Environmental Monitoring Report for the Ada Tepe Prospect of the Khan Krum Deposit, 2015 Year

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1. INTRODUCTION

The purpose of this document is to report the analyzed results of the environmental and biological monitoring work completed at the local monitoring network, including sampling points for surface and ground water, air and soil in the Ada Tepe area, Khan Krum deposit.

This document reports the completed monitoring activities related to the implementation of DPMK's project for the Mining and Processing of Gold Ore from the Ada Tepe prospect, Khan Krum Deposit, Krumovgrad. The main objectives of the Monitoring Plan are:

- Gather information to complement the already existing database available at the Company prior to commencing construction works of the future minesite;
- Compare current results on local environmental status with future ones, i.e. once construction works begin and then throughout the next stages of project implementation;
- Collect minesite design data.

The monitoring efforts involve sampling from designated points and subsequent testing. The test results were used to identify any changes to the monitored environmental components in the in the Ada Tepe area, Khan Krum deposit. Analyses have been conducted by a certified lab, as well as by using Company equipment and appliances.

2. GENERAL

The Environmental Monitoring Report (the Report) of Dundee Precious Metals Krumovgrad ("DPMK" or "the Company") has been drafted in connection with environmental monitoring conducted in the area of the future minesite under the project for Mining and Processing of Auriferous Ores from the Ada Tepe Prospect, Khan Krum Deposit, Krumovgrad Municipality, and in execution of the Company's obligations provisioned in the 2014 Environmental Monitoring Plan, endorsed by the respective environmental authorities.

Appendix 1 presents a map showing the location of individual mine facilities and their respective distance from nearby populated areas.

According to the provisions of the Design Phase, item 3 of the EIA Resolution (Appendix 2), the Company has drafted an environmental monitoring plan. The plan is coordinated with REWI-Haskovo, the EEA and Krumovgrad Municipality, and the "Waters" Component is also agreed with the Basin Directorate for Water Management - East Aegean Region - Plovdiv.

3. SOURCES OF POLLUTION AND MONITORING THE IMPACT ON BIOLOGICAL COMPONENTS IN THE ADA TEPE AREA

3.1 Surface and Ground Water:

The East Aegean Catchment Directorate based in the city of Plovdiv is in charge of the area where the Krumovgrad Gold Project shall be implemented.

Water management is performed according to effective regulations in Bulgaria and specific short and long-term activities are consistent with the drafted Water Management Plan for the Arda River Basin, which includes Krumovitsa and its tributaries.

In terms of the project area, **Order No РД-292 /22.03.2010** by the Minister of Environment and Waters approves the ***River Basin Management Plan (RBMP) for the East-Aegean Region,*** which is the main water management tool and provides guidance on the current and future water control in the the Arda River.

The sources of pollution of surface and ground waters in the area depend on the nature of the agricultural business (typical of the region) which involves fertilizers, along with the local topography, precipitation intensity, mineral composition of the rock, degree of weathering, etc. Another important source of pollution is the fact that most local settlements, with very few exceptions, have no waste water treatment facilities on their territory.

DPMK was not engaged in any production activities in 2015. The Company is undergoing various procedures for obtaining all necessary permits, as required by the provisions of the Spatial Planning Act.

3.2 Air

According to Bulgaria's climatic division, the project area belongs to the Continental-Mediterranean climatic type, Southern Bulgarian climate sub-area, Eastern Rhodopean river valleys climatic zone. The low-mountainous topography of the Eastern Rhodope Mountains cut by the Krumovitsa River flowing south to the north allows free flow of both Mediterranean and cold continental air during winters.

The area is located east of the polluted air basins of Dimitrovgrad, controlled by the Ministry of Environment and Water (MOEW) (controlled air pollutants: dust, sulphur dioxide, nitrogen oxides, hydrogen sulphide, fluoric compounds, lead aerosols) and south of Kardzhali (controlled air pollutants: dust, sulphur dioxide, nitrogen oxides, lead aerosols). Due to its remoteness from the quoted basins, its rugged mountain terrain and the prevalent wind direction (NNW to SSE), the project area is not accessible for pollutants from these two monitored basins. No local industrial pollutants have been documented on Krumovgrad's territory.

This Report presents measurements of dust and gas emissions in ambient air, conducted by a certified lab (Measurement Records are provided in Appendix 3), as well as results from three PM2.5 and PM10 continuous monitoring stations, and eight deposited dust measurement stations. Appendix 3 features the 2015 Meteorological Data Report. There is free online access to continuous monitoring data at:

http://krumovgrad.webnoise.eu/index.php

3.3 Soils

According to Bulgaria's soil division, this region belongs to the Mediterranean soil district, Balkan-Mediterranean soil sub-area, East-Rhodopean-Sakar province. This province is dominated by shallow soils (Leptosols, LP) – umbric leptosols with lithosols, umbric liptosols with cinnamon luvisols (chromicq LVx) soils and development of erosion. The soils in the province belong mainly to Class IV of soil capability – poor.

The leached forest cinnamon soil is the prevalent soil type in the project area. The intrazonal soils – rendzinas are rare and the alluvial soils are even much rarer.

No acidification, salinisation, or other negative anthropogenic impacts on the Ada Tepe soils have been identified. Some sections of the forest soils in the Ada Tepe area demonstrate higher concentrations of arsenic, chrome and nickel due to the soil's natural chemistry. In 2015 soil sampling was conducted over the entire concession area. Results are presented in the "Soils" section.

3.4 Biological monitoring

The future minesite area falls within the footprint of the Natura 2000 protected site known as BG 0001032 Rhodopes East under Council Directive 92/43 on the Conservation of Natural Habitats of Wild Fauna and Flora.

BG 0002012 Krumovitsa, a protected site under Council Directive 79/409/EEC on the Conservation of Wild Birds and endorsed by the Bulgarian Council of Ministers (Resolution № 122/02.03.2007), is in close proximity to the project area. Pursuant to the provisions of the Regulation on the Terms and Procedures for Assessing Plans', Programs', Projects' and Investment Proposals' Compatibility with the Scope and Objectives of Protected Sites' Conservation (promulgated in SG Issue 73/ 11.09.2007, amended in SG Issue 81/ 15.10.2010), a Compatibility Assessment has been drafted to determine the project's alignment with the scope and objectives of the East Rhodopes protected area. The assessment aims to define, describe and assess the direct and indirect impacts on the human health and the environmental media including biodiversity and its elements, soil, water, air, climate, landscape, subsurface environment, natural sites, diversity of minerals, and their interactions. The relatively small territory (approx 85 ha), i.e. some 04% to be affected, as well as the proximity of anthropogenic landscapes (many villages, fields, actively used meadows, forest plants), presuppose the averagely small number of habitats and species, which will be disturbed by DPMK's project. Monitored species in sample areas in 2015 are as follows:

- population of the Jersey Tiger moth (Euplagia quadripunctaria);
- population of the yellow-bellied toad (Bombina variegata);
- the populations of the two tortoise species - Hermann's Tortoise (Testudo hermanni) and Spur Thigh Tortoise (Testudo graeca)
- bat populations;

3.5 Noise

The future minesite is situated in a hilly area. There are no industrial sources of noise in close proximity. Everyday activities of local residents are the only sources of noise in the area. Noise monitoring is scheduled at 6 points (local settlements) due to the lack of the 7th point, i.e. the production site itself. Measurements are conducted by a certified lab.

3.6 Blast vibration impact (vibrations)

Blast vibration impact monitoring prior to the start of construction works aims to establish current vibration levels caused by various types of activities. Hence, the first continuous monitoring point (for vibrations) was scheduled for Pobeda hamlet, Ovchari village on the assumption that traffic from/to the minesite would have a most tangible impact on residential buildings and farm facilities that are closest to the nearby road. Since local residents refused to rent a land plot to host the Company's seismograph, the latter had to explore alternative location options. It had similar experience regarding the locations of PM10 and deposited dust measurement devices. After reviewing nearby settlements that would be affected by future minesite traffic, the village of Zvanarka was chosen as part of the access road recommended by the Kardzhali District Road Management, considered as the road of first choice during the EIA procedure. Measurement devices are located close to the road (at approx. 1,5m) and shall collect data about the impact of one of the most likely sources of vibrations - road traffic. Continuous monitoring data are freely available online at:
http://krumovgrad.webnoise.eu/seismo.php?sn=3003048

The Monitoring Plan foresees continuous blast vibration impact control at a third point, after the start of construction works. A map of all monitoring points is provided in Appendix 5.

4. LOCATION OF MONITORING POINTS, SAMPLING AREAS AND TERRITORIES

4.1 Water

Water quality assessment in the area of the future minesite shall be done by sampling 22 water points - 8 for surface and 14 for ground water. Only existing points are being monitored, since some points do not exist yet or have not been set up as monitoring points (e.g. old exploration boreholes). A map of surface and ground water monitoring points in 2015 is presented in Appendix 4. Static water levels are observed at 15 points, with weekly and monthly frequency. A map of all piesometric drillholes, including inclined ones, is presented in Appendix 4. Details of the selected locations are provided in Table 4-1.1. The table provides description of each individual point.

Table 4-1.1: Water monitoring points							
№	**Title**	**Suspended Solids (m)**	**coordinates: (WGS84)**	**Type**	**of monitored indicators**	**Sampling frequency**	**Location, Description and Objectives**
1	ESW 01	236	E 387727 N 45. 86,770	SW	as described in Table 2-2-2	Once per month	Krumovitsa River – the source point (at confluence of Egrechka River and Kessebirdere) Identifies surface water quality south from the minesite
2	ESW 03	233	E 38 69 38 N 45 86 342	SW	as described in Table 2-2-2	Once per month	Kessebirdere - upstream of confluence with the Egrechka River. Identifies the water quality upstream of confluence point. Egrechka River
3	ESW 04	235	E 38 76 08 N 45 86 646	SW	as described in Table 2-2-2	Once per month	Egrechka River – upstream the confluence with Kessebirdere Identifies the water quality upstream of confluence point.
4	ESW 05	222	E 39 03 67 N 45 88 680	SW	as described in Table 2-2-2	Once per month	Buyukdere - upstream of confluence with the Krumovitsa River Identifies the water quality of Buyukdere upstream of confluence with Krumovitsa River.
5	ESW 06	240	E 386225 N 4588202	SW	as described in Table 2-2-2	Once per month	Kaldzhikdere - upstream of the bridge at Pobeda hamlet of Ovchari village. Identifies the water quality in the gully upstream of the intersection with the access road to the minesite and the section of the gully passing by the minesite.
6	ESW 07	220	E 38 77 91 N 45 89 777	SW	as described in Table 2-2-2	Once per month	Kaldzhikdere - upstream of confluence with the Krumovitsa River Identifies the quality of the stream flowing west of the minesite

