Evaluation report: *Environmental Impact Assessment Study for The Roşia Montană Project.*

Prepared by the

Independent Group of International Experts (IGIE)

Report Authors

Prof. Ioan Bica PhD, (Romania) Technical University for Constructions, Bucharest

Prof. János Földessy PhD, (Hungary) University of Miskolc

Dr. Ing. Karl Kast, (Germany), the Baden-Württemberg Chamber of Engineers

Sándor Kisgyörgy, (Hungary), Környezetvédelmi Szakértői Iroda KFT

Prof. Eugeniu Luca PhD, (Romania) Land Reclamation and Engineering Faculty, University of Bucharest

Assoc. Prof. Philip Peck PhD, (Sweden), University of Lund and UNEP Grid Arendal

Report prepared for the Ad Hoc expert committee (Roşia Montană Project) convened by the Government of Hungary and the Government of Romania, 30 November 2006

ABBREVIATIONS USED IN THIS REPORT

APELL	Awareness and Preparedness for Accidents at a Local Level
BAT	Best Available Technology
BREF	BAT Reference Documents
CiL	Carbon in Leach
EFG	Environmental Financial Guarantee
EIA	Environmental Impact Assessment
EIPPCB	European Integrated Pollution Prevention and Control Bureau
EMS	Environmental Management System
ESMS	Environmental and Social Management System
EU	European Union
FA	Financial Assurance
ICOLD	International Commission of Large Dams
ICMI	International Cyanide Management Institute
IGIE	Independent Group of International Experts
OECD	Organisation for Economic Co-operation and Development
PMP	Probable Maximum Precipitation
RMGC	Roşia Montană Gold Corporation
RMP	Roşia Montană Project
TMF	Tailings Management Facility
SCS	Secondary Containment System
tpa	tonnes per annum
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
WAD	Weak Acid Dissociable
WFD	Water Framework Directive
WWTP	Waste Water Treatment Plant

Executive summary

The IGIE has been created to review the EIA that was issued by the project proponents (S.C. Roşia Montană Gold Corporation S.A) in May 2006.

The whole EIA is comprised of 10 Chapters (14 volumes), in total of more than 600 pages, complemented by 13 volumes of detailed operation and management plans for the different work types within the project, and 6 volumes of baseline studies incorporating 9 reports (an additional circa 4000 pages). These documents are numbered by volume.

From this extensive material, the IGIE review focuses primarily on the transboundary effects aspects of the potential development, its technological processes, and its mining and processing facilities. The IGIE has studied and reviewed the critical points, technological parameters, transporting pathways, storage facilities, and so forth that have the potential (e.g. in the case of an accident or malpractice) to lead to development of a transboundary environmental incident if not managed properly. The review encompasses the project life cycle from the design phase, through the operational life and includes the closure and post-closure phases.

The IGIE regards that the security of the planned activity relies on five basic principles and these have constituted the point of departure for the assessment:

1 Construct with robust levels of security;

2 Construct and operate under strict quality assurance regulations and procedures;

3 Construct according to the permit and operate under strict authority control and with transparency;

4 Provide adequate financial guarantees for the implementation of all environmental safety measures required by the control authorities, even in extreme events, or at the time of closure;

5 Construct and operate under the control of a National control authority with proven legal, personal, professional and financial capacity to enforce the requirements of National legislation in harmony with EU directives and principles, with international insight,[1] and with due regard for the international consequences of the planned development.

A detailed Environmental and Social Management Plan (ESMS) complements the EIA documentation. The IGIE considers that this material can provide a sound basis for best practice operations after some modifications and development, together with the fulfilment of the other four basic principles mentioned above.

[1] It is considered by the IGIE that this needs to involve the ongoing engagement of an international expert group who are tasked to evaluate the safety and environmental performance of the operation on the basis of the actual Environmental and Social Management Plan of the company and its mode of operation. Within the terms of reference for such a group, it is considered that the following items should be included *inter alia*: evaluate the environmental performance of the Company in the past year; check the execution or enforcement of past recommendations; evaluate the monitoring data from the past year; provide recommendations for he development of the ESMS for the next year; provide further recommendations to the National authorities where deemed appropriate for enforcement by the competent National authorities; report the results of its review to a bilateral Environmental Committee.

Within this review three categories of comment have been applied: General **Remarks** (which generally require no action); **Recommendations** (which are observations which may bring improvement in the management of the project, but it is not considered an absolute requirement that they should be implemented); and **Concerns.** Concerns certainly require action from decision makers, authorities, and/or designers).[2]

The IGIE considers that the sound and justified management of the Concerns and Recommendations highlighted in this report is a basic prerequisite for the adaptation of the EIA and for environmental permitting.

A summary of recommendations and concerns is included below in this summary for reference. While further details surrounding these recommendations are included in the body of the document, it is intended that this summary serve as a basis for discussions regarding this project evaluation.

Concerns and Recommendations surrounding cyanide issues:

Concern I The planned cyanide detoxification is a crucial factor within the environmental risk profile of the planned development. This technology will reduce cyanide levels in the liquid effluent waste stream from the processing facility to levels well below the maximum level limits designated as safe under European Union and North American guidelines. However, it is mentioned in the EIA documentation that reaction rate in the INCO process is reduced to one-tenth with temperature decrease from 25ºC to 5ºC. In the winter period there are 4 months when the average temperature is below 5ºC.

- **Recommendation 1** Provide clarification and evidence that reduced reaction rates with decreased temperature (resulting increased retention time) was considered in calculating the retention time and hence the dimensioning of the cyanide destruction/detoxification unit. The same recommendation for clarification applies to the semi-passive treatment lagoons downstream of the TMF.

- **Recommendation 2** A lack of clarity regarding the sodium cyanide solubilisation process should be rectified. The platform where container will be filled/injected with water with high Ph must retain 110 %, of the container volume, or "more in the case of storms". It is however unclear what is implied by "more".

- **Recommendation 3** The IGIE suggest that the tailings waters should be monitored (at a minimum on a monthly basis) by the responsible authority. Moreover, the results of this monitoring should be open for control by independent specialized laboratories and data should be available for public review.

- **Recommendation 4** The possible investments related to the transport and the agreed transportation chain should be reflected in the final EIA documentation and the allowable transport routes for cyanide should be defined in the Environmental Permit according to special requirements in Romanian legislation for the storage, transport and handling of dangerous substances. Moreover, such items should be in compliance with international treaties and relevant EU directives.

- **Recommendation 5** The IGIE is on the opinion that Romanian cyanide producer(s) (if any) should be obliged to join the Cyanide Management Code and to achieve its

[2] IGIE member Sándor Kisgyörgy of Hungary has expressed a diverging opinion regarding this definition. See Annex C.

standards. Such progress conceivably offers opportunities for reductions in cyanide transportation distances.

- **Recommendation 6** The Company or companies chosen or deemed eligible for cyanide transportation should be named and their certificates and declaration of cooperation should be added to the EIA documentation in an addendum.

- **Recommendation 7** The Company chosen for cyanide transportation should be obliged to join the Cyanide Management Code and to achieve its standards.

- **Recommendation 8** An accident pollution prevention and response plan should be prepared for cyanide transport and for other hazardous chemicals. The bridges on rivers and stretches of road or railway directly adjacent to waterways should be regarded as environmental hotspots in this document and should be inventoried. Scenarios should be prepared for accidental pollution events at these points. – Moreover, it is recommended that RMGC produce a significantly more thorough assessment of the safety, environmental and/or social impact of transport activities for the proposed project with a thorough analysis of the possible alternatives for hazchem transportation modality and route and discussion of the negative and positive environmental and social impacts.

- **Recommendation 9** In recognition that Romania will attain membership of the EU as of January 2007, the IGIE proposes that the prescriptions of the coming EC Directive on the protection of groundwater against pollution 2003/0210 (C0D) (and its subsequent revisions) should be regarded as if they were introduced in Romania, and consequently groundwater protection should be required with proven quality under all storage facilities where cyanide can occur in concentrations above the effluent limit.

Concern II: At cold temperatures the HDPE pipeline may become rigid and fragile and may fail. Also, the fluids may freeze partially or completely and clog the pipelines. Information is deemed to be required on how this situation was taken into account in the design of pipeline layout. Particularly as several sections the transporting pipes run on the surface, and in the review it has been unclear as to how their protection against winter conditions is solved.

Concerns and Recommendations surrounding the Tailings Management Facility

- **Concern III and Recommendation 10** In view of the fact that operational as well as natural factors influence the physical structure of the TMF in its final appearance and reflect to its safety, the construction and operation of the Corna Tailings Dam and its associated structures must be accompanied by a supervising group of independent experts (specialized and qualified in tailings dam engineering) who are authorised to initiate actions for safety improvement if unfavourable conditions develop.[3]

- **Concern IV and Recommendation 11** A number of examples are provided in this report that reveal a need for better understanding the geo-hydraulic behaviour of the TMF in its geological environment at a larger scale. This again calls for independent

[3] IGIE member Sándor Kisgyörgy of Hungary has requested an additional condition regarding this recommendation. See Annex C.

expertise. It is strongly recommended to extend the system of monitoring into further areas of influence of the pond including those that do not constitute a part of the project territory.

Concern V: An aspect of great importance in the design of the TMF is the drainage capacity of the huge rockfill body which will form the downstream half of the final Corna Dam. As far as can be seen from the documents, no technical provisions are made to safely draw off that flow in a controlled manner (drain zones).

- **Recommendation 12** In addition to what has been explained regarding the flow through the valley flanks, attention must be drawn to the static effects of the percolation through the abutments of the dam towards the valley flanks downstream. This aspect calls for careful observation by adequate monitoring.

- **Recommendation 13** Further investigations to assess geotechnical parameters in the following areas are recommended:

    - Data on the soil mechanical properties of the sediments of tailings solids should be assessed and provided.

    - The susceptibility to liquefaction of these sediments should be assessed in the light of heavy fluid loads onto the rolled rockfill body of the upper dam portion.

    - Acceptable stability of the dam structure under static loading strongly depends on the strength attributed to the rockfill embankment body but this strength may not be guaranteed under the action of long term weathering of the material. As such, the stability of a downstream slope inclined under 1(V): 1.6 (H) is questionable and it is considered that a flatter downstream shell will be required. This point is also important in the event of mining cessation (inactivity) or temporary suspension of operations. We propose that determination regarding the shear resistance of the rockfill needs to be made.

Concern VI and Recommendation 14 In the static analysis performed so far, no seepage effects appear to have been taken into account. It is deemed that attention must be drawn to the fact that this is acceptable only under the condition that drainage elements to draw off seeping waters from the dam shell body that are reliable and effective in the long term are provided. In this instance a bottom drainage layer in the whole downstream base and a drain toe at the downstream slope end appears advisable (material: gravel made from crushed durable rock or natural gravel).

Concern VII and Recommendation 15 As has been experienced from events surrounding the 2000 accident at Baia Mare, there is an urgent need to provide an open exit in the water cycle system of a tailings disposal facility in order to cope with the challenge of an unbalanced ratio precipitation/evaporation.

- **Recommendation 16** The emergency case measures discussed in regard to the tailings transportation line are important and should be implemented and continuously observed/monitored during the processing.

- **Recommendation 17** in addition it is recommended to monitor the flow by means of two electronic flow meter systems (one at the start and the other at the end of the line) in order to control leakages or losses during the processing. Automatic shutdown of

the circulation process should be installed linked to detection of a leakage by differential signal evaluation.

Concerns and Recommendations surrounding the management of water

Concern VIII It is noted that the hydrology of the design area must account for a net positive balance precipitation/evaporation of around 300mm plus per year. Within the design, all the contaminated waters from the process plant, the Cirnic waste rock area (after ARD treatment), Cetate waste rock dump (after ARD treatment), the domestic wastewaters (after an undefined treatment), polluted ground waters, and polluted surface waters will be collected at the Tailing Management Facility (TMF). However, in the assessment, no reference for water loss from the system was found. In spite of this, a closed water circuit is planned for the project.

- **Recommendation 18** It is thereby recommended that this item be clarified with a summary of the water balance included losses and management of excess waters (if any) and freeboard details.

- **Recommendation 19** It is recommended that thorough details of where the surplus water will be dealt with are provided for operational, closure and post-closure stages of the operation.

- **Recommendation 20** All basic data and preliminary assumptions related to the hydrology of the area and the water balance should be counterchecked. The IGIE proposes a detailed independent evaluation of the calculations by independent international experts. Among other things, the possible consequences of the climatic changes should be subject of this evaluation. This issue was discussed briefly,[4] but has been left out from the calculation as "these are only indicative".

- **Recommendation 21** A clear(er) balance of all used waters should be added to the basic documentation. The change of the amount of stored toxic waters, the availability of storing volume, the change of water covered surface on the TMF should be discussed. All quality and quantity consequences should be explained and justified accordingly.

- **Recommendation 22** A clear statement is necessary on the amount of contaminated water expected to remain at the time of cessation of operations and/or at the time of active mine closure activities; and upon its future fate. This statement should include waters held in surface bodies and in subsurface reserves (groundwater/pore water) Bilateral agreement is needed in the ad hoc committee whether the solution is acceptable regarding residual cyanide polluted water mine pits, in tailings and in underlying geological structures.

Remark A key element of the environmental performance of the planned development is that the cyanide rich waters will be detoxified to 10 mg/l WAD cyanide concentration.

- **Recommendation 23** It is recommended that the efficiency of the detoxification should be subject of continuous control by a responsible authority. Reference should be given that (i) the legal basis exists for the environmental authority to check water quality inside the technology and for taking enforcement measures in the case of non

[4] Volume 23, page 10.

compliance[5] (ii) further, it is important that the proper institutional capacity is demonstrated for the continuous oversight of such performance and (iii) monitoring data will be open for interested outside parties.

