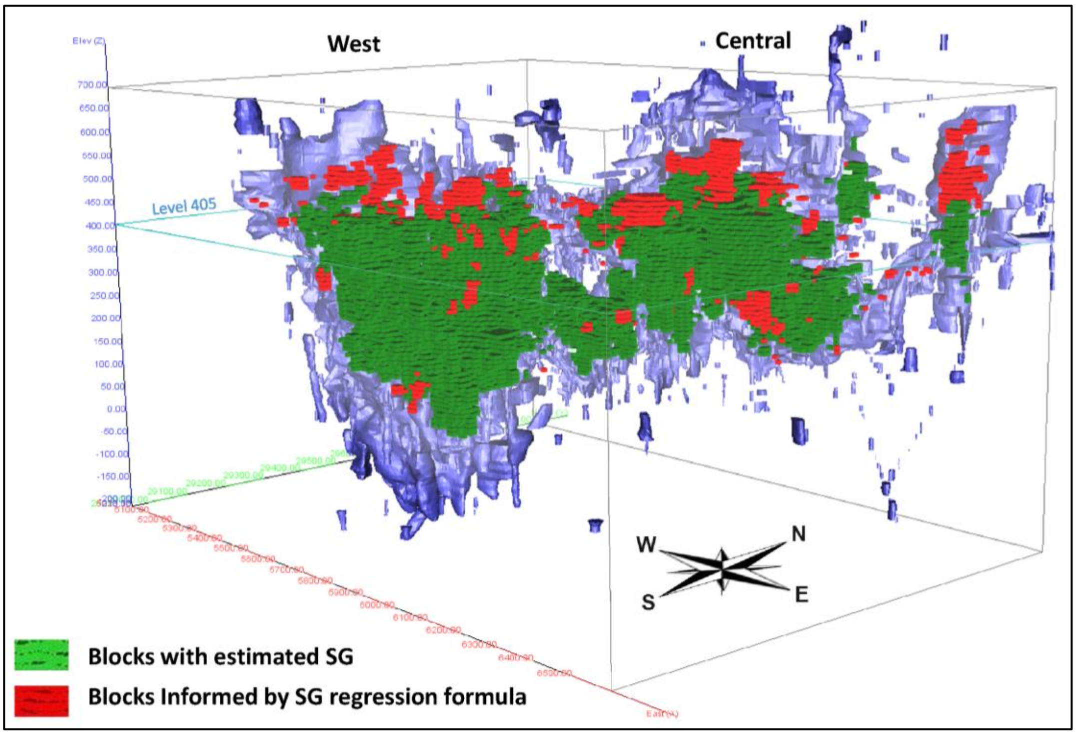


Figure 29: 3D view of Chelopech deposit, representing the distribution of blocks with estimated SG and blocks with applied regression formula in stockwork domains (DPMC, 2019)

Table 30: Search parameters for the estimation of bulk density

Domain	Search pass	Search distance			Minimum Nb data	Maximum Nb data	Maximum samples per hole
		Major	Semi	Minor			
All	1	30	20	10	5	30	10
	2	60	40	20	5	30	10
	3	90	60	30	5	15	15

14.3 Geological Interpretation and Modelling

14.3.1 Summary

Field observations supported by statistical analysis show that the distribution of copper, gold and silver mineralisation at Chelopech is primarily determined by alteration style and textural assemblages.

Mineralisation domains are classified on these geological criteria for which there are two types:

- Silica Envelopes: Lower-grade silica-overprinted haloes

- Stockwork Envelopes: Internal units of stockwork material which typically host higher-grade copper, gold and silver mineralisation.

Silica Envelopes ("SE") are modelled on logged hydrothermal alteration assemblages, typically represented by silica overprinting. Internal waste volumes exist which are interpreted (wireframed) and excluded from grade estimation.

Stockwork Envelopes ("HG") are modelled using a combination of alteration and groups of textural assemblages. These textural groupings differ between mine blocks and are listed in Section 7.5 and Table 6. The high grade Stockwork Envelopes are characterised with massive sulphides, well developed stockwork textures and high-grade copper and gold grades, generally >3 g/t gold equivalent (AuEq) (see Table 42, for AuEq calculation).

The stockwork material is typically located along the south and southeast portions of Silica Envelopes which together generally plunge towards the south and southeast.

Typical cross-section examples of Silica and Stockwork envelopes are illustrated in Figure 30 and Figure 31.

Interpretation of the 3D wireframes was completed by Chelopech geological mine staff using GEMS software. Strings were generated in plan view at 10 m elevations and linked together to form solid wireframe volumes.

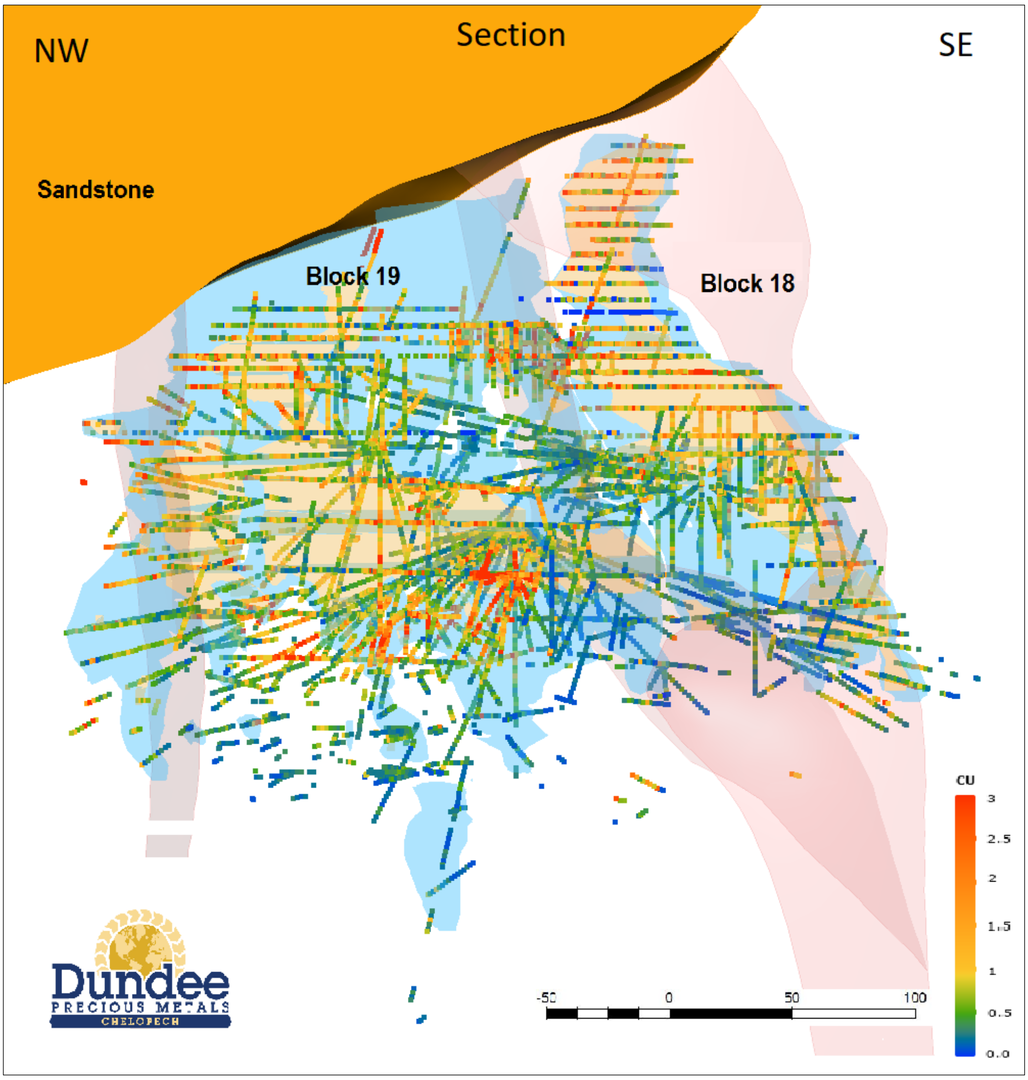


Figure 30: Vertical section (looking northeast) showing drillhole grades, Silica Envelope (blue) and Stockwork Envelope (gold), mining blocks 18 and 19 (DPMC, 2019)

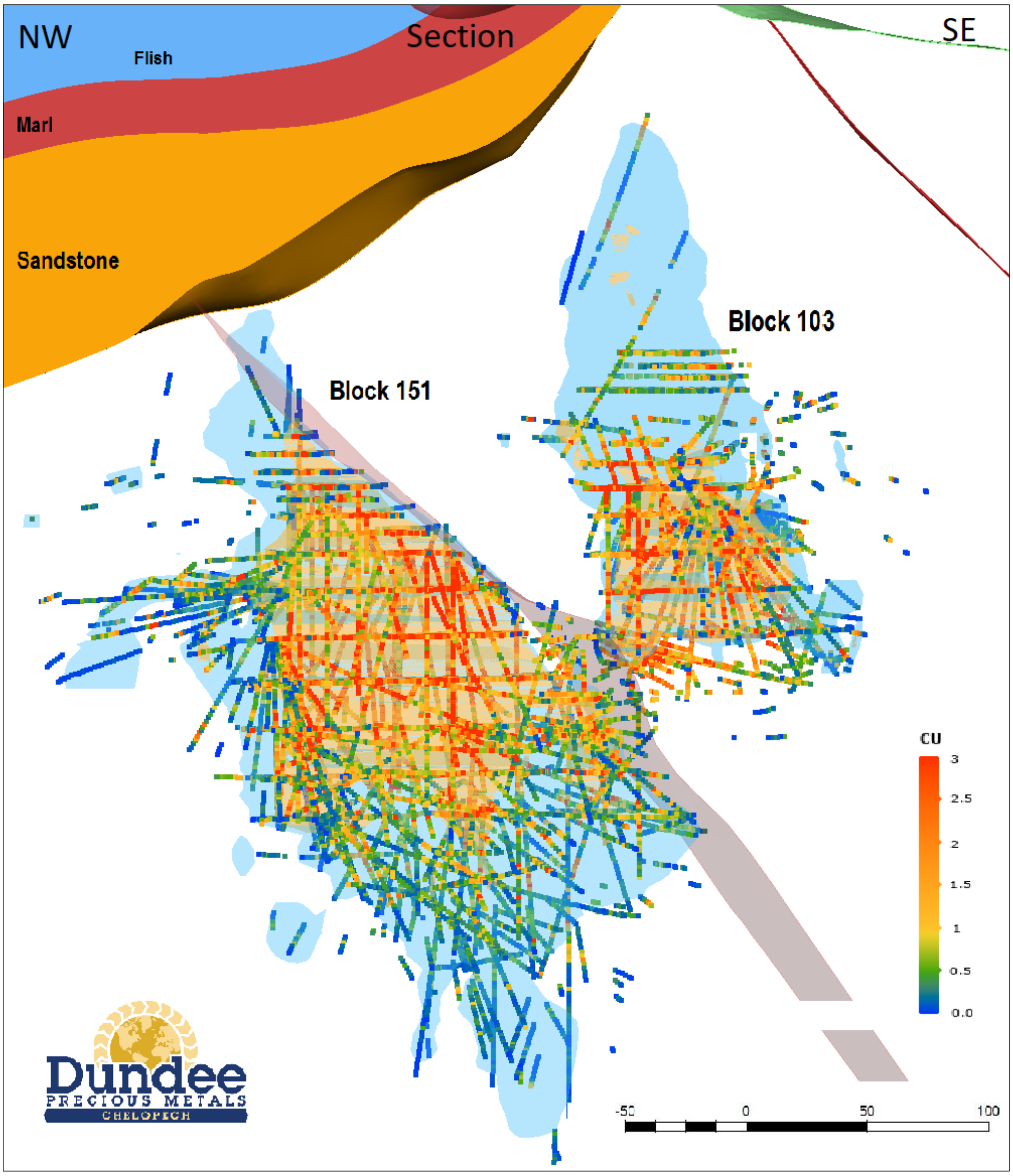


Figure 31: Vertical section (looking northeast) showing drillhole grades, Silica Envelope (blue) and Stockwork Envelope (gold), mining blocks 151 and 103 (DPMC, 2019)

14.3.2 Surface Topography

A 3D digital terrain model (DTM) for Chelopech has been constructed using digitised 5 m contours from a commercially available map which has been supplemented by recent surface survey data. The DTM is reasonably accurate and provides a detailed representation of the ridges, valleys and topographical breaks at Chelopech. The detailed accuracy of the topographic model is immaterial as it is not used in the estimate of resources, since mineralisation occurs well below the surface at the 400 mRL.

14.3.3 Underground Development and Stoping

The Mine Survey Department constructs 3D solids of all the underground development and stoping. These solids have been extensively validated and represent material mined up to 31 December 2019. Some overlap occurs between the digital solids to ensure that all development volumes are accounted for.

14.4 Mineral Resource Modelling

14.4.1 Compositing

A detailed statistical review of the impact of different composite lengths was undertaken for the 2013 MRE update (CSA Global, 2014); the findings of this review (Table 31) are still considered current and relevant and are included here. Based on this review and more recent verification work, no bias was observed when compositing to 1.5 m, 3 m and 6 m lengths. Based on this review, the most appropriate composite length was considered 3 m (which also matches the average face sample panel length). The impact of including residuals was also investigated and no significant bias was observed. Quantile-quantile (Q-Q) plots of 3 m composites with residuals vs composites without residuals are illustrated in Figure 32 and Figure 33.

Compositing was not completed on the face sample database. Development face samples are taken as horizontal panel chips of each development drive advance. Each round is an average of 3 m in length over an area of approximately 20 cm x 20 cm.

For grade estimation, the drillhole database and the face sample database were combined to form a single sample database. All domain statistics, variography and estimation of resources were completed using the combined dataset.

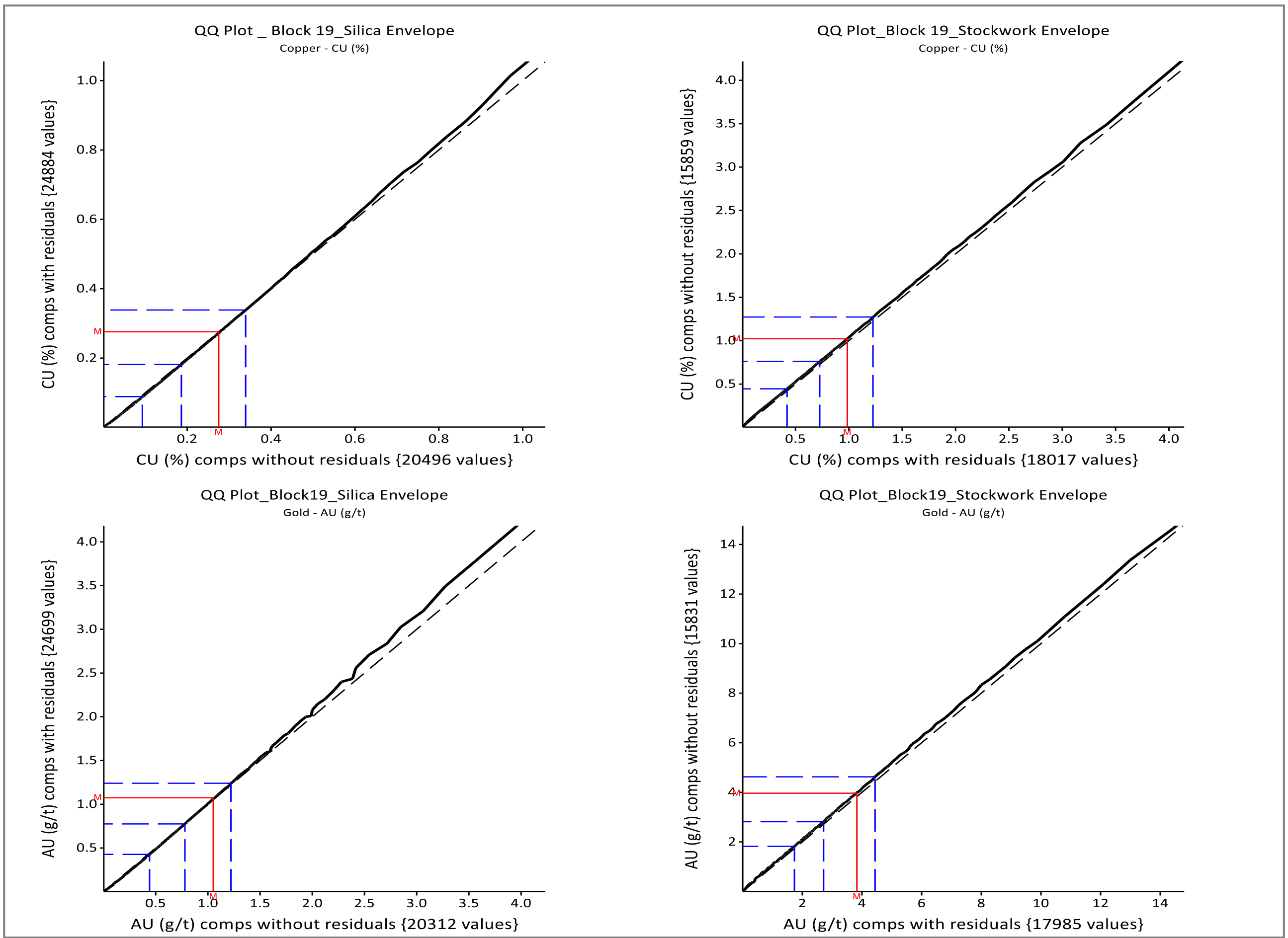


Figure 32: Q-Q plots of composites with residuals vs composites without residuals for Block 19 (DPMC, 2017)

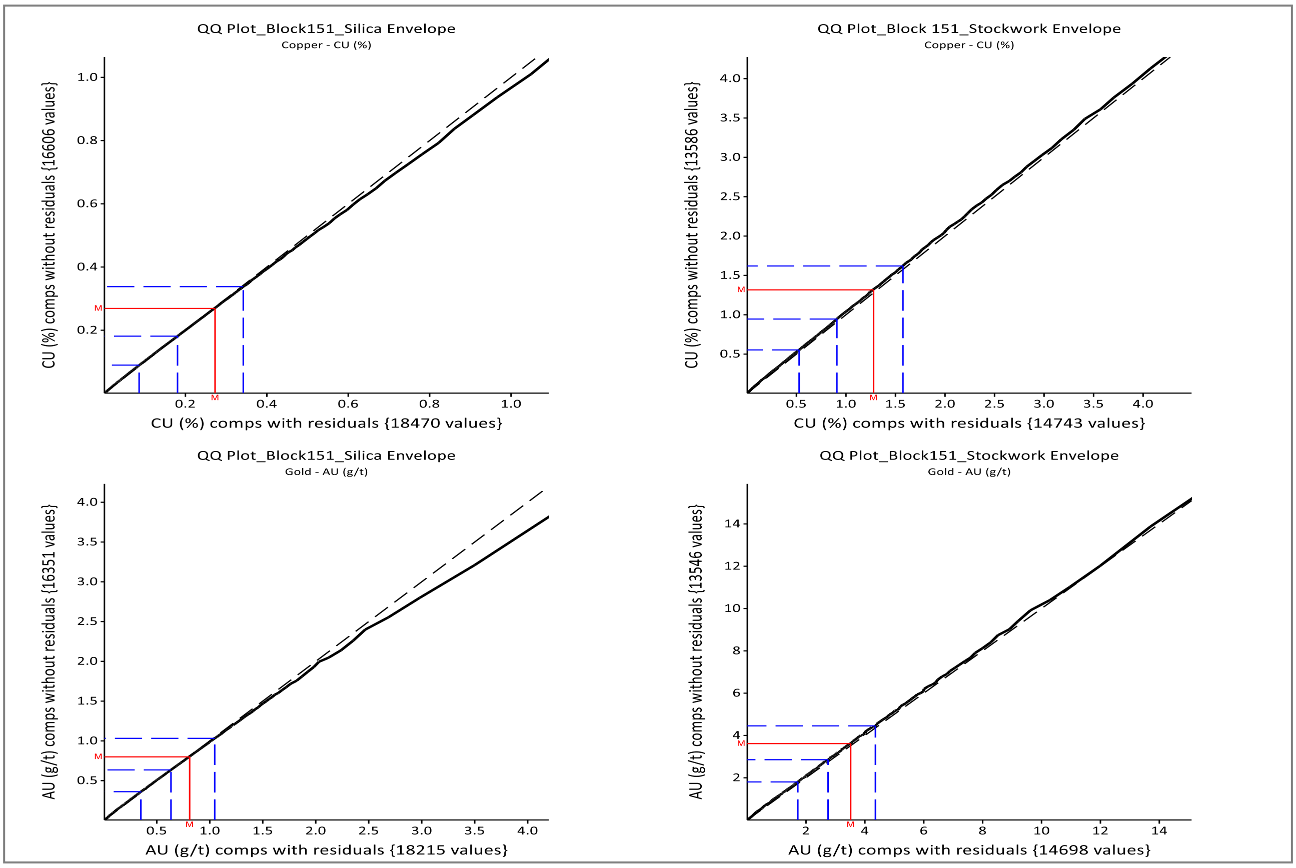


Figure 33: Q-Q plots of composites with residuals vs composites without residuals for Block 151 (DPMC, 2017)

14.4.2 Univariate Domain Descriptive Statistics

Descriptive statistics, histograms and probability plots were compiled for the copper, gold, silver, sulphur and arsenic composite data, grouped by the modelled Silica Envelopes, Stockwork Envelopes and Mining Blocks (Table 32, Table 33 and Figure 34). These were used to assess the grade distributions within each domain and to determine a suitable method for interpolating grades and to select appropriate top cuts.

Most of the assay data in the high-grade domains show moderate to low coefficients of variation, with sulphur showing the lowest of all the elements. Gold summary statistics show moderate to high coefficients of variation.

Statistical analysis of composites flagged within the low-grade regions of each block was also completed with all low-grade blocks showing similar low copper grades and moderate to high coefficients of variation.

