S T A T E M E N T S

REGARDING:

The project for Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of the Khan Krum Deposit,

The terms of reference for the scope and content of an environmental impact statement for the project for Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of the Khan Krum Gold Deposit.

Mining waste management plan

PROJECT: Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of the Khan Krum Gold Deposit

INVESTOR: Balkan Mineral and Mining EAD

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Processing of Low-Sulphide Auriferous Ores

1. Reasons for drawing up of this statement

Commissioning by the Krumovgrad Municipality for elaboration of an Opinion.

2. The sources used for the elaboration of the Opinion

2.1. **The project** for Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of the Khan Krum Deposit,

2.2. **The terms** of reference for the scope and content of an environmental impact statement for the project for Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of the Khan Krum Gold Deposit. Prepared by Balkan Mineral and Mining EAD, Sofia, July 2010.

2.3. Mine waste management plan, Balkan mineral and Mining EAD. An integral part of the project, which is subject to EIA. Prepared by: Irena Stambolieva, Engineer, Environment and Sustainable Development Manager

2.4. A Report on the hydrological survey of how the Proposed Investment Project for Mining and Processing of Auriferous Ore in the Krumovgrad Licensed Area by Balkan Mineral and Mining EAD will affect the drinking water supply sources for the settlements in Krumovgrad Municipality. Vodokanal Project AD, town of Plovdiv. Project team leader, Engineer N. Neikov, April 2005.

2.5 **EIA Statement** for the proposed investment project for Mining and Processing of Auriferous Ore from the Krumovgrad Licensed Area, April 2005.

2.6 **EIA Statement** for the proposed investment project for Mining and Processing of Auriferous Ore from the Krumovgrad Licensed Area, ATTACHMENTS, April 2005.

2.7 **Terms of Reference** for the Scope and Content of the EIA Statement for the Proposed Investment Project for Mining and Processing of Auriferous Ore from the Krumovgrad Licensed Area.

2.8 **CONSULTANCY ON THE TERMS OF REFERENCE** for the Scope and Content of the EIA Statement for the Proposed Investment Project for Mining and Processing of Auriferous Ore from the Krumovgrad Licensed Area.

2.9 **Feasibility Study** (Summary) of the proposed investment project for Mining and Processing of Auriferous Ore from the Krumovgrad Licensed Area, Bulgaria. Ausenco Ltd. ("Ausenco"), 2004-2005.

3. Opinion about: The project for Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of the Khan Krum Deposit, Terms of reference regarding the scope and contents of the environmental impact assessment statement; The waste management plan.

3.1. Generally regarding:

The project for Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of the Khan Krum Deposit, The terms of reference for the scope and content of an environmental impact statement for the project for Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of the Khan Krum Gold Deposit.

Mining waste management plan

Based on a Permit by the Ministry of Economy and on an Agreement for Prospecting for and Exploration of Underground Mineral Resources, Balkan Mineral and Mining EAD has carried out prospecting and exploration operations in the Krumovgrad license area. “BMM” EAD have carried out geological research in 2000 – 2001 and have, on the basis of these activities, received

in 2001 a **Certificate for Geological Discovery – a low-sulphide epithermal auriferous deposit known as "Khan Krum".** The company was awarded the right to carry out additional prospecting for detailed study of the auriferous minerals in the Ada Tepe section, as well as further exploration of the adjoining sections of the deposit – "Sarnak", "Skalak", "Kaklitsa" and "Kapel".

The exploration results from the period 2000-2004 were compiled in a Report for the Completed Geological Work for Exploration and Evaluation of the Auriferous Resources of the Khan Krum Deposit Including the Sites of Ada Tepe, Surnak, Skalak, Kuklitsa and Kupel in the Krumovgrad Licence, Kardzhali District and the report was submitted to the Ministry of Environment and Watr and the Ministry of Economy by the end of 2004 by BMM EAD, which also applied to the Ministry of Environment and Water for registration of a **commercial discovery**.

At the same time, a project proposal for "Mining and Processing of Auriferous Ores from the Krumovgrad Licensed Area" was drawn up by BMM EAD for the following activities: open pit mining for auriferous ore;

construction of production facilities for processing of the mined ore to plan for and produce an end product of Dore alloy; construction of ore and mining waste stockpiles; TMF etc. An Environmental Impact Assessment Report was prepared for the project and a review procedure was started. At a later stage, BMM EAD requested termination and was given a Resolution by the Minister of the MOEW to terminate the EIA process for the "Mining and Processing of Auriferous Ores from the Krumovgrad Licensed Area" project started in 2004. On 28.08.2009, the MOEW issued a certificate of **commercial discovery** to BMM EAD in accordance with the Ores and Minerals Act, for the prospecting and exploration area of Krumovgrad, conditionally named the Khan Krum deposit.