- **Recommendation 24** Winter time operational conditions should be addressed with additional rigour in the EIA with special attention to water quantity, quality issues and operational installations under extreme winter conditions.

- **Recommendation 25** The planned development should be prepared for the detoxification and treatment of the effluent waters up to the valid effluent standards by the time of commissioning of gold recovery. The necessary water permits should be available by the time of environmental permitting procedure for all kind of used or contaminated waters.[6]

- **Recommendation 26** It is recommended that undertakings should be sought that all investments needed for decreasing the environmental pollution load to the level required by the authority should be permitted, built and trialled by the time of commissioning the mine (i.e. the start of gold recovery).

- **Recommendation 27** The project proponents should include details in the EIA that explicitly demonstrate how the treatment of waters from the site will satisfy the requirements of the Water Framework Directive.

Concerns and Recommendations regarding environmental management and transparency

Remark In this review it is accepted that at present the EMS is a "plan only" and that it is quite reasonable that much work needs to be done to implement and operationalise it. However, the IGIE has attached significant weight to the issue of general transparency.

- **Recommendation 28** It is considered that a large degree of external party insight to the conduct of this project is important and is reasonable to expect. As such, it is recommended that this be sought by the authorities during (eventual) licensing of the project.

- **Recommendation 29** It is recommended that clarification be sought on how "independence" can best be maintained in EMS reviews,[7] and where and how the external verification of the system will take place. It is recognised that this may be achieved by certification by an authorised consultant.

- **Recommendation 30** The IGIE considers that during (nominally) the first one-third of the project lifetime, the project should be subjected to multi-faceted EMS audits, in which (for confidence building) trans-boundary stakeholders should also be invited to participate.

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[5] It is indicated that Governmental Emergency Ordinance (GEO) no. 195/2005, Chapter 1, Art. 7 stipulates that National Environment Guard responsible for monitoring the environmental protections measures inside the processes; Art. 79 – stipulates that NEG has access anywhere and at any time to check the activity.

[6] In interpreting this recommendation, it is noted that the Romania Environment Law – GEO no. 195/2005 stipulates that the Environmental Permit is the last permit that has to be obtained. In order to obtain this, the developer has to provide all the other permits – including the water permit.

[7] Mentioned in Chapter 1, pages 40 to 47 (ESMS Plans Appendix P).

Remark Moreover, personnel resources and management capacity within the organisation are vital to the meaningful implementation of any management system.

- **Recommendation 31** In this regard, it is recommended that the project proponents be required to provide estimates of the environmental management team and its capacities. This should include *inter alia*: role descriptions, qualifications and task time-lines. As an alternative or complement, clear requirements (a detail scope of work) for an external company to perform EMS tasks could also be required.

Concerns and Recommendations regarding Mine Closure

Concern IX: A significant query is related to a rolling "revised plan for closure" and financial set asides made for unscheduled closure. Unscheduled cessation of mining at any point would disrupt the mine plan and many "closure activities" linked to ongoing operations would become void. For example, should the mine become uneconomic and mining activities cease at a point where the Cirnic pit and the Jig pit had not been backfilled (with run of mine waste rock from other mining areas), then these pits would not be backfilled. Rather, it is probable that the only economic closure option would be water filling (BAT is that filling is performed by transfer mining and in such a scenario there is no mining operation to transfer).

- **Recommendation 32** If the scenario above were not acceptable, then extra EFG sum(s) would need to be negotiated for the remediation of the pits (with same being refunded at the acceptable completion of backfilling according to the mine plan). It appears that there needs to be agreement to link periodic review of the mine plan (included in the EIA) with an additional group of financial items. A high priority in this area should be a firm link to activities that are based on transfer mining tasks.

Concern X: A number of important details were not found in the examination of the EIA documentation regarding where the EFG shall be placed or where it is envisaged to be placed. There is no mention of a bank, bonding company, insurance company, financial institution or other. Nor is it mentioned what the mode of fund accumulation might be. Nor are there indications of how the EFG will (or could be) divorced from company assets (an extremely important item in the case of bankruptcy).

- **Recommendation 33** While it is accepted at these details would be negotiated with the Romanian Authorities before the project is approved, in this instance it is recommended this issue should be fully resolved before any final permitting process is undertaken.

Concern XI: The details of a residual fund to manage effluents into the future were not clear. While it is clear that there are residual and ongoing costs of circa USD 1.25M per year, neither the sum set aside,[8] nor its likely management structure are made clear in the documentation.

Concern XII and Recommendation 34 The IGIE consider that the financial guarantee is an absolutely fundamental issue for safe mine (project) closure. As such it is recommended that the Ad Hoc Expert committee should consider that the mode of accumulation and the management of the EFG to be a key point and a general precondition for project consent from both the Hungarian and Romanian parties. Moreover, considering the highly cyclic

[8] While no sum is mentioned, a sum of around USD 10M is inferred on p.38 of Mine Rehabilitation and Closure Management Plan where the following quote is found " Backfilling the Cetate pit would incur additional cost of the order of USD 100 million. This is an order of magnitude more than the cost estimated for long-term pit water management".

nature of gold prices it is necessary that the EFG recognise that the possibility exists at some point in the project life cycle that it is loss-making. Furthermore, it is recommended that the EFG should NOT be based upon profit set-asides (earnings) but should be a financial set aside sum that is based upon estimates of closure costs for the project during each year of operation.

Remark: Within the EIA documentation there is a marked lack of discussion and explicit planning for the contingency that mining operations continue beyond – or even well beyond the indicated closure dates. This is inconsistent with a number of items in the EIA that point out measures taken to avoid "extinguishing" ore resources. In a number of locations, the EIA documentation clearly recognises and explicitly states measures taken NOT to sterilise ore body resources. In particular the possibility that underground operations within the Cetate ore body may be commenced after pit operations falls into this category.

- **Recommendation 35** It is considered that this is an item that should be specifically highlighted in the final EIA documentation and related agreements as it has the potential to affect two factors that are critical to the mine plan – i.e. the rehabilitation plan and time scales for operations.

- **Recommendation 36** It is held that a strategy for management of water in the absence of the Cetate void is required (i.e. if underground operations are undertaken and a pit lake cannot be formed).

In closing this summary, the IGIE concludes that while significant evidence has been found for the planning of a robust project in the EIA documentation, many points of query or concern remain open at this point in time.

Regarding the detailed Environmental and Social Management Plan (ESMS) that complements the EIA documentation; the IGIE considers that this ESMS can provide a sound basis for best practice operations after some modifications, development and refinement. The ESMS will serve to support attainment basic principles mentioned at the opening of this summary.

In the overall evaluation, the IGIE has come to the following conclusions:

- The existing documents allow the conclusion with the exceptions listed above; the EIA for the Rosia Montana Project is well developed. Further, if the five basic principles provided on the opening page of this summary are held to in a diligent manner in all stages of the project life cycle then the projected benefits of the project should accrue and the inherent risks could be reduced.

- With regard for the need for robust security of the development, for the utilisation of large volumes of hazardous chemicals in the mineral processing technologies, for the traditional environmental experiences with cyanide leaching in mining, and for the adequate management of large dams, the IGIE propose that an independent international expert team be set up to perform yearly assessments regarding the fulfilment of the ESMS quality assurance procedure, its continuous development, and the implementation of regulatory requirements. Such a team would provide advice to both the project operators for improved practice; and to the environmental authorities with regard the development of regulatory requirements as appropriate.

- The IGIE consider that the financial guarantee is an absolutely fundamental issue for safe mine (project) closure. It is considered that the mode of accumulation and the management of the EFG should be a key point and a general precondition for project

consent from both the Hungarian and Romanian parties. Moreover, considering the highly cyclic nature of gold prices it is necessary that the EFG recognise that the possibility exists at some point in the project life cycle that the operation is loss-making. Furthermore, it is considered that the EFG should be based upon estimates of true closure costs for the project during each year of operation.

- Diverging opinions of the IGIE members are included in Annex C and have been marked with footnotes throughout the preceding summary.

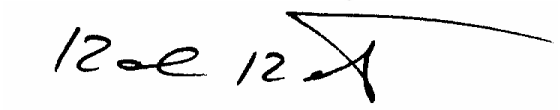
Finally the IGIE recommends that all remarks, recommendations and concerns provided in this evaluation report on the Environmental Impact Assessment Study for The Roşia Montană Project should be thoroughly assessed and where applicable included in the ensuing design and operational steps for the project. Moreover, such points should be central to reviews by independent international experts as mentioned above.

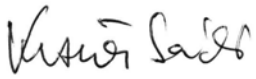
In this context and under the conditions stated above, the IGIE consider that it is reasonable that the proposed project can be discussed and evaluated by the authorities. However, the IGIE holds that the concerns outlined in this report require full resolution to the satisfaction of the Ad Hoc Committee prior to such discussions and evaluation.

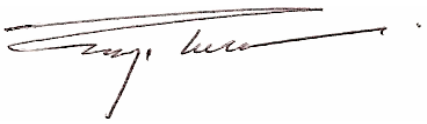
Signed this day, 30th November 2006:

Prof. Ioan Bica PhD, (Romania) 

Prof. János Földessy PhD, (Hungary) 

Dr. Ing. Karl Kast, (Germany) 

Sándor Kisgyörgy, (Hungary) 

Prof. Eugeniu Luca PhD, (Romania) 

Assoc. Prof. Philip Peck PhD, (Sweden) 

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1 Introduction and Background

The Independent Group of International Experts (IGIE) is a group of environmental, civil engineering and mining consultants invited, and mutually accepted by the representatives of the Hungarian and Romanian Governments (the partners) who are responsible for dialogue and review of the Rosia Montana project and the *Report on Environmental Impact Assessment Study for The Roşia Montană Project* (the EIA).

1.1 Scope

The IGIE has been created to review the EIA that was issued by the project proponents (S.C. Roşia Montană Gold Corporation S.A) in May 2006.

The whole EIA is comprised of 10 Chapters (14 volumes), in total of more than 600 pages, complemented by 13 volumes of detailed operation and management plans for the different work types within the project, and 6 volumes of baseline studies incorporating 9 reports (an additional circa 4000 pages). These documents are numbered by volume. For simplicity in this analysis, references to content of the EIA and its supporting documentation are labelled by volume number and page (i.e. volume 3, page 5). A summary of the EIA documentation is included in Annex A.

The IGIE review focuses primarily on the transboundary effects aspects of the potential development. As part of this, substantial effort has been directed to examination of its technological processes, and its mining and processing facilities. As such, the expert group has sought to study and review the critical points, technological parameters, transporting pathways, storage facilities, and so forth that have the potential (e.g. in the case of an accident, mismanagement, or malpractice) to lead to development of a transboundary environmental incident. The review encompasses the project life cycle from the design phase, through the operational life and includes the closure and post-closure phases.

The IGIE regards that the security of the planned activity relies on five basic principles:

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- Construct and operate under strict quality assurance regulations and procedures;
- Construct according to the permit and operate under strict authority control and with transparency;[9]
- Provide adequate financial guarantees that for the implementation of all environmental safety measures required by the control authorities, even in extreme events, or in the time of closure;
- Construct and operate under the control of a National control authority with proven legal, personal, professional and financial capacity to enforce the requirements of National legislation in harmony with EU directives and principles. and with

[9] Construct and operate under the control of a National control authority with proven legal, personal, professional and financial capacity to enforce the requirements of National legislation in harmony with EU directives and principles, with international insight, and with due regard for the international consequences of the planned development.

international insight,[10] with due regard for the international consequences of the planned development.

A detailed Environmental and Social Management Plan (ESMS) complements the EIA documentation. At this juncture it is held that this material can provide a sound basis for best practice operations after some modifications and development together with the fulfilment of the other five basic principles mentioned above. This assessment also addresses such aspects insofar as they are relevant to the analysis.

1.2 The IGIE Group

The composition of the expert group is:

Prof. Ioan Bica PhD, (Romania), Technical University for Constructions, Bucharest

Prof. János Földessy PhD, (Hungary), University of Miskolc

Dr. Ing. Karl Kast, (Germany), the Baden-Württemberg Chamber of Engineers

Sándor Kisgyörgy, (Hungary), Környezetvédelmi szakértői iroda KFT

Prof. Eugeniu Luca PhD, (Romania) Land Reclamation and Engineering Faculty, University of Bucharest

Assoc. Prof. Philip Peck PhD, (Sweden), University of Lund and UNEP Grid Arendal.

1.3 IGIE Group Activities

The IGIE group reports to the partners and this report is to support discussions regarding the project that are to be conducted by the Ad Hoc Committee of Experts. This committee is chaired jointly by the Environmental Minister of Hungary and the Environmental and Water Management Ministry of Romania.

The initial meeting of the group was held on 7 September 2006, in the town of Ighiu, Romania after the conduct of a visit to the Rosia Montana site and township. Prof. I. Bica was not present at the meeting. The initial meeting consisted of a summarising of the review work that had been conducted prior to the meeting by a number of the IGIE group, a comparison of key concern areas, and a rationalising of the individual expertise of the group. For generation of the group's common review statement, it was decided that the experts should distribute the tasks required within the review and commenting process for the EIA as listed in Table 1-1.

[10] It is considered by the IGIE that this needs to involve the ongoing engagement of an international expert group who are tasked to evaluate the safety and environmental performance of the operation on the basis of the actual Environmental and Social Management Plan of the company and its mode of operation. Within the terms of reference for such a group, it is considered that the following items should be included *inter alia*: evaluate the environmental performance of the Company in the past year; check the execution or enforcement of past recommendations; evaluate the monitoring data from the past year; provide recommendations for he development of the ESMS for the next year; provide further recommendations to the National authorities where deemed appropriate for enforcement by the competent National authorities; report the results of its review to a bilateral Environmental Committee.