Table 31: Summary statistics for drillhole composite data, as of October 2013

Domain	Composite length	Sample	No. of samples	Cu (%)	Au (g/t)	Ag (g/t)
High Grade Envelope	1.5 m	1.5 m	48,662	1.24	4.00	8.70
		Residual	672	1.34	3.58	9.02
		Subtotal	**49,334**	**1.24**	**4.00**	**8.71**
	3.0 m	3.0 m	23,749	1.26	4.03	8.75
		Residual	1,569	0.89	2.91	7.47
		Subtotal	**25,318**	**1.24**	**4.00**	**8.71**
	6.0 m	6.0 m	11,203	1.27	4.07	8.83
		Residual	2,128	0.93	3.17	7.41
		Subtotal	**13,331**	**1.24**	**4.00**	**8.71**
	Total		**87,983**	**1.24**	**4.00**	**8.71**
	RAW Mean (not composited)		*49,746*	*1.24*	*4.08*	*8.82*
Silica Envelope	1.5 m	1.5 m	78,072	0.30	1.00	3.63
		Residual	1,923	0.35	1.15	4.15
		Subtotal	**79,995**	**0.30**	**1.00**	**3.64**
	3.0 m	3.0 m	37,805	0.30	0.99	3.63
		Residual	3,555	0.33	1.15	3.80
		Subtotal	**41,360**	**0.30**	**1.00**	**3.64**
	6.0 m	6.0 m	17,571	0.30	0.97	3.63
		Residual	4,538	0.33	1.22	3.69
		Subtotal	**22,109**	**0.30**	**1.00**	**3.64**
	Total		**143,464**	**0.30**	**1.00**	**3.64**
	RAW Mean (not composited)		***79,898***	***0.30***	***1.01***	***3.67***
GRAND TOTAL	**TOTAL**		**231,447**	**0.66**	**2.15**	**5.58**
	RAW Mean (not composited)		***129,644***	***0.66***	***2.18***	***5.64***

Table 32: Summary sample statistics for the major Stockwork domains

Block	103	150	151	19
Copper (%)				
Count	6,120	8,049	16,197	18,783
Minimum	0.01	0.01	0.01	0.01
Maximum	23.29	20.1	28.91	15.27
Mean	1.14	1.82	1.27	0.98
Standard deviation	1.15	1.79	1.39	0.93
Variance	1.33	3.20	1.93	0.87
Coefficient of variation	1.01	0.98	1.10	0.96
Gold (g/t)				
Count	6,119	8,043	16,185	18,782
Minimum	0.01	0.01	0.01	0.01
Maximum	207.53	67.1	131.4	197.23
Mean	2.83	4.57	3.47	3.80
Standard deviation	4.06	4.94	3.74	4.90
Variance	16.50	24.38	13.96	24.02
Coefficient of variation	1.44	1.08	1.08	1.29
Silver (g/t)				
Count	6,120	8,050	16,181	18,783
Minimum	0.01	0.01	0.01	0.01
Maximum	61.60	584.01	4280.00	468.80
Mean	4.45	12.6	14.11	8.74
Standard deviation	4.16	18.76	57.03	11.72
Variance	17.28	352.07	3252.09	137.39
Coefficient of variation	0.93	1.49	4.04	1.34
Sulphur (%)				
Count	6,119	8,017	16,196	18,783
Minimum	0.16	0.17	0.88	0.01
Maximum	47.03	49.61	52.4	46.01
Mean	13.96	17.37	17.1	11.56
Standard deviation	5.19	7.17	7.19	4.32
Variance	26.96	51.45	51.70	18.65
Coefficient of variation	0.37	0.41	0.42	0.37
Arsenic (%)				
Count	6,120	8,050	15,298	18,783
Minimum	0.01	0.01	0.01	0.01
Maximum	7.76	6.15	8.30	5.20
Mean	0.33	0.43	0.39	0.24
Standard deviation	0.36	0.53	0.41	0.28
Variance	0.13	0.28	0.17	0.08
Coefficient of variation	1.10	1.24	1.05	1.15

Table 33: Summary sample statistics for the major Siliceous domains

Block	103	150	151	19
Copper (%)				
Count	9,396	5,848	22,050	25,905
Minimum	0.01	0.01	0.01	0.01
Maximum	19.62	9.23	18.35	20.15
Mean	0.28	0.32	0.26	0.27
Standard deviation	0.50	0.50	0.39	0.38
Variance	0.25	0.25	0.15	0.15
Coefficient of variation	1.78	1.57	1.49	1.41
Gold (g/t)				
Count	9,366	5,847	22,118	25,970
Minimum	0.01	0.01	0.01	0.01
Maximum	106.29	113.85	23.48	79.20
Mean	0.76	0.91	0.77	1.05
Standard deviation	1.88	2.20	0.79	1.69
Variance	3.54	4.84	0.62	2.87
Coefficient of variation	2.48	2.41	1.02	1.61
Silver (g/t)				
Count	9,423	5,859	22,119	25,973
Minimum	0.01	0.01	0.1	0.01
Maximum	274.99	739.37	3197.73	213.89
Mean	2.39	4.59	4.07	4.30
Standard deviation	5.69	13.35	24.01	6.21
Variance	32.34	178.16	576.50	38.56
Coefficient of variation	2.38	2.91	5.90	1.44
Sulphur (%)				
Count	9,420	5,854	22,129	25,970
Minimum	0.01	0.44	0.01	0.01
Maximum	40.73	44.51	48.74	42.16
Mean	9.28	8.85	9.78	7.95
Standard deviation	3.91	4.24	4.07	2.61
Variance	15.29	17.94	16.55	6.8
Coefficient of variation	0.42	0.48	0.42	0.33
Arsenic (%)				
Count	9,392	5,841	19,761	25,957
Minimum	0.01	0.01	0.01	0.01
Maximum	2.69	3.10	2.94	3.08
Mean	0.06	0.07	0.08	0.06
Standard deviation	0.1	0.13	0.11	0.09
Variance	0.01	0.02	0.01	0.01
Coefficient of variation	1.65	1.92	1.35	1.53

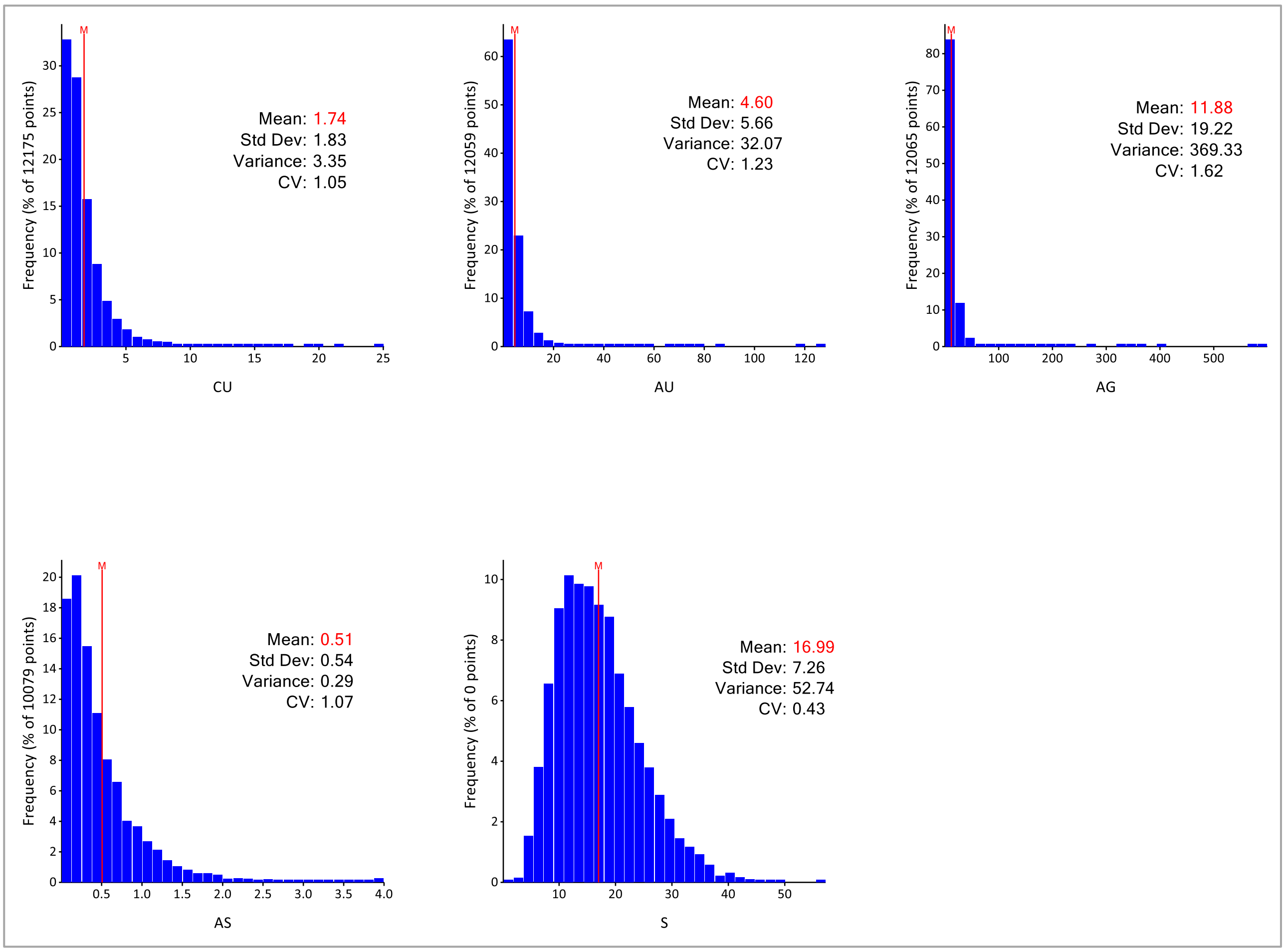


Figure 34: Examples of histograms for the five estimated variables for Stockwork domain Block 150 (DPMC, 2019)

14.4.3 Multivariate Domain Descriptive Statistics

A multivariate analysis of the relationship between copper, gold, arsenic and sulphur was completed in 2012 to test correlation between all elements. The findings of this review are still considered current and relevant and are included here.

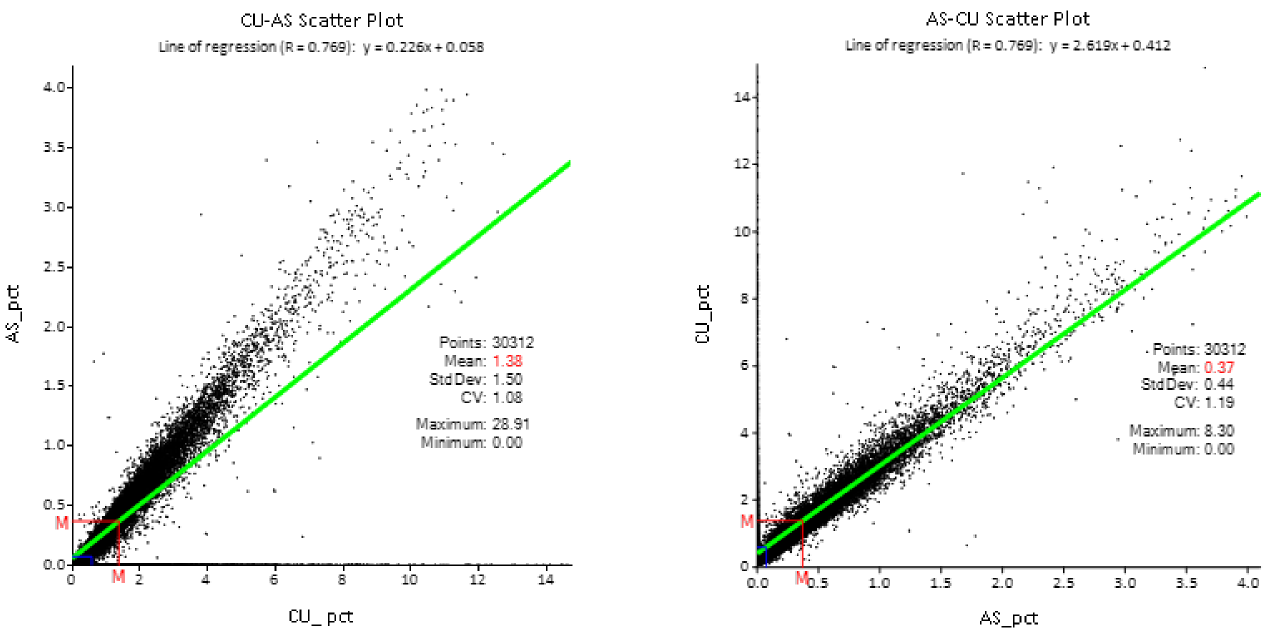
Moderate correlation was noted between copper and gold while strong correlation exists between copper and arsenic and only in high-grade domains. Significant differences in the levels of correlation are noted between the different domains. Gold is understood to have undergone a separate and more pervasive phase of mineral emplacement relative to copper.

The linear correlation coefficients (Pearson correlation coefficients) for copper-arsenic are generally 0.70. An example of a correlation matrix for Stockwork Domain 103 is presented in Table 34 and correlation plots for copper vs arsenic are illustrated in Figure 35 and Figure 36.

Table 34: Stockwork Domain 103 – correlation matrix displaying Pearson correlation coefficients

	Copper	Gold	Silver	Sulphur
Gold	0.32			
Silver	0.40	0.28		
Sulphur	0.34	0.28	0.39	
Arsenic	0.84	0.31	0.34	0.30

Correlation Plots : Cu v As - Western Blocks
Scatter Plots
Stockwork Domains

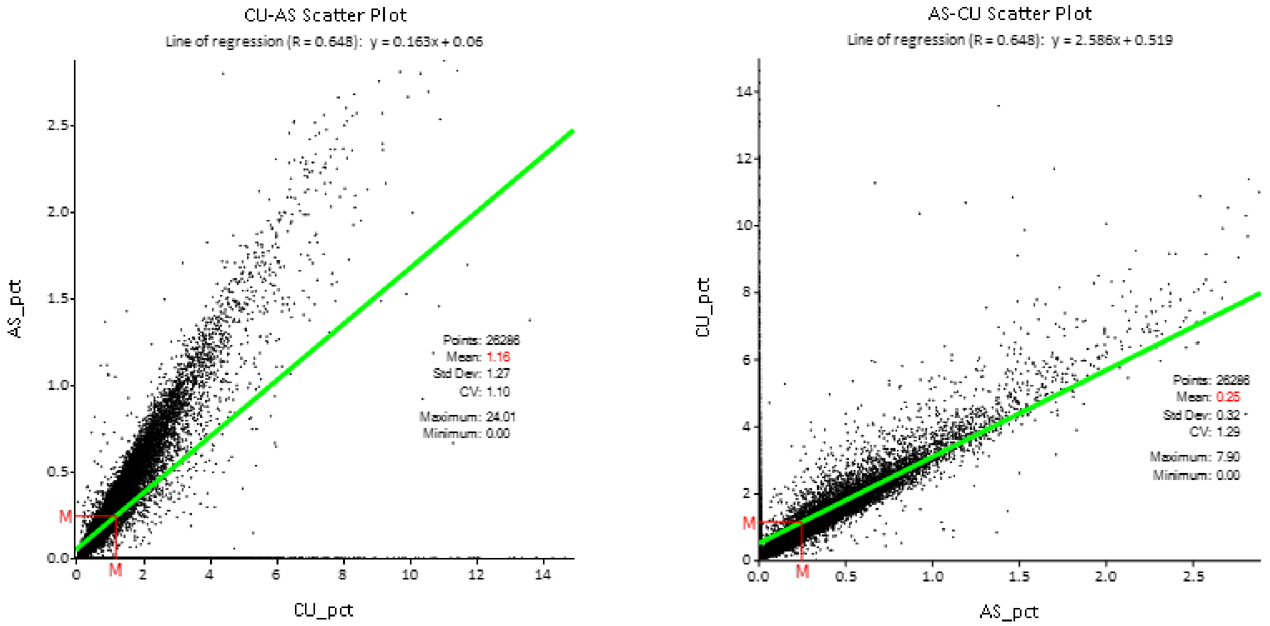


Correlations :

	CU	AU	AG	AS	S
CU	1.00				
AU	0.39	1.00			
AG	0.36	0.23	1.00		
AS	0.77	0.38	0.25	1.00	
S	0.40	0.36	0.47	0.31	1.00

Figure 35: Copper-arsenic correlation plots for Stockwork Western domains (DPMC, 2017)

Correlation Plots : Cu v As - Central Blocks
Scatter Plots
Stockwork Domains



Correlations :

	CU	AU	AG	AS	S
CU	1.00				
AU	0.52	1.00			
AG	0.39	0.37	1.00		
AS	0.65	0.36	0.23	1.00	
S	0.49	0.46	0.42	0.37	1.00

Figure 36: Copper-arsenic correlation plots for Stockwork Central domains (DPMC, 2017)

14.4.4 Application of Top Cuts

Copper and gold grades distributions for the various estimation domains are characterised by being positively skewed with moderate to high coefficients of variation, indicating that high-grade values may contribute significantly to local mean grades. No top cut was required for sulphur due to an absence of outliers in the population.

Appropriate copper and gold top cuts were obtained by reviewing probability plots and the impact of applied cuts to the mean grades and standard deviation. Top cuts were chosen where there was a pronounced inflection of the distribution or an increase in the variance of the data.

A summary of the more significant high-grade top cuts as applied to individual domains is presented in Table 35.

Table 35: Top cuts used for copper, gold, silver and arsenic for the largest domains of Resource model

Block	Element	Sub-domain	Number (data)	Mean	Upper cut	Cut mean	Number (data cut)	% Change in mean
103	Cu	HG	6,120	1.14	5.6	1.14	48	0
		SE	9,396	0.31	2.6	0.30	44	-7
103	Au	HG	6,119	2.83	16	2.83	48	0
		SE	9,366	0.76	6	0.75	47	1
103	Ag	HG	6,120	4.45	40	4.44	5	0
		SE	9,423	2.39	17	2.20	69	8
103	As	HG	6,120	0.33	2	0.32	30	3
		SE	9,392	0.06	0.4	0.06	111	0
150	Cu	HG	8,049	1.82	14	1.82	11	0
		SE	5,848	0.32	4	0.31	15	3
150	Au	HG	8,043	4.57	31	4.51	46	1
		SE	5,847	0.91	12	0.86	12	5
150	Ag	HG	8,050	12.60	87	12.12	59	4
		SE	5,859	4.59	70	4.29	23	7
150	As	HG	8,050	0.43	4	0.43	11	0
		SE	5,841	0.07	0.9	0.07	25	0
151	Cu	HG	16,197	1.27	5.6	1.22	217	4
		SE	22,050	0.26	2	0.25	105	4
151	Au	HG	16,185	3.47	14	3.35	154	3
		SE	22,118	0.77	6	0.76	58	1
151	Ag	HG	16,181	14.11	99	12.76	106	10
		SE	22,119	4.07	25	3.51	234	14
151	As	HG	15,298	0.39	2	0.38	140	3
		SE	19,761	0.08	0.6	0.08	104	0
19	Cu	HG	18,783	0.98	7	0.97	50	1
		SE	25,905	0.27	3	0.27	51	0
19	Au	HG	18,782	3.80	25	3.70	108	3
		SE	25,970	1.05	10	1.02	87	3
19	Ag	HG	18,783	8.74	73	8.54	94	1
		SE	25,973	4.30	40	4.20	111	1
19	As	HG	18,783	0.24	1.7	0.24	79	0
		SE	25,957	0.06	0.6	0.06	90	0

14.4.5 Impact of Data Clustering

Visual inspection of the face sampling, underground mineral resource drilling and surface drilling datasets shows clear clustering of data, biased towards higher-grade regions of the mineral deposit. This is due to a high density of face sampling within the high-grade portions of the resource currently targeted for mining. Declustering was completed to review its effect prior to mineral resource estimation.

Cell declustering was completed with weights determined as 1/n, with “n” representing the number of data in each cell. The mean grades of the naive (cut) composites and the declustered (cut) composites have been compared (Table 36). As expected, the declustered mean grades tend to be lower than the un-declustered mean grades.

Table 36: Comparison of raw and declustered mean grades by domains

Block	Sub-domain	Declustered cell dimensions	Mean	Cut mean	Declustered cut mean	Difference
Copper %						
103	HG	25 x 25 x 20	1.14	1.14	1.12	-2%
	SE	25 x 25 x 20	0.31	0.30	0.27	-4%
150	HG	25 x 25 x 20	1.82	1.82	1.61	-12%
	SE	25 x 25 x 20	0.32	0.31	0.35	9%
151	HG	25 x 25 x 20	1.27	1.22	1.15	-9%
	SE	25 x 25 x 20	0.26	0.25	0.24	-8%
19	HG	20 x 20 x 20	0.98	0.97	0.94	-4%
	SE	20 x 20 x 20	0.27	0.27	0.26	-4%
Gold (g/t)						
103	HG	25 x 25 x 20	2.83	2.83	2.68	-5%
	SE	25 x 25 x 20	0.76	0.75	0.71	-7%
150	HG	25 x 25 x 20	4.57	4.51	4.14	-9%
	SE	25 x 25 x 20	0.91	0.86	0.99	9%
151	HG	25 x 25 x 20	3.47	3.35	3.01	-13%
	SE	25 x 25 x 20	0.77	0.76	0.71	-8%
19	HG	20 x 20 x 20	3.80	3.70	3.45	-9%
	SE	20 x 20 x 20	1.05	1.02	0.94	-10%
Silver (g/t)						
103	HG	25 x 25 x 20	4.45	4.44	4.85	9%
	SE	25 x 25 x 20	2.39	2.20	2.47	3%
150	HG	25 x 25 x 20	12.60	12.12	12.12	-4%
	SE	25 x 25 x 20	4.59	4.29	4.72	3%
151	HG	25 x 25 x 20	14.11	12.76	11.70	-17%
	SE	25 x 25 x 20	4.07	3.51	3.66	-10%
19	HG	20 x 20 x 20	8.74	8.54	9.00	3%
	SE	20 x 20 x 20	4.30	4.20	4.18	-3%

14.4.6 Variography Study

Summary

A detailed review of the copper, gold, silver, arsenic and sulphur variography was undertaken in Supervisor software in preparation for grade estimation. This was undertaken on the 3 m, uncut, assay dataset (with drillhole data composited to 3 m) within individual Silica Envelope ("SE") domains which encapsulate the Stockwork ("HG") domains.

The variography was used to describe the spatial correlation (co-variance) between data points within mineralisation domains for a nominated separation distance (lag). All data points within the zone are compared at nominated lag distances with the average squared difference of the two sample points obtained. The averaged squared difference of the data point's gamma (Y-axis) for each lag distance (X-axis) is plotted. This calculated graph is called an experimental semi-variogram, hereby referred to as the variogram.

Fitted to the variogram is a mathematical model which, when used in the ordinary kriging algorithm, will re-create the observed spatial continuity described in the variogram.

Modelling

A standard approach was used model the variograms for each envelope. The steps taken are summarised below:

- Variograms were generated to determine the major, semi-major and minor axes of continuity which are perpendicular to each other
- The variogram in the downhole direction is modelled to determine the nugget to determine the close-spaced variability
- The major, semi-major and minor axes of continuity are modelled using two or occasionally three spherical structures.

In summary:

- The modelled orientations were consistent with the geological understanding of the mineralisation
- A low nugget effect and a dominant first structure were the key features of the models
- The variogram model parameters for the major stockwork domains are presented in Table 37 to Table 40.

Table 37: Variogram parameters – Block 150 Stockwork domain

Element	C0	C1	Rotation			Range			C2	Range		
			Z Rot.	Y Rot.	Z Rot.	Major	Semi	Minor		Major	Semi	Minor
Copper	0.22	0.46	140	-70	10	22	19	17	0.32	109	68	31
Gold	0.24	0.45	140	-70	10	38	23	19	0.31	117	74	38
Silver	0.27	0.48	140	-70	10	30	28	21	0.29	118	83	38
Sulphur	0.11	0.50	140	-70	10	30	24	20	0.39	112	76	37
Arsenic	0.14	0.55	140	-70	10	33	24	16	0.31	103	57	29

Table 38: Variogram parameters – Block 103 Stockwork domain

Element	C0	C1	Rotation			Range			C2	Range		
			Z Rot.	Y Rot.	Z Rot.	Major	Semi	Minor		Major	Semi	Minor
Copper	0.27	0.43	-110	-80	-30	25	19	15	0.30	66	51	24
Gold	0.23	0.46	-110	-80	-30	19	13	8	0.31	58	43	20
Silver	0.21	0.45	-110	-80	-30	18	13	7	0.35	56	43	24
Sulphur	0.22	0.33	-110	-80	-30	18	13	6	0.45	50	38	21
Arsenic	0.23	0.45	-110	-80	-30	28	19	7	0.32	59	40	18

Table 39: Variogram parameters – Block 19 Stockwork domain

Element	C0	C1	Rotation			Range			C2	Range		
			Z Rot.	Y Rot.	Z Rot.	Major	Semi	Minor		Major	Semi	Minor
Copper	0.25	0.44	60	60	-50	16	13	10	0.3	67	39	28
Gold	0.46	0.37	60	60	-50	17	12	7	0.17	66	45	29
Silver	0.36	0.35	60	60	-50	14	12	9	0.29	76	57	39
Sulphur	0.23	0.4	60	60	-50	24	19	15	0.37	75	57	49
Arsenic	0.18	0.42	60	60	-50	18	13	13	0.39	73	53	40

Table 40: Variogram parameters – Block 151 Stockwork domain

Element	C0	C1	Rotation			Range			C2	Range		
			Z Rot.	Y Rot.	Z Rot.	Major	Semi	Minor		Major	Semi	Minor
Copper	0.29	0.49	-130	80	-170	22	15	12	0.22	81	61	45
Gold	0.36	0.47	-130	80	-170	23	19	16	0.16	83	66	47
Silver	0.26	0.47	-130	80	-170	37	30	21	0.27	80	70	54
Sulphur	0.12	0.52	-130	80	-170	27	26	16	0.36	93	54	36
Arsenic	0.24	0.54	-130	80	-170	21	15	10	0.23	63	50	38

14.5 Block Modelling

14.5.1 Block Model Extents and Block Size

Prior to estimation a volume block model was constructed using the Geovia mine planning software package (“GEMS”). Kriging Neighbourhood Analysis (KNA) was performed to determine optimal block sizes. Figure 37 highlights a test block area where KNA was completed to determine an optimum block size.

