Review and Pit Optimization of Eti Gümüs Silver Mine in Turkey (according to international standards)

Authors:

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- Ulrich Ruppel Mining Director (CP Mining AusIMM) IMC-Montan Consulting GmbH

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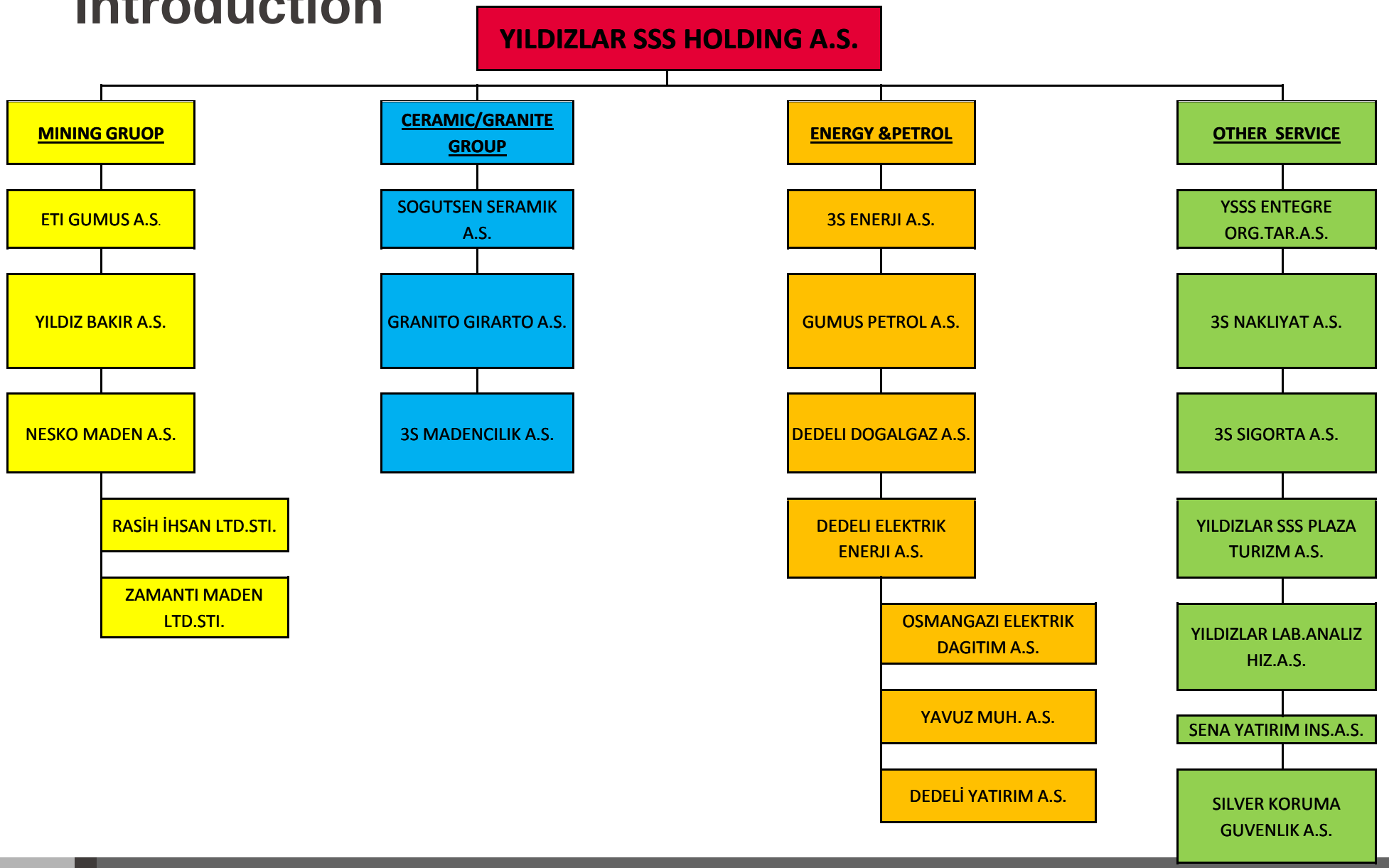
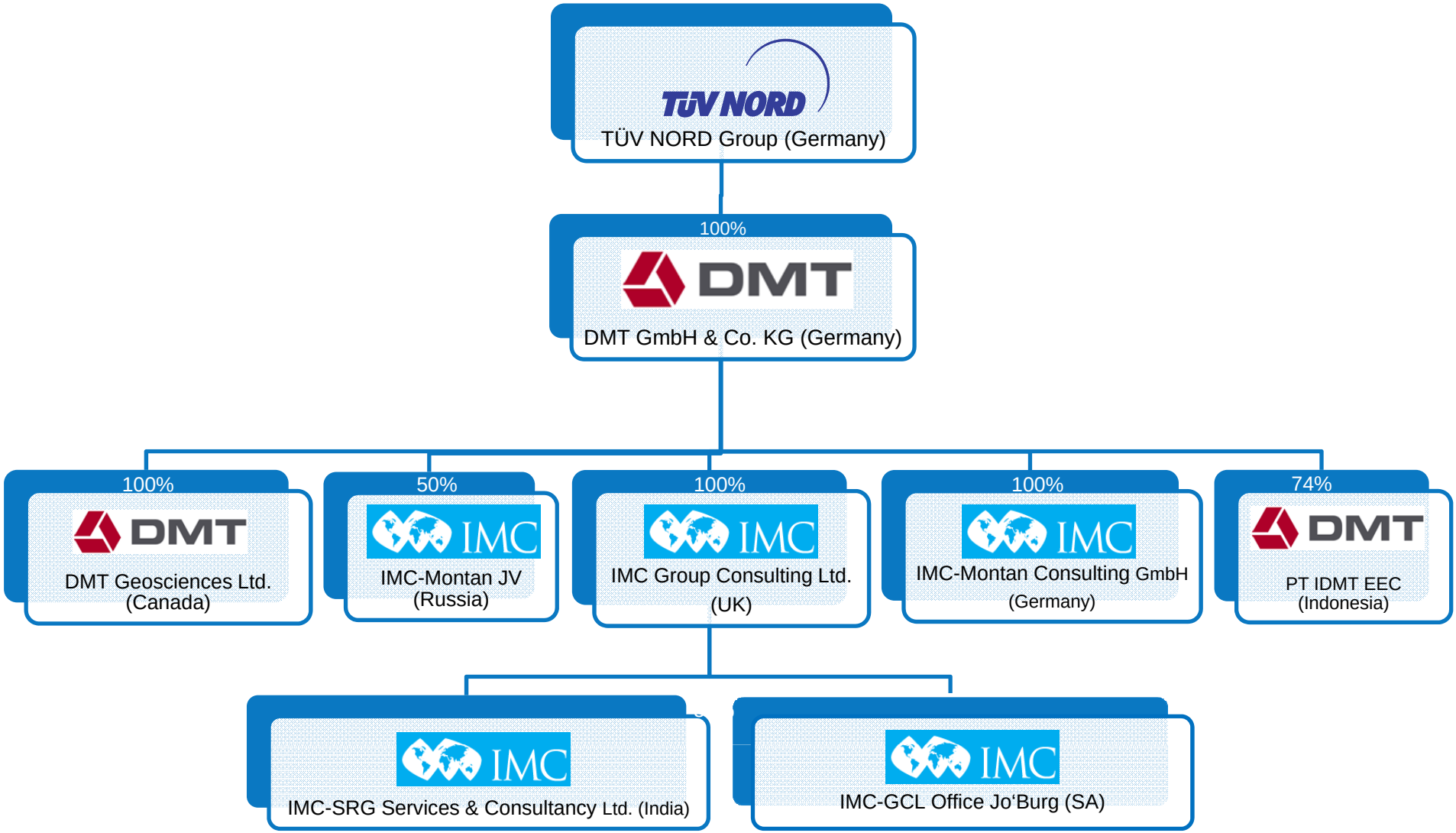
Introduction

- **Eti Gümüs – largest silver producer in Turkey**
- Preparation for IPO (Istanbul)
- International Mining Consultancy was required for preparation of a report following Canadian NI 43-101 / JORC Code
- Yildizholding selected IMC-Montan Consulting, a subsidiary of DMT GmbH & Co. KG, member of TÜV-Nord Group
- Scope of Work: - Operational and Life of Mine Plan (LOM)
  - NI 43-101 / JORC Code report