The commercial discovery is grounds for granting of the mining **concession** that allows BMM EAD to mine and process auriferous ore from the Khan Krum deposit, which became the **subject of a new project**.

The project proposal of BMM EAD considers mining and processing of gold ores from the Ada Tepe prospect in the Khan Krum Deposit, town of Krumovgrad, Municipality of Krumovgrad, District of Kardzhali.

The proposed investment project includes the following main activities, considered in the EIA:

- open pit mining for low-sulphide auriferous ore;
- construction of production facilities for processing of the ore (a process plant) to gold concentrate;
- construction of ore and mining waste storage and disposal facility;
- construction of the necessary infrastructure: roads, electrical supply, water supply, material storage facilities etc.

BMM EAD will construct an open pit mine. The mined ore will be processed by crushing, grinding and flotation. The expected annual production of ore is 850,000 t. Depending on the content of precious metals in the ore, the expected annual yield of gold-silver concentrate will vary between 500 and 10,000 t.

It should be pointed out that the Khan Krum deposit comprises six sections: Ada Tepe, Kuklitsa, Kupel, Sinap, Surnak and Skalak.

Most of the surveying for economically suitable open-pit mined deposits were conducted on Ada tepe. The remaining five sections require additional work. This is the reason why the proposed investment project for mining and processing of low-sulphide auriferous ore from the Khan

Krum deposit is for the Ada tepe section. The second phase of mining and processing of auriferous ore in the Kaktlitsa, Kapel, Sinap, Sarnak and Skalak sections will take place provided that economic reserves are established there. The development of these five sections is not in the subject of the project and of the EIA terms of reference.

The Ada Tepe prospect is located approximately 3 km south-west of the town of Krumovgrad and **approximately 1 km from the Krumovitsa River**.

The entire area required for the implementation of the proposed development, 98 hectares, is state controlled forest fund land and is included in the future concession. The total area comprises:

- The Ada Tepe open pit mine 17 hectares
- The ROM ore pad 3 hectares
- The low-grade ore stockpile , 10 hectares
- A facility for the production of gold-silver concentrate (Process Plant) 6 hectares
- The integrated mine waste facility 41 hectares
- The soil and sub-soil material stockpile 5 hectares
- A retention pond (close to the open pit) and two collecting sumps (at the toe of the Integrated Mine Waste Facility) 4 hectares
- Roads 12 hectares
- An abstraction well.

The project considers **alternative** options for: the location of sites, the ore mining processes; ore processing; management of mining waste (waste rock and flotation waste), water supply and reduction of water consumption, as well as a "no-action" alternative. Having considered the strengths and weaknesses of the project alternatives, BMM EAD compiled and proposed the project under consideration. The project considers the **raw and other materials, natural resources, and energy sources required during the construction and operation phases.**

The project considers also the types and quantities of **wastes** and **emissions** during both the construction and the operation phases: hazardous waste, production waste, mining waste, and concentrator plant waste (tailings).

The project considers the expected **ambient air** emissions and the related impacts. Also, the **harmful physical factors**: noise (during construction and operation), vibration, and radiation.

The project considers **surface and ground water pollution sources** during the construction and operation phases, water from sanitary facilities and bathrooms, mine drainage, flotation waste water, drainage from the integrated mine waste facility) and proposes measures for reduction of the surface and ground water impacts.

The project considers the potential negative impacts on soils in the area during the deposit construction and operation phases.

A **Mining Waste Management Plan** for Balkan Mineral and Mining EAD was developed in relation to the Ores and Minerals Act and the Regulation on the Specific Requirements for Management of Mine Waste. The mining waste generated during the mining and processing of low-sulphide auriferous ores from the Ada Tepe section of the Khan Krum deposit comprise waste rock and flotation waste (tailings). It is suggested that these wastes are disposed of in one facility, classified as a **Category B facility.**

The technological and geological parameters of the deposit were used to produce a **description of the mining waste** and to forecast their quantity.