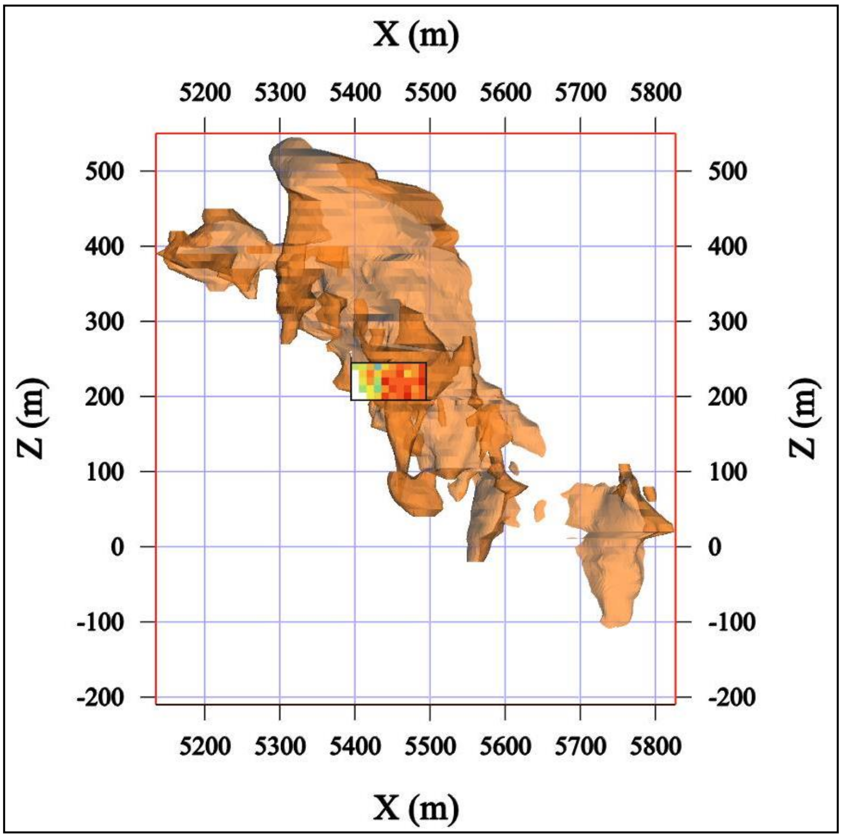


Figure 37: QKNA in 151 Block (DPMC)

Figure 38 shows the results of the block size quantitative KNA analysis where block sizes ranging from 5 m x 5 m x 5 m to 20 m x 20 m x 20 m were tested. The following statistics were reported during the review:

- The slope of the regression of the “true” block grade and the “estimated” block grade
- The weight of the mean – which reflects local variability
- The distribution of the kriging weights, including the proportion of the negative weights
- Kriging efficiency.

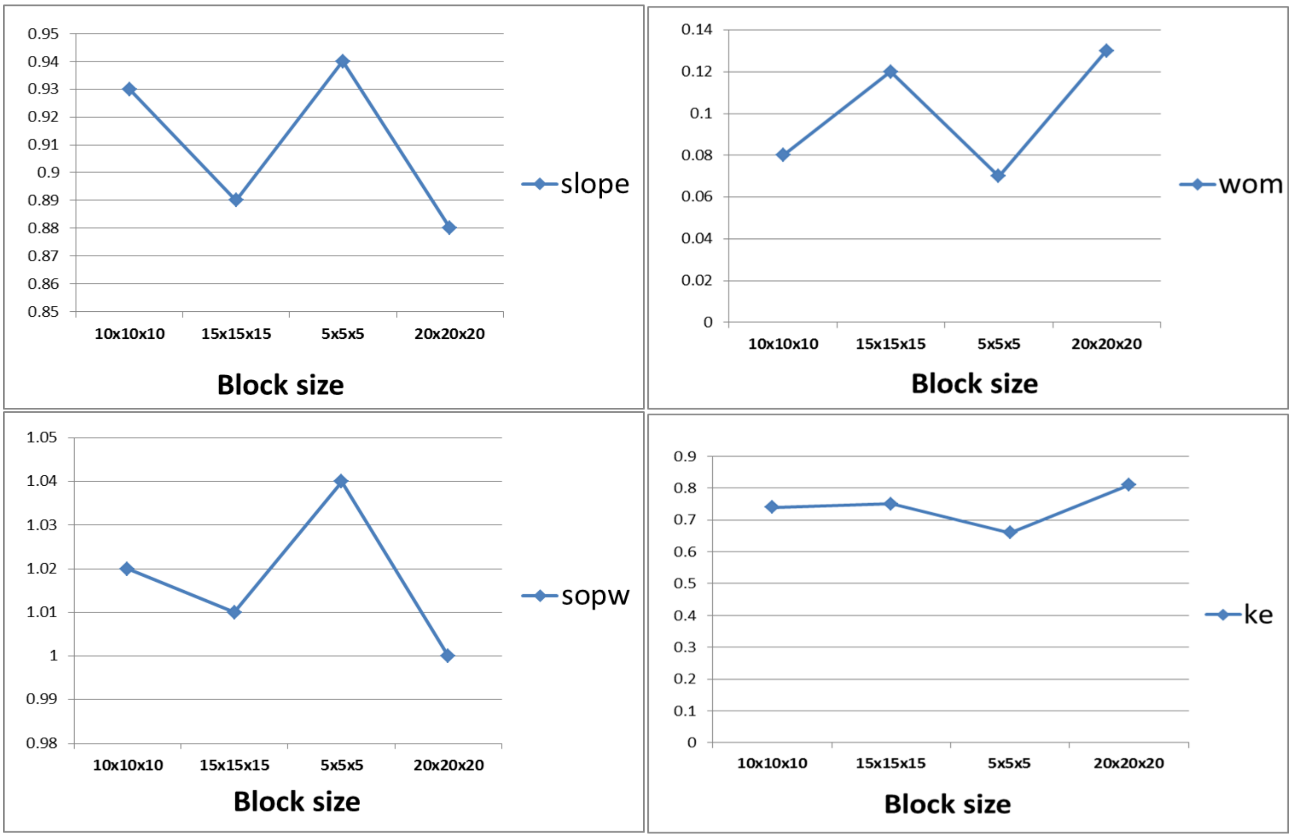


Figure 38: Quantitative KNA results for block size (DPMC)

The block size of 5 mE x 5 mN x 5 mZ was found to achieve the good results in terms of the chosen criteria; however, a parent cell block dimension of 10 mE x 10 mN x 10 mZ was chosen as a compromise between drilling and face sampling data spacing and the spatial requirements of mine planning for underground development and production.

14.5.2 Block Model Attributes

The volume block model was coded by stockwork and siliceous domain using the geological and structural wireframes. Final block volumes were validated against the wireframe volumes.

The dimensions and extents of the block model and are summarised in Table 41. Figure 39 shows the outline of the complete block model for the Chelopech MRE area.

Table 41: Coordinate and dimensions for the volume block model

	Minimum (m)	Maximum (m)	Extent (m)	Block size
Easting	4,770	7,160	2,390	10
Northing	28,900	30,550	1,650	10
Elevation	-370	830	1,200	10

A list of block model attributes is presented in Table 42.

Table 42: Block model attributes

Attribute	Description
Rock Type	Mineralisation block number suffix with 1 for HG and 2 for SE
Density	Estimated in situ dry bulk density
Percent	Percent of block containing HG or SE volume
CU	Estimated copper value in percent
AU	Estimated gold value in ppm
AG	Estimate silver value in ppm
AS	Estimated arsenic value in percent
S	Estimated sulphur value in percent
AUEQ	AuEq=2.06*Cu% +Au g/t
BV	Block variance
PROFIT3_T	Profit per tonne and cut-off grade parameter
KE	Kriging efficiency
KV	Kriging variance
MEANDIST	Mean distance of samples used
MEANVAL	Mean value of samples used
NNEGATW	Number of kriging negative weights
NUMHOLES	Number of drillholes used
NUMPOINT	Number of sample points used
SLOPE	Kriging slope of regression between estimated and true grades
SPASS	Estimation search pass - 1 = first search pass; 2=second search pass; 3=third search

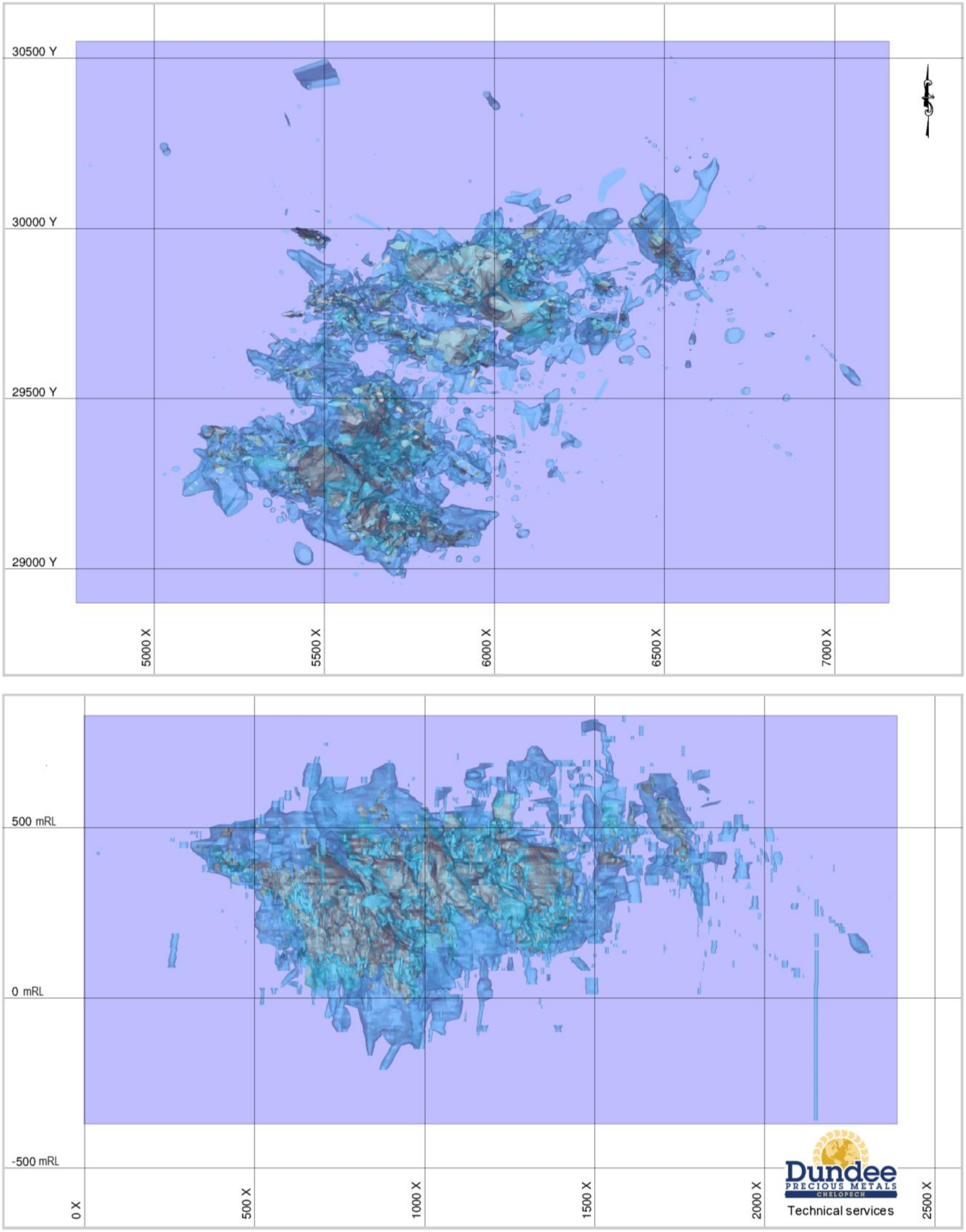


Figure 39: Plan view (top) and vertical section, looking north (bottom) of block model extents for Chelopech MRE area (DPMC, 2019)

Note: Shaded blue area shows outline of the model area and the data extents used for this MRE.

14.6 Grade Estimation

Estimation of the copper, gold, silver, arsenic and sulphur grades was completed using ordinary kriging, using the GEMS implementation of the GSLIB ordinary kriging algorithm.

14.6.1 Summary

Ordinary kriging is described as the best linear unbiased estimator (BLUE), which applies the modelled variogram to produce a minimum error-variance estimate. This is based on a linear weighting of the sample data within a defined sample search neighbourhood. The algorithm requires the sum of the weights applied to the sample data to equal one, thus allowing the mean grade to vary as the search neighbourhood is moved to each new location but using a constant covariance model (the variogram) to determine the sample weights.

Discretisation allows for the kriging of grades into blocks using point to block covariance values, to produce a block estimate. The discretisation matrix reproduces the theoretical global block variance based on the variogram model. This is achieved by increasing the number of discretisation points and changing their configuration until the block variance stabilises.

Estimation variance, which represents the minimised error variance on which the kriging weights are based, is a measure of the deviation of the estimated block variance from the theoretical block variance. The estimation variance depends on the block size, spatial configuration of the sample data used and the variogram model, but not the actual sample data values.

14.6.2 Estimation Parameters

Optimum sample search parameters were determined through a process of KNA completed to investigate kriging efficiency and slope of regression. In addition to this, results from the variography review and known data spacing support the selection of search parameters chosen. The sample search parameters used are presented in Table 43.

Kriging was estimated into parent blocks, discretised into 3 m x 3 m x 3 m (X, Y, Z) parts.

During estimation, kriging and search statistics were copied to the estimated blocks to assist with validation and classification of the estimate. These parameters included:

- Number of samples informing a block’s estimate
- Average distance of samples informing a block’s estimate
- The estimation pass each block was estimated in
- The kriging variance.

Table 43: Ordinary kriging sample search parameters

Domain	Search pass	Search distance			Minimum Nb data	Maximum Nb data	Maximum samples per hole
		Major	Semi	Minor			
All geology domains, except 103, 149, 147, 145, 5	1	30	15	10	12	24	4
	2	60	30	20	8	24	4
	3	120	60	40	4	24	4
103	1	40	20	15	12	24	4
	2	80	40	30	8	24	4
	3	160	80	60	4	24	4
149 SE	1	30	25	10	12	24	4
	2	60	50	20	8	24	4
	3	120	100	40	4	24	4
149 HG	1	30	25	10	10	20	4
	2	60	50	20	6	20	4
	3	120	100	40	2	20	4
147	1	30	20	15	12	24	12
	2	60	40	30	8	24	8
	3	120	80	60	4	24	4
145	1	40	40	15	12	24	4
	2	80	80	30	8	24	4
	3	160	160	60	4	24	4
5	1	30	30	15	12	24	12
	2	60	60	30	8	24	8
	3	120	120	60	4	24	4
SG	1	30	20	10	5	30	10
	2	60	40	20	5	30	10
	3	90	60	30	5	15	15

14.7 Block Model Validation

The estimate was validated by comparing input composites vs output grades. This was completed:

- At a local scale, by comparing (on section) sample grades against neighbouring block grades (see Figure 40 and Figure 41).
- At a semi-local scale; by generating swath plots at Bench, Easting and Northing increments. Swath plots compare total model tonnes vs total composite metres and average model grades vs average composite grades, at even increments (swaths) across the resource (Figure 42 and Figure 43).
- At a global scale; by comparing mean grades of the estimated model against the declustered and top cut assay input data.
- By reviewing mining reconciliation data (detailed in Section 16.7) in key production areas to compare modelled vs mined grades and tonnes. The reconciliation work completed by DPM shows a good correlation between mill production, Mineral Reserves and Mineral Resources. Table 44 presents the MRE (before dilution) compared mine production estimates. As expected, the MRE tonnes are slightly lower with higher grades than the production data.

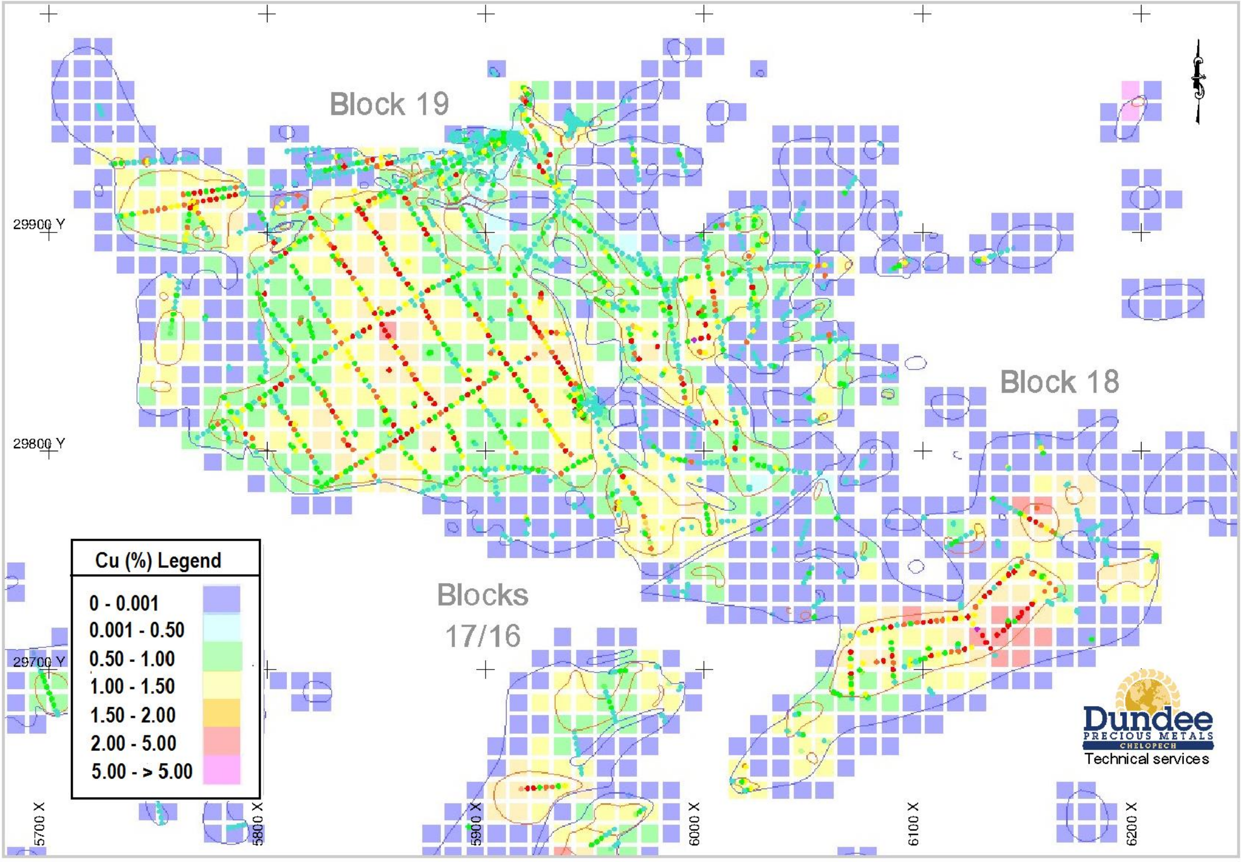


Figure 40: Central area, plan view at 350 mRL, comparing assay vs block Cu grades (DPMC, 2019)

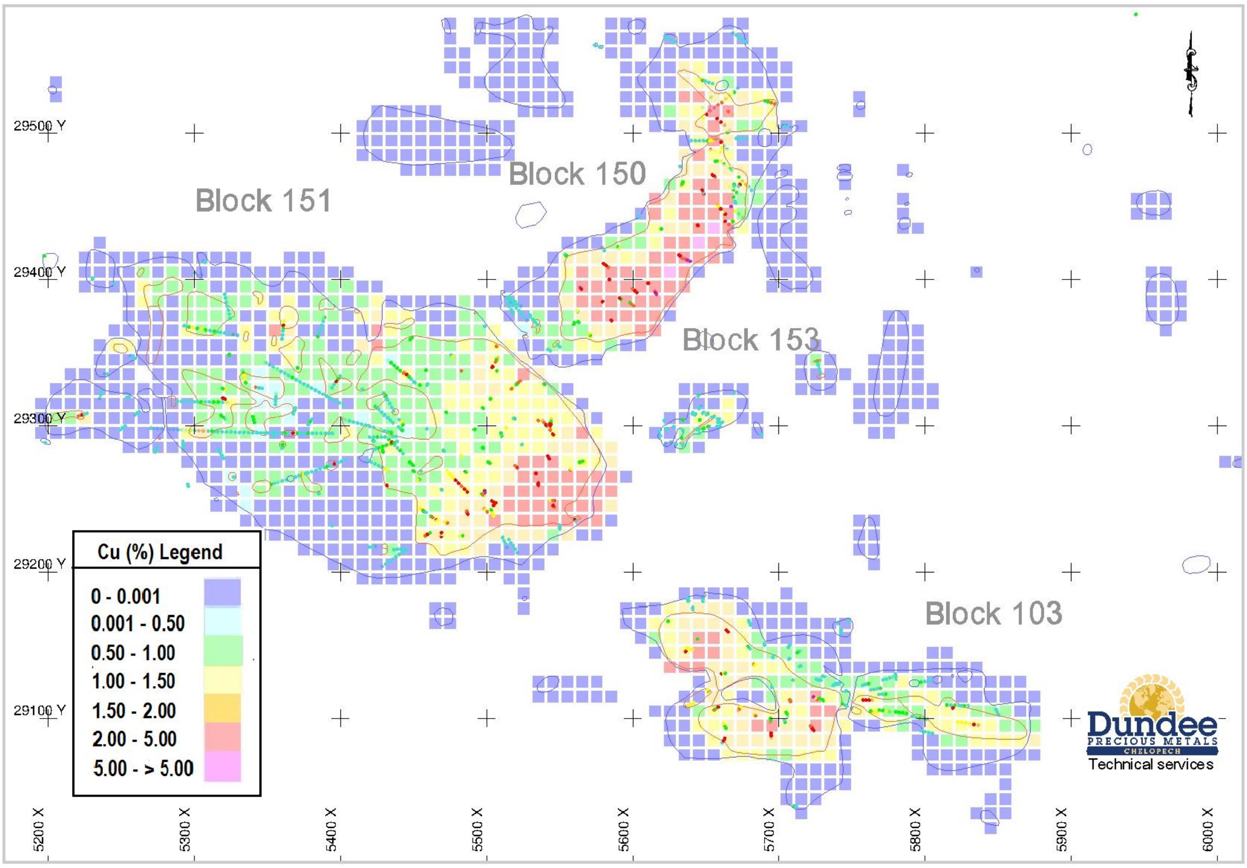


Figure 41: Western area, plan view at 260 mRL, comparing assay vs block Cu grades (DPMC, 2019)