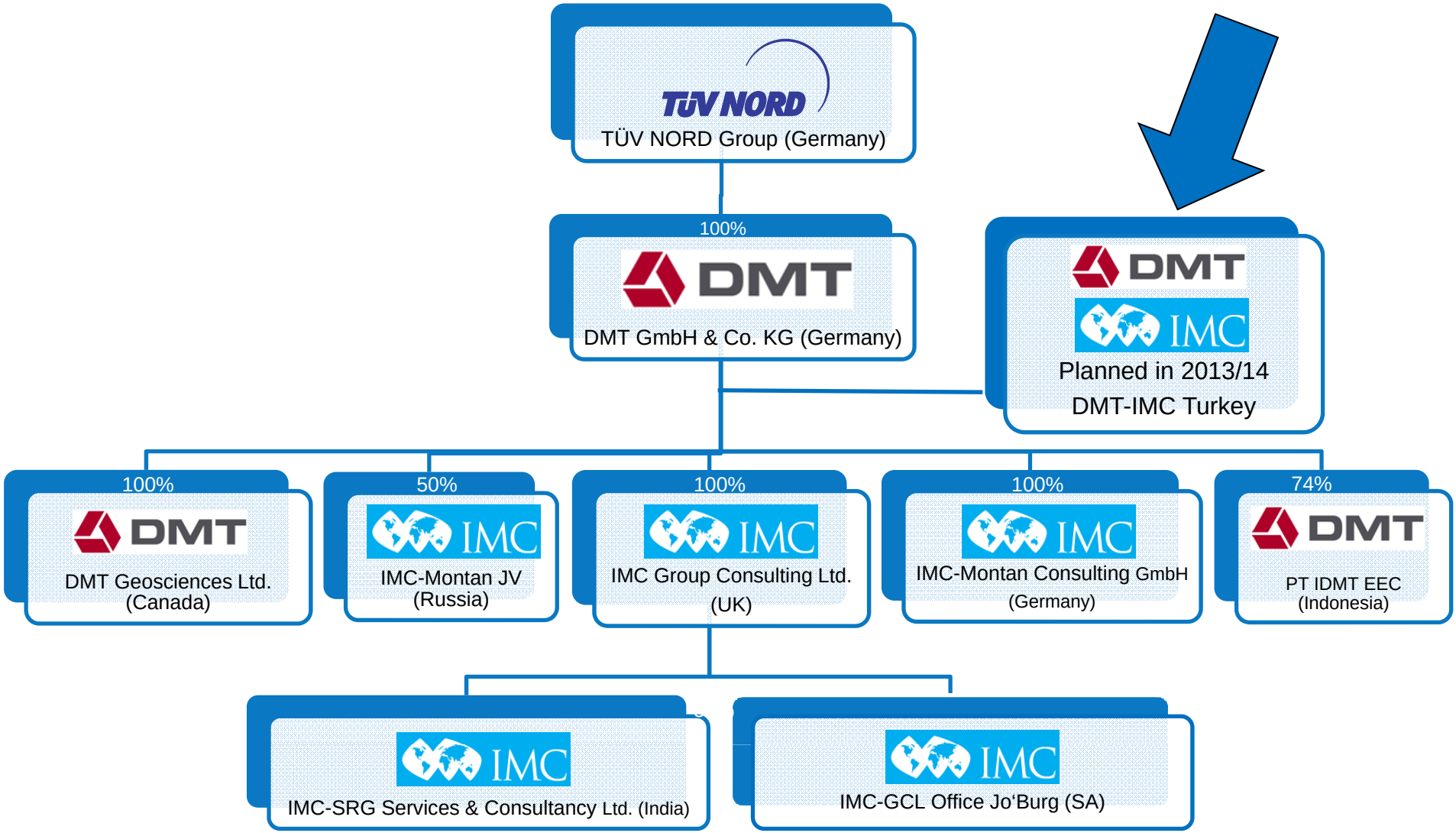
Introduction



Introduction



Introduction



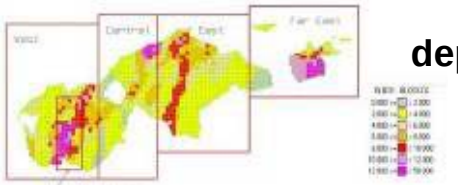
The Parent Company …

DMT GmbH & Co. KG at a glance

- 130 Mio. € annual turnover (2012)
- Approx. 660 employees

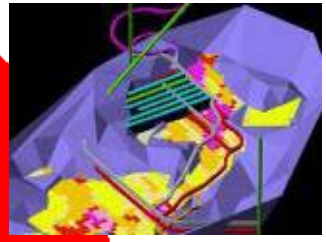
- 16 government approved expert bodies for safety
- 3 accredited testing laboratories
- 75 government approved experts

Services for the Mining Industry



deposit-modelling

mine planning



greenfield development

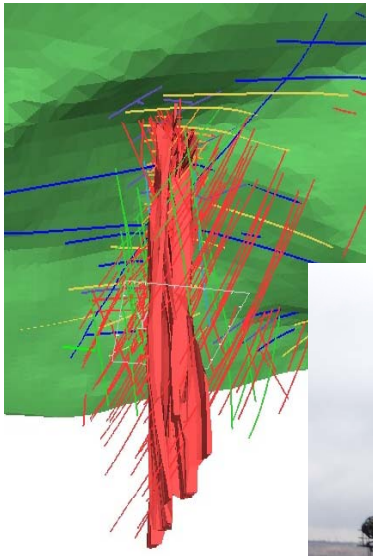
process design

mine site rehabilitation

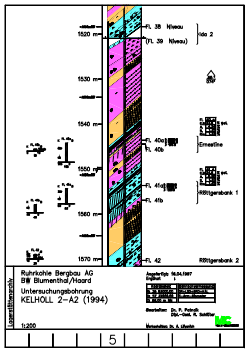
assistance during operation

Scope of Services IMC

- Geology & Orebody Modelling
- Resource/Reserve Estimates compliant to JORC or NI 43-101
- Bankable Studies
- Engineering Services
  - Mine Design
  - Process Design
- Project Management Services
- Environmental & Social Impact Assessments
- Rehabilitation of Mine Sites
- Investors‘ Support
  - Due Diligence
  - Mineral Expert Report
  - Project Valuations
- Management Assistance during Operation



Geology & Resources (DMT-EG)

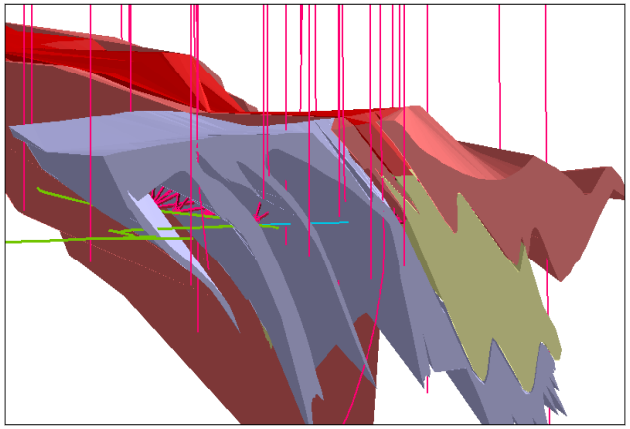


Services

- Mapping
- Exploration
- Resource evaluation
- Geological risk analyses

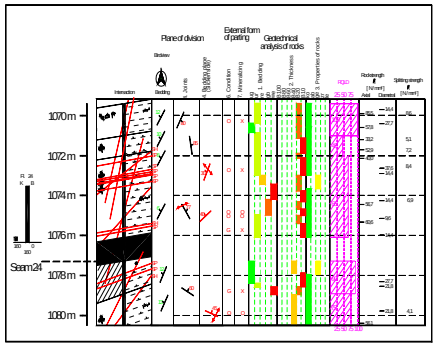
Software Expertise

- SURPAC
- DATAMINE
- VULCAN
- SURFER
- IRAP RMS
- PETREL
- MINEX
- ROCKWORKS
- LYNX



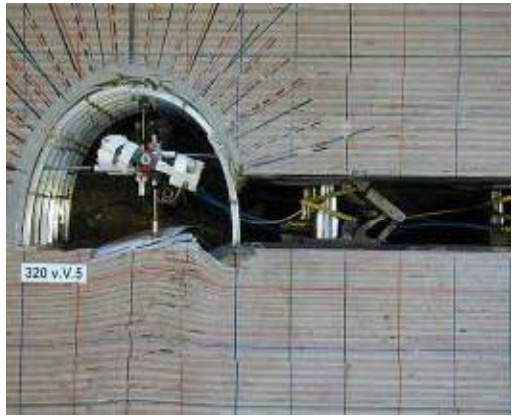
Planning and supervision of

- 2D and 3D seismic surveys
- Geoelectrics, gravimetry a.o.
- Prospecting and drilling
- Sampling and QC
- Borehole geophysics



