

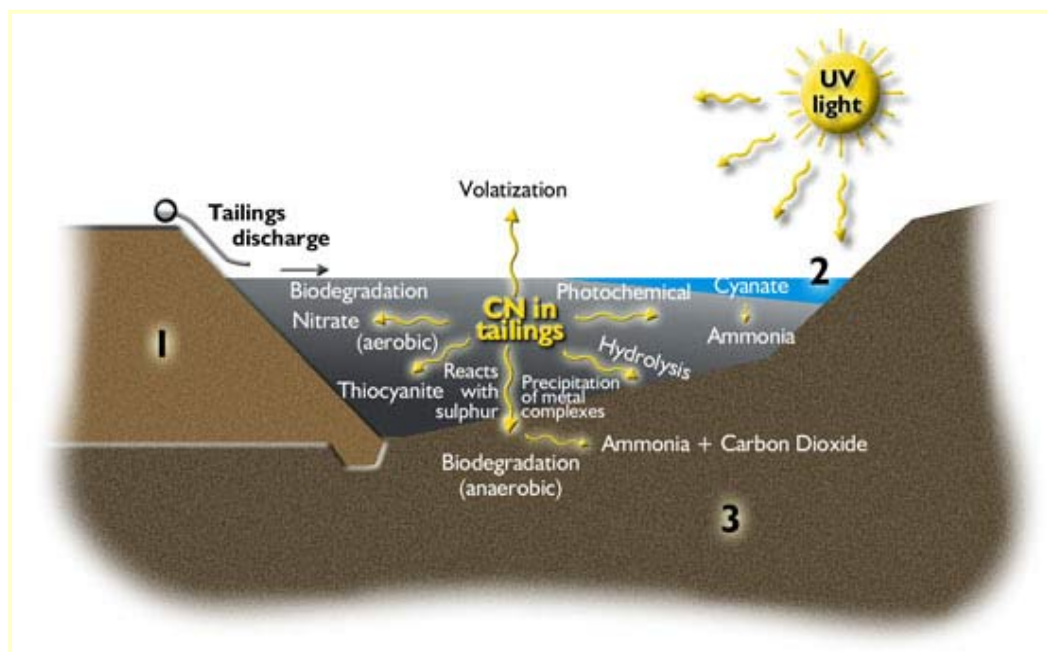
Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	2
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Alba Iulia, 31.07.2006
RMGC internal unique code	MMGA_0002
Proposal	What is cyanide in leach?
Solution	<p>A summary description of the tailings processing system, as well as the use and management of the cyanide can be found in the Non-technical Summary, Chapter 9 of the EIA (Report on the Environmental Assessment (EIA)) or detailed in Chapter 2, Technological Processes, Section 4.1.2.2 The main technological processes.</p> <p>The most efficient and cost-effective process for extracting the gold and silver from ores such as the ones in Roşia Montană is based on full cyanide-leaching of the ore. There are numerous examples of similar ores throughout the world, which require the use of cyanide-based technology for efficient precious metals recovery. The implementation of the cyanide-based technology for gold and silver recovery from the ore in Roşia Montană is based on a detailed testwork program conducted by AMMTEC Limited and AMDEL Limited. The tests were scheduled and reviewed by GRD MINPROC Limited, and later on, the conclusions of the testing program were reviewed and reconfirmed by S.N.C. LAVALIN and AUSENCO. The issuance of the cyanide leaching technology for the ore in Roşia Montană considered the best practices used in Europe and worldwide. The technology for metals recovery by using cyanide leaching in CIL is Best Available Techniques BAT (please see Chapter 3.1.6.2.2 and Chapter 5.2 of the Guidelines of BREF [1] UE Document on BAT for Management ... in Mining Activities, March 2004).</p> <p>The cyanide, in a solid briquette form, will be transported in specially-designed and manufactured isotainers. The cyanide will be dissolved only into the transportation containers, in alkaline solution, sourced from and re-circulated back into a mixing tank. The mixing tank is designed to have enough capacity to store the entire quantity of a transportation container. The cyanide solution, as soon as it is dissolved in the container, will be transferred from the mixing tank into a large volume storage tank.</p> <p>The fine ground ore, resulting from the overflow of the ball mills' cyclones, is transferred to the tank of the feeding pump for the CIL circuit, where it's mixed with cyanide and lime suspension, required to balance the level of pH. The active carbon is added in the CIL tank to support the leaching process and the adsorption of the dissolved metals.</p> <p>The slurry is subject to a leaching process taking place within two parallel rows of 7 CIL tanks each, containing agitators. The size of the CIL tanks is D = 18 m x H = 20 m. The CIL tanks are sized to ensure enough time of contact between the cyanide solution, the ground ore and the active carbon. Sodium cyanide solution may be added in the CIL tanks number 2 and 4 of each row if needed, in order to maintain the required cyanide concentration. The slurry is circulated into the gravitational cyanide-leaching circuit, and the carbon advances continuously counter the flow of the slurry, pumped by the vertical pumps. The time for advancing from a tank into another is adjusted so that the load of gold and silver on the carbon is ensured to be from 7,000 to 8,000 g/t.</p> <p>Once in the feeding tank of the thickener, the slurry is mixed with flocculants which support the sedimentation of the solids. The thickener ensures the increase of the solid content within the sediment and, at the same time, the development of the supernatant almost clarified. The Supernatant discharged from the thickener will be directed towards the grinding circuit, to reuse and recover the cyanide.</p> <p>The thickened slurry is pumped towards the cyanide detoxification circuit, working on SO₂/air procedure, where the WAD cyanide concentration will decrease to the level approved through the European Directive.</p>

The management of the tailings and the detoxification technology are **BAT techniques**, according to Chapter 3.1.6.3, 3.1.6.3.2 and 4.3.11.8 (The Guidelines of the EU Document of BAT for Management ... in Mining Activities, March 2004). The treated tailings are pumped back into the tailings dam.

The cyanide is extremely toxic therefore its manufacturing, transport, handling and neutralization must be handled with care. However, the use of cyanide has a great advantage for the environment because it breaks down quickly (biodegradation under UV light) becoming inert under normal weather conditions, and the compounds resulting from the degradation, hydrolysis, adsorption processes taking place in the TMF are very stable (basically, these compounds become inert within the environment in the TMF once the process tailings are stored); there is no possibility of bio-accumulation, i.e. mercury or heavy metals. This Project will implement the Best Available Techniques (BAT) for gold recovery and waste management (we refer here to waste resulting from mining and processing) and will comply with the European Directive for cyanide content mining waste.

The cyanide used for the ore processing will be handled / stored in compliance with the EU standards and the provisions of the International Code for the Management of the Cyanide (ICMC-www.cyanidecode.org); it will be safely kept on the processing plant site in order to prevent any accidental spillage. The cyanide and its compounds will be subject to INCO detoxification procedure (DETOX) – this procedure is considered the Best Available Technique (BAT) as per BREF document; the process tailings will be discharged into the TMF in accordance with EU Directive 2006/21/CE on the management of mining waste.

The main quantity of the cyanide will be recovered in the processing plant as shown in Figure 4.1.15 and described in Section 2.3.3, Chapter 4.1 Water of the EIA Report. Even so, there will be a residual quantity of cyanide. The treated tailings represent the only source of the Project for process residual water. The residual cyanide concentrations found in the treated tailings slurry will have to comply with the EU Directive for mine waste which stipulates a maximum value of 10 mg/L CN_{WAD} (weak acid dissociable). The cyanide will exist as potential pollutant of the surface waters only on the plant site and during the mining phase and for the first one or two years after closure. Modeling of the predicted concentrations in the TMF has shown that treated process plant tailings flow is expected to contain 2 to 7 mg/L total cyanide. Further degradation will reduce the concentrations to below applicable standards in surface water (0.1 mg/l) within 1-3 years of closure. A secondary effect of this treatment is also the removal of many of the metals which may potentially occur in the process waste water stream. An assessment of the likely chemical makeup of the tailings leachate, conducted on testworks, is summarized in Table 4.1-18 (Section 4.3.), Chapter 4.1 Water, of the EIA report. The drawing below presents the complexity of the



degradation/decomposing processes which the CN goes through, once discharged into the TMF.

After discharge, the water is circulated back into the process; the decant water in the TMF during the entire period of storage, is subject to passive treatment processes, including natural degradation of the cyanide, hydrolyses, volatilization, photo-oxidation, bio-oxidation, mixing / separation, adsorption, dilution due to rainfalls etc.

According to the data sourced during the operation of various mines, different cyanide reduction efficiencies are outlined (from 23-38% to 57-76% for total cyanides and from 21-42% to 71-80% for WAD), depending on the season (temperature).

An average of approx. 50% decrease of CN_t concentration was considered for the TMF during operations' phase. The Model compiled for the degradation process shows that the cyanide concentration may decrease to even 0.1 mg CN_t/L during the first three years of closure.

The main part (90%) of the decomposed cyanide (average of 50%) is broken down by volatilization / hydrolysis, as cyanic acid. The mathematic modeling of the cyanic acid concentration in the TMF showed a maximum hourly concentration of 382 $\mu g/m^3$ in comparison to 5,000 $\mu g/m^3$, the concentration allowed by the Order no. 462 of the Ministry of Environment and Waters' Management.

References:

[1] Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities. EUROPEAN COMMISSION, DIRECTORATE-GENERAL JRC JOINT RESEARCH CENTRE, Institute for Prospective Technological Studies, Technologies for Sustainable Development, European IPPC Bureau, Final Report, July 2004 (<http://eippcb.jrc.es/pages/FActivities.htm>)

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	4
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Alba Iulia, 31.07.2006
RMGC internal unique code	MMGA_0010

Proposal	What quantity of cyanide is going to be used to separate gold from tailings in open air?
Solution	<p>The use of cyanide per year for ore processing will vary from 11,000 to 13,000 tones; but, this will be used within the processing plant site, and not in the open environment. The pH level will be maintained between 9 and 11 during the entire technological process, from ore grounding in the ball mills and up to the discharge point in the tailings dam, in order to prevent / minimize / remove the hydrogen cyanide emissions, which can be controlled in a basic environment.</p> <p>The cyanide is extremely toxic therefore its manufacturing, transport, handling and neutralization must be handled with care. However, the use of cyanide has a great advantage for the environment because it breaks down quickly (biodegradation under UV light) becoming inert under normal weather conditions, and the compounds resulting from the degradation, hydrolysis, adsorption processes taking place in the TMF are very stable (basically, these compounds become inert within the environment in the TMF once the process tailings are stored); there is no possibility of bio-accumulation of, i.e. mercury or heavy metals. This Project will implement the Best Available Techniques (BAT) for gold recovery and waste management (we refer here to waste resulting from mining and processing) and will comply with the European Directive for cyanide content mining waste.</p> <p>The cyanide used for the ore processing will be handled / stored in compliance with the EU standards and the provisions of the International Code for the Management of the Cyanide (www.cyanidecode.org); it will be safely kept on the processing plant site in order to prevent any accidental spillage. The cyanide and its compounds will be subject to INCO detoxification procedure (DETOX) – this procedure is considered the Best Available Technique (BAT) as per BREF document [1]; the process tailings will be discharged into the TMF in accordance with EU Directive 2006/21/CE on the management of mining waste.</p> <p>References: [1] Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities. EUROPEAN COMMISSION, DIRECTORATE-GENERAL JRC JOINT RESEARCH CENTRE, Institute for Prospective Technological Studies, Technologies for Sustainable Development, European IPPC Bureau, Final Report, July 2004 (http://eippcb.jrc.es/pages/FActivities.htm).</p>

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MMDD's item no. for the question which includes the observation identified by the RMGC internal code	4	
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Alba Iulia, 31.07.2006	
RMGC internal unique code	MMGA_0012	
Proposal	If cyanide is used in open environment, on how many Km2 the flora and fauna of the area will be destroyed, being fully aware of the fact that cyanide evaporates at 27°Celsius and will enter the underground waters?	
Solution	<p>In the case of Roşia Montană project, there will be no cyanide used in the open environment. Cyanide has been proposed to be used for the project in order to extract precious metals inside Processing Plant. All cyanide will be use in a closed environment, pursuant to the provisions of EU Directive on Mine Waste (EU Directive 2006/21/EC) as well as Romanian water discharge standards (NTPA-001). These directives and guidelines meet or exceed international codes to which the company has also committed for the use, handling, transport and discharge of cyanide. An example is the International Cyanide Management Code that has been prepared by UN. In addition the handling, storage and use of cyanide will observe the recommendations of EU CEFIC (European Chemical Industry Council) on the use, transport and handling of cyanide.</p> <p>There is no possibility for cyanide to enter the ground waters as the only water to leave the closed process plant will be treated to meet the standards stipulated in the EU mine waste directive (2006/21/EC) which are considered safe for the environment.</p>	

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	5
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Zlatna, 02.08.2006
RMGC internal unique code	MMGA_0018
Proposal	<p>The questioner is not against the project and submits at the secretary a "List of proposed works" that refers to the following issues: Site access and transport roads: verification of the foundations through geo-technical drillings;</p>
Solution	<p>For the geotechnical investigation all facility locations have been tested with the appropriate level of core drilling, geophysical surveying, and test pitting with rock core samples collected as well as soil samples for geotechnical test work. The designed facilities fully meet the geotechnical requirements required by the design criteria and included in current in force legislation.</p> <p>The results of geotechnical investigations have been the base of preparing the feasibility and engineering study and the studies conducted for the design and foundation of mining facilities and their access roads. The results of the geotechnical program were used for the EIA but not all of the details for all drill holes, test adits, surveys and test work are reported in the EIA as this is outside its scope. In total, 232 test adits and 251 geotechnical drill holes have been advanced for completing 10,360.22 metres. Also, geotechnical data has been secured after conducting geological exploration (surface and underground exploration, channel samples collected from existing mining works).</p> <p>The details of this work are presented in the geotechnical reports and included in the feasibility study and in design studies. All design work and proposed construction will be required to meet the requirements of all laws of Romania and EU guidelines in order to meet the technical requirements to obtain the necessary permits and financing required to build and operate the project.</p>

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MMDD's item no. for the question which includes the observation identified by the RMGC internal code	5
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Zlatna, 02.08.2006
RMGC internal unique code	MMGA_0019
Proposal	<p>Ores: the extraction must be performed selectively and the ores should be processed separately by mercury amalgamation in barrel mills.</p> <p>The processing of ore on the Roșia Montană will not be performed using mercury amalgamation in barrel mills. Mercury amalgamation is currently used on a low scale worldwide to recuperate gold.</p> <p>The use of this method is not recommended for Roșia Montană due to the elevated toxicity of mercury as well as due to the fact that mercury is used for ores with high free gold grade, and what has remained undeveloped until now in Roșia Montană is disseminated gold for which the best gold recovery method is the proposed method. That is why the use of a powerful pollutant in the technological flow is not recommended because this element does not degrade in time (as cyanide) but it accumulates in the Tailings Management Facility.</p>
Solution	<p>Mercury amalgamation is not an approved BAT (Best Available Techniques) technology. – the EU Directive to which RMGC has committed itself. The use of mercury amalgamation is also a serious environmental and ecological risk, which we will not engage in – consistent with Romania, EU and international guidelines and laws. Within chapter 5, Assessment of the Alternatives, a comparison is presented and analyzed between several methods of gold ore processing, among which amalgamation.</p> <p>In addition, the extraction of ore at Roșia Montană is not planned to be conducted on a selective basis, as such a method is not considered to be the most effective method of maximizing return on investment and use of the resource for the benefit of the region, Romania, and the company. Bulk mining has been shown through a number of independent feasibility and optimization studies to be the best and optimum method of developing disseminated gold resources.</p>

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	10
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	-
RMGC internal unique code	MMGA_0050
Proposal	<p>The questioner has submitted at the secretary a document called "Genocide through pollution – cyanide poisoning = weapon for mass destruction and extinction – terrorist weapon, at Baia Mare, October 2003" See the enclosed material in copy.</p>
Solution	<p>The most efficient and cost-effective process for extracting the gold and silver from ores such as the ones in Roşia Montană is based on full cyanide-leaching of the ore. There are numerous examples of similar ores throughout the world, which require the use of cyanide-based technology for efficient precious metals recovery. The implementation of the cyanide-based technology for gold and silver recovery from the ore in Roşia Montană is based on a detailed testwork program conducted by AMMTEC Limited and AMDEL Limited. The tests were scheduled and reviewed by GRD MINPROC Limited, and subsequently, the conclusions of the testing program were reviewed and reconfirmed by S.N.C. LAVALIN and AUSENCO. The issuance of the cyanide leaching technology for the ore in Roşia Montană considered the best practices used in Europe and worldwide. The technology for metals recovery by using cyanide leaching in CIL is Best Available Technology (BAT) (please see Chapter 3.1.6.2.2 and Chapter 5.2 of the Guidelines of BREF [1] UE Document on BAT for Management ... in Mining Activities, March 2004).</p> <p>The cyanide, in a solid briquette form will be transported in specially-designed isotainers. The cyanide will be dissolved only into the transportation containers, in an alkaline solution, sourced from and re-circulated back into a mixing tank. The mixing tank is designed with enough capacity to store the entire quantity of a transportation container. The cyanide solution, as soon as it is dissolved in the container, will be transferred from the mixing tank into a large volume storage tank.</p> <p>The cyanide is extremely toxic therefore its manufacturing, transport, handling and neutralization must be handled with care. However, the use of cyanide has a great advantage for the environment because it breaks down quickly (biodegradation under UV light) becoming inert under normal weather conditions, and the compounds resulting from the degradation, hydrolysis, adsorption processes taking place in the TMF are very stable (basically, these compounds become inert within the environment in the TMF once the process tailings are stored); there is no possibility of bio-accumulation of, for example, mercury or heavy metals. This Project will implement the Best Available Techniques (BAT) for gold recovery and waste management (we refer here to waste resulting from mining and processing) and will comply with the European Directive for cyanide content mining waste.</p> <p>The cyanide used for the ore processing will be handled / stored in compliance with the EU standards and the provisions of the International Code for the Management of the Cyanide (www.cyanidecode.org); it will be safely kept on the processing plant site in order to prevent any accidental spillage. The cyanide and its compounds will be subject to INCO detoxification procedure (DETOX) – this procedure is considered the Best Available Technique (BAT) as per BREF document; the process tailings will be discharged into the TMF in accordance with EU Directive 2006/21/CE on the management of mining waste.</p> <p>For a better understanding of the differences between Roşia Montană and Baia Mare, please see attached the Comparison Table for the two Projects. Please see the Annex 3.2 – Have lesson being learnt? The comparison between Roşia Montană and Baia Mare TMF</p> <p>References: [1] Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities. EUROPEAN COMMISSION, DIRECTORATE-GENERAL JRC JOINT RESEARCH CENTRE, Institute for Prospective Technological Studies, Technologies for Sustainable Development, European IPPC Bureau, Final Report, July 2004 (http://eippcb.jrc.es/pages/FActivities.htm)</p>

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	9
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Rosia Montana, 24.07.2006
RMGC internal unique code	MMGA_0064
Proposal	<p>The questioner wants to state that cyanide is not the solution, cyanide kills.</p> <p>The use of cyanide in mining industry represents 15% only from the total production of cyanide; cyanide is also used in pharmaceutical, food, metal processing, plastics, phones and computers industry.</p> <p>There are also other areas using cyanide to produce the following chemicals:</p> <ul style="list-style-type: none"> - the production of adiponitril (the basic material for nylon); - the production of acetone cyanohydrins (an intermediate for the production of methyl methacrylate); - cyanide chloride; - chelate compounds; - production of sodium and potassium cyanide (used especially in mining industry). <p>Moreover, cyanide is released from natural substances contained by certain foods and certain plants, such as cassava. The cyanide is found also in the cigarette smoke, as well as products resulted from the combustion of synthetics such as plastic.</p> <p>Cyanide is extremely toxic therefore its manufacturing, transport, handling and neutralization must be handled with care. However, cyanide has a great advantage for the environment because it breaks down quickly (biodegradation under UV light) becoming inert under normal weather conditions, and the compounds resulting from the degradation, hydrolysis, adsorption processes taking place in the TMF are very stable (basically, these compounds become inert within the environment in the TMF once the process tailings are stored); there is no possibility of bio-accumulation, i.e. mercury or heavy metals. This Project will implement the Best Available Techniques (BAT) for gold recovery and waste management (we refer here to waste resulting from mining and processing) and will comply with the European Directive for cyanide content mining waste.</p> <p>The cyanide used for the ore processing will be handled / stored in compliance with the EU standards and the provisions of the International Code for the Management of the Cyanide (www.cyanidecode.org); it will be safely kept on the processing plant site in order to prevent any accidental spillage. The cyanide and its compounds will be subject to INCO detoxification procedure (DETOX) – this procedure is considered the Best Available Technique (BAT) [1] as per BREF document; the process tailings will be discharged into the TMF in accordance with EU Directive 2006/21/CE on the management of mining waste.</p> <p>The Section 4.3 „Alternatives for leaching agents” of Chapter 5 (Alternatives) of the EIA Report includes an assessment of the alternatives in what regards the use of cyanide, in consideration to the environmental protection and cost-efficiency, and implementation in the processing. The conclusion reached is that the use of the cyanide represents the best available technique (BAT) in accordance to the definition accepted by the European Union.</p> <p>In regards to the toxicity of the tailings containing compounds of cyanide, it is worth noticing that Roşia Montană Project was designed and developed to recycle at maximum the cyanide used in the process as much as possible from technical feasibility point of view and, in addition, to include a phase of cyanide destruction (DETOX) which will bring the CN_{WAD} cyanide concentration to a value of under 10 ppm. This</p>
Solution	

level of cyanide is established by the European Directive for mining waste (2006/21/EC). Furthermore, the TMF of the Roşia Montană Project complies in full with the standards and the recommendations quoted from the Terms of Reference document in regards to the Best Available Techniques for the management of tailings and waste rock in mining (BREF which ensures the reduction to minimum of any potential impact generated by the tailings dam.

References:

[1] Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities. EUROPEAN COMMISSION, DIRECTORATE-GENERAL JRC JOINT RESEARCH CENTRE, Institute for Prospective Technological Studies, Technologies for Sustainable Development, European IPPC Bureau, Final Report, July 2004 (<http://eippcb.jrc.es/pages/FActivities.htm>).