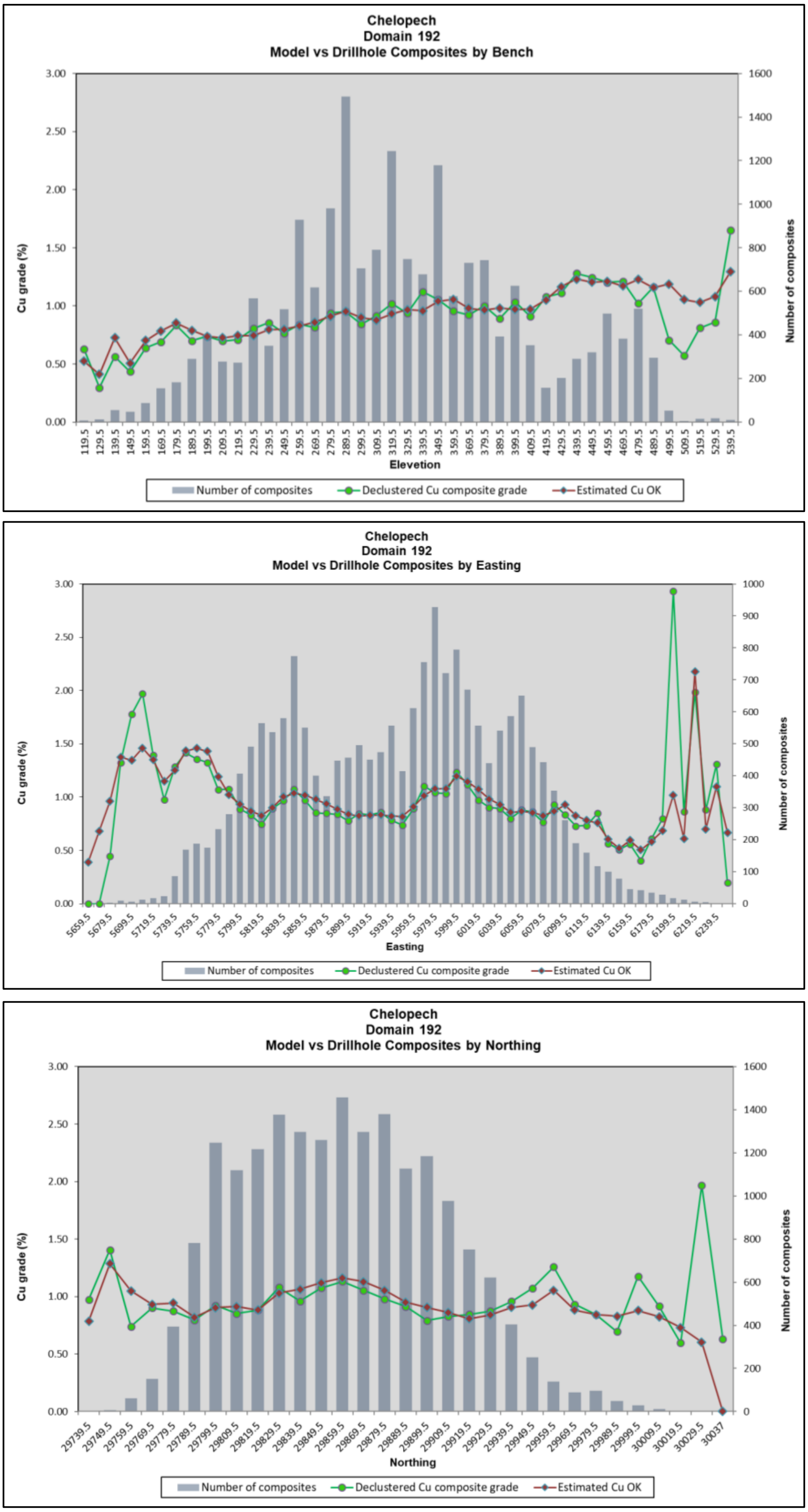


Figure 42: Bench, Easting and Northing swath plots – Central area (DPMC, 2019)

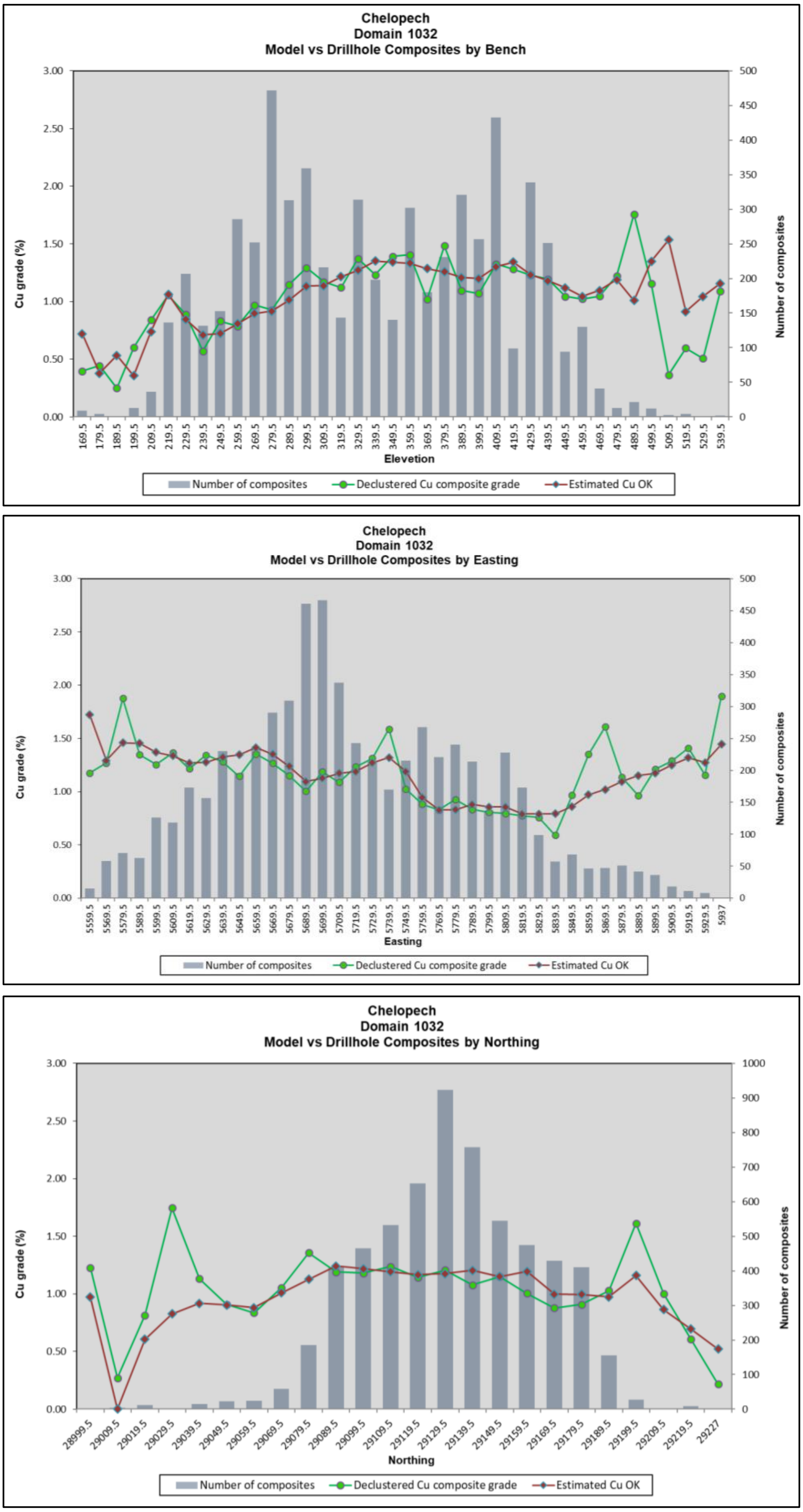


Figure 43: Bench, Easting and Northing swath plots – Western area (DPMC, 2019)

Table 44: MRE compared to 2019 production

31 December 2019	Resource model 31 December 2019						Actual Mined					
Blocks	Tonnage	Cu %	Au g/t	Ag g/t	As %	S %	Tonnage	Cu %	Au g/t	Ag g/t	As %	S %
Block 19	488,799	0.78	3.15	5.90	0.23	10.90	522,923	0.71	2.96	5.48	0.22	10.40
Block 103	450,749	0.94	3.13	3.38	0.31	12.58	490,849	0.85	3.04	3.22	0.26	11.91
Block 149	57,224	2.26	13.78	15.22	0.67	21.35	60,400	2.14	12.45	14.92	0.57	21.65
Block 150	177,596	1.55	4.33	7.79	0.47	16.63	179,889	1.41	4.16	7.41	0.39	15.91
Block 151	815,035	1.12	3.20	8.54	0.37	16.85	845,707	0.98	3.04	7.70	0.31	14.90
Total	**1,989,401**	**1.07**	**3.58**	**6.85**	**0.34**	**14.53**	**2,099,768**	**0.95**	**3.39**	**6.28**	**0.29**	**13.36**
% Resource model Dec 19 Tonnes							-6%					
% Resource model Dec 19 Cu								11%				
% Resource model Dec 19 Au									5%			
% Resource model Dec 19 Ag										8%		
% Resource model Dec 19 As											14%	
% Resource model Dec 19 S												8%

14.8 Mineral Resource Reporting

14.8.1 Resource Classification

Classification of the MRE was based on the May 2014 Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards on Mineral Resources and Mineral Reserve standards defined in NI 43-101. Classification of the MRE was based on the following criteria:

1. Geological knowledge and reliability of interpretation.
2. QAQC and database verification.
3. Sample support and drill density.
4. Grade continuity and variography.
5. Ordinary kriging statistics.
6. Validation of the estimation of in-situ grades for copper, gold, silver, arsenic and sulphur.
7. Validation of the tonnage factors derived from estimation of the in-situ dry bulk density.

Interpolation classification of the MRE was based on interpreted volumes which enclose those areas of the MRE that honour the following criteria:

- Measured Mineral Resources:
  - Blocks estimated within the first estimation search pass
  - A kriged slope of regression of >= 0.85
  - For Block 19 Central area only, an additional requirement of kriging efficiency of >=75% was used.
- Indicated Mineral Resources:
  - Blocks estimated within the first or second estimation search pass
  - A kriged slope of regression of >= 0.70
  - Regions with good geological understanding and a drill spacing of <40 m, which roughly equates to the range of continuity describing 70% of the sample variance.
- Inferred Mineral Resources:
  - Blocks estimated within the third estimation search pass
  - Slope of regression < 0.70%
  - Extensions of known mineralisation which have reasonable sample support to infer grade and geological continuity but require additional drilling or sampling to verify that inferred continuity.

Figure 44 and Figure 45 present views of the classified MRE.

The classification codes assigned to the block model were:

- Measured Mineral Resources: RESCLASS = 1
- Indicated Mineral Resources: RESCLASS = 2
- Inferred Mineral Resources: RESCLASS = 3

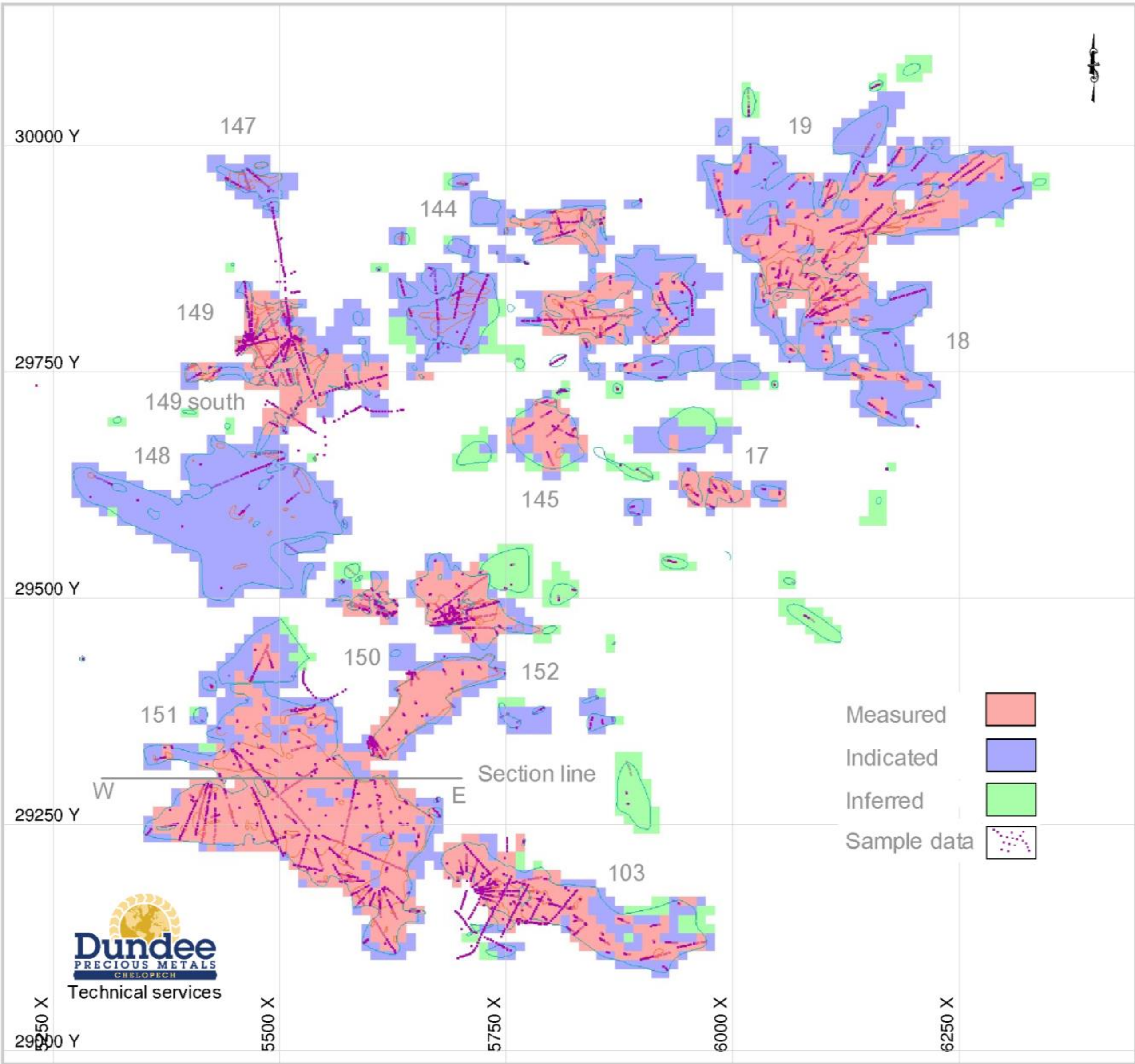


Figure 44: Plan view of classified model for Chelopech deposit, at level 220 showed by RESCLASS with supporting samples (DPMC, 2019)

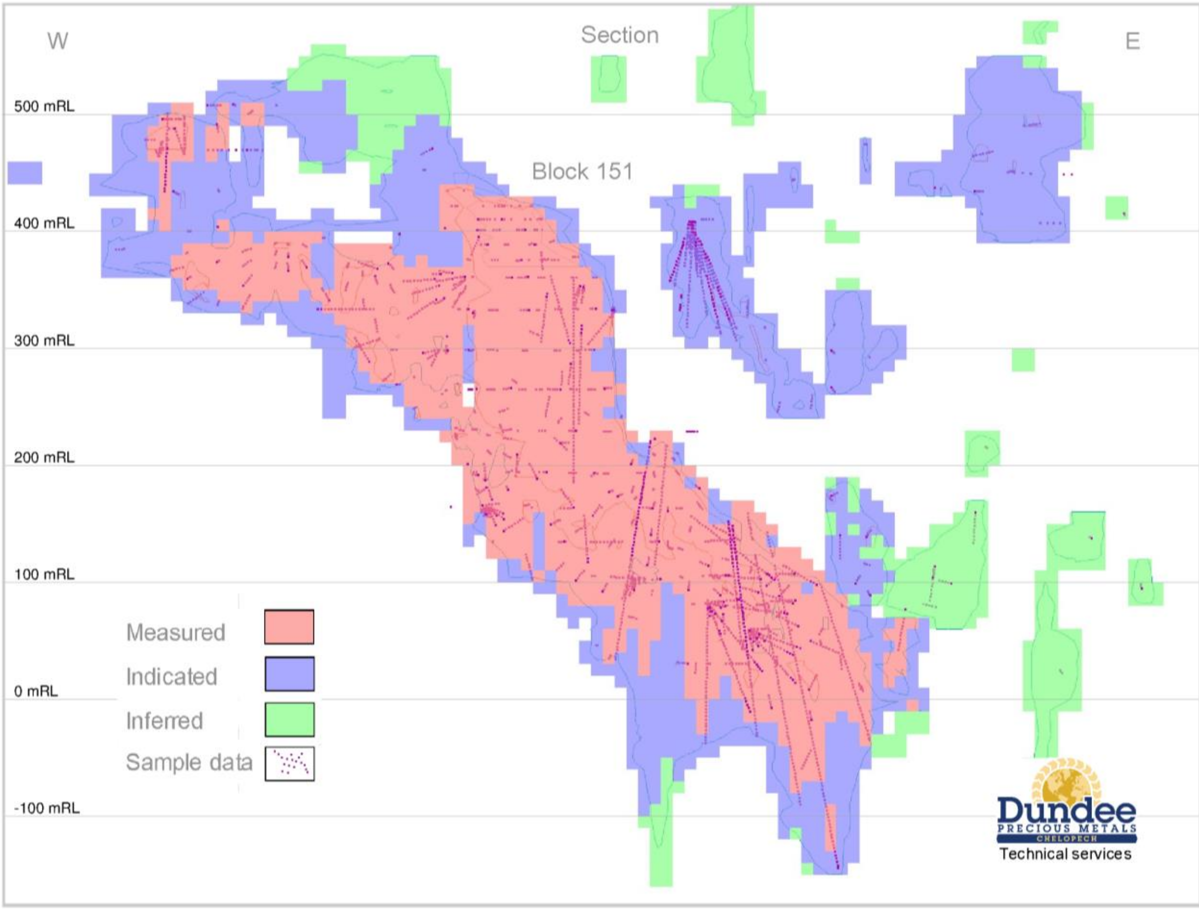


Figure 45: Vertical section view of classified model for Block 151 showed by RESCLASS, looking north with supporting samples (DPMC, 2019)

Note: The section line can be found in the previous figure.

14.8.2 Resource Tabulation

The MRE presented in Table 45 has been depleted by all mining and development works, as at 31 December 2019. The MRE is reported using a NSR calculation based on current operating costs and metal revenue to meet "reasonable prospects for eventual economic extraction" criteria.

Recovery calculations are variable based on individual grade domains and factor in recoveries incorporated via the pyrite concentrator circuit. Plant recoveries are presented in Table 49 and the profit calculation based on an NSR algorithm is included in Table 48.

The final profit classification incorporates revenue factors for each recoverable metal type and royalties. From this, the final net operating profit is determined by incorporating OPEX. The Mineral Resource remaining after subtraction of Mineral Reserves has been reported at a net operating profit of >US$0/t, using the net profit calculation outlined above and in Table 48 . Mineral Resources are based on metal prices of US$1,400/oz Au, US$17/oz Ag and US$2.75/lb Cu.

The MRE of Measured and Indicated Mineral Resources are reported, exclusive of those Mineral Resources where modifying factors have been applied to report Mineral Reserves.

The process used for reporting Mineral Resources exclusive of Mineral Reserves is as follows:

- The model is depleted as at 31 December 2019 using the mined out volumes (stopes, development).
- A 3 m buffer zone around the surveyed mine solids is created using Leapfrog Geo. This is to define a zone where reasonable assumption is made that an area this close to existing depletion will not be extractable going forward. This replaces what was done previously which was to sterilise areas around the next 24 month planned stopes.

- LOM planned stopes are removed from the block model.

Table 45: MRE Statement for the Chelopech with an effective date of 31 December 2019

Chelopech Mineral Resource estimate as at 31 December 2019									
Resource category	**Mt**	**Grades**					**Metal content**		
		Au (g/t)	**Ag (g/t)**	**Cu (%)**	**S (%)**	**As (%)**	**Au (Moz)**	**Ag (Moz)**	**Cu (Mlb)**
Measured	9.0	2.95	7.92	0.98	11.97	0.27	0.856	2.301	196
Indicated	5.2	2.72	8.13	0.87	10.45	0.22	0.453	1.355	100
Total Measured + Indicated	**14.2**	**2.86**	**8.00**	**0.94**	**11.41**	**0.25**	**1.308**	**3.656**	**296**
Inferred	1.9	2.02	6.57	0.84	9.86	0.09	0.123	0.399	35

Notes:
- *MRE is reported using an operating net profit cut-off of >US$0.*
- *Tonnages are rounded to the nearest 1,000 tonnes to reflect this as an estimate.*
- *Metal content is rounded to the nearest 100 tonnes or 100 ounces to reflect this as an estimate.*
- *The Mineral Resources are reported exclusive of Mineral Reserves.*
- *Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.*

Additionally, the MRE (exclusive of Mineral Reserves) is set out in Table 46 in a grade-tonnage tabulation. The reporting cut-off is highlighted in bold.

Table 46: Grade-tonnage tabulation for the Chelopech Copper-Gold Project as at 31 December 2019, reported for a range of profit cut-offs

Mineral Resource estimate as at 31 December 2019								
Resource category	**Cut-off (profit)**	**Million tonnes**	**Profit (US$)**	**Au (g/t)**	**Ag (g/t)**	**Cu (%)**	**S (%)**	**As (%)**
Measured Resource	**0**	**9.0**	**58.9**	**2.95**	**7.92**	**0.98**	**11.97**	**0.27**
	2.5	8.5	62.3	3.03	8.05	1.01	12.10	0.28
	5	8.2	65.0	3.09	8.12	1.03	12.19	0.29
	7.5	7.8	67.7	3.16	8.21	1.05	12.26	0.29
	10	7.5	70.1	3.21	8.28	1.07	12.34	0.30
Indicated Resource	**0**	**5.2**	**49.1**	**2.72**	**8.13**	**0.87**	**10.45**	**0.22**
	2.5	4.7	54.6	2.85	8.36	0.92	10.63	0.23
	5	4.3	59.2	2.97	8.56	0.95	10.79	0.24
	7.5	3.9	64.3	3.11	8.77	0.99	10.96	0.25
	10	3.6	68.6	3.21	8.89	1.02	11.09	0.26
Measured + Indicated Resource	**0**	**14.2**	**55.3**	**2.86**	**8.00**	**0.94**	**11.41**	**0.25**
	2.5	13.2	59.6	2.97	8.16	0.98	11.58	0.26
	5	12.4	63.0	3.05	8.27	1.00	11.71	0.27
	7.5	11.7	66.5	3.14	8.40	1.03	11.83	0.28
	10	11.1	69.6	3.21	8.48	1.05	11.94	0.29
Inferred Resource	**0**	**1.9**	**31.4**	**2.02**	**6.57**	**0.84**	**9.86**	**0.09**
	2.5	1.7	35.3	2.13	6.77	0.87	10.00	0.09
	5	1.4	40.3	2.25	6.91	0.91	10.05	0.10
	7.5	1.3	45.2	2.36	7.16	0.96	10.13	0.10
	10	1.1	50.8	2.49	7.33	1.00	10.17	0.10

**The Mineral Resource is reported exclusive of Mineral Reserves.*

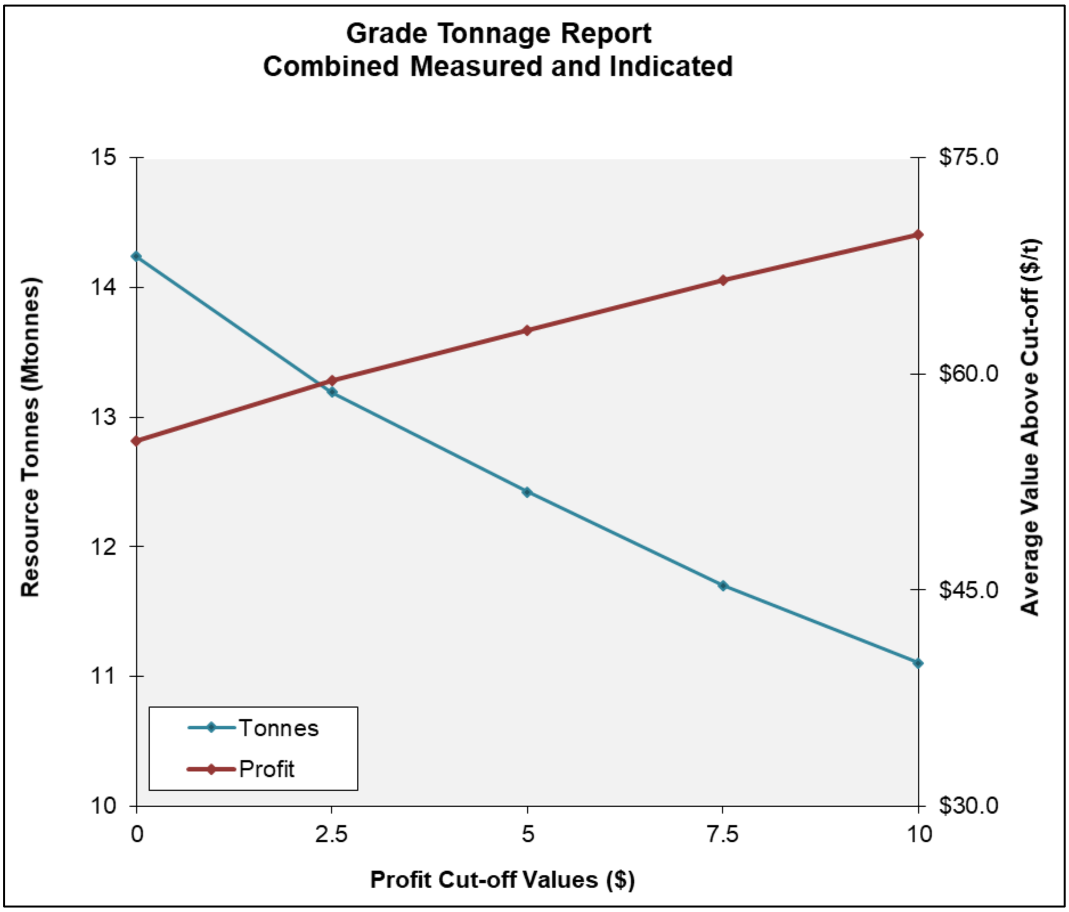


Figure 46: Grade-tonnage report for Measured and Indicated Mineral Resources, reported at net operating profit >US$0/t cut-off (DPMC, 2019)

Comparison of the 2019 MRE with the previously reported 2018 MRE, after depletion of Mineral Reserves, is presented in Table 47. The updated MRE shows the following:

- An increase of 13.53% in Measured and Indicated Mineral Resources. This increase in Measured and Indicated Mineral Resources is largely attributed to the new net smelter return (NSR) assumptions and exclusion of the use of AuEq in the reporting cut-off criteria (Section 15.2 for further detail on removal of AuEq from reporting criteria).
- In addition, ongoing infill and resource development drilling programs which have defined and reclassified resources in blocks 17, 18, 19, 103 and 151, have also been completed.
- Additional mineral resources – Block 148 and Block 7 – were defined.

