Explanatory Note to Chapter 5 – Review of Alternatives

Contents:

Date **Author**

October 25th, 2010 **Marilena Pătrașcu**

Detailed contents:

1. Assessment of the impact of the amendments to the relevant legal framework upon the Project and/or upon the EIA Report

This chapter is dedicated to a review of the various potential alternatives applicable in determined situations. Thus, taking into account the applicable legal framework (which could impact each determined situation), this chapter deals with alternatives such as the scenario without the Project being implemented, change of the start date of the Project and production rate, change of location for certain Project components, technological processes and main prevention measures, including environmental impact mitigation, transport aspects, alternatives for other Project components, Project closure alternatives. Each of the situations described in this chapter is analyzed in more details in the corresponding chapter within the EIA Report.

There is no distinct legal framework applicable exclusively to the review of alternatives, which is highly technical and aims at identifying the benefits of Project implementation, in relation to the potential available alternatives. Consequently, bearing in mind the conclusions contained in the explanatory notes to the various chapters relevant also for the review of alternatives, it should be noted that the evolution of the legal framework is not likely to modify the Project or the EIA Report.

However, in order to substantiate the aforementioned conclusion, we would like to review the major developments of the applicable legal framework:

- As regards extractive waste, account was taken of the applicable community legislation, i.e. Directive of the European Parliament and Council no. 2006/21/EC on the management of waste from extractive industries. It is worth noting that the EIA Report anticipated some regulations which were only later transposed into the Romanian legislation. Moreover, Government Decision no. 856/2008 (transposing Directive no. 2006/21/EC) was not amended subsequent to its publication.
- Another law taken into account in the chapter "Review of Alternatives" and which is worth mentioning expressly due to its importance within the legal framework is Law no. 458/2002, as amended by Government Ordinance no. 11/20010 and the related approval law. The main amendments refer to Annex no. 1 "Quality parameters of drinking water" and Annex no. 2 "Control and audit monitoring". After looking into the amendments to these Annexes, we appreciate that the legislative changes do not have an impact upon the Project.
- Another relevant piece of legislation within the context of this chapter 5 is Governmental Emergency Ordinance no. 152/2005 on integrated pollution prevention and control (IPPC). This regulation transposes the provisions of Directive 96/61/EC on integrated pollution prevention and control (IPPC), as amended by Directives no. 2003/35/EC and no. 2003/87/EC. The regulation was subsequently amended by Law no. 84/2006 and Governmental Emergency Ordinance no. 40/2000. The main changes to the Governmental Emergency Ordinance no. 152/2000 are: changes to the definitions of the following terms – "best available techniques", "operational change", and "limit emission values"; description of the attributions of the competent environmental authority in coordinating the procedures for the issuance of the integrated environmental permit in case there are several authorities involved, as well as description of the conditions for the issuance of the integrated environmental permit; possibility for the competent authority to impose on the operator the measures which are required for its functioning, through the integrated environmental permit, by means of the revisions and updates of the applicable conditions.

In addition to the acts referred to above, the observations regarding the evolution of the applicable legal framework for Chapter 3 – Waste and Chapter 4 – Potential Impact also apply.

2. Updates to Chapter 5 – „Review of Alternatives"

2.1. Area development alternatives without the Project

Following from the observations made with regard to the chapter "Area development alternatives without the Project" in the 2006 EIA Report, we would like to highlight that the activity of Minvest – Roşiamin subsidiary was stopped in 2006. This does not result in any changes to the conclusions of the chapter, which analyzed the impact of the "zero alternative", taking into account the imminent closure of the operations of Minvest – Roşiamin subsidiary.

As the number of jobs estimated for the construction and operational phases has increased compared to the number indicated in the EIA Report, the negative impact of the "zero alternative" is maintained or even enhanced because of the loss of this job creation opportunity. According to the company's estimates, throughout the lifetime of the mine, the project will generate 2,300 direct jobs during the construction phase, 842 direct jobs

during the operational phase and 270 jobs in the closure phase. This does not result in any changes to the conclusions of the EIA chapter, which considered this scenario.

2.2. Alternatives regarding the Project start date and the production rate

This does not require updating as a result of time elapsing or as a result of legislative changes.

2.3. Alternatives regarding the location of certain Project components

This does not require updating as a result of time elapsing or as a result of legislative changes.

2.4. Alternatives regarding technological processes and major measures to prevent/mitigate the environmental impact

With regard to the gold ore processing technology, the project developer continued to monitor the developments in gold mining techniques, as well as in other technological areas. Based on the assessment within the EIA Report of various processes using alternative technologies, no major progress has been made to date with regard to alternative leaching agents, which could be applicable in practice within this Project. In this respect, reference can be made to the document called "Technological flow and leaching alternatives for the technological flow at Rosia Montana", developed in 2007, available on http://rmgc.ro/files/processing-and-leaching-alternatives-ro.pdf. The project holder will continue to monitor alternative processes which may represent better ore processing solutions for Rosia Montana.

In the EIA Report, several alternative strategies for cyanide detoxification and management were described before the selection of the procedure with SO2/air for the removal of cyanide from the process tailings, prior to their discharge in the tailings management facility. These management strategies referred to cyanide extraction processes instead of detoxification (destruction) of cyanide.

In the time which elapsed since the drafting of the EIA Report, additional studies were conducted researching various solutions and other were further developed. The points below are a summary of the novelties in the field:

a) Destructive processes:

- SO_2/air curtains remain the predominant