A forecast of the **liquid phase chemistry** and of the hazard of acid water generation is provided. The project considers the potential environmental risks and measures for their prevention. The project proposes a **program for prevention of water and soil deterioration**. This program comprises a **monitoring network** for monitoring of the water flows, soil and air in the mine waste facility. A **facility closure plan** is proposed for the facility post-operation period. The EIA ToR describes **the environment** in which the project will be implemented. A description of the **atmospheric air** in the region is provided and the sources of its pollution during the construction and operation phases are considered – blasting gases, burst emissions of blasting gases, emissions of particulate matter etc.

The project describes the **hydrological and hydrogeological conditions** and factors of the **ground and surface** water resources in the area, and the sources of their pollution during construction and operation. The project provides a water balance for the production sites.

The project describes the **geology** of the deposit and assesses the project implementation impacts on the local geology. The project describes also the **soils** in the area and assesses the amount of damage caused to lands and soils.

Description is provided also of the **plants** and **animals** in the area and of the expected impacts by the project during the construction, operation, closure and rehabilitation phases of the project. It should be pointed out that the area envisaged for the construction of the project belongs, according to the Biodiversity Act, to an area, potentially protected under a Natura 2000 project. This is the **Eastern Rhodopes protectd area** according to the Directive on the Conservation of Natural Habitats of Wild Fauna and Flora. The Krumovitsa protected area, protected under the Birds Directive, is located in immediate proximity. The regulatory framework in effect during the EIA elaboration requires that a **Compatibility Assessment Report** be drawn up, assessing the compatibility of the project with the scope and objective of the protected areas.

The landscape and the expected changes caused in it during the construction, operation, closure and rehabilitation phases is also provided. **Cultural heritage** exists in the Ada Tepe area – a Thracian cult site, a locally significant architectural monument of culture, in use with varying intensity for 1,500 years, was established on the crest.

Evidence of ancient mining activities was revealed at the Ada Tepe hill (an underground shaft), a gold mine (c. 15-8 century BC), spanning the western, eastern and a larger portion of the northern hillsides of Ada Tepe. The project implementation may jeopardize some of the structures.

The project considers the aspects of health and hygiene in accordance with Regulation 7 on the Hygiene Requirements for Health Protection of the Urban Environment, which regulates the minimum distances between production sites and urban areas. Re-consideration is required for the siting of the facilities required for the project: the open pit mine, crushing area, process plant and integrated mine waste facility.

The structure and contents of the environmental impact statement for the project for Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of the Khan Krum Gold Deposit, town of Krumovgrad are presented.

The project presents the structure and contents of the assessment of project compatibility with the scope and objectives for protected area conservation.

3.2. Opinions, recommendations and notes regarding the project for Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of the Khan Krum Deposit,

The terms of reference for the scope and content of an environmental impact statement for the project for Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of the Khan Krum Gold Deposit.

Mining waste management plan

3.2.1. Opinions, recommendations and notes regarding the concept of Balkan mineral and Mining EAD about the EIA during the exploration, mining and processing of ore, management of mining waste and water, and the impact mitigation measures.

3.2.1.1. Geological profile of the deposit

It was established that the geochemical background of the concession area is naturally rich in arsenic, chromium, nickel etc.

There are no data in the project about the chemical composition of the ore and the low-grade ore material.

What are the contents in those ores of the more important chemicals present in the deposit area, such as arsenic, chromium, nickel, iron, manganese, zinc, cobalt, copper, cadmium, and lead?

It was established that **pyrite** is the most abundant iron sulphide. It contains arsenic, tellurium and nickel. Other sulphides such as **marcazite**, a dimorph of pyrite, **galenite and sphalerite** have been established as well.

We draw attention to this fact because the content of arsenic and heavy metals in the ore and in low-grade ore, and in the mine waste as compared to the gold content is far higher than 0.1 %, rendering them hazardous.

It is untrue that arsenic and heavy metals occur in the ore, low-grade ore and mine waste as water insoluble ingredients. **Hydrogeochemical, biochemical and electrochemical processes causing decomposition of minerals and transition of arsenic and heavy metals into the water** occur in the mine pit and in the low-grade ore and mine waste stockpiles during the development of the deposits. The triple system of metal-oxygen (air) causes decomposition of the mineral during the development of the deposit. Pyrite decomposition, for example, is as follows:

$$2FeS_2 + 70_2 + 2H_20\ 2FeSO_4 + 2H_2SO_4$$

The velocity of the mineral decomposition in the triple system is low, but increases with time.