Table 47: Comparison between previous MRE (December 2018) and current MRE (December 2019)

Comparison of MRE as at 31 December 2019 with MRE as at 31 December 2018 Mineral Resources exclude all blocks already classified as Mineral Reserves									
Resource category	**2019 Mt**	**2018 Mt**	**Grades**				**% Difference**		
			2019 Cu (%)	**2018 Cu (%)**	**2019 Au (g/t)**	**2018 Au (g/t)**	**Tonnes % difference**	**Cu % difference**	**Au % difference**
Total Measured + Indicated	14.2	12.5	0.94	1.08	2.86	3.42	13.53%	-12.95%	-16.39%
Inferred	1.9	1.5	0.84	0.93	2.02	2.63	29.66%	-9.91%	-23.02%

Notes:
- *MREs are reported using an operating net profit cut-off of >US$0.*
- *Tonnages are rounded to 1,000 tonnes and metal to 100 tonnes or 100 ounces as this is an estimate.*
- *Metal content is rounded to the nearest 100 tonnes or 100 ounces to reflect this as an estimate.*
- *The Mineral Resource is reported exclusive of Mineral Reserves.*
- *Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.*

It is the QP author's opinion that the Chelopech MRE has a low risk of being affected by factors such as geological understanding, data management, estimation methodology or classification strategy. The deposit geology is well understood, has been appropriately modelled in 3D and has adequate sampling data to support the grade and tonnage estimates. Recent reconciliation with production has verified the quality of the MRE.

CSA Global and the report authors do not believe that the estimate of Mineral Resources may be materially affected by metallurgical, environmental, permitting, legal, title, taxation, socio-economic, marketing or political issues.

15 Mineral Reserve Estimates

15.1 History and Study Methodology

At the time of the acquisition of the mine by DPM, annual ore production output for the previous four years was in the order of 522 ktpa, with 640 kt achieved in 2003. The current production target of the operation is 2.2 Mtpa, the achievement of which is enabled by the upgraded ore handling facilities and infrastructure, whilst at the same time, introducing a new stoping method. This implementation plan was completed in the third quarter of 2012.

Long-hole open stoping (LHOS) was successfully implemented in 2005, and by December 2008, the mine output had increased to the equivalent of 1 Mtpa, which was the pre-upgrade design capacity of the Kapitalna shaft. This nominal rate continued through to 2010, with an increase to ~1.3 Mtpa in 2011, followed by ~1.8 Mtpa in 2012 and by ~2 Mtpa in 2013, on completion of the new underground crusher-conveyor system.

15.2 Net Smelter Return and Gold Equivalent Cut-Off

The Chelopech Mineral Resource and Mineral Reserve estimates per the Bulgarian reporting guidance as specified in the concession agreement are constrained by a gold equivalent (AuEq) cut-off as follows:

- A gold equivalent cut-off of 4 g/t (Reserves). This value shall not be increased. This is to limit the Chelopech operation from high grading above the agreed to AuEq cut-off (4 g/t) and to limit sterilization of blocks thereof.
- Capital infrastructure to be maintained for blocks between 3 and 4 g/t AuEq for future accesses (Resource)

There are numerous benefits of an NSR model compared to a single metal cut-off grade approach, such as:

- Polymetallic ore can be converted into a profitability variable expressed in terms of US$/t
- Investigation of the potential viability of selected Mineral Reserves blocks can be quickly assessed
- The profitability of planned stopes can be assessed
- The effect of commodity price fluctuations can be quickly applied to the Mineral Reserves model.

Mineral Resource estimates completed since 2012 have also been reported based on gold equivalent cut-off of 3.0 g/t and a net smelter return cut-off value greater than US$0.00/t. Mineral Reserve estimates completed since 2012 have also been reported based on gold equivalent cut-off of 3.0 g/t and a net smelter return cut-off value greater than US$10.00/t.

Analysis completed for the end of 2019 reporting process, identified that there has been a deviation between the AuEq and the NSR value. At both a US$0.00/t and a US$10.00/t NSR value, Mineral Resources with a AuEq grade lower than 3.0g/t AuEq met the NSR criteria.

Based on this analysis, the cut-off criteria for Mineral Resources and Mineral Reserves were confined to an NSR value of US$0.00/t and a US$10.00/t respectively.

Ongoing checks will continue throughout the mine life to ensure that the Bulgarian AuEq cut-off criteria are honoured.

15.3 Metallurgical Recovery Algorithms

To create an NSR model, additional attributes were added to the GEMS Mineral Resources model. These fields are presented in Table 48.

Table 48: NSR calculation – additional GEMS attributes

Field (units)	Formula	Description
TONNES (t)	X_{INC}*Y_{INC}*Z_{INC}*DEN_VOID	Tonnes of an area – length x breadth x height x density
Copper concentrate		
CUREC (%)	See Table 49: Metallurgical recovery algorithms	Copper recovery using mill defined recovery algorithm
AUREC (%)	See Table 49: Metallurgical recovery algorithms	Gold recovery using mill defined recovery algorithm
AGREC (%)	See Table 49: Metallurgical recovery algorithms	Silver recovery using mill defined recovery algorithm
CU_MET_R (lb)	CUREC/100*TONNES*CU/100*2204.6226	The amount of copper recovered, in pounds
AU_MET_R (tr.oz)	AUREC/100*TONNES*AU/31.1035	The amount of gold recovered, in troy ounces
AG_MET_R (tr.oz)	AGREC/100*TONNES*AG/31.1035	The amount of silver recovered, in troy ounces
PAYABLE (USD)	0.94*CU_MET_R*2.75+0.93*AU_MET_R*1400 +0.92*AG_MET_R*17.0	Payable content from metal recovered. Mineral Resources use US$1400 Au oz/ Au whilst Mineral Reserves use US$1250 Au oz/ Au. Uses long term metal prices of US$17/oz Ag and US$2.75/lb Cu for both Mineral Resource and Mineral Reserves.
CU_C_DMT (t)	CU_MET_R/2204.6226/0.165	Copper concentrate generated in dry metric tonnes
TCRC (USD)	CU_MET_R*0.1981*0.94+AU_MET_R*5*0.93+ AG_MET_R*0.5*0.92+CU_C_DMT*334	Treatment charges and recovery charges
ROYALTY (USD)	(CU/100*TONNES*2204.6226*2.75+AU*TONNES/31.1035*1400+AG*TONNES/31.10317.0)*0.015	The operation royalty charge has been calculated using the base formula of 1.5% of the in-situ metal (Cu, Au and Ag) value.
SUSTAINING_CAP	4.2	Sustaining capital added based on longterm financial model
OPEX (USD)	TONNES*(35.2+ SUSTAINING_CAP)+ ROYALTY	Operating expenditure
PROFIT (USD)	PAYABLE -TCRC-OPEX	Profit
PROFIT_T (USD)	PROFIT/TONNES	Profit per tonne
NSR (USD)	(1-TCRC/ PAYABLE)*100	Net smelter return
Pyrite Concentrate		
PC_CUREC (%)	92.4-CUREC	Copper recovery in pyrite concentrate
PC_AUREC (%)	88.53-AUREC	Gold recovery in pyrite concentrate
PC_AGREC (%)	80.61-AGREC	Silver recovery in pyrite concentrate
PC_CUREC 149(%)	92.4-CUREC	Copper recovery in pyrite concentrate for Block 149
PC_AUREC 149(%)	90.0-AUREC	Gold recovery in pyrite concentrate for Block 149
PC_AGREC 149(%)	80.61-AGREC	Silver recovery in pyrite concentrate for Block 149
PC_CU_MET_R (lb)	(PC_CUREC+PC_CUREC149)/100)*TONNES*CU/100*2204.6226	The amount of copper recovered, in pounds
PC_AU_MET_R (tr.oz)	(PC_AUREC+PC_AUREC149/100)*TONNES*AU/31.1035	The amount of gold recovered, in troy ounces
PC_AG_MET_R (tr.oz)	(PC_AGREC+PC_AGREC149/100)*TONNES*AG/31.1035	The amount of silver recovered, in troy ounces
PC_PAYABLE (USD)	0.6*PC_AU_MET_R*1400	Payable made from metal recovered. Mineral Resources use US$1400 Au oz/ Au whilst Mineral Reserves use US$1250 Au oz/ Au.
PC_AU_C_DMT (t)	PC_AU_MET_R*31.1035/6.5	Gold pyrite concentrate generated in dry metric tonnes
PC_TCRC (USD)	PC_AU_MET_R*0.56+PC_AU_C_DMT*74	Treatment charges and recovery charges
PC3_OPEX (USD)	TONNES*0.61	Operating expenditure
PC3_PROFIT (USD)	PC_PAYABLE - PC_TCRC-PC3_OPEX	Profit
PC3_PROFIT_T (USD)	PC3_PROFIT/TONNES	Profit per tonne
NSR2 (USD)	(1-PC_TCRC/ PC_PAYABLE)*100	Net smelter return

Field (units)	Formula	Description
Total		
TOT_CUREC (%)	CUREC + PC_CUREC+ PC_CUREC149	Total copper recovery
TOT_AUREC (%)	AUREC + PC_AUREC+ PC_AUREC149	Total gold recovery
TOT_AGREC (%)	AGREC + PC_AGREC+ PC_AGREC149	Total silver recovery
TOT_CU_MET_R (lb)	CU_MET_R + PC_CU_MET_R	The amount of copper recovered, in pounds
TOT_AU_MET_R (tr.oz)	AU_MET_R + PC_AU_MET_R	The amount of gold recovered, in troy ounces
TOT_AG_MET_R (tr.oz)	AG_MET_R + PC_AG_MET_R	The amount of silver recovered, in troy ounces
TOT_PAYABLE (USD)	PAYABLE + PC_PAYABLE	Payable made from metal recovered
TOT_TCRC (USD)	TCRC + PC_TCRC	Treatment charges and recovery charges
TOT_OPEX (USD)	OPEX + PC3_OPEX	Operating expenditure
PROFIT3 (USD)	PROFIT + PC3_PROFIT	Profit
PROFIT3_T (USD)	PROFIT_T + PC3_PROFIT_T	Profit per tonne and cut-off grade parameter
NSR3 (USD)	NSR1 + NSR2	Net smelter return

Table 49 presents the metallurgical recovery algorithms used to define the profit per tonne.

Table 49: Metallurgical recovery algorithms

Metal	Mining block	Algorithm
CUREC	All blocks	101.9503+0.1326*Cu (%)-0.186*Ag (g/t)-1.3782*S (%)/Cu (%)
AUREC		81.9153+3.4898*Au (g/t)-1.607*Ag (g/t)-2.387*S (%)/Cu (%)
AGREC		0.2848+0.2875*Ag (g/t)-0.7849*S (%)/Cu (%) +0.8512*AuRec (%)

These metallurgical recovery algorithms currently have limitations, so for Mineral Resource and Mineral Reserve estimations, minimum and maximum metallurgical recovery limits were used to stop improbable recoveries being used to determine the economic model revenue. The limits employed are presented in Table 50.

Table 50: Metallurgical recovery limits to copper concentrates

Description	Lower	Upper
Copper	10%	90%
Gold	10%	77%
Silver	10%	68%

Also, if the Mineral Resource classification (RESCLASS) equals 3, then copper, gold and silver metallurgical recoveries are set to zero. A Mineral Resource classification of 3 represents Inferred Mineral Resource.

15.4 Development of Iso-Shells

Once profit per tonne was estimated for each block within the Mineral Resources block model, iso-shells were developed automatically at a cut-off of >US$0/t and ≥US$10/t using GEMS software, for the Mineral Resources and Reserves, respectively.

GEMS triangulates an iso-shell around all blocks that exceeds the input value. The iso-shells produced were then used as a guide to create wireframes and solids, which were then visually checked against the geology and grade models for consistency. The wireframes and solids were then validated for tonnes and grade estimation purposes.

On completion of the validation process, solids were then handed over to the Mine Planning Engineer.

15.5 Design of Development and Stopes

Based on the ≥US$10/t iso-shell and ≥3 g/t AuEq stopes, level and capital development were designed and scheduled out. Secondary stopes and ore remnants were designed based on the most up-to-date survey data available, for the depleted stopes abutting them. In most cases, these were three-dimensional laser surveys of the mined-out stopes. However, if not available, stope designs were used.

Stoping is divided vertically in each block into multiple horizons, varying from 60 m to 90 m in height, so that multiple stopes can be mined in each block simultaneously. Each stope is designed at a nominal 30 m height and 20 m width. The design length can usually vary between 20 m and 60 m, depending on geology, and whether it is a primary or a secondary stope.

During mining, the length may change based on actual conditions. Sequencing for each horizon is focused on a bottom-up, inside-out approach to minimise stress on the secondary stopes and pillars, and to push the stress onto the abutments.

15.6 Mineral Reserve Statement

Based on the methodologies described above, Mineral Reserves for the Chelopech Mine are presented in Table 51.

Table 51: Chelopech Project Mineral Reserve Statement with an effective date of 31 December 2019

Chelopech Mineral Reserves as at 31 December 2019										
Classification		kt	Grades					Metal content		
			Au (g/t)	Ag (g/t)	Cu (%)	S (%)	As (%)	Au (koz)	Ag (koz)	Cu (klb)
Proven	Stopes	8,498	2.80	7.12	0.92	12.86	0.28	766	1,945	171,770
	Broken Stocks	31	3.25	3.97	0.53	11.70	0.19	3	4	370
	Stockpiles	24	3.11	4.10	0.79	11.71	0.22	2	3	420
Probable	Stopes	7,727	3.19	8.00	0.87	11.85	0.26	793	1,987	147,717
	Ore Development	577	4.30	8.13	1.22	13.47	0.37	80	151	15,538
Total Proven*		**8,553**	**2.81**	**7.10**	**0.92**	**12.85**	**0.28**	**771**	**1,952**	**172,560**
Total Probable		**8,304**	**3.27**	**8.01**	**0.89**	**11.96**	**0.27**	**873**	**2,138**	**163,255**
TOTAL*		**16,857**	**3.03**	**7.55**	**0.90**	**12.41**	**0.27**	**1,644**	**4,089**	**335,815**

**Including Broken Stocks and Stockpiles.*
Mineral Reserves are based on long-term metal prices of US$1,250/oz Au, US$17/oz Ag and US$2.75/lb Cu.
Tonnage figures have been rounded to the nearest 10,000 tonnes to reflect this as an estimate.

The Probable Mineral Reserve classification has been determined to be those designed stopes that lie further than 15 m (half-stope height) away from any level, with crosscut development completely through the ore. That is, ore classified as Proven Mineral Reserve is within 15 m of existing development, or stopes, where sampling takes place on a regular basis and classified as Measured Mineral Resources.

Net changes in tonnes and contained metals from the 2018 to the 2019 Mineral Reserves estimate show reductions of 1.2 million tonnes (Mt) in tonnage, 132,000 oz of gold and 19 million pounds (Mlb) of copper. Corresponding percentage reduction are respectively -7% in tonnes, -7% in metal content for gold, and -5% in metal content for copper. The decrease can be attributed to 2019 mining depletion, which has been partially offset by addition of new stope and redesign of existing stopes.

New designs contributed about 1.0 Mt to the Mineral Reserves, mainly from Blocks 148, 149, 151, 10 and 7.

This Mineral Reserve estimate is considered robust. Chelopech is an established mine and it is anticipated that there will be no major changes in legislation which will affect the materiality of the current Mineral Reserve estimate. Considering that Bulgaria is part of the EU, any likely changes are if the current legislations are not EU compliant.

The Mineral Reserves at Chelopech have been estimated by including several technical, economic and other factors. A change to any of the inputs would therefore have some effect on the overall results. Concerning mining and metallurgical factors, it is CSA Global's and the report authors belief that sufficient work has been done by DPM to ensure that these are not likely to have any significant or material effect on Mineral Reserves.

CSA Global does not believe that the estimate of Mineral Reserves may be materially affected by metallurgical, environmental, permitting, legal, title, taxation, socio-economic, marketing or political issues. However, CSA Global relies on information (as presented in Section 3) of this Technical Report in relation to legal and environmental considerations.

16 Mining Methods

16.1 Mining Operations

Underground mining production is performed using sublevel Long-Hole Open Stoping (LHOS) methods. The various orebodies are developed at nominal 30 m vertical intervals and accessed by major declines in both, the Western and Central areas. Stopes are designed to be 20 m wide between the levels. The length of the stope depends on the geotechnical conditions, but can range between 20 m and 60 m. The new trend of stope design is to keep a 20–30 m length and 60 m height, where geological and geotechnical conditions are suitable. This allows for improvement in ore handling and dust suppression during ore mucking because of shorter remote loading. Ore is delivered via ore passes, or via trucks, to the run of mine (ROM) bin above the crusher. The crusher feeds up to 400 tph to a system of eight conveyors, to transport the ore to the surface stockpile.

Once mined via an "end-slice" methodology, stopes are backfilled with "paste-fill" produced from the mill tailings, to which cement is added and which is gravity fed underground via a system of borehole and pipes to the stopes being filled.

Multiple horizons are designed in each ore body so that multiple stopes can be in production at any one time. Simulations have shown that at least six stopes shall need to be producing ore to maintain ore production of 2.2 Mtpa, with up to 22 stopes being drilled, "mucked" and filled at any one time.

16.2 Mining Schedule

The mining development and production schedule was developed using GEMS and MineMax software. As well as the focus on the sequencing previously mentioned, the scheduling strategy aims to maintain a blend from the blocks approximating the proportion in the Mineral Reserves, so that multiple mining areas can be maintained for as long as possible, to minimise congestion and maximise production.

The LOM production schedule summary is presented in Table 52.

Table 52: LOM production schedule (2020–2027)

Reserves 2019	Unit	2020	2021	2022	2023	2024	2025	2026	2027	Total
Ore Reserves	kt	2,200 kt per year each year								**16,856**
Cu	%	0.93	0.93	0.93	0.91	0.91	0.89	0.91	0.78	0.90
Au	g/t	3.11	3.08	3.04	3.08	3.05	3.03	2.95	2.86	3.03
Ag	g/t	6.05	7.09	8.38	7.39	7.11	6.80	8.78	9.38	7.55
As	%	0.29	0.27	0.28	0.28	0.28	0.28	0.27	0.23	0.27
S	%	12.94	12.08	12.80	12.52	12.48	11.90	11.99	12.68	12.41
Sum waste vertical development metres	km	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	**0.8**
Sum jumbo waste and ore development metres	km	6.0	6.0	6.1	6.0	6.1	6.0	2.5	0.2	**38.9**
LH drill metres	km	235	243	213	236	215	230	200	149	**1,721**
PF volume	000 m^3	396	571	667	587	564	560	583	656	**4,585**
WF volume	000 m^3	148	140	131	123	140	144	55	3	**884**
Total BF volume	000 m^3	544	710	798	710	705	704	638	660	**5,469**

16.3 Mining Equipment Selection

The operations at Chelopech are a typical medium to large scale mechanised operation using large-sized equipment. The proposed primary equipment selected is similar to those currently in use at the mine, as presented in Table 53.

Table 53: Primary mobile equipment

Type	Model	Numbers	2020	2021	2022	2023	2024	2025	2026	2027	Σ
Loader	LH517	Fleet	6	6	6	6	6	6	6	3	
		Purchase requirement		1	1	2	1	1			6
Truck	TH550	Fleet	7	7	7	7	7	7	7	5	
		Purchase requirement		1	1	2	1	1			6
Development drills	Axera 7-260 Cabine	Fleet	4	4	4	4	4	2	2	2	
		Purchase requirement									
Production drills	Solo DL420-15C	Fleet	4	4	4	4	4	4	4	3	
		Purchase requirement		1	1						2
Service machine	Caterpillar 930H	Fleet	7	7	6	6	5	4	4	4	
		Purchase requirement	1	1	1						3
Grader	12H	Fleet	3	3	3	3	3	3	3	3	
		Purchase requirement									
Aggregate truck (shotcrete)	Utimec 1500 Transmixer	Fleet	2	2	2	2	2	1	1	1	
		Purchase requirement		1	1						2
Shotcrete machine	Sika PM 407	Fleet	2	2	2	2	2	1	1	1	
		Purchase requirement	1		1						2
Water truck	-	Fleet	2	2	2	2	2	2	2	2	
		Purchase requirement		1							1
Underground jeeps 100%	-	Fleet	23	20	20	15	10	10	10	10	
		Purchase requirement	5	6	6	6	6	6			35
Underground trucks (man)	-	Fleet	1	1	3	1	1	1	1	1	
		Purchase requirement									
Mobile rock breaker		Fleet	2	2	2	2	2	2	2	2	
		Purchase requirement									

16.4 Mine Ventilation

The ventilation system has been upgraded by installation of four 110 kW fans working in parallel at Zapad shaft on 405 level. This shaft is a 3.5 m diameter, currently bare concrete-lined shaft, stripped after its decommissioning as ore hoisting shaft. The new fan battery was commissioned in Q2 2014 to increase ventilation capacity and to improve overall efficiency for future requirements.

16.5 Backfill

A paste backfill plant has been built on surface, commissioned in 2010, to facilitate maximum use of the available tailings for backfill placement underground in the mine. This will meet future backfill requirements and has replaced the existing hydraulic backfill plant. The facility is built adjacent to the existing hydraulic backfill plant and makes use of existing binder silos and backfill reticulation holes.

The paste backfill plant consists of a high rate thickener, vacuum filter, mixer and binder addition system. A complete underground borehole and piping paste reticulation system has been installed with the plant, having a capacity of producing 230 t/hr of paste backfill.