Table 1-1 Major review accountabilities within the IGIE

Review accountabilities	**Head reviewer(s) or author**
Executive Summary	Philip Peck
Scope, objectives	Janos Foldessy
Cyanide processes, operation, destruction, and decay	Janos Foldessy
Transportation issues	Ioan Bica
TMF construction, management, dam stability, freeboard, bottom protection, and leachates.	Eugeniu Luca, Ioan Bica, Karl Kast
Water cycle management, ARD and basic data validity	Sandor Kisgyörgy, Ioan Bica
Environmental management, audits, and transparency	Philip Peck
Closure, chronic pollution, and financial guarantees	Philip Peck
Recommendations and conclusions	Karl Kast

Although the reviewers initially worked separately on these items, an iterative process of peer review within the group was agreed and the group has now formulated one consolidated Joint Reference Report. The views and findings of the group members have been discussed, correlated and reviewed in a process of document exchange and via several telephone conferences before issue of this report. Both versions of the report that have been issued to the Ad Hoc expert group (a draft report and this final report) report have been edited and consolidated by Dr Philip Peck (Sweden).

A number of deadlines/task timelines were agreed by the group:

- preliminary sub-component drafts issued to the group members for review 15 September 2006;
- internal review and document exchange between 15 September and 29 September 2006;
- draft report compilation 29 September to 2 October 2006;
- compiled draft issued to the Ad Hoc committee 2 October 2006;
- issue of final IGIE report on 30 October 2006.

This set of task deadlines were kept by the IGIE with the exception of the issue of the final report on the 30th October. The issue of this report was delayed awaiting feedback from the Romanian-Hungarian Joint Ad-Hoc Committee and was rescheduled by the IGIE for 30 November 2006. A final round of review iterations and two IGIE teleconferences were conducted in mid November prior to the finalisation of the report.

This Report is intended for submission to the Romanian-Hungarian Joint Ad-Hoc Group. Opinions of an expert which differ from the joint opinion in the report will also be attached as separate opinion annexes. After the publication of the report, the IGIE Group shall terminate its activity and will be dissolved.

1.4 Limitations

Where relevant, limitations are stated in each individual section of this report. It is intended that these limitations be consolidated within this section for the final report.

The analysis has resulted in observations which have different levels of potential impact within the project. As such, in this review three categories of comment have been applied: General **Remarks** (which generally require no action); **Recommendations** (which are observations which may bring improvement in the management of the project, but it is not considered an absolute requirement that they should be implemented); and **Concerns** (that certainly require action from decision makers, authorities, and/or designers).

As the final report of the IGIE, this document represents the joint position of the IGIE except for reservations expressed by individual IGIE members as recorded in Annex C.

2 Cyanide processes and issues

This review work has concentrated on processes involving the utilisation of cyanide, the manner in which the gold extraction (CiL) plant is projected to be operated, the issues surrounding cyanide destruction and cyanide decay processes.

The use of cyanide and its relevant technological, ecological, environmental problems is perhaps the most contentious issue linked to the RMP.

In this analysis three important documents which regulate the use and management of cyanide in the mining industry have been applied:

- EIPPCB Sevilla (2003): BREF Best Available Techniques for Management of Tailings and Waste Rock in Mining Activities;

- ICMI (2002): Implementation Guidance for the International Cyanide Management Code;

- EU Parliament (2006): 2006/21/EC Mine Waste Directive.

The regulations and recommendations included in these documents were compared and correlated with the information released in the EIA for the RMGC Project.

According to the guidelines set in the IGIE meeting, work has been concentrated on the transboundary issues with relation to cyanide, i.e. examination of the technological process and the cyanide management processes within the TMF management cycle. This review has not taken up other related issues such as APELL, training, etc. Nor has the review addressed water treatment issues of wastewater before released to natural drainage (i.e. compliance with NTPA 001 requirements).

Rosia Montana Project activities require the use and storage of chemicals, including sodium cyanide, that are defined as dangerous substances under European Commission Directive 96/82/EC, 9 December 1996 ("Seveso II"). Pursuant to European Commission Directive 2003/105/EC, 16 December 2003, the project and the project proponents are subject to the requirements of Seveso II to prevent major accidents and to limit their consequences for man and the environment. The major management actions that that the project proponents will take to implement these requirements are listed in Table 3.1. within Section 3: *Regulatory Requirements and Codes of Practice for Cyanide Management*. These details have not been repeated here.

2.1 Clarity of cyanide issues

The experience of the IGIE is that neither Hungarian nor Romanian speaking public has clear information about the potential hazards and benefits of the forthcoming development. Acknowledging the considerable effort of the company on promoting the Project the IGIE urges the release of more understandable explanations of the technologies to be used and more exact values as far as planned production figures, emissions, and how possible related hazard to water, air and soil exists. Further it is urged that work is undertaken to inform stakeholders on how will they be involved and how will they be continuously informed. This would certainly help in achieving better public acceptance of the project.

- **Remark** The translation of the Chapter 2 Technological Processes to Hungarian is poor. The level of importance that this part of the operation has indicates that is should be given much higher attention than this appears to have been given.

2.2 Processing technology description

The outlined CIL processing technology (Chapter 2, pages 62-78) is industry standard. It also strictly follows the recommendations of the International Cyanide Management Code. The listed designers – AMMTEC, AMDEL, Minproc, SNC Lavalin, and Cyplus – are well recognized engineering design houses.

After detailed analysis of alternatives the designers chose the SO2/air INCO process for decyanidation of the thickened tailing. This is BAT. The design guarantees less than 10 mg/l WAD CN concentration in the effluents and tailing coming from the plant. This meets Mining Waste Directive requirements.

- **Remark** In Exhibit 2.28 (Cyanide Balance; Note C) it appears that the Romanian counterpart designer Ipromin SA and the aforementioned engineering houses had poor communication during the compilation of the EIA.

2.3 Cyanide Code Implementation

In the EIA documentation it is stipulated that RMGC will acquire sodium cyanide only from that companies that are signed the International Cyanide Management Code. It is also required that an independent auditing company, agreed by the International Cyanide Management Institute has to certify that the activity of the company conform to the regulations.

RMGC will be signatory of the Cyanide Code and as such will accept external audits of its cyanide management. RMGC also commits to enforce Cyanide Code regulations on its subcontractors.[11] The IGIE suggests that external audits from a representative of the Hungarian partner be invited.

2.4 Cyanide destruction

The extraction of gold and silver involves the addition of water and reagents that includes cyanide in the process solution. Due to high concentrations of cyanide (Chapter 2, page 86: the quality of pulp needing treatment before its evacuation in the decant pond is Cn_{total} = 165 – 290 mg/l in the process solution). A cyanide detoxification plant will process the thickened and partly dewatered slurry (tailings) prior to it being pumped to the TMF. As has been mentioned, the preferred technology is the INCO SO_2/air process (Chapter 2, page 25).[12]

[11] RMGC will sign a protocol with the transport company and with the producer of the sodium cyanide in order to stipulate the responsibilities of each party involved in this process.

[12] The EIA indicates a target cyanide WAD concentration of 10 mg/l. The EU BAT document indicates that it is BAT to use CN if one applies the SO2/air technique to destruct CN prior to discharge to the tailing pond. This is mode of cyanide destruction is to be applied in the Rosia Montana project. The Mining Waste Directive allows 10 mg/l WAD cyanide for facilities permitted after May 2008 or 50 mg/l WAD cyanide for facilities which have been permitted before that date. While evidence exists that 2 mg/l WAD cyanide may be achieved if there is a favourable technological response from the treated ore to the applied technology, the BAT technology for CN treatment is does not indicate this final threshold value for CN discharge.

The planned cyanide detoxification is a crucial factor regarding the environmental risk of the planned development. According to the EIA documentation, the cyanide detoxification facility will be incorporated within the process plant. This technology will reduce cyanide levels in the liquid effluent waste stream from the processing facility to levels well below the maximum level limits designated as safe under European Union and North American guidelines. The tailings will then be released from the process plant to the TMF.[13]

Despite the above assurances, it is mentioned[14] that reaction rate in the INCO process is reduced to one-tenth with temperature decrease from 25ºC to 5ºC. In the winter period there are 4 months when the average temperature is below 5ºC.

Concern: Clarification is required if this fact (resulting increased retention time) was considered in calculating the retention time and hence the dimensioning of the cyanide destruction/detoxification unit. The same request for clarification applies to the semi-passive treatment lagoons downstream of the TMF.

- **Recommendation** It is recommended that a lack of clarity regarding the sodium cyanide solubilisation process be rectified. The platform where container will be filled/injected with water with high Ph must retain 110 %, of the container volume, or "more in the case of storms". It is however unclear what is implied by "more".

- **Recommendation** The IGIE suggest that the tailings waters should be monitored (at a minimum on a monthly basis) by the responsible authority. Moreover, the results of this monitoring should be open for control by independent specialized laboratories and data should be available for public review.

2.4.1 Cyanide balance

The cyanide balance description needs clearer accounting the amount of cyanide that is to arrive to the TMF, what amounts of cyanide leave the TMF, in what manners (surface attenuation, dissociation, recirculation, etc) breakdown occurs. At present there is no clear view on what the possible effects of existing sulphide minerals (if any) might be, and how these minerals might affect the cyanide dosage and/or concentrations.

2.5 Cyanide transport

Cyanide transportation issues are addressed in the next chapter (Section 3.1.1).

2.6 Pipe transport of tailing from the CIL plant to TMF

Concern: At cold temperatures the HDPE pipeline may become rigid and fragile and may fail. Also, the fluids may freeze partially or completely and clog the pipelines.

Information is deemed to be required on how this situation was taken into account in the design of pipeline layout. Particularly as several sections the transporting pipes run on the

13. In Chapter 5, pages 46-58, a suite of alternative cyanide technologies are addressed by full technological and economical assessment, while only technical discussion of the non-cyanide alternatives (Thiourea, etc) are provided and economic appraisal is not covered. In the light of technological discussions, the IGIE accepts that further economic evaluation was not provided.

14 Chapter 2, p. 81.

surface, and in the review it has been unclear as to how their protection against winter conditions is solved.

3 Transportation issues

Transportation issues have been noted by a number of IGIE reviewers. The concerns noted are listed or cross referenced below.

3.1 Cyanide and Hazchem transportation concerns

3.1.1 Cyanide transportation

The EIA report (Section 5 of Plan G) describes supply of sodium cyanide from international sources. The delivery of sodium cyanide by truck from Romanian sources was rejected as the project proponents indicate that Romanian manufacturing and transportation sources do not currently subscribe to the International Cyanide Management Code.[15]

With 11-13Kt/year of cyanide consumption, 500-650 truckloads of this hazardous good (average two trucks per day) will be transported from the port/factory through a poor quality road system to Rosia Montana. Five cyanide transportation route alternatives are introduced in the EIA documentation and the plans require the transport of cyanide in solid form in specially reinforced and sealed containers to the Project site.

The project proponent indicates that **IF** the cyanide transport contractor is certified under the International Cyanide Management Code (emphasis added), a Summary Report Form and Auditor Credentials Form will be available for public review on the International Cyanide Management Institute's web site, www.cyanidecode.org.

- **Recommendation** The Company chosen for cyanide transportation should be named and its certificates and declaration of cooperation should be added to the EIA documentation in an addendum.

- **Recommendation** The Company chosen for cyanide transportation should be obliged to join the Cyanide Management Code and to achieve its standards.

A summary of relevant regulations are provided in Table 3.1 (page 9 of the Cyanide Management Plan – Plan G). The content of that table is also included in Annex B to this report. Additional regulations, guidelines and protocols held to be relevant, or potentially relevant, in this regard are also listed there.

Further, the project proponents indicate that as part of their contractual arrangements they shall prepare written agreements with the cyanide manufacturer and transporter that outline responsibility for the following health, safety and environmental issues during each phase of cyanide transportation, as applicable:

- Driver/operator qualifications and vehicle operation training;

[15] International Cyanide Management Institute, May 2002; *International Cyanide Management Code for the Manufacture, Transport, and Use of Cyanide in the Production of Gold*

- Accident prevention, emergency response, and safety training for transporter drivers/operators throughout the transportation process (including responsibilities for strict maintenance of driver/operator sobriety during transport;
- Packaging;
- Labelling;
- Storage prior to shipment;
- Evaluation and selection of routes to reduce risks, including community consultation and disclosure;
- Establishment of protocols for driver/RMGC communications and automated shipment tracking via global positioning systems (GPSs) or other automated methods;
- Storage and security at ports of entry and cargo transfer points;
- Interim loading, storage and unloading during shipment;
- Transport to the Rosia Montana Project process plant;
- Unloading at the process plant;
- Proper maintenance and operation of transportation vehicles throughout each delivery;
- Coordination of security and emergency response actions throughout the transportation process; and
- Preparation and submittal of trip reports and immediate reporting of transportation hazards or unsafe roadways or driving conditions.

Moreover, the project proponent indicates that these agreements shall also specify that any designated responsibilities that apply to RMGC, the cyanide manufacturer, and the cyanide transporter extend to any subcontractors used by these parties for any activities related to cyanide transportation, and that all affected parties are required to inform subcontractors of their designated responsibilities.

- **Remark** The IGIE consider that the preferred option will likely be where the public road transport is the shortest and that the transportation should be agreed with the relevant affected marine, railway and road institutions.