Autochthonous microflora of diverse microorganism groups occurs in all of the developed deposits containing sulphide minerals, and oxidises the reduced sulphuric compounds and acdic iron ions of acidic manganese. The representatives of such microorganisms established in the mine and stockpile drainage are bacteria of the species *Thiobacillus ferooxidans* and *Tiobacillius thiooxidans*. They cause abrupt catalyzing of many chemical and biochemical reactions causing mineral decomposition and releasing of arsenic and heavy metals into water. **Where the ratio between sulphide and alkaline components in some deposits ensure a neutralizing potential much higher than the acidity potential, the acid released during mineral decomposition is neutralised and the drainage is non-acidic, the pH of the water is neutral, but arsenic and heavy metals remain in the water.**

We draw attention to these matters of principle, because the development of the deposit causes pollution of soils, ground water and surface water, drainage from the low-grade ore stockpile, the integrated mine waste facility, the soil stockpile, the mine drainage, and the flotation return water.

3.2.1.2. The soils in the deposit area.

The soils belong to the forest areas on Ada Tepe and near the villages of Kaklitsa, Sarnak, and Skalak and their content of arsenic, chromium, nickel and cadmium is high. The comment here is that the high concentrations result from naturally enriched geochemical background.

Our explanation is that geochemical anomalies occur in the Khan Krum deposit (where arsenic and heavy-metal containing geological structures have entered the deposit during its formation).

Inundation of these geological structures by atmospheric precipitation and the air involved in the development of thionic bacteria have caused leaching of arsenic and heavy metals over the centuries. These materials have been released into the water for subsequent absorption into the soil. Much of the soil in the region of study contain nickel, chromium, manganese, arsenic, etc. in excess of the background levels. In many cases these are higher than the admissible limit values (ALV). Most concerning is the content of arsenic in agricultural soils, reaching 2 to 20 times the ALV.

The elevated content of heavy metals and metalloids in the soils has increased the sensitivity of these soils to acidification which in turn increases the mobility of metals making them accessible to other media.

The pH of the soil solution (in water) is equal, most often, to 5.0-6.0 units, describing it as acidic. Neutral and slightly alkaline soils occur as well. We draw attention to the soils because the operation of the deposit impacts the soils through the deposition of particulate matter and hazardous substances released into the ground air. The stockpile for soils polluted with arsenic and heavy metals may become a source of pollution for other media in the case of increased arsenic and heavy metal mobility through the soil in the stockpile.

3.2.1.3. Surface and ground water in the area

Seven samples were taken and analyzed for tracing of the groundwater composition. But why have they been taken only from the area where the integrated mine waste facility will be located?

There is no comment about the composition of the ground water, but the submitted protocols show groundwater pollution even in this area. Iron content exceeds the admissible level by a factor of 9.2. Antimony exceeding the admissible level by a factor of 1.06 was found. This confirms thee above statement regarding mineral decomposition and releasing of heavy metals into the water.

The main surface water body which may be affected by the project is the Krumovitsa River, being the nearest water body and the wastewater receiving body.

The main impact on the Krumovitsa River and on its tributaries is caused by the absence of domestic wastewater treatment facilities. This is the reason why the tributaries have been rated as category-two receiving water bodies. **There are no sources of industrial wastewater.**

Drinking water sources supplying the villages in the Krumovgrad and Momchilgrad municipalities downstream of the Khan Krum have been built along the Krumovitsa River.

Samples taken from the Krumovitsa River and its tributaries show that the water meets the requirements for category one receiving water bodies with regard to the contents of heavy metals and arsenic.

The project, the ToR for the EIA Statement, and the mine waste management plan do not make provisions for arsenic and heavy-metal containing water: the topsoil stockpile drainage; polluted with arsenic and heavy metals, from the ROM ore pad, and from the low-grade ore stockpile. The drainage from the Integrated Mine Waste Facility will report to a return water pond, which will also receive mine water. The water from this pond will be discharged into the Krumovitsa River and will be treated only for suspended solids. The discharge is expected to meet the individual emission standards for category two receiving water bodies. This is inadmissible.

With regard to the arsenic and heavy metal contents, the discharged water should meet the category one requirements.

3.2.1.4. Ore stockpile

The ore stockpile will be constructed to the southwest of the open pit, north of the integrated mine waste facility, on an area of 3 hectares. The ore stockpile drainage will not be collected and treated. This drainage, as we have already seen, will contain arsenic and heavy metals.