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№	**Title**	**Suspended Solids (m)**	**coordinates: (WGS84)**	**Type**	**of monitored indicators**	**Sampling frequency**	**Location, Description and Objectives**
7	ESW 08	231	E 388364 N 4587708	SW	as described in Table 2-2-2	Once per month	River Krumovitsa river, about 200 m downstream of the north sump of the IMWF.
8	ESW 09	215	E 386952 N 4592512	SW	as described in Table 2-2-2	Once per month	River Krumovitsa River, approximately 100m upstream of the discharge point Reference to point ESW 10. Indicates water quality before discharge
9	ESW 10	215	E 386822 N 4592681	SW	as described in Table 2-2-2	Once per month	River Krumovitsa River, approximately 100m downstream of the discharge point Its purpose is to assess the impact on the surface water quality after the discharge of water.
10	EGW 01	N/A	Design E 388187,46 N 4589517.6	GW	Water level	Once per month	The monitoring point is located NE from the site, and covers groundwater running towards the Krumovitsa River from the entire SW sector of Ada Tepe. It is situated in Eocene sandstones and conglomerates. The point monitors the water quality in SWB, code BG3G00PtPg2023 - Fissure-flow groundwaters, Krumovgrad-Kirkovo zone.
					as described in Table 2-2-2	4 times per year	
11	EGW 02	312	E 388103 N 4588506	GW	Water level	Once per month	The point is a well set up E-NE of the open pit at the foot of the slope (in Chobanka), and represents ground water in Palaeocene breccio-conglomerates and sandstones (Krumovgrad Group), with draining direction E-NE to the Krumovitsa River. The point monitors the water quality in SWB, code BG3G00PtPg2023 - Fissure-flow groundwaters, Krumovgrad-Kirkovo zone.
					as described in Table 2-2-2	4 times per year	
12	EGW 03	312	E 386986 N 4588201	GW	Water level	Once per month	The monitoring point is situated in the metamorphic complex (metagranites and granite-gneiss) on the west slope of Ada Tepe and its purpose is to monitor groundwater flowing towards Kardzhikdere from the drainage on the west slope of the deposit. The point monitors the water quality in SWB, code BG3G00PtPg2023 - Fissure-flow groundwaters, Krumovgrad-Kirkovo zone.
					as described in Table 2-2-2	4 times per year	

Table 4-1.1: Water monitoring points							
№	**Title**	**Suspended Solids (m)**	**coordinates: (WGS84)**	**Type**	**of monitored indicators**	**Sampling frequency**	**Location, Description and Objectives**
13	EGW 04	229	E 387596 N 4586825	GW	Water level as described in Table 2-2-2	Once per month 4 times per year	The monitoring point is set up in the metamorphic rocks on the slope descending to the Krumovitsa River terrace and covers groundwater flowing south downstream of the mining waste facility. The point monitors the water quality in SWB, code BG3G00PtPg2023 - Fissure-flow groundwaters, Krumovgrad-Kirkovo zone.
14	EGW 05	220	E 387957 N 4591016	GW	as described in Table 2-2-2	4 times per year	Krumovgrad drinking water abstraction, located in the in the alluvials of the Krumovitsa River. Identifies any negative changes in the quality of the groundwater abstracted for drinking. The point monitors the water quality in the quaternary aquifer of the water body named BG3G000000Q010 Interstitial groundwaters in the Quaternary deposits.
15	EGW 06	218	E 387590 N 4590649	GW	as described in Table 2-2-2	4 times per year	Ovchari-Krumovgrad – II drinking water abstraction, located in the alluvials of the Krumovitsa River. Identifies any negative changes in the quality of the groundwater abstracted for drinking. The point monitors the water quality in the quaternary aquifer of the water body named BG3G000000Q010 Interstitial groundwaters in the Quaternary deposits.
16	EGW 07	230	E 387521 N 4586750	GW	as described in Table 2-2-2	under discharge permit (but minimum four times a year)	Proprietary abstraction well, located in the alluvials of the Krumovitsa River. Identifies any negative changes in the quality of the groundwater abstracted for drinking. The point monitors the water quality in the quaternary aquifer of the water body named BG3G000000Q010 Interstitial groundwaters in the Quaternary deposits. When the construction of the Tube Well is completed, a conceptual design of the facility will be attached to the Monitoring plan in order to provide clarity on the contact point of the infiltration lateral in the tube well and the lithology structure.

Table 4-1.1: Water monitoring points							
№	**Title**	**Suspended Solids (m)**	**coordinates: (WGS84)**	**Type**	**of monitored indicators**	**Sampling frequency**	**Location, Description and Objectives**
17	EGW 08	N/A	Design E 387367 N 4587549	GW	Water level as described in Table 2-2-2	Once per month 4 times per year	At high elevation of Ada Tepe, a reference point over the IMWF. Set in a metamorphic complex - metagranites and gneisses, with some schists layers. The groundwater source is porous, with draining direction to the Krumovitsa River. The point provides the background characteristics of groundwater running towards IMWF.
18	EGW 09	N/A	Design E 388302 N 4587478	GW	Water level as described in Table 2-2-2	Once per month 4 times per year	At the toe of the north part of IMWF, between the North Collection Sump and the Krumovitsa River. Set in a metamorphic complex - metagranites and gneisses, with some schists layers. The groundwater source is porous, with draining direction to the Krumovitsa River. The point monitors the groundwater quality running to IMWF.
19	EGW 10	N/A	Design E 388392 N 4587262	GW	Water level as described in Table 2-2-2	Once per month 4 times per year	At the toe of the south part of IMWF, between the South Collection Sump and the Krumovitsa River. Set in a metamorphic complex - metagranites and gneisses, with some schists layers. The groundwater source is porous, with draining direction to the Krumovitsa River. The point monitors the groundwater quality running to IMWF.
20	EGW 11	325	E 385053 N 4589103	GW	as described in Table 2-2-2	4 times per year	Pump station of Zvanarka village. The captured springs are water bodies not pertaining to to the Krumovitsa River terrace. Krumovitsa River. They drain waters in the Paleogene sediments. The point monitors household and potable water supply quality.
21	EGW 12	220	E 389417 N 4589599	GW	as described in Table 2-2-2	4 times per year	Tube well of pump station at Guliika village. Located in the alluvial deposits of the Krumovitsa river. The point monitors household and potable water supply quality.
22	EWW 01	N/A	Design	WW	quantity	Continuous	Household wastewater treatment plant - inlet. Water quality and quantity will be monitored, as this is

Table 4-1.1: Water monitoring points							
№	**Title**	**Suspended Solids (m)**	**coordinates: (WGS84)**	**Type**	**of monitored indicators**	**Sampling frequency**	**Location, Description and Objectives**
					as described in Table 2-2-2	On a monthly basis	important for the subsequent biological treatment process.
23	EWW 02	N/A	Design	WW	quantity	Continuous	Household wastewater treatment plant - discharge. Water quantity and quality data will be collected prior to discharge.
					as described in Table 2-2-2	On a monthly basis	
24	EWW 03	N/A	Design	WW	quantity	Continuous	Runoff Storage Pond - water quality and quantity will be monitored in view of the fact that the process is water-quality sensitive.
					as described in Table 2-2-2	Once per week	
25	EWW 04	N/A	Design	WW	quantity	Continuous	North collecting sump of the IMWF - the water quality and quantity will be monitored for reuse in the process.
					as described in Table 2-2-2	Once per week	
26	EWW 05	N/A	Design	WW	quantity	Continuous	South collecting sump of the IMWF - the quality and quantity of water will be monitored for reuse in the process.
					as described in Table 2-2-2	Once per week	
27	EWW 06	N/A	Design	WW	quantity	continuous	Collection sump at the open pit (mine water) -the quality the water will be monitored for reuse in the

Table 4-1.1: Water monitoring points							
№	**Title**	**Suspended Solids (m)**	**coordinates: (WGS84)**	**Type**	**of monitored indicators**	**Sampling frequency**	**Location, Description and Objectives**
					as described in Table 2-2-2	Once per week	process.
28	EWW 07	207	E 386952,99 N 4592540.62	WW	quantity	Continuous	Discharge Point (preliminarily agreed with the East Aegean Basin Directorate) - discharge water quality.
					as described in Table 2-2-2	Once per week	

* "Seasonal" means:

- Spring – May through June;
- Summer – July through September;
- Fall – October through November;
- Winter – January through February.

Surface and groundwater samples for testing were taken in May, July and December 2015.

Samples were taken from current monitoring points, provided the presence of water therein. Additional sampling for assay purposes was conducted at boreholes close to the future points EGW 09 и EGW 10, which are expected to be demolished during the project's construction phase.

Appendix 4 presents maps of surface and groundwater monitoring points that were sampled for quality analysis in 2015. These points were selected in a manner, which enables sufficient data collection for the proper monitoring of the background water status in the area around and downstream river beds and gullies adjacent to the future Ada Tepe minesite. A map of all piesometric drillholes for static water level measurements is provided in the same Appendix. Appendix 4 also features all records with results, including an individual analysis of static water level measurements (from their initiation up to 2015).

Water analysis at point EGW 07 (Proprietary abstraction well) has not been conducted. The point was placed under care and maintenance by DPMK and sealed by the Plovdiv Basin Directorate, at the request of the Company.

Surface water sampling and testing covers 9 points, as follows:

Type	**Internal DPMK name, used for the specific point**
Surface waters	ESW 01, ESW 03, ESW 04, ESW 05, ESW 06, ESW 07, ESW 08, ESW 09 and ESW 10

Surface waters were tested for the following:

- All surface water points: copper (Cu), arsenic (As), iron (Fe), manganese (Mn), zinc (Zn), aluminum (Al), dissolved oxygen, pH, conductivity, N-NH4, N-NO2, N-NO3, total N, P-ortho-PO4, total phosphorus (P), BOD5, chromium (Cr (VI), Cr(III), oil and petroleum products, nickel (Ni), sulphates (SO4), calcium (Ca), magnesium (Mg), cadmium (Cd), Cl, calcium carbonate hardness, lead (Pb), cobalt (Co), cyanides (free), cyanides (total).
- Points ESW 09 and ESW 10 were also tested for chromium (Cr total) and COD.