Target design strengths for the paste for stope filling range between 260 kPa and 450 kPa after 56 days. The required strength is dependent on the location of the fill in the stope. Studies conducted during 2010 showed that this should be attainable with cement contents ranging between 3.5% and 5%. Optimisation of the process will continue to be an ongoing process.

Dry waste material from waste developments is used to backfill stopes where paste-fill is not required.

16.6 Crown Pillar Extraction

The crown pillar at 330 m level, 150 block has been drilled and blasted in section (stopes), and as each section is extracted the void replaced with cemented paste fill. The old caved area at the pillar contact on 350 level has been bolted and grouted by cemented injection.

From 2014 up to the end of 2019, DPMC has successfully demonstrated the safe and efficient recovery of approximately 370,000 t of ore from the block 150 crown pillar. It is intended to use the same mining approach as demonstrated with the 150 crown pillar to be able to extract material from other pillars near historical cave zones previously restricted from mining.

16.7 Reconciliation

Reconciliation, defining the performance of the mine and mill compared to the Mineral Reserves, commenced in detail in 2009. In 2019, the results show that the mine is producing an average of 6% more tonnes at 11% lower copper and 5% lower gold grades, after mining dilution and ore losses, compared to the Mineral Reserves block model for the same period.

Reconciliation at Chelopech is consistent with good mining industry standards (±10%) for this style of mineralisation.

16.8 Dilution and Ore Loss

Dilution and losses due to mining activities were applied to the tonnes of each block, as per the mining method designed to mine them. Values are based on the history-to-date for those blocks mined and methods used. Mining block dilution and ore loss assumptions are presented in Table 54.

Table 54: Dilution and ore loss assumptions

Mining method	Mining block	Losses	Dilution
LHS&BF	150	7.71%	6.70%
LHS&BF	151	6.82%	7.20%
LHS&BF	19E	7.61%	5.99%
LHS&BF	19W	7.87%	5.44%
LHS&BF	103	7.99%	8.80%
LHS&BF-CP	150	9.01%	9.01%
SLC	151, 19, 103, 16, 17, 18, 8	20.0%	29.0%
LHS&BF*	152, 153, 16, 17, 18, 8, 10	7.35%	6.85%

Definitions: LHS&BF – Long-Hole Stoping and Backfill; SLC – Sublevel Caving; CUT&F – Cut and Fill.
**Average.*

16.9 Underground Crusher Conveyor System

A materials handling system for the mine was designed by DPMC and constructed to replace the previous ore handling system in 2012 (discussed further in Section 18).

The previous system of train haulage and shaft hoisting has been entirely replaced by a 2 Mt/a underground crushing and conveying system, that takes ore from an ore pass system underground reporting to the 195 level and crushes, transports by conveyors and discharges the ore onto a 6,000 t live capacity reclaim stockpile on surface.

This ore handling system incorporates a primary crusher (a 1,070 mm x 1,500 mm jaw crusher) between the 195 level and the 165 level underground, which discharges into a 400 t crushed ore bin. The crusher is fed from a ROM bin sitting under a grizzly with openings of 800 mm x 800 mm.

Ore is fed to the grizzly via three sources:

1. A 4 m diameter x 135 m long ore pass for 151 and 150 block material above the 260 level.

2. A 7 m diameter x 30 m long ore bin for the 144, 145, 147, 149, and 103 blocks, 150 and 151 blocks between the 225 and 260 levels; and the Central area 16, 18 and 19 blocks.
3. A truck tip directly on the grizzly for ore in 151 and 150 blocks, on and below the 195 level.

A plate feeder draws material from the 400 t crushed ore bin and loads a picking belt (CV1) for removal of tramp metal using a self-cleaning magnet. Material is then conveyed via six more haulage conveyors (CV2-CV7) to the surface. The surface conveyor (C1105) transfers this material to the surface reclaim stockpile, where it is reclaimed and conveyed to the SAG mill to provide uninterrupted feed to the process plant.

The total length of the six underground conveyors is 3.9 km. Total lateral development required was 4.5 km. The design capacity of the system is 400 t/hr as a result of this underground crusher installation, the existing surface crusher installation is reduced to one crusher, to handle oversize and to maintain minimum production in case of emergency.

The new conveyor system was commissioned in 2012 and has been in operation continuously since then. This system is the only means of ore hoisting to surface.

17 Recovery Methods

17.1 Recoverability

Current ore treatment processes comprise conventional crushing of run-of-mine (ROM) ore in a primary jaw crushing circuit, grinding in a SAG milling circuit, bulk floatation, three-stage cleaner flotation and concentrate dewatering to produce the copper/gold concentrate, while the pyrite is recovered from the copper circuit cleaner tails.

The primary saleable product is a gold-copper concentrate containing, on average, 16.5% Cu, 35 g/t Au and 5.5% arsenic, which is loaded at the mine site through a conveyor system from the stockpile into rail wagons and dispatched to the Port of Burgas for sea transportation to the Company's smelter in Namibia and to third parties.

Since 2014, pyrite concentrate, containing gold, has been produced in a section with a capacity allowing the production of up to 400,000 tonnes of pyrite concentrate per year from the mill feed as a separate secondary concentrate product, in addition to the produced gold-copper concentrate. Production is currently operated to meet market demand.

Tailings from the concentrator are thickened and directed to the mine backfill plant, with the balance discharged to the flotation tailings management facility (TMF).

The concentrator operates 24 hours per day, 7 days per week, and is designed to process 275 tonnes per hour (t/hr) at an operating availability of around 92%, with an average annual ore throughput capacity of 2.2 Mt.

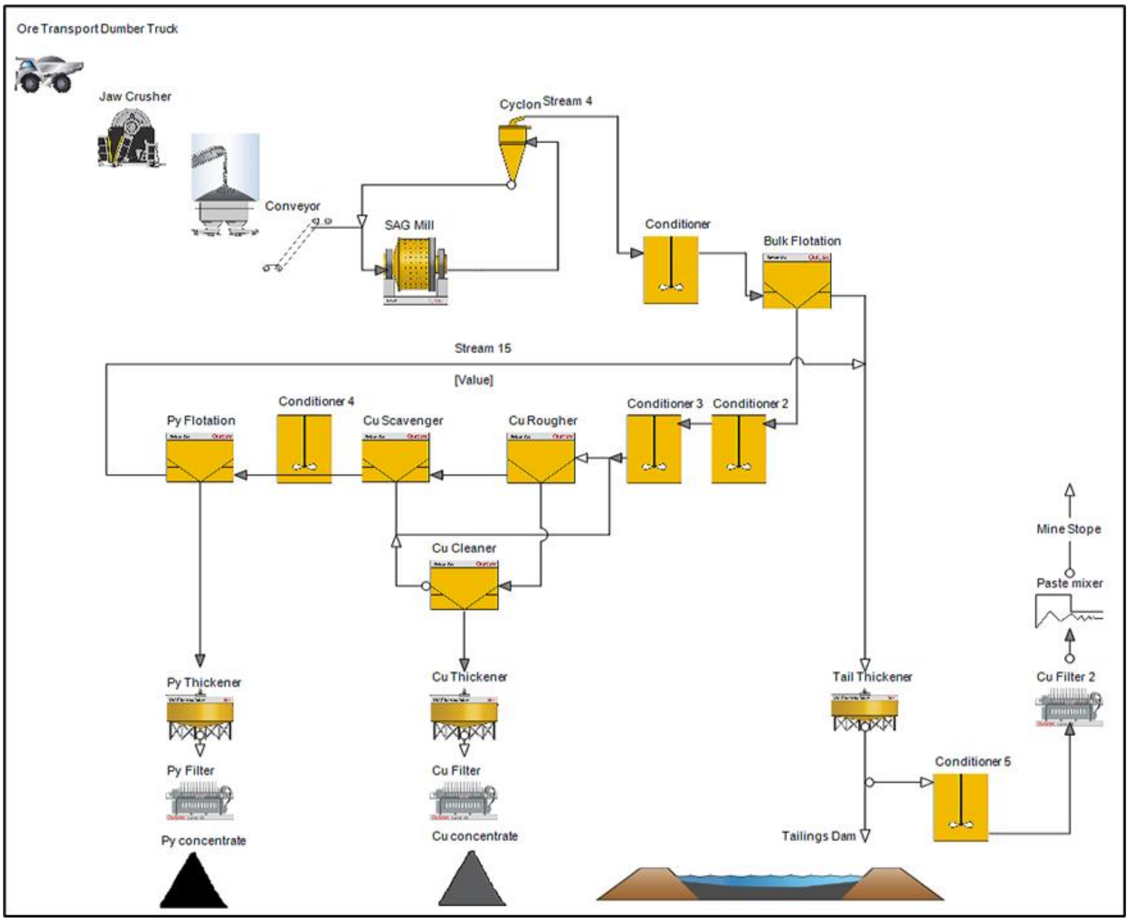


Figure 47: Chelopech Process Flow Diagram (DPMC, 2019)

17.2 Plant Production Performance

Table 55 shows the progressive ramp-up in ore production, feed grades and metal recoveries since 2006, whilst Table 56 and Table 57 show the corresponding concentrate and contained metals. Implementation of the main concentrator process expansion commenced in 2010 and was completed in phases with the final construction of the mine upgrade in early 2013.

Table 55: Ore processed, head grades, and metal recovery to copper concentrate at Chelopech operations

Year	Ore processed (kt)	Cu (%)	Au (g/t)	Ag (g/t)	S (%)	Cu, % recovery	Au, % recovery	Ag, % recovery
2006	953	1.4	4.0	10.5	14.9	85.4	58.0	41.0
2007	913	1.3	3.9	7.7	13.3	87.1	65.2	49.2
2008	901	1.2	4.0	7.5	12.3	86.0	61.2	47.5
2009	981	1.4	4.3	7.9	13.9	87.2	64.6	47.6
2010	1,001	1.5	3.9	8.7	16.1	85.5	54.5	41.5
2011	1,354	1.5	3.9	8.1	14.8	84.5	56.0	42.9
2012	1,820	1.3	3.7	9.3	14.9	82.3	55.5	35.7
2013	2,032	1.2	3.5	7.7	13.5	81.4	48.4	34.9
2014	2,076	1.18	3.72	9.14	14.89	82.3	50.1	38.7
2015	2,052	1.10	3.70	10.69	14.62	80.1	47.0	34.3
2016	2,212	0.98	3.43	8.95	14.14	80.5	48.5	35.8
2017	2,219	0.91	3.74	7.52	13.51	80.6	52.9	38.6
2018	2,217	0.92	3.72	6.77	13.23	81.2	53.5	38.0
2019	2,203	0.93	3.35	6.29	13.25	82.14	50.53	35.43

Table 56: Copper concentrate and contained metal produced

Year	Concentrate produced (kt)	Cu, contained, (kt)	Au, contained (koz)	Ag, contained (koz)
2006	70	12	71	132
2007	65	11	75	111
2008	55	9	71	103
2009	72	12	88	118
2010	75	12	66	113
2011	103	17	94	152
2012	119	19	121	217
2013	127	21	132	219
2014	126	20	124	236
2015	113	18	115	242
2016	107	17	118	228
2017	101	16	141	207
2018	104	17	142	183
2019	105	16.9	120	158

Table 57: Pyrite concentrate and contained metal produced

Year	Concentrate produced, (kt)	Au, contained (koz)	Ag, contained (koz)	Cu, contained, (t)
2013	15	3,074	8,749	55
2014	163	36,465	103,224	601
2015	239	54,772	182,207	950
2016	215	47,237	143,148	1,564
2017	249	56,448	139,977	1,765
2018	260	59,255	137,862	1,939

Year	Concentrate produced, (kt)	Au, contained (koz)	Ag, contained (koz)	Cu, contained, (t)
2019	252	53,472	124,560	1,693

17.3 Future Production Performance

The current operation produces a copper concentrate with associated gold and silver, with copper, gold and silver recoveries averaging 85%, 55% and 42% respectively, between 2004 and 2011. Since 2012, as the plant throughput has increased, the head grades have steadily decreased, with resulting decreases in recovery to concentrate (81.5%, 50.3%, and 35.9% respectively). For the remainder of the mine life, the operation will be treating declining metal head grades, which at the current LOM production rate (~2.2 Mtpa) will result in declining copper concentrate production. The pyrite recovery circuit has enabled the overall site production of gold to increase (~75% in 2019).

The extensive performance database generated over the years has been used to develop the recovery models used for production predictions. These are described in full in Section 15 and have been applied to the current LOM plan block model (Table 52). The 2019 annual review of the recovery models vs the actual plant performance indicate that the current models are still able to accurately predict the plant recovery performance for the expected future plant feed grades.

Table 58 summarises the expected metal distribution over the current LOM (2020 to 2027) schedule into the copper and pyrite concentrates.

Table 58: Predicted metal distributions to copper and pyrite concentrates (2020 to 2027)

LOM 2020 to 2027	%Wt	Cu (%)	Au (%)	Ag (%)
Copper concentrate	5.0	81.5	50.0	38.0
Pyrite concentrate	11.0	7.5	21.0	25.0
Tails	84.0	11.0	29.0	37.0
Total	**100**	**100**	**100**	**100**

17.4 Current and Projected Requirements for Energy, Water and Process Materials

The total power consumption is approximately 38 kWh/t of which grinding and flotation is approximately 75%. The main reagents are collector (120-150 g/t), quicklime (3-4 kg/t) and sulfuric acid (0.7-1.0 kg/t). The water consumption is approximately 0.35 m^3/t of ore treated.

DPMC does not forsee any material change in the consumption of power, water and process materials, compared to that used in the last three years.

18 Project Infrastructure

18.1 Mine Upgrades

Section 16 describes the mine infrastructure upgrades.

18.2 Concentrator Upgrades (to 2012)

18.2.1 Summary

The basis for the mine and plant expansion was to install the capacity to mine and process 2 Mt/a of ore from the underground mine. It was important to integrate the existing equipment where possible, to both minimise capital expenditure and interferences with existing operations during installation. In the concentrator, this required bypassing of the existing secondary/tertiary crushing section completely, combined with the installation of a new grinding and primary flotation equipment to handle the increased material flows.

The upgraded circuit equipment primarily included:

- A crushed ore stockpile being fed from the underground primary crushing and conveying system. Apron feeders transfer the ore onto the original crushing circuit feed conveyor.
- Two conveyors to transfer primary crushed ore from the existing transfer conveyor to the SAG mill feed chute.
- A single-stage SAG mill, 8.24 m diameter and 4.73 m effective grinding length, powered by a 5.8 MW motor, including ball charging, liner handling and associated equipment.
- The mill product classification circuit, comprising mill discharge hopper, cyclone feed pumps and cyclone cluster.
- Four 100 m^3 capacity tank cells for the upgraded rougher and scavenger duties.
- Utilisation of existing flotation circuit as the upgraded three-stage cleaning circuit.
- New concentrate and flotation tailings thickeners for water recovery and recycling at the plant site.
- The thickened tailings are further processed in the “paste” plant, completed in September 2010, prior to being placed underground as backfill material.
- A vertical plate and frame pressure filter and ancillary equipment for concentrate dewatering, and filter-cake handling.

18.2.2 Comminution

The first phase of the upgrade was completed using the original primary crushing circuit, which comprised of three parallel streams, each comprising an apron feeder, a jaw crusher and a short discharge belt. The final phase of implementation was completed in December 2012, when the underground crushing and conveying part of the project connected through to the new coarse ore stockpile and feeding system.

Crushed product from the primary crushers, which has a typical P_{80} of 100 mm, is ground using a single-stage closed grinding circuit with cyclone classification. This comprises a single-stage SAG mill, 8.53 m diameter x 4.72 m long, with a rated capacity of 5,800 kW. Cyclone underflow is returned to the SAG mill and the overflow gravitates to the flotation circuit passing via an “in-stream” analysing system, which monitors the density and the assay composition of the stream, and a particle size analyser.

18.2.3 Flotation

The flotation process continues as before in the new rougher/scavenger circuit comprising of four 100 m^3 tank cells, where a bulk sulphide concentrate, containing the copper minerals and most of the pyrite, is collected and forwarded to the cleaner circuit.

The combined concentrate flows via a conditioner tank to the previous rougher/scavenger cells, rearranged to form the new first cleaner circuit, by using lime for pyrite depression. These comprise of two banks of four, four-cell Denver-500 cells, and the circuit tails (cleaner tails) being combined with the rougher/scavenger tailings to form the final tailings stream. The first cleaner concentrate reports to the second and third cleaners, while the cleaner tailing reports back to the first cleaner feed.

Reagents currently used are PAX (potassium amyl xanthate) for collection, Oreprep F549 for frother, and slaked lime for pH control. Final concentrate is gravity fed to the dewatering section, while the final tailings are transported by gravity to the current water recovery thickener located at the plant site.

18.2.4 Concentrate Handling

The copper concentrates report to the filter section for thickening and filtration. A 12 m high-rate thickener is used to thicken the final copper concentrate, which is then dewatered typically to a moisture content of less than 8%, using a vertical plate pressure filter. The filtered cake is stored and transported periodically by rail to Burgas, for onward shipment to the smelter located in Namibia.

18.2.5 Paste Backfill

The paste backfill plant is located to the north of the plant, alongside the mine portal. The dewatered tailings are either pumped to the paste plant feed tank, and from there into the plant as required for placement underground, or, delivered by gravity to the flotation TMF, located 3 km to the south of the plant site.

The backfill section further dewaters the thickened tailings by filtering in one (of two) vacuum disc filters. This produces a paste, which is then combined with cement at the appropriate percent solids and transported underground via gravity to the reticulation system for delivery to the mined out stopes. System control is fully automatic; however, operations are monitored via a control room where the performance of the plant and paste product quality is controlled, and the required communication and coordination with the southern site and underground personnel are maintained.

18.2.6 Process Control

The main process streams – feed, concentrate and tailings – are controlled by operators employed by DPMC quality control section, who perform the sampling and sample preparation. 24-hour bulk samples are collected and assayed for the purposes of the metallurgical balance of products and metals. The assays are performed by the onsite independent assay laboratory, which is part of the SGS-certified multi-national group of laboratories.

Quality control operators also take two-hour stream samples for operational purposes, mill feed samples for moisture and granulometric determinations, concentrate stock samples for moisture determinations, 24-hour bulk samples from the backfill plant products for granulometric determinations, as well as another metallurgical testwork, as required.

The process plant is provided with an Amdel in-stream analyser system, which monitors the density and the composition of the main process streams. The system operates in real time and provides feedback on the stream copper, iron, sulphur and arsenic grades, density and percentage of solids.

18.3 Concentrator Upgrades (post-2012)

18.3.1 Cleaner Circuit (completed July 2012)

In mid-2013, the existing second and third copper circuit cleaner banks cells were replaced with new units. Each stage comprises of two stages of "staged flotation reactors" (SFRs) in series for each. Selection of these units followed the extensive plant trials through 2012 testing a production sized unit as the first stage of the second cleaner (Woodgrove Technologies, 2012).

18.3.2 Pyrite Recovery Circuit (completed March 2014)

Prompted by the success of the cleaner circuit upgrade, the new pyrite circuit included the SFR design as the flotation units. The remainder of the circuit includes a concentrate thickener, filter, and concentrate storage area located on the west side of the current concentrator building. The complete circuit was commissioned and in full production by the end of Q2 2014.

18.3.3 Concentrate Handling Facility (completed Q3, 2014)

This material handling system conveys both of the copper and pyrite concentrates produced from their respective storage areas, across the site to a "rail loadout" system. From here, the two concentrates are transported to a holding warehouse in the port of Burgas, from where it is loaded into bulk cargo carriers for transport to the final destination.

18.4 Tailings Management

18.4.1 Flotation Tailings Management Facility

The existing flotation Tailings Management Facility (TMF) is located 3 km south of the plant site. Since the start of operations, and prior to 2011, the existing embankment was progressively raised using low permeability fill and structural fill on an as required basis, using an upstream raise construction method. The method of deposition (when not being deposited underground as backfill for stopes) is by sub-aerial methods, using a combination of spigots at regular intervals on the main embankment, west and north side of impounded area. In 2018, the construction of the next raise of the TMF to the 630 masl elevation began and is continuing according to accepted design (SWECO Energoproekt, 2015 and 2018). At the end of 2019 the main dam and the larger part of the adjacent facilities were constructed to a projected elevation by the upstream method. The development of the main dam wall to its next elevation of 630 masl is ongoing, using an upstream construction method. The capacity of the upgraded facility has increased as a result.

Additionally, in 2019 the upgrades to the embankments on the north - eastern and western side of the facility commenced to the next elevation 630 masl. Each of these will be raised to the 630 elevation which will enable storage of the expected flotation tailings for the entire LOM. An ongoing project is in place to complete the TMF buttressing, which will increase the reliability of the facility in compliance with CDA guidelines and international best practice standards.

18.4.2 Tailings Management Design Parameters

The design of the existing TMF to the current 620 m level was based on backfilling of underground stopes with flotation tailings. Whilst mined-out voids have been filled, tails were deposited underground for ~60% of the time, with the remainder being transported to the TMF. For the future, the design capacity of the extended TMF is based on 40% of the total tailings production being sent underground. The final volume capacity for the future facility from between the 620 masl and 630 masl levels was forecasted to be a further 21.6 Mt.

18.4.3 Site Water Management

The operation is currently permitted to discharge water from the TMF to a certain limit each year. These discharges have been reducing over the last five years, as the tonnes of ore processed have increased and more TMF water is recycled in the process.

The water balance model has been run for a wide range of conditions over several years. The modelling indicates that under dry to normal conditions, with the use of all mine water, all the tailings facilities can be operated with a "negative" water balance, maintaining pond volumes close to the minimum levels.

Under 1:100-year wet conditions, pond volumes increase significantly. However, water can be drawn down over the following few years and no uncontrolled spillway discharges are forecast.

18.4.4 Stability Assessment

The stability of the TMF embankments was assessed under static and pseudo-static loading conditions, using limit equilibrium methods and critical state models. The seismic assessment included operating and maximum credible earthquake (MCE) loads. The liquefaction assessment of tailings deposits was finalized on September 2019 and was the source for the development of design criteria for buttressing, according to modern approaches complies with world dam safety practice and Canadian dam association (CDA) Guidelines.

Generally accepted minimum factors of safety of 1.5 for static conditions, and 1.1 operational basis earthquake (OBE) and 1.0 maximum credible earthquake (MCE) for pseudo-static seismic conditions were adopted for the design of the embankment.

Liquefaction Potential Assessment

The possibility of embankment failure due to liquefaction was assessed based on the modern international methods. There was several in situ and laboratory and geotechnical tests, including standard penetration testing (SPT), cone penetration testing (CPT), drilling of exploration boreholes and sampling, seismic wave assessment and advanced laboratory testing.

Based on the assessment, it was determined that the entire tailings mass adjacent to the main embankment has a medium to high potential for liquefaction, subject to the water table level, i.e. only the areas below the water table are likely to liquefy during the MCE event. The assessment indicated that an OBE is not expected to trigger liquefaction of the entire tailings mass.

Embankment Stability

The stability assessment indicated that the main embankment has an adequate factor of safety for static conditions in its current state. In the event of an OBE seismic event, the embankment continues to meet the required factors of safety.

Embankments were modelled with the rehabilitated downstream batter slope of 1V:3H, constructed to the final flotation tailings elevation. Both of the southern and western embankments satisfied all conditions and as such, the final rehabilitation slope of 1V:3H was adopted for design of the final stage.

A forthcoming design case for placing a “buttress” has been incorporated, and construction will commence in the second half of 2020 and to be completed in 2021.

19 Market Studies and Contracts

19.1 Markets

DPMC sells its copper concentrate primarily to Dundee Precious Metals Tsumeb (Pty) Ltd (DPMT) on a trilateral agreement with IXM SA (formerly Louis Dreyfus Commodities Metals Suisse SA). Sales of copper concentrate to third parties largely depend on contractual fill of the DPMT smelter and it assumes that current capacity at Tsumeb of 240,000 tpa will be optimised to 265,000 tpa. The pyrite concentrate is sold to XGC and Transamine, with whom DPMC has an offtake agreement for the 200,000–250,000 tonnes produced annually.