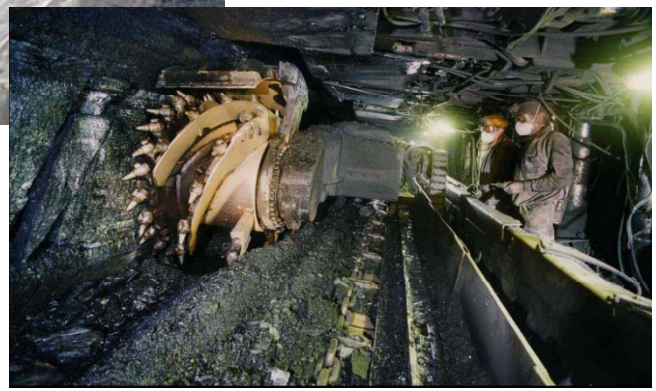
Rock Mechanics

- Geotechnical Assessments
- Stabilisation of Mine Workings
- Assessment of underground excavations
- Simulation and Testing of Roof Support elements
- Rock Burst Prevention
- Pit Slope Stability & Stabilisation



Extraction & Haulage

- Extraction Technologies for Coal & Ore
- Layout and design of
  - Shovel & Truck
  - Long Wall
  - R&P
  - Bucket Wheel Mines
- Life of Mine Plans
- Layout and design of haulage systems
- Layout and Design of Backfilling Plants



Mineral Processing

- Processing Technologies
  - Coal
  - Iron Ore
  - Base Metals
- Lab and Pilot Plant Testing
- Simulation Software for Processing
- Flow Sheet Development
- Design of Beneficiation Plants
- Project Management Services

Specialist Services

- Underground Mine Ventilation
- Coal Mine Methane & Utilisation
- Mine Closure Planning
- Subsidence Control
- Hydrogeology and Mine Water
- Environmental Services
- Methane Inflow Forecast Calculation
- Gas Outburst Prevention
- Mine Safety Audits

Introduction – NI 43-101

Item 1: Summary
Item 2: Introduction
Item 3: Reliance on Other Experts
Item 4: Property Description and Location
Item 5: Accessibility, Climate, Local Resources, Infrastructure and Physiography
Item 6: History
Item 7: Geological Setting and Mineralization
Item 8: Deposit Types
Item 9: Exploration
Item 10: Drilling
Item 11: Sample Preparation, Analyses and Security
Item 12: Data Verification
Item 13: Mineral Processing and Metallurgical Testing
Item 14: Mineral Resource Estimates
Item 15: Mineral Reserve Estimates
Item 16: Mining Methods
Item 17: Recovery Methods
Item 18: Project Infrastructure
Item 19: Market Studies and Contracts
Item 20: Environmental Studies, Permitting and Social or Community Impact
Item 21: Capital and Operating Costs
Item 22: Economic Analysis
Item 23: Adjacent Properties
Item 24: Other Relevant Data and Information
Item 25: Interpretation and Conclusions
Item 26: Recommendations
Item 27: References

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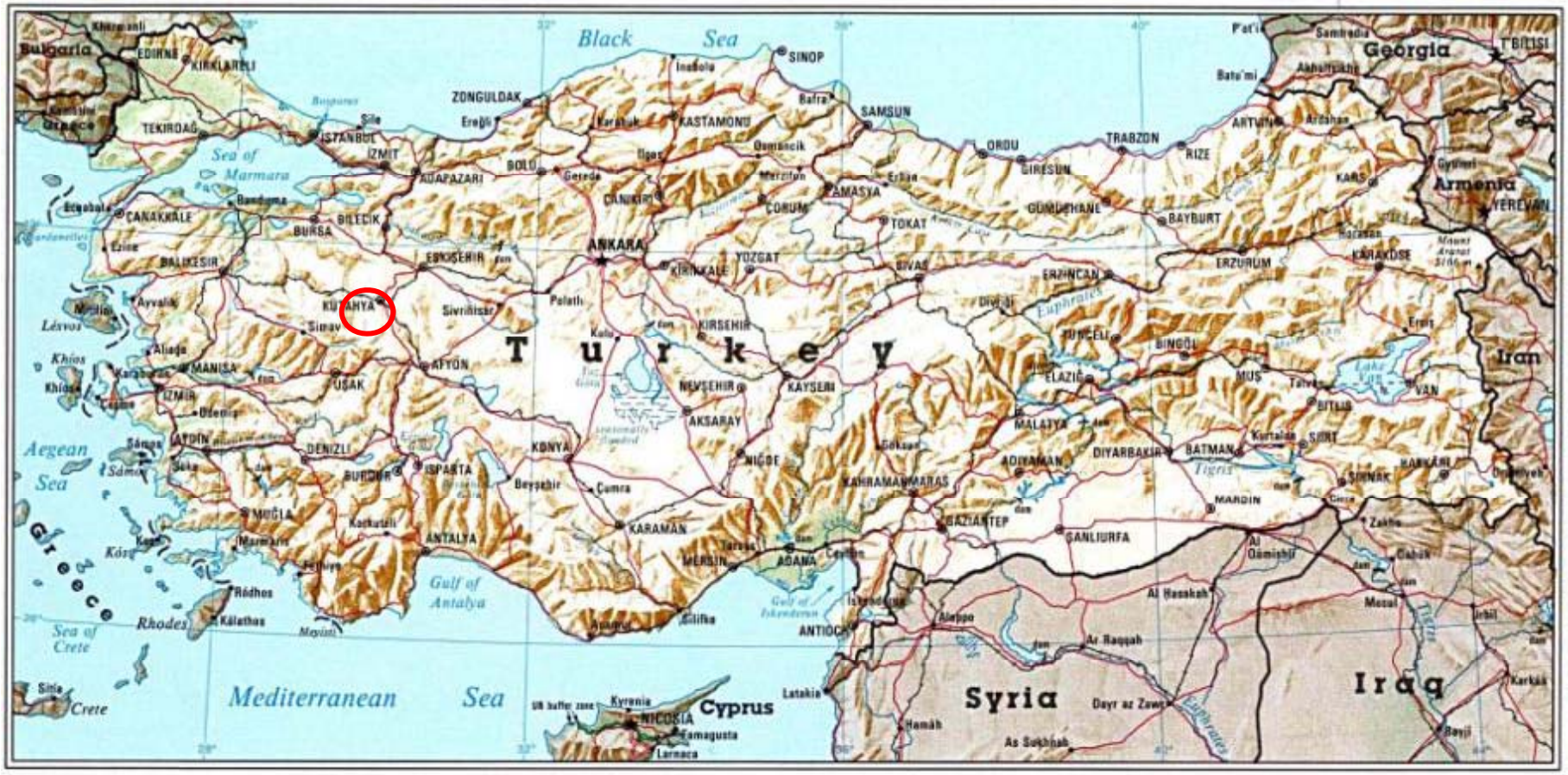
Project - Location



Project – other key data

- Historical production up to 4 Mt/a
- Target: Stable production of 4.32 Mt/a
- Resource grade (measured and indicated): 128.6 g Ag/t and 0.68% Zn
- Potential for re-processing of tailings 26.7 Mt @ 83 g Ag/t

Project - pictures

Project - pictures

Project - pictures

Contents

Base Parameters

- First Time Pit Optimization for the Operation

➡ Dataset not in the required format

➡ Effort was required to collect and generate required dataset

Base Parameters

Final compiled set of base parameters for Pit Optimization

Silver Price	30 US$/oz
Waste Mining Cost	1.95 $/t
Ore Mining Cost	2.15 $/t
Processing and G&A Cost	21.5 $/t
Silver Recovery	52 %
Mining Dilution	5 %
Mining Losses	5 %
Overall Pit Slope	45 deg.