Groundwater sampling and testing covers 8 points, as follows:

Type	**Internal DPMK name, used for the specific point**
Groundwater	EGW 02, EGW 03, EGW 04, EGW 05, EGW 06, EGW 08, EGW 11 and EGW 12

Groundwaters were tested for the following:

- Points EGW 02, EGW 03, EGW 04, EGW 08, EGW 09, EGW 10, as follows: petroleum products, F, Hg, Pb, Se, Na, B, Sb, total cyanides, total hardness, permanganate oxidability, conductivity, pH, NH4, NO2, NO3, SO4, Cl, PO4, Cd, Cu, Ni, Cr (VI), Al, Fe, Ca, Mg, Mn, Zn, As, natural U, benzene, benzo[a]pyrene, 1,2-dichloroethane, polycyclic aromatic hydrocarbons, tetrachloroethylene and trichloroethylene, single pesticides, total pesticides, total alpha-activity, total beta-activity, total indicative doze.
- Pursuant to the indicators provisioned in Appendix 1 (Tables A1, B, C and D) of Regulation 9 on Domestic and Potable Water Quality, points EGW 05, EGW 06, EGW 11 and EGW 12 were tested as follows:
- 1. Microbiological indicators under Table A.1 on water, under art. 6, par. 1, p. 1, 2, and 4: E. coli and enterococci.
- 2. Table B - chemical indicators - acrylamide, antimony (Sb), arsenic (As), benzene, benzo[a]pyrene, boron (B), bromates, vinyl chloride, 1,2-dichloroethane, epichlorohydrin, mercury (Hg), cadmium (Cd), copper (Cu), nickel (Ni), nitrates (NO3), nitrites (NO2), lead (Pb), pesticides, total pesticides, polycyclic aromatic hydrocarbons, selenium (Se), tetrachloroethylene and trichloroethylene, total trihalomethanes, fluorides (F-), chromium (Cr), cyanides (CN-)
- 3. Table C - Indicative indicators - Ph, Al, NH4, taste, conductivity, Fe, Ca, Mg, Mn, odor, turbidity, Na, total C, total hardness, residual free chlorine, permanganate oxidisable C, sulphates (SO4), phosphates (PO4), chlorides (Cl-), color, zinc (Zn), Clostridium perfringens (incl. spores), coliforms, number of colonies (microbe number) at 22 °C.
- 4. Table D - radiological indicators - tritium, total indicative doze, total alpha-activity, total beta-activity, natural uranium (U).

Static water levels are measured on a weekly basis at the following points: EGW 04 (ATDDGT 043), EGW 04-1 (ATDDGT 036), EGW 05 (ATDDGT 037), EGW 06 (ATDDGT 038), EGW 07 (ATDDGT 039), EGW 08 (ATDDGT 042), EGW 09 (ATDDGT 041), EGW 09-1 (ATDDGT 040), EGW 15 (BH-THICK-E), EGW 16 (BH-MWF-H), EGW 17 (BH-MWF-K), EGW 18 (BH-MWF-F), EGW 19 (BH-RPWR-B), EGW 20 (BH-RPWR-D) and EGW 21 (BH-MWF-J).

4.2 Air

Ambient Air Quality (AAQ) was analyzed by a certified lab in 6 points outlined in Table 4-2.1. The following indicators are scheduled for monitoring: NO, NO_2, SO_2, H_2S, O_3, NH_3, CO, CH_4, non-methane hydrocarbons, PM_{10} , $PM_{2,5}$ – fine particulate matter and meteorological parameters: temperature, relative humidity, air pressure, wind velocity, wind direction.

Table 4-2.1: Ambient air monitoring				
Place of measurement	**Points №**	**Number of Points**	**Parameters**	**Frequency**
Krumovgrad, Izgrev quarter	AA 01	1	As per the listed above	Once per annum
Pobeda hamlet, Ovchari village	AA 02	1		
Varhushka hamlet, Ovchari village.	AA 03	1		
Dazhdovnik village	AA 04	1		
Zvanarka village	AA 05	1		
Chobanka hamlet, Ovchari village.	AA 06	1		

A map of all monitoring points is provided in Appendix 3

An assessment of ambient air quality was made in February and August 2015 by the EEA - Stara Zagora regional lab.

In 2015 the Company installed and commissioned the following devices for continuous monitoring of fine particulate matter in ambient air and deposited dust measurements:

- 3 dust meters of the E Sampler type, produced by Enviro Technology, UK, for PM_{10} , $PM_{2,5}$ measurements;
- 8 deposited dust meters (Frisbee type dust deposit gauge).
- The specifications of the measurement devices used are attached to the data presented in the Appendices.

PM_{10} , $PM_{2,5}$ and deposited dust (per unit area) measurements in the following monitoring points are given below:

Table 4-2.2 Internal monitoring of ambient air

ID №	Receptor	Parameters Measured	Duration
AA 01	Krumovgrad, Izgrev quarter	PM_{10} and $PM_{2.5}$ ($\mu g/m^3$), and Deposited Dust ($mg/m^2/day$)	Continuous
AA 02	Pobeda hamlet, Ovchari village		
AA 03	Soyka hamlet, Ovchari village		
AA 04	Sinap hamlet, Ovchari village	Deposited Dust ($mg/m^2/day$)	Continuous

AA 05	Kupel hamlet, Dazhdovnik village		
AA 06	Zvanarka village**		
AA 07	Varhushka quarter of Ovchari village.		
AA 08	Chobanka quarter, Ovchari village.		
AA 09	Process Plant area***	PM_{10} and $PM_{2.5}$ ($\mu g/m^3$), and Deposited Dust ($mg/m^2/day$)	Continuous

The map of all monitoring points is provided in Appendix 3

**Np monitoring devices have been installed in point AA02 due to lack of consent by local residents.*

*** PM measurement equipment is installed in point AA 06 instead of AA02.*

****Measurements in AA 09 shall begin when the point is available.*

Internal monitoring data is presented in Appendix 3 to this report.

4.2.1. Weather Monitoring

According to the international conventions and the Bulgarian legislation all industrial operations must have in place a system for control of environmental impact. The weather monitoring is an integral component of that system, as the ambient air is the media where gas and dust emissions disperse. In this connection, a professional Automated Weather Station (AWS) was set up and commissioned in early November, 2013. The station is located north-east of the minesite, on the outskirts of the town of Krumovgrad. It is at about 3000 m distance from the future minesite. The Weather Station will send real time data about key weather components:

Air temperature and humidity;

Atmospheric pressure;

Wind direction and speed;

Amount and intensity of precipitation;

The continuous 24h gathering of weather data is part of the national system for weather monitoring. Dundee Precious Metals Krumovgrad EAD (the Company) provides access to these data to the National Institute of Meteorology and Hydrology at the Bulgarian Academy of Sciences (NIM-BAS) on the basis of a bi-lateral agreement. The weather station is located in Krumovgrad on NIM-BAS property. A Weather Monitoring Report is drafted on a monthly basis. The AWS was commissioned in November 2013. All weather data during project implementation shall be used for drafting monitoring and design reports, as well as for blast work plans, taking into account wind speed and direction, IMWF and open pit water balance.

4.3 Soils

One soil sampling (in the autumn) took place in 2015. Apart from the monitoring points listed in Table 4-3.1, soils samples from the entire concession area have been tested, too. Results from these testings are presented in a separate report (see Appendix 6). Measured parameters at internal monitoring points are presented in Table 4-3.1

Table 4-3.1: Soil Monitoring					
Internal DPMK code No.	**Sampling point**	**Description and distance to the closest mine facility**	**Number of sampled areas**	**Parameters mg/kg**	**Frequency**
ESS 01	E 387583 N 4588927	Approximately 150m north of the mine and 115m north of the old derelict chalet building	1	pH, As, Cd, Ni, Pb, Zn, Cr, Cu, Mn, Hg, Fe, basic elements - K, Ca, Mg, Na	Once in two years, in autumn
ESS 02	E 388008 N 4588444	Approximately 200m east of the mine and 130m south-west of Chobanka quarter, Ovchari village.	1	pH, As, Cd, Ni, Pb, Zn, Cr, Cu, Mn, Hg, Fe, basic elements - K, Ca, Mg, Na	Once in two years, in autumn
ESS 03	E 388591 N 4587686	Approximately 400m east of the IMWF and 120m west of Kupel quarter, Dazhdovnik Village	1	pH, As, Cd, Ni, Pb, Zn, Cr, Cu, Mn, Hg, Fe, basic elements - K, Ca, Mg, Na	Once in two years, in autumn
ESS 04	E 387821 N 4586910	Approx. 100m south of the process plant and 157m north of Krumovitsa River	1	pH, As, Cd, Ni, Pb, Zn, Cr, Cu, Mn, Hg, Fe, basic elements - K, Ca, Mg, Na	Once in two years, in autumn
ESS 05	E 387012 N 4587523	Approx. 300m west of the precipitation (runoff) water reservoir and 138m south-west of the road connection Pobeda quarter, Ovchari village and the Ada Tepe minesite.	1	pH, As, Cd, Ni, Pb, Zn, Cr, Cu, Mn, Hg, Fe, basic elements - K, Ca, Mg, Na	Once in two years, in autumn
ESS 06	E 387047 N 4588323	Approx. 200m west of the minesite, between Pobeda quarter and Soyka quarter of Ovchari village.	1	pH, As, Cd, Ni, Pb, Zn, Cr, Cu, Mn, Hg, Fe, basic elements - K, Ca, Mg, Na	Once in two years, in autumn
ESS 07	E 387831 N 4588038	between the open mine pit, IMWF	1	pH, As, Cd, Ni, Pb, Zn, Cr, Cu, Mn, Hg, Fe, petroleum products	Once in two years, in autumn
ESS 08	E 388191 N 4587311	between the north and south gully of the IMWF	1	pH, As, Cd, Ni, Pb, Zn, Cr, Cu, Mn, Hg, Fe, petroleum products	Once in two years, in autumn

A map of all points is presented in Appendix №6.

Measured parameters are defined as total content in mg/kg of dry soil, in line with the requirements of Regulation 3 on the Maximum Allowable Concentrations of Harmful Substances in the Soil (effective 12.08.2008).

4.4 Biological monitoring

Biological monitoring components cover:

- Analysis and assessment of the Jersey Tiger moth (Euplagia quadripunctaria) population and assessment of the project's anthropogenic impact on it;
- Analysis and assessment of the population status and dynamics of the yellow-bellied toad (Bombina variegata), in particular the project's anthropogenic impact on this species.
- Analysis and assessment of the population status and dynamics of the two tortoise species Hermann's Tortoise (Testudo hermanni) and Spur Thigh Tortoise (Testudo graeca), including the project's anthropogenic impact on them. Furthermore, the success of the Tortoise Relocation Project should be examined, as well as the measures undertaken within the framework of the Biodiversity Action Plan, which covers the present state of nearby habitats, i.e. those in close proximity to the open pit;
- Analysis and assessment of the bats' population status and dynamics, aiming to establish the current status of bat populations inhabiting open pit neighboring areas, as well as a referential area, located several kilometers away from future mine operations.

4.5 Noise

Noise monitoring is scheduled at 7 points and actual measurements have been made at 6 points (local settlements) due to the lack of the 7th point, i.e. the production site itself.

Table 4-5.1: Noise Monitoring

Point #	Place of Measurement	Number of Points	Parameters	Frequency
1	Krumovgrad, Izgrev quarter	1	Equivalent noise level (dBA)	Once every year, by an accredited laboratory
2	. Soyka hamlet, Ovchari village.	1		Once every year, by a certified lab
3	. Varhushka hamlet, Ovchari village.	1		Once every year, by a certified lab
4	. Pobeda hamlet, Ovchari village	1		Once every year, by a certified lab
5	Dazhdovnik village	1		Once every year, by a certified lab
6	minesite*	1		Once every year, by an accredited laboratory
7	. Chobanka 2 hamlet, Ovchari village.	1		Once every year, by a certified lab

According to the 'Methodology for determination of the total sound power emitted into the environment from industrial sites and determination of the noise levels at the points of impact'

A map of all monitoring points is provided in Appendix 7

Measurements are conducted by a certified lab.