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	14
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Rosia Montana, 24.07.2006
RMGC internal unique code	MMGA_0075
Proposal	How much cyanide will evaporate or escape from the tailings facility?
Solution	<p>The tailings stored in the TMF will contain 5-7 ppm WAD cyanide concentration, below the standard level imposed by the recently approved EU Directive for mining waste which is 10 ppm WAD cyanide. The tailings stored in the TMF are subject to a series of chemical reactions which, in time, lead to changes of the cyanide concentration in the TMF (neutralization). After discharge in the tailings dam, the water content solutions will go through three different processes:</p> <ol style="list-style-type: none"> 1 - The main part of the water and tailings resulting from the technological process and discharged into the tailings dam, containing cyanide of the above mentioned concentration, will be circulated back and reused in the processing plant; 2 - Part of the water will evaporate in accordance with the pH level and the geometry of the tailings dam. The evaporation increases during summer. The quantity of cyanide evaporated varies in accordance with the above mentioned variables; 3 - A percentage of up to 40% will be retained at first, due to being attached to solid particles. Once the tailings are buried, a neutralizing environment occurs, and a series of mechanisms will decompose the cyanide, in time. <p>The seepage from the tailings dam will be captured completely by the secondary containment dam, located downstream from the tailings dam and will be pumped back to the tailings dam, so that no water with cyanide content will reach the water system.</p> <p>The TMF was designed on the basis of 4 extremely important elements, including the protection parameters of the groundwater. These are: a starter dam of low permeability, a colluvium like layer of low permeability in the tailings dam pond, a secondary containment system and collection basin and a final treatment system for any water seepage.</p> <p>The modeling of the cyanide mass balance must be semi-quantitative until the real solution and the concentrations in the air can be obtained from the mining process. The model was developed on the basis of the information obtained from the designed technological flow, from the model of cyanide degradation and from other available sources, including similar mine sites where similar processes are developed. Due to its limitation, the mass cyanide balance identifies and estimates in an appropriate manner, the most significant compounds for the cyanide balance and shows the purpose of the cyanide within the ore processing and within the TMF.</p> <p>The estimation of the mass balance within the tailings dam, as well as the related dispersion in the air is essentially simple. The tailings discharged in the TMF and the cyanide concentration within these tailings are mostly known. The total cyanide concentration is estimated to be 7 mg/L, at the point it leaves the cyanide detoxification plant. This involves a WAD cyanide concentration between 4 and 6 mg/L. Based on the discharge rate and the concentration, it is estimated that the TMF will receive approximately 97 tones of total cyanide per year. Based on the volume of the pores in the tailings, almost one third of this quantity will be contained by the tailings, and 66 tone/year will be contained by the water in the tailings dam, which will be circulated back into the technological processes.</p> <p>The cyanide degradation within the tailings dam is a well known process. A great part of the degradation is actually, volatilization. Generally, 90% is considered volatilization, the rest being represented by other chemical processes.</p>

This Model was developed especially for this Project, as showed in Section 4.1.4.8, Volume 8, Chapter 2, Technological Processes from EIA. According to this Model, almost half of the cyanide quantity is lost through degradation during a one year period of time. If it is considered that 90% of this loss is due to emissions in the air, means that almost **30 tone/year** is lost in the year. The Model of cyanide balance is presented in detail and supportive to the hypothesis in Volume 8, Chapter 2, Technological Processes, Section 4.1.3. Even though there are several suppositions regarding the cyanide balance within the tailings dam, the figures represent approximate averages on short intervals. There will also be exceptions recorded from this estimation but, for the time being, the mass balance is fairly accurate for this phase of the Project. One of the most probable exceptions will be that a lower level of cyanide discharged in the TMF is recorded. For the phase of the Project, as a safety measure, there have been assumed to be high cyanide concentrations leaving the detox process. The selected INCO SO₂/Air process for the cyanide neutralization proposed, on regular basis, WAD cyanide concentrations smaller than 2 mg/L. Obviously, if lower cyanide concentrations at discharge are recorded, then the cyanide emissions into the air from the tailings dam is lower.

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	16
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Rosia Montana, 24.07.2006
RMGC internal unique code	MMGA_0080
Proposal	<p>How a protected area can exist in Rosia Montana between 6 open pits: 2 rock quarries and 4 mining pits?</p> <p>A protected area within the implementation perimeter of the Roşia Montană project is certainly possible.</p> <p>The way that the development of the project has been designed, there will be no period in which, during the 16 years of the project, the 4 ore open pits and the 2 rock quarries will operate at the same time. During the construction stage, only 2 rock quarries will operate, then, during the operational stage, these will be operated temporarily on very short periods, when rockfills are required for the drains and filters of the tailings management facility. From year 1 to year 9 of the operational phase, the mining activities will be carried out in two open pits (Cârnic and Cetate), and after year 9 the activity will be transferred into two new open pits (Orlea and Jig). Even the two open pits will be operated sequentially so that, while an open pit will operate in the ore the other will operate in the waste rock in order to open new working faces.</p> <p>This spacing out has been planned as a mitigation / elimination measure of the potential impact of the mining activities (dust, noise, vibrations due to drilling, blasting, loading and transport activities). For more details please see the EIA report, Chapter 4 "Potential Impact", Sections 4.2 "Air", respectively 4.3 "Noise and Vibrations". These sections describe in detail all aspects related to the potential impact resulted from the mining activities. Dispersion models have been elaborated both for air and noise and vibrations. The modeling result is illustrated in the maps attached to the two sections, where, prevention, mitigation and elimination measures of potential impact are also presented.</p>
Solution	<p>The proposed strategy for the implementation of the best management practice, aiming at eliminating potential impact, is presented in the related management plans, plan D – Air factor quality management and plan E – Management plan for noise and vibrations. In conclusion, according to the results of the evaluation elaborated by the team of independent experts in the protected area (historic center of the Roşia Montană commune), no nonconformance with the environmental standards as a result of the proposed activities have been noticed.</p> <p>Through the utilization of modern technologies, adequate measures and actions, the vibrations (or earthquakes) resulted from the explosive used in open pits will be kept within certain limits in order to ensure the protection of buildings and historical monuments in the area proposed for preservation.</p> <p>In this regard, some special technological blasting options will be applied at smaller distances towards the protected areas in order to reduce the blasting holes diameter and length, quantity of explosive fired on bench or in successive stages, etc.</p> <p>Through the implementation of the proposed mitigation measures, the quality conditions of the environmental factors for the residential areas will be observed. Also, a quality monitoring plan of the environmental factors for all operational stages of the project – construction, operation, closure and post-closure – has been prepared. Sensors will be installed on the buildings classified as historical monuments, to record the discomfort level as a result of the blasting activities.</p>

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	32
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Rosia Montana, 24.07.2006
RMGC internal unique code	MMGA_0118
Proposal	<p>The questioner makes comments related to the short lifetime of the Project: 10 to 15 years and asks why the company is in such a hurry to complete the project after 10 years, while experts of good will claim that works can be developed for 500-800 years without many problems.</p>
	<p>The project has a longer lifetime than that one indicated in the question. The project has a development closure period of 30 years. This lifetime results taking into account the following periods: geological research period of about 5 years (between 1998 and 2003), development period of about 4 years, project construction period of about 2 years, operation period of 16 years and closure period of approximately 3 years. To this 30 years period, at least 7 years are added in order to monitor the post-closure environmental conditions.</p>
Solution	<p>With regards to the duration of 500 – 800 years, this opinion is not supported by the quantity of resources / reserves identified until now. Such a long lifetime of a project supposes an extremely low yearly production capacity. The gold grade relatively low of the Roşia Montană ore deposit would determine incomes from gold sale which would not cover the expenses related to its extraction.</p> <p>It is important to mention that the rich part of the ore deposit was already mined during the 2000 years of mining, leaving behind only the poor part of the ore deposit. Consequently, the gold content must be counterbalanced by the processing of a large quantity of ore, so that the economic profitability to be assured.</p>

Domain

TECHNOLOGICAL PROCESSES

MMDD's item no. for the question which includes the observation identified by the RMGC internal code

82

MMDD's identification no. for the question which includes the observation identified by the RMGC internal code

Campeni, 26.07.2006

RMGC internal unique code

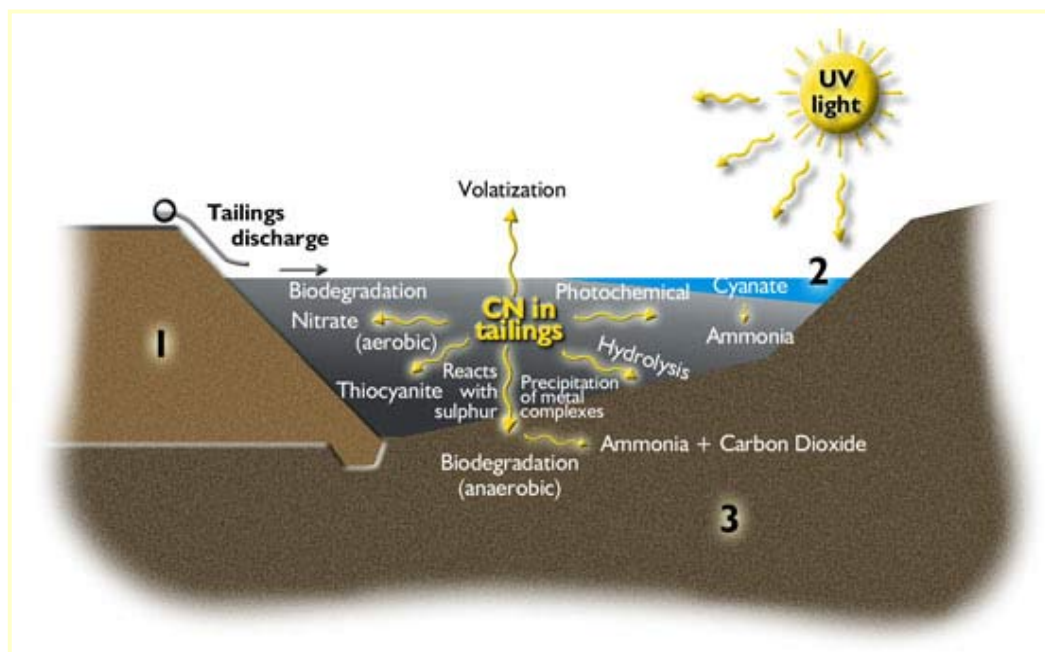
MMGA_0206

Proposal

The questioner would like to learn the annual exact figures, the exact quantities for S, NH3 and heavy metals that will enter the underground waters (not data like: several, some, or moderate). He underlines the fact that company's representatives must not claim that there are no underground waters, because from data secured from Romanian Waters Authority it clearly results that these waters exist and there are also counted springs.

The major part quantity of the cyanide will be recovered in the processing plant as shown in Figure 4.1.15 and described in Section 2.3.3, Chapter 4.1 Water of the EIA (Report on the Environmental Impact Assessment (EIA)) Even so, there will be a residual quantity of cyanide. The treated tailings represent the only source of the Project for process residual water. The residual cyanide concentrations found in the treated tailings slurry will have to comply with the EU Directive for mine waste which stipulates a maximum value of 10 mg/L CN_{WAD} (weak acid dissociable). The cyanide will exist as potential pollutant of the surface waters on the plant site, and only during the mining phase and for the first one or two years after closure. Modeling of the predicted concentrations in the TMF has shown that treated process plant tailings flow is expected to contain 2 to 7 mg/L total cyanide. Further degradation will reduce the concentrations to below applicable standards in surface water (0.1 mg/l) within 1-3 years of closure. A secondary effect of this treatment is also the removal of many of the metals which may potentially occur in the process waste water stream. An assessment of the likely chemical makeup of the tailings leachate, conducted on testworks, is summarized in Table 4.1-18 (Section 4.3.), Chapter 4.1 Water, of the EIA report. The drawing below presents the complexity of the degradation / decomposing processes which the CN goes through, once discharged into the TMF.

Solution



After discharge, the water is circulated back into the process; the decant water in the TMF during the entire period of storage is subject to passive treatment processes, including natural degradation of the cyanide, hydrolyses, volatilization, photo-oxidation, bio-oxidation, mixing / separation, adsorption,

dilution due to rainfalls etc.

According to the data sourced during the operation of various mines, different cyanide reduction efficiencies are outlined (from 23-38% to 57-76% for total cyanides and from 21-42% to 71-80% for WAD), depending on the season (temperature).

An average of approx. 50% decrease of CN_t concentration was considered for the TMF during the operations' phase. The Model compiled for the degradation process shows that the cyanide concentration may to decrease to 0.1 mg CN_t/L during the first three years of closure.

The main part (90%) of the decomposed cyanide (average of 50%) is broken down by volatilization / hydrolysis, as cyanic acid. The mathematical modeling of the cyanic acid concentration in the TMF showed a maximum hourly concentration of 382 $\mu g/m^3$ in comparison to 5,000 $\mu g/m^3$, which is the concentration allowed by the Order no. 462 of the Ministry of Environment and Waters' Management.

In what concerns the quantity of S, NH_3 and heavy metals, this will remain in the TMF. The technology described in Chapter 2 – Technological processes or the TMF Management Plan, Section 3.2 – The Chemistry of clarified water, the tests conducted by the consultants working on the overall design show that the composition of the process tailings is as presented below. The sulphur can be associated with certain metals as sulphides, and the percentage of NH_3 is from 6.6 to 25 mg/L.

Table Error! No text of specified style in document.-1.The chemistry of the clarified water (with detoxified tailings)

	Sample ⁽²⁾			TN001 Standard		Sample ⁽²⁾			TN001 Standard
	RM1	RM2	RM3			RM1	RM2	RM3	
Total Cyanide ⁽³⁾	1.13	5.09	3.29	0.1	Manganese	0.3	0.8	<0.1	1
WAD Cyanide ⁽³⁾	0.37	0.77	0.22	...	Molybdenum	0.4	0.3	0.4	0.1
Thiocyanate	70	69	91	...	Sodium	725	900	705	..
Cyanate	390	390	350	...	Niobium	<0.1	<0.1	<0.1	...
Thiosalts	<2	<2	2.50	...	Neodymium	<0.01	<0.01	<0.01	...
Ammonia	6.6	7.3	25	2	Nickel	0.20	0.40	0.20	0.5
Gold	0.0085	0.043	0.0165	---	Phosphorus	<1	<0.5	<1	...
Silver	<0.05	<0.05	<0.05	0.1	Lead	<1	<1	<1	0.2
Aluminium	<0.2	0.2	0.20	5	Praseodymium	<0.005	<0.005	<0.005	...
Arsenic	0.30	<0.2	0.20	0.1	Rubidium	0.35	0.35	0.50	...
Boron	0.20	0.2	0.40	...	Sulphur	660	1,030	962	...
Barium	<0.05	<0.05	<0.05	...	Sulphate ⁽¹⁾	1,980	3,090	2,886	600
Beryllium	<0.02	<0.02	<0.02	...	Antimony	0	0.28	0.06	...
Bismuth	<0.02	<0.02	<0.02	...	Scandium	<0.5	<0.1	<0.5	...
Calcium	401	675	707	300	Selenium	<5	<5	<5	0.1
Cadmium	<0.5	<0.1	<0.5	0.2	Silicon	8	6	8	...
Cerium	<0.01	<0.01	<0.01	...	Samarium	<0.01	<0.01	<0.01	...
Cobalt	0.40	0.40	0.80	1	Tin	<0.2	<0.2	<0.2	...
Chromium	<0.2	<0.2	<0.2	1	Strontium	1.4	2.1	2.1	...
Cesium	<0.02	<0.02	<0.02	...	Tantalum	<0.005	<0.005	<0.005	...
Copper	0.10	0.10	0.10	0.1	Terbium	<0.005	<0.005	<0.005	...
Dysprosium	<0.01	<0.01	<0.01	...	Tellurium	<0.1	<0.1	<0.1	...
Erbium	<0.01	<0.01	<0.01	...	Thorium	<0.01	<0.01	<0.01	...

Europium	<0.002	<0.05	<0.002	...	Titanium	<0.2	<0.2	<0.2	...
Iron	0.20	1.4	1.0	5	Thallium	<0.01	<0.01	<0.03	...
Gallium	<0.2	<0.1	<0.2	...	Thulium	<0.005	<0.005	<0.005	...
Gadolinium	<0.05	<0.05	<0.05	...	Uranium	<0.01	<0.01	<0.01	...
Germanium	<0.5	<1	<0.5	...	Vanadium	<0.5	<0.5	<0.5	...
Hafnium	<0.1	<0.1	<0.1	...	Tungsten	<0.1	<0.1	<0.1	...
Mercury	<0.01	<0.01	<0.01	0.05	Yttrium	<0.01	<0.01	<0.01	...
Potassium	142	136	132	...	Ytterbium	<0.01	<0.01	<0.01	...
Lanthanum	<0.01	<0.01	<0.01	...	Zinc	<0.2	<0.1	<0.2	0.5
Lithium	<0.1	<0.1	<0.1	...	Zirconium	<0.1	<0.1	<0.1	...
Magnesium	5.4	14.4	8.2	100					
Notes: (1) The calculations are based on the assumption that the total sulphur is sulphide. Units of mg /L The results are obtained in laboratory environment; they might not be the same in practice < Shows not identifiable within the limits of the testwork									

Source of information: Cyplus/INCO 2004 – Test Program to Evaluate Cyanide Destruction Option Using SO₂/Air and Peroxygen-Based Technologies for the Treatment of Roşia Montană Leach Effluent.

The Corna Dam [also called the “Tailings Management Facility” (TMF) dam] will not negatively impact the area’s water table.

The possibility for lateral seepage flowing around the secondary containment facilities was investigated as part of the design studies. The hydrogeologic studies in the Corna valley indicated that groundwater was flowing toward the valley bottom and that the final elevation of the tailings pond surface was less than the elevation of the existing groundwater levels. Therefore, it is considered that there will not be a gradient for groundwater to flow to the adjacent valleys. The groundwater elevations in the sides of the TMF basin have been monitored over a five year period and only indicate small seasonal variations.

An engineered liner is included in the design of the Tailings Management Facility (TMF) basin to be protective of groundwater. Specifically, the Roşia Montană Tailings Management Facility (TMF or “the facility”) has been designed to be compliant with the EU Groundwater Directive (80/68/EEC), transposed as Romanian GD 351/2005. The TMF is also designed for compliance with the EU Mine Waste Directive (2006/21/EC) as required by the Terms of Reference established by the MEWM in May, 2005. The following paragraphs provide a discussion of how the facility is compliant with the directives.

The TMF is composed of a series of individual components including:

- the tailings impoundment;
- the tailings dam;
- the secondary seepage collection pond;
- the secondary containment dam, and
- the groundwater monitoring wells/extraction wells located downstream of the Secondary Containment dam.

All of these components are integral parts of the facility and necessary for the facility to perform as designed.

The proposed low permeability soil liner will be fully compliant with Best Available Techniques (BAT) as defined by EU Directive 96/61 (IPPC) and EU Mine Waste Directive. Additional design features that are included in the design to be protective of groundwater include:

- A low permeability (1x10⁻⁶ cm/sec) cut off wall within the foundation of the starter dam to control seepage;
- A low permeability (1x10⁻⁶ cm/sec) core in the starter dam to control seepage;

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- A seepage collection dam and pond below the toe of the tailings dam to collect and contain any seepage that does extend beyond the dam centerline;
 - A series of monitoring wells, below the toe of the secondary containment dam, to monitor seepage and ensure compliance, before the waste facility limit.

In addition to the design components noted above specific operational requirements will be implemented to be protective of human health and the environment. In the extremely unlikely case that impacted water is detected in the monitoring wells below the secondary containment dam, they will be converted to pumping wells and will be used to extract the impacted water and pump it into the reclaim pond where it will be incorporated into the RMP processing plant water supply system, until the compliance is reestablished.

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	87
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Campeni, 26.07.2006
RMGC internal unique code	MMGA_0215
Proposal	<p>There is hydrocyanic acid in the tailings facility that will evaporate at 26°C. How will RMGC prevent this evaporation that will cause acid rains?</p>
Solution	<p>The tailings dam will never contain hydrogen cyanide, simply because this is a gaseous product which results from the CN volatilization process, at low pH, i.e. pH under 8.50% CN turns into HCN. The acid rains usually occur due to certain compounds of S or N in the air, or due to the emissions of certain strong acids (such as sulphuric acid, azotic acid or chlorine); the operations to take place on the proposed Project site don't have such potential. HCN has two characteristics: is very low soluble and doesn't react to water drops and breaks down quickly in the atmosphere – it turns into carbonate.</p> <p>The assessment of the HCN emissions is based on a Model summarized in Volume 12, Chapter 4.2 Air. AERMOD, Version 99351. -EPA, 2004. User's Guide for the AMS/EPA Regulatory Model – AERMOD. EPA-454/B-03-001, was used for modeling the dispersion of HCN. Please also see: http://www.epa.gov/scram001/dispersion_prefrec.htm#aermod. The concentrations estimate were much below the awareness limits stipulated by the standards for the air quality.</p> <p>The Cyanide management Plan and the Air quality management Plan present clear solutions to prevent / reduce / remove the potential impact of the HCN emissions; starting from the results of the HCN dispersion model, we present here some of them:</p> <ul style="list-style-type: none"> - the sodium cyanide will be handled in liquid form only, as from the unloading from the supply trucks, up to the time it is discharged onto the TMF, within the tailings; the sodium cyanide is represented by alkaline solutions of high pH (over 10.5-11) of various sodium cyanide concentrations. The scope of the alkalinity of these solutions is to maintain the cyanide as cyan ions form (CN⁻) and to stop forming the hydrogen cyanide (HCN), phenomenon which occurs in environment of low pH only; - the volatilization of the cyanide off a solution can't happen as free cyanide, but HCN only; - the handling and storage of the cyanide solutions will only take place through closed systems, the only facilities / areas where HCN could form and volatilize, with small emission ratios, are the leaching tank and the tailings thickener, as well as the tailings dam; - the HCN emissions from the surface of the above mentioned tanks and from the surface of the tailings dam could occur due to the decrease of the pH within the superficial layers of the solutions (which encourages the occurrence of HCN) and due to the desorbition (volatilization in the air) of this compound; - the concentration of the cyanides within the handled solutions will decrease from 300 mg/L in the leaching tanks up to 7 mg/L (total cyanides) at the point of discharge into the tailings dam. The significant decrease of the cyanide concentration at the point of discharge into the tailings dam is supported by the detox system; - the knowledge on the cyanide chemistry, as well as the experience from similar activities, have lead us to the following possible HCN emissions in the air: 6 t/year from the leaching tanks, 13 t/year from the tailings thickeners and 30 t/year (22.4 t, and 17 mg/h/m², during hot season and 7.6 t, and 11.6 mg/h/m², during the cold season) from the surface of the tailings dam, meaning a daily average total HCN emission of 134.2 kg; - once emitted, the hydrogen cyanide is subject to certain chemical reactions in low atmosphere, leading to ammonia; - the mathematical modeling of the HCN concentrations in the ambient air (if the HCN is not subject to chemical reactions in the atmosphere) showed the highest concentrations at the level

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- of the soil, within the industrial site, namely within the area of the TMF and near the processing plant – the maximum concentration being of 382 µg/m³per hour;
- the highest concentrations of HCN in the ambient air will be of 2.6 times less than the value imposed for the safety of the workers, as stipulated by the national legislation;
 - the concentrations of HCN in the ambient air in the inhabited areas near the industrial site will be of 4 – 80 µg/m³, over 250 – 12.5 less than the safety value as stipulated by the national legislation (the national legislation and the EU legislation for the air quality don't stipulate any limit values for the protection of population's health);
 - the advance of the HCN in the atmosphere involves an insignificant compound of reactions in liquid phase (the water vapors in the atmosphere and the rain drops) because, at partial low pressure, specific to gases in free air, the HCN is very weak soluble in water, and the rain will not effectively reduce the concentrations from the air (MUDDER, et al., 2001, CICERONE and ZELLNER, 1983);
 - the chance for the value of the HCN concentrations in precipitations within or outside the area of the Project be significantly higher than the basic values (of 0.2 ppb) is extremely low.