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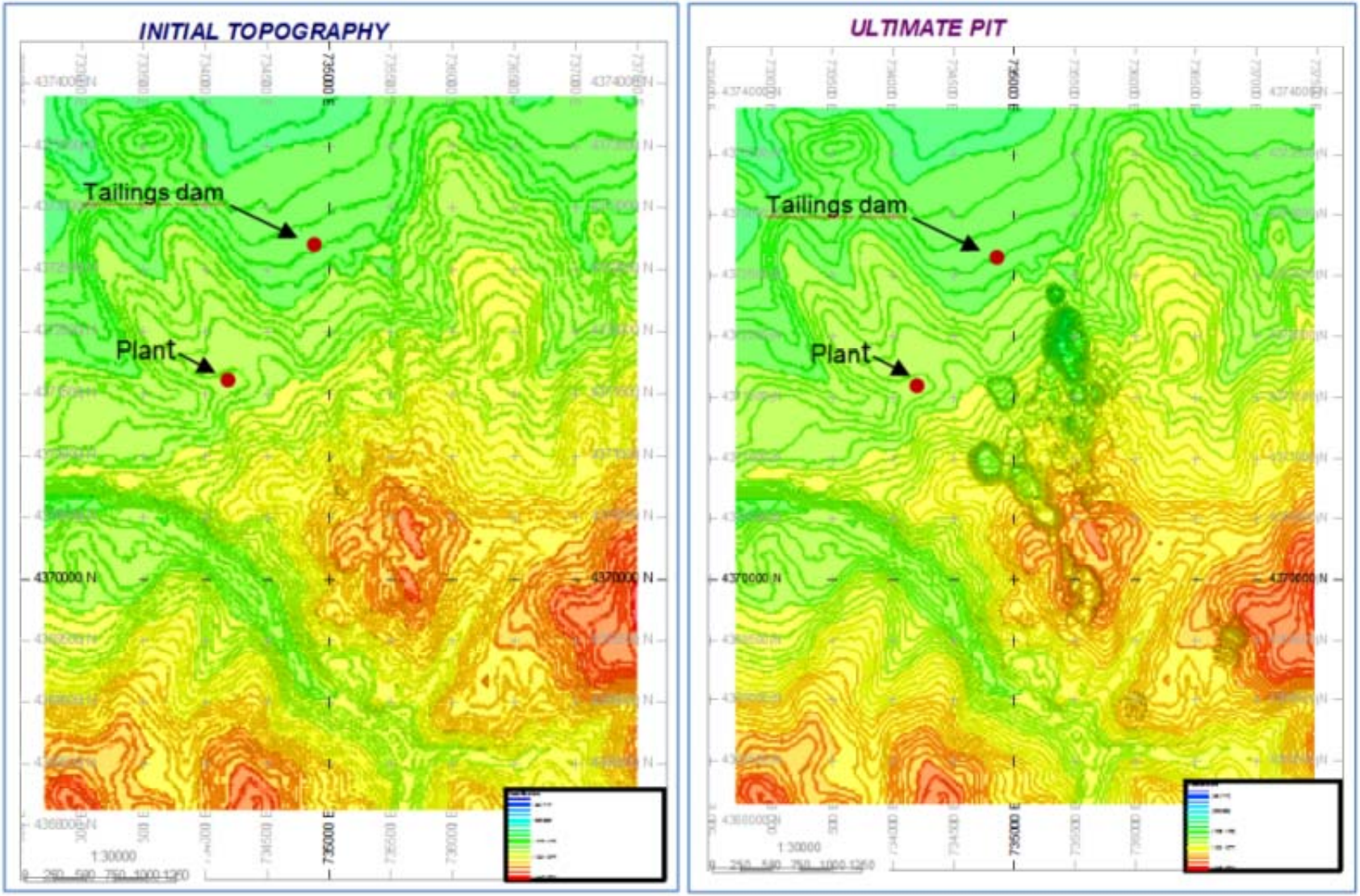
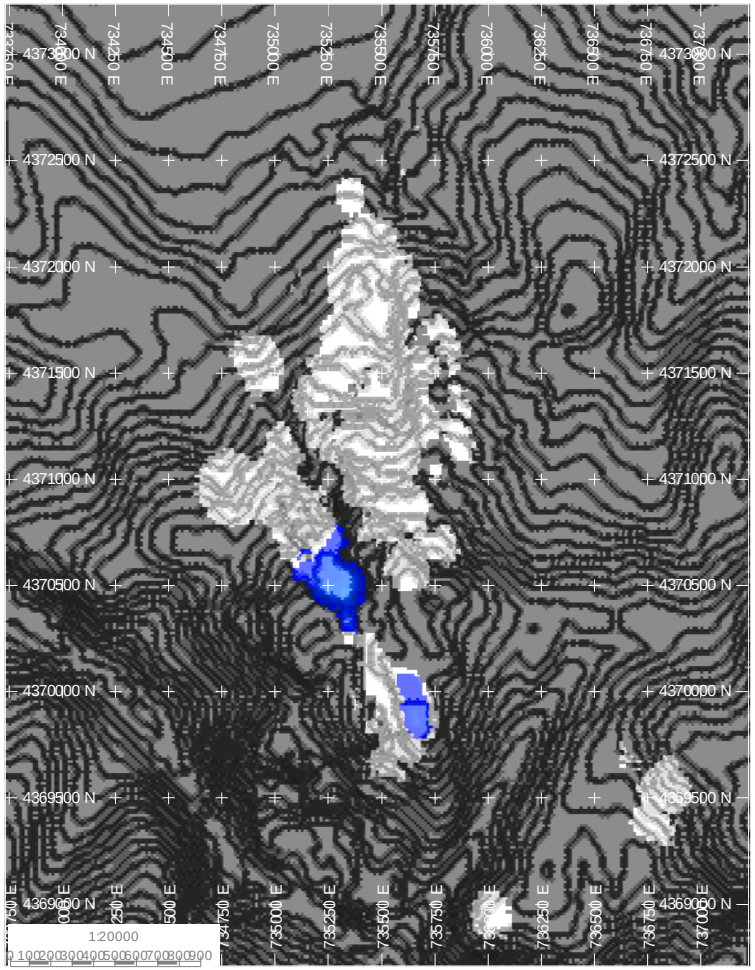
Results