4.6 Blast vibration impact (vibrations)

Blast vibration impact monitoring prior to the start of minesite construction works was carried out at the points indicated in Table 3-6.1 below.

Table 3-6.1: Internal and external monitoring of blasting vibration impact

Point #	Place of measurement	Number of Points	Parameters*	Frequency
1	Soyka hamlet, Ovchari village	1	PPV, f	24-hour monitoring
2	Pobeda hamlet, Ovchari village	1	PPV, f	
3	Process Plant (admin. building)	1	PPV, f	

*This point was replaced by a point in Zvanarka village for the reasons described in 3.6. above.

The Company uses its own continuous monitoring device - a Minimate Pro 4 seismograph by Instantel, that measures:

- Peak particle velocity - PPV mm/s;
- acceleration – a, m/s2;
- displacement – U, µm;
- frequency – f, Hz.

5. MONITORING TYPE AND FREQUENCY

5.1 Water

Water samples were taken three times in 2015 by a certified lab. Water quality results are shown in Table 4-1.2. Groundwater static water levels were measured on a weekly basis. All current test results on water quality were reviewed against the regulated limits and are provided in Appendix 4 for higher clarity.

Surface water analysis results are compared to the metric values provisioned in Regulation № Н-4/ 14.09.2012 for Surface Water Characterization (issued by the Minister of Environment and Water, prom. in SG issue 22/5.03.2013, effective 05.03.2013). In addition, surface water status has been compared to the provisioned Individual Emission Limits outlined in Permit №33140188/21.08.2015 for discharge of treated waste waters, issued by the Plovdiv Basin Directorate.

Results from groundwater tests are reviewed against the groundwater quality standards set out in Regulation № 1/10.10.2007 on Groundwater Exploration, Use and Protection. Appendix 4 presents surface and ground water monitoring results in 2015 and prior to that year, compared to the metric values stipulated by current legal standards.

5.2 Ambient Air

Ambient air quality was measured twice in 2015 (in February and March). The tests were carried out by an EEA certified lab - the Stara Zagora Regional Laboratory. The test results were compared against the regulated values set in Regulation 12/15.07.2010 on the Air Emission Limits for Sulphur Dioxide, Nitrogen Dioxide, Fine Particulate Matter, Lead, Benzene, Carbon Monoxide and Ozone and against the limits set in Regulation 14/23.09.1997 on the Regulated Limits for Harmful Substances in the Ambient Air of Populated Areas. All test results are provided in Appendix 3.

In 2015 the Company initiated its own continuous monitoring at three PM2.5 and PM10 points, together with deposited dust measurements. Results are presented in an independent report (Appendix 3).

5.3 Soils

A comprehensive soil survey was carried out in 2015 in the entire concession area, including soil samples covered by the Internal Monitoring Plan. Results are presented in Appendix 6 to this report.

5.4 Biological monitoring

Within the reported period, animal species were monitored in the area of Ada Tepe prospect, Khan Krum deposit, in the period April - September, 2015. The monitored territories were those listed in the endorsed Monitoring Plan, "Biodiversity" section. Appendix 8 presents independent reports on all monitored animal species in 2015, together with comparative data from previous years.

The scope of the biological monitoring, its plant species section in particular, is focused on those territories that are in close proximity to the future minesite, also covering the actions needed to execute the Biodiversity Management Plan, i.e.

- natural habitats mapping and assessment;
- Mapping of tortoise key areas and sites;
- Floristic composition of natural habitats.

All habitats have been identified according to the EUNIS (European Nature Information System) hierarchical classification of habitats http://eunis.eea.europa.eu/index.jsp). According to

this classification, a natural habitat is the natural home or environment of plant and animal species, which is characterized first by its specific physical features (topography, physiognomic indicators, soils, climate, waters, etc.) and second - by its flora and fauna. The EUNIS classification of habitats covers Europe's entire territory, both land and sea. All conservation-worthy habitats featured in the European environmental network NATURA 2000 correspond to those listed in EUNIS (http://eunis.eea.europa.eu/habitats.jsp). Several other documents need to be consulted in order to arrive at a final classification of habitats of conservation significance, namely the Interpretation Manual of European Union Habitats EUR 27, the Identification Guide to the Habitats of European Conservation Significance in Bulgaria and the Red Book of Endangered Species in Bulgaria (http://e-ecodb.bas.bg/rdb/en/vol3/).

Monitoring results are presented as part of a Company project to implement the Biodiversity Action Plan.

5.5 Noise

Noise measurements were conducted once at 6 points (settlements) by a certified lab. Results are presented in Appendix 7. Measurements were conducted on 14-15.10.2015, accounting for daytime, evening and nighttime noise limits, in compliance with Regulation №6/ 26.06.2006 on the Environmental Noise Indicators of Time-Dependent Levels of Discomfort, Environmental Noise Limits, Methods for Assessment of Noise Levels and Negative Effects of Noise on Human Health. Obtained data has been analyzed by using the reference values listed in Regulation 6 above.

5.6 Blast vibration impact (vibrations)

Continuous measurements of vibrations were conducted in one point (Zvanarka village) in 2015. Specific measurements of blast vibration impact have not been conducted, since blast works are not the presumed sources of vibration. Data collected since 17.09. 2015 (measurements' starting date) is presented in Appendix 5. Files can be opened by using a software which is freely accessible and available for downloading from the webpage of the measurement equipment producer at:

http://www.instantel.com/downloads/default.aspx

6. RESULTS FROM THE IMPLEMENTATION OF THE MONITORING PLAN

The results are provided by monitoring points for various environmental components:

6.1 Water

In 2015 testing and assay of water samples was conducted by a certified lab (Eurotest-control EAD, Sofia) three times, respectively in May, August and December 2015. Samples were taken from surface waters of tributaries and the Krumovitsa River, as well as from groundwaters, including drinking water abstractions. The gathering of baseline data on the status of waters and the dynamics of their quantitative and qualitative parameters shall continue until the start of minesite construction works. As we gather baseline data about the water, we would be able to more accurately assess the impact of the future mining and processing operations.

Assay results for all monitoring points are provided in Appendix 4.

6.1.1 Surface Water

The water quality of Ktumovitsa River and its tributaries was tested at 9 points in 2015. Surface waters were tested three times in May, August and December under the parameters set out in item 4.1 of this Report.

According to Regulation № H-4, the status of waters in rivers falls within four river categories - mountain rivers (R1, R2, R3), semi-mountain rivers (R4, R5) + conditional spring-type rivers(R15), plain rivers (R7, R8, R12, R13), intermittent and Black sea type of rivers (R9, R10, R11, R14). The Krumovitsa River and its tributaries belong to the intermittent type.

The comparison between surface water status and test results can be made according to the three states defined in Regulation № H-4 - "very good", "good" and "moderate". For the purposes of this Report, the physical and chemical elements for "good" surface water quality were chosen for comparison of monitoring results. Other indicators for surface water quality are the quality standards for chemical elements and other substances applicable to internal surface waters, i.e. the regulated limits for quality standards of chemical elements and other substances that are also provisioned in Regulation № H-4/ 14.09.2012 on Surface Water Characterization. The reference values provisioned in the Regulation on the Environmental Quality Standards (EQS) for priority substances and other pollutants have also been added to this analysis.

Results from analyzed samples were also compared to the Individual Emission Limits indicated in a Waste Water Discharge Permit, issued in connection with the design of a waste water treatment facility.

In all presented records of surface water testings, the Cr^{6+} indicator is <0,05 mg/l, which exceeds the value (0,008 mg/l) set out in Regulation № H-4/ 14.09.2012 on Surface Water Characterization. Given such values in the submitted records from the testings, it is not possible to establish whether the concentration of Chromium (hexavalent) in surface waters is elevated or not. Hence this indicator has not been described in surface water test results. The following elevated concentrations have been established at different surface water monitoring points:

- ESW 01 – Krumovitsa River, first section (the confluence point of Krumovitsa, Egrechka and Kessebirdere). This point is situated 200m south from the future minesite and indicates background levels. It presents the state of those waters that run close to the southern part of the future mining operation and yet remain off-site and downstream the Krumovitsa River.

No elevated concentrations have been observed, as per the physical and chemical indicators for "good" quality of intermittent type of rivers (such as Krumovitsa) and the quality standards for chemical elements and other substances for surface waters produced internally (regulated limits - environmental quality standards), provisioned in Regulation № H-4/ 14.09.2012 on Surface Water Characterization.

As to the chemical indicators provisioned in the Regulation on the Environmental Quality Standards (EQS) for priority substances and other pollutants, all measurements are below indicated threshold levels.

The same is valid for values above the individual emission limits.

- ESW 03 – Kessebir River downstream of Sinap, upstream the confluence with Egrechka River

This point is situated 600m N-NW Sinap. Its purpose is to gather data about any pollution generated in the water catchment area of Kesebir gully.

Three water samples were tested in 2015. Test results show that the concentration of aluminum ions (Al) in the sample taken on 29.05.2015 was 0,026 mg/l, compared to the 0,25 mg/l "good" quality indicator stipulated in Regulation H-4. Next two measurements showed a drop in concentration - first to 0,024 mg/l (in August) and then below set detection limits (in December).

- ESW 04 – Egrechka River – upstream the confluence with Kessebirdere

This point is situated 500m south from the future process plant. Its purpose is to gather data about any pollution of Egrechka generated in the water catchment area. This is a background monitoring point, since it is located above the minesite.

Three water samples were tested in 2015. Three water samples were tested in 2015. Test results show that two samples were within limits. The sample taken on 18.08.2015 showed lead ion concentration of 0,021 mg/l, i.e. above the set limit of 0,014 mg/l, as per the EQS Regulation; this concentration also exceeded individual emission limits on lead ions, stipulated in the Waste Water Discharge Permit (i.e. 0,01 mg/l).

- ESW 05 Buyukdere - upstream the confluence point Krumovitsa River.

The purpose of this point is to gather information about any Krumovitsa pollution generated by the populated areas situated in the water catchment area of the gully. The

Buyukdere River is a right-hand tributary of Krumovitsa River. Two water samples were tested in 2015. The second sampling scheduled for September 2015 did not take place due to lack of water.

Sample test results show that the concentration of water pollutants in 2015 remains below the limits provisioned in Regulation H-4/14.09.2012 on Surface Water Characterization.

- ESW 06 Kaldzhikdere - upstream of the bridge at Pobeda hamlet of Ovchari village.

Identifies water quality in the gully upstream of the intersection with the access road to the minesite and the section of the gully passing by the minesite.

Two water samples were tested in 2013. No water samples were taken in September due to the lack of water.

Sample test results show that all samples were within limits, except for the elevated concentration of iron ions in one sample taken on 09.12.2015, showing 0,14 mg/l compared to the established quality standard of 0,1 mg/l, as per the EQS Regulation.

- ESW 07 Kaldzhikdere - upstream the confluence point with Krumovitsa

This point is situated N-NW, at 300m from the confluence point of Kaldzhikdere and Krumovitsa River. The waters in this gully are directly connected the flow generated by precipitations in the Ada Tepe area. The purpose of this point is to gather data on Krumovitsa River pollution generated by populated areas situated within the gully's water catchment area and the future minesite.