3.2.1.5. Low-grade mineral stockpile

The low-grade ore stockpile will be established next to the integrated mine waste facility in the north-western section, covering an area of 10 hectares. The drainage from the low-grade ore stockpile will not be collected and treated. This drainage, as we have already seen, will contain arsenic and heavy metals.

3.2.1.6. Soil Stockpile

The soil stockpile will be established to the northeast of the open pit on an area of 5 hectares. As we have already seen, the soils are polluted with heavy metals and arsenic. This increases their sensitivity to acidification, which increases the mobility of metals making them available to other media. The pH of the soil solution (in water) is equal, most often, to 5.0-6.0 units, describing it as acidic.

The soil-stockpile drainage will not be collected and treated.

3.2.1.7. Integrated Mine Waste Facility

The Integrated Mine Waste Facility will receive low-grade ore (low in gold) and process plant tailings. The facility will be established on an area of 41 hectares between the open mine pit and the process plant, the toe in the southwestern area reaching a distance of 50 m from the Krumovitsa River. No consideration has been made of the expected arsenic and heavy metal pollution in the drainage. The drainage will be collected in two sumps from which it will be pumped into a return water pond, which will also receive the polluted mine drainage.

Periodically, water from the return water pond will be released into the Krumovitsa River, following treatment for suspended solids. No chemical treatment for arsenic and heavy metals will be provided for the discharge.

3.2.2. Mining of low-sulphide auriferous ore. Mine water

The Ada tepe section will be open pit mined, using drilling and blasting, excavation, and hauling of the extracted waste rock, the low-grade material, and the ore. The problems raised by open pit mining of low-sulphide auriferous ore (open pit mine and its auxiliary sites) are **considered separately**.

Here we will point out only that it is unlikely to expect pollution of the mine water with suspended solids only. The development of this **low-sulphide** auriferous deposit will be concurrent with **hydrogeochemical and electrochemical** processes causing decomposition of minerals and entry of arsenic, heavy metals and sulphate ions in the mine water. Pollution of the mine water will occur also from explosives and vehicles.

The mine water will report only to the return water pond. This pond will also receive the polluted drainage from the Integrated Mine Waste Facility. Discharging of the return water pond into the Krumovitsa river following only removal of suspended solids would be unacceptable.

3.2.3. Processing of low-sulphate auriferous ore. Return Water Supply

The problems concerning the potential technological and technical solutions for processing of low-sulphide auriferous ores from the Khan Krum deposit are considered separately.

The construction of a process plant (concentrator plant) is envisaged in the BMM EAD project for processing of low-sulphide auriferous ore from the Ada Tepe section of the Khan Krum deposit. The process involves: ore crushing; grinding; gravity separation; flotation; dewatering of the final product – the gold-silver concentrate.

The concentrator plant will use return water. We should draw attention to the fact that no additional processes have been taken into account in the flotation process using return water supply. When using acidic reactants, the return water will become gradually acidic.

The acidic return water will be in constant contact with new batches of ground sulphidic auriferous ore and will decompose the minerals, with arsenic, heavy metals and sulphate ions accumulating in the liquid phase. This part of the return water, entering the IMWF with the tailings will be separated as polluted drainage. This water will report to the return water pond. This pond will also receive polluted mine drainage.

The periodical discharging of water from the pond into the Krumovitsa River, following treatment for non-metallic substances only, is inadmissible.

3.2.4. Concentrator Plant Return Water Pond

The concentrator plant return water pond will be established near the open pit on an area of 4 hectares. The return water pond is designed to collect IMWF drainage – non-metallic mine waste and concentrator plant tailings collected in the northern and southern settling tanks and will be pumped from them into the pond, as will be the open pit drainage. Water from the pond will report to the concentrator plant to provide for return water supply. We quote: **“It is assumed that the surplus water from the return water pond which cannot be used in the concentrator plant may be treated and discharged”.**

Treatment, however, means removal of suspended solids from the pond effluent.

So far we have been considering the expected composition of IMWF drainage and of the mine drainage. We have looked also at the requirements for protection of the water in the Krumovitsa River, ensuring drinking and domestic water supply for the urban areas downstream of the Khan Krum deposit.

It is clear that releasing of this water into the Krumovitsa river following removal of suspended solids only is inadmissible.

3.2.5. Integrated Mine Waste Facility

An integrated mine waste facility is being proposed for operation in Bulgaria for the first time, and we are not aware of such practices anywhere else in the world.