INITIAL TOPOGRAPHY
Tailings dam
Plant
ULTIMATE PIT
Tailings dam
Plant

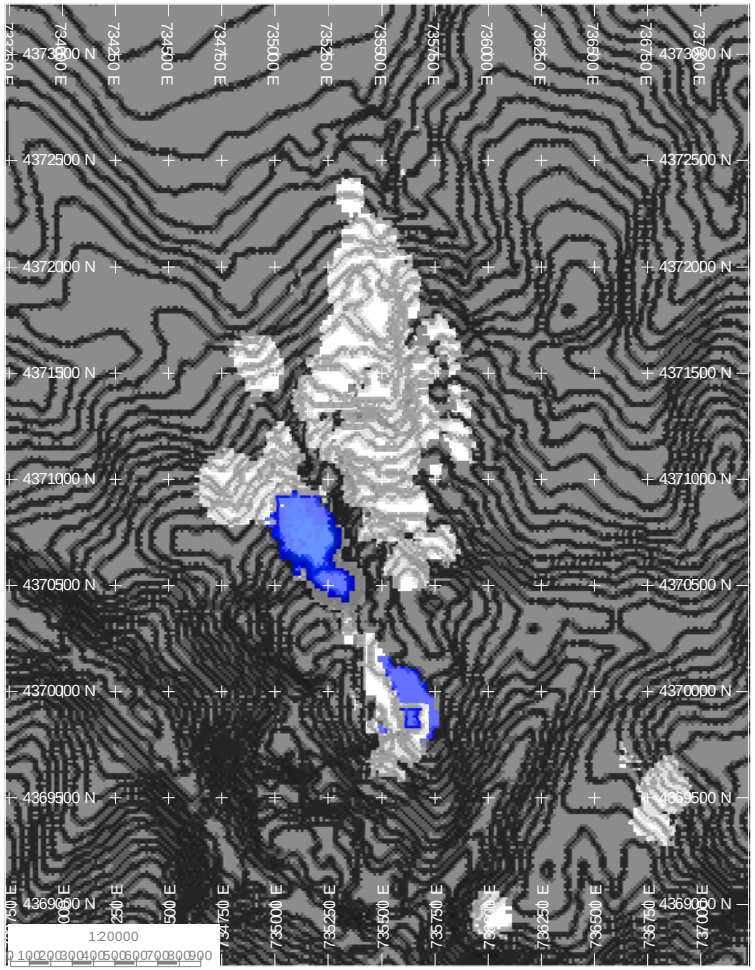
Mine Development year 1

Year 1



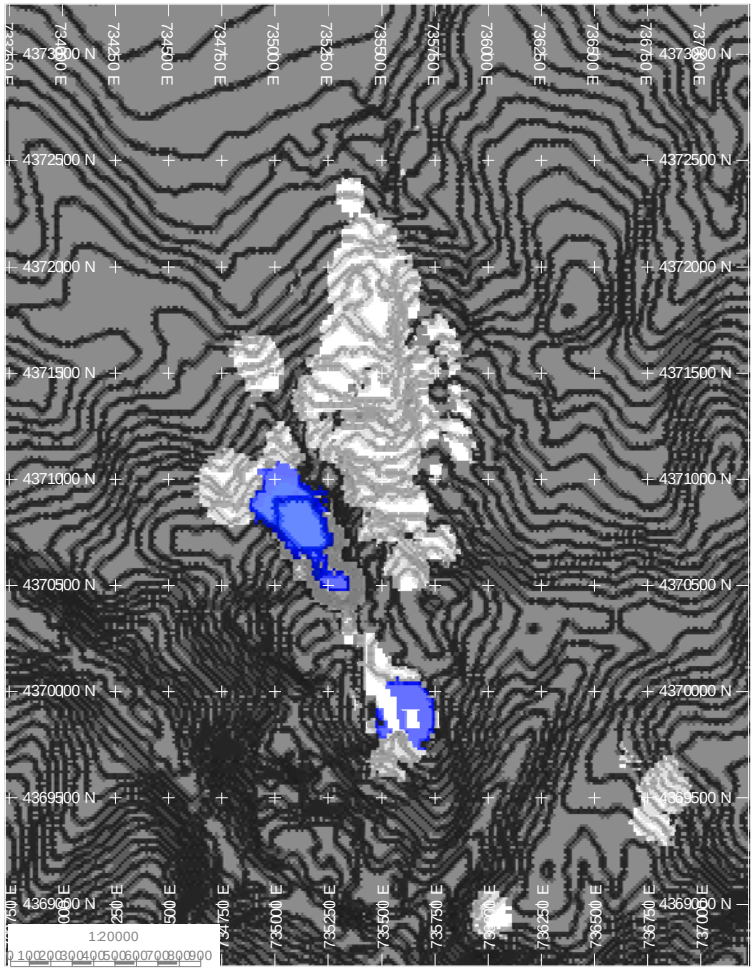
Mine Development year 2

Year 2



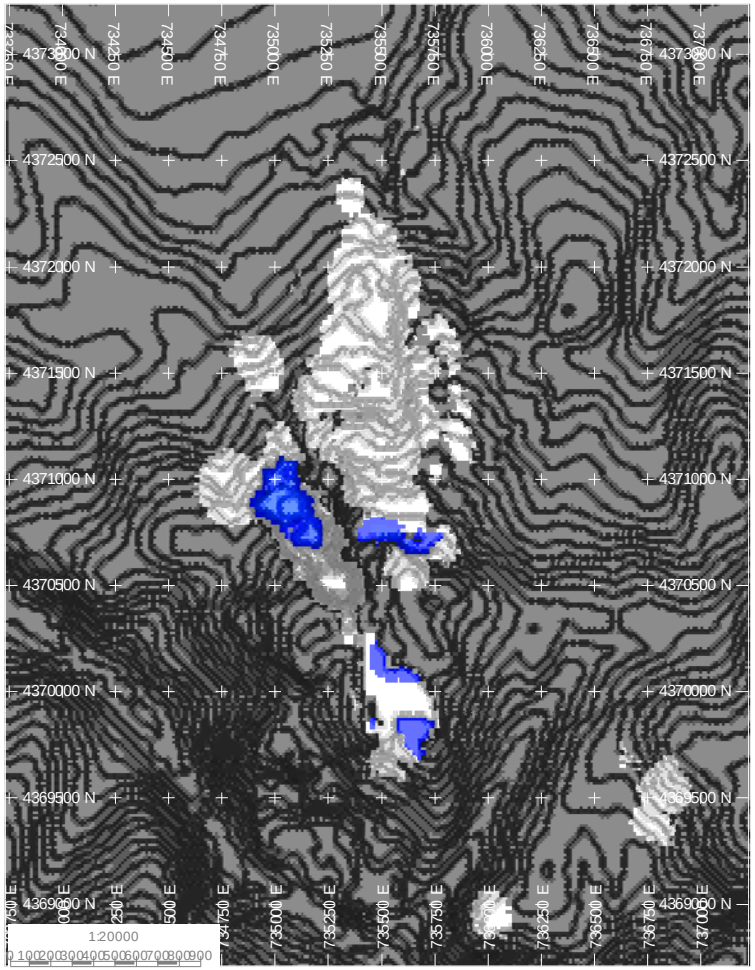
Mine Development year 3

Year 3



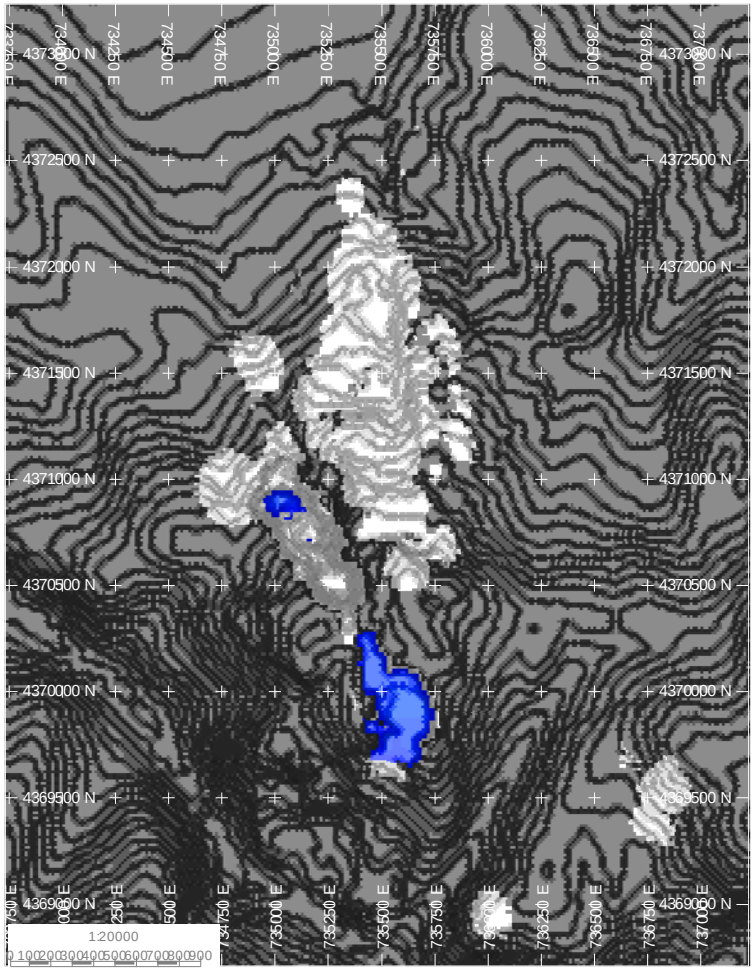
Mine Development year 4

Year 4



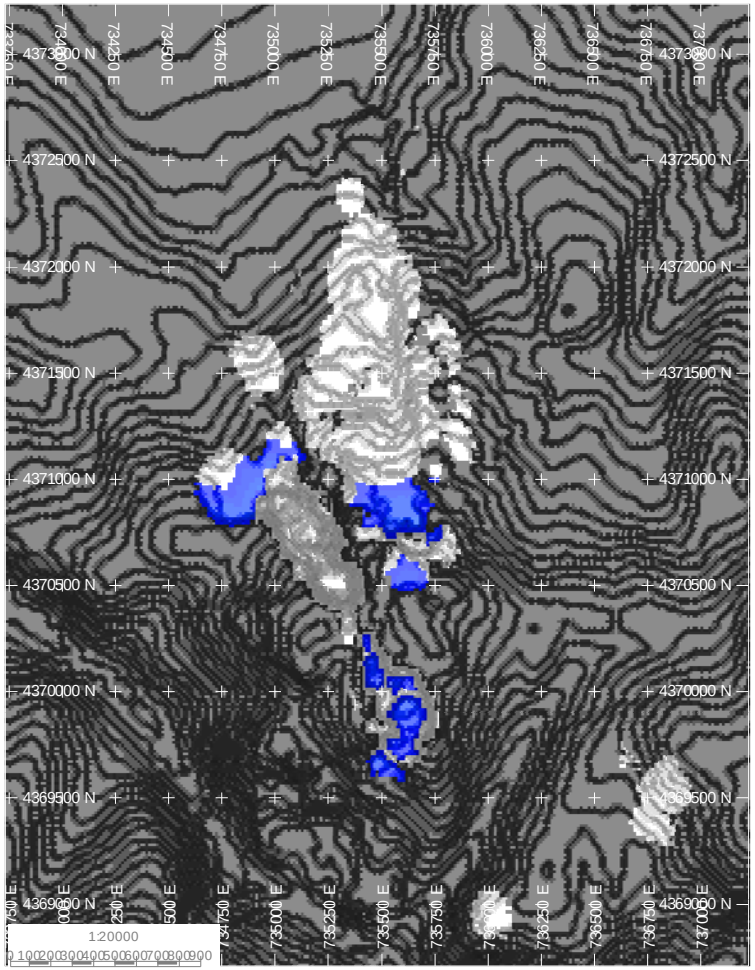
Mine Development year 5

Year 5



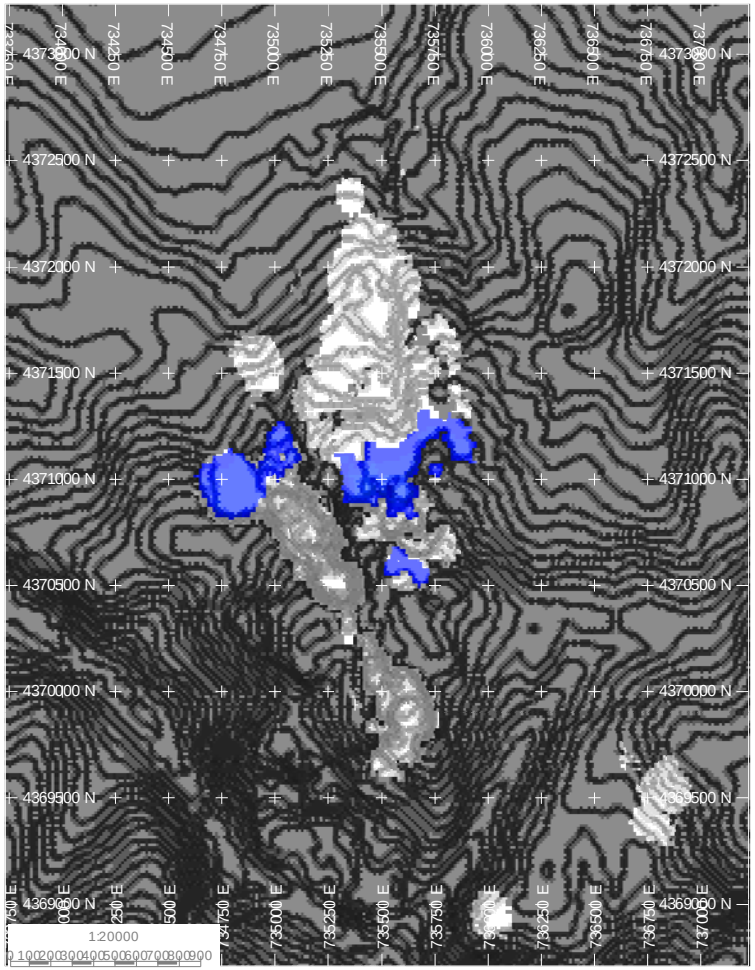
Mine Development year 6

Year 6



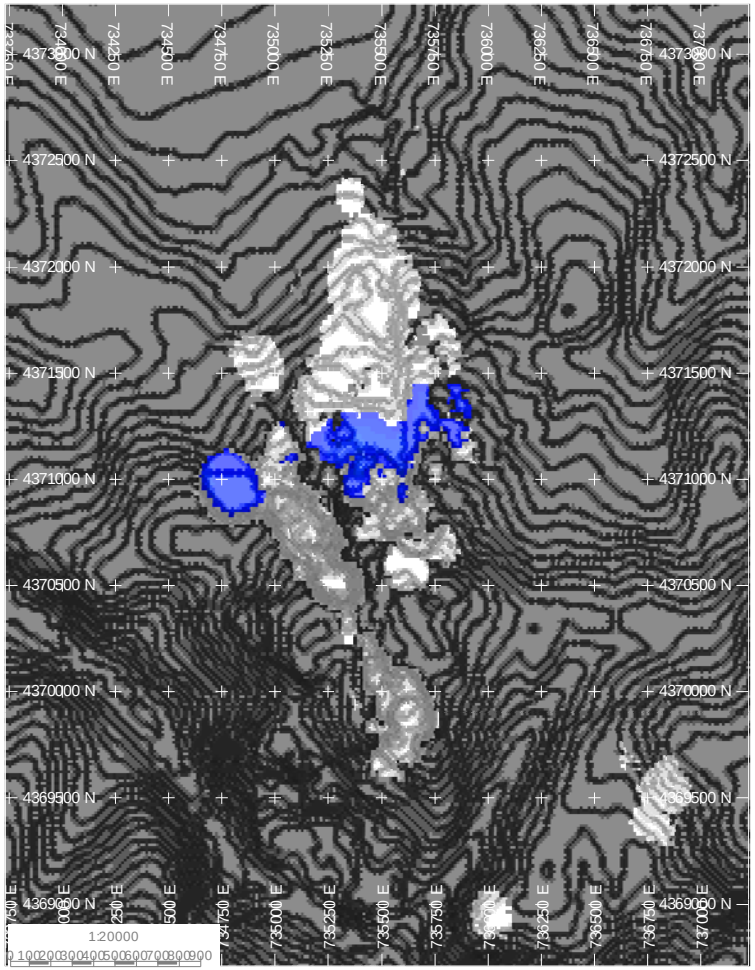
Mine Development year 7

Year 7



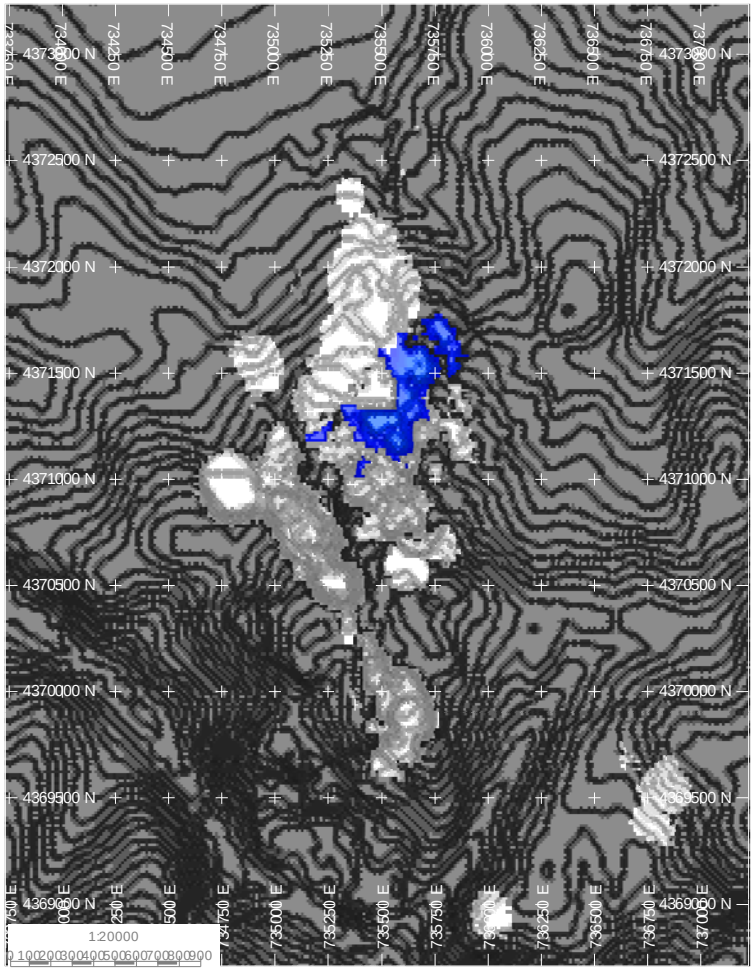
Mine Development year 8

Year 8