The point was sampled once throughout the reported period, proving to be dry, just like in the previous two cases. Analyses show no contamination in terms of the sampled components.

- ESW 08 Krumovitsa river, downstream of the north sump of the IMWF.

Three water samples were tested in 2015. Results show no contamination throughout the reported period.

- ESW 09 Krumovitsa River.

The point is approximately 100m upstream of the discharge point. ESW 09 is a reference point for ESW 10. It indicates Krumovitsa River water quality before discharge downstream of the water treatment facility.

Water samples taken from this point were testes three times in 2015. Results show that the sample taken on 18.08.2015 displays higher concentrations than the permitted ones, as per Regulation H-4, namely:

- Ammonia nitrogen (NH_4^+ - N) - concentration of 1,93 mg/l, compared to the permitted 0,65 mg/l under Regulation H-4;

- Total nitrogen (N_{total}) - concentration of 3,6 mg/l, compared to the permitted 2,5 mg/l under Regulation H-4;
- Phosphates (PO_4^{3-}-P) - concentration of 0,21 mg/l, compared to the permitted 0,15 mg/l under Regulation H-4;
- Manganese ions (Mn) - concentration of 0,15 mg/l, compared to the permitted 0,05 mg/l under Regulation H-4;
- Iron ions (Fe) - concentration of 1,13 mg/l, compared to the permitted 0,1 mg/l under Regulation H-4;
- Copper ions (Cu) - concentration of 0,031 mg/l, compared to the permitted 0,022 mg/l under Regulation H-4;

It appears that there is an almost complete correlation between elevated concentrations in reference point ESW 09 and ESW 10, except for copper ions concentration which is within permitted limits at ESW 10.
Pollutant concentrations are directly linked to nearby farmlands and their fertilization, and discharged non-treated waste waters from the local sewage.

• ESW 10 Krumovitsa River, downstream of the discharge point of mine waste waters.

This point is located along the Krumovitsa River, approximately 100m downstream of the discharge point. The aim is to facilitate the assessment of discharged treated waters' impact on the river's water quality. Until 2014 this point was indicated as 02.

In 2015 the point was sampled three times. The first sampling on 29.05.2015 displayed two components with elevated concentrations:
- Aluminum ions (Al) - concentration of 0,35 mg/l, compared to the permitted 0,025 mg/l under Regulation H-4;
- Iron ions (Fe) - concentration of 0,48 mg/l, compared to the permitted 0,1 mg/l under Regulation H-4;

The second sampling on 18.08.2015 showed the following elevated values:
- Ammonia nitrogen (NH_4^+ - N) - concentration of 2,81 mg/l, compared to the permitted 0,65 mg/l under Regulation H-4;
- Total nitrogen (N_{total}) - concentration of 5 mg/l, compared to the permitted 2,5 mg/l under Regulation H-4;
- Phosphates (PO_4^{3-}-P) - concentration of 0,3 mg/l, compared to the permitted 0,15 mg/l under Regulation H-4;
- Manganese ions (Mn) - concentration of 0,14 mg/l, compared to the permitted 0,05 mg/l under Regulation H-4;
- Iron ions (Fe) - concentration of 0,16 mg/l, compared to the permitted 0,1 mg/l under Regulation H-4;

The direct correlation between the two points, i.e. ESW 09 and ESW 10 is apparent. The only difference is in the concentration of copper ions which are also present at ESW 10 but in

slightly lower concentrations. It also appears that the concentration of ammonium and phosphate ions, as well as that of total nitrogen, increase from ESW 09 to ESW 10, while metal ions' correlation between the two points is inversely proportional, i.e. decreases downstream. This is most probably due to the slightly higher presence of hydrogen cations in this environment, proven by the nearly neutral pH values at both points. Most probably, free hydrogen ions quickly form hydrocarbons and then bind metal ions, which also explains the drop in their concentration. Contamination with the above mentioned pollutants is probably due to the several urban sewage pipes which discharge non-treated waste waters into the river or its riverbed sands, depending on the season. Another additional explanation are all arable lands along the Krumovitsa River, upstream these two points.

This results in a direct correlation of the volume of surface runoff that passes through the riverbed and affects the dilution of present pollutants. As a result of this water dilution, available data indicates that these are clean waters, as per the terms of Regulation H-4.

6.1.2 Ground water

Ground water samples were taken according to the monitoring schedule, with some exceptions. No samples were taken from ESW 07 monitoring point, since it is an underground shaft well (designed to meet the fresh water demands of a future mining operation), which is currently placed under care and maintenance and sealed by the Plovdiv Basin Directorate, at the request of the Company. Other monitoring points, namely EGW 01, 09 and 10 are not set up yet. Data gathering about the static groundwater levels continued in 2015 and the data is provided in Appendix 4, together with a brief analysis on their dynamics. The regular monitoring activities at these stations enable tracking of the dynamics of the groundwater flow and chemical composition. The data will be later used for comparison with the future data as part of the future assessment of any indirect future impact of the mining operations on the local ground water. Variances in the static water levels of these waters are dictated by the recharge conditions and seasonal climatic conditions. Our analysis shows that there is no direct link between water levels measured in various piesometers. However, all of them are directly affected/ recharged by precipitation.

Points and analyzed ground water points are as follows:

- Design borehole EGW 01. It is located NE from the minesite and covers fissured groundwaters running towards the Krumovitsa River from the entire NE sector of Ada Tepe. It is situated in Eocene sandstones and conglomerates. The point monitors the water quality in SWB, code BG3G00PtPg2023 - Fissure-flow groundwaters, Krumovgrad-Kirkovo zone.

No analysis was conducted in 2015, since this is a design borehole.

- Point EGW 02 is a well set up E-NE of the open pit at the foot of the slope (in Chobanka hamlet), and represents ground water in Palaeocene breccio-conglomerates and sandstones (Krumovgrad Group), with draining direction E-NE to the Krumovitsa River. The point monitors the water quality in SWB, code BG3G00PtPg2023 - Fissure-flow groundwaters, Krumovgrad-Kirkovo zone.

The chemical test of the sample shows that the water at this point meets the quality standards pursuant to Regulation 1/2010 on Groundwater Exploration, Use and Protection, except for the arsenic (As) content in a sample taken on 18.08.2015, showing 11 µg/l, compared to a quality standard of 10 µg/l.

- Borehole EGW 03 is situated in the metamorphic complex (metagranites and granite-gneiss) on the west slope of Ada Tepe and its purpose is to monitor groundwater flowing towards Kardzhikdere from the drainage on the west slope of the deposit. The point monitors the water quality in SWB, code BG3G00PtPg2023 - Fissure-flow groundwaters, Krumovgrad-Kirkovo zone.

The chemical test of the samples taken in 2015 shows that the water at this point meets the quality standards provisioned in Regulation 1/2010 on Groundwater Exploration, Use and Protection, except those described in the Table below.

Indicator	Quality standard as per Regulation № 1/2010	Assay in an Accredited lab conducted on 29.05.2015	Assay in an Accredited lab conducted on 18.08.2015	Assay in an Accredited lab conducted on 09.12.2015
Manganese (Mn)	(50 µg/l)	230 µg/l	510 µg/l	101 µg/l
Iron (Fe)	(200 µg/l)	(51 µg/l)	3320 µg/l	(150 µg/l)
Arsenic (As)	(10 µg/l)	<5	41 µg/l	(8.5 µg/l)

The presence of iron and arsenic ions that fails to meet set quality standards is most probably due to the lower level of water dilution in summer months caused by less precipitation.

- Borehole EGW 04 is set up in the metamorphic rocks on the slope descending to the Krumovitsa River terrace and covers groundwater flowing south downstream of the mining waste facility. The point monitors the water quality in SWB, code BG3G00PtPg2023 - Fissure-flow groundwaters, Krumovgrad-Kirkovo zone.

The chemical test shows that the water at this point meets the quality standards pursuant to Regulation 1/2010 on Groundwater Exploration, Use and Protection. The following deviations were identified:

Indicator	Quality standard as per Regulation № 1/2010	Assay in an Accredited lab conducted on 29.05.2015	Assay in an Accredited lab conducted on 18.08.2015	Assay in an Accredited lab conducted on 09.12.2015
Manganese (Mn)	(50 µg/l)	120 µg/l	105 µg/l	50 µg/l
Iron (Fe)	(200 µg/l)	(47 µg/l)	210 µg/l	(170 µg/l)

*elevated levels (see Regulation №1)

Elevated iron levels are most probably due to corroded pipe casing. Elevated manganese levels are most probably due to ongoing natural processes of oxidation and to groundwaters' hydro-geological dynamics.

- EGW 05 - Krumovgrad drinking water abstraction, located in the in the alluvials of the Krumovitsa River. Identifies any negative changes in the quality of groundwater abstracted for domestic and potable needs. The point monitors the water quality in the quaternary aquifer of the water body named BG3G000000Q010 Interstitial groundwaters in the Quaternary deposits.

Tests show that the assayed indicators meet the requirements of Regulation 9 on Drinking and Household Water Quality. The following deviations were identified:

Indicator	REGULATION 9 on Drinking and Household Water Quality.	Assay in an Accredited lab conducted on 29.05.2015	Assay in an Accredited lab conducted on 18.08.2015	Assay in an Accredited lab conducted on 09.12.2015
Nitrates (NO_3)	(50 µg/l)	50 µg/l	(2.9 µg/l)	(4 µg/l)
Total alfa activity	0,1 Bq/l	0,099 Bq/l	0,117 Bq/l	0,048 Bq/l
E. coli	0/100 cfu/100cm³	1/100	1/100	1/100
coliforms	0/100 cfu/100cm³	22/100	7/100	43/100
enterococci	0/100 cfu/100cm³	0/100	2/100	5/100
Clostridium perfringens	0/100 cfu/100cm³	0/100	2/100	0/100

*elevated levels, as per Regulation №1

A specific feature of this point is the repeated presence of microorganisms that are hazardous to human health. Nitrate concentration in the month of May is another specific feature and is most likely due to the fertilization of nearby arable lands in the Krumovitsa terrace. Another point to mention is the slightly elevated alpha radiation in the July water sample.

- EGW 06 Ovchari-Krumovgrad II drinking water abstraction, located in the alluvials of the Krumovitsa River. Identifies any negative changes in the quality of the groundwater abstracted for drinking. The point monitors the water quality in the quaternary aquifer of the water body named BG3G000000Q010 Interstitial groundwaters in the Quaternary deposits.

Tests show that the assayed indicators meet the requirements of Regulation 9 on Drinking and Household Water Quality. The following deviations were identified:

Indicator	REGULATION 9 on Drinking and Household Water Quality.	Regulation №1 on Groundwaters	Assay in an Accredited lab conducted on 29.05.2015	Assay in an Accredited lab conducted on 18.08.2015	Assay in an Accredited lab conducted on 09.12.2015
coliforms	0/100 cfu/100cm^3	-	10/100	0/100	0/100
E. coli	0/100 cfu/100cm^3	-	1/100	0/100	0/100
bromates	10 µg/l	-	26	<10	<10
Chlorine (free)	0.3 mg/l	-	0.111 mg/l	0.392 mg/l	1.52 mg/l

*elevated levels, as per Regulation №1

The high concentration of free chlorine is probably due to the heavy chlorination of potable water. The May sample displays elevated content of microorganisms that are hazardous to human health. In the subsequent samples their presence is brought down to 0. The one-time elevated value of bromates is interesting to note and should be followed-up on in the future.