- **Recommendation** The possible investments related to the transport and the agreed transportation chain should be reflected in the final EIA documentation and the allowable transport routes for cyanide should be defined in the Environmental Permit.

- **Recommendation** The IGIE is on the opinion that Romanian cyanide producer(s) (if any) should be obliged to join the Cyanide Management Code and to achieve its standards. Such progress conceivably offers opportunities for reductions in cyanide transportation distances and further reduces the potential for transboundary pollution incidents.

- **Remark** Despite of the transport management system described in the EIA, the review group has doubts if the present provincial road conditions from any direction to Rosia Montana would satisfy the safety requirements for such transport. This refers

especially to the conditions during winter and during intense rainstorms, which are becoming more and more frequent during the springtime in the Carpathians.

- **Recommendation** If not already addressed in the items listed above, an accident pollution prevention and response plan should be prepared for cyanide transport and for other hazardous chemicals. The bridges on rivers and stretches of road or railway directly adjacent to waterways should be regarded as environmental hotspots in this document and should be inventoried. Scenarios should be prepared for accidental pollution events at these points.

Remark Related to concerns surrounding both transportation and disruption to supply, information is deemed to be required on what the buffer CN storage capacity of the plant is, and how this storage is protected against incidents and accidents.

3.2 General Hazchem transportation issues

The impacts of the transport activities of RMGC during both construction and operation phases are assessed in Chapter 4.10 of the EIA Report. From the beginning of the assessment it is recognised that huge transport activities shall be necessary, for this project on the one hand, and that the roads in Romania are not in poor condition, on the other.

Moreover, in the assessment impact it is recognised that the rate of traffic accidents are some four times higher in Romania when compared to other European countries. This situation is associated with a combination of poor infrastructure, the technical condition of the vehicle fleet, the behaviour of the traffic participants and failures in the implementation of traffic rules.

Furthermore, the project is located in a mountainous area with many access difficulties that are related to the roads, landscape, slopes, climatic conditions etc. Many of the local roads are rural and unpaved, which means that in the rainy or winter periods these can become impassable, or that there is an increased risk of accidents, especially for heavy trucks.

It is reported (Table 4.10-1)[16] that during the construction and operation of the project a huge quantity of raw materials, substances, wastes and fuel (oil, diesel oil) will be transported each year – both to and from Rosia Montana. These substances include: sodium cyanide (13 000 tpa), quick lime (54 000 tpa), nitrate of ammonium (8 700 tpa), diesel oil (16 500 tpa), hydrochloric acid (2 300 tpa), used oils (100 000 tpa), and so forth. Some of these substances and materials are considered as dangerous and they fall under special conditions regarding storage, transport and handling – from both national and international regulations. Moreover, significantly oversized mining equipment and installation equipment will need to be transported, both during the constructing and operation phases.

The EIA Report stipulates that a preliminary study was produced tasked with the assessment of the alternative transport routes to Rosia Montana, but few or no details are provided. Regarding the transport activities, the EIA Report summarised over 26 pages of general ideas concerning the management of transport activity in order to minimise the environment impact or to reduce the risk. There are only a few items in the assessment that are strictly related to the project development and operation.

[16] Chapter 4, Section 10.

The following remarks regarding the assessment of the impact of the transport activities, made in the mentioned chapter are considered pertinent:

Remark - The analysis provided in the EIA documentation failed to clarify the transportation impacts. The structure and the findings are not specific for an EIA related to this activity (i.e. an analysis of the impacts on air, soil, water, flora and fauna, human settlements, human activities, etc., is missing).

Remark - None of the proposed road route alternatives are analysed from an environmental impact point of view and their characteristics are not described as favourable and/or non-favourable in the context of the required transportation purpose.

Remark - No analysis is provided on the issues related to the transportation of oversized equipment on the small, narrow rural and mountain roads. While it is specified that some of these equipments may be transported as components, no detail information is provided about how big these components should be.

Remark - No detail analysis is provided regarding the transport in the winter conditions, especially in the mountain areas where the roads are narrow and steep, and where many of them are unpaved. From the documentation, it is not clear what the proposed idea that the proponent shall cooperate with the local authorities in order to remediate the damage, or in order to establish the remediation program actually entails.

Remark - Analysis for each of the five transport alternatives that were studied in the preliminary project are not provided. It is reasonable to assume that the cultural, historical, architectural and other public or private assets that would be damaged (as result of vibrations, for example) should be provided.

Remark - In the examination carried out, analysis for each of the five transport alternatives that were studied in the preliminary project were not found. It remains unclear if the roads cross sensitive areas, or areas that fall under national or international regulations (for special protection) as for example Birds Directive, Habitat Directive, Natura 2000, etc.

Remark - No specific references were found to national and international regulations regarding the transport, storage and handling of dangerous substances in the body of the transport analysis. It is considered that this issue has to be carefully analysed, keeping in mind that there are many dangerous substances used in this project, and of course these need to be also transported.

Remark - No prognoses, (based on models) regarding the effect of an accident were made within the EIA report. Examples of scenarios that could be examined include *inter alia*: transport of oil (inside a village, outside the village, crossing a river etc), transport of sodium cyanide, transport of wastes; the climatic conditions influencing accident probability, and so forth.

Remark - While it is appreciated in the EIA Report indicates that the risks for accidents are qualitatively reduced; there is nothing specified about the method of analysis, scenarios taken into account, and so forth.

- **Recommendation** Pursuant to the above remarks, it is recommended that the project proponents produce a significantly more thorough assessment of the safety,

environmental and/or social impact of transport activities for the proposed project with a thorough analysis of the possible alternatives for hazchem transportation modality and route and discussion of the negative and positive environmental and social impacts.

4 TMF construction and management issues

Tailings are to be sent by pipeline and deposited behind the Tailings Management Facility (TMF) dam in the Corna Valley. The TMF includes a (starter) dam wall that will be constructed prior to tailings deposition. The dam will then be raised in stages throughout the life of the mine to accommodate the deposition of tailings arriving from the cyanide detoxification plant. The TMF main dam is designed to be permeable to allow water to seep out from the TMF to allow tailings consolidation and enhance stability. This water will go to the secondary pond and then it will be pumped back behind the TMF dam for recycle to the process plant.

The IGIE regards this main dam as a major risk source for the planned development. Particular focus has been applied to the basic geotechnical data, the requirements of the dam construction material and construction methodology.

4.1 General aspects and introduction

As for the other parts of the complex mining system represented by this project, the planning of the TMF is based on the BAT.[17] When referring to tailings dams this requirement is directly related to ICOLD[18] recommendations.

According to the documents available for the IGIE, the Rosia Montana TMF is planned as a tailings pond formed by a cross valley dam in the Corna Valley. This dam forms - in regard to its hydrological aspects - a portion of the global hydrological system of the whole mining complex.

Besides other features for the water quality management downstream of the Corna Dam, a secondary (smaller) dam is planned to form a Secondary Containment System (SCS). In the SCS the seepage through the main dam will be collected and pumped back to the tailings pond.

The Corna Dam is planned with a starter dam of circa 100m in height. With subsequent stages of augmentation this dam will finally reach its final height of circa 200m after 17 years of operation. At the end of the operation period, the TMF-Site will be rehabilitated for the post-closure phase of infinite duration.

- **Remark** The general concept and principal layout of the TMF as briefly described above is in accordance with the existing applicable recommendations and regulations.

4.2 Principal Design Concept of the Corna Dam

A very important feature of the Corna Dam is its design with a starter dam and the staged construction of the final dam. The design principles for these two parts of the dam are completely different.

[17] BAT: "Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities" (European Commission, 2004).

[18] ICOLD: International Committee on Large Dams, Bulletins, issued from the Committee on Mine and Industrial Tailings Dams

The **starter dam** is planned following the design principles for a sealed water retaining dam. It will be constructed in a short period of time to its full height and allows impounding of water (tailings slurry) simply by feeding in the fluid coming from the processing plant through the pipeline system (also discussed in Section 4.6.) Under the condition of a quality controlled construction of the dam according to the proposed design, the starter dam is a robust and reliable structure. However this requires that the water level in the reservoir is kept low enough to guarantee sufficient storage capacity to cope with the natural inflow under the highest expectable runoff conditions (see Section 4.5 and Chapter 5).

The **final dam** is planned for construction following the so called centreline method. This method provides the construction of a dam that is triangular in shape from rolled and compacted fill (waste rock). The upstream face of this triangle is vertical, situated in the centreline of the starter dam which remains in place right up to the end of the staged construction. The support of the "vertical wall" of the fill is given by the steadily accumulating body of the tailings solids which settle in the reservoir with the feeding of tailings slurry into it from the temporary dam crest. Thus, the final dam grows slowly along with the continuous operation of the TMF over its active lifetime until its closure.

Whereas the starter dam is a dam constructed following standard rules of embankment dam technology, the long term production of a tailings dam following the centreline method depends on a great number of factors which are virtually impossible to be foreseen and predicted in the planning state. These factors also interact with the natural conditions prevailing over the long period of "construction".

- **Concern and Recommendation** In view of the fact that these factors directly reflect on the safety of the project, the construction and operation of the Corna Tailings Dam and its associated structures must be accompanied by a supervising group of independent experts (specialized and qualified in tailings dam engineering) who are authorised to initiate actions for safety improvement if unfavourable conditions develop.

- **Remark** Independent from this, it must be stressed that the IGIE failed to find in the documentation provided a vital set of information – a quantitative analysis of the time-development of the storage-, sediment- and dam fill-volumes and corresponding sequential overall profiles along the valley axis calculated on the basis of the rates of processing quantities and water cycle.

- **Remark** Nevertheless, it can be stated that the construction of the Corna Dam following the given design is – in principle – feasible.

4.3 Geology, hydrogeology, and reservoir water losses

In the EIA Study there is evidence that substantial quantities of geological, hydrogeological and geotechnical data have been collected. On that basis it can be affirmed here, that a safe performance of the Corna Dam and its related structures can be attained.

According to the plans detailed in the EIA documentation the bottom of the TMF will be excavated in order to arrive at the colluvium stratum that has a permeability of approximately 10^{-8} m/s. When compacted, this stratum will constitute the waterproof layer of the bottom of the TMF. Where this stratum is missing or where it is eroded, the plans indicate that a new

colluvium layer will be deposited and compacted on the bottom of TMF in order to ensure the continuity of the waterproof strata.[19]

On the down stream of the TMF and near to the dam, drains to collect the infiltrated water[20] and monitoring wells are to be installed. Drains to depress the piezometric surface are also indicated for the bottom of the TMF in order to reduce the infiltration to the nearby valley.

It is considered that a few items must be mentioned here as examples for the need to improve the interpretation and to further investigate possible risks.

1. The geological formations present below the floor and the side slopes of the valley are of sufficiently low permeability, which is clearly to be concluded from the water levels measured in the investigation boreholes. However, independent of the presence of low permeability colluvial (soil) layers above the bedrock, the creation of a reservoir with impoundment of circa 100m of water (starter dam), later circa 200m (final dam) will inevitably lead to a build-up of corresponding hydrostatic water loads on the rock body all along the reservoir base.

2. In light of the above, it would thus be an illusion to try to achieve a substantial reduction of the water load on the rock body by providing artificial soil layers, or geosynthetic clay-liners in areas where natural low permeability soil strata are missing or washed away on steeper slope sections (see Volume 9, Exhibit2.45B, sketch 1).

3. As a consequence of this, the natural submersed springs nowadays existing in the reservoir flanks will be blocked by the impounding of the tailings fluid, this resulting in the diversion of these natural waters towards the neighbouring valleys. This in turn leading to a rise of the phreatic lines in those slopes and to an increase in the flow of the springs there (in such cases there may be risks of slope-instability that need further assessment).

4. It remains very important to better determine the flow rate that will accumulate in the secondary dam after the closure of the TMF; particularly as this water needs to be pumped and treated.

5. It is also important to better determine how long after the closure of the TMF this pumping and treated system will have to be maintained and in operation.

These observations lead to the following remarks and recommendations.

- **Concern and Recommendation** Examples like those make clear that under complex conditions such as those in the case in question, numerous important questions can come up which again call for independent expertise. It is strongly recommended to extend the system of monitoring into further areas of influence of the pond which do not exist as part of the project territory.

- **Remark** The considerable head of the impoundment of water at a height of 200m will also affect the percolation of the Corna Dam – the upper portion of which is according to the present design of a pervious nature (rockfill). It must be conceded that the quantification of the flow rate through the dam is very difficult to predict with

[19] Volume 2, page 19.

[20] Volume 2, Exhibit 2.49.

accuracy.[21] The problems related with this situation should at least be discussed and considered carefully as the seepage flow will directly load the SCS.

- **Concern**: An aspect of great importance in this context is the drainage capacity of the huge rockfill body which will form the downstream half of the final Corna Dam. As far as can be seen from the documents (see Volume 9, Exhibit 2.47) no technical provisions are made to safely draw off that flow in a controlled manner (drain zones).

- **Recommendation** In addition to what has been explained above regarding the flow through the valley flanks, the attention of the designers must be drawn to the static effects of the percolation through the abutments of the dam towards the valley flanks downstream. This aspect calls for careful observation by adequate monitoring.

The above points do not principally give rise to doubts in regard to the feasibility of the TMF, but call for proper consideration.

4.4 Safety under static and dynamic (seismic) loading

The IGIE considers that the information on geotechnical safety (stability) under static and dynamic loading available to date is not fully satisfactory but can relatively easily be further completed. The suggestions for additional data collection or analysis are considered reasonable and valid.

- **Recommendation** Further investigations to assess geotechnical parameters in the following areas are recommended:

    - Data on the soil mechanical properties of the sediments of tailings solids should be assessed and provided.