19.2 Contracts

The terms of smelting, refining, transportation, handling, sales, hedging, forward sales, contractor arrangements, rates or charges, are within market parameters for the type of arsenic-containing complex concentrates that DPMC produces. Treatment charges for DPMC copper concentrate at DPMT are calculated on a cost plus basis. DPMC does not use mining or concentrating contractors as the mining and mineral processing activities are self-performed.

20 Environmental Studies, Permitting and Community Impact

20.1 Legal and Permitting

20.1.1 Company Information

The mining concession for operating the complete Chelopech mine, processing and associated infrastructure is owned by DPMC, a subsidiary of DPM.

20.1.2 Business Legislation

The Constitution of the Republic of Bulgaria from July 1991 proclaims and establishes guarantee mechanisms for the main principles of the market economy as the inviolability of the private property, free business initiative, equal conditions for performing economic activities, for all individuals and legal persons.

The Bulgarian Commerce Act governs the legal organisational forms of corporate business entities, and the rules applicable to each form, in respect of incorporation procedures and documents, capital and shares, shareholders, management bodies, resolutions, administration, mergers, liquidation and insolvency. Investors are free to choose the legal form of presence in Bulgaria among all types of commercial companies and partnerships envisaged by Bulgarian legislation, as well as to register as sole traders (natural persons). Limited liability company (OOD) and joint-stock company (AD) are the most often chosen types of commercial companies. Regardless of the selected legal-organisational form, the investor must announce both, the initial formation and subsequent changes, with the Commercial Register at the Registry Agency of Bulgaria.

20.1.3 Mining Legislation

The Subsurface Resources Act regulates the conditions and the procedures for prospecting, exploration and mining of underground Mineral Resources located on the territory of the Republic of Bulgaria, the continental shelf and the exclusive economic zone in the Black Sea.

The Subsurface Resources Act came into force in March 1999 and has been amended several times since its promulgation, with the last amendment in December 2017, in force from January 2018. This act established the objects over which mining concessions may be granted and setting forth the conditions and the procedure for granting concessions.

20.1.4 Taxation

The taxation of corporate income and profits is governed by the Corporate Income Tax Act (CITA). In connection with the accession of Bulgaria to the EU on 1 January 2007, a new CITA was adopted to meet the necessity of harmonisation of Bulgarian taxation legislation with the requirements of the European directives concerning direct taxation. Under CITA, all resident companies and partnerships, as well as permanent establishments of non-residents, are liable to corporate income tax of 10%. Certain types of income originating from Bulgaria and payable to foreign entities, or individuals, are subject to a withholding tax amounting from 5% to 10%.

CITA establishes rules for defining the taxable income, for applying corporate income tax exemption, for loss carry-over, thin capitalisation, and withholding tax.

According to Value Added Tax Act most of goods and services are subject to a 20% value added tax (VAT) rate. Any person, legal or physical, resident or non-resident, who has a taxable turnover of at least BGN 50,000 during the preceding 12 months, is obliged to register for VAT purposes. Only VAT registered persons may charge VAT on taxable supplies and recover input VAT charged to them.

20.1.5 Customs Duties

Customs duties are payable on the importation of goods and products to Bulgaria. Following Bulgaria's accession to the EU and gaining full member status on 1 January 2007, a number of changes and specific developments occurred in the foreign trade and customs regime, in regard to exports and imports of goods. More specifically, the new developments concerned the direct application of Community acquis, which regulates the common procedures, tariff and non-tariff measures (prohibitions and restrictions) on exports and imports of goods "to" and "from" non-member states and uniform customs control instruments.

The Single Market of the EU was built over the course of three decades in compliance with the founding documents. As a full EU member, Bulgaria also became an equal participant in the Single Market of the EU. Likewise, domestic legislation in the respective areas was brought into conformity with the legislation of the Community – the acquis communautaire. Bulgaria is also a member of the World Trade Organization (WTO).

The Bulgarian customs legislation is harmonised with the European one. The imports of products are subject to customs duties at rates determined in the Customs Tariff approved by the Government. At its accession to the EU, Bulgaria eliminated the customs duties in its trade with the other EU Member States and started applying the Common Customs Tariff of the EU in its trade with non-member states.

The Common Customs Tariff requires levying of the same duties on products, imported from third countries. It is used by the EU as an instrument for regulation of international trade. The EU keeps adapting the Common Customs Tariff to the results of negotiations for tariff reduction within the framework of the General Agreement on Tariffs and Trade, recently applied by the WTO.

Bulgaria has preferential tariff agreements (free trade agreements) with the EU, European Free Trade Associated (EFTA) and Central European Free Trade Associated (CEFTA), Turkey, Israel, Macedonia, Albania, Serbia and Montenegro, which may result in certain tariff rates being reduced or eliminated. The preferential tariff rates apply to products originating from the respective party to the agreement and are subject to submission of an evidence of origin.

20.1.6 Relief or Deferral of Customs Duties

Generally, the customs duties and import VAT are payable at the time of the importation. However, there are some customs procedures and arrangements under which products could be imported into Bulgaria without need of immediate payment of customs duties. Such procedures include:

- Inward processing: An approval can be obtained from the customs authorities, subject to certain conditions, that goods be imported into Bulgaria without payment of customs duties for the purposes of their processing and subsequent re-exportation.
- Warehousing procedures: An approval from the customs authorities could be obtained such that goods are imported free of customs duties and stored in warehouses in Bulgaria, until needed for the purposes of the business. If the goods are subsequently re-exported, no customs duties are payable. If the goods are placed on the Bulgarian market, all custom duties are due, but the payment of such can be deferred until the goods are withdrawn from the warehouse.
- Temporary imports: In some cases, assets can be imported into Bulgaria without immediate payment of customs duties, for the purposes of them being used in Bulgaria and subsequently re-exported. Certain professional equipment could be temporarily imported without payment of customs duties. Upon importation of such equipment, the custom duties that are due are deposited with the State as a guarantee. If the goods are subsequently re-exported, a certain percent of the custom duties is due (3% per month of warehousing). If the goods are placed on the Bulgarian market, all custom duties are due plus interest, but the payment of such can be deferred until the goods are withdrawn from the warehouse. Other assets could be temporarily imported with a partial relief from customs duties.

20.1.7 Social Security/Health Insurance Contributions

The main legal instruments in the field of social security and health insurance regimes are the Social Security Code and the Health Act. Legislation requires that all employees are covered by the social security system. The system includes coverage for a group of social risks, which are general illness, work accidents, occupational diseases, maternity, disability, unemployment and retirement. Every employee, who was employed for more than five working days, or 40 working hours, during a calendar month, have to be secured against all social risks, for the period of employment.

The social security/health insurance contributions are based on the employee gross monthly remuneration. However, the legislation provides for a minimum and a maximum limit of the amount, used as a base for calculating the social security/health insurance contributions. The minimum amount depends on two factors a) the code of economic activity under company's registration and b) group of professions divided by organisational levels in which the particular position falls in. The maximum amount valid for all economic activities and professions is BGN 2,600 for 2017. For 2018, this rate has been retained.

20.2 Foreign Investment

20.2.1 National Treatment

The Investment Promotion Act (IPA) provides for national treatment to foreign investors, which means that foreign investors are entitled to perform commercial activities in the country under the same provisions applicable to Bulgarian investors, except where otherwise provided by law. In particular, this principle covers the whole range of economic and legal forms of activities for accomplishing entrepreneurial businesses. The national treatment of foreign investors allows for the possibility of foreign investors to participate in the process of privatisation and acquisition of shares, debentures, treasury bonds and other kinds of securities.

20.2.2 Most Favoured Nation Status

Bulgaria is signatory to a number of bilateral treaties on promotion and mutual protection of foreign investment which provide, further to the national treatment regime, for the most favoured nation status of the investment made by entities and individuals, from one of the contracting countries on the territory of the other contracting country.

20.2.3 Priority of International Treaties

According to the Bulgarian Constitution any international treaty, which has been ratified according to a procedure established by the Constitution, which has been promulgated, and which has entered into force for the Republic of Bulgaria, shall be part of the domestic law of the land. Any such treaty shall take precedence over any conflicting standards of domestic legislation. This guiding principle finds expression in the treaties for protection of foreign investments, and especially, in the agreements for the elimination of double taxation regulations.

The international treaties on mutual protection of foreign investment always include an extended concept of a foreign direct investment, and the application of this concept has priority over the Bulgarian legislation. National treatment applies to foreign investors, which means that foreign persons are entitled to invest in Bulgaria under the terms and conditions provided to Bulgarian investors, except as otherwise is provided by law.

20.2.4 Guarantees Against Adverse Changes of the Legislation

The IPA stipulates in Article 23 that foreign investment made prior to legislative revisions imposing statutory restrictions solely on foreign investments shall be governed by the legal provisions which were effective at the moment of implementation of the said investment.

The Subsurface Resources Act provides in Article 63 for protection of investments, in prospecting and/or exploration and concession activities, against changes in the legislation which result in the restriction of rights to, or material damages for, the holder of prospecting and exploration permits or mining concessions. In cases where such changes have been adopted, the permit or concession holder upon request thereby the terms and conditions of the concluded contract shall be amended so as to restore his rights and interests in conformity with the initially concluded contract.

20.2.5 Institutional Framework

In accordance with the latest amendments of the IPA, the Bulgarian Foreign Investment Agency, established in 1995, was transformed into an agency under the supervision of the Ministry of Economy, and renamed as the Invest Bulgaria Agency. Currently, the basic function of the Agency is to support the Minister of the Economy in the implementation of the State policy for encouragement of investments.

The key function of the Agency is to assist companies in the investment process. It provides to prospective investors updated information about site identification and selection, support with the application for investment incentives, contacts with suppliers and prospective business partners, liaison with central and local government, branch chambers and non-government organisations.

20.2.6 Investment Incentives under the IPA and Commerce Act

Foreign investors are entitled to incorporate Bulgarian companies, to invest in Bulgarian companies, to acquire and to own Bulgarian companies and assets, and to freely transfer that ownership and other contractual rights. No restrictions are imposed on foreign ownership and participation in Bulgarian companies. Foreign entity may own 100% of a Bulgarian registered company. There are no restrictions on the amount of capital that can be invested in a Bulgarian company.

Earnings and profits may be repatriated after payment of liabilities due to the State, and capital can be repatriated upon cessation of the investment, or upon winding-up the business. All enterprises with foreign investments must take the form of business entities pursuant to the Bulgarian Commercial Act.

Foreign legal entities may register branches, if they have been registered abroad and are entitled to carry out business activities. Under the national law, a branch is a part of the main company but with a different seat. No authorised capital is needed for its opening.

Foreign persons may also set up representative offices registered at the Bulgarian Chamber of Commerce and Industry. The representative office, however, may not carry out commercial activities.

A joint venture is a company formed jointly by a Bulgarian and a foreign partner. The size of the foreign participation is not limited. Joint ventures must take the form of any of the business organisations stipulated in the Commerce Act.

20.3 Land Ownership

Prior to 1990, most land in Bulgaria was state-owned, either as community property or as property of state-owned entities. Individuals owned only limited farmland and residential land. Since 1991, the ownership and use of land has been regulated by the Constitution, the Property Act, the Ownership and Use of Agricultural Land Act, the Municipal Property Act, the State Property Act, and the Investment Promotion Act. According to Bulgarian legislation the right to own property is guaranteed and protected by the law. Property is private and public, and private property is inviolable. Full ownership over the land is considered the most suitable to assure undisturbed operation for the life of the mine. Where needed limited real rights in a real estate has been acquired by DPMC such as right of use, right of construction, right of passage through another's lot and especially the right to lay branches from physical-infrastructure public networks and facilities through other persons' lots. The State Property Act and the Municipal Property Act provide for two kinds of state and municipal property, private and public, and establish different mechanisms for the management of the land based on its type. In 2011, a new Forestry Act was promulgated defining special requirements related to change of designation and the acquisition procedure for forestry land. Rights and transactions affecting real estate are recorded in the Registry agency, by reference to the names of the owner and to parcels of land.

Under the Subsurface Resources Act, the holder of licence for exploration and the owner of the land may sign a contract for establishment of proprietary rights on the land in favour of the holder of the licence for the purpose of use of the land for the term of the licence, where the terms and conditions and procedure and compensation for use of the land are specified. Where no agreement is reached, the holder of licence for exploration may refer the matter to be solved by the Minister of Energy, who may, depending on the nature of the works, their duration and impact on the bowels of the earth and the environment, submit a request through the Governor of the region by location of the land, to the Minister of Finance or the Minister of Regional Development and Public Works for compulsory appropriation of the private properties or part thereof in view of the needs of the exploration, pursuant to Chapter Three of the State Property Act, and after equivalent compensation in advance.

Details of the expropriation procedure are provided for in the State Property Act. The expropriation procedure requires an approved detailed development plan. Compensation must be paid in advance of title being taken of the owner. The compensation mechanism and the amount are defined by the district governor after approval by the State.

20.4 Social Impacts

Mining is an industry traditionally associated with economic prosperity, contradictory social impacts and environmental footprint. The challenge every mining company faces today is to operate and progress in such fashion so as to respond to current market demands, at the same time providing for actual improvement of the life of society close to which it operates, and investing in the preservation and recovery of nature. Earning DPMC's social licence to operate is a long process that depends on pursuit of responsibility in corporate behaviour and actions.

DPMC provides clear benefits to its stakeholders – shareholders, employees, contractors, local communities, Bulgarian people and the government. Among some of the measurable impacts are:

- Employment rate – DPMC's operations ensure high employment rate in the region. This includes not only staff employed directly by DPMC (865), but also contractors' employees and induced business employees.
- Consumption effect – DPMC employees receive almost three times higher salaries compared to the country average which enhances the consumption effect and provides a favourable environment for local business development, which otherwise would not be present.
- Strategic community investments – DPMC's strategic community investments, nearly US$1 million per year, are focused on local education (mainly on maintaining DPMC's own school in Chelopech), sports, culture, smaller scale infrastructure as well as the University of Mining and Geology in Sofia. Community investments provide new opportunities for the local youth in the long term.
- Value to national government – This includes royalties, duties, VAT, excise taxes, individual income taxes, corporate tax, social security, health insurances and other taxes paid directly by the DPMC and its employees.
- Value to local government – Royalties and tax payments specifically to the local government fund the investment programs of municipalities of Chelopech and Chavdar. Additionally, they serve as co-financing for EU-funded projects.
- Socio-economic effects – Calculated as a multiplied socio-economic effect of investments in the local communities of Chelopech, Chavdar and Zlatitsa. This takes into account direct and indirect investments, in the categories of education, health, infrastructure, sports and culture, and others.
- Other impacts include improved levels of safety awareness in the local community. Additionally, DPMC has initiated environmental and public infrastructure rehabilitation in close proximity to the mine site.

20.5 Permitting

TMFs are operated based on an approved Mine Waste Management Plan (MWMP). Operators of class A mine waste management facilities require a permit, which is issued based on the approved MWMP. As an operator of a Class A facility, DPMC has an approved MWMP, last updated in December 2019 and an amended permit, issued in December 2019 as well. In May 2017, the Regional Inspectorate of Environment and Water – Sofia, issued a positive Decision for the investment proposal "TMF Chelopech 630 level upgrade". All the required land for the upgrading of the TMF has been purchased by DPMC in 2017. The permitting process under Spatial Development Act has commenced and will continue through to mid-2018 when the construction permit is expected to be issued.

According to the Bulgarian and EU requirements, DPMC is required to meet the water quality standards of discharge of domestic waste water. In 2018, a new Waste Water Treatment Plant (WWTP) for domestic waste water was commissioned. The WWTP is part of DPMC's commitment made under an Environmental and Social Agreement between DPMC and EBRD.

There are day-to-day operating activities require a number of specific permits, which DPMC maintains on an ongoing basis. These can be grouped in three categories: water use and discharge, blasting activities, and general waste treatment. All permits required in order to maintain the continuity of the business have been obtained and are up to date as at the time of reporting.

20.6 Tailings Management Facility Site Monitoring

The Chelopech TMF operation is based on a TMF Control and Monitoring Plan (CMP) and an Emergency Risk Assessment, which are also part of the overall MWMP. The Plan and the Assessment provide the technical details of each TMF component plus guidelines for TMF control and monitoring.

Internal operating instructions for each set of TMF are in place and have been developed on the basis of the CMP. The TMF operation includes mine waste distribution, size and location of the supernatant pond and the condition of all facilities within the TMF system. The TMF monitoring is performed according to the CMP, based on operational instructions for each TMF component, including:

- Routine daily monitoring – by visual observation and records
- Compliance monitoring – by regular measurements and data reviews against the set of criteria included in the CMP
- Environmental monitoring – by identifying the qualitative parameters of surface water, groundwater, decant water and the disposed tailings.

All observations and measurements are documented, interpreted and analysed. The reviews of all data collected as part of the TMF monitoring process (including data of all facilities under the TMF system) are conducted at several levels and with different frequency:

- Operational analysis conducted by DPMC engineering team.
- Quarterly and annual data review by the international company. Consist overall review of operational data, compliance monitoring, water monitoring and stability assessment. The summarised data is compiled as a report and presented to the operational team with conclusions and recommendations.
- Regulatory compliance reviews conducted by the Designer to monitor the TMF compliance against the CMP, Bulgarian and EU regulatory requirements.
- TMF operate according the best international practices and data reviewing conducted by an independent Consultant (Auditor), which is a reputable international company.
- Twice per year seasonal committee reviews (spring and fall) in compliance with the Bulgarian legislation, which produce compliance assessment based on reports and other documents by: government regulators, local municipalities, universities, government experts, designers and consultants.

20.7 Closure Plan and Rehabilitation

Chelopech is to provide a financial guarantee for environmental and rehabilitation costs for the Chelopech mine and facilities. In March 2010, pursuant to its agreement between the Bulgarian government and DPM, Chelopech submitted for approval to the Ministry of Economics, Energy and Tourism (MoEET), now Ministry of Energy, and the Ministry of Environment and Water (MoEW), for the Closure and Rehabilitation Plan covering the estimated closure and rehabilitation costs for the Chelopech mine. The plan was approved by the MoEET on 15 April 2010 and by the MoEW on 21 May 2010. In December 2015, competent authorities approved the updated Closure and Rehabilitation Plan with a revised value. In 2018, the Chelopech TMF overall Closure and Rehabilitation Plan was updated in connection with the TMF upgrade project to level 630. The plan was approved by the Ministry of Energy.

Chelopech was the first mining company in Bulgaria to submit a closure and rehabilitation plan in compliance with the new EU legal regulations on providing financial guarantees for closure and rehabilitation of mine sites. The total value of the closure and rehabilitation of the mine site in 2010 was estimated at €20,730,687. Revised value in 2015 was estimated at €13,949,832. In 2015, the financial guarantee was separated in two bank guarantees – one for the mine and surface infrastructure and another for the TMF closure activities. In September 2018, the Chelopech TMF overall Closure and Rehabilitation Plan was updated with a revised value of €9.4 million. The mine and surface infrastructure closure bank guarantee remains €6.3 million. In November 2019, the financial guarantees were renewed for a year.

According to the current closure plan, the monitoring of the closed TMF will continue over a period of five years. After the fifth year the overall review and report will be prepared. If necessary, the monitoring will continue for additional five years. DPMC has a plan for annual TMF control, prepared in compliance with the Bulgarian legislation, which utilises the existing monitoring system on the site in order to ensure the long-term stability of the TMF and mitigate its impact on the environment.

The main objective of the monitoring process is to collect reliable information about the condition of the TMF and its impact on the environmental media during the post-closure period. Once the TMF seepage quality meets the discharge standard requirements for the respective category of receiving water, the seepage return system (pipeline and pumps) will be decommissioned.

21 Capital and Operating Costs

21.1 Capital

The expansion project for the Chelopech mine was completed in 2012 at an overall capital cost of US$171.2 million. The project enabled the company to achieve an ore processing rate of 2 Mtpa. Through optimization and increasing operational efficiencies, the company has achieved an actual throughput rate of 2.2 Mtpa and expects to maintain this rate going forward. Table 59 presents special projects capital, sustaining capital associated with ongoing operations for the life of the mine, as well as estimated closure costs. The capital and operating costs have been developed using actual cost and performance, applied to the projected mine and processing plan. The track record of performance since DPM purchased the property is the basis for justifying the cost base.

Table 59: Capital costs (2020 to 2027)

Item	Unit	LOM
Sustaining/Replacement Capital (2020 to 2027)	US$ M	82.9
Other Project Capital	US$ M	10.7
Closure Costs	US$ M	21.7
LOM Capital Expenditure	**US$ M**	**115.30**

21.2 Operating Costs

The average estimated annual site operating cost for the LOM is US$39.36/t treated, as presented in Table 60 and Table 61.

Table 60: Operating costs – copper concentrate

Item	Unit	2020-2027
Mine	US$/t ore	17.30
Concentrator	US$/t ore	9.68
Services	US$/t ore	1.60
General and Administration	US$/t ore	7.43
Royalty	US$/t ore	2.77
Total On Site Cash Costs/t ore treated (1)	**US$/t ore**	**38.78**
Total Cash Costs/oz AuEq (2)	US$/oz AuEq	905
On Site Cash Costs/oz Au (1),(3)	US$/oz	459
On Site Cash Costs/lb Cu (1),(3)	US$/lb	1.01
Cash Costs/oz Au sold, net of by-product credits (1),(4)	US$/oz	751

(1) Refer to the "Non-GAAP Financial Measures" section of DPM Management's Discussion and Analysis (MD&A) for the three and 12 months ended 31 December 2019 for more information regarding reconciliations of these Non-GAAP measures.

(2) Total cash costs include on-site and off-site costs. AuEq ounces include gold ounces as well as copper pounds and silver ounces produced and converted to an AuEq based on the ratio of the forecast prices for each commodity.

(3) Gold and copper are accounted for as co-products. Total on-site cash costs are net of by-product silver sales revenues.

(4) Cash costs/oz Au sold, net of by-product credits, represent cost of sales, less depreciation, amortisation and other non-cash expenses, plus treatment charges, penalties, transportation and other selling costs related to the sale of copper concentrate, less by-product copper and silver revenues, divided by the payable gold in copper concentrate sold.

Table 61: Operating costs – pyrite concentrate

Item	Unit	2020–2027
On Site Cash Costs/t ore treated [(1)]	**US$/t ore**	**0.58**
Cash Costs/oz Au sold [(2)]	US$/oz	801
Cash Costs – Copper and Pyrite Concentrates		
Cash Costs/oz Au, net of by-product credits, including payable gold in copper and pyrite concentrates and related costs [(3)]	US$/oz	762

(1) On-site operating cash costs include processing costs.

(2) Cash costs/oz Au sold represent processing costs and treatment charges, penalties, transportation and other selling costs related to the sale of pyrite concentrate divided by the payable gold in pyrite concentrate sold.

(3) Cash costs/oz Au sold, net of by-product credits, represent cost of sales, less depreciation, amortisation and other non-cash expenses, plus treatment and refining charges, penalties, transportation and other selling costs related to the sale of copper and pyrite concentrates, less by-product copper and silver revenues, divided by the payable gold in copper and pyrite concentrates sold.

(4) Refer to the "Non-GAAP Financial Measures" section of the MD&A for the three and 12 months ended 31 December 2019 for more information regarding reconciliation of this Non-GAAP measure.

22 Economic Analysis

22.1 Introduction

This section describes the mine economics under conditions applicable for its development and operation, and discloses economic analyses based on changes in key parameters.

The analysis has been conducted on a site basis only and, consequently, does not include corporate overheads or head office costs.

Mining and processing data and capital and operating costs are drawn from other parts of the Technical Report and combined with the site's fiscal regime in an economic model that calculates normal measures of economic return, such as NPV, and reports key production statistics for the mine.

22.2 Economic Analysis

22.2.1 Production

Financial analysis for the mine is based on extraction and treatment of underground ore, at a rate of 2.2 Mtpa, to produce flotation copper and pyrite concentrates, which will be sold to a specialty smelter owned by DPM in Namibia for most of the copper concentrate, and to third parties for the pyrite concentrate.