- EGW 07 Proprietary abstraction well, located in the alluvials of the Krumovitsa River. Identifies any negative changes in the quality of the groundwater abstracted for drinking. The point monitors the water quality in the quaternary aquifer of the water body named BG3G000000Q010 Interstitial groundwaters in the Quaternary deposits. When the construction of the Tube Well is completed, a conceptual design of the facility will be attached to the Monitoring plan in order to provide clarity on the contact point of the infiltration lateral in the tube well and the lithology structure.

No analysis was conducted in 2015, since this the water supply source is sealed.

- EGW 08 design borehole in the Ada Tepe area - it is located at high elevation on Ada Tepe and is a reference point above the IMWF. Set in a metamorphic complex - metagranites and gneisses, with some schist layers. The groundwater source is porous, with draining direction to the Krumovitsa River. The point provides the background characteristics of groundwater running towards IMWF.

Samples were taken from a geotechnical borehole some 200m west of the future monitoring point, with the aim to gather data until a proper piesometer is set up at this specific location. The chemical test of the samples shows that waters at this point meet the quality standards provisioned in Regulation 1/2010 on Groundwater Exploration, Use and Protection. The following deviations were, however, identified:

Indicator	Regulation №1 on Groundwaters	Assay in an Accredited lab conducted on 29.05.2015	Assay in an Accredited lab conducted on 18.08.2015	Assay in an Accredited lab conducted on 09.12.2015
Total indicative dose	0,1 mSv/per annum	0,021 mSv/per annum	0,113 mSv/per annum	0,085 mSv/per annum
Total alpha activity	0,1 Bq/l	0,113 Bq/l	0,67 Bq/l	0,517 Bq/l
permanganate oxidisable C	5 mg O2/l	1,86 mg O2/l	2,61 mg O2/l	6,4 mg O2/l
Manganese	50 µg/l	14 µg/l	14.4 µg/l	160 µg/l
Iron	200 µg/l	43 µg/l	2 µg/l	350 µg/l
Petroleum products	50 µg/l	<20 µg/l	<20 µg/l	58 µg/l

*elevated levels, as per Regulation №1

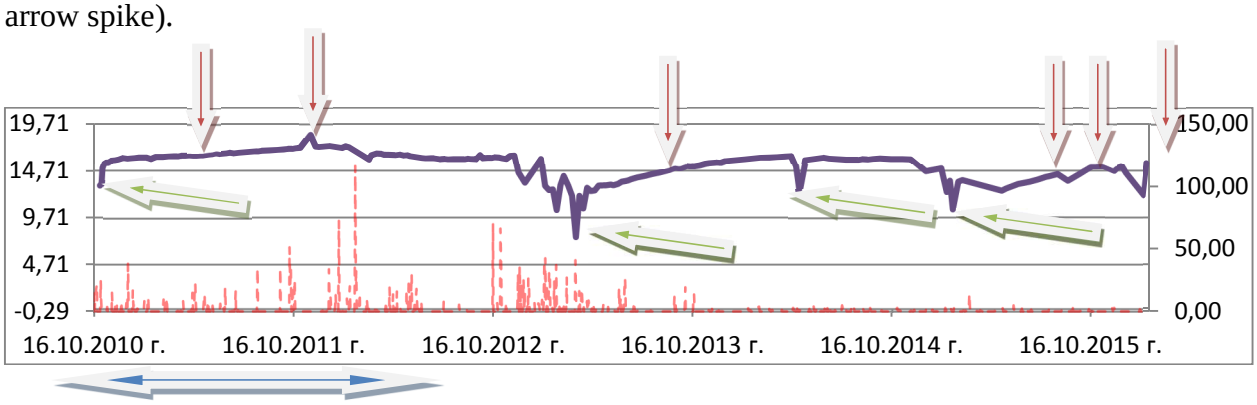
High iron (Fe) concentrations in the last sample are probably due to the highly corroded pipe case of this particular borehole.

Without any long-term observation, it would be hard to identify the source of elevated alpha activity in the last two samples, as well as the one-time elevated total indicative dose in the July sample.

The elevated concentration of manganese is probably due to lower static water levels, i.e. less water to leach the metals. The same applies to petroleum products. This hypothesis is confirmed by analyses of static water levels measured within the boreholes, displaying the following variations:

- On 20.05.15 – 12,98 m;
- 14.08.15 – 14,35 m;
- 10.12.15 – 15,18 m.

Groundwater level variations are presented in the below chart (the dark line). Precipitation and respective precipitation volumes are marked in red. There is an apparent link between precipitation volumes and recharged groundwaters. However, this is observed with a corresponding delay in time at the different boreholes. Groundwater recharging is also strongly dependent on precipitation intensity. The chart shows groundwater recharges as spikes marked with green arrows, caused by precipitation (red bars), while the smooth progression of the curve displays those areas with decreasing water levels (marked with red arrows). The blue arrow shows a water saturated area, immediately followed by a very pronounced spike in groundwater levels. We are witnessing a longterm correlation between fissure saturation (after a long period of low-volume precipitation) and a subsequent period, after pores get water saturated (green arrow spike).



Elevated permanganate oxidation reveals a likely process of fermentation. However, the water sample bears no visible evidence of this.

- Design borehole EGW 09. At the toe of the north part of IMWF, between the North Collection Sump and the Krumovitsa River. Set in a metamorphic complex - metagranites and gneisses, with some schist layers. The groundwater source is porous, with draining direction to the Krumovitsa River. The point monitors the groundwater quality running to IMWF.

The point was not analyzed, as it is still not set up.

- Design borehole EGW 10. At the toe of the south part of IMWF, between the South Collection Sump and the Krumovitsa River. Set in a metamorphic complex - metagranites and gneisses, with some schist layers. The groundwater source is porous, with draining direction to the Krumovitsa River. The point monitors the groundwater quality running to IMWF.

The point was not analyzed, as it is still not set up.

- EGW 11 - Zvanarka drinking water abstraction. Captured springs are water sources that do not pertain to the Krumovitsa River terrace. They drain waters in

the Paleogene sediments. The point monitors the quality of waters used for potable and domestic needs.

EGW 11 water sample tests show that ion concentrations meet the quality standards provisioned in Regulation 9/16.03.12001 on Drinking and Household Water Quality, except on the following dates with certain elevated concentrations, as indicated below:

Indicator	Regulation №9 on Drinking and Household Water Quality	Assay in an Accredited lab conducted on 29.05.2015	Assay in an Accredited lab conducted on 18.08.2015	Assay in an Accredited lab conducted on 09.12.2015
Aluminum	200 µg/l	1300 µg/l	15 µg/l	<8.0 µg/l
Manganese	50 µg/l	100 µg/l	4.4 µg/l	4 µg/l
Iron	200 µg/l	1300 µg/l	140 µg/l	19 µg/l
E. coli	0/100 cfu/100cm^3	1/100	2/100	2/100
coliforms	0/100 cfu/100cm^3	16/100	42/100	18/100
enterococci	0/100 cfu/100cm^3	0/100	2/100	1/100
Total alpha activity	0,1 Bq/l	0,049 Bq/l	0,094 Bq/l	0,119 Bq/l

*elevated levels, as per Regulation №1

The high concentration of aluminum, manganese and iron is probably due to low volumes of water at the source, which is located in limestone. Water drainage at this monitoring point cannot be compared to other potable water monitoring points, since they are located in the alluvial Krumovitsa River terrace. There is no available data on water levels and volumes at the source, which means that above mentioned likelihood is based on assumptions only.

Perhaps the same reasons could also explain the presence of microorganisms in these waters.

This water sample also features chromium and nickel, which are not found in other sampled points. Their concentration is, however, below the threshold for potable water.

- EGW 12 - abstraction facility at Guliika pump station. Located in the alluvial deposits of the Krumovitsa River. The point monitors the quality of waters used for potable and domestic needs.

The chemical test of the samples taken from EGW 12 shows that waters at this point meet the quality standards provisioned in Regulation 9/16.03.12001 on the Drinking Water Quality.

Indicator	Regulation №9 on Drinking and Household Water Quality	Assay in an Accredited lab conducted on 29.05.2015	Assay in an Accredited lab conducted on 18.08.2015	Assay in an Accredited lab conducted on 09.12.2015
E. coli	0/100 cfu/100cm^3	1/100	0/100	0/100
coliforms	0/100 cfu/100cm^3	18/100	0/100	0/100
Chlorine (free)	0.3 mg/l	0.153 mg/l	0.488 mg/l	0.39 mg/l
Total alpha activity	0,1 Bq/l	0,024 Bq/l	0,084 Bq/l	0,141 Bq/l

*elevated levels, as per Regulation №1

The reasons are probably the same as with monitoring point EGW 11.

6.2 Air.

Ambient air quality was measured twice - in February and August. Assessment of ambient air quality was done by an accredited laboratory - the Stara Zagora Regional Laboratory of the Executive Environmental Agency. By the start of the project's construction stage, the company will continue to gather data and monitor the air quality in order to identify the dynamics of the quantitative and qualitative parameters of the ambient air. Such baseline data will be gathered to enable accurate future assessment of the impact of the mining and processing operations at the Ada Tepe prospect, Khan Krum deposit.

Test results from all monitoring points are provided in Appendix 3.

The certified lab measured the following parameters - nitrogen oxide (NO), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), hydrogen sulphide (H_2S), ozone (O_3), ammonia (NH_3), carbon oxide (CO), methane (CH_4), fine dust particles with a diameter up to 10 micrometers (PM 10), suspended particles, lead (aerosol) (Pb), benzene, polycyclic aromatic hydrocarbons (PAH), heavy metals – cadmium (Cd), nickel (Ni) and mercury (Hg), arsenic (As).

Overall, the conclusion is that ambient air quality is good.

The test results were compared against the regulated values set in Regulation 12/15.07.2010 on the Air Emission Limits for Sulphur Dioxide, Nitrogen Dioxide, Fine Particulate Matter, Lead, Benzene, Carbon Monoxide and Ozone and against the limits set in Regulation 14/23.09.1997 on the Regulated Limits for Harmful Substances in the Ambient Air of Populated Areas.

The conclusion drawn from the analysis of the data measured by the certified Regional Lab in Stara Zagora is that there are no elevated concentrations of pollutants.

Results from the Company's internal measurements of PM 10 and PM 2.5 also show no elevated concentrations, as per the limits indicated in Regulation 12. Deposited dust concentrations calculated per unit of surface area also meet the statutory requirements of 350 mg/m^2/24 hours, provisioned in Regulation 2/ 19.02.1998 on Maximum Allowable Air Emissions (Concentrations in Waste Gases) of Harmful Substances Emitted from Static Sources.