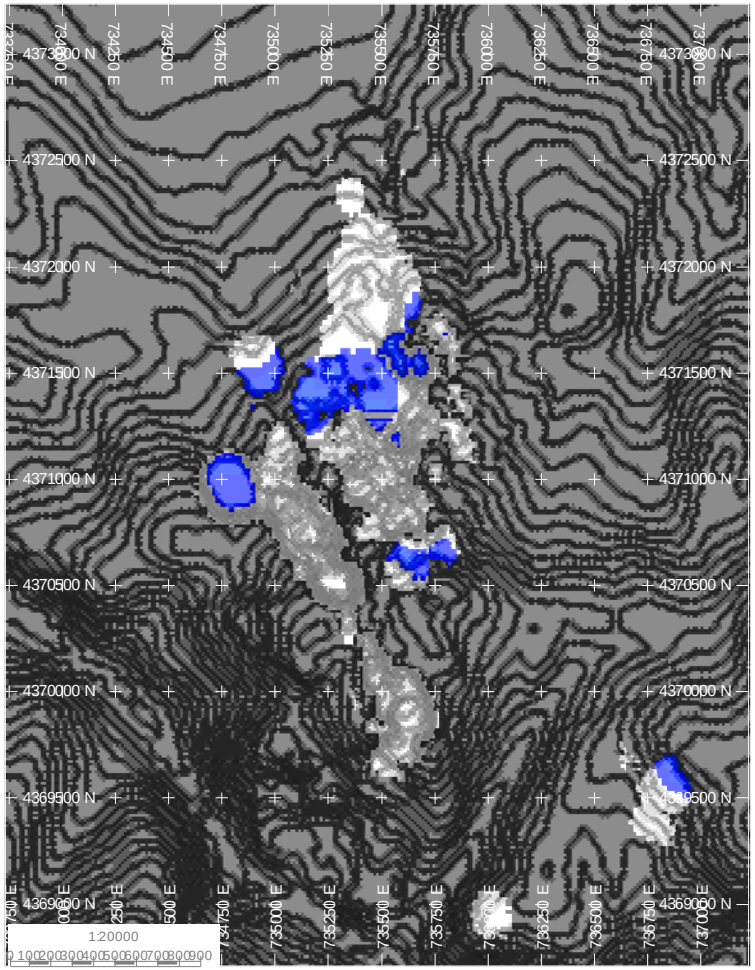
Mine Development year 9

Year 9



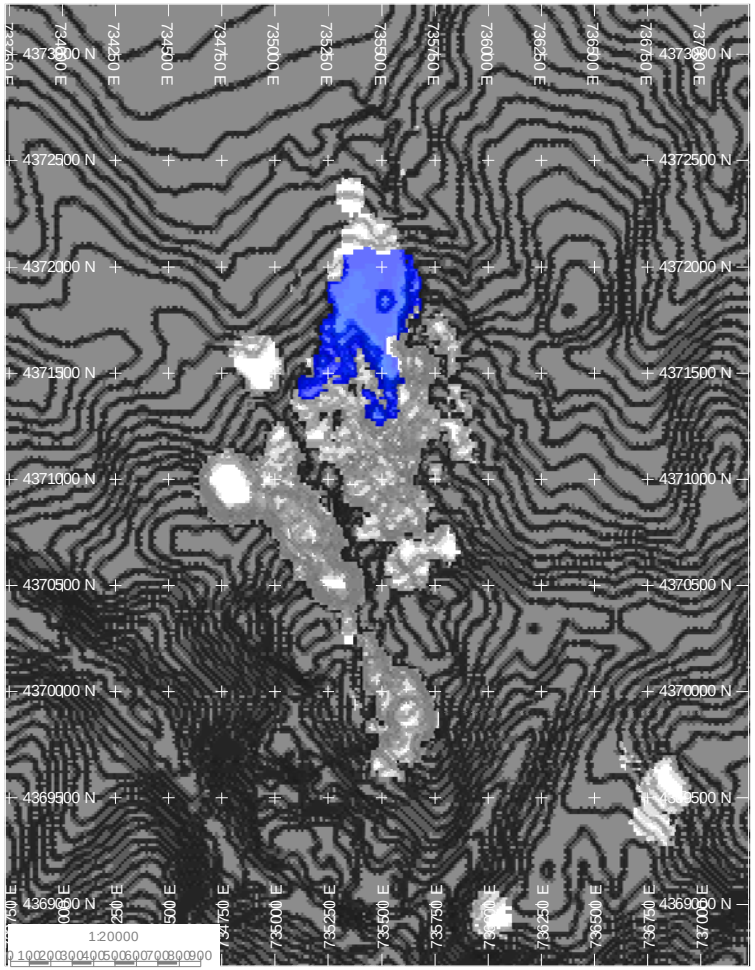
Mine Development year 10

Year 10



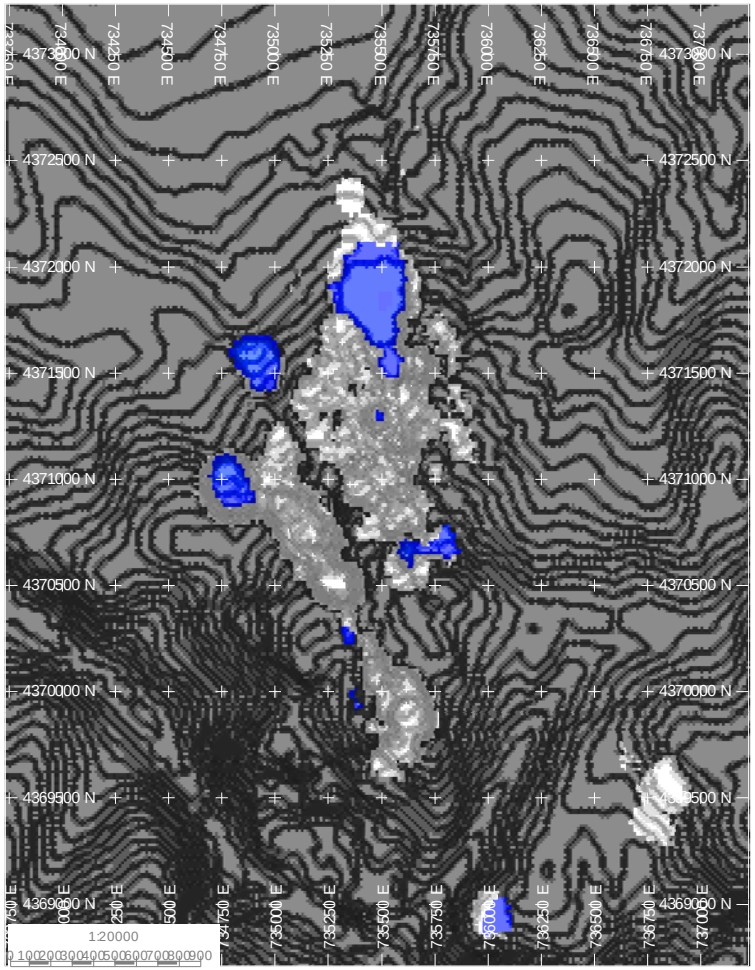
Mine Development year 11

Year 11



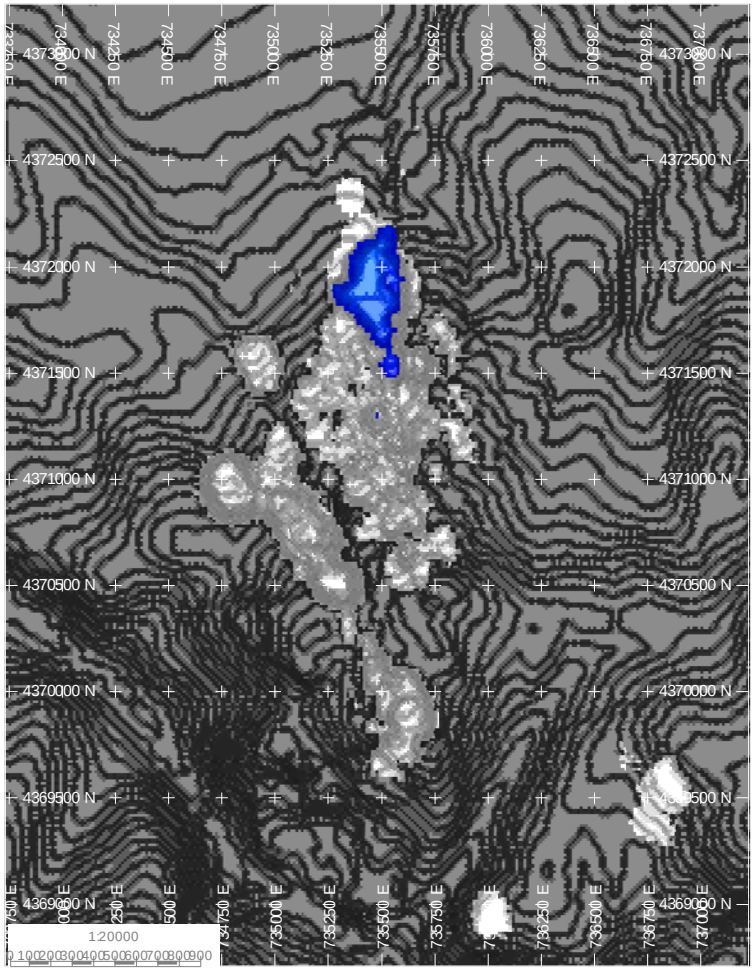
Mine Development year 12

Year 12



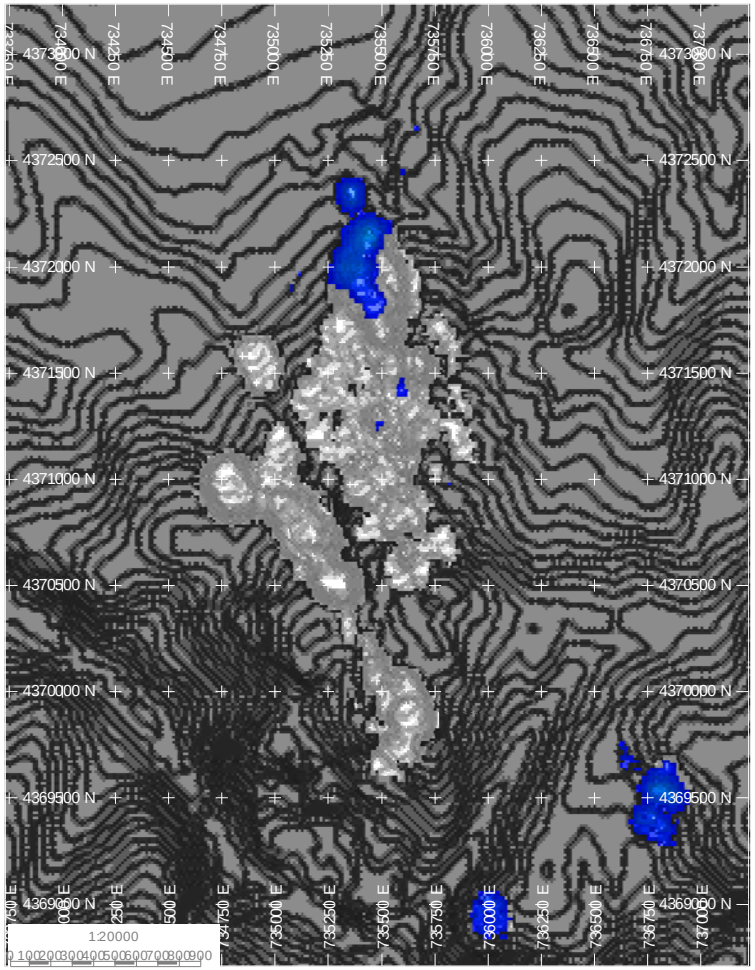
Mine Development year 13

Year 13

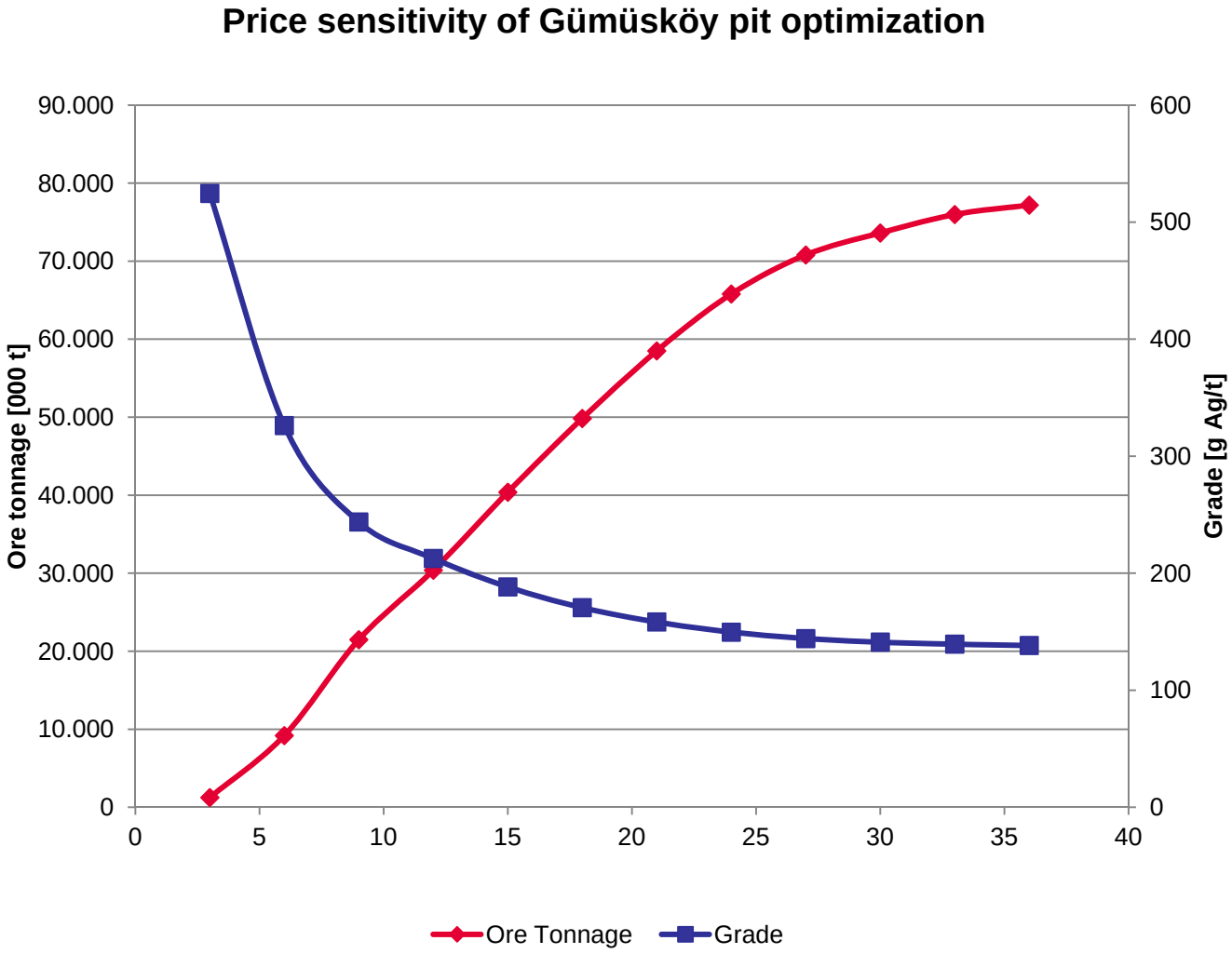


Mine Development year 14

Year 14



Results


Price sensitivity of Gümüsköy pit optimization
Ore tonnage [000 t]
Grade [g Ag/t]
90.000
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0
600
500
400
300
200
100
0
0
5
10
15
20
25
30
35
40
Ore Tonnage
Grade

Results