    - The susceptibility to liquefaction of these sediments should be assessed in the light of heavy fluid loads onto the rolled rockfill body of the upper dam portion.

    - Acceptable stability of the dam structure under static loading strongly depends on the strength attributed to the rockfill embankment body but this strength may not be guaranteed under the action of long term weathering of the material. As such, the stability of a downstream slope inclined under 1(V): 1.6 (H) is questionable (e.g. strength parameters are not provided in Volume 8, page 40). It is considered that a flatter downstream shell will be required. This point is also important in the event of mining cessation (inactivity) or temporary suspension of operations (cf. Volume 29, pages 76-107).

- **Recommendation** It should be further investigated whether it is sufficient (or not) to calculate the slope stability under earthquake loads with the quasi static approach.

- **Recommendation** In the static analysis performed so far, no seepage effects appear to have been taken into account. It is deemed that attention must be drawn to the fact that this is acceptable only under the condition that drainage elements to draw off seeping waters from the dam shell body that are reliable and effective in the long term

[21] Volume 8, page 188 indicates a seepage flow rate of 50m^3/hr while in Volume 29, page 74 a seepage rate of 77 m^3/hr is mentioned.

are provided. In this instance a bottom drainage layer in the whole downstream base and drain toe at the downstream slope end appears advisable (material: gravel made from crushed durable rock or natural gravel).

- **Remark** As it is considered that these proposals can readily be followed up, the abovementioned points are not deemed to pose serious problems for the project.

4.5 TMF water diversion and storm water management

As is also mentioned in Sections 4.1 and 4.2, the water balance of the TMF poses a particular challenge. This consideration is not only in regard to the reliability under extreme hydrological conditions (storm water) but also in regard to the operational conditions in the later stages of construction (above the starter dam level). The IGIE refer to Volume 23 (see Section 3.1) in this context:

There are many components which interact and must be balanced under various conditions. In the opinion of the IGIE, there are factors in this problem which are virtually impossible to predict with a high degree of accuracy at this point in time.

The members of the IGIE fully agree with the conditions that are included in the design so far, namely:

- to provide a free storage capacity for the volume according to 2 * PMP - events under sufficient freeboard at any time, including the post- closure phase.

In view of the formulation in Volume 25 page 8:

"The primary operational criteria for the TMF: …..

- to insure 100 % recycling of the process water to the plant and
- 'zero discharge' to environmental media under normal operating and climatic conditions; …"

The IGIE must draw attention to the fact that natural inflow into the tailings pond and evaporation are not balanced. When considering natural inflow from the valley slopes (despite the existence of the diversion channels along the shore lines on both sides), there is a "net plus" in the ratio of precipitation and evaporation.

- **Concern and Recommendation** As has been experienced from events surrounding the 2000 accident at Baia Mare, there is an urgent need to provide a open exit in the water cycle system of a tailings disposal facility in order to cope with problems such as those described above.

- **Recommendation** For completeness, provisions should be made to meet the prescriptive limits of contaminants in the effluent in the environment.

4.6 Transport system for the tailings

The Transport system for the tailings is planned as one 800mm diameter pipe (material: HDPE). The planned pipeline length is 4.35km. The tailings pipe will be located on the ground either with earth berms covering it at certain spacings or it will be fully buried. The maximum flow-rate is planned to be 2 730m^3/h = 0.75m^3/s.

For cases of emergency it is planned to place the pipe in trenches or to build an earth dam along the tailings pipe to contain the accidental overflows.

- **Recommendation** The emergency case measures are important and should be implemented and continuously observed/monitored during the processing.

- **Recommendation** In addition it is recommended to monitor the flow by means of two electronic flow meter systems (one at the start and the other at the end of the line) in order to control leakages or losses during the processing. Automatic shutdown of the circulation process should be installed linked to detection of a leakage by differential signal evaluation.

For completeness it is kept in mind here that concentration of CN in the tailings fluid is reported to be < 10 ppm after treatment in the processing plant.

4.7 Closure and rehabilitation planning of the tailings pond

Closure and rehabilitation comprise a number of various aspects. However in the context of the TMF this involves achieving as close as is feasible or possible to achieve a condition that can be left on its own within the surrounding environment.[22]

With particular interest for the TMF are challenges related to *inter alia*:

- long-term stability;
- safety against erosion;
- safety under extreme meteorological conditions (low probability events);
- minimised need for monitoring and maintenance;
- removal of all technical elements with limited lifetime;
- prevention of hazardous (contaminant) impacts to the environment;

are to be taken into account.

Many of these aspects are discussed in the relevant documents (e.g. Volume 8, page175). Experience shows that the prediction of the physical performance of the dam and - in particular - the sediment body in a tailings pond is very difficult to achieve as the operational conditions and natural conditions over a long period of mining play an important role. As such, plans for technical measures to obtain a desired situation in the closure phase of such a project should be recognised as only "intentional perspectives" rather than fact or expected outcomes.

The present perspective outlined in the respective documents (e.g. Vol. 29) are focused upon *inter alia:*

- removal of the free supernatant water from the pond by pumping it into the mining pit ponds;
- shaping and covering the surface of the sediments with slope of 0.5 % (!) for preventing oxygen contact, removal of surface water and surface vegetation;
- seeking to install a "semi-passive" system for treatment of the persisting contaminated seepage water through the Corna Dam;

[22] Indeed, as this procedure should aim for regarding the whole mine and as is discussed in Chapter 6.2.

- achieving permanent diversion of the natural runoff flowing towards the pond area (including storm water) by maintaining the diversion channels around the tailings pond and providing a control weir to limit the flow rate downstream.

The IGIE provides the following general comments to the above:

- **Remark** It can be confirmed that the relevant problems related to the closure and rehabilitation phase have been discussed in the planning documents.

- **Remark** Questions in regard to the long-term behaviour of the abandoned mining facilities remain open for further clarification. In particular this comment is relevant to the long-term pollution of the environment by slow permanent contaminant movements.

- **Remark** There is a high probability that a number of the measures proposed to technically rehabilitate the pond area will **NOT** function in the manner described in the documentation. This situation is described because inevitable phenomena such as long-term consolidation of the fine sediments (of enormous thickness), shrinkage of cover layers under atmospheric influences, and others, will interfere with and jeopardise the achievement of the described effects. Nevertheless, adequate solutions with - at least - midterm reliability very likely **DO** exist and must be found.

The IGIE group offers the following closing recommendations regarding the TMF:

- **Recommendation** The formation of an independent expert group is recommended for the review of all details in design, material quality and earthworks of the embankment structure in each of the construction, closure and rehabilitation life cycle phases.

- **Recommendation** The closure planning of the TMF (especially the possibilities of the works required to achieve coverage) needs further long-term consideration and reference to external independent expertise during the operation phase.

5 Water cycle management

This section addresses water cycle management, ARD concerns and a number of parameters of basic data validity.

Water is the element of the environment which bears the major environmental risk in transboundary context. Moreover, water use represents high volume resource consumption for the operation with utilisation within technological processes occurring at a rate of around 1 m^3/ton-ore. Moreover, hazardous chemicals will be added in processes at a concentration which is 2000 times higher than the effluent standard(s) and heavy metals will be leached out from the ore into water solutions. Further, the pH of effluents from the site can fall to less than 3 if acidification effects related to sulphide minerals are not controlled.

As such, in the event of an accident, the potential for a pollution wave passing through Romanian territory (and even across National boundaries) with a concentration sufficient to kill the living environment in the river system exists. Such events have the potential to seriously affect water use in the Aries, Mures/Maros, Tisza and Danube system. As such, the sound management of the water cycle forms a fundamental element of the environmental safety of the planned development.

The IGIE has performed its evaluation on the basis of the EIA documentation. However, the EIA has also relied on a deal of basic documentation which were not available for the IGIE for assessment. As such, limitations exist regarding the extent to which the IGIE evaluation can be definitive.

5.1 Water balance estimations

5.1.1 Precipitation statistics and calculations

The water balance for the project (and as such also to the TMF due to its central role) is based on three specialized studies. The first two studies utilise monitoring data coming from the meteorological stations in the area of the project. These include data from the Rotunda – Rosia Montana Meteorological station (1983 – 2005) and from the Abrud station (1965 – 1999) respectively.

The third study takes the form of a new report performed by an independent expert. Here, data is analysed from 21 meteorological stations in an area of about 60 km around the Rosia Montana. Based on the data analysis of these data over a period of 16 years 10 stations were chosen considered as representative for the location Rosia Montana. The analysis addresses two different periods: one in summer, from May to November and the second from December to April. The results indicate that the value of Maximum Probable Precipitation is higher than the one which was obtained in the previous assessments. The values of maximum winter precipitation were combined with the maximum ice melting.

Notably, the study indicates that the most extreme value for precipitation is likely to occur during the summer period. In addition to the Maximum Probable Precipitation, the values for other probabilities were also recalculated. These values are similar with the ones obtained from earlier studies.

- **Remarks** In summary, a series of remarks are listed here:

- The first two studies were based by the meteorological data obtained from two meteorological stations in the project area

- The additional study performed by an independent expert was performed in order to evaluate extreme precipitation events. This study was based on the data from 10 meteorological stations in a 60 km area around the project's location;

- The maximum values yielded by the new study (Maximum Probable Precipitation) are greater than the earlier studies and have been used to dimension the TMF;

- All studies generally indicate similar values and likelihoods for other different events;

- The potential effects of climate change (with the concomitant effect that rainfall intensities for short events are increasing all over Europe, does not seem to have been discussed.

5.1.2 Water extraction and ecological flow rates for local waterways

The water balance takes into consideration the necessity to ensure the minimum ecological flow rate for the river within the project's area of influence.

During the operation period of the project the water need will vary between 66 and 70 l/sec. About 80 % of the water will be provided by water recirculation; the rest will come from different sources. One intake will be built on Aries River. The analysis of the effect of the water intake was made for two scenarios, related to the flow rate extracted by other companies in the river basin:

- The flow rate stipulated in the water management permits of each company;

- The real extracted flow rate by each company.

Both scenarios show that 96 – 100 % from the maximum extraction needed flow rate will be assured for the project; in this case the minimum ecological flow rate of the river will be three times greater that the necessary.[23]

5.1.3 PMP and TMF overtopping

The storage capacity of the TMF over and above the deposited tailing is about 2 PMF. This means that the free height over the deposited tailings is sufficient to allow the accumulation of two successive Maximum Probable Precipitation plus 2 m as safety guard. This corresponds to an overtopping probability of 0.0000001%.[24] As such, the storage capacity is greater than the indicated requirements for the entire operational period.[25]

- **Remarks** In summary, a series of remarks are listed here:

[23] Volume 4, page 4.

[24] Volume 2, page 37.

[25] Volume 2, Figure 2.7.

- The safety height of the main dam appears to be safely established;
- The precipitation (maximum value, annual average value and minimum value) are greater than the evaporation;
- The water in the TMF is to operate with closed circuit but in this case it is not specified what will happen with the precipitation that accumulates in the TMF;
- There are also some cases in which contaminated water that cannot be discharged in the rivers is pumped in the TMF; while these seem to involve small flow rates, these also accumulate;
- The ex-filtrated water is pumped from secondary retention dam back to TMF;
- The potential for significant evolution of climatic changes within the project lifespan are not taken into account in this moment.

5.2 General remarks and observations regarding water cycle

The basic design criteria rely principally upon the "current version of the Project Water Balance". The major water component design parameters are summarised in Table 3.1 of V23. This basic documentation was not available for IGIE, and the detailed control checking related to the justification of the data was beyond the capacity of the expert group.

One member of the IGIE (IB) had the opportunity to examine the basic documentation earlier. He lists in his statement that the water balance for the project is based on two studies. Further, he considers that the Report regarding the water balance in the project was reviewed in order to take into account the values of the precipitations on the last five years, as they resulted from the RMG meteorological station (Volume 4, page75).

As such it was deemed that the hydrological study, the base data, the model used is rigorous and well assessed and the hypotheses presented as alternatives are judged to be correct. The water balance takes into consideration the necessity to ensure the minimum ecological flow rate for the river from the project area of influence.

- **Remark** Regarding the fact that the environmental protection strategy relies on the assumption that closed water cycle is possible in the planned development, the IGIE holds that this issue should be handled in a conservative fashion.

5.2.1 Hydrology, water balance

The IGIE notes that the hydrology of the design area must account for a net positive balance precipitation/evaporation of around 300mm plus per year. Beyond this, all the contaminated waters from the process plant, the Cirnic waste rock area (after ARD treatment), Cetate waste rock dump (after ARD treatment), the domestic wastewaters (after an undefined treatment), polluted ground waters, and polluted surface waters will be collected at the Tailing Management Facility (TMF). In the assessment made by the IGIE, no reference for water loss from the system was found. In spite of this, a closed water circuit is planned for the project. If the material has been interpreted correctly, then this is possible only when excess waters are continuously stored in an increasing amount.

Although it is not stated clearly in the text above, the IGIE cannot exclude that the situation arises where all excess waters will require storage within the TMF up to the closure period. The amount of these wastewaters is estimated around 7Mm^3 by the end of mining activity. If this is the case, the environmental risk consequences of this toxic (partly detoxified) water management concept are not acceptable. Moreover, it was not clear to the IGIE what the minimum height difference between the tailings and the top of the dam will be with specific regards to the necessary reserve capacity for industrial reuse water, storm waters, winter conditions, and so forth.

- **Recommendation** It is thereby recommended that this item be clarified with a summary of the water balance included losses and management of excess waters (if any) and freeboard details.