It should be noted that in winter months (November and December) the average hourly rates of fine dust particles very often exceed statutory thresholds but do not remain above the set limit of 50µg/m^3 for PM_{10} for more than 24 hours. Hence elevated hourly rates cannot be combined and reported as air pollution. As to $PM_{2,5}$, we've noticed elevated concentrations in the average data per hour in winter months. However, they cannot be calculated per annum, since the 25 µg/m^{3}limit set out in Regulation 12 is an average annual one. Results from the 6-months of continuous measurements show no exceeded limits (on a 6-monthly basis).

Results from the Company's continuous internal monitoring of fine particulate matter and deposited dust are presented in Appendix 3.

6.3 Soils.

Soils samples were taken during a comprehensive soil survey in the entire concession area.

Sampling took place in October 2015 and was conducted by a team of certified experts from Pushkarov Soil Science Institute. The sampling approach meets environmental monitoring requirements. Each average sample consists of 5 individual samplings made at 2m distance from the fixed point. When possible, soil samples were also taken at a second depth (20-40m). Due to the rocky landscape, this was done for 5 samples only.

All samples were dried, screened with a 2mm screen and prepared for analysis. Screening (agate) was done in order to establish the pH and the decomposition in order to define general forms of heavy metals.

Sample preparation and extraction was conducted in line with the provisions of Regulation 3/2008 (on pollutants in the soil) with aqua regia.

Analytic work was carried out in a certified lab to the University of Mining and Geology with an ICP instrument.

Results from the 8 samples featured in DPMK's Internal Monitoring Plan are presented in the Table below:

Ref No.	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
ESS 1	242	<1	173	65.0	<0.5	161	18.1	113
ESS 2	107	<1	98.2	38.2	<0.5	90.0	12.0	79.4
ESS 3	21.1	<1	64.2	44.7	<0.5	38.9	9.5	158
ESS 4	<10	<1	120	57.8	<0.5	53.7	7.1	148
ESS 5	98.1	<1	107	57.7	<0.5	80.7	18.4	109
ESS 6	25.6	<1	48.4	48.1	<0.5	51.7	34.8	152

ESS 7	85.4	<1	75.8	46.5	<0.5	108	16.9	100
ESS 8	<10	<1	31.1	26.2	<0.5	27.8	19.9	90.9

**values marked in red exceed the statutory limits set out in Regulation 3/2008 on Pollutants in the Soil*

A report on all tested soil samples, as well as bee honey samples, is available in Appendix 6. It should be noted that all 5 honey bee samples were tested for potentially hazardous elements (metals and metalloids). Their safety analysis shows no such presence, established by the used measuring equipment. This shows that all honey bee samples can be characterized as safe for consumption from a nutritional point of view.

6.4 Biological monitoring

Monitoring of Reptiles: Monitoring days allocated to both protected tortoise species – Herman's Tortoise (Testudo hermanni) and Spur-thighed Tortoise (Testudo graeca) were increased to 45 man-days during the reported period. Thus monitoring was also conducted in the period April - September, offering a much broader picture of the development of these populations at two very important moments of their life cycle, i.e. before and after winter hibernation. Tortoise monitoring began in 2012 and the data gathered throughout the years is presented in a comprehensive monitoring report on both species. The report is available in Appendix 8.

Monitoring of insects: Jersey Tiger moth (Euplagia quadripunctaria) monitoring was done over 40 fieldwork days in May, June, July and August, concurrently with the tortoise and yellow-bellied toad monitoring. The species was identified at Ada Tepe. Individuals were practically found only in acacia forests (Robinia pseudoacacia) or immediately close to them. This monitoring will be conducted annually during the construction stage (maximum two years) and by the 3rd year of operation. Starting from the 4th year, the observation may be performed every second year.

Monitoring of amphibians: Field studies conducted in 2013 showed that the yellow-bellied toad (Bombina variegata) is scarcely present in the area. Hence it cannot be monitored in terms of project impact.

Appendix 8 presents the Biological Monitoring Report for animal species class insects (Insecta), class amphibians (Amphibia) and class reptiles (Reptilia) in the Ada Tepe area, Khan Krum deposit.

The Company also conducted monitoring of various bat species in 2105, although such was not originally scheduled in its Monitoring Plan. Results are presented in Appendix 8.

6.5 Noise

In 2015 the Company conducted noise analysis at 6 points located in the vicinity of the future minesite. Each monitoring point was visited three times to measure daytime, evening and nighttime noise levels, as per the requirements of Regulation 6/ 26.06.2006 on the

Environmental Noise Indicators of Time-Dependent Levels of Discomfort, Environmental Noise Limits, Methods for Assessment of Noise Levels and Negative Effects of Noise on Human Health (Regulation 6).

Results obtained from these 6 monitoring points were compared to permitted noise levels, stipulated in Regulation 6. Comparative levels are presented in the Table below:

Sites and Development Areas within or outside Urbanized Areas		Equivalent noise level dB(A)		
		Day	Evening	Night
1.	Urban areas and sites	55	50	45

Data has been analyzed both in terms of individual time zones and equivalent values per 24 hours.

Наименование	**Вид**	**L day**	**L evening**	**L night**	**L 24**
	Residential areas and sites	55	50	45	-
	Production sites	70	70	70	-
	unit	dB (A)	dB (A)	dB (A)	dB (A)
1.Krumovgrad (Izgrev quarter)	Noise in residential area	41,5	33,17	34,17	42,29
2 Soyka hamlet*	Noise in residential area	40,3	34,59	35,76	42,88
3.Varhushka hamlet*	Noise in residential area	42,6	35,31	37,9	44,97
4 Pobeda hamlet*	Noise in residential area	46,5	47,1	44,9	51,83
5.Dazhdovnik village	Noise in residential area	40,9	43,15	44,12	50,14
6 Minesite**	Noise in production area	-	-	-	-
7.Chobanka hamlet*	Noise in residential area	43,3	33,71	34,56	43,32

* hamlets of Ovchari village

** Measurements shall commence when the minesite is commissioned.

Data analysis shows that all measurements meet statutory limits. It should be noted, that equivalent night-time noise measurements in the hamlet of Pobeda (44,9 dB (A)) and the village of Dazhdovnik (44,12 dB (A)) came very close to the 45 dB (A) night-time noise limit. High values are due to the periodic barking of dogs, as well as sounds made by crickets.

6.6 Blast vibrations.

Blast vibrations are measured at one monitoring point in Zvanarka village, next to third-class road 509, which was recommended to the Company as an access road to the future minesite. The Company has installed one seismograph, which has measured 566 occurrences since its installation on 03.06.2015 till 31.12.2015. Some of the registered occurrences are presented in Appendix 5, also showing different sources of measured anomalies.

7. ASSESSMENT OF THE EFFICIENCY OF THE MONITORING NETWORK FOR 2015

7.1 Efficiency

Water Component

The applied on-site monitoring design provides an overview of the state and tendencies for changes in the hydrodynamic and hydrochemical conditions of surface and groundwaters in the area of the future minesite. Monitoring data analysis leads to the following conclusions about the efficiency of the 2015 monitoring network:

- The location of the monitoring points makes it possible to evaluate the general picture of the water status by providing the option for comparison with an eventual future contamination of surface and groundwaters as a result of Dundee Precious Metals Krumovgrad EAD's operations on the basis of hydrogeological and hydrochemical conditions close to the footprint of the future mine that represent the various types of groundwaters, which by one way or another are geologically connected to the ore body of Ada Tepe and the layers beneath it;

Ambient Air Component

The current on-site monitoring design gives an overview of the status and trends of changes in ambient air quality in the area of the future project. Reviewed monitoring data leads to the conclusion that the chosen monitoring design is effective enough and gives an overview of:

- Ambient air quality as the only source of information for the Company;
- The location of the monitoring points makes it possible to evaluate the general picture of ambient air status by providing the option for comparison with an eventual future contamination as a result of DPMK's operations;
- Installing dust meters (operating 24/7) in three settlements is an opportunity to get to know current state of affairs, prior to the start of any mining operations. At all three monitoring points, measuring devices collect data not only on PM10, as required by the Monitoring Plan, but also on the PM2,5 respiratory fraction which also poses risks to human health;

- Deposited dust measuring devices present the current status quo and results can be compared with subsequent data collected during the different stages of minesite operations.

Biological monitoring

Progress on the Krumovgrad Gold Project enhanced the Company's approach to the protection of endangered animal species in the Eastern Phodopes protected area which falls entirely within the footprint of the future minesite. This led to the drafting of a Biodiversity Action Plan, which puts a strong emphasis on developing the habitats of the two protected tortoise species (Hermann's tortoise and Spur Thigh Tortoise). The Plan's main objectives are to improve habitats in the minesite's vicinity, facilitate the development of local populations of tortoises and combat poaching. The Company has drafted a project to implement the actions and activities envisaged in the Biodiversity Action Plan. Some of these activities were carried out in 2015 and it would be fair to say that they helped clarify and specify the objectives set out in the Plan, and their corresponding performance measures. In particular, these activities involved: mapping of habitats in the area adjacent to the minesite; identifying suitable locations for setting up small anti-erosion facilities that would serve as small ponds to retain water in the dry months of the year, to serve the needs of local animal species and other scheduled project activities.

Parallel to the work carried out within the framework of its Monitoring Plan and Biodiversity Action Plan, the Company also intensified its tortoise monitoring. Reported results on the development of tortoise populations cover the period from 2012 to 2015. In addition to the monitoring requirements featured in the Monitoring Plan, the Biodiversity Action Plan presented further monitoring areas, indicative of the development of tortoise populations.

The Company shall continue making analyses and assessments based on field surveys, so as to account for the interaction between abiotic, biotic and anthropogenic factors, and estimate environmental patterns and the impact of external stress factors.

Soils

The Company conducted a comprehensive survey in 2015, covering not only the 7 points featured in its Monitoring Plan, but also another 90+ points, set up in a specific monitoring network. The aim was to show the current status of soils and the interventions needed to improve that status. Parallel to this monitoring within a broader network, the Company drafted a baseline map to facilitate future comparisons of soil status, i.e. before and after minesite operations.

In addition, it conducted an analysis of 5 bee honey samples taken from bee hives close to the future minesite, as well as reference samples that could also be used when making comparisons once minesite operations commence.

Noise

Current noise measurements show values that bear no industrial impact. Collected data shall help compare data before/ after minesite operations, as well as identify key areas to introduce noise protection measures to, if needed.

Blast vibrations (Vibrations)

Blast vibration measurements at 1 point in Zvanarka village, located 2 m from the main access road, recommended by the Kardzhali District Road Management, i.e. road III-509 through the villages of Zvanarka and Tokachka, are an indication of current blast vibration impacts. Since there is not statutory framework for buildings-safe vibration levels in Bulgaria, results are compared with the German standard DIN 4150 for the protection of buildings and cultural monuments. Current measurements show values that bear no industrial impact.

Collected data shall help compare data before/ after minesite operations, as well as identify key areas to introduce vibration and noise protection measures on access roads.