Production Schedule – optimized to receive constant head grade

	Unit	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Ore Production	000 t	4,320	4,320	4,320	4,320	4,320	4,320	4,320	4,320	4,320	4,320
Ore Grade	g/t	145	145	143	145	146	146	146	138	136	138
Waste removal	000 t	4,468	3,762	4,017	3,892	3,528	3,335	3,527	2,832	4,084	4,299
Stripping Ratio	t/t	1.03	0.87	0.93	0.90	0.82	0.77	0.82	0.66	0.95	1.00
Recovery Ore	%	52	52	52	52	52	52	52	52	52	52
Recovered Ag	kg	325,116	326,442	320,327	325,522	327,362	328,250	328,565	311,026	306,613	308,899

	Unit	2023	2024	2025	2026	2027	2028	2029	2030	Total
Ore Production	000 t	4,320	4,320	4,320	4,320	4,320	4,320	4,320	172	73,612
Ore Grade	g/t	140	140	152	148	140	136	116	114	141
Waste removal	000 t	3,661	3,634	7,371	8,125	7,517	6,141	17,457	745	92,396
Stripping Ratio	t/t	0.85	0.84	1.71	1.88	1.74	1.42	4.04	4.33	1.26
Recovery Ore	%	52	52	52	52	52	52	52	52	
Recovered Ag	kg	315,578	314,361	341,429	332,374	313,499	306,059	261,510	10,214	4,511,864

Contents

Future

- Operational and Life of Mine Plan (LOM) of Eti Gümüs based on optimization results
- Reconciliation to improve the accuracy of the geological model
- Establishing long/short-term mine plan and updating it according to new findings on a regular basis

For more information, please contact

THANK YOU VERY MUCH FOR YOUR ATTENTION

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