5.2.2 Future fate of the excess waters

The EIA states that: "Contingency cyanide treatment plant is available but only used in operations if required to recover TMF storage after PMP event for example; in closure it may be used when pumping decant pond water to Cetate Pit Lake".[26]

- **Remark** The indirect message from the text above that the mine pits will be used for final emplacement of partly detoxified waters in the closure period. This solution could be strongly criticized from environmental point of view.

- **Recommendation** It is thereby recommended that thorough details of where the surplus water will be dealt with are provided for operational, closure and post-closure stages of the operation.

5.2.3 Cyanide detoxification in the process circuit

Around 1 m^3/t used water will be recirculated from the TMF to the technological process circuit where the required cyanide concentration is above 200 mg/l in the water. This water will be detoxified to less than 10 mg/l WAD cyanide. Further cyanide degradation is then (reasonably) assumed within the TMF and the water then is cycled back to the process with new cyanide dosing up to 200 mg/l again.

Certain counter-interest can be seen in this procedure as the higher the efficiency of detoxification and degradation, then the higher the amounts of fresh cyanide that will need to be added to the process. There was no reference found by the IGIE in the EIA document on who and how often will monitor the effluent quality from the technology to the tailing pond, and who will control the performance promised in the EIA. Similarly no reference was found to efforts to minimise the requirements for additional cyanide addition.

5.2.4 Operation in winter conditions

According to the documentation, water will be recycled from the TMF to the mill via a floating barge pump station located in the decant pond[27] according to the document.

[26] Volume 11, page 47, Fig. 4.1.11.

[27] Volume 23, page 31.

However, no details were found of winter time operational conditions in the process description.

- **Remark** Similar to queries posed in Sections 2.4 and 2.6, it is deemed that information would be useful regarding the operation of transport and reclaimed water pipelines as well as spigotting systems under winter conditions.

5.2.5 Treatment of the different contaminated waters

As a general opening concern, the chapter on waters does not explicitly mention or take into regard the Water Framework Directive (WFD), the objectives of which must be implemented by Romania as the country enters the EU. As such, the national authorities are tasked with delineation of water bodies, setting up quality standard parameters related to the good quality status of the given water body, and decisions on effluent quality standards. The project proponents are in turn required to (i) to perform according to the effluent standards, and (ii) to prove with proper self monitoring that the effluent standards are met. While the IGIE accepts that there are uncertainties related to the planned water treatment technologies and that delineation of regulatory requirements may not yet have been received from the authorities, the WFD should be recognised more clearly in the documentation.

- **Recommendation** The project proponents should include details in the EIA that provide explicit details of how the treatment of waters from the site will satisfy the requirements of the WFD.

In general, it was found that it is difficult to obtain a clear picture of the contaminated water treatment strategy. Statements from the EIA documentation in this regard are included below.

- A treatment plant for diluted water cyanide solution is mentioned.[28] The Project proposes 3 procedures (oxidation using peroxides, adsorption using active carbon or other adsorbents and reverse osmosis) which will all be tested in pilot phase operations during the Project construction period. Further, lagoon systems for a passive/semi-passive process of treatment will be commissioned in the last 3 years of operations.

- There is also a treatment version allowing for the direction of waters to detoxification plants for advanced purification if the downstream passive treatment lagoons do not provide the water quality results required for discharge directly to the environment.

- A detoxification plant will also operate during the closure phase. If necessary effluent will be treated with INCO's CN treatment or one a process of oxidation using peroxide depending on the effluent's composition after the advanced treatment of diluted waters.

- Over the first 6 years of the mine life, the wastewater treatment plant will treat average and maximum flows of 272 and 400 cubic metres per hour respectively (75 and 111 l/s).[29] After the end of the year 6, the plant will be expanded to treat on average 375 cubic metres per hour (104 l/s) with a maximum rate of 650 cubic metres per hour

[28] Volume 2, page 132.

[29] Volume 23, page 60.

(180 l/s). Additional details are promised to be provided in future versions of the Water Management and Erosion Control Plan.

- A contingency cyanide treatment system treatment plant will be provided[30] before commencement of operations to remove residual cyanide concentrations in the TMF decant pond and/or SCD pond to a concentration below the TN001 limit of 0.1 mg/L total CN. This will ensure that discharges can be made to the environment under certain conditions for the purposes of effective water management (e.g. for storage volume recovery after a PMP). Design and management criteria for this plant have yet to be finalised and will be included in future versions of the Water Management and Erosion Control Plan.

The IGIE reviewers did not find general references for a number of important criteria. These include inter alia: the basis of WWTP sizing; details of the planned technology/process choice; and when the commissioning is planned. The assumption that storm water dilution up to the level where the quality is in accordance with the effluent standard of 0.1 mg/l CN appears partly unjustified. Reference is given for rain water dilution and treatment lagoons[31] also, but dilution itself can not be regarded as proper treatment.

5.2.6 Open issues of the water management cycle

There are several issues in the document which have been left open, remain to be developed, shall be trialled and built later and so forth. These include wastewater treatment technologies,[32] sediment capacity of the Cetate pond, and more.

- **Remark** The IGIE queries the number of options that are left for "later design or consideration".

5.3 Water cycle recommendations

Based on the observations listed in Section 5.1 and the content of the EIA in general, a number of recommendations are proffered by the IGIE. These are listed here.

- **Recommendation** All basic data and preliminary assumptions related to the hydrology of the area and the water balance should be counterchecked. The IGIE proposes a detailed independent evaluation of the calculations by independent international experts. Among other things, the possible consequences of the climatic changes should be subject of this evaluation. This issue was discussed briefly,[33] but has been left out from the calculation as "these are only indicative".

- **Recommendation** A clear(er) balance of all used waters should be added to the basic documentation. The change of the amount of stored toxic waters, the availability of storing volume, the change of water covered surface on the TMF should be discussed. All quality and quantity consequences should be explained and justified accordingly.

[30] Volume 23, page 61.

[31] Volume 2, page 159, Fig. 2.10.

[32] Volume 23, page 60-61.

[33] Volume 23, page 10.

A key element of the environmental performance of the planned development is that the cyanide rich waters will be detoxified to 10 mg/l concentration WAD cyanide.

- **Recommendation** It is recommended that the efficiency of the detoxification should be subject of continuous control by a responsible authority. Reference should be given that (i) the legal basis exists for the environmental authority to check water quality inside the technology and for taking enforcement measures in the case of non compliance (ii) the proper institutional capacity will exist for the continuous control and (iii) monitoring data will be open for interested outside parties.

- **Recommendation** Winter time operational conditions should be addressed with additional rigour in the EIA with special attention to water quantity, quality issues and operational installations under extreme winter conditions.

The IGIE is concerned that the closed water circuit[34] in the technology process is an overly optimistic assumption, especially regarding experiences with the pollution event in the year 2000 in Baia Mare.

- **Recommendation** The planned development should be prepared for the detoxification and treatment of the effluent waters up to the valid effluent standards by the time of commissioning of gold recovery. The necessary water permits should be available by the time of environmental permitting procedure for all kind of used or contaminated waters.

The IGIE is concerned that future plans (design items left for future determination) related with water treatment provide an insufficient basis for justification of sound solutions.

- **Recommendation** It is recommended that undertakings should be sought that all investments needed for decreasing the environmental pollution load to the level required by the National and European legislation should be permitted, built and trialled by the time of commissioning the mine (i.e. the start of gold recovery).

5.4 Cetate acid water pond

The exfiltration of acid water from old mining works (including also exfiltration from installed drainage gallery(s) will be collected in the contaminated water pond – Cetate. The dam of this water pond is of class II importance and in category B according to Romanian standards. The height of this dam is 31 m (39 m) and the total catchments area is 4.9 km^2. The maximum normal capacity of operation is 600 000m^3, including up to 25 000m^3 of stored sediments.

It is estimated that a flow rate between 231 and 371 m^3/h of acid water will be collected. In order to maintain a minimum ecological flow-rate in the Rosia Valley, a diversion channel will be constructed to collect and transport clean water from the catchment around the Cetate dam. This water will be discharged in the Rosia valley. At the start of operations, the channel will drain a surface of about 7.5 km^2 that has not been affected by historic mining works. As such, in the first stage the minimum flow rate of Rosia Valley will be affected to only a limited degree by the construction of the dam.

[34] Albeit it is recognised that the tailings dam is permeable.

After mining operations have ceased, this dam will be perforated as soon as observed qualitative parameters of the stored water correspond to the imposed norms regarding the discharge of the water into natural water bodies. The entire exposed surface will be re-arranged in order to reduce the remaining effects and as much as is possible the natural profile of the Rosia Valley will be restored. Revegetation of the area will be carried out. The system of treatment lagoons that will be built downstream of the dam will be maintain in operation after the closing of the activity in order to ensure a semi-passive treatment of storm water.

- **Remark** The IGIE perceives that the designed solution for the management of the Cetate acid water pond is adequate.

- **Recommendation** A clear statement is necessary on the amount of contaminated water remaining at the time of cessation of operations and active mine closure activities; and upon its future fate. This statement should include waters held in surface bodies and in subsurface reserves (groundwater/pore water).

5.5 Carnic Waste Rock Stockpile

Discussion of the waste rock stockpile has been included in this assessment of water cycle due to the potential for acid water generation associated with them and their consequent importance for water management issues.

The projected waste rock stockpile will include some 257Mt material. The rock extracted from quarries and a portion of the waste rock shall be used for the construction of the dams of the TMF from Corna Valley and also for the two dams for water retention. As much as the waste rock will not be used for construction activity it will be transported to the Cetate and/or Carnic Waste Stockpile. Starting with the 10th year of the project activity the Carnic pit will be filled with waste rock coming from the final stage of the Cetate, Orlea and Jig quarry mining.

Before any spoil will be deposited in the area designated for this purpose, vegetation, soil and degraded rocks will be removed. The remaining soil will be compacted in order to ensure a reduced permeability on the bottom of these spoil banks. Channels will be constructed around the spoil bank in order to collect storm water. All surface water runoff from the spoil bank will be transported to the water management system and will be collected in TMF or in another retention structure. This water will then be pumped to the industrial waste water treatment plant or to the processing plant.

The disposal of the waste rocks to the spoil bank will be made selectively; the rocks that have a potential to generate acid water will be deposited at the interior side of the spoil bank.

When the mining activity will be finished both spoil bank will be re-arranged and covered with vegetal soil. The slope will be 2.5:1 with steps at about 2.5 m width. At the end of each levelling stage the slopes and the stairs will be covered with topsoil to facilitate revegetation.

- **Remark** The IGIE perceives that the designed solution for waste rock management and management of contaminated runoff from the stockpiles is adequate.

5.6 Other water cycle concerns

A first item in this section addresses an apparent oversight. Although the probability appears very low, the IGIE cannot exclude an accidental pollution spill owing to a dam failure, delay of dam construction compared with the utilisation of storage volume actually available, or to

extreme weather conditions. The IGIE did not find adequate reference within the EIA documents regarding the possible effects of this event downstream in the regional watershed.

A second item for concern recorded here are upcoming requirements from the European Commission addressing groundwater protection. The Council Directive 80/68/EEC of 17 December 1979 on the protection of groundwater against pollution caused by certain dangerous substances indicates (paragraph 3) that "Member States shall take the necessary steps to: (a) prevent the introduction into groundwater of substances in list I. Cyanide is included in list I (8th position). European Commission has adopted the proposal for a Groundwater Directive (COM (2003)550 final) on 19th September 2003.

Further, the draft Directive on the protection of groundwaters against pollution[35] indicates (paragraph 10) that the protection prescribed in the Directive 80/68/EEC should be continuous regarding the measures aimed at preventing that pollution could reach the groundwaters on direct or indirect way. This directive will likely come into force at the end of 2006.

- **Recommendation** In recognition that Romania will attain membership of the EU as of January 2007, the IGIE proposes that the prescriptions of the coming EC Directive on the protection of groundwater against pollution 2003/0210 (C0D) (and its subsequent revisions) should be regarded as they were introduced in Romania, and consequently artificial groundwater protection should be required with proven quality under all storage facilities where cyanide can occur in concentrations above the effluent limit.

[35]Referring to updates of the proposal for a Groundwater Directive (COM (2003)550 final) of 19th September 2003.

6 Environmental management, audits, and transparency

The BAT suggestions/guidelines for environmental management systems (EMS) include a long list of features that are intended to ensure that EM practices at a mine represent BAT.

- **Remark** In essence, the BAT issues for EMS systems appear to have been addressed diligently and indeed the BAT checklist appears to have constituted the starting point for the work. Moreover, the promised EMS and its review processes are apparently anchored at the top management level of the company.[36]

6.1 External party insight

In this review it is accepted that at present the EMS is a "plan only" and that it is quite reasonable that much work needs to be done to implement and operationalise it. As such, the queries or concerns are principally related to one aspect – that of general transparency.

- **Recommendation** It is considered that a large degree of external party insight to the conduct of this project is important and is reasonable to expect. As such, it is recommended that this be sought by the authorities during (eventual) licensing of the project.

Two additional items should be clarified in this regard.

6.1.1 Environmental policy

The first is related to the environmental policy that is promised within the EIA to be available on the home page [to quote: *Roşia Montană Project Environmental and Social Policies and Commitments, which is maintained separately and published as a controlled document on the RMGC website (www.rmgc.ro)*]. This was not found. While this is pointed out and a clarification should be sought, it appears that the intent of the project proponent is good.[37]

The underlying context of a policy is stated in the EIA documentation.[38] This is included for reference here.