7.2 Proposals for improving efficiency

Water Component

- The locations for setting up new piesometer wells/ boreholes for environmental monitoring in 2014 have been chosen following recommendations from the EEA. Scheduled points indicated as EGW 01, EGW 08, EGW 09, EGW 10 are included in the Company's 2014 Monitoring Plan. The location of future piesometers is shown in Appendix 4.
- All groundwater points shall be tested against the established values pertaining to groundwater quality standards set out in Appendix 1 of Regulation 1 on Groundwater Exploration, Use and Protection. Points that are drinking water abstractions shall be respectively tested against the limits stipulated in Appendix 1 of Regulation 9 on on Drinking and Household Water Quality.
- Potassium should be added as a tested element in all groundwater monitoring points except EGW 05, 06, 07, 11 and 12, since it is among the key ions and influences ion balance.
- The locations of two new surface water monitoring points - ESW 09 and ESW 10 - have been chosen following recommendations from experts from the Basin Directorate in Plovdiv. The points are part of the Company's 2014 Monitoring Plan. The location of future monitoring points is shown in Appendix 4.
- In addition to the physical and chemical surface water indicators, the following biological elements for quality shall also be monitored at ESW 08, ESW 09 and ESW 10: Biotic index for macrozoobenthos ("Methods for monitoring the biological element macrozoobenthos in rivers (biotic and trophic index"), and IPS index for phytobenthos - flint (diatom) algae ("Methods for monitoring the biological element phytobenthos in rivers (IPS index)").

- Start collecting data on the status of surface waters on a weekly basis (pH, conductivity, dissolved oxygen, temperature) at the points of monitoring. Reason - accumulation of data and creating a model of the seasonal dynamics of surface waters' physical qualities;
- Continue collecting data on static water levels in piesometers until construction works commence, then reduce their number to those that are currently featured in the Monitoring Plan.
- In 2014, an additional abstraction facility at Guliika pump station was added to the existing monitoring network, set up for groundwaters used for domestic and potable purposes. This was done following recommendations of experts from the Plovdiv Basin Directorate. The Guliika abstraction facility provides additional data on the status of groundwaters used for domestic and potable purposes.

Air

- The frequency with which ambient air quality is being measured should be once per annum, in the summertime. The choice of this season is related to the expected impact of particulate emissions on the ambient air due to site activity;
- Continue collecting data on the two types of PMs (sized 2,5 to 10), as well as deposited dust data throughout the entire period of minesite operations.

Soils

- Soils monitoring should take place prior to commencing construction works;

Biological monitoring

- Biological monitoring should continue in order to accomplish its main objective, i.e. to provide an impartial monitoring of project impact in the Ada Tepe license, Krumovgrad municipality. Ensure the monitoring of all biological components at Ada Tepe, indicated in the Compatibility Assessment Report.
- Apply the measures stipulated in the Biodiversity Action Plan and the project designed for its implementation.

8. CONCLUSION

Waters

After summarizing the results of tests conducted in 2015 and comparing them with the quality standards provisioned in Regulation № Н-4/ 14.09.2012 for Surface Water Characterization (issued by the Minister of Environment and Water, prom. in SG 22/ 5.03.2013, effective 5.03.2013) and individual emission limits set out in Permit №33140188/21.08.2015 for discharge

of treated waste waters, issued by the Plovdiv Basin Directorate, we can make the following conclusions:

1. Surface waters, as follows:
   - Krumovitsa River - meets the requirements of Regulation № H-4, except measurements at ESW 10, some 100 m downstream of the discharge point, where aluminum (Al) and iron (Fe) ions tested on 20.05.2015 exceeded the permitted threshold for "good" water quality in rivers of the Krumovitsa type, as per Regulation № H-4. On 18.08.2015 tests conducted at points ESW10 and ESW09 (100 m upstream of the discharge point) showed elevated levels of ammonium ((NH_4), total nitrogen (N_{total}), phosphates (PO_4), manganese (Mn) and iron (Fe) ions, as well as copper (Cu) ions at monitoring point 9. Subsequent measurements showed no elevated values;
   - Egrechka River - meets the requirements of Regulation № H-4. Elevated concentration of lead (Pb) ions was measured only once (small volumes of surface run-off in the summer months);
   - Kessebirdere - meets the requirements of Regulation № H-4, with only one exception on 29.05.2015 with elevated concentration of aluminum (Al) ions;
   - Buyukdere - meets the requirements of Regulation №H-4;
   - Kaldzhikdere - meets the requirements of Regulation № H-4, with only one exception on 09.12.2015 with elevated concentration of iron (Fe) ions;

2. Groundwaters – Groundwaters' quality in the monitoring points is related to the mineralogy of the specific earth layers through which the drillhole passes, as well as the layers through which waters run prior to reporting to the monitoring point. As evident from the information presented in the report, there are elevated concentrations of certain metals, which could be a combined consequence of the mineralogical structure of the layers, piesometers' corroded pipe casing or polluted drillholes from drills. Most common elevated concentrations of ions were those of iron (Fe), aluminum (Al), manganese (Mn) and rarely arsenic (As).
3. Different numbers and types of microorganisms that shouldn't be present in potable water have been detected at monitoring points for groundwaters, used for domestic and drinking purposes. This was most probably due to the fact that sampled water was not chlorinated.

Air

Analyses of 2015 test results allow for the following conclusions:

Monitoring activities conducted at 6 points by a certified lab showed no ambient air pollution. There was a one-time elevated level of nitric oxide (NO) in February showing 201µg/m^3, compared to the permitted level of 200µg/m^3, as per Regulation 12. It should be noted that at all settlements, winter levels of nitric and sulfur oxide are higher, which is most probably due to the type of heating used in this season, i.e. combustion of fossil fuels.

Soils

Analyzed soil samples data within the monitoring network shows as follows:

- Cadmium concentration in all samples is below 1mg.kg-1 (i.e. below detection limit).
- Mercury concentration is below 0.5mg.kg-1 (below detection limit).
- Lead concentration is within background levels and is not considered as a problem in the surveyed points.
- Zinc concentration (average value - 80 5 mg.kg-1) is significantly below the maximum allowable level of 200 mg.kg-1.
- Chrome concentration is in general below the maximum allowable level, except for sample 49 which exceeds twice the limit values of 449mg.kg-1.
- Nickel concentration varies in different samples. There are high natural levels of this element, which is typical of the Eastern Rhodopes. Here we've established a variation around 73.2mg.kg-1. However, some samples considerably exceed the maximum allowable levels, reaching up to 345 at monitoring point 49. The information is presented in an interpolated map (Fig.4).
- From all sampled elements, the most significant variations are with arsenic. Arsenic variations are indeed high (average value - 111,0 mg.kg-1 ± 120,4). The calculated mean is 55,7. The highest recorded value is 477mg.kg-1 at point 57. These concentrations significantly exceed the maximum allowable limit and fall within the so-called intervention levels (i.e. over 120 mg.kg-1 for industrial sites). At the same time, the interpolated map presented here (Fig 5) shows that high concentrations are primarily seen in the south-west part of the concession area.

As a general conclusion, we can say that the majority of the samples reflect the metallogenic character of the area. It would be advisable to monitor nickel and arsenic concentrations over the years, since they exhibit high deposition levels.

Biological monitoring

Tortoises:

- Throughout the entire period of the survey, only the winter of 2013-2014 can be defined as an unfavourable one in terms of climate conditions, with potentially high risk for the tortoises.
- The natural thinning of the forest after the heavy snow falls has improved living conditions for terrestrial tortoises at Ada Tepe.
- The nutritional status of all tortoises at the end of the 2015 season (identified with the help of the weight index) provides for smooth winter hibernation.
- Sub-populations of both tortoise species are ageing - a fact which was again confirmed this year.

- Additional data gathered in 2015 confirmed the established opinion that the T. graeca sub-population at Ada Tepe and Sinap is less stable;
- Collected data on the dynamics of tortoise numbers, their spatial distribution and private moves, reveals that migration processes have a great impact on their populations.
- Reproduction rates among both tortoise species are very low in all three surveyed areas.
- Tortoise-eating in this region is a serious threat to terrestrial tortoises.
- Relocated and non-relocated tortoises at Ada Tepe share the same fate. There are no disturbing differences.
- The execution of the Biodiversity Action Plan for the Hermann Tortoise (Testudo hermanni) and the Spur-thighed Tortoise (Testudo graeca) in the Ada Tepe Project area in all of its aspects shall significantly improve living conditions for these two species and shall help curb poaching.

Bats

- On Ada Tepe's project site there are no shelters of the 10 cave-inhabiting bat species subject to protection in the protected area BG 0001032 Rhodopes- East. The site is not a part of their potential favorable habitat, which is confirmed by results from the project "Mapping and determining the conservation status of natural habitats and species - Phase I".

(http://natura2000.moew.government.bg/Home/ProtectedSite?code=BG0001032&siteType=HabitatDirective).

- The site is not a part of the potential habitat of both forest bat species (Barbastella barbastellus and Myotis bechsteinii), subject to conservation within the Protected zone, since these bats inhabit mainly wet mountain deciduous and rarely coniferous forests. The white pine and oak trees combined with the geographical and landscape specifics of Ada Tepe maintain dry and warm microclimate and do not provide suitable shelters for these two species.
- Effective changes in the micro climate and micro landscape of the Thracian mine following conducted archaeological excavations permanently chased away its inhabitants - a small summer community of 8 - 10 representatives of the Greater Horseshoe Bat (Rhinolophus ferrumequinum). As already pointed, there are no favorable conditions for their return. There are no other suitable natural shelters for the species on the project site, and therefore no measures could be planned and applied for mitigation of the impact on the habitats used for rest by the scarce bat population.
- The project site is typical for its exceptionally low species diversity of the bat stock and its very low hunting activity. Flights of single representatives of four species are registered. This is mostly due to the lack of suitable shelters in the white pine trees and their density, impeding the typical bat flight activity.

- The Krumovitsa River gully is a very favorable hunting habitat for most bat species inhabiting a wide range area. The gold ore mining technology and all measures provided in the EIA Statement and the Compatibility Assessment Report guarantee the protection of this adjacent habitat, including river water quality, and will not affect bats' food potential.

Jersey Tiger Moth

- The species is local, also found beyond the project site;
- Due to the cool spring, the year was not vary favorable for the species;
- More comprehensive information on the status of the Jersey Tiger moth population should be collected in the Krumovgrad region.

Yellow-bellied Toad:

- The population of this species is very small in the area ;
- Its population is stable.
- The implementation of the "Biodiversity Action Plan for the Hermann Tortoise (Testudo hermanni) and the Spur-thighed Tortoise (Testudo graeca) in the Ada Tepe Project area" will significantly improve the living conditions of the yellow-bellied toad by creating new habitats (micro water reservoirs).

Noise

Noise measurements do not exceed permitted urban values.

Blast Vibration Impact

Conducted blast vibration measurements show a number of single events whose sources cannot be definitively determined. However, they display values in different directions relative to the ground surface that exceed the limits set out in the German standard DIN4150 for residential buildings and cultural monuments.