The facility will be positioned over the watershed of two main valleys and other parts of them. They discharge into the Krumovitsa River. The river is a limiting factor to the east. To the north, the facility borders on the Ada Tepe open pit, located at its foot, and to the northeast and northwest it borders on properties of the neighbouring villages.

The facility will cover 41 hectares.

The facility will be developed from the bottom up, starting near the river and building up-hill, at approximately 150 m along the slopes of the two valleys. The slopes of the southern valley are very steep and are not specified in the project. The facility will be structured as two main platforms on both valleys, with downstream slopes and internal cells made of berms to receive tailings. Материалът, който ще се използва е нерудна минна маса.

The underdrain system will be built as a combined perforated HDPE pipe and a crushed rock drain system a median rock diameter of 150 mm, 200 mm, and 300 mm.

A filter system consisting of a layer of crushed mine rock or geotextile will be placed along the slopes of the outer berms. The tailings fed from the concentrator plant comprises 56% solid phase. It is expected that when consolidated, it will lose 40% of its volume due to the drainage of interstitial water. This means that substantial quantities of drainage are expected. It is believed that the amount of water entering the tailings in the facility will be insubstantial in comparison to atmospheric precipitation during extreme precipitation events.

The envisaged drainage system will convey the water released from tailing and the flow from the atmospheric precipitation.

The drainage system is sized for a design flow during a 10 year precipitation event, and the entire system is sized for a design flow during a 100 year precipitation event. A water balance of the IMWF was defined from:

- The water from the consolidated tailings
- The water from atmospheric precipitation over the IMWF area
- The water from atmospheric precipitation from the concentrator plant area, flowing naturally toward the southern slope of the IMWF

Opinions, remarks and recommendations for the Integrated Mine Waste Facility

- The IMWF will be constructed in the left part of the watershed area of the mid-stream portion of Krumovitsa River, a right-hand and one of the most torrential tributaries of the Arda River. The area features low vegetation and eroded terrains. The annual precipitation amount is 880 mm and the runoff is fast. The Krumovitsa River is among Bulgaria's most water-bearing rivers. The peaks and parameters of the high water levels are significant. This is due to the position of the river with relatively low watershed crests. This allows for **entry of precipitation masses.** High precipitation is formed by widespread and frequently intensive rain fall.

The drainage material (waste rock), which will be used in constructing the drainage system, is sized 150 mm, 200 mm and 300 mm, and the tailings will be fine grained with a d_{80} value (80% of particles have smaller grain size than d_{80}) of near 30 microns. The joint function of the drainage material (crushed waste rock, geotextile) and the tailings will cause **clogging** with drainage material causing the drainage system to become plugged and stop its function. It was established that the waste rock is heavily permeable to air and water. Both "solid" and "soft" waste rock are manifest. Different rock weathering depths exist in the deposit, with the rocks mined above 400 m RL being highly weathered. **The diversity of waste rock shows that it is not one of the most reliable materials that can be used in the construction of the IMWF and of the drainage system**. No IMWF liner is provided for.

The quantity of mined waste rock will be twice the quantity of Concentrator Plant tailings. It is not clear how joint drainage will be implemented.

The model IMWF stability analysis was carried for two conditions: all the material was modelled as tailings; no water aquifer is formed within the waste body.

The seismic stability of the slopes was evaluated not considering liquefaction.

The IMWF is expected to reach a final height of 170 m, which defines it as a very responsible facility.

An expert assessment is required of this facility by a Bulgarian institution.

Such a high facility and the potential for entry of torrential precipitation create a danger of slides occurring in certain areas.

No sediment-flow retention pool is envisaged at the toe of the facility.

The drainage comprising return water in the tailings and water in contact with waste rock are expected to contain arsenic, heavy metals and sulphate ions.

- The IMWF is classified as a Category A facility.
- The IMWF does not guarantee the protection of the Krumovtsa River bed and the safety of surrounding urban areas.
- The waste rock and the flotation tailings cannot be disposed of in the IMWF as suggested.
- The quantity of gold extracted during the flotation of low-sulphide auriferous ore is low. The remaining significant amount of gold in the tailings cannot be extracted in the future following joint discharging of the tailings and the waste rock.

3.2.6. Impact of the project for Mining and Processing of Low Sulphide Auriferous Ore from the Ada Tepe Section of the Khan Krum Deposit on the drinking water sources for the villages in the Krumovgrad Municipality

The need for "fresh" water for the production process requires the construction of a well in the Krumovitsa River floodplain. The borehole will be established in the Krumovitsa River alluvial deposits in the right-hand floodplain at approximately 500 m upstream of the existing pumping stations of Guliika, Ovchari and Krumovgrad, supplying water to a group of villages. The project does not specify the structural dimensions of the borehole and its type (pipe, shaft), and there are no aquifer conductivity calculations.