These policies and commitments demonstrate a fundamental commitment by RMGC to:

- *Achieve and maintain compliance with applicable Romanian regulatory requirements, European Union guidelines, and other relevant international standards;*
- *Continually seek to refine and optimise the environmental and social management practices implemented on the project;*

[36] ESMS Plans, Appendix P, page 41-47. A comprehensive internal management review of the overall suitability and effectiveness of the Roşia Montană Project Environmental and Social Management System will be performed by a Management Review Board (made up of the Functional/Operational Directors and General Counsel, with the assistance of the Manager, Environmental Management and Assistant Manager, Community relations) at least annually.

[37] This said, the members of the IGIE have indicated that Romanian stakeholders and Hungarian stakeholders have experienced considerable difficulty in navigating to, or finding vital project information; this in itself may not be an indication of non-transparent behaviour, but none-the-less a number of interested parties have had difficulty finding relevant information.

[38] Roşia Montană Gold Corporation S.A. - Report on Environmental Impact Assessment Study Environmental and Social Management Plan, Section 2: Environmental and Social Policy Page 6 of 38

– *Manage, mitigate, or (where feasible) prevent the potentially negative environmental and social impacts associated with the Roșia Montană Project; and otherwise*
– *Provide demonstrable economic, social, and environmental benefits to nearby communities and the Romanian nation as a whole.*

These policies and commitments also emphasise open communication and consideration of the environmental and social interests of the adjacent communities, regulatory agencies, and other interested parties who have an interest or stake in RMGC performance.

A second point for clarification is related to the BAT recommendation that the management system and audit procedure be examined and validated by an accredited certification body or an external EMS verifier.

- **Remark** An explicit statement of requirements for, or acceptance of, an external audit was not found in the documentation examined.

6.1.2 Independent auditing

Also related to this, BAT guidelines indicate that "independent (where practicable) internal auditing in order to determine whether or not the environmental management system conforms to planned arrangements and has been properly implemented and maintained". In this regard, the proponents promise that a comprehensive evaluation will be performed on at least an annual basis that addresses the functionality of the various environmental and social management plans, procedures, and other elements of the Environmental and Social Management System, in conformance with MP-12, "Internal Environmental and Social Management System Performance Verifications." Verification responsibilities will be assigned to an Independent Compliance Management Team comprised of RMGC personnel and/or independent contractors or consultants, subject to the functional independence, qualification, and training requirements specified in MP-12.[39]

- **Recommendation** In this regard it is recommended that clarification be sought to clarify how "independence" can best be maintained in such reviews, and where and how the external verification of the system will take place.

- **Recommendation** The IGIE considers that during (nominally) the first one-third of the project lifetime, the project should be subjected to multi-faceted EMS audits, in which (for confidence building) trans-boundary stakeholders should also be invited to participate.

6.2 Personnel resources and capacity

Moreover, personnel resources and management capacity within the organisation are vital to the meaningful implementation of any management system.

- **Recommendation** In this regard, it is recommended that the project proponents be required to provide estimates of the environmental management team and its capacities. This should include *inter alia*: role descriptions, qualifications and task time-lines. As an alternative or complement, clear requirements (a detail scope of work) for an external company to perform EMS tasks could also be required.

[39] Ch 1 ESMS Plans Appendix P, page 40-47.

7 Closure issues and concerns

In the EIA, the project proponents indicate that funds to cover closure of the RMGC project will be covered by a financial guarantee to ensure money is available for this work irrespective of any change in economic conditions. This is an important undertaking and is clearly of interest in and importance for parties affected, or potentially affected by the project (such as downstream countries).

Financial Assurance (FA) is increasingly seen as a means to ensure orderly, clean and lasting closure of mines. FA encompasses environmental surety instruments that protect the government and public in the event a mining company cannot meet its reclamation or rehabilitation obligations. As such, FA is generally the money available for closure of the mine in the case when the mine owner is not available to perform the work.

7.1 Mine closure and rehabilitation

Several aspects of mine closure are briefly introduced here. They include the financial guarantee required for the project; the specific details of the project for which the guarantee is defined; the possibility that the mine plan does not represent a foreseeable mine future; residual pollution should the project be cancelled, and general governance issues beyond the scope of the EIA documentation.

7.1.1 Funding mine closure

According to the EIA documentation, the Mine Closure Plan being developed for the project outlines a plan for decommissioning the facility, rehabilitating the site and implementing a long-term programme of after-care. It goes further to indicate that as part of the EIA and permitting process, a mine closure process, schedule and financial guarantee structure will be defined and agreed to. The preparation of a decommissioning and rehabilitation strategy before the development of the RMP is described as an integral part of the process.

- **Remark** As such, the undertakings detailed appear to be representative of good practice. The IGIE considers that the risk at hand therefore is whether they are carried through or not. In this regard, the responsibility for the setting of proper, fair and adequate conditions for closure – and the agreement of an adequate sum of money to be set aside and held as an "insurance" against the risk of the miner not closing the site – must lie to a significant extent as the accountability of the licensing jurisdiction and the government of Romania. Similarly, the accountability for monitoring the performance of the miner against set rules during the conduct of mining is also the accountability of these responsible parties.

7.1.2 Specific details of mine closure provisions

According to Articles 7-2(d) of the EU Mine Waste Directive and the Terms of Reference (ToR) of the EIA, the proponent has indicated adequate arrangements by way of a financial guarantee will be made available, as required under Article 14 of the EU Mine Waste Directive (2006/21/EC), so that "all obligations under the permit issued pursuant to this Directive, including after-closure provisions, are discharged".

It should clearly distinguish:

A. The technical concept of mine closure, time estimates of the activities including the post closure phase is contained in the Mine Closure and Rehabilitation Plan (& Waste Management Plan).
B. Cost estimates broken down according to the relevant activities and time periods
C. Arrangements of financial instruments to guarantee the funds are available when they are needed, including the calculations of the financial net present value.

- **Remark** For item A above, time estimates somewhat unclear in some regards, especially with regards to the long term management of leachates from the TMF. Further, no significant mention was found of the need for flexibility regarding the operation of the mine (time and waste volumes).

- **Remark** For item B, the most significant query is related to a rolling "revised plan for closure" and financial set asides made for unscheduled closure. Unscheduled cessation of mining at any point would disrupt the mine plan and many "closure activities" linked to ongoing operations would become void. For example, should the mine become uneconomic and mining activities cease at a point where the Cirnic pit and the Jig pit had not been backfilled (with run of mine waste rock from other mining areas), then these pits would not be backfilled. Rather, it is probable that the only economic closure option would be water filling (BAT is that filling is performed by transfer mining and in such a scenario there is no mining operation to transfer).

- **Recommendation** If this scenario were not acceptable, then extra EFG sum(s) would need to be negotiated for the remediation of the pits (with same being refunded at the acceptable completion of backfilling according to the mine plan). It appears that there needs to be agreement to link periodic review of the mine plan (included in the EIA) with an additional group of financial items. A high priority in this area should be a firm link to activities that are based on transfer mining tasks.

- **Remark** Item C. A number of important details were not found in the examination of the EIA documentation regarding where the EFG shall be placed or where it is envisaged to be placed. There is no mention of a bank, bonding company, insurance company, financial institution or other. Nor is it mentioned what the mode of fund accumulation might be. Nor are there indications of how the EFG will (or could be) divorced from company assets (an extremely important item in the case of bankruptcy).

- **Recommendation** While it is accepted at these details would be negotiated with the Romanian Authorities before the project is approved, in this instance it is recommended this issue should be fully resolved before any final permitting process is undertaken.

- **Remark** Related to both item B and C, The details of a residual fund to manage effluents into the future were not clear. While it is clear that there are residual and ongoing costs of circa USD 1.25M per year, neither the sum set aside[40] nor its likely management structure are made clear in the documentation.

[40] While no sum is mentioned, a sum of around USD 10M is inferred on p.38 of Mine Rehabilitation and Closure Management Plan where the following quote is found " Backfilling the Cetate pit would incur additional cost of the order of USD 100 million. This is an order of magnitude more than the cost estimated for long-term pit water management".

Concern and Recommendation The IGIE consider that the financial guarantee is an absolutely fundamental issue for safe mine (project) closure. It is considered that the mode of accumulation and the management of the EFG should be a key point and a general precondition for project consent from both the Hungarian and Romanian parties. Moreover, considering the highly cyclic nature of gold prices it is necessary that the EFG recognise that the possibility exists at some point in the project life cycle that it is loss-making. Furthermore, the EFG should NOT be based upon profit set-asides (earnings) but should be set aside based upon estimates of closure costs for the project during each year of operation.

7.1.3 Contingent expansion or continuation of mining activities

Within the EIA documentation there is a marked lack of discussion and explicit planning for the contingency that mining operations continue beyond – or even well beyond the indicated closure dates.

- **Remark** This is markedly inconsistent with a number of items in the EIA. In a number of locations, the EIA documentation clearly recognises and explicitly states measures taken NOT to sterilise resources. In particular the Cetate ore body falls into this category. Discussions were not located in the EIA documentation that addresses the contingencies that will need to be built into the mine plan to account for this.

- **Recommendation** It is considered that this is an item that should be specifically highlighted in the final EIA documentation and related agreements as it has the potential to affect two factors that are critical to the mine plan – i.e. the rehabilitation plan and time scales for operation.

Again related to the above point, or as an example of such, some minor concerns regarding the strategy for management of water in the absence of the Cetate void as a water management facility can be expressed. For example, if mining were to continue underground in the Cetate ore body (a reasonable possibility) then a major component of the mine water management strategy would become unavailable. In the EIA, an interdependence of water balance etc with the Cetate pit for closure of other parts of the operation is made, but clear recognition that the Cetate pit could become the site of an underground mine – thus not become available for such purposes – is not addressed in any way.[41]

- **Recommendation** It is held that a strategy for management of water in the absence of the Cetate void is required. Indeed, recognition of this in the management plans is necessary.

7.1.4 Closure considerations under Zero Option

Remark Under the "Zero option" for Roşia Montană, which describes the status if the project should not go ahead, it is correctly noted that substantial environmental remediation works must be carried out with funding provided from public sources or from donor aid. The

[41] The importance of the pit to water management is listed on page 83 Section 5, Mine Rehabilitation and Closure plan *"Inter-dependence with other closure and remediation activities: The open Cetate pit serves as a reservoir for TMF decant pond water which is removed from the impoundment area within a short time in order to start consolidation and covering of the TMF in the shortest possible time. Backfilling of the Cetate pit would bar this option, unless extra water treatment capacity is installed to remove the residual cyanide from the decant pond water, or waiting a sufficient time (several months to years according to model calculations) until natural degradation has led to a cyanide concentration below 0.1 mg CNtot/l". Due to the volume of water, the pit lakes will be used as the focal point for water treatment during the closure period. Use of the pit lake will be transitioned over a period of several years starting at the end of Year 16 after the termination of ore processing. Pit lake management will consist of measures implemented during and after operations"*

project proponents indicate that the (their) cost estimates for mine closure activities required at the existing RosiaMin operations in order to achieve an environmental standard comparable to that achieved by the RMGC project would be €23.2 million.

– **Remark** While the veracity of this costing has not be assessed,[42] it is noted here that a) such funding would need to be found, and b) such works may not take place even in the medium term. As such, the existing environmental damage related to the site will be ongoing for some time. This situation is important to any evaluation of the project.

7.1.5 General governance issues

Moving away from specific issues, it appears that an additional but significant closure issue does exist that is currently beyond the control of the company and cannot be specifically covered by the EIA. This can be seen largely as a governance risk.

– **Remark** Countries such as Romania have yet to develop sufficiently sophisticated corporate governance, regulatory frameworks, or financial and insurance markets to adequately address mine closure rules or funding. This indicates a possibility that insufficient bonding, monitoring and enforcement could eventuate. Capacity building in such areas is also generally listed as a priority need.

This stated, the IGIE is hopeful that the high visibility of this project for critical stakeholders should provide significant motivation for governing bodies to perform well in this regard. If these issues are recognised and dealt with by the authorities, it appears that such environmental risks can be markedly reduced.

7.2 Chronic pollution

Chronic pollution issues are important for the area if the project goes ahead or not.

7.2.1 General environmental context prior to proposed operations

The area suffers from considerable pollution – much the result of mining activities – particularly open pit mining that has been conducted since the 1970s. In and around Roşia Montană there are circa 400 hectares of disturbed ground with large scars from open pit mining, tailings and waste rock deposits, dams, waste dumps, and abandoned equipment.

As a result of this long history of mining, during which few environmental controls were applied, significant environmental impacts on the surrounding areas include:

- Contamination of air quality by dust blown from barren working areas and mining wastes (waste rock and tailings);
- Contamination of surface and underground waters with heavy metals, as a result of oxidation of remnant sulphide minerals (Acid Rock Drainage) in old mine workings and in waste deposits;
- Contamination of surface water by process plant discharges and uncontrolled run-off from operational and derelict mined areas and mine dumps;

[42] Experience within the IGIE team suggests that the remediation figure could be higher.

- Contamination of soils by waste materials and run-off from mine voids and waste dumps;
- Derelict land consisting of unrehabilitated mined areas and waste dumps.

In relation to the potential for transboundary impacts, the main concern regarding the existing setting is the contamination of surface streams. These form the headwaters of a river system that ultimately crosses national boundaries, and they are currently subject to contaminated discharges from the existing mining operations.

Surface watercourses represent both the main pathway and the receptor for any Project related pollution having transboundary significance.[43] Polluted discharges from site and consequential changes in water quality have implications for a range of water users, including:

- Industrial and agricultural users.
- Wildlife (especially aquatic wildlife);
- Communities that use river water and depend on access to useable water for their livelihoods (such as fishermen);

– **Remark** Considering the significant existing pollution detailed above, the closure and remediation of the existing environmental harm should be considered a prerequisite. The IGIE considers that any additional environmental burden related to the new project is unacceptable as the historical pollution conceivably caters for all "capacity" for environmental pollution.