For further details regarding the Use of cyanide in technological processes, the Balance of the cyanides, as well as the Emissions and the impact of the cyanide against the quality of the air, please see the EIA, Chapter 2, Chapter 4.1 and Chapter 4.2 (Section 4.2.3).

The references for this Project include:

- CICERONE, R.J., and ZELLNER, R., 1983. *The atmospheric chemistry of hydrogen cyanide (HCN)*. *Journal of geophysics research*, Volume 88, issue no. C15, page. 10,689 to 10,696;
 - MUDDER, T.I., BOTZ, M.M., and SMITH A., 2001. *Chemistry and Treatment of Cyanidation Wastes*, The Second edition. *Mining Journal Books, Ltd.*, London, 373 p.
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Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	142
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Alba Iulia, 31.07.2006
RMGC internal unique code	MMGA_0318

Proposal What does the cyanide in leach represent, from the beginning of the process till its end?

A summary description of the tailings processing system, as well as the use and management of the cyanide, can be found in the Non-technical Summary, Chapter 9 of the EIA Report or detailed in Chapter 2, Technological Processes, Section 4.1.2.2 The main technological processes.

The most efficient and cost-effective process for extracting the gold and silver from ores such as the ones in Roşia Montană is based on full cyanide-leaching of the ore. There are numerous examples of similar ores throughout the world, which require the use of cyanide-based technology for efficient precious metals recovery. The implementation of the cyanide-based technology for gold and silver recovery from the ore in Roşia Montană is based on a detailed testwork program conducted by AMMTEC Limited and AMDEL Limited. The tests were scheduled and reviewed by GRD MINPROC Limited, and subsequently, the conclusions of the testing program were reviewed and reconfirmed by S.N.C. LAVALIN and AUSENCO. The issuance of the cyanide leaching technology for the ore in Roşia Montană considered the best practices used in Europe and worldwide. The technology for metals recovery by using cyanide leaching in CIL is **Best Available Technology BAT** (please see Chapter 3.1.6.2.2 and Chapter 5.2 of the Guidelines of BREF [1] UE Document on BAT for Management ... in Mining Activities, March 2004).

The cyanide in a solid briquette form will be transported in specially-designed and manufactured isotainers. The cyanide will be dissolved only into the transportation containers in alkaline solution, sourced from and re-circulated back into a mixing tank. The mixing tank is designed with sufficient capacity to store the entire quantity of a transportation container. The cyanide solution, as soon as it is dissolved in the container, will be transferred from the mixing tank into a large volume storage tank.

Solution

The fine ground ore, resulting from the overflow of the ball mills' cyclones, is transferred to the tank of the feeding pump for the CIL circuit, where it's mixed with cyanide and lime suspension, required to balance the level of pH. Active carbon is added in the CIL tank to support the leaching process and the adsorption of the dissolved metals.

The slurry is subject to a leaching process taking place within two parallel rows of 7 CIL tanks each containing agitators. The size of the CIL tanks is D = 18 m x H = 20 m. The CIL tanks are sized to ensure enough time of contact between the cyanide solution, the ground ore and the active carbon. Sodium cyanide solution may be added as needed to the CIL tanks number 2 and 4 of each row, in order to maintain the required cyanide concentration. The slurry is circulated into the gravitational cyanide-leaching circuit, and the carbon advances continuously counter the flow of the slurry, pumped by the vertical pumps. The time for advancing from one tank into another is adjusted so that the load of gold and silver on the carbon is ensured to be from 7,000 to 8,000 g/t.

Once in the feeding tank of the thickener, the slurry is mixed with flocculants which support the sedimentation of the solids. The thickener ensures the increase of the solid content within the sediment and, at the same time, the development of the supernatant almost clarified. The Supernatant discharged from the thickener will be directed towards the grinding circuit, to reuse and recover the cyanide.

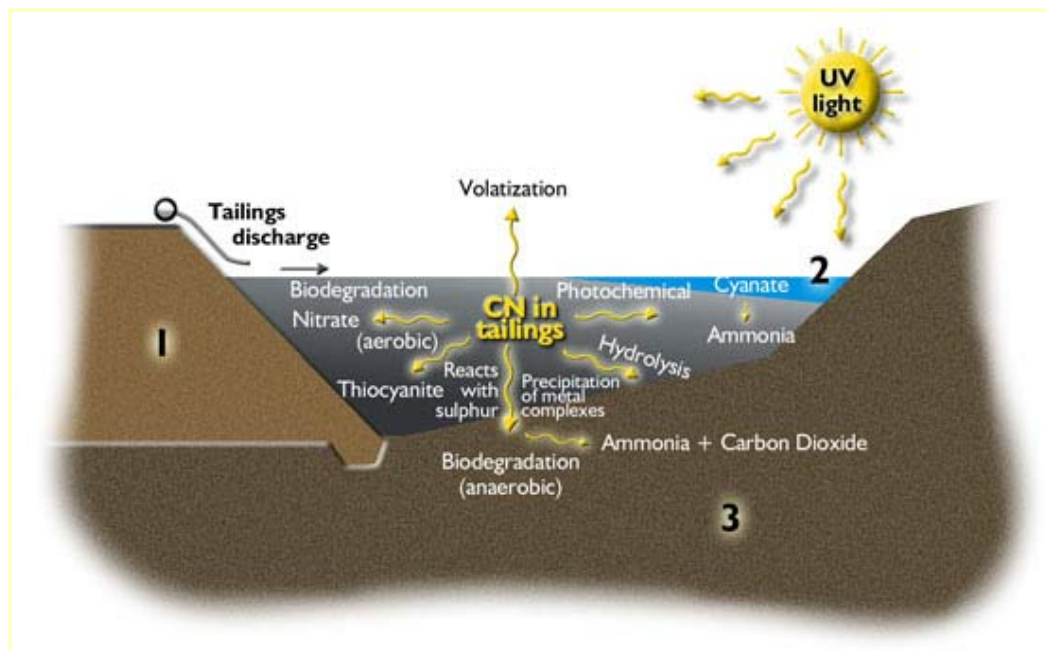
The thickened slurry is pumped into the cyanide detoxification circuit, working on SO₂/air procedure, where the WAD cyanide concentration will decrease to the level approved through the European Directive. The management of the tailings and the detoxification technology are **BAT techniques**, according to

Chapter 3.1.6.3, 3.1.6.3.2 and 4.3.11.8 (The Guidelines of the EU Document of BAT for Management.. in Mining Activities, March 2004). The treated tailings are pumped back into the tailings dam.

The cyanide is extremely toxic therefore its manufacturing, transport, handling and neutralization must be handled with care. However, the cyanide has a great advantage for the environment because it breaks down quickly (biodegradation under UV light) becoming inert under normal weather conditions, and the compounds resulting from the degradation, hydrolysis, adsorption processes taking place in the TMF are very stable (basically, these compounds become inert within the environment in the TMF once the process tailings are stored); there is no possibility of bio-accumulation, for example of mercury or heavy metals. This Project will implement the Best Available Techniques (BAT) for gold recovery and waste management (we refer here to waste resulting from mining and processing) and will comply with the European Directive for cyanide content mining waste.

The cyanide used for the ore processing will be handled / stored in compliance with the EU standards and the provisions of the International Code for the Management of the Cyanide (ICMC-www.cyanidecode.org); it will be safely kept on the processing plant site in order to prevent any accidental spillage. The cyanide and its compounds will be subject to INCO detoxification procedure (DETOX) – this procedure is considered the Best Available Technique (BAT) as per BREF document; the process tailings will be discharged into the TMF in accordance with EU Directive 2006/21/CE on the management of mining waste.

The main quantity of the cyanide will be recovered in the processing plant as shown in Figure 4.1.15 and described in Section 2.3.3, Chapter 4.1 Water of the EIA. Even though, so there will be a residual quantity of cyanide. The treated tailings represent the only source of the Project for process residual water. The residual cyanide concentrations found in the treated tailings slurry will have to comply with the EU Directive for mine waste which stipulates a maximum value of 10 mg/L CN_{WAD} (weak acid dissociable). The cyanide will exist as potential pollutant of the surface waters on the plant site and only during the mining phase and for the first one or two years after closure. Modeling of the predicted concentrations in the TMF has shown that treated process plant tailings flow is expected to contain 2 to 7 mg/L total cyanide. Further degradation will reduce the concentrations to below applicable standards in surface water (0.1 mg/l) within 1-3 years of closure. A secondary effect of this treatment is also the removal of many of the metals which may potentially occur in the process waste water stream. An assessment of the likely chemical makeup of the tailings leachate, conducted on testworks, is summarized in Table 4.1-18 (Section 4.3.), Chapter 4.1 Water, of the EIA report. The drawing below presents the complexity of the



degradation/decomposing processes which the CN goes through, once discharged into the TMF.

After discharge, the water is circulated back into the process; the decant water in the TMF during the entire period of storage is subject to passive treatment processes, including natural degradation of the cyanide, hydrolyses, volatilization, photo-oxidation, bio-oxidation, mixing / separation, adsorption, dilution due to rainfalls etc.

According to the data sourced during the operation of various mines, different cyanide reduction efficiencies are outlined (from 23-38% to 57-76% for total cyanides and from 21-42% to 71-80% for WAD), depending on the season (temperature).

An average of approx. 50% decrease of CN_t concentration was considered for the TMF during the operational phase. The Model compiled for the degradation process shows that the cyanide concentration may decrease to 0.1 mg CN_t/L during the first three years of closure.

The main part (90%) of the decomposed cyanide (average of 50%) is broken down by volatilization / hydrolysis, into cyanic acid. The mathematic modeling of the cyanic acid concentration in the TMF showed a maximum hourly concentration of 382 $\mu g/m^3$ in comparison to 5,000 $\mu g/m^3$, the concentration allowed by the Order no. 462 of the Ministry of Environment and Waters' Management.

References:

[1] Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities. EUROPEAN COMMISSION, DIRECTORATE-GENERAL JRC JOINT RESEARCH CENTRE, Institute for Prospective Technological Studies, Technologies for Sustainable Development, European IPPC Bureau, Final Report, July 2004 (<http://eippcb.jrc.es/pages/FActivities.htm>)

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	150
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Alba Iulia, 31.07.2006
RMGC internal unique code	MMGA_0320
Proposal	The questioner wants to know which is going to be the situation of the acid rainfalls.
	<p>The activities taking place on the Project site, as well as the emissions from the ore processing operation will not generate any acid rains. These emissions are described in Chapter 4.2 Air. The acid rain usually occurs due to certain compounds of S or N in the air, or due to the emissions of certain strong acids (such as sulphuric acid, nitric acid or chlorine); the operations to take place on the proposed Project site don't have such potential. Hydrogen cyanide (HCN) has two characteristics: it has low solubility and doesn't react to water drops, and breaks down quickly in the atmosphere – it turns into carbonate.</p> <p>If the Questioner refers to HCN emissions and their impact, then: The assessment of the HCN emissions is based on a Model summarized in Volume 12, Chapter 4.2 Air. AERMOD, Version 99351. -EPA, 2004. User's Guide for the AMS/EPA Regulatory Model – AERMOD. EPA-454/B-03-00, was used for modeling the dispersion of HCN. Please also see: http://www.epa.gov/scram001/dispersion_prefrec.htm#aermod. The concentrations estimated were well below the awareness limits stipulated by the standards for air quality.</p> <p>The Cyanide Management Plan and the Air quality management Plan present clear solutions to prevent / reduce / remove the potential impact of the HCN emissions: starting from the results of the HCN dispersion model, we present here some of them:</p> <ul style="list-style-type: none"> - the sodium cyanide will be handled in liquid form only, from the unloading of the supply trucks, up to the time it is discharged onto the TMF, within the tailings; the sodium cyanide is represented by alkaline solutions of high pH (over 10.5-11) of various sodium cyanide concentrations. The scope of the alkalinity of these solutions is to maintain the cyanide in cyan ions form (CN⁻) and to stop forming the hydrogen cyanide (HCN), phenomenon which occurs in environments of low pH only; - the volatilization of the cyanide off a solution can't happen as free cyanide, but only as HCN; - the handling and storage of the cyanide solutions will only take place through closed systems; the only facilities / areas where HCN could form and volatilize, with small emission ratios, are the leaching tank and the tailings thickener, as well as the tailings dam; - the HCN emissions from the surface of the leaching tanks and from the surface of the tailings dam could occur due to the decrease of the pH within the superficial layers of the solutions (which encourages the occurrence of HCN) and due to the desorption (volatilization in the air) of this compound; - the concentration of the cyanides within the handled solutions will decrease from 300 mg/L in the leaching tanks up to 7 mg/L (total cyanides) at the point of discharge into the tailings dam. The significant decrease of the cyanide concentration at the point of discharge into the tailings dam is supported by the detox system; - the knowledge of the cyanide chemistry, as well as the experience from similar activities, have lead us to the following estimated HCN emissions in the air: 6 t/year from the leaching tanks, 13 t/year from the tailings thickeners and 30 t/year (22.4 t, and 17 mg/h/m², during hot season and 7.6 t, and 11.6 mg/h/m², during the cold season) from the surface of the tailings dam, meaning a daily average total HCN emission of 134.2 kg; - once emitted, the hydrogen cyanide is subject to certain chemical reactions in low atmosphere, leading to ammonia; - the mathematical modeling of the HCN concentrations in the ambient air (if the HCN is not
Solution	

subject to chemical reactions in the atmosphere) showed the highest concentrations at the level of the soil, within the industrial site, namely within the area of the TMF and near the processing plant – the maximum concentration being 382 µg/m³per hour;

- the highest concentrations of HCN in the ambient air will be 2.6 times less than the value imposed for the safety of the workers, as stipulated by the national legislation;
- the concentrations of HCN in the ambient air in the inhabited areas near the industrial site will be of 4 – 80 µg/m³, over 250 – 12.5 times less than the safety value as stipulated by the national legislation (the national legislation and the EU legislation for the air quality don't stipulate any limit values for the protection of public health);
- the advance of the HCN in the atmosphere involves an insignificant compound of reactions in liquid phase (the water vapors in the atmosphere and in rain drops) because, at partial low pressure, specific to gases in free air, the HCN is very weakly soluble in water, and the rain will not effectively reduce the concentrations from the air (MUDDER, et al., 2001, CICERONE and ZELLNER, 1983);
- the likelihood for the value of the HCN concentrations in precipitations within or outside the area of the Project to be significantly higher than the basic values (of 0.2 ppb) is extremely low.

For further details regarding the Use of cyanide in technological processes, the Balance of the cyanides, as well as the Emissions and the impact of the cyanide against the quality of the air, please see the EIA, Chapter 2, Chapter 4.1 and Chapter 4.2 (Section 4.2.3).

The references for this Project include:

- CICERONE, R.J., and ZELLNER, R., 1983. *The atmospheric chemistry of hydrogen cyanide (HCN)*. *Journal of geophysics research*, Volume 88, issue no. C15, page. 10,689 to 10,696;
 - MUDDER, T.I., BOTZ, M.M., and SMITH A., 2001. *Chemistry and Treatment of Cyanidation Wastes*, The Second edition. *Mining Journal Books, Ltd.*, London, 373 pg.
-

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	155
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Zlatna, 02.08.2006
RMGC internal unique code	MMGA_0328
Proposal	When a terrain is being surveyed, the analysis of its composition is being done not only for gold and silver, but also for other metals, some of them are harmful for the technological process. The presence of arsenic has been acknowledged. Are there any stages for eliminating this arsenic included in the technological process (in theory this is performed by burning), because the questioner couldn't find them in the project?
Solution	In the case of the Roşia Montană Project, analyses for gold, silver and sulfur as well as for other 47 minor elements including arsenic have been carried out. The average arsenic content is of 0.0089%, that means a very low grade and as a result this grade does not damage the technological process, as no procedure is provided for its removal.

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	155
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Zlatna, 02.08.2006
RMGC internal unique code	MMGA_0329
Proposal	What type of cyanide is being used: sodium cyanide, potassium cyanide or calcium cyanide? Generally speaking, sodium cyanide is being used, but potassium cyanide has the better efficiency rate and it is more expensive.
Solution	<p>The Roşia Montană Project will use sodium cyanide. In comparison to the ore reserves in other countries, the ore in Roşia Montană is very clean which represents a plus for the Project, in terms of cost-efficiency.</p> <p>This reagent will arrive at the mine in solid briquettes of sodium cyanide, in sealed containers. The cyanide solution is obtained by using certain automatic methods, developed within closed environment, so that the workers are not exposed to gas and dust; also, the gas and dust will not be released in the air. The cyanide solution is reused in the process, and the residues discharged in the same time with the tailings (processing waste) are subject to cyanide destruction process. Thus, the tailings discharged in the TMF will not be toxic. These methods comply with standards and regulations, such as the International Code for the Management of Cyanide (signed by Roşia Montană Gold Corporation (RMGC)), as well as the European Directive for mining waste.</p>

Domain		TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	156	
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Zlatna, 02.08.2006	
RMGC internal unique code	MMGA_0334	
Proposal	Is there the possibility for RMGC to process pyrites from Rosia Montana mine?	
Solution	This option is out of the question because in the case of the Roşia Montană project, no pyrite concentrates requiring a different technological process as compared to the technology proposed by project, will be obtained. The pyrite concentrates are obtained by flotation which in the case of the Roşia Montană mineralization has a low gold and silver recovery while through the modern technologies proposed by the project, respectively the cyanidation in special tanks followed by electrolysis will ensure high recovery.	

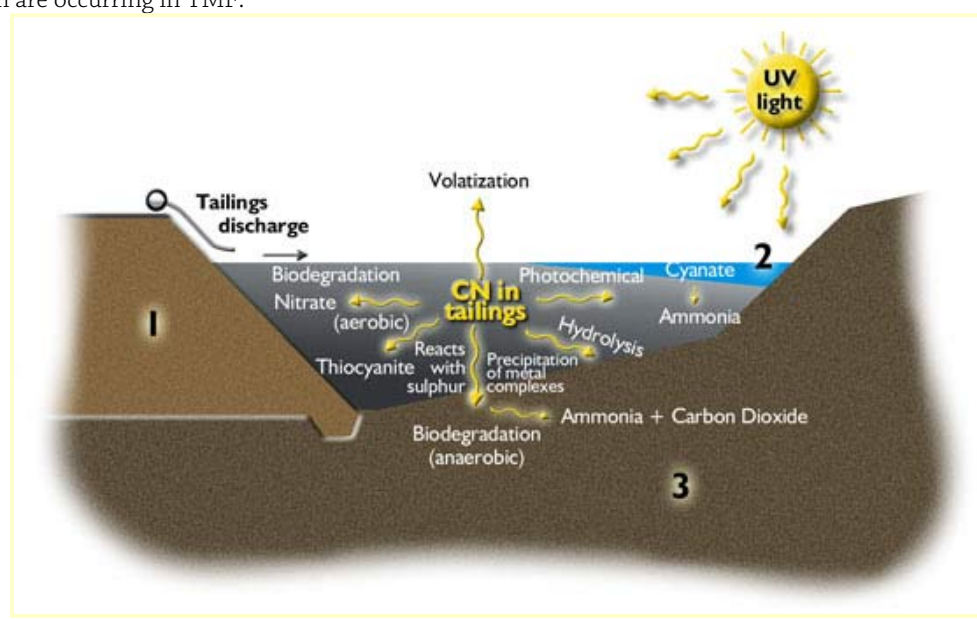
Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	160
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Zlatna, 02.08.2006
RMGC internal unique code	MMGA_0344
Proposal	What is the cyanide quantity that will enter in the TMF together with the tailings, if 0.8 kg of cyanide is consumed for processing for a ton of extracted ore?

The cyanide mass balance for the process is detailed in Chapter 2 Technological Processes, Section 4.1.3 *Industrial Wastewater treatment of the EIA (Report on the Environmental Assessment (EIA))*.

Based on the discharge rate and the concentration, it is estimated that the TMF will receive approximately 97 tones of total cyanide per year. Based on the volume of the pores in the tailings, almost one third of this quantity will be contained by the tailings, and 66 tones / year will be contained by the water in the tailings dam, which will be circulated back into the technological processes.

The main quantity of the cyanide will be recovered in the processing plant as shown in Figure 4.1.15 and described in Section 2.3.3, Chapter 4.1 *Water* of the EIA. Even so, there will be a residual quantity of cyanide. The treated tailings represent the only source of the Project to process residual water. The residual cyanide concentrations found in the treated tailings slurry will have to comply with the EU Directive for mine waste which stipulates a maximum value of 10 mg/L CN_{WAD} (weak acid dissociable). The cyanide will exist as potential pollutant of the surface waters on the plant site and only during the mining phase and for the first one or two years after closure. Modeling of the predicted concentrations in the TMF has shown that treated process plant tailings flow is expected to contain 2 to 7 mg/L total cyanide. Further degradation will reduce the concentrations to below applicable standards in surface water (0.1 mg/l) within 1-3 years of closure. A secondary effect of this treatment is also the reduction of many of the metals which may potentially occur in the process water stream. An assessment of the likely chemical makeup of the tailings leachate, based on testing, is summarized in Table 4.1-18 (Section 4.3.), Chapter 4.1 *Water*, of the EIA report. The below drawing is presenting the complexity of CN degradation processes which are occurring in TMF.

Solution



After discharge, the water is circulated back into the process; the decant water in the TMF during the entire period of storage, is subject to passive treatment processes, including natural degradation of the cyanide, hydrolyses, volatilization, photo-oxidation, bio-oxidation, mixing / separation, adsorption, dilution due to rainfalls etc.

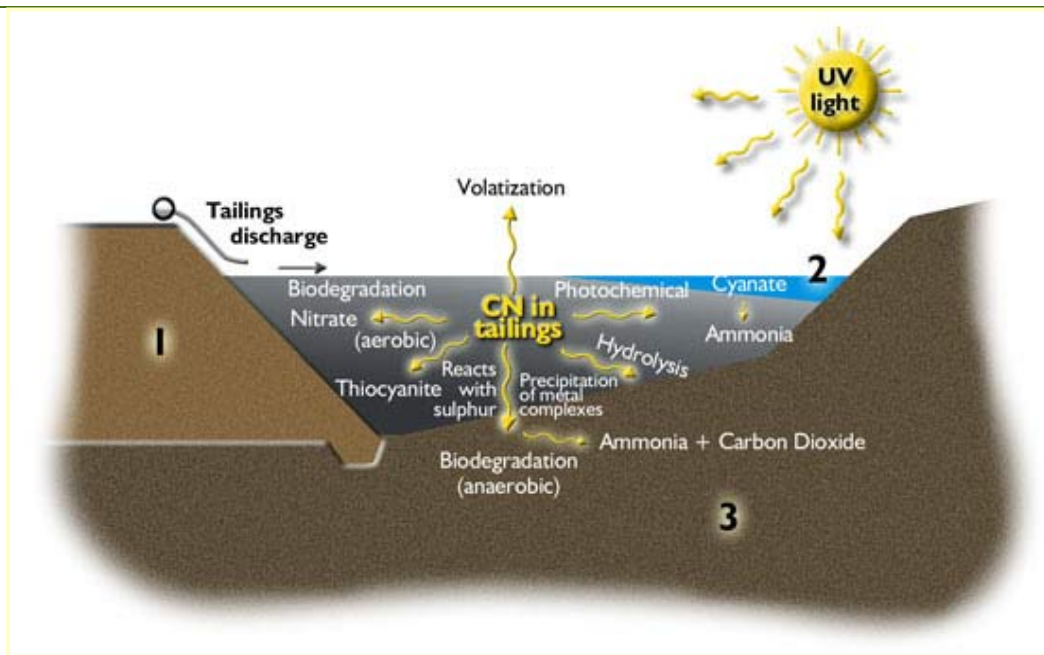
According to the data sourced during the operation of various mines, different cyanide reduction efficiencies are outlined (from 23-38% to 57-76% for total cyanides and from 21-42% to 71-80% for WAD), depending on the season (temperature).