We should note that the main source of underground potable water for the villages in the Krumovgrad Municipality is the alluvial aquifer formed in the current deposits of the Krumovitsa River and its larger tributaries.

The main water quantity in the water-abstraction facilities is drawn during the extraction of water from the recharging source – the Krumovitsa River. The high filtration parameters of the flood plain materials of the river bed ensure **direct hydraulic connectivity and intensive exchange of water between the aquifer and the river**. The average hydraulic gradient is 26 l/sec.

The Krumovitsa River recharges from precipitation and snow, the minimum water quantities occurring during the summer and autumn, the lowest being the months of August and September.

We will point out once again that the groundwater in the area is controlled by the river, which is significant in the formation of the local operational resource.

The proximity of the Gulika, Krumovgrad and Ovchari pumping stations proves this fact – the proximity of the pumping stations does not affect their design average annual flows. This leads to the conclusion that the new "freshwater" borehole will not have a substantial effect on the drawing of water by the other pumping stations in the Krumovgrad municipality.

We should draw attention to the fact that the prohibitions and restrictions imposed within the sanitary protection belt areas will be sufficient to ensure lasting and secure protection against entry of pollutants in the water abstraction facilities, since the measures do not affect the entire river course. **Any pollution of the Krumovitsa River water (or any of its tributaries) will, irrespective of its duration or intensity, cause deterioration of the quality of abstracted potable groundwater.**

The map attached with the project shows a road connecting the town of Krumovgrad with the site, crossing the sanitary protection belts 11 and II I of the Ovchari Pumping Station. Considering the impact of the project for Mining and Processing of Low-Sulphide Auriferous Ore from the Ada Tepe Section of the Khan Krum Deposit, it is imperative that prohibitions and

restrictions are imposed on the Krumovitsa River, equal to those imposed for belt III of the Sanitary Protection Belts.

Very strict monitoring of all industrial processes and farming operations is required on the territory of all water-supply areas and along the entire watershed area along the upper flow of the Krumovitsa River. The project does not consider the protection of the main source of potable groundwater for the villages in the Krumovitsa Municipality – the Krumovitsa River.

The potential pollutants are the open pit mine with polluted mine water, drainage from the stockpile for soils polluted with arsenic and heavy-metal, drainage from the ore stockpile, drainage from the low-grade ore stockpile, drainage from the IMWF etc.

It is inadmissible that water from the return water pond (receiving return water from the IMWF and mine drainage) should be discharged into the Krumovitsa River only following precipitation of the solid phase without chemical treatment.

In conclusion, it is clear that the protection of the Krumovitsa River requires special attention.

The Ministry of Environment and Water and its branches should monitor the future project for Mining and Processing of Low-Sulphide Ores from the Ada Tepe Section of the Khan Krum deposit.

3.2.7. Requirements of the EEC Convention on Transboundary Environmental Impact Assessment

The project activities are considered 'Large Scale Mining, Extraction and On-Site Concentration of Metal Ores' and are covered under the Convention on Transboundary Environmental Impact Assessment. BMM EAD have not prepared information for all envisaged activities that should be submitted to the MOEW and to the Republic of Greece, which is the country closest to the project site. The Greek country has a right to participation in the EIA procedure. The opinion of Greece should be taken into account in the preparation of the final ToR for the EIA statement.

3.2.8. Health and hygiene aspects

The locations of the following four operating areas under the project:

- Open Pit Mine
- Crushing Section
- Process Plant (Concentrator)
- Mining waste facility

imply violation of Regulation 7 of the Ministry of Healthcare on the hygiene requirements for health protection of the urban environment. The hygiene protection belt area for the open mine is set at 2,000 m.

There are 17 villages and locations which are 330 to 1,935 m away from the open mine.

The integrated mine waste facility is regarded a facility for non-hazardous waste, but the hygiene protection distance from urban areas for such facilities is set at 1,000 m.

There are 5 urban areas which are 365 to 972 m away from the IMWF, which is a violation of the hygiene protection area requirement.

It is unclear how the problem of the affected population will be resolved.