As far as environmental issues are concerned, the project proponents and the EIA indicate that the project will meet the current Romanian and EU legal requirements and will also follow relevant World Bank Guidelines, industry best practices and best available techniques. There are several project areas where these undertakings are of particular interest for stakeholders, including: tailings and water management; the utilisation of cyanide in processing; and closure.

The Cetate Water Catchments Pond on the Rosia Stream is a central portion of the environmental controls for existing pollution. This structure included as part of the mine design – is to be constructed to ensure that contaminated runoff from historic mines no longer enters watercourses and that runoff from the new mine is also intercepted. Water from this pond is to be treated and clean water will then be released to maintain stream-flow in the Rosia and Corna Streams. This management scheme should result in a very significant improvement in water quality in the local streams compared with the current situation. As such, the net impact on the water quality of the Abrud River is therefore forecasted to be positive, bringing significant contribution to the improvement in water quality in the Abrud River. However, because of the extremely small contribution (in terms of both quantity and therefore quality) of the Abrud River to the quality of water in the Mures river flowing into Hungary, the project proponents indicate that this positive impact will have no significant transboundary effect, despite its influence being beneficial.

– **Remark** In regards to the comments above, it must be recognised that the most significant regional polluter is the adjacent Rosia Poieni copper mine.

[43] A detailed discussion on surface waters is provided in Chapters 4 and 7 of the Environmental Impact Assessment study.

7.2.2 Formalised working relationship with Minvest for remediation of residual pollution sources from old RosiaMin mine

While the IGIE considers that this may only constitute a minor point due to the fact that the majority of the Rosiamin mine footprint is to be enveloped and extinguished by mining operations planned by the Rosia Montana Project, it is none-the-less considered worthy of mention.

- **Remark** No details regarding the formalisation of a working relationship were found in the EIA documentation. However, arrangements for working with Minvest for the redevelopment or rehabilitation of old workings, the hand-over of areas, and delineation of pollution remediation responsibilities will be required. They will also have some minor bearing on the progress of dealing with the present pollution problems. It remains possible that Minvest would carry out (or NOT carry out) a portion of the rehabilitation works themselves in a manner not addressed by the EIA. As such a proportion of the risk control measures promised in the EIA may become null and void as the state run company would perform them as they see fit. There is also a possibility that Minvest works could disrupt the progress of the RMP.

8 Conclusions and recommendations

The Independent Group of International Experts (IGIE), consisting of:

- Prof. Ioan Bica PhD, (Romania) Technical University for Constructions, Bucharest;
- Prof. János Földessy PhD, (Hungary) University of Miskolc;
- Dr. Ing. Karl Kast, (Germany), the Baden-Württemberg Chamber of Engineers;
- Sándor Kisgyörgy, (Hungary), Környezetvédelmi szakértői iroda KFT;
- Prof. Eugeniu Luca PhD, (Romania) Land Reclamation and Engineering Faculty, University of Bucharest;
- Assoc. Prof. Philip Peck PhD, (Sweden), University of Lund and UNEP Grid Arendal;

has been created to review the Environmental Impact Assessment Study Report (EIA) of the Rosia Montana Project (RMP) in Romania.

The extensive material of the EIA (33 Volumes with in total nearly 5000 pages), supplied to the IGIE, was reviewed with foci primarily on:

- the transboundary effects aspects of the potential development,
- technological processes and
- mining and processing facilities.

The IGIE has studied and reviewed the critical points, technological parameters, transporting pathways, storage facilities, and so forth that have the potential (e.g. in the case of an accident, mismanagement or malpractice) to lead to development of a transboundary environmental incident. The review encompasses the project life cycle from the design phase, through the operational life and includes the closure and post-closure phases.

The IGIE regards that the security of the planned activity relies on five basic principles and these have constituted the point of departure for the assessment:

- Construct with robust levels of security;
- Construct and operate under strict quality assurance regulations and procedures;
- Construct according to the permit and operate under strict authority control and with transparency;
- Provide adequate financial guarantees that for the implementation of all environmental safety measures required by the control authorities, even in extreme events, or in the time of closure;
- Construct and operate under the control of a National control authority with proven legal, personal, professional and financial capacity to enforce the requirements of National legislation in harmony with EU directives and principles. and with international insight,[44] with due regard for the international consequences of the planned development.

[44] It is considered by the IGIE that this needs to involve the ongoing engagement of an international expert group who are tasked to evaluate the safety and environmental performance of the operation on the basis of the actual Environmental and Social Management Plan of the company and its mode of operation. Within the terms of reference for such a group, it is considered that the following items should be included *inter alia*: evaluate the environmental performance of the

While significant evidence has been found for the planning of a robust project (as defined above) in the EIA documentation, the preliminary questions that were raised by IGIE and communicated to the project proponents via Romanian authorities, were not answered on the occasion of the site visit of the IGIE. As a consequence, the detailed Environmental and Social Management Plan (ESMS) that complements the EIA documentation has formed the basis of the assessment. The IGIE considers that this ESMS can provide a sound basis for best practice operations after some modifications, development and refinement. The ESMS will serve to support attainment of the other four basic principles mentioned above.

In the overall evaluation the IGIE has come to the following conclusions:

- The existing documents allow the conclusion that with the exceptions listed above, the EIA for the Rosia Montana Project is well developed. Further, if the five basic principles given above are held to in a diligent manner in all stages of the project life cycle then the projected benefits of the project should accrue and the inherent risks should be drastically reduced (presumably to levels acceptable to stakeholders).

- With regard for the need for robust security of the development, for the utilisation of large volumes of hazardous chemicals in the mineral processing technologies, for the traditional environmental experiences with cyanide leaching in mining, and for the adequate management of large dams, the IGIE propose that an independent international expert team be set up to perform yearly assessments regarding the fulfilment of the ESMS quality assurance procedure, its continuous development, and the implementation of regulatory requirements. Such a team would provide advice to both the project operators for improved practice; and to the environmental authorities with regard the development of regulatory requirements as appropriate.

- The IGIE consider that the financial guarantee is an absolutely fundamental issue for safe mine (project) closure. It is considered that the mode of accumulation and the management of the EFG should be a key point and a general precondition for project consent from both the Hungarian and Romanian parties. Moreover, considering the highly cyclic nature of gold prices it is necessary that the EFG recognise that the possibility exists at some point in the project life cycle that it is loss-making. Furthermore, it is considered that the EFG should be based upon estimates of true closure costs for the project during each year of operation.

Finally the IGIE recommends that all remarks, recommendations and concerns give in this evaluation report on the Environmental Impact Assessment Study for The Roşia Montană Project should be thoroughly assessed and where applicable included in the ensuing design and operational steps for the project. Moreover, such points should be central to reviews by independent international experts as mentioned above.

In this context and under the conditions stated above, the IGIE consider that it is reasonable that the proposed project can be discussed and evaluated by the authorities. However, the IGIE holds that the concerns outlined in this report require full resolution to the satisfaction of the Ad Hoc Committee prior to such discussions and evaluation.

Company in the past year; check the execution or enforcement of past recommendations; evaluate the monitoring data from the past year; provide recommendations for he development of the ESMS for the next year; provide further recommendations to the National authorities where deemed appropriate for enforcement by the competent National authorities; report the results of its review to a bilateral Environmental Committee.

References

A full listing of the Rosia Montana EIA is included in Annex A. At the time of writing, this material is also available on the project proponent's website: www.rmgc.ro

A listing of relevant international regulations and guidelines (in particular relevant to cyanide utilisation and transportation) that have been referenced, utilised or discussed in the generation of this report are included in Annex B.

Other documents referred to in this report include:

- Commission of the European Community (2006): Directive 2006/21/EC of the European Parliament and of the Council on the management of waste from extractive industries and amending Directive 2004/35/EC.

- Commission of the European Community: Directorate-General JRC. (2004). *Reference Document on Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities* (ST/EIPPCB/MTWR_BREF_FINAL). Sevilla: Joint Research Centre, Institute for Prospective Technological Studies.

- International Cyanide Management Institute (ICMI) (2002): *Implementation Guidance for the International Cyanide Management Code*

- International Cyanide Management Institute (ICMI) (May 2002); *International Cyanide Management Code for the Manufacture, Transport, and Use of Cyanide in the Production of Gold*

- ICOLD. (Various Bulletins) International Commission on Large Dams (ICOLD) - Committee on Mine and Industrial Tailings Dams

- UNEP ICOLD. (2001). *Tailings Dams - Risk of Dangerous Occurrences, Lessons learnt from practical experiences* (Bulletin 121 [compilation of 221 tailings dam incidents mainly from the above two publications, and examples of effective remedial measures]). Paris: United Nations Environmental Programme (UNEP) Division of Technology, Industry and Economics (DTIE) and International Commission on Large Dams (ICOLD).

Annex A – Roşia Montană Gold Corporation S.A. - Report on Environmental Impact Assessment Study: Contents

Baseline Reports

Air Quality Baseline Condition Report	Volume 3
Biodiversity Baseline Report	Volume 4
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Plan G – Cyanide Management Plan	Volume 26
Plan H – Biodiversity Management Plan	Volume 27
Plan I – Emergency Preparation and Spill Contingency Management Plan	Volume 28
Plan J – Mine Rehabilitation and Closure Management Plan	Volume 29
Plan K – EIA Public Consultation and Disclosure Plan	Volume 30
Plan L – Community Sustainable Development Management Plan	Volume 31
Plan M – Cultural Heritage Management Plan	Volume 32, 33
Plan N – Environmental and Social Monitoring Management Plan	Volume 21

Annex B – A list of relevant international regulations and guidelines relevant to cyanide utilisation and transportation.

Extracts from Table 3.1 (Cyanide Management Plan G) *Regulatory Requirements Applicable to the Importation and Transportation of Sodium Cyanide Reagent and the Management of Process Cyanide*

- European Commission Directive 96/82/EC, 9 December 1996 on the control of major-accident hazards involving dangerous substances ("Seveso II")
- Directive 2003/105/EC of the European Parliament and of the Council of 16 December 2003 amending Council Directive 96/82/EC on the control of major-accident hazards involving dangerous substances
- (Governmental Decision (GD) No 95/2003 on the control of the activities with major accident hazards in which are involved dangerous substances; this directive transposes the EU Seveso II Directive)
- Directive 2005/…/EC of the European Parliament and of the Council of[sic] On the management of waste from extractive industries and amending Directive 2004/35/EC
- Council Regulation (EEC) 793/93 on the Control and Evaluation of the Risks of Existing Substances
- Commission Regulation (EC) No 1179/94 of 25 May 1994 concerning the first list of priority substances as foreseen under Council Regulation (EEC) No 793/93
- Commission Regulation (EC) No 2268/95 of 27 September 1995 concerning the second list of priority substances as foreseen under Council Regulation (EEC) No 793/93

- Commission Regulation (EC) No 143/97 of 27 January 1997 concerning the third list of priority substances as foreseen under Council Regulation (EEC) No 793/93

- Commission Regulation (EC) No 2364/2000 of 25 October 2000 concerning the fourth list of priority substances as foreseen under Council Regulation (EEC) No 793/93

- Council Directive (EC) No 1488/94 of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances

- Regulation (EC) 304/2003 concerning the export and import of dangerous chemicals

In addition to the regulatory requirements deemed to be applicable by the project proponents (as listed above), the IGIE review process has identified a number of other documents that may be relevant to the project. Detail review of these has NOT been performed within this assessment.

- OECD Guidelines for Multinational Enterprises (especially Chapter V. - Environment)

- OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response (2003.) + OECD Guidance on Safety Performance Indicators (2003.)

- UNECE Convention on the Transboundary Effects of Industrial Accidents (1992.)

- UNECE Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) – Geneva, 30 September 1957 (current text with all amendments in force)

- OTIF Regulations concerning the International Carriage of Dangerous Goods by Rail, 2005 (RID)

- UNECE Protocol on Civil Liability and Compensation for Damage Caused by Effects of Industrial Accidents on Transboundary Waters (2003.)

- UNECE Convention on Civil Liability for Damage Caused during Carriage of Dangerous Goods by Road, Rail and Inland Navigation (CRTD)

- Rotterdam Convention on the Prior Informed Consent Procedure for certain Hazardous Chemicals and Pesticides in International Trade (1998.)

- UNEP APELL (Awareness and Preparedness for Emergencies at Local Level) for Mining (2003.)

- UNEP/ICOLD/ICME – Environmental Regulation for Accident Prevention in Mining: Tailings and Chemicals Management; Mining and Sustainable Development

- UNEP/WB-IFC/MMSD – Finance, Mining and Sustainability.

- UNECE Convention on Protection and Use of Transboundary Rivers and International Lakes.

- Directive 76/464/EEC - Water pollution by discharges of certain dangerous substances (The Council Directive 76/464/EEC will be integrated in the Water Framework Directive. Article 22 together with Article 16 of the Water Framework Directive (2000/60/EC) set out the transitional provisions for the existing Directive on discharges of certain dangerous substances (76/464/EEC))

Annex C – Reservations and diverging opinions of IGIE members.

1. Sándor Kisgyörgy has expressed a reservation regarding the definitions of "recommendations" and "concerns" as supplied in Section 1.4 the opinion that majority of the **recommendations** supplied by the IGIE are so important isues that they should be treated with the same seriousness and weight as the **concerns**. Accordingly there should not be a differentiation between recommendations and concerns regarding the level of importance.

2. Sándor Kisgyörgy considers that the expert team referred to within Concern III, Recommendation 10 should have a majority of international members.