An average 50% decrease of CN_t concentration was considered for the TMF during operations' phase. The Model compiled for the degradation process shows that the cyanide concentration is possible to decrease to even 0.1 mg CN_t/L during the first three years of closure.

The main part (90%) of the decomposed cyanide (average of 50%) is broken down by volatilization / hydrolysis, as cyanic acid. The mathematic modeling of the cyanic acid concentration in the TMF showed a maximum hourly concentration of 382 $\mu g/m^3$ in comparison to 5000 $\mu g/m^3$, the concentration allowed by the Order no. 462 of the Ministry of Environment and Waters' Management.

The cyanide used for the ore processing will be handled / stored in compliance with the EU standards and the provisions of the International Code for the Management of the Cyanide (ICMC-www.cyanidecode.org); it will be safely kept on the processing plant site in order to prevent any accidental spillage. The cyanide and its compounds will be subject to INCO detoxification procedure (DETOX) – this procedure is considered the Best Available Technique (BAT) as per BREF document; the process tailings will be discharged into the TMF in accordance with EU Directive 2006/21/CE on the management of mining waste.

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	173
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Brad, 04.08.2006
RMGC internal unique code	MMGA_0353
Proposal	<p>The questioner is not against mining projects that have as target mining industry, but he believes that cyanide is very dangerous and it shouldn't be used. The questioner is worried about the ecological section of the project, especially as far as Aries River is concerned. If cyanide is not safely collected, everything will be destroyed without doubt: fish, living creatures, air.</p>
Solution	<p>Roşia Montană Project will use cyanide, just as other 400 projects worldwide use it. The cyanide will be delivered to the site in solid form, within safe containers, and it will be turned into liquid only once it reaches the plant site. The cyanide leaving the plant site will have non-toxic concentrations of less than 10ppm, in compliance with the national and European legislation. Roşia Montană Gold Corporation is the first mining company in Europe to sign the International Code for the Management of Cyanide. Currently, the European Union has a legislation which covers the cyanide. From 1st of May 2006, the European Directive for the storage of mining waste came into force and it was transposed by the national legislation. The Roşia Montană Project will fully comply with the provisions of this Directive.</p> <p>The main quantity of the cyanide will be recovered in the processing plant as shown in Figure 4.1.15 and described in Section 2.3.3, Chapter 4.1 <i>Water</i> of the EIA (Report on the Environmental Assessment (EIA)) Even so, there will be a remaining quantity of cyanide. The treated tailings represent the only source of the Project to process residual water. The residual cyanide concentrations found in the treated tailings slurry will have to comply with the EU Directive for mine waste which stipulates a maximum value of 10 mg/L CN_{WAD} (weak acid dissociable). The cyanide will exist as a potential pollutant of the surface waters on the plant site and only during the mining phase and for the first one or two years after closure. Modeling of the predicted concentrations in the TMF has shown that treated process plant tailings flow is expected to contain 2 to 7 mg/L total cyanide.</p> <p>Further degradation will reduce the concentrations to below applicable standards in surface water (0.1 mg/l) within 1-3 years of closure. A secondary effect of this treatment is also the removal of many of the metals which may potentially occur in the process waste water stream. An assessment of the likely chemical makeup of the tailings leachate, conducted on testworks, is summarized in Table 4.1-18 (Section 4.3.), Chapter 4.1 <i>Water</i>, of the EIA. The drawing below presents the complexity of the degradation / decomposing processes which the CN goes through, once discharged into the TMF.</p>



After discharge, the water is circulated back into the process; the decant water in the TMF during the entire period of storage, is subject to passive treatment processes, including natural degradation of the cyanide, hydrolyses, volatilization, photo-oxidation, bio-oxidation, mixing / separation, adsorption, dilution due to rainfalls etc.

According to the data sourced during the operation of various mines, different cyanide reduction efficiencies are outlined (from 23-38% to 57-76% for total cyanides and from 21-42% to 71-80% for WAD), depending on the season (temperature).

An average of approx. 50% decrease of CN_t concentration was considered for the TMF during the operational phase. The Model compiled for the degradation process shows that the cyanide concentration may decrease to even 0.1 mg CN_t/L during the first three years of closure.

The main part (90%) of the decomposed cyanide (average of 50%) is broken down by volatilization / hydrolysis, as cyanic acid. The mathematic modeling of the cyanic acid concentration in the TMF showed a maximum hourly concentration of 382 $\mu g/m^3$ in comparison to 5,000 $\mu g/m^3$, the concentration allowed by the Order no. 462 of the Ministry of Environment and Waters' Management.

The cyanide used for the ore processing will be handled / stored in compliance with the EU standards and the provisions of the International Code for the Management of the Cyanide (www.cyanidecode.org); it will be safely kept on the processing plant site in order to prevent any accidental spillage. The cyanide and its compounds will be subject to INCO detoxification procedure (DETOX) – this procedure is considered the Best Available Technique (BAT) as per BREF document; the process tailings will be discharged into the TMF in accordance with EU Directive 2006/21/CE on the management of mining waste.

The EIA presents the mitigation measures to be applied so that the legal provisions for environmental protection are complied with in full. The main issues are related to the manufacturing, transportation and use of cyanide in accordance with the above mentioned Code, as well as the issues related to the use of the DETOX treatment facility within the processing plant site for reducing the cyanide concentration within the tailings to be discharged in the tailings dam; the scope of this facility is to reduce the concentration of the cyanide to a percentage lower than the one considered as being toxic for people and birds (less than 10 parts per million).

The tailings management facility (TMF) of the Roşia Montană Project complies, in full, with international standards, as well as with the recommendations quoted from the "Terms of Reference" document regarding the Best Available Techniques for tailings and waste rock management in mining activities

which ensure maximum mitigation of any potential impact generated by the tailings dam.

Therefore, the TMF will be built of rocks, will have a sealed core and is designed to cope with major earthquakes of 8 degrees on Richter scale, as well as to store 2 consecutive PMPs (probable maximum precipitations). Downstream of the main dam, there will be a secondary dam built to collect any seepage, water which will be pumped back into the tailings dam.

The strategy for seepage management, considered a potential contamination source, will include several items.

An engineered liner is included in the design of the Tailings Management Facility (TMF) basin to protect the groundwater. Specifically, the Roşia Montană Tailings Management Facility (TMF or “the facility”) has been designed to be compliant with the EU Groundwater Directive (80/68/EEC), transposed as Romanian GD 351/2005. The TMF is also designed for compliance with the EU Mine Waste Directive (2006/21/EC) as required by the Terms of Reference established by the MEWM in May 2005. The following paragraphs provide a discussion of how the facility is compliant with the directives.

The TMF is composed of a series of individual components including:

- the tailings impoundment;
- the tailings dam;
- the secondary seepage collection pond;
- the secondary containment dam, and
- the groundwater monitoring wells/extraction wells located downstream of the Secondary Containment dam.

All of these components are integral parts of the facility and necessary for the facility to perform as designed.

The directives indicated above require that the TMF design be protective of groundwater. For the Roşia Montană project (RMP), this requirement is addressed by consideration of the favorable geology (low permeability shales underlying the TMF impoundment, the TMF dam, and the Secondary Containment dam) and the proposed installation of a low-permeability (1×10^{-6} cm/sec) recompacted soil liner beneath the TMF basin. Please see Chapter 2 of EIA Plan F, “The Tailings Facility Management Plan” for more information.

The proposed low permeability soil liner will be fully compliant with Best Available Techniques (BAT) as defined by EU Directive 96/61 (IPPC) and EU Mine Waste Directive. Additional design features that are included in the design to be protective of groundwater include:

- A low permeability (1×10^{-6} cm/sec) cut off wall within the foundation of the starter dam to control seepage;
- A low permeability (1×10^{-6} cm/sec) core in the starter dam to control seepage;
- A seepage collection dam and pond below the toe of the tailings dam to collect and contain any seepage that does extend beyond the dam centerline;
- A series of monitoring wells, below the toe of the secondary containment dam, to monitor seepage and ensure compliance, before the waste facility limit.

In addition to the design components noted above specific operational requirements will be implemented to be protective of human health and the environment. In the extremely unlikely case that impacted water is detected in the monitoring wells below the secondary containment dam, they will be converted to pumping wells and will be used to extract the impacted water and pump it into the reclaim pond where it will be incorporated into the RMP processing plant water supply system, until compliance is reestablished.

The possibility for lateral seepage flowing around the secondary containment facilities was investigated as part of the design studies. The hydrogeologic studies in the Corna valley indicated that groundwater was flowing toward the valley bottom and that the final elevation of the tailings pond surface was less than the elevation of the existing groundwater levels. Therefore, it is considered that there will not be a gradient for groundwater to flow to the adjacent valleys. The groundwater elevations in the sides of the TMF basin

have been monitored over a five year period and only indicate small seasonal variations.

The EIA (Chapter 10 *Transboundary Impacts*) assesses the proposed project with regard to potential for significant river basin and transboundary impacts downstream which could, for example, affect the Mureş and Tisa river basins in Hungary. The Chapter concludes that under normal operating conditions, there would be no significant impact for downstream river basins/transboundary conditions.

The issue of a possible accidental large-scale release of tailings to the river system was recognized to be an important issue during the public meetings when stakeholders conveyed their concern in this regard. As a result, further work has been undertaken to provide additional detail to that provided in the EIA on impacts on water quality downstream of the project and into Hungary. This work includes modelling of water quality under a range of possible operational and accident scenarios and for various flow conditions.

The model used is the INCA model developed over the past 10 years to simulate both terrestrial and aquatic systems within the EUROLIMPACS EU research program (www.eurolimpacs.ucl.ac.uk). The model has been used to assess the impacts from future mining, and collection and treatment operations for pollution from past mining at Roşia Montană.

The modelling created for Roşia Montană simulates eight metals (cadmium, lead, zinc, mercury, arsenic, copper, chromium, manganese) as well as Cyanide, Nitrate, Ammonia and dissolved oxygen. The model has been applied to the upper catchments at Roşia Montană as well as the complete Abrud-Arieş-Mureş river system down to the Hungarian Border and on into the Tisa River. The model takes into account the dilution, mixing and physico-chemical processes affecting metals, ammonia and cyanide in the river system and gives estimates of concentrations at key locations along the river, including at the Hungarian Boarder and in the Tisa after the Mureş joins it.

Because of dilution and dispersion in the river system, and of the initial EU BAT-compliant technology adopted for the project (for example, the use of a cyanide destruct process for tailings effluent that reduces cyanide concentration in effluent stored in the TMF to below 6 mg/l), even a large scale unprogrammed release of tailings materials (for example, following failure of the dam) into the river system would not result in transboundary pollution. The model has shown that under worse case dam failure scenario all legal limits for cyanide and heavy metals concentrations would be met in the river water before it crosses into Hungary.

The INCA model has also been used to evaluate the beneficial impacts of the existing mine water collection and treatment and it has shown that substantial improvements in water quality are achieved along the river system under normal operational conditions.

For more information, an information sheet presenting the INCA modeling work is presented under the title of the Mureş River Modeling Program and the full modeling report is presented in **Annex 5.1**.

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	196
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Cluj Napoca, 07.08.2006
RMGC internal unique code	MMGA_0388
Proposal	<p>By using cyanides in order to extract the gold the air is going to be impacted due to the volatilization of cyanides, cyanhydric acids, which will destroy the plant life, the environment, life.</p>
Solution	<p>The cyanide is extremely toxic therefore its manufacturing, transport, handling and neutralization must be handled with care. However, the use of cyanide has a great advantage for the environment because it breaks down quickly (biodegradation under UV light) becoming inert under normal weather conditions, and the compounds resulting from the degradation, hydrolysis, adsorption processes taking place in the TMF are very stable (basically, these compounds become inert within the environment in the TMF once the process tailings are stored); there is no possibility of bio-accumulation of, i.e. mercury or heavy metals. This Project will implement the Best Available Techniques (BAT) for gold recovery and waste management (we refer here to waste resulting from mining and processing) and will comply with the European Directive for cyanide content mining waste.</p> <p>The cyanide used for the ore processing will be handled / stored in compliance with the EU standards and the provisions of the International Code for the Management of the Cyanide (ICMC-www.cyanidecode.org); it will be safely kept on the processing plant site in order to prevent any accidental spillage. The cyanide and its compounds will be subject to INCO detoxification procedure (DETOX) – this procedure is considered the Best Available Technique (BAT) as per BREF document [1]; the process tailings will be discharged into the TMF in accordance with EU Directive 2006/21/CE on the management of mining waste.</p> <p>The assessment of the HCN emissions is based on a Model summarized in Volume 12, Chapter 4.2 Air. AERMOD, Version 99351. -EPA, 2004. User's Guide for the AMS/EPA Regulatory Model – AERMOD. EPA-454/B-03-001, was used for modeling the dispersion of HCN. Please also see: http://www.epa.gov/scram001/dispersion_prefrec.htm#aermod. The concentrations estimate were much below the awareness limits stipulated by the standards for the air quality.</p> <p>The references for this Project include:</p> <ul style="list-style-type: none"> -CICERONE, R.J., and ZELLNER, R., 1983. <i>The atmospheric chemistry of hydrogen cyanide (HCN)</i>. <i>Journal of geophysics research</i>, Volume 88, issue no. C15, page. 10,689 to 10,696; -MUDDER, T.I., BOTZ, M.M., and SMITH A., 2001. <i>Chemistry and Treatment of Cyanidation Wastes</i>, The Second edition. <i>Mining Journal Books, Ltd.</i>, London, 373 p. <p>The Cyanide management Plan and the Air quality management Plan present clear solutions to prevent / reduce / remove the potential impact of the HCN emissions; starting from the results of the HCN dispersion model, we present here some of them:</p> <ul style="list-style-type: none"> - the sodium cyanide will be handled in liquid form only, as from the unloading from the supply trucks, up to the time it is discharged onto the TMF, within the tailings; the sodium cyanide is represented by alkaline solutions of high pH (over 10.5-11) of various sodium cyanide concentrations. The scope of the alkalinity of these solutions is to maintain the cyanide as cyan ions form (CN⁻) and to stop forming the hydrogen cyanide (HCN), phenomenon which occurs in environment of low pH only; - the volatilization of the cyanide off a solution can't happen as free cyanide, but HCN only; - the handling and storage of the cyanide solutions will only take place through closed systems; the only facilities/ areas where HCN could form and volatilize, with small emission ratios, are the leaching tank and the tailings thickener, as well as the tailings dam; - the HCN emissions from the surface of the above mentioned tanks and from the surface of the

tailings dam could occur due to the decrease of the pH within the superficial layers of the solutions (which encourages the occurrence of HCN) and due to the desorption (volatilization in the air) of this compound;

- the concentration of the cyanides within the handled solutions will decrease from 300 mg/L in the leaching tanks up to 7 mg/L (total cyanides) at the point of discharge into the tailings dam. The significant decrease of the cyanide concentration at the point of discharge into the tailings dam is supported by the detox system;
- the knowledge on the cyanide chemistry, as well as the experience from similar activities, have led us to the following possible HCN emissions in the air: 6 t/year from the leaching tanks, 13 t/year from the tailings thickeners and 30 t/year (22.4 t, and 17 mg/h/m², during hot season and 7.6 t, and 11.6 mg/h/m², during the cold season) from the surface of the tailings dam, meaning a daily average total HCN emission of 134.2 kg;
- once emitted, the hydrogen cyanide is subject to certain chemical reactions in low atmosphere, leading to ammonia;
- the mathematical modeling of the HCN concentrations in the ambient air (if the HCN is not subject to chemical reactions in the atmosphere) showed the highest concentrations at the level of the soil, within the industrial site, namely within the area of the TMF and near the processing plant – the maximum concentration being of 382 µg/m³ per hour;
- the highest concentrations of HCN in the ambient air will be of 2.6 times less than the value imposed for the safety of the workers, as stipulated by the national legislation;
- the concentrations of HCN in the ambient air in the inhabited areas near the industrial site will be of 4 – 80 µg/m³, over 250 – 12.5 less than the safety value as stipulated by the national legislation (the national legislation and the EU legislation for the air quality don't stipulate any limit values for the protection of population's health);
- the advance of the HCN in the atmosphere involves an insignificant compound of reactions in liquid phase (the water vapors in the atmosphere and the rain drops) because, at partial low pressure, specific to gases in free air, the HCN is very weakly soluble in water, and the rain will not effectively reduce the concentrations from the air (MUDDER, et al., 2001, CICERONE and ZELLNER, 1983);
- the chance for the value of the HCN concentrations in precipitations within or outside the area of the Project to be significantly higher than the basic values (of 0.2 ppb) is extremely low.

For further details regarding the Use of cyanide in technological processes, the Balance of the cyanides, as well as the Emissions and the impact of the cyanide against the quality of the air, please see the EIA Report, Chapter 2, Chapter 4.1 and Chapter 4.2 (Section 4.2.3).

References:

[1] Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities. EUROPEAN COMMISSION, DIRECTORATE-GENERAL JRC JOINT RESEARCH CENTRE, Institute for Prospective Technological Studies, Technologies for Sustainable Development, European IPPC Bureau, Final Report, July 2004 (<http://eippcb.jrc.es/pages/FActivities.htm>).

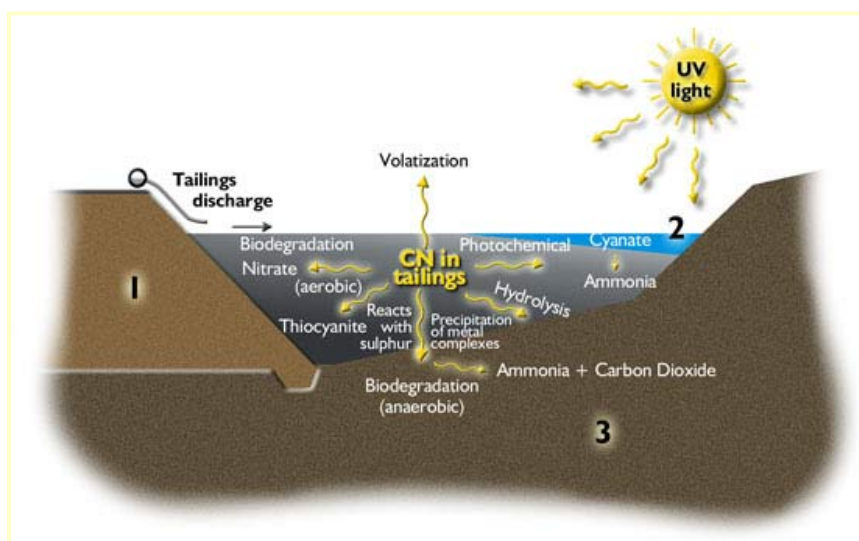
Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	202
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Cluj Napoca, 07.08.2006
RMGC internal unique code	MMGA_0402
Proposal	If in order to process the mined ore 1kg of cyanide is used, what quantity of cyanide is going to enter in the decant pond together with the tailings?

The cyanide mass balance for the process is detailed in Chapter 2 Technological Processes, Section 4.1.3 *Industrial Wastewater treatment of the EIA (Report on the Environmental Assessment .(EIA))*

Based on the discharge rate and the concentration, it is estimated that the TMF will receive approximately 97 tones of total cyanide per year. Based on the volume of the pores in the tailings, almost one third of this quantity will be contained by the tailings, and 66 tones/year will be contained by the water in the tailings dam, which will be circulated back into the technological processes.

The main quantity of the cyanide will be recovered in the processing plant as shown in Figure 4.1.15 and described in Section 2.3.3, Chapter 4.1 Water of the EIA Report. Even though, there will be a remaining quantity of cyanide. The treated tailings represent the only source of the Project for process residual water. The residual cyanide concentrations found in the treated tailings slurry will have to comply with the EU Directive for mine waste which stipulates a maximum value of 10 mg/L CN_{WAD} (weak acid dissociable). The cyanide will exist as potential pollutant of the surface waters on the plant site and only during the mining phase and for the first one or two years after closure. Modeling of the predicted concentrations in the TMF has shown that treated process plant tailings flow is expected to contain 2 to 7 mg/L total cyanide.

Further degradation will reduce the concentrations to below applicable standards in surface water (0.1 mg/l) within 1-3 years of closure. A secondary effect of this treatment is also the reduction of many of the metals which may potentially occur in the process water stream. An assessment of the likely chemical makeup of the tailings leachate, based on testing, is summarized in Table 4.1-18 (Section 4.3.), Chapter 4.1 Water, of the EIA report. The below drawing is presenting the complexity of CN degradation processes which are occurring in TMF.



After discharge, the water is circulated back into the process; the decant water in the TMF during the entire period of storage, is subject to passive treatment processes, including natural degradation of the cyanide, hydrolyses, volatilization, photo-oxidation, bio-oxidation, mixing / separation, adsorption, dilution due to rainfalls etc.

According to the data sourced during the operation of various mines, different cyanide reduction efficiencies are outlined (from 23-38% to 57-76% for total cyanides and from 21-42% to 71-80% for WAD), depending on the season (temperature).

An average 50% decrease of CN_t concentration was considered for the TMF during operations' phase. The Model compiled for the degradation process shows that the cyanide concentration is possible to decrease to even 0.1 mg CN_t/L during the first three years of closure.

The main part (90%) of the decomposed cyanide (average of 50%) is broken down by volatilization / hydrolysis, as cyanic acid. The mathematic modeling of the cyanic acid concentration in the TMF showed a maximum hourly concentration of 382 $\mu g/m^3$ in comparison to 5,000 $\mu g/m^3$, the concentration allowed by the Order no. 462 of the Ministry of Environment and Waters' Management.

The cyanide used for the ore processing will be handled / stored in compliance with the EU standards and the provisions of the International Code for the Management of the Cyanide (ICMC-www.cyanidecode.org); it will be safely kept on the processing plant site in order to prevent any accidental spillage. The cyanide and its compounds will be subject to INCO detoxification procedure (DETOX) – this procedure is considered the Best Available Technique (BAT) as per BREF document; the process tailings will be discharged into the TMF in accordance with EU Directive 2006/21/CE on the management of mining waste.