22.2.2 Assumptions

In calculating the LOM returns, the following fundamental assumptions were made:

- Metal prices of US$1,250/oz gold, US$2.75/lb copper and US$23.00/oz silver will be maintained throughout the LOM.
- Metal price and currency hedging is excluded.
- The LOM is approximately eight years, with the financial analysis being run through until 2027. The mine will treat ore at the nominal rate of 2.2 Mtpa.

22.2.3 Currency, Exchange Rates and Escalation

The analysis has been conducted in US$ rather than BGN, since it is the standard currency for evaluation of mineral projects in Eastern Europe.

Base exchange rates used for the evaluation of the project are:

- US$1.25/EUR
- BGN 1.95583/EUR (BGN is fixed against EUR)
- BGN 1.56/US$.

Effects of significant changes, favourable and unfavourable, in EUR against US$ are assessed in the sensitivity analysis.

The analysis has been conducted without escalation of capital or operating costs or metal prices.

22.2.4 Reporting of Results

The relevant LOM assumptions and results are presented in Table 62 to Table 66 below.

Table 62: Throughput, LOM and metal price

Item		Unit	LOM
Mine/Concentrator	2020 to 2027 (average)	Mtpa ore	2.2
LOM		years	8
Metal prices	Gold	US$/oz	1,250
	Copper	US$/lb	2.75
	Silver	US$/oz	23.00

Table 63: LOM economics

Item		Unit	LOM
After tax	NPV at a discount rate of 5.0%	US$ M	307

Table 64: Production (2020 to 2027)

Item		Unit	LOM
Total quantity ore mined/milled		Mt	16.9
Average grades	Gold	g/t	3.03
	Copper	%	0.90
	Silver	g/t	7.55
Metallurgical recoveries			
Copper concentrate	Gold	%	49.94
	Copper	%	81.72
	Silver	%	38.24
Pyrite concentrate	Gold	%	21.04
	Copper	%	7.52
	Silver	%	24.66
LOM 2020–2027			
Total production	Gold (in copper and pyrite concentrate)	oz	1,166,935
	Copper (in copper concentrate)	t	124,468
	Silver (in copper concentrate)	oz	1,563,679
	Gold equivalent	oz	1,799,398

Table 65: Revenue and operating surplus (2020 to 2027)

Item		Unit	LOM
Revenue	Total	US$M	1,175
EBITDA	Total	US$M	479

Table 66: Cash flows (2020 to 2027)

Item	Unit	LOM
Total pre-tax cash flow	US$M	390
Corporate taxation	US$M	21
Total after-tax cash flow	US$M	369

22.2.5 Sensitivity Analysis

The economic analysis with cash flow forecasts on an annual basis has used only Proven and Probable Mineral Reserves, and sensitivity analyses with variants in metal prices, grade, capital and operating costs.

The sensitivity analysis on the updated 20 site parameters has been conducted to assess the effects of changes in key parameters upon NPV, after taxation in this case, and the results are presented in Table 67.

Table 67: LOM sensitivity analysis – after tax

Gold price	Price (US$/oz)	NPV at 0% (US$ M)	NPV at 5% (US$ M)	NPV at 7.5% (US$ M)
-20%	1,000	187	161	151
-10%	1,125	279	234	216
0%	1,250	371	307	282
10%	1,375	463	380	347
20%	1,500	555	454	413
Copper price	**Price (US$/lb)**	**NPV at 0% (US$ M)**	**NPV at 5% (US$ M)**	**NPV at 7.5% (US$ M)**
-20%	2.20	261	220	204
-10%	2.48	316	264	243
0%	2.75	371	307	282
10%	3.03	426	351	321
20%	3.30	481	394	360
Site cash costs – Copper Concentrate	**US$/t of ore processed**	**NPV at 0% (US$ M)**	**NPV at 5% (US$ M)**	**NPV at 7.5% (US$ M)**
-20%	31.02	490	401	366
-10%	34.90	431	354	324
0%	38.78	371	307	282
10%	42.66	311	260	240
20%	46.54	251	213	198
Off-site costs – Copper Concentrate	**US$/t of ore processed**	**NPV at 0% (US$ M)**	**NPV at 5% (US$ M)**	**NPV at 7.5% (US$ M)**
-20%	31.40	490	415	384
-10%	35.33	430	361	333
0%	39.26	371	307	282
10%	43.18	311	253	231
20%	47.11	252	200	179
Off-site costs – Pyrite Concentrate	**US$/t of ore processed**	**NPV at 0% (US$ M)**	**NPV at 5% (US$ M)**	**NPV at 7.5% (US$ M)**
-20%	7.56	400	333	306
-10%	8.51	385	320	294
0%	9.46	371	307	282
10%	10.40	357	294	269
20%	11.35	342	281	257
Exchange rate	**US$/EUR**	**NPV at 0% (US$ M)**	**NPV at 5% (US$ M)**	**NPV at 7.5% (US$ M)**
-20%	1.00	471	387	353
-10%	1.13	419	346	316
0%	1.25	371	307	282
10%	1.38	319	266	245
20%	1.50	271	228	210

The current outbreak of novel Coronavirus (COVID-19) and any future emergence and spread of similar pathogens could have an adverse impact on global economic conditions which may adversely impact the Company's operations, and the operations of its suppliers, contractors and service providers, the ability to obtain financing and maintain necessary liquidity, and the demand for and ability to transport the Company's products.

The outbreak of COVID-19 and political upheavals in various countries have already caused significant volatility in commodity prices. The outbreak is causing companies and various international jurisdictions to impose restrictions such as quarantines, business closures and travel restrictions. While these effects are expected to be temporary, the duration of the business disruptions internationally and related financial impact cannot be reasonably estimated at this time.

Similarly, the Company cannot estimate whether or to what extent this outbreak and the potential financial impact may extend to countries outside of those currently impacted. Travel bans and other government restrictions may also adversely impact the Company's operations and the ability of the Company to advance its projects.

In particular, if any employees or consultants of the Company become ill due to COVID-19 or similar pathogens and/or the Company is unable to source necessary consumables or supplies or transport its products, due to government restrictions or otherwise, it could have a material negative impact on the Company's operations and prospects, including the complete shutdown of one or more of its operations. The situation is dynamic and changing day-to-day. The Company is exploring several options to deal with any repercussions that may occur as a result of the COVID-19 outbreak and global pandemic.

23 Adjacent Properties

There are no other mining operations/projects in the immediate vicinity of the Chelopech mine. The Assarel/Medet and Elatsite mines are approximately 15 km and 5 km from Chelopech, respectively, but are based on porphyry-copper deposits, which have no practical relevance to the Chelopech epithermal copper-gold sulphide mineral deposit.

24 Other Relevant Data and Information

The report authors are not aware of any other relevant data and information that is material to this project, that has not already been covered elsewhere in this Technical Report.

25 Interpretation and Conclusions

The following interpretations and conclusions are set out in relation to the work completed in 2019.

25.1 Geology and Sampling Procedures

During site visits undertaken annually by CSA Global from 2013 to 2019 inclusive, meetings have been held with DPM staff and the SGS laboratory manager. Data and procedures were reviewed in the mine office, underground operations, core yard, processing plant and SGS laboratory.

Conclusions based on these site visits include:

- Procedures used during logging, splitting and sampling of drill material are appropriate, with the core farm and digital data collection methods well managed.
- Underground face sampling and mapping procedures are of a high standard and completed by well trained and competent geological staff.
- The onsite acQuire database is robust and of appropriate standard; however, the historical data (which is no longer a significant part of the overall database) is not readily verifiable.
- SGS Assay laboratory in Chelopech is well run, has excellent housekeeping with good procedures and security controls in place. An audit was completed in September 2015 by David Muir (CSA Global Senior Database Geologist) and reported no significant issues.

25.2 Underground Face Sampling Data

Face sampling reviews and how well they compare with drill data have previously been undertaken and the results of this review remain current and relevant. Based on these reviews, as well as observations made onsite made by CSA Global staff, it is believed that all face sampling data are of sufficient quality and should be considered suitable for use in mineral resource estimation. Care needs to be taken that the nominal 3 m length of face samples is maintained to ensure drill samples (composited to 3 m) are of equal weight. Appropriate use of declustering to avoid bias in areas of close spaced sampling is completed. A possible high-grade bias may exist when sampling the higher-grade zones, most likely due to the competency contrast between massive sulphide ore and lower-grade siliceous material, resulting in unintentional weighting of samples with high-grade sulphide material.

Between 2018 and January 2020, the practice of shotcreting faces meant that representative sampling became more difficult (risk of contamination from shotcrete) and geological mapping was hindered. In January 2020, a memorandum was issued whereby shotcreting would be limited to capital work only, which resolves the issue of both representative sampling and geological mapping.

25.3 Operational Resource Development Drilling

In 2019, a total of 51,922 metres of resource development diamond drilling was completed within the Chelopech concession.

Mineral resource development extensional drilling was concentrated on the upper levels of Target 700 and Blocks 151, 17, 18, 5, 25 and 10, with the aim to expand the current ore body extents and allow conversion of Mineral Resources into Mineral Reserves. Further to this, the areas down plunge of Blocks 144 and 147 were also drilled during the year.

In 2019, metallurgical testing was completed on two targets – Target 7 and Target 148. Metallurgical testwork indicates that the mineralisation is highly amenable to the current processing flowsheet. As a result, the targets were converted into blocks (respectively Block 7 and Block 148).

DPMC's operational mineral resource development drilling strategy for 2019 combined resource definition drilling designed to a 30 m x 30 m drilling grid with infill grade control holes. Wider spaced mineral resource definition drilling was employed to define Indicated Mineral Resources. Operational infill drilling on a 15 m x

15 m drilling grid was designed to upgrade Indicated Mineral Resources to the Measured Mineral Resource category and to allow detailed production design and scheduling works.

25.4 Geological Model

CSA Global believes the current understanding of geology and mineralisation controls is good, and that the current geological model adequately predicts the in-situ grades and tonnes realised during underground development and mine production. Implementation of a procedure to create short-term planning model, incorporating updated grade control geology mapping, sampling and drilling data has been completed. This model is provided to mine planning department on a quarterly basis and is delivering improvements in short-term planning plus facilitating ongoing improvements to the process of completing the annual MRE update.

Areas requiring improvement over the next 12 months are related to software interfaces between production reporting and in-situ grades, handling of 3D geology mapping, and survey of development and production void volumes.

25.5 Assay QAQC

The assay results for blanks, standards, field duplicates, preparation duplicates and laboratory duplicates for gold, copper, silver, arsenic and sulphur samples undertaken since the previous MRE have been reviewed. A summary of conclusions relevant to DPMC are:

- The QAQC procedures implemented at Chelopech are adequate to assess the accuracy and precision of the assay results obtained.
- Overall blank results show no significant indications of contamination. Where copper and silver failures were noted, these tended to be in non-certified blanks or at low grades relative to economic levels of mineralisation and laboratory lower detection limits.
- No fatal flaws were apparent with the standards (assay accuracy), but non-systematic bias and failures were noted in individual CRMs (i.e. some bias is positive and some negative).
  - Silver standard failures – DPMC site-specific standards show some failures but these results are exaggerated by the assay precision (results are returned in increments of 1.5 g/t) and many of the standards having expected values close to the detection limit (threshold). As silver is a minor element, this issue is not considered material to the MRE.
  - Copper standard bias – Most probably due to the digestion method used at the site laboratory not being the same as used in the Geostats round robin when assigning an expected value.
- Duplicates analysed at SGS Chelopech show good repeatability with no significant bias. Sporadic issues were noted with silver and arsenic duplicates analysed at SGS Bor and overall SGS Bor duplicates had poorer precision and higher biases than samples analysed at SGS Chelopech.
- Instances of between laboratory bias (over reporting by approximately 3% and 4%) were noted in the gold and copper external check samples (umpires). It must be noted that SGS Chelopech under reports with respect to the umpire assaying so the mineral resource estimate would not be overstated but is more likely to be slightly understated.
- SGS Chelopech umpire results are precise, but SGS Bor results have poorer repeatability than expected.

25.6 Database Validation

DPMC capture data daily into the acQuire GIMS, ensuring that the data is validated using constraints and triggers. Verification checks are also conducted on surveys, collar coordinates, lithology, and assay data.

Data undergoes further validation by CSA Global through a series of Datamine loading macros. The report authors have reviewed the reports and believes the data verification procedures undertaken on the data collected from DPMC adequately support the geological interpretations and the analytical and database quality, and therefore support the use of the data in the Mineral Resource and Mineral Reserve estimates.

25.7 Bulk Density

In 2013, a review of bulk density data was undertaken (CSA Global, 2014). The results of this review remain current and relevant. CSA Global concludes that the in-situ dry bulk density data are collected using appropriate sampling methods and analysis procedures. The methods used to estimate density to determine the mineral resource tonnage, through a combination of ordinary kriging in areas of detailed sampling, and by application of the relationship between sulphur grade and density where insufficient samples are available, are suitable for this style of deposit and mineralisation.

25.8 Mineral Resource Estimation

Copper, gold and silver mineralisation has been modelled for high-grade stockwork “Blocks” which are enclosed within a lower-grade siliceous alteration envelope. The mineralisation Blocks are generally discrete units and have been modelled as hard boundaries (i.e. only samples within each volume are used to estimate grade and tonnes for the volume).

Drillhole samples were composited to 3 metres downhole after a statistical review demonstrated 3 metres was an appropriate composite length and does not produce any significant grade bias. This length matches the nominal underground face sampling width of 3 metres allowing drillhole and face sampling data to be combined for grade estimation.

Assay data in the high-grade stockwork domains show moderate to low coefficients of variation, with sulphur showing the lowest of all the elements. Gold statistics show moderate to high coefficients of variation. Statistical analysis of composites within the low-grade siliceous Blocks show similar but lower grade distributions with and moderate to high coefficients of variation.

Moderate correlation was noted between copper and gold while strong correlation exists between copper and arsenic in high-grade domains. Significant differences in the levels of correlation are noted between the different domains. Gold has undergone a separate and more pervasive phase of mineral emplacement relative to copper.

Copper and gold grades distributions for the various estimation domains are characterised by being positively weighted with moderate to high coefficients of variation, indicating that high-grade values may contribute significantly to local mean grades. Appropriate copper and gold top cuts were obtained by reviewing probability plots and the impact of applied cuts to the mean grades and standard deviation. No sulphur data was top cut due to the low number of outliers in each population.

Face sampling, underground resource drilling and surface drilling datasets shows clear clustering of data, biased towards higher-grade regions of the mineral deposit. This is due to a high density of face sampling within the high-grade portions of the resource currently targeted for mining. Declustering was completed to remove this effect prior to resource estimation.

Variograms were modelled for all mineralisation blocks. The modelled orientations were consistent with the geological understanding of the mineralisation. A low nugget effect and a dominant first structure were the key features of the models.

Grade was estimated into a 10 m x 10 m x 10 m volume block model using ordinary kriging for copper, gold, silver, arsenic and sulphur. Optimum sample search parameters were determined through a process of KNA completed to investigate kriging efficiency and slope of regression. In addition to this, results from the variography review and known data spacing support the selection of search parameters chosen.

Swath plots were reviewed to assess semi-local scale reliability of blocks relative to input data along bench, easting and northing slices. Mean grades of inputs and outputs were compared. Histograms and probability of inputs and outputs were compared to assess level of smoothing. Visual validation of cross sections showed that blocks reflect the grade tenor of input data.

The MRE for the Chelopech Mine has been classified as either Measured, Indicated or Inferred Mineral Resources following the definition standards specified by the CIM and incorporated into NI 43-101. The MRE has been reported using an operating net profit cut-off of >US$0 to satisfy the requirement that there be reasonable prospects for eventual economic extraction.

The Mineral Resource has been depleted for mining as at 31 December 2019. A 3 metre buffer around existing depletion has also been removed from the resource, on the assumption that if it has not already been mined out, it no longer satisfies reasonable prospects for eventual economic extraction, given its proximity to existing development.

25.9 Process Plant

The Chelopech process plant operation is at a mature steady-state with a high level of automation and control as well as a very competent workforce and management team. Plant availability remains around 92% and the plant consistently achieves the its operating target of treating 2.2 million tonnes of ore per annum. The recovery forecast models are reviewed regularly and remain accurate based on the current ore feed and plant performance.

Future effort and focus will be around implementing advanced process control tools and other operational technologies that will optimize the performance of each section as well as ensuring the entire facility is operated at the economic optimum, based on plant feed and various other factors.

25.10 Mine Operations

The mine is now a mature steady-state operation with a high level of management control, up-to-date equipment and a workforce that can operate the systems adequately. The high quality of the Mineral Reserves mean that a high level of mine planning can be instituted and complied with.

It is CSA Global's belief that operations will continue at current levels, given the continued level of management. Mining equipment is expected to be replaced and updated on a regular basis to ensure mechanical availabilities commensurate with global norms.

25.11 Qualitative Risk Assessment

The table below summarises the areas of uncertainty and risk associated with the project, and has been prepared from reviews completed by CSA Global, and informed by the conclusions summarised above, and recommendations discussed in Section 26.

Table 68: Project-specific risks

Project risk area	Summary	Outcome	Mitigation
Geology and data management	No significant risks.		
Resource estimation	No significant risks.		
Mining: Future crown pillar reclamation	There are several crown pillars remaining in historical mining areas that contain Mineral Resource volumes that may, in whole or part be economically extractable.	Pillar extraction in old mining areas carries a degree of geotechnical and operational risk. Geotechnical conditions in the pillars may cause difficult operational conditions, leading to premature cessation of operations.	Recent experience (2014–2016) gained in the recovery of 235,000 t of 150 block crown pillar has enabled a set of safe operating practises to be established. Additional works are required to fully assess the degree to which material proximal to other historic mining areas can be extracted.
Mining: Secondary stope filling	Filling of secondary stopes, is essential to ensure an orderly stoping sequence.	Delayed filling will affect the mining sequence and impact on the mining schedule.	Ensure the filling sequence is not delayed or interrupted.
Pyrite Treatment Project	Confirmation of recovery predictions and capital and operating costs.	Implementation could add up to an additional 70,000 to 80,000 oz production at a cash cost of <$800/oz.	Project will only be reinstated once the long-term gold price is considered stable.

Project risk area	Summary	Outcome	Mitigation
Force majeure (including COVID-19 outbreak)	Could affect labour and supply chain which could impact capital and operating costs. Could affect obligations under the concession and exploration contracts	Could impact on the mining and exploration schedule	Managing inventories and reviewing alternative supply options should any disruptions occur. Focus on managing outbound supply chains, including, by considering multiple sale and transportation outlet. Written notice to MoE for temporary suspension of the concession contract for the period of Force majeure. Additional agreements for extending the exploration contract terms and extension of other contracts for land use.

26 Recommendations

26.1 Assay QAQC

A QAQC program has been implemented by DPM to provide confidence that sample assay results are reliable, accurate and precise. No fatal flaws were observed, and the following is recommended:

- The failed CRMs should be investigated (potential sample swaps) and the database updated accordingly.
- The notable difference in precision and bias observed at SGS Bor compared to SGS Chelopech should be investigated.
- DPMC site-specific standards show good precision and report within two standard deviations of the expected value, but exhibit bias (particularly with respect to copper values). It is recommended that the results of these are reviewed over the last three years to determine whether the results are consistent or whether drift has occurred. If the results are consistent, then the expected values should be adjusted accordingly. Note that as Geostats has certified these standards, they should be notified of the bias.
- The bias in the external copper results between SGS Chelopech and ALS Rosia Montana requires ongoing monitoring. The bias previously observed in the gold umpires appears to have been resolved.

26.2 Geology and Mineral Resources

- Additional drilling of zones above 450 level in proximity to historical cave zones is warranted and as such is part of the long-term exploration strategy at Chelopech mine. Measured and Indicated Mineral Resources in this area were not considered in the current Mineral Reserves estimate outlined in this Technical Report. Resource drilling activity will continue in 2020 and geotechnical assessment to better understand risk in cave zones before consideration for conversion to Mineral Reserves in due course.
- In conjunction with exploration drilling, grade control drilling to delineate the orebody boundaries should continue to improve the location of the ore boundaries and reduce the risk ore dilution and loss.
- Continue to review and monitor the "representivity" of face samples for use in ongoing MRE work.
- Continue with structural data mapping and development of the structural model, to determine the paragenesis, pre-, syn- and post-mineralisation structures. Review the potential impact or application this structural data as an enhancement to the MRE modelling process.
- Use the structural model to assist exploration drill targeting.
- Further development of lithogeochemical vectoring approaches, as used in recent DPM exploration drilling programs, to generate exploration targets in areas where geophysics has not identified anomalies. In addition, investigate if multi-element geochemistry can be used to define geotechnical domains in the mineral resource model, particularly in relation to hardness which is useful information for the plant.
- A 3 m buffer wireframe used to sterilise mined out areas is currently created using an automated process. It is recommended that moving forward, as part of end of month finalisation of mined out volumes, that the surveyor and mining engineer identify zones that are not amenable to mining, and include those in mined out volumes, so that the 3 m buffer assumption can be replaced with a more refined approach that is informed by the experience of the mining engineer.

26.3 Mining and Processing

- Continue attention to the planning detail that has been successful at demonstrating continuous improvement at the Chelopech Mine.
- Continue current design and operating procedures to mitigate risks in extracting Block 19 and 103 crown pillars.
- Maintain the use of modern technology in equipment sourcing and utilisation.

- The positive attitude of the Chelopech personnel and their interest in continually improving should continue to be encouraged.
- Ensure designed operational practices are always adhered to.

26.4 2020 Operational Resource Development Drilling

The 2020 Mineral Resource development strategy for Chelopech will focus on the upper levels of deposit.

Based on the results from 2019, resource development drilling in upper levels of Block 151 will continue from underground and surface drilling programs. The aim is to test the current ore contours (south boundary) and look for extensions. The purpose of the planned surface drilling program is to discover new mineralisation zones near to the historically mined HG orebody 390 in the west where the contact with the covering sandstones is defined as having potential for massive lensoidal mineralisation bodies.

Drilling program in upper levels of Blocks 17, 25 and 5 will continue in 2020. The purpose of this drilling program is to determine the shape and size of the mineralised zones.

Target 700 extensional drilling will continue with the aim to further delineate the target volume and to begin establishing continuity between drillholes. The Target 700 area coincides with southwest-northeast structural trend which has been assessed as having high potential for hosting mineralisation. The mineralisation is presented as quartz-barite-sulphide veins coincident with a wide silica alteration zone and is primarily enriched with gold-silver but virtually devoid of copper.

Additionally, DPMC plans to test the following targets:

- Extensional drilling:
  - Extensional diamond drilling in upper levels in northeastern direction from Block 10 and northern from Blocks 18 and 7. This area is poorly explored and historical drilling results in combination with structural and lithological models indicate untested mineralisation may be present in this area.
  - Extensional drilling in a target area “North”, located in the northeast section of Chelopech deposit close to the boundary of Block 147 between 210 mRL and -80 mRL. The mineralisation is presented as semi-massive to massive copper-gold mineralisation constrained within steeply dipping structures. This section of the mine has been poorly explored to date.
  - A short program will be undertaken aiming to test the gap between Block 149, Block 25 and Target 4.
  - Extensional drilling in upper levels of 150 near to the boundary of the sandstone and volcanic rocks. In a closer space between Block 150 and the west boundary of Block 19, there are many high copper-gold narrow zones.
- Grade control drilling:
  - Grade control drilling in Blocks 103 and 151 between levels 400 mRL and 300 mRL to test the current ore contours and possibly extend them.
  - Grade control drilling in Blocks 144, 145, 147, and 149 to check the continuity of mineralisation, to define the orebody contours.
  - Grade control drilling in eastern parts of Block 19 between 320 mRL and 260 mRL.

For 2020, a total 44,000 metres of operational resource development drilling has been planned to cover the targets mentioned above. DPMC intends to spend US$2,200,000 for operational resource development drilling during 2020.

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