3.2.9. Compatibility Assessment Report

The Ada Tepe section of the Khan Krum deposit lies within the Eastern Rhodopes protected area intended for conservation of natural habitats of the wild flora and fauna. The Krumovitsa

protected area for conservation of wild birds is located some 4 km from the project area. Therefore, the project for Mining and Processing of Auriferous Ores from the Ada Tepe Section of the Khan Krum Deposit should be subject to assessment of the compatibility of plans, programs, projects and investments with the scope and objectives of the protected areas. The project is likely to have a significant negative impact on the natural habitats, the populations and habitats of species under protection in the Eastern Rhodopes and Krumovitsa protected areas.

BMM EAD have not prepared a ToR for the scope and content of the Compatibility Assessment.

Only the structure and contents of the report on the assessment of project compatibility with the scope and objectives for protected area conservation have been prepared.

3.2.10. Cultural Heritage

A Thracian shrine has been registered on the crest of the Ada Tepe hill, with the status of an archeological monument of culture. This cult site had been in use for 1,500 years. Also, various archaeological structures have been studied and documented.

Evidence of ancient mining activities was revealed at the Ada Tepe hill, a gold mine from the late Bronze and early Iron ages (c. 15-8 century BC), spanning the western, eastern and a larger portion of the northern hillsides of Ada Tepe.

The project implementation will endanger some of these structures.

No solution for their conservation is provided.

C O N C L U S I O N

This Statement for the Project for Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of the Khan Krum Deposit, The Terms of reference regarding the scope and contents of the **environmental impact assessment** statement; and the Mine Waste Management Plan contain opinions, recommendations and notes regarding:

1. Environmental aspects

The Khan Krum deposit belongs to the Krumovitsa River watershed area. This is the main source of underground potable water for the villages in the Krumovgrad Municipality is the alluvial aquifer formed in the current deposits of the Krumovitsa River and its larger tributaries downstream of the Khan Krum deposit. No direct hydraulic connection exists between the aquifer and the river.

The project for Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of the Khan Krum Deposit **envisages**:

- Open pit mining for low-sulphide auriferous ore;
- Construction of production facilities for processing of the ore (a process plant) to gold-silver concentrate;
- Construction of an integrated mine waste facility
- Construction of project infrastructure – roads, water and power supply services, materials storage facilities, etc. in the Krumovitsa River watershed area

Considering the impact of the project for Mining and Processing of Low-Sulphide Auriferous Ore from the Ada Tepe Section of the Khan Krum Deposit, and as can be seen from the vast practical experience of the environmental impact of such facilities, it is imperative that prohibitions and restrictions are imposed on the Krumovitsa River, equal to those imposed for belt III of the Sanitary Protection Belts. **The concept of Balkan Mineral and Mining EAD for the assessment of the environmental impacts during the study, mining and processing of**

ore, management of mine waste and drainage, and the impact mitigation solutions do not guarantee protection of the environment to the required degree.

This applies most to the protection of the Krumovitsa River – the main source of potable groundwater for the settlements in the Krumovgrad municipality.

2. Mining of low-sulphate auriferous ores – open pit, auxiliary sites, technology proposals.

These are considered separately.

We believe that the best solution would be for Balkan Mineral and Mining EAD to draw up a project for overall development of the Khan Krum deposit.

3. Processing of low-sulphide auriferous ore

The solutions for the problems occurring during the processing of low-sulphide auriferous ore are provided separately.

We will note here only that the advantages of the cyanide technology over the flotation of low-sulphide auriferous ore are indisputable from any respect.

4. Requirements of the EEC Convention on Transboundary Environmental Impact Assessment

BMM EAD have not prepared information about all envisaged activities for submission to the MOEW and the Republic of Greece.

5. Health and hygiene aspects

The issue of the population affected by the construction of the open pit facilities and of the IMWF at distances shorter than those required for hygiene protection has not be resolved.

6. Report on the assessment of project compatibility with the scope and objectives for protected area conservation

BMM EAD have not prepared a ToR for the scope and content of the Compatibility Assessment. Only the structure and contents of the report on the assessment of project compatibility with the scope and objectives for protected area conservation have been prepared.

7. Cultural Heritage

No solution for the conservation of the cultural heritage is provided.

We propose that Balkan mineral and Mining EAD should prepare a project for Mining and Processing of Auriferous Ores from the Khan Krum Deposit (i.e. from all sections) using cyaniding in ore processing and applying technical and technological solutions for management of mine waste and tailings and water from the cyaniding plant, ensuring a high level of protection of environment protection in the area.