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	202
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Cluj Napoca, 07.08.2006
RMGC internal unique code	MMGA_0408
Proposal	How is the cyanide from the tailings facility neutralized?
Solution	<p>It should be noted that a large proportion of the cyanide used for the ore processing is recycled; this represents a preferred alternative which helps reducing the operation costs. There will be only the un-recycled cyanide put through the INCO detoxification process. A residual quantity of cyanide will remain in the tailings.</p> <p>The tailings stored in the TMF will contain 5-7 ppm WAD cyanide concentration, below the standard imposed by the recently approved EU Directive for mining waste which is 10 ppm WAD cyanide. The tailings stored in the TMF are subject to a series of chemical reactions which, in time, lead to changes of the cyanide concentration in the TMF (neutralization). The following paragraph explains these claims.</p> <p>Sometimes, the terms used must be defined in order to avoid any confusion. Most of the substances can be solid, liquid or gas, in accordance to the chemical conditions they are subject to. The cyan ion can be found in a solution of alkaline pH; the cyanide makes hydrogen cyanide (HCN) within a weak alkaline solution (of pH less than 8) which has a limited solubility in water (the cyanide turns into gas, and HCN volatilizes). There are, also, cyanide complexes, such as copper cyanide, zinc cyanide etc which can be found in the solution. The solid cyanide used in mining industry is usually sodium or potassium cyanide. The solid cyanide is dissolved and then put into the leaching tanks, in accordance with the requirements. There is always the possibility that a small percentage of solid cyanide would not be dissolved, but this percentage is always reduced to minimum, due to the obvious costs of operations.</p> <p>The main discussions on tailings and cyanide refer to the cyanide in solution, and the discussions involving the environment refer to free cyanide and WAD cyanide. The free cyanide is the cyanide ion (CN⁻) and hydrogen cyanide (HCN), while WAD cyanide refers to the cyanide which is easily releasable from complexes-cyanic when the pH is low, meaning any free cyanide already existing and released from the cyanide complexes of nickel, zinc, copper and cadmium (less the complexes made up with steel or cobalt). The tailings will comprise WAD cyanide of 5 to 7 ppm, according to the tests conducted by the design team. This cyanide will be subject to certain natural decomposing mechanisms, i.e. certain bacteria can metabolize the cyanide, turning it into nitrates. Also, there are other mechanisms such as hydrolysis, precipitation, adsorption and forming and dissociation of the complexes. After discharge in the tailings dam, the water content solutions will go through three different processes:</p> <ol style="list-style-type: none"> 1 The main part of the water and tailings resulting from the technological process and discharged into the tailings dam, containing cyanide of the above mentioned concentration, will be recirculated and reused in the processing plant; 2 Part of it will evaporate depending on the pH level and the geometry of the tailings dam. The evaporation increases during summer. The quantity of cyanide evaporated varies in accordance with the above mentioned variables; 3 A percentage of up to 40% will be retained at first, due to being attached to solid particles. Once the tailings are buried, a neutralizing environment occurs, and a series of decomposing mechanisms will decompose the cyanide over time. <p>Seepage from the tailings dam will be captured completely by the secondary containment dam, located downstream the tailings dam, and will be pumped back to the tailings dam, so that no water with cyanide content will reach the water system.</p>

The TMF was designed on the basis of 4 extremely important elements, including the protection parameters of the groundwater. These are: a starter dam of low permeability, a colluvium like layer of low permeability in the tailings dam pond, a secondary containment system and collection basin and a final treatment system for any water seepage.

1. The treated tailings discharged in the tailings dams must have a content of maximum 10 mg CN_{ue}/L, as per the European Directive 2006/21/EC passed in 2006 for the management of the waste in mining industry for new mines.

The INCO process proposed by Roşia Montană Project for oxidizing the cyanides in the tailings resulting from ore processing will ensure, based on the facts presented and checked by other mines in Europe and worldwide which apply this procedure, that the WAD cyanide concentration will be below the one imposed by the Directive (5 to 7 mg/L CN_{ue}, and 10 to 12 mg/l CN_t).

The research and the findings from other operational mines were reviewed and used to compile models of the processes which take place in time under the influence of the environment elements within the tailings dam where the tailings are discharged.

After discharge, the water is circulated back into the process; the decant water in the TMF during the entire period of storage is subject to passive treatment processes, including natural degradation of the cyanide, hydrolyses, volatilization, photo-oxidation, bio-oxidation, mixing / separation, adsorption, dilution due to rainfalls etc.

According to the data sourced during the operation of various mines, different cyanide reduction efficiencies are outlined (from 23 to 38% to 57 to 76% for total cyanides and from 21 to 42% to 71 to 80% for WAD), depending on the season (temperature).

An average of approx. 50% decrease of CN_t concentration was considered for the TMF during the operational phase. The Model compiled for the degradation process shows that the cyanide concentration may decrease to 0.1 mg CN_t/L during the first three years of closure.

The main part (90%) of the decomposed cyanide (average of 50%) is broken down by volatilization / hydrolysis, as cyanic acid. The mathematic modeling of the cyanic acid concentration in the TMF showed a maximum hourly concentration of 382 µg/m³ in comparison to 5,000 µg/m³, the concentration allowed by the Order no. 462 of the Ministry of Environment and Waters' Management.

2. The water in the tailings dam is not released in the environment during the operational phase, under normal operation conditions (the decant water is circulated back in the process, and the seepage is retained in the secondary dam).

There are 3 situations in which there could be an environmental impact:

- Operation run under abnormal conditions, when the storage capacity of the tailings dam is exceeded (the TMF is designed for two consecutive PMPs occurring in 24 hours), if the natural dilution doesn't assure the concentration imposed by NTPA 001 (0.1 mg CN_t/L);
- At closure, when the water in the tailings dam will be used for flooding rehabilitation of Cetate pit, if the quality conditions are not met (0.1 mg CN_t/L);
- Seepage from the tailings dam.

The first two situations are to be avoided by the construction of the wastewater treatment plant for low cyanide concentrations, available throughout the entire period of operation.

As shown, the seepage from the tailings dam will be monitored and circulated back in the tailings dam throughout the entire period of the operation, with no discharge in the environment. During the last three years of operation before closure, there will be tests run for passive treatment processes in lagoons, which according to the results (meeting the imposed condition of 0.1 mg CN_t/L), will remain operational during closure and post-closure phase.

Thus, we believe that the Project addresses all the issues related to cyanide destruction in the tailings dam water.

Domain		TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code		202
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code		Cluj Napoca, 07.08.2006
RMGC internal unique code		MMGA_0411
Proposal	What type of explosive will be used for ore extraction?	
Solution	The used explosive is of ANFO type (mixture of ammonium nitrate and gas), and for detonation of the basic explosive Booster initiation charges will be used. The priming will be of sequential type and non-electric detonators of NONEL type and detonating cord will be used.	

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	203
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Cluj Napoca, 07.08.2006
RMGC internal unique code	MMGA_0414
Proposal	Which is the experience of RMGC in such operations, activities of this type, what technical warranties can it provide?
	The Roşia Montană mine project has been elaborated by a team of Romanian and foreign specialists with a recognized experience at national and international level. The managing team who coordinates the designing and development has an experience of over 40 years in the development of similar projects with same extraction, processing, closure technologies as well as ecological improvement of mining perimeter.
Solution	<p>Also, the consulting companies involved into the designing of the Roşia Montană project are international companies with a wide experience in the mining field and which have implemented mining projects all over the world.</p> <p>The project was conceived to comply with the best available techniques (BAT), and this can be checked by consulting the BREF document for mining industry prepared by IPPC Office from Seville in June 2004, and published on: www.eippcb.jrc.es/pages/FActivities.htm</p>

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	221
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Cluj Napoca, 07.08.2006
RMGC internal unique code	MMGA_0451
Proposal	<p>With regard to blasting procedures, the company claims that mining panels are going to be blasted and for every mining panel a quantity of 1296 kg AM1 is going to be used. Within EIA is stated that between 28 and 32 mining panels are going to be blasted, but not more than 10 tons of explosive. The questioner believes that the information is not correct because, at a simple calculation one could see that if 28 mining panels are being blasted, the quantity of explosive is much larger. The company informs that blasting procedures will be developed twice maximum three times a week, and that proves that at Rosia Montana one cannot speak of a protection area.</p>
Solution	<p>The questioner equals the number of blasting stages with the number of panels, which is a mistake, because one stage will blast 4 panels.</p> <p>The Chapter 2 of the EIA report – Technological processes, page 60 - describes the blasting stages, as follows: “a blasting stage will detonate up to 1,296 kg of AMFO, resulting in a mining mass of 8,000 – 10,000 t” which represents 4 panels (1 panel = 2430 t of blasted mining mass as per page 59 of the same Chapter). Therefore, the calculation is correct because 28-32 panels represent 7-8 blasting stages which multiplied by 1,296 kg of ANFO (maximum) result in approximately 10,000 kg of ANFO, namely 10 tons of explosive.</p> <p>In the spring of 2006, taking advantage of the opportunity offered by the existing mining unit (a massive blasting using 3,000 kg of explosive), RMGC has installed sensors on the monument houses from the protected area and outside this area in order to determine the ground stability and monitor the discomfort generated by the blasting activities. No impact from the propagated vibration or noise level point of view has been highlighted. Technical University of Constructions in Bucharest and SC Ipromin SA have undertaken a scientific explanation of these aspects in two studies of substantiation of the security area between the industrial and protected areas. These studies were required for the urbanism documentations and establishment of the future functionalities.</p> <p>Due to the successive operation of the open pits, 2 maximum 3 weekly blastings will be carried out within one open pit.</p>

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	229
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Cluj Napoca, 07.08.2006
RMGC internal unique code	MMGA_0460
Proposal	Which are the concrete measures through which the company analyzes the conditions generating the Baia Mare accident and the measures through which the company specifically, taking into account these conditions, tries to prevent from the occurrence of a similar accident in Rosia Montana area?
Solution	<p>From the design phase, the Roşia Montană Project considered compliance with the best available techniques (BAT) – please see BREF document, national legislation and the European Directive. Also, the Roşia Montană Project was made to comply with the new Directive for the storage of mining waste (Mine Waste Directive, 1st April 2006). Also, RMGC (Roşia Montană Gold Corporation (RMGC)) is the first European mining company to sign the International Code for the Management of Cyanide – please see www.cyanidecode.org.</p> <p>All these regulations mentioned above were issued for European and international level following the accidents that occurred in mining industry at the end of '90s or right after 2000, including the accident from Baia Mare, in order to agree the environment and risks management in mining industry. For further details, please see the comparison Table made for Roşia Montană and Baia Mare Projects, on the basis of the design criteria up to the measures to prevent / remove any potential impact. Please see Annex 3.1 of the hereby Report which can be visited online on the internet page www.rmgc.ro.</p>

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	232
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Cluj Napoca, 07.08.2006
RMGC internal unique code	MMGA_0469
Proposal	<p>The questioner wants to know how the pits are going to evolve because EIA doesn't provide this information. The impact study doesn't present certain baseline documents, it doesn't provide cross-sections of the pits, of the decant pond, the areas' faults cannot be identified, which are the fracturing areas, the major tension status cannot be noticed, nothing can be seen concerning a micro tectonic study. The voids cannot be seen, so transversal and longitudinal cross – sections at reasonable distance are missing, at least at 25m if not at 10m, because this is how pit's benches will be developed. There isn't any gradient presented for the aquifer in the decant pond area.</p>
Solution	<p>In Chapter 2 – technological processes – the evolution of the open pits is presented yearly both from waste quantity point of view (Table 2-12, p. 58) and ore quantity which is to be processed (Table 2-16, p. 64). The evolution of the open pits is also presented in the General layout – the end of the years 0, 7, 16 and 19 and in the annexes 2.3 through 2.7 in technological processes. The geological cross-sections through open pits are presented in Chapter 4.5 – Geology – in pages 11-13, fig. 2.1 – Geological schematic cross-section through Carnic and Cetate areas, fig. 2.2 - Geological schematic cross-section through Orlea area, fig. 2.3 - Geological schematic cross-section through Jig and Carnic areas.</p> <p>For tailings management facility, cross-sections are presented in the Technological processes Annexes: Drawing 2.19 – Tailings management facility scheme and Drawing 2.20 – Cross-sections trough the tailings management facility dam and secondary retention dam. In the Tailings management facility plan, fig. 5.2 the Geological profile along the tailings management facility dam is presented. The drawings 03A, 03B, 07A, 07B and 09 present cross-sections through the main and secondary tailings management facilities as well as data from the geological study described in Section 2.3 (p.28) from the same plan.</p> <p>All these plans and cross-sections present the faults, geological structure and geotechnical foundation conditions requested by the above question. The iso-lines of the groundwater layers are presented in fig.4.1 in the Baseline hydro-geological report (Vol.2).</p> <p>The geological cross-sections through the open pit benches are performed in a grid of 10 x 10 m, but these are not the object of the EIA report, being presented in the “Calculation documentation for the Roşia Montană objective resources” which is in course of approval by National Agency for Mineral Resources.</p> <p><i>We mention that these data are classified according to the Professional Secret Law and are not public data.</i></p>

Domain

TECHNOLOGICAL PROCESSES

MMDD's item no. for the question which includes the observation identified by the RMGC internal code

265

MMDD's identification no. for the question which includes the observation identified by the RMGC internal code

Cluj Napoca, 07.08.2006

RMGC internal unique code

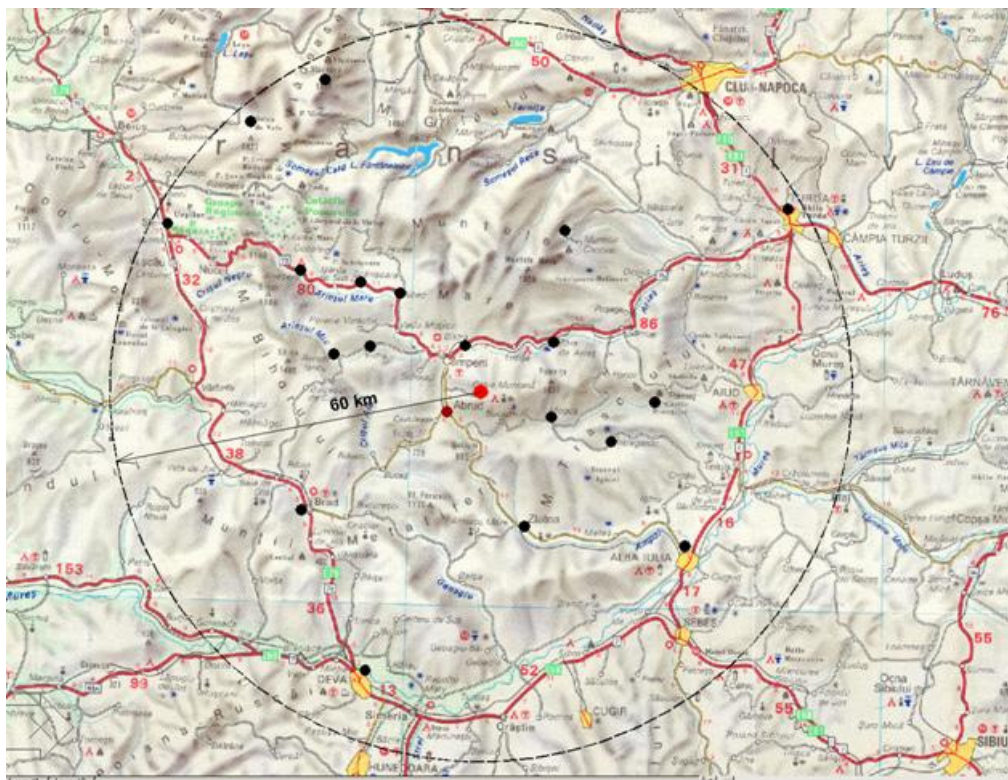
MMGA_0556

Proposal

In reference to the TMF, the questioner points out the fact that according to the EIA, this can allow two maximum precipitation events, but asks for further explanations on this issue, i.e. maximum refers to the upper limit- so why twice more?

The company carried out a complex meteorological study using the data collected from 20 meteorological stations situated at distances of 6 – 57 km from Roşia Montană. These stations record data for different intervals, starting with 1895 and statistic analyses have been performed, separately for winter and summer seasons. The Corna tailings management facility has been designed to retain in totality (without overflowing occurrence) the water drained from two consecutive PMPs, each having 24-hours duration (450 mm/24h + 450 mm/24h). As per the estimates in the specialty studies ordered by RMGC, the PMP (probable maximum precipitation) represents the highest water volume collected in 24h / m² as a result of extreme precipitation with a recurrence probability of 1/10,000 years. The design criteria for the tailings management facility have included 2 PMPs, a theoretic hypothesis possible once at 100 million years (fig. 4.1.8., p.18, Chapter 4.1. Water from the report on EIA study)

Solution



Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	277
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Cluj Napoca, 07.08.2006
RMGC internal unique code	MMGA_0590
Proposal	<p>The questioner wants to know what the level of the pH in the TMF is because if it drops below 7 it generates hydrocyanic acid. What are the risks for the pH to reach this value? What measures can be taken in this respect? What device will be used to monitor the pH level? How close are the pH meters installed from one another, how deep are they installed as the difference may occur on the height?</p>
	<p>Water from the process plant site will be released at a safe PH level of approximately 9, and cyanide levels will be below the 10ppm required by the EU and considered safe for the environment.</p> <p>The safe PH level will be achieved through use of EU-directed best available techniques (BAT) methods in the INCO-SO2 method.</p> <p>Detoxification of cyanide to levels of cyanide to less than 10ppm meet the standards stipulated in the EU mine waste directive (2006/21/EC). Upon deposition in the tailings dam, levels of cyanide will further break down – specifically upon exposure to ultra-violet light as well as through dilution due to rainfall. The amount of WAD (weak acid dissolvable cyanide) cyanide will be at an even lower level of concentration. This level is not considered to be in danger of generating hydro-cyanic acid within water at a PH of approximately 9. These practices and guidelines meet all EU and international best practice codes and guidelines.</p> <p>All cyanide will be used within a closed environment and subject to the Romanian water discharge standards (TN-001), and the EU Directive on mine waste 2006/21/EC.</p>
Solution	<p>These directives and guidelines meet or exceed international codes to which the company has also committed for the use, handling, transport and discharge of cyanide (e.g. International Cyanide Management Code as endorsed by the UN). In addition, the handling, storage and use of cyanide will be subject to the EU CEFIC (Cyanide Sector Group) guidelines on the use, transport and handling of cyanide. The PH of water will be monitored upon discharge into the Tailings Management Facility (TMF) as well as weekly PH measurements around the TMF and in all monitoring wells situated adjacent to and below the TMF. The tailings pond and tailings dam have been designed to the highest standards to prevent pollution of groundwater, and to continually monitor the groundwater and extract any pollution detected – a system verified by hydro-geologic studies. Specifically, the design features include an engineered clay liner system within the TMF basin to meet a permeability specification of 1×10^{-6} cm/sec, a cut-off wall within the foundation of the starter dam to control seepage, a low permeability core for the starter dam to control seepage, and a seepage collection dam and pond below the toe of the tailings dam to collect and contain any seepage that does extend beyond the dam centerline. A series of monitoring/extraction wells below the toe of the secondary containment dam will monitor groundwater quality and extract any contamination.</p> <p>The design of the TMF dam incorporates all International, EU and Romanian design criteria. PH meters are used to collect and measure these data.</p>

Domain	TECHNOLOGICAL PROCESSES
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MMDD's item no. for the question which includes the observation identified by the RMGC internal code	286
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MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Turda, 09.08.2006
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RMGC internal unique code	MMGA_0615
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Proposal	The questioner wants to know whether there are any mining methods that are less dangerous than those proposed by RMGC.
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The mining methods proposed by Roşia Montană Gold Corporation are classical methods for ore extraction in open pits, which consist in blasting, loading and transport to the primary crusher. All these operations will be carried out with the strict observance of the occupational safety norms. An alternative to this method is the underground mining, which is much more dangerous than the open pit mining, considering that there at any time, there's the risk of stopes to collapse and capture miners and equipments in underground, or the risk of damages to the ventilation system with baneful consequences over the miners' security. Other consequence of the underground mining is the possible falling of some surface areas due to the mining voids.

Also, the underground mining is carried out with high costs and with an irrational mining of the ore resources which remain blocked in the protection pillars necessary to support the working faces.

Solution	As a conclusion, the mining method proposed by RMGC, respectively in open pits, is the safest mining method used all over the world.
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Both the gold and silver recovery technology by cyanidation through CIL procedure and the utilization of the detoxification circuit of the cyanide based on SO₂ / air method are considered BAT being used all over the world. The cyanide content in the tailings management facility will be below the minimum content stipulated by the existing European regulations.

In Chapter 5 – Alternatives of the EIA report, the alternative solutions regarding the mining and processing of the Rosia Montana ore have been presented in detail. The proposed technologies have been selected (with explications) as a result of a multi-criteria analysis. The analyzed criteria are as follows: ore deposit conditions, risks associated with each technology, operation costs, etc.

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	315
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Turda, 09.08.2006
RMGC internal unique code	MMGA_0656
Proposal	<p>In what other countries or continents has RMGC mined gold and silver? What technology did it use and how was the private properties issue settled? What were the impacts on the environment? And do they plan to use these technologies in Rosia Montana as well?</p>
	<p>RMGC has never mined any gold-silver ore deposits. The company was established in order to develop the Roşia Montană deposit, but the company's management and experts who are developing Roşia Montană Project have worked in North and South America, Europe, Australia, Asia and Africa.</p> <p>Moreover, the consultants involved in the design of Roşia Montană mine are international companies with an extensive experience in mining field. They have developed mining operations throughout the world.</p>
Solution	<p>The technology proposed at Roşia Montană is a widely used technology in over 400 similar mining operations from the entire world and at least in 6 similar mining operations from Europe: Spain, Sweden, Finland, Italy, Turkey and Bulgaria.</p> <p>The issue of acquiring properties has been differently discussed considering specific applicable legislation of each state and has been developed in full compliance with relevant World Bank provisions.</p> <p>The environmental impact, being a local impact, is extremely mitigated due to the fact that a progressive ecologic reconstruction will be implemented, as proposed for Roşia Montană case.</p>

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	331
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Baia de Aries, 15.08.2006
RMGC internal unique code	MMGA_0682
Proposal	<p>The questioner asks the following question: An industrial road is planned to be built on the Rosia Valley. The experience from the Apuseni Mountains proved that a public road can be used also as industrial road, then why can't the old road on Corna valley be used up to the mine's mouth, crossing the dam at the mine's mouth and then further on to the processing plant? They would save money this way, moreover, the road following the Gura Minei-Arpabus railroad is quite dangerous during the winter season.</p>
Solution	<p>It is true that many industrial roads from Apuseni Mountains are used as public roads; the local mining companies want to have a better access to their facilities. These companies allowed public access on their industrial roads where public safety wasn't threatened and the road traffic was safe.</p> <p>With respect to the access road to the proposed processing plant, two options are considered: (i) Rehabilitation of County Road DJ 742, including those two bridges that will allow both industrial and public traffic and (ii) construction of a road on the southern side of the valley, following the narrow gauge rail way Gura Minei – Aprabus Crusher. This road will ensure fluidization of traffic but may be hazardous during winter. In case the existing road is used, the access to the plant will be made over a bridge crossing Roşia Valley. It is unlikely to consider the option of crossing the valley over the dam. The dam construction until its operational phase as an access road would imply a long period of time and that it is why this cannot be an option. The two options will be considered by relevant authorities and they will decide which the optimum one is.</p>

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	336
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Baia de Aries, 15.08.2006
RMGC internal unique code	MMGA_0683
Proposal	<p>The questioner makes the following comments and observations: The quantities of cyanide used at the Baia de Aries mine operation were much lower than the ones to be used in Rosia Montana. The effects of the small quantities of cyanide used at Baia de Aries are visible down the Aries valley into the Mures River, etc.</p>
Solution	<p>Cyanide has been used to process ores at Baia de Arieş, but with no detoxification of tailings before their discharge in the Tailings Management Facility (TMF). Rarely, a chlorination of water discharged from the TMF has been performed when cyanide concentrations exceeded the standard limits. In 2005 Baia de Arieş mining operation was closed and the employees were laid off without implementing a Closure and Rehabilitation Plan. However, there haven't been notified any aspects that would not be compliant with the law or which might have generated a significant impact on the ecosystem of Arieş River or on the downstream watershed. The impact on Arieş River watershed consists in an elevated load of heavy metals in the water, due to previous mining activities, but according to the official reports of National Administration of Romanian Waters – Mureş Water Directorate cyanide is not indicated as a pollutant.</p> <p>Cyanide will be used at Roşia Montană only in an enclosed system, within the plant site, any accidental discharges will be collected and reused in the process, and there is no possibility to have elevated concentrations of cyanide outside of this site, in used waters or in tailings that are discharged in the TMF. The tailings will be detoxified before leaving the plant site until they reach concentrations as low as 10ppm; this proposed technology of detoxification is considered as being BAT (Best Available Technique), which was selected after conducting detoxification tests that have considered the conditions of the ore deposit and site; also, full compliance with Romanian legislation with EU Mine Waste Directive (2006/21/EC), as well as with international guidelines and codes (Cyanide Management Code) has been aimed.</p> <p>Cyanide concentrations will be monitored online, during the development of each process stage, and after tailings are discharged in the TMF, a monitoring system through boreholes that will be located downstream of the TMF was conceived in order to emphasize full compliance with the law. When the sensors of the monitoring system have detected that the maximum admitted concentration has been exceeded, the processing system will be stopped until the problem is solved.</p>

Domain	TECHNOLOGICAL PROCESSES
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MMDD's item no. for the question which includes the observation identified by the RMGC internal code	338
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MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Lupsa, 16.08.2006
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RMGC internal unique code	MMGA_0693
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Proposal	Is cyanide used for mining operations in countries like Canada, the USA Australia and in other developed countries?
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Solution	Cyanide is used to process gold and silver ores on large scale not only in Canada, Australia and USA, but also in Europe: in Spain, Italy, Sweden, Finland, and Turkey, where gold mines exist. Cyanide is the most efficient method of extracting gold from low-grade ores. In Australia, cyanide is used by most of the mines to process ores, and the entire quantity of cyanide produced in Australia is used in mining industry. Currently, more than 400 mines are in their operational stage at global level and they are all using cyanide to recover gold.
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Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	338
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Lupsa, 16.08.2006
RMGC internal unique code	MMGA_0699
Proposal	<p>How long (how many years) does it take for the cyanide used in the mining activities to neutralize, to lose its harmful effect?</p> <p>The cyanide concentrations to reach the TMF, will be neutralised in 1 to 3 years. The process to neutralise and minimise the concentrations of cyanide to levels lower than those found in cigarette smoke is an ongoing process. The cyanide concentrations must comply with the standards imposed by the European Union; they are 5 times less than in Canada, USA, Australia. The same technological processes are used in over 400 mine worldwide.</p> <p>Modeling of the predicted concentrations in the TMF has shown that treated process plant tailings flow is expected to contain 2 to 7 mg/L total cyanide. Further degradation will reduce the concentrations to below applicable standards in surface water (0.1 mg/l) within <i>1-3 years of closure</i>. A secondary effect of this treatment is also the reduction of many of the metals which may potentially occur in the process water stream. An assessment of the likely chemical makeup of the tailings leachate, based on testing, is summarized in Table 4.1-18 (Section 4.3.), Chapter 4.1 Water, of the EIA report.</p> <p>The mining activity is a dynamic process where the cyanide is added, used and recycled within the process; the concentration of the cyanide is reduced to under 10ppm by using a Detox plant. As soon as the tailings are discharged onto the tailings dam, the CN becomes subject to certain complex degradation processes. There must be emphasised that the cyanide used for the ore processing is recycled, such supporting the decrease of the operational costs. Only the un-recycled cyanide is put through the INCO technological process for neutralization. A residual quantity of cyanide remains in the tailings; these will be buried once other tailings are stored on top of them.</p>
Solution	<p>The tailings stored in the TMF will contain 5 to 7 ppm WAD cyanide concentration, below the standard imposed by the recently approved EU Directive for mining waste which is 10 ppm WAD cyanide. The tailings stored in the TMF are subject to a series of chemical reactions which, in time, lead to changes of the cyanide concentration in the TMF (neutralization). The following paragraph explains these claims.</p> <p>Sometimes, the terms used must be defined in order to avoid any confusion. Most of the substances can be solid, liquid or gas, in accordance to the chemical conditions they are subject to. The cyan ion can be found in a solution of alkaline pH; the cyanide makes hydrogen cyanide (HCN) within a weak alkaline solution (of pH under 8) which has a limited solubility in water (the cyanide turns in gas, and HCN volatilizes). There are, also, cyanide complexes, such as copper cyanide, zinc cyanide etc which can be found in the solution. The solid cyanide used in mining industry is usually sodium or potassium cyanide. The solid cyanide is dissolved and then put into the leaching tanks, in accordance with the requirements. There is always the possibility that a small percentage of solid cyanide might not be dissolved, but this percentage is always reduced to minimum, due to the obvious costs of operations.</p> <p>The main discussions on tailings and cyanide refer to the cyanide in solution, and the discussion involving the environment refer to free cyanide and WAD cyanide. The free cyanide is the cyanide ion (CN⁻) and hydrogen cyanide (HCN), while WAD cyanide refers to the cyanide which is easy releasable from complexes-cyanic when the pH is low, meaning any free cyanide already existing and released from the cyanide complexes of nickel, zinc, copper and cadmium (less the complexes made up with steel or cobalt). The tailings will comprise WAD cyanide of 5 to 7 ppm, according to the tests conducted by the design team. This cyanide will be subject to certain natural decomposing mechanisms, i.e. certain bacteria can metabolize the cyanide, turning it into nitrates. Also, there are other mechanisms such as hydrolysis,</p>

precipitation, adsorption and forming and dissociation of the complexes. After discharge in the tailings dam, the water content solutions will go through three different processes:

1. The main part of the water and tailings resulting from the technological process and discharged into the tailings dam, containing cyanide of the above mentioned concentration, will be circulated back and reused in the processing plant;
2. Part of it will evaporate in accordance with the pH level and the geometry of the tailings dam. The evaporation increases during summer. The quantity of cyanide evaporated varies in accordance with the above mentioned variables;
3. A percentage of up to 40% will be retained at first, due to being attached to solid particles. Once the tailings are buried, there is a neutralizing environment occurring, and a series of decomposing mechanisms will decompose the cyanide, in time.

Conclusion: a significant percentage of the initial quantity of the cyanide stored in the TMF is recycled back to the processing plant, together with the recovered water; the rest of the cyanide quantity is subject to certain natural decomposing mechanisms (i.e. the activity of the bacteria), which continue to reduce the concentration of the cyanide in the TMF. These natural phenomenon can't be easily quantified; but RMGC commits to comply with the regulations established in Romania, the most relevant being NTPA001. NTPA001 imposes a level of 0.1 ppm Total Cyanide for water discharge in the TMF. The longest period of time foreseen for neutralization is related to the cyanide buried in the tailings, but that matters is that this cyanide will remain in the TMF until is neutralized and it is not released in the environment.

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	340
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Lupsa, 16.08.2006
RMGC internal unique code	MMGA_0713
Proposal	<p>No mention has been made regarding the project's impact on the inhabitants of Lupsa and they want to be informed whether there is any alternative to this project and especially if they will be affected by pollution as they haven't forgotten yet the taste of the hydrochloric acid from Zlatna. The pollution existing in the area already affects the animals and the fruit trees.</p>
Solution	<p>The RMP's immediate impact on Lupşa will be to stop the flow of acid water full of heavy metals from Roşia Montană, which will be collected, treated, and discharged as clean water into the Roşia and Corna streams, meeting all Romanian (TN-001) and EU laws and directives, In the long term, the project could provide the town with environmental benefits.</p> <p>The EIA report describes in detail the potential impact of the project's activities on Lupşa and other towns in the region. This includes discussion of the impact on water, air, biodiversity, and noise and vibration. For example, chapter 4-1 describes the potential impact on surface waters. Furthermore, there is a complex study on the dispersion of air pollution, starting from the construction, through to operation, and mine closure stages and until the final rehabilitation stage. The report includes description of monitoring and mitigation methods, including considerable detail on how we propose to conduct our monitoring process both within project's impact area and in adjacent areas. Legislation requires the company to self monitor, and the regulatory authorities will have their own monitoring system. Roşia Montană and downstream communities will have access to the data.</p> <p>There could be significant environmental benefits for Lupşa. For example, if the pollution affecting apple trees in Lupşa results from existing and previous poor mining practices in Roşia Montană, improving the water quality could contribute to improved fruit harvest. Obviously, if the cause of that aspect of pollution stems from Zlatna, neither permitting nor canceling the RMP would have an impact in Lupşa.</p> <p>The economic impact is also likely to be felt throughout the region. In addition to the 563 jobs during production, the project will lead to some 5,600 indirect jobs for 20 years. These indirect jobs will be largely created locally and regionally, including neighboring towns. RMGC will also spend some US\$1.69 billion procuring goods & services, during construction and operations. This includes USD 450 million during construction and USD 1,170 million during production, with spin-off benefits to neighboring towns and localities including Lupşa, Muşca and Bistra.</p>

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	355
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Bucuresti, 21.08.2006
RMGC internal unique code	MMGA_0731
Proposal	<p>The questioner proposes non-polluting mining operations in the area, banning any type of deforestation and expropriation, maintaining the churches, houses and monuments unaltered, no use of cyanide, and the obligation to record all these measures in special documents.</p>
Solution	<p>Any human activity involves a potential impact on environmental factors. It depends on the proposed technology and the way in which associated risks are kept under control in order to prevent/eliminate the respective impact. Any mining activity implies alterations of the relief, and generates a significant impact at local level on environmental factors, but the impact and mining associated risks can be controlled, minimized or eliminated by using Best Available Techniques and a strategy of progressive ecologic rehabilitation.</p> <p>For Roşia Montană Project, the proposed technology is the result of an analysis of many criteria that considered all the conditions related to the site and ore deposit. The factors that have caused the selection of these technologies have taken into account to reduce land clearings as much as possible, only few properties to be impacted, and fair compensation of landlords based on equal opportunities principle. Therefore, the significant impact will cover areas already impacted by 2,000 year old mining activities.</p> <p>With respect to the protection of churches and historic monuments, protected areas have been established and management plans have been proposed in order to manage their restoration, conservation and development.</p> <p>All alternative technologies have been detailed in Chapter 5 of the Environmental Impact Assessment, and the impact on environmental factors and on people's health have been the major criteria in selecting those solutions.</p>

Domain		TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	356	
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Bucuresti, 21.08.2006	
RMGC internal unique code	MMGA_0733	
Proposal	Concerning the electricity supply, the questioner wants to know whether the high voltage line to be built was designed such as to support both the Rosia Montana mining operations, and the Rosia Poieni mining operations, taking into consideration that the problem of building two high voltage lines in the area is very old.	
Solution	Currently, there are two high voltage lines in the area – one coming from Alba Iulia-Zlatna-Processing Plant (Roşia Poieni open pit), crossing the Roşia Montană perimeter and one coming from Deva-Brad-Câmpeni-Lupşa. It is compulsory to have two power sources so as to secure an alternative source in case of a power line failure. Given that most mining operations in the area, as well as the smelters at Zlatna, have been shut down, there is enough power to supply both the Roşia Montană and Cuprumin (although Cuprumin ceased operations as early as December 2006). None of the hydroelectric power plants supplying electricity into the grid operate at full power, given the low power consumption for industrial purposes in the area.	

Domain	TECHNOLOGICAL PROCESSES
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MMDD's item no. for the question which includes the observation identified by the RMGC internal code	372
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MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Bucuresti, 21.08.2006
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RMGC internal unique code	MMGA_0765
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Proposal	What are the effects that have never been mentioned, what will happen when the company's representatives start thinking about underground mining operations?
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Solution	<p>The company does not plan to use the underground mining method given that the economic, environmental and safety data show that this is not a viable alternative (see chapter 5 Alternatives, comprising a detailed description of alternatives). The Roşia Montană deposit is a large, though low-grade gold deposit. Therefore, the only economically viable mining method is open pit mining. Large amounts of ore need to be mined and processed if gold is to be marketed in such a way as to cover production costs and to ensure profitability. The underground mining method does not meet these requirements, being applied for the extraction of high-grade gold hosted in vein-type orebodies or bonanza-type deposits, requiring the extraction of small amounts of ore. Also, this mining method is not economical, given that for safety reasons, supportive pillars are used and, consequently, certain areas in the gold deposit remain unmined.</p>
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It should also be noted that underground mining has a higher risk of accidents, such as cave-ins or gas emissions. The presence of huge underground voids will result in land subsiding on the surface, with negative consequences on the buildings and structures existing in the area. Underground voids can also lead to the formation of acid rock drainage. Pyrite (iron sulphide) oxidizes when exposed to oxygen and seepage water (present everywhere in the underground voids), thus generating ARD.

All these negative impacts can be avoided if the open pit mining method is chosen. In conclusion, the underground mining method is definitely not an option for the company.

Domain

TECHNOLOGICAL PROCESSES

MMDD's item no. for the question which includes the observation identified by the RMGC internal code

379

MMDD's identification no. for the question which includes the observation identified by the RMGC internal code

Bucuresti, 21.08.2006

RMGC internal unique code

MMGA_0780

Proposal

The questioner, in his capacity of director of the "Terra Mileniul III" NGO, makes the following comments: Concerning the environmental impact assessment procedure, the conclusions regarding the potential impact of the project upon the environment indicate that a mining project of this size may be developed even inside the built area of state capitals, because the maximum pollutant concentrations accepted are complied with, and the related risks are low or moderate, especially due to the implementation of various techniques and technologies and due to the high-performance management of a mining company having no relevant experience.

Areas intended for the development of the Roşia Montană mining operations have been delineated so as to be clearly separated from residential areas. The protection limits have been established based on scientific surveys, aiming to prevent/eliminate the potential impacts that could occur as a result of the mining operations. The maximum allowable concentrations referred to in the question have been estimated by using emission dispersion models (dust, pollutants, noise and vibrations). These are internationally recognized methodologies; each Romanian expert in charge with the development of such models has worked alongside specialists with international experience in similar projects. The aim was to create emission dispersion models that would reflect the real conditions existing on the site, as a result of the development of mining operations. The emission dispersion modeling has also taken into account measures meant to prevent/minimize or eliminate the potential impact (such measures include watering the working benches and access roads, creating noise barriers or using machinery equipped with noise-monitoring devices).

Solution



A similar open cast mining project is currently operating right in the middle of the Waihi town (New Zealand), using exactly the same technologies. Life in the community has not been significantly disrupted by the mining operations. This proves that mining techniques have improved, the use of the best available techniques ensuring that the industry can exist in parallel with daily, human activities without causing disruption. We have enclosed a photo of this mining operation (dating from 2006) so as to bring further arguments in support of what has been just said. Other similar photos are available on the company's web site www.marthamine.co.nz.

Domain		TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code		390
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code		Bucuresti, 21.08.2006
RMGC internal unique code		MMGA_0816
Proposal	In principle, the questioner agrees to the project, but he believes that two conditions must be complied with: - no cyanide should be used	
	Metal recovery based on cyanide leaching using the CIL method, as well as the cyanide detoxification technology using the SO ₂ /air method are BAT, being extensively used around the world. The final cyanide concentration in the tailings pond will be less than the minimum allowable concentration levels set by the European legislation.	
Solution	Cyanide use in the Roşia Montană Project has been decided following the testing of several process technologies (see chapter 5 –Alternatives). Given the type of the deposit (disseminated mineralization, low-grade recoverable mineralized rock) and following a multi-criteria assessment, it has been concluded that the only feasible technology is cyanidation. Cyanidation is characterized by an acceptable level of risks and easily controllable impacts, due to the improved technology used in the mining industry.	

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	390
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Bucuresti, 21.08.2006
RMGC internal unique code	MMGA_0820
Proposal	<p>Concerning the statement that cyanide is used in Australia, the speaker says he has been living in Australia for 25 years, and no cyanide is used in mining operations there, Australia being the second largest gold producer in the world. He believes that, if the Romanian technicians participate in and approve this project and the use of cyanide, this would be a violation of good practice of technicians and engineers.</p>
Solution	<p>Almost all major gold mining operations in Australia use cyanide for either the whole of ore leaching, leaching of high grade concentrates or production of concentrates. Not only the gold mines, but many of the base metal mines use cyanide as a flotation depressant in the recovery of sulphide minerals. There are a number of small alluvial gold producers who do not use cyanide however the gold production attributed to these operators is minor. There are two suppliers/manufacturers of sodium cyanide in Australia AGR (Australian Gold Reagents) in the western part of Australia, and Orica in the eastern part of Australia. AGR produces approximately 45,000 tons per annum of sodium cyanide, predominantly as a liquid which is transported in tankers. Orica produces approximately 60,000 tons per annum, predominantly as a solid which is freighted as solids in 1 ton bags or in ISO containers (as is proposed for Rosia Montana).</p> <p>All of the Australian cyanide production is used in mining. 60,000 tons per annum is used for gold mining purposes, the remainder in other mining applications. The new Boddington project which is currently being designed will use an additional 10,000 tone per annum. As a result, the cyanide manufacturing industry in Australia is looking at expansions to meet the increased demand.</p> <p>A list of Australian gold mines using sodium cyanide is attached. (Annex 3.3).</p>

Domain	TECHNOLOGICAL PROCESSES
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MMDD's item no. for the question which includes the observation identified by the RMGC internal code	397
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MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Bucuresti, 21.08.2006
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RMGC internal unique code	MMGA_0848
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Proposal	I want to know what is the transfer of heat in the pipeline transporting the process water to the plant, what is the difference in height between the water capture point and the maximum of that pipeline?
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	The minimum water temperature in the pipelines, measured at adduction, is +4°C.
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Solution	The difference (increase) in temperature as measured at adduction and in the farthest point in the circuit is 5-6°C.
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	The difference in height between the water adduction point and the maximum height of the respective pipeline is 310 meters.
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Domain		TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code		397
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code		Bucuresti, 21.08.2006
RMGC internal unique code		MMGA_0849
Proposal	How was the Reynolds number calculated, under a laminar flow profile or under a turbulent flow profile, for the whole plant?	
	The Reynolds number was calculated under a turbulent flow profile, as follows:	
Solution	For the medium flow ($Q_{med} = 224$ cubic meters/h), the nominal pipeline diameter $D_n = 250$ mm and the kinematical viscosity is $4^{\circ}C$: $Re = 199\ 425$ (under a turbulent flow profile).	
	For the maximum flow ($Q_{max} = 350$ cubic meters/h) : $Re = 319\ 081$ (under a turbulent flow profile).	

Domain	TECHNOLOGICAL PROCESSES
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MMDD's item no. for the question which includes the observation identified by the RMGC internal code	397
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MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Bucuresti, 21.08.2006
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RMGC internal unique code	MMGA_0850
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Proposal	How were all the dimensions calculated and, in the event of a drought or extremely low temperatures, causing the Aries River to freeze, are there going to be any problems, including filter clogging?
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Potential impacts on the Aries River were examined in the EIA, which concluded that the Roşia Montană Project's use of water will not negatively impact the river, including its flow and biodiversity. The water authorities have confirmed the project will not affect the river's baseline condition.

Water requirements for the Roşia Montană Project operations are described in Section 3 of Chapter 4.1 (Volume 11) of the EIA. Average demand is 1,482 m³ / hour (Table 4.1-10), of which 1,184 m³ / hour (80%) is recycled from the tailings management facility (TMF). Fresh water demand (207 m³ / hour) represents 14% of the total.

Solution	<p>Abstraction of fresh water from the Arieş River will be fully in accordance with regulatory permitting requirements. The design abstraction from the Arieş River is specified in Section 3.2.1 of Chapter 4.1 at 350 m³/ hour. This compares with an average flow in the Arieş of 45,300 m³ / hour and a minimum recorded flow of 2,860 m³ / hour. On average, the project fresh water makeup demand is less than 1% of the Arieş flow. Apart from extreme dry conditions, there is always sufficient water in the Arieş to meet ecological flows and the requirements of all users. In extreme dry or frozen conditions, water intake may have to be reduced, or temporary storage provided.</p> <p>There is considered to be no issue with the freezing of the Arieş River causing problems with filter clogging or other issues due to cold temperatures. Such considerations have been factored into the design of the water system. The Arieş River continues to flow through-out the coldest periods.</p>
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Domain	TECHNOLOGICAL PROCESSES
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MMDD's item no. for the question which includes the observation identified by the RMGC internal code	397
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MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Bucuresti, 21.08.2006
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RMGC internal unique code	MMGA_0851
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Proposal	What kind of filters are used, what is the diameter of the pores and what is the pressure loss between the two faces?
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Solution	<p>A short presentation of used filters is set forth below:</p> <ul style="list-style-type: none">- Drains under the riverbed made of steel pipe 500 mm Diameter with slits of 1.5x150 mm on the upper half;- The drain is surrounded by a gravel-packed screen with maximum grain size of 5 mm;- Minimum height of water above the drain: H=1.0 m.
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Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	426
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Bucuresti, 21.08.2006
RMGC internal unique code	MMGA_0921
Proposal	<p>Chapter 2 regarding technology suggests that the rain water will be collected and used in the technological process in order to eliminate the consumption of fresh water. The idea is meritorious, but who can believe that rain water can be collected? This idea is 30-year old, however it has never been put into practice and it would practically cause a perturbation of the natural water cycle, therefore it is not an environmentally friendly idea.</p>
Solution	<p>The concept of collecting rain water is a proven and commonly used technique to minimize the loss of clean water from the natural system and prevent polluting discharges. While rainfall obviously cannot be collected directly before it reaches the ground, rainfall is collected naturally as runoff in accordance with the ground contours, as with all streams and valleys.</p> <p>The planned Roşia Montană Project includes a specially designed system for the collection of the pluvial waters. Water is collected primarily in the Roşia Montană Valley, mostly due to the need to collect and treat the surface water due to its current poor quality consisting primarily of acidity (PH; 2-4) and high metal content. If required, the water is going to be used in the technological process; if not, it is going to be discharged in the surface water, following treatment as required. In regard to the surface discharges resulting from rainfall, to ensure the ecological flow on the Valea Corna and Valea Roşia, some diversion channels have been designed to deviate the surface runoffs, to discharge them downstream of the Corna and Roşia Valley dams so as to avoid rain water coming into contact with the rocks containing sulfides, to cease the acid water generation, and to provide for more efficient water management. Capture and treatment of these waters and the acid water seepages, and the surface discharges, is part of the water management for the area to deal with the current poor water quality and cease pollution entering the natural water ways.</p> <p>The water management strategy in respect of rainfall and runoff is to allow all clean rainwater runoff to divert around project areas and continue in its natural state. Any rainwater and runoff that has, or could, come into contact with potential contamination is intercepted for use in the project or treated prior to discharge. The plant site runoff pond collects such water, as does the tailings management facility where intercepted rainwater and runoff (which has contact with the tailings and so cannot be diverted as 'clean' runoff) is returned to the plant from the decant pond.</p>

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	447
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Deva, 23.08.2006
RMGC internal unique code	MMGA_0951
Proposal	<p>The questioner expresses dissatisfaction at cyanide being used for ore processing and points out the fact that, irrespective of the tailings' cyanide levels, accidents are still possible and sometimes with serious consequences. The project very easily dismisses the possibility of using other reagents, such as tiourea. The EIA claims that tiourea is likely to cause cancer, but so is cyanide, don't you agree?</p> <p>Chapter 5 of the EIA Report (Assessment of the Alternatives) presents an assessment of the options available for gold and silver recovery from the ore. Table 5.15 lists and ranks the reagents which could be considered for use instead of cyanide. This Table also ranks the reagents on the basis of cost-effectiveness, technical and environmental criteria, and clearly the cyanide is the preferred option. This section of the report concludes as follows: <i>The presented classification shows that, despite the fact that the cyanide is not the ideal reagent for gold recovery, it is significantly better than any other alternative, according the criteria for best available techniques.</i></p> <p>The Section 4.3 „Alternatives for leaching agents” of Chapter 5 (Alternatives) of the EIA Report includes an assessment of the alternatives with regard to the use of cyanide, in consideration of the environmental protection and cost-efficiency, and implementation in the processing. The conclusion was that the use of the cyanide represents the best available technique (BAT) [1] in accordance to the definition accepted by the European Union.</p>
Solution	<p>With regard to the toxicity of the tailings containing compounds of cyanide, it is worth noting that the Roşia Montană Project was designed and developed to recycle a maximum of the cyanide used in the process - as much as possible from technical feasibility point of view and, in addition, to include a phase of cyanide destruction (DETOX) which will bring the CN_{WAD} cyanide concentration to a value of under 10 ppm the level of cyanide established by the European Directive for mining waste (2006/21/EC). Furthermore, the TMF of the Roşia Montană Project complies in full with the standards and the recommendations quoted from the Terms of Reference document in regards to the Best Available Techniques for the management of tailings and waste rock in mining (BREF) which ensures the reduction to minimum of any potential impact generated by the tailings dam.</p> <p>References: [1] Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities. EUROPEAN COMMISSION, DIRECTORATE-GENERAL JRC JOINT RESEARCH CENTRE, Institute for Prospective Technological Studies, Technologies for Sustainable Development, European IPPC Bureau, Final Report, July 2004 (http://eippcb.jrc.es/pages/FActivities.htm).</p>

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	447
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	Deva, 23.08.2006
RMGC internal unique code	MMGA_0952
Proposal	<p>In Canada, high-efficiency gravitational separation mechanisms and procedures have been invented for the preparation of the auriferous ore. It is quite surprising that the project does not at least examine the possibility of using these Canadian mechanisms, produced in Canada and sold in large quantities everywhere in the world. Why doesn't the project take them into consideration?</p>
Solution	<p>With regard to the centrifugal concentrators mentioned, I would suggest this reference would be with regard to the Knelson Centrifugal Concentrator and the Falcon Centrifugal Concentrator, both of which were independently developed by two companies located in Vancouver, Canada.</p> <p>The detailed testwork programs carried out on the Roşia Montană ore have in fact investigated the use of these devices. Minproc Engineers, SNC Lavalin, Ausenco and JR Goode and Associates have all managed testwork programs utilizing these devices. It needs to be appreciated that such devices, as well as the many other gravity gold devices available, are for the recovery of coarse gold. It was such coarse gold that historical mining activities sought all those years ago. Gold that could be seen and separated by hand. Most of this coarse gold has been mined and the current Roşia Montană Gold Project is predominantly about processing the ore that is too fine to be caught by earlier gravity devices and mostly still too fine for modern day centrifugal concentrators like the Falcon and the Knelson.</p> <p>This is not to say that some gravity gold does not exist. What is important is that the gold that would be caught by gravity would be minor in amount and the project would not be economic if gravity devices alone were employed. In addition, the gravity gold can still be recovered with the leaching process currently planned to be used at Rosia Montana.</p>

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	18
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	No. 108387/19.07.2006 and No. 74156/AF/20.07.2006
RMGC internal unique code	MMGA_1054
Proposal	<p>The questioner mentions the INCO process used for treating the tailings slurry, highlights the influence of temperature on the efficiency of the treatment process, and offers precise technical data.</p>
	<p>The cyanide used for the ore processing will be handled / stored in compliance with the EU standards and the provisions of the International Code for the Management of the Cyanide (ICMC-www.cyanidecode.org); it will be safely kept on the processing plant site in order to prevent any accidental spillage. The cyanide and its compounds will be subject to INCO detoxification procedure (DETOX) – this procedure is considered the Best Available Technique (BAT) as per BREF [1] document; the process tailings will be discharged into the TMF in accordance with EU Directive 2006/21/CE on the management of mining waste.</p> <p>The INCO process used to treat the cyanide content tailings, by using SO₂/air in the presence of catalyst (soluble copper) is influenced by the following parameters: the SO₂/CN⁻ report, the concentration of the catalyst, the pH (the optimum level is from 8 to 10, obtained by adding lime) and reaction time.</p> <p>The operation of INCO facilities, located outdoor, takes place at various seasonal temperatures.</p> <p>The researches conducted for studying the impact of the temperature on the cyanide oxidation process within INCO procedure lead to contradictory findings:</p> <ul style="list-style-type: none"> - E. A. Devuyt and collaborators [2] consider that the temperature has not got a great impact against the speed of cyanide oxidation within the range of 5 to 60oC; - US EPA [3] estimates that the INCO process depends on the temperature, mentioning slower reaction speed within the range of 25 to 5oC.
Solution	<p>The INCO process for Roşia Montană Project is controlled by monitoring the CNue concentration in the treated tailings which must not exceed 10 mg/L, as per the mine waste Directive.</p> <p>If the low temperatures during winter lead to the reduction of the cyanide oxidation speed and the increase of the CNue concentration over the mentioned limit, the Project took into consideration a potential impact and stipulates:</p> <ul style="list-style-type: none"> - the increase of the SO₂/CN⁻ report (the increase of SO₂ consumption); - the increase of the catalyst concentration (add soluble copper in comparison to the existing one); - the increase of the reaction time (double capacity of the reactor is stipulated). <p>In addition, should the need arise, the reaction capacity provided by the wastewater treatment plant for low content cyanide designed to be used under abnormal operation conditions can be used when the storage capacity of the TMF (>2 consecutive PMPs) is exceeded.</p> <p>References:</p> <p>[1] <i>Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities</i>. EUROPEAN COMMISSION, DIRECTORATE-GENERAL JRC JOINT RESEARCH CENTRE, Institute for Prospective Technological Studies, Technologies for Sustainable Development, European IPPC Bureau, Final Report, July 2004 (http://eippcb.jrc.es/pages/FActivities.htm).</p> <p>[2] Devuyt, E.A., Conrad, B.R., Hudson, W; <i>Commercial operation of INCO's SO₂/air cyanide removal process; Conference on Cyanide and the Environment</i>, Tucson, Arizona, dec. 1984.</p>

[3] US Env. Prot. Agency, Technical Report, *Treatment of Cyanide heap leaches and tailings*, EPA 530-R-94-037 (NTISPB94-201837), sept 1994.

Domain		TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	296	
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	No. 109043/07.08.2006 and No. 74513/08.08.2006	
RMGC internal unique code	MMGA_1111	
Proposal	Why hasn't been assessed the option of continuing the current mining operations (with an annual ore production of approx. 400,000 tons), especially taking into account that RMGC has been the licence titleholder for the last 6 years?	
Solution	<p>The Roşia Montană deposit is a large one, but it contains low grade gold ore. Therefore, open-pit mining is the only method economically viable as large amounts of ore need to be mined and processed in order to obtain enough gold to cover the production costs and ensure profitability by sale (see Chapter 5 – Alternatives, section 2.2 Production Rate Alternative). The continuation of the exploitation at an annual production rate of 400,000 tons of mined ore would not be enough to fulfill this aim. This was in fact the main reason for the closure of the RoşiaMin mine, a mine operation subsidized by the Romanian state.</p> <p>Subsidies are not allowed in the gold mining sector in the EU member states. Therefore, all state-subsidized gold and silver mines have been closed down in order to comply with the EU requirements. Several annual production rates have been considered in the feasibility study and it was concluded that the project begins to meet the profitability key criteria at a minimum rate of 6 million tons/year, with a maximum efficiency at a rate of 20 million tons/year. Given the features of the ore deposit a production rate of 13 million tons/year is enough to ensure an optimum balance between profitability, social impact, environmental impact and related risks.</p>	

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	1262
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	No. 110435/22.08.2006
RMGC internal unique code	MMGA_1152
Proposal	The questioner asks the following questions: What will happen with the evaporated hydrogen cyanide (HCN)?
Solution	<p>The emission of hydrogen cyanide (HCN) resulting both from the processing plant and from the deterioration of cyanide in the TMF have been estimated following the dispersion modeling, process which is detailed in Chapter 4 – Potential Impact, section 4.2 – Air. The results obtained are based on the following aspects:</p> <ul style="list-style-type: none"> - The handling of sodium cyanide (NaCN), from the moment it is unloaded from the supply trucks up to the disposal of processing tailings into the TMF will involve only liquid sodium cyanide, in the form of alkaline solutions with a high pH level (>10.5 -11) with different concentrations of sodium cyanide (NaCN). The alkalinity of these solutions is meant to maintain cyanide in the form of cyanide ions (CN⁻) and to prevent the formation of hydrogen cyanide (HCN), a phenomenon that occurs only in media with a low pH level; - HCN only, and not free cyanide will result from the volatilization of the cyanide present in a solution; - Handling and storage of NACN solutions will be carried out only by means of closed systems. The only installations/areas suitable for the formation and volatilization of HCN, with low emission rates of HCN in the atmosphere, are the CIL tanks, the tailings thickener as well as the tailings pond surface; - An alkaline pH level (9-11) automatically adjusted is constantly maintained in the leaching tanks in order to prevent the formation of HCN, except for cases where the pH level needs to be adjusted in order to meet the optimum parameters required for processing; - HCN emissions on the surface of the above-mentioned tanks and tailings pond can occur as a result of pH decrease at the surface of solutions (which favors HCN forming) and of the desorption of this compound (it volatilizes in the atmosphere); - Cyanide concentrations in the solutions used will drop from 300 mg/l in the CIL tanks to 7 mg/l (WAD cyanide) when discharged into the TMF; cyanide concentrations will drop sharply before discharge due to the treatment of the solution in the DETOX system; - Based on professional knowledge regarding the cyanide chemistry and on previous experience from similar activities, the following HCN emissions in the atmosphere have been estimated to occur: 6t/year from the CIL tanks, 13t/year from the tailings thickener tank and 30t/year (22.4t that is to say 17 mg/h/m² during the summer period and 7.6 t or 11.6 mg/h/m² during the winter season) from the surface of the tailings pond. This means that the total emissions of HCN amount to 134.2 kg/day; - HCN emissions undergo a series of chemical reactions in the lower layers of the atmosphere which result in the formation of ammonia; - mathematical modeling of HCN concentrations in the air (assuming HCN does not undergo chemical reactions in the atmosphere) pointed out the highest HCN concentrations at ground level, in the industrial area, namely in the TMF area and in an area located in the proximity of the processing plant. The maximum concentration was estimated to be 382 µg/m³/hour; - The maximum concentrations of HCN in the air will be 2.6 times lower than the maximum level allowable under the Romanian legislation on occupational health; - HCN concentrations in the air from the polluted areas in the proximity of the industrial area will range from 4-80 µg/m³ that is to say more than 250-12.5 times lower than the maximum level allowed in accordance with the Romanian legislation on the occupational health (the national and EU legislation on air quality do not stipulate maximum levels allowed for the protection of the

population's health);

- HCN uptake in precipitation (water vapors and rain drops) is a very minor component of the HCN evolution as, at partially low pressures (which is characteristic for the gases in the atmosphere), HCN is hardly soluble in water, and rainout does not effectively reduce atmospheric HCN concentrations (Mudder, et al., 2001, Cicerone și Zellner, 1983);
- HCN concentrations in the precipitations measured inside or outside the Project perimeter are unlikely to be significantly higher than the base values (0.2 ppb).

For further details on cyanide use in the technological processes, cyanide balance and cyanide emissions and their impact on air quality, see Chapters 2; 4.1; and 4.2 (Section 4.2.3) of the EIA Report.

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	1897
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	No. 110906/25.08.2006
RMGC internal unique code	MMGA_1236
Proposal	<p>The cyanide represents the biggest danger: deficiencies at the tailings management facilities with cyanide can poison the Aries, Somes, Tisa and Danube rivers;</p> <p>Cyanide is extremely toxic therefore its manufacturing, transport, handling and neutralization must be handled with care. However, cyanide has a great advantage for the environment because it breaks down quickly (biodegradation under UV light) becoming inert under normal weather conditions, and the compounds resulting from the degradation, hydrolysis, adsorption processes taking place in the TMF are very stable (basically, these compounds become inert within the environment in the TMF once the process tailings are stored); there is no possibility of bio-accumulation, i.e. mercury or heavy metals. This Project will implement the Best Available Techniques (BAT) for gold recovery and waste management (we refer here to waste resulting from mining and processing) and will comply with the European Directive for cyanide content mining waste.</p> <p>The cyanide used for the ore processing will be handled/stored in compliance with the EU standards and the provisions of the International Code for the Management of the Cyanide (www.cyanidecode.org); it will be safely kept on the processing plant site in order to prevent any accidental spillage. The cyanide and its compounds will be subject to INCO detoxification procedure (DETOX) – this procedure is considered the Best Available Technique (BAT) as per BREF [1] document; the process tailings will be discharged into the TMF in accordance with EU Directive 2006/21/CE on the management of mining waste.</p>
Solution	<p>Section 4.3 „Alternatives for leaching agents” of Chapter 5 (Alternatives) of the EIA Report includes an assessment of the alternatives in what regards the use of cyanide, in consideration to the environmental protection and cost-efficiency, and implementation in the processing. The conclusion reached is that the use of the cyanide represents the best available technique (BAT) in accordance to the definition accepted by the European Union.</p> <p>The tailings management facility (TMF) of the Roşia Montană Project complies, in full, with the international standards, as well as with the recommendations quoted from the “Terms of Reference” document regarding the Best Available Techniques for tailings and waste rock management in mining activities which ensure maximum mitigation of any potential impact generated by the tailings management facilities.</p> <p>Therefore, the TMF will be built of rocks, will have a sealed core and is designed to cope with major earthquakes of 8 degrees on Richter scale, as well as to store 2 consecutive PMPs (probable maximum precipitations). Downstream the main dam, there will be a secondary dam built to collect any seepage, water which will be pumped back into the tailings dam. The strategy for seepage management, considered being potential contamination source, will include several items.</p> <p>An engineered liner is included in the design of the Tailings Management Facility (TMF) basin to be protective of groundwater. Specifically, the Roşia Montană Tailings Management Facility (TMF or “the facility”) has been designed to be compliant with the EU Groundwater Directive (80/68/EEC), transposed as Romanian GD 351/2005. The TMF is also designed for compliance with the EU Mine Waste Directive (2006/21/EC) as required by the Terms of Reference established by the MEWM in May, 2005. The following paragraphs provide a discussion of how the facility is compliant with the directives.</p> <p>The TMF is composed of a series of individual components including:</p>

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- the tailings impoundment;
 - the tailings dam;
 - the secondary seepage collection pond;
 - the secondary containment dam;
 - the groundwater monitoring wells/extraction wells located downstream of the Secondary Containment dam.

All of these components are integral parts of the facility and necessary for the facility to perform as designed.

The directives indicated above require that the TMF design be protective to groundwater. For the Roşia Montană project (RMP), this requirement is addressed by considering of the favorable geology (low permeability shale underlying the TMF impoundment, the TMF dam, and the Secondary Containment dam) and the proposed installation of a low-permeability (1×10^{-6} cm/sec) re-compacted soil liner beneath the TMF basin. Please see Chapter 2 of EIA Plan F, “The Tailings Facility Management Plan” for more information.

The proposed low permeability soil liner will be fully compliant with Best Available Techniques (BAT) as defined by EU Directive 96/61 (IPPC) and EU Mine Waste Directive. Additional design features that are included in the design to be protective of groundwater include:

- A low permeability (1×10^{-6} cm/sec) cut off wall within the foundation of the starter dam to control seepage;
- A low permeability (1×10^{-6} cm/sec) core in the starter dam to control seepage;
- A seepage collection dam and pond below the toe of the tailings dam to collect and contain any seepage that does extend beyond the dam centerline;
- A series of monitoring wells, below the toe of the secondary containment dam, to monitor seepage and ensure compliance, before the waste facility limit.

In addition to the design components noted above specific operational requirements will be implemented to protect human health and the environment. In the extremely unlikely case that impacted water is detected in the monitoring wells below the secondary containment dam, they will be converted into pumping wells and will be used to extract the impacted water and pump it into the TMF where it will be incorporated into the RMP processing plant water supply system, until the compliance is reestablish.

The possibility for lateral seepage flowing around the secondary containment facilities was investigated as part of the design studies. The hydro-geologic studies in the Corna valley indicated that groundwater was flowing toward the valley bottom and that the final elevation of the tailings pond surface was less than the elevation of the existing groundwater levels. Therefore, it is considered that there will not be a gradient for groundwater to flow to the adjacent valleys. The groundwater elevations in the sides of the TMF basin have been monitored over a five year period and only indicate small seasonal variations.

The EIA Report (Chapter 10 Transboundary Impacts) assesses the proposed project with regard to potential for significant river basin and transboundary impacts downstream which could, for example, affect the Mureş and Tisa river basins in Hungary. The Chapter concludes that under normal operating conditions, there would be no significant impact for downstream river basins/transboundary conditions.

The issue of a possible accidental large-scale release of tailings to the river system was recognized to be an important issue during the public meetings when stakeholders conveyed their concern in this regard. As a result, further work has been undertaken to provide additional detail to that provided in the EIA Report on impacts on water quality downstream of the project and into Hungary. This work includes a model of water quality under a range of possible operational and accident scenarios and for various flow conditions.

The model used is the INCA model developed over the past 10 years to simulate both terrestrial and aquatic systems within the EUROLIMPACS EU research program (www.eurolimpacs.ucl.ac.uk). The model has been used to assess the impacts from future mining, and collection and treatment operations for pollution from past mining at Roşia Montană.

The model created for Roşia Montană simulates eight metals (cadmium, lead, zinc, mercury, arsenic, copper, chromium, manganese) as well as Cyanide, Nitrate, Ammonia and dissolved oxygen. The model

has been applied to the upper catchments at Roşia Montană as well as the complete Abrud-Arieş-Mureş river system down to the Hungarian Border and on into the Tisa River. The model takes into account the dilution, mixing and physical-chemical processes affecting metals, ammonia and cyanide in the river system and estimates the concentrations at key locations along the river, including at the Hungarian Border and in the Tisa after the Mures joins it.

Because of dilution and dispersion in the river system, and of the initial EU BAT-compliant technology adopted for the project (for example, the use of a cyanide destruct process for tailings effluent that reduces cyanide concentration in effluent stored in the TMF to below 6 mg/l), even a large scale un-programmed release of tailings materials (for example, following failure of the dam) into the river system would not result in transboundary pollution. The model has shown that under worse case dam failure scenario all legal limits for cyanide and heavy metals concentrations would be met in the river water before it crosses into Hungary.

The INCA model has also been used to evaluate the beneficial impacts of the existing mine water collection and treatment and it has shown that substantial improvements in water quality are achieved along the river system under normal operational conditions.

For more information, an information sheet presenting the INCA modeling work is presented under the title of the Mureş River Modeling Program in Annex 5 and the full modeling report is presented as Annex 5.1.

References:

[1] Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities. European Commission General-Directorate Joint Research Centre, Institute for Prospective Technological Studies, Technologies for Sustainable Development, European IPPC Bureau, Final Report, July 2004 (<http://eippcb.jrc.es/pages/FActivities.htm>)

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	1920
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	No. 110904/25.08.2006
RMGC internal unique code	MMGA_1244
Proposal	<p>The project does not take into consideration the phenomenon "cyanide rain" which could be generated by the cyanide evaporation from the tailings management facility;</p>
Solution	<p>The assessment of the hydrogen cyanide HCN emissions is based on a Model summarized in Volume 12, Chapter 4.2 Air. AERMOD, Version 99351. -EPA, 2004. User's Guide for the AMS/EPA Regulatory Model – AERMOD. EPA-454/B-03-001, was used for modeling the dispersion of HCN. Please also see: http://www.epa.gov/scram001/dispersion_prefrec.htm#aermod. The concentrations estimated were well below the awareness limits stipulated by the standards for the air quality.</p> <p>The Cyanide management Plan and the Air quality management Plan present clear solutions to prevent / reduce / remove the potential impact of the HCN emissions; starting from the results of the HCN dispersion model: we present here some of them:</p> <ul style="list-style-type: none"> - the sodium cyanide will only be handled in liquid form, from the unloading from the supply trucks, up to the time it is discharged onto the TMF within the tailings; the sodium cyanide is represented by alkaline solutions of high pH (over 10.5-11) of various sodium cyanide concentrations. The scope of the alkalinity of these solutions is to maintain the cyanide as cyan ions form (CN⁻) and to stop formation of the hydrogen cyanide (HCN), a phenomenon which occurs in environment of low pH only; - the volatilization of the cyanide off a solution can't happen as free cyanide, but only as HCN; - the handling and storage of the cyanide solutions will only take place through closed systems; the only facilities / areas where HCN could form and volatilize, with small emission rates, are the leaching tank and the tailings thickener, as well as the tailings dam; - the HCN emissions from the surface of the above mentioned tanks and from the surface of the tailings dam could occur due to the decrease of the pH within the superficial layers of the solutions (which encourages the occurrence of HCN) and due to the desorbtion (volatilization in the air) of this compound; - the concentration of the cyanides within the handled solutions will decrease from 300 mg/L in the leaching tanks up to 7 mg/L (total cyanides) at the point of discharge into the tailings dam. The significant decrease of the cyanide concentration at the point of discharge into the tailings dam is supported by the detox system; - the knowledge of cyanide chemistry, as well as the experience from similar activities, have lead us to the following possible HCN emissions in the air: 6 t/year from the leaching tanks, 13 t/year from the tailings thickeners and 30 t/year (22.4 t, and 17 mg/h/m², during hot season and 7.6 t, and 11.6 mg/h/m², during the cold season) from the surface of the tailings dam, meaning a daily average total HCN emission of 134.2 kg; - once emitted, the hydrogen cyanide is subject to certain chemical reactions in low atmosphere, leading to ammonia; - the mathematical modeling of the HCN concentrations in the ambient air (if the HCN is not subject to chemical reactions in the atmosphere) showed the highest concentrations at the level of the soil within the industrial site, namely within the area of the TMF and near the processing plant – the maximum concentration being of 382 µg/m³per hour; - the highest concentrations of HCN in the ambient air will be of 2.6 times less than the value imposed for the safety of the workers, as stipulated by the national legislation; - the concentrations of HCN in the ambient air in the inhabited areas near the industrial site will be of 4 – 80 µg/m³, over 250 – 12.5 less than the safety value as stipulated by the national legislation (the national legislation and the EU legislation for the air quality don't stipulate any

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- limit values for the protection of public health);
- the advance of the HCN in the atmosphere involves an insignificant compound of reactions in liquid phase (the water vapors in the atmosphere and the rain drops) because, at low pressures specific to gases in free air, the HCN is very weakly soluble in water, and the rain will not effectively reduce the concentrations from the air (MUDDER, et al., 2001, CICERONE and ZELLNER, 1983);
 - the chance for the value of the HCN concentrations in precipitations within or outside the area of the Project to be significantly higher than the basic values (of 0.2 ppb) is extremely low.

For further details regarding the Use of cyanide in technological processes, the Balance of the cyanides, as well as the Emissions and the impact of the cyanide against the quality of the air, please see the EIA, Chapter 2, Chapter 4.1 and Chapter 4.2 (Section 4.2.3).

The references for this Project include:

- CICERONE, R.J., and ZELLNER, R., 1983. *The atmospheric chemistry of hydrogen cyanide (HCN)*. *Journal of geophysics research*, Volume 88, issue no. C15, page. 10,689 to 10,696;
 - MUDDER, T.I., BOTZ, M.M., and SMITH A., 2001. *Chemistry and Treatment of Cyanidation Wastes*, The Second edition. *Mining Journal Books, Ltd.*, London, 373 p.
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Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	2984
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	No. 111777/25.08.2006
RMGC internal unique code	MMGA_1279

Proposal	<p>The individual efficiencies of the chemical reactions presented within project are not specified</p> <hr/> <p>The INCO process used to treat the cyanide content tailings, by using SO₂/air in the presence of catalyst (soluble copper) is influenced by the following parameters: the SO₂/CN⁻ report, the concentration of the catalyst, the pH (the optimum level is from 8 to 10, obtained by adding lime) and reaction time.</p> <p>The operation of INCO facilities, located outdoor, takes place at various seasonal temperatures.</p> <p>The researches conducted for studying the impact of the temperature on the cyanide oxidation process within INCO procedure lead to contradictory findings:</p> <ul style="list-style-type: none"> - E. A. DEVUYST and collaborators [1] consider that the temperature has not got a great impact against the speed of cyanide oxidation within the range of 5 to 60°C; - US EPA [2] estimates that the INCO process depends on the temperature, mentioning slower reaction speed within the range of 25 to 5°C. <p>The INCO process for Rosia Montana Project is controlled by monitoring the CNue concentration in the treated tailings which must not exceed 10 mg/L, as per the mine waste Directive.</p>
Solution	<p>If the low temperatures during winter lead to the reduction of the cyanide oxidation speed and the increase of the CNue concentration over the mentioned limit, the Project took into consideration a potential impact and stipulates:</p> <ul style="list-style-type: none"> - the increase of the SO₂/CN⁻ report (the increase of SO₂ consumption); - the increase of the catalyst concentration (add soluble copper in comparison to the existing one); - the increase of the reaction time (double capacity of the reactor is stipulated). <p>In addition, should the need arise, the reaction capacity provided by the wastewater treatment plant for low content cyanide designed to be used under abnormal operation conditions can be used when the storage capacity of the TMF (>2 consecutive PMPs) is exceeded.</p> <p>References:</p> <p>[1] DEVUYST, E.A., Conrad, B.R., Hudson, W.; Commercial operation of INCO's SO₂/air cyanide removal process; Conference on Cyanide and the Environment, Tucson, Arizona, dec. 1984</p> <p>[2] US Env. Prot. Agency, Technical Report, Treatment of Cyanide heap leaches and tailings, EPA 530-R-94-037 (NTISPB94-201837), sept 1994.</p>

Domain		TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code		3134
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code		No. 112944/25.08.2006
RMGC internal unique code		MMGA_1402
Proposal	The questioners do not agree to the utilization of the technology on cyanide basis for the gold and silver recovery within the "Rosia Montana" mining project.	
	Both the metal recovery technology using cyanide in the carbon-in-leach (CIL) procedure and the use of the cyanide detoxification circuit based on the SO ₂ /Air procedure are considered to be the best available technologies, being widely used in the entire world. The cyanide content to be discharged in the tailings management facility will be below the minimum content admitted by the European regulations.	
Solution	The use of cyanide in the Roşia Montană project is the result of processing tests conducted upon several gold recovery technologies (see Chapter 5 – Alternatives). Given the features of the deposit (disseminated mineralization, reduced concentrations of useful mineral substances) identified through a multi-criteria analysis, cyanidation was considered to be the only feasible technology that implies acceptable risks and a potential impact that is easy to control, due to the current technological level of mining industry. Concerning the alternative methods available, in order to increase the recoverability of gold, the use of highly toxic substances is also required, such as mercury or ore roasting, generating sulphuric acid, which is highly toxic. These methods will not be used to process the Roşia Montană ores.	

Domain	TECHNOLOGICAL PROCESSES
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MMDD's item no. for the question which includes the observation identified by the RMGC internal code	3134
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MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	No. 112944/25.08.2006
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RMGC internal unique code	MMGA_1403
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Proposal	The questioners request the MMGA the project postponing until nonpolluting technologies will be available
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Any human activity implies a potential impact on environmental media. It depends on the proposed technology and how related risks are kept under control, in order to prevent / eliminate such impact. Any mining activity causes alteration of the relief, and generates a significant local impact on the environmental media; however, through the use of the best available technologies and a progressive ecological restoration strategy, the impact and risks related to mining activities may be kept under control, and minimized/eliminated.

Solution	<p>In the case of Roşia Montană Project, the proposed technology is the result of a multi-criteria analysis that has taken into consideration the features of the site and the deposit. The elements that lead to the selection of the proposed technologies have taken into consideration the deforestation of smallest possible areas, affecting an optimal number of properties and equitable compensation, according to the principle of equality. Consequently, the highest impact affects the areas that have already been affected by the 2,000 year old mining activities. Churches and historical monuments will be protected by buffer zones and management plans for their restoration and enhancement.</p>
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The proposed technologies are the best available techniques to date, worldwide, and it is highly unlikely that the future mining technologies to be discovered will not have any environmental impact or will not generate any pollution.

All alternative technologies have been analyzed in detail in Chapter 5 of the EIA Report, and the impact upon the environmental media and population health has been the most important criterion based on which the proposed solutions have been selected.

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	3234
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	No. 111435/25.08.2006
RMGC internal unique code	MMGA_1417
Proposal	<p>The permanent evaporation of cyanide from the basin surface will affect large areas having even a trans-frontier impact</p>
Solution	<p>The assessment of the HCN emissions is based on a Model summarized in Volume 12, Chapter 4.2 Air. AERMOD, Version 99351. -EPA, 2004. User's Guide for the AMS/EPA Regulatory Model – AERMOD. EPA-454/B-03-001, was used for modeling the dispersion of HCN. Please also see: http://www.epa.gov/scram001/dispersion_prefrec.htm#aermod. The concentrations estimate were much below the awareness limits stipulated by the standards for the air quality.</p> <p>The Cyanide management Plan and the Air quality management Plan present clear solutions to prevent / reduce / remove the potential impact of the HCN emissions; starting from the results of the HCN dispersion model, we present here some of them:</p> <ul style="list-style-type: none"> - the sodium cyanide will be handled in liquid form only, as from the unloading from the supply trucks, up to the time it is discharged onto the TMF, within the tailings; the sodium cyanide is represented by alkaline solutions of high pH (over 10.5-11) of various sodium cyanide concentrations. The scope of the alkalinity of these solutions is to maintain the cyanide as cyan ions form (CN⁻) and to stop forming the hydrogen cyanide (HCN), phenomenon which occurs in environment of low pH only; - the volatilization of the cyanide off a solution can't happen as free cyanide, but HCN only; - the handling and storage of the cyanide solutions will only take place through closed systems; the only facilities / areas where HCN could form and volatilize, with small emission ratios, are the leaching tank and the tailings thickener, as well as the tailings dam; - the HCN emissions from the surface of the above mentioned tanks and from the surface of the tailings dam could occur due to the decrease of the pH within the superficial layers of the solutions (which encourages the occurrence of HCN) and due to the desorbtion (volatilization in the air) of this compound; - the concentration of the cyanides within the handled solutions will decrease from 300 mg/L in the leaching tanks up to 7 mg/L (total cyanides) at the point of discharge into the tailings dam. The significant decrease of the cyanide concentration at the point of discharge into the tailings dam is supported by the detox system; - the knowledge on the cyanide chemistry, as well as the experience from similar activities, have lead us to the following possible HCN emissions in the air: 6 t/year from the leaching tanks, 13 t/year from the tailings thickeners and 30 t/year (22.4 t, and 17 mg/h/m², during hot season and 7.6 t, and 11.6 mg/h/m², during the cold season) from the surface of the tailings dam, meaning a daily average total HCN emission of 134.2 kg; - once emitted, the hydrogen cyanide is subject to certain chemical reactions in low atmosphere, leading to ammonia; - the mathematical modeling of the HCN concentrations in the ambient air (if the HCN is not subject to chemical reactions in the atmosphere) showed the highest concentrations at the level of the soil, within the industrial site, namely within the area of the TMF and near the processing plant – the maximum concentration being of 382 µg/m³per hour; - the highest concentrations of HCN in the ambient air will be of 2.6 times less than the value imposed for the safety of the workers, as stipulated by the national legislation; - the concentrations of HCN in the ambient air in the inhabited areas near the industrial site will be of 4 – 80 µg/m³, over 250 – 12.5 less than the safety value as stipulated by the national legislation (the national legislation and the EU legislation for the air quality don't stipulate any

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- limit values for the protection of population's health);
- the advance of the HCN in the atmosphere involves an insignificant compound of reactions in liquid phase (the water vapors in the atmosphere and the rain drops) because, at partial low pressure, specific to gases in free air, the HCN is very weak soluble in water, and the rain will not effectively reduce the concentrations from the air (MUDDER, et al., 2001, CICERONE and ZELLNER, 1983);
 - the chance for the value of the HCN concentrations in precipitations within or outside the area of the Project be significantly higher than the basic values (of 0.2 ppb) is extremely low.

For further details regarding the Use of cyanide in technological processes, the Balance of the cyanides, as well as the Emissions and the impact of the cyanide against the quality of the air, please see the EIA Report, Chapter 2, Chapter 4.1 and Chapter 4.2 (Section 4.2.3).

The references for this Project include:

- CICERONE, R.J., and ZELLNER, R., 1983. *The atmospheric chemistry of hydrogen cyanide (HCN)*. *Journal of geophysics research*, Volume 88, issue no. C15, page. 10,689 to 10,696;
 - MUDDER, T.I., BOTZ, M.M., and SMITH A., 2001. *Chemistry and Treatment of Cyanidation Wastes*, The Second edition. *Mining Journal Books, Ltd.*, London, 373 p.
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Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	35
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	No. 116015/08.12.2006
RMGC internal unique code	MMGA_1481
Proposal	<p>If the project will be implemented and the cyanide will be utilized, the ecological disaster which will occur in Apuseni Mountains must be taken into account;</p>
Solution	<p>The affirmation lacks of substance. The proposed technology for mining and process is successfully applied by over 400 mines worldwide, and the detoxification process in over 90 similar projects worldwide and it was patented 30 years ago; in Europe, this procedure works successfully in more than 5 mines (please see BREF document [1] for examples).</p> <p>The Project is designed in accordance to the new European Directive (2006/21/EC) for the management of mining waste. This imposes, that for new mining projects, the cyanide concentration in tailings be less than 10 parts per million (ppm), at the point of discharge.</p> <p>The cyanide is extremely toxic, and therefore its manufacturing, transport, handling and neutralization must be handled with care. However, the cyanide has a great advantage for the environment because it breaks down quickly (biodegradation under UV light) becoming inert under normal weather conditions, and the compounds resulting from the degradation, hydrolysis, adsorption processes taking place in the TMF are very stable (basically, these compounds become inert within the environment in the TMF once the process tailings are stored); there is no possibility of bio-accumulation, for example of mercury or heavy metals. This Project will implement the Best Available Techniques (BAT) for gold recovery and waste management (we refer here to waste resulting from mining and processing) and will comply with the European Directive for cyanide content mining waste.</p> <p>The cyanide used for the ore processing will be handled / stored in compliance with the EU standards and the provisions of the International Code for the Management of the Cyanide (ICMC-www.cyanidecode.org); it will be safely kept on the processing plant site in order to prevent any accidental spillage. The cyanide and its compounds will be subject to INCO detoxification procedure (DETOX) – this procedure is considered the Best Available Technique (BAT) as per BREF document; the process tailings will be discharged into the TMF in accordance with EU Directive 2006/21/CE on the management of mining waste.</p> <p>RMGC complies with the International Code for the Management of Cyanide, which requires the use of the best management practice for cyanide. RMGC will purchase the cyanide from a producer which will also comply with this Code.</p> <p>The Section 4.3 „<i>Alternatives for leaching agents</i>” of Chapter 5 (<i>Alternatives</i>) of the EIA includes an assessment of the alternatives with regards to the use of cyanide in consideration to the environmental protection and cost-efficiency, and implementation in the processing. The conclusion was that the use of the cyanide represents the best available technique (BAT) in accordance to the definition accepted by the European Union.</p> <p>References: [1] Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities. EUROPEAN COMMISSION, DIRECTORATE-GENERAL JRC JOINT RESEARCH CENTRE, Institute for Prospective Technological Studies, Technologies for Sustainable Development, European IPPC Bureau, Final Report, July 2004 (http://eippcb.jrc.es/pages/FActivities.htm)</p>

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	50
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	No. 114888/05.10.2006
RMGC internal unique code	MMGA_1493
Proposal	The questioner does not agree to the Rosia Montana project implementation formulating the following remarks and comments: The implementation of this project implies the total destruction of the underground mining works from Rosia Montana;
Solution	<p>The RM project does not imply the complete destruction of the underground mining works from Roşia Montană.</p> <p>Indeed, the four pits planned overlap with most of the over 140 km long network of existing mine galleries and underground mining works. All the accessible galleries have been investigated and inventoried in order to identify ancient mining works as well as for their archaeological discharge. Approximately 7 km of cumulated galleries have been identified where traces of ancient mining activities have been found. But parts of these galleries have been deteriorated by medieval, modern and contemporary activities. The way some of these ancient and medieval mining works are going to be conserved is presented in the Cultural Heritage Management Plan (e.g. the Cătălina Monuleşti gallery, the Păru Carpeni gallery and the Pietra Corbului area).</p> <p>Apart from these historical galleries, other galleries, both modern and older, will remain outside the planned pits. From the environmental protection point of view, the removal of most of the network of underground mining works in Roşia Montană will have a positive effect, as these works are the main generators of acid rock drainage.</p> <p>If this project fails to be implemented as per the mine closure procedures, the galleries network in Roşia Montană would be closed down definitively. In this case, most of these galleries will collapse in time due to water accumulations on the inside.</p>

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	54
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	No. 114731/25.09.2006
RMGC internal unique code	MMGA_1498
Proposal	<p>The mining into the four open pits will allow the water and wind to spread sodium cyanide;</p> <p>The pit mining has nothing in common with the use of cyanide. The cyanide is used in the technological process only which happens in closed circuit within the ore processing plant site.</p> <p>The Project is designed in accordance to the new European Directive (2006/21/EC) for the management of mining waste. This imposes that for new mining projects, the cyanide concentration in tailings be smaller than 10 parts per million (ppm), at the point of discharge. For Roşia Montană Project, this is obtained by recycling a large quantity of cyanide and by reusing it due to the treatment of the residual cyanide taking place within a process which was tested and proven as being efficient for cyanide destruction.</p> <p>The cyanide used for the ore processing will be handled / stored in compliance with the EU standards and the provisions of the International Code for the Management of the Cyanide (www.cyanidecode.org); it will be safely kept on the processing plant site in order to prevent any accidental spillage. The cyanide and its compounds will be subject to INCO detoxification procedure (DETOX) – this procedure is considered the Best Available Technique (BAT) as per BREF document; the process tailings will be discharged into the TMF in accordance with EU Directive 2006/21/CE on the management of mining waste.</p>
Solution	<p>The assessment of the HCN emissions is based on a Model summarized in Volume 12, Chapter 4.2 Air. AERMOD, Version 99351. -EPA, 2004. User's Guide for the AMS/EPA Regulatory Model – AERMOD. EPA-454/B-03-001, was used for modeling the dispersion of HCN. Please also see: http://www.epa.gov/scram001/dispersion_prefrec.htm#aermod. The concentrations estimate were much below the awareness limits stipulated by the standards for the air quality.</p> <p>The Cyanide management Plan and the Air quality management Plan present clear solutions to prevent / reduce / remove the potential impact of the HCN emissions; starting from the results of the HCN dispersion model, we present here some of them:</p> <ul style="list-style-type: none"> - the sodium cyanide will be handled in liquid form only, as from the unloading from the supply trucks, up to the time it is discharged onto the TMF, within the tailings; the sodium cyanide is represented by alkaline solutions of high pH (over 10.5-11) of various sodium cyanide concentrations. The scope of the alkalinity of these solutions is to maintain the cyanide as cyan ions form (CN⁻) and to stop forming the hydrogen cyanide (HCN), phenomenon which occurs in environment of low pH only; - the volatilization of the cyanide off a solution can't happen as free cyanide, but HCN only; - the handling and storage of the cyanide solutions will only take place through closed systems; the only facilities / areas where HCN could form and volatilize, with small emission ratios, are the leaching tank and the tailings thickener, as well as the tailings dam; - the HCN emissions from the surface of the above mentioned tanks and from the surface of the tailings dam could occur due to the decrease of the pH within the superficial layers of the solutions (which encourages the occurrence of HCN) and due to the desorption (volatilization in the air) of this compound; - the concentration of the cyanides within the handled solutions will decrease from 300 mg/L in the leaching tanks up to 7 mg/L (total cyanides) at the point of discharge into the tailings dam.

The significant decrease of the cyanide concentration at the point of discharge into the tailings dam is supported by the detox system;

- the knowledge on the cyanide chemistry, as well as the experience from similar activities, have lead us to the following possible HCN emissions in the air: 6 t/year from the leaching tanks, 13 t/year from the tailings thickeners and 30 t/year (22.4 t, and 17 mg/h/m², during hot season and 7.6 t, and 11.6 mg/h/m², during the cold season) from the surface of the tailings dam, meaning a daily average total HCN emission of 134.2 kg;
- once emitted, the hydrogen cyanide is subject to certain chemical reactions in low atmosphere, leading to ammonia;
- the mathematical modeling of the HCN concentrations in the ambient air (if the HCN is not subject to chemical reactions in the atmosphere) showed the highest concentrations at the level of the soil, within the industrial site, namely within the area of the TMF and near the processing plant – the maximum concentration being of 382 µg/m³per hour;
- the highest concentrations of HCN in the ambient air will be of 2.6 times smaller than the value imposed for the safety of the workers, as stipulated by the national legislation;
- the concentrations of HCN in the ambient air in the inhabited areas near the industrial site will be of 4 – 80 µg/m³, over 250 – 12.5 smaller than the safety value as stipulated by the national legislation (the national legislation and the EU legislation for the air quality don't stipulate any limit values for the protection of population's health);
- the advance of the HCN in the atmosphere involves an insignificant compound of reactions in liquid phase (the water vapors in the atmosphere and the rain drops) because, at partial low pressure, specific to gases in free air, the HCN is very weak soluble in water, and the rain will not effectively reduce the concentrations from the air (MUDDER, et al., 2001, CICERONE and ZELLNER, 1983);
- the chance for the value of the HCN concentrations in precipitations within or outside the area of the Project be significantly higher than the basic values (of 0.2 ppb) is extremely low.

For further details regarding the Use of cyanide in technological processes, the Balance of the cyanides, as well as the Emissions and the impact of the cyanide against the quality of the air, please see the EIA Report, Chapter 2, Chapter 4.1 and Chapter 4.2 (Section 4.2.3).

The references for this Project include:

- CICERONE, R.J., and ZELLNER, R., 1983. *The atmospheric chemistry of hydrogen cyanide (HCN)*. *Journal of geophysics research*, Volume 88, issue no. C15, page. 10,689 to 10,696;
 - MUDDER, T.I., BOTZ, M.M., and SMITH A., 2001. *Chemistry and Treatment of Cyanidation Wastes*, The Second edition. *Mining Journal Books, Ltd.*, London, 373 p.
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Domain	TECHNOLOGICAL PROCESSES
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MMDD's item no. for the question which includes the observation identified by the RMGC internal code	56
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MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	No. 114674/02.10.2006
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RMGC internal unique code	MMGA_1500
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Proposal	The questioner does not agree to the Rosia Montana project implementation formulating the following remarks and comments: the information regarding the cyanide detoxification is incorrect;
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The affirmation lacks of substance. The detoxification process is successfully applied in over 90 similar projects worldwide and it was patented 30 years ago; in Europe, this procedure works successfully in more than 5 mines (please see BREF⁹ document for examples).

The Project is designed in accordance to the new European Directive (2006/21/EC) for the management of mining waste. This imposes that for new mining projects, the cyanide concentration in tailings to be less than 10 parts per million (ppm), at the point of discharge.

Solution	For Roşia Montană Project, this is obtained by reusing the biggest possible amount of cyanide and, to treat the residual cyanide, by using a process which was tested and proven as being efficient for tailings detoxification. The cyanide concentration below 10ppm is not toxic for people or animals, such as birds, cows or sheep.
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It is difficult to make more comments on the subject while no clear data on the information the Questioner claims are erroneous.

Domain	TECHNOLOGICAL PROCESSES
MMDD's item no. for the question which includes the observation identified by the RMGC internal code	750
MMDD's identification no. for the question which includes the observation identified by the RMGC internal code	No. 109707/21.08.2006 and No. 75024/21.08.2006
RMGC internal unique code	MMGA_1538
Proposal	<p>If the waste ore reserve sourced from Cetate and Carnic pits represents areas of high content of sulfides which causes a more difficult processing through the direct use of cyanide, then is it required to substantially modify the flowsheet in order to obtain acceptable processing results?</p>
Solution	<p>The EIA and the feasibility study investigated a wide range of processing options to ensure the project's economic, environmental, cultural and social viability. The designated process best satisfies these criteria, and is the only option that meets BAT (Best Available Technology) as required by the EU and all environmental requirements.</p> <p>It is important to keep in mind in this regard that the economic cut-off grade used to determine if material mined from the pits is ore or waste is not determined on the sulfide content but on the economic grade of the ore.</p>
Solution	<p>A number of alternatives (see alternatives section of the EIA in Chapter 5) were investigated as part of the feasibility study and EIA process. None of these alternatives were able to meet the requirements and optimize the benefits of the project while at the same time fulfilling the broader socio-economic and environmental responsibilities of the project. Mercury amalgamation, for example, may be able to pick up the gold that's in the sulfide, but it would also release tons of millions of mercury. Roasting the concentrate to break down the sulfide, on the other hand, would release significant levels of SO2 and hydrogen sulfide. The process chosen is the safest, cleanest and most economical process available for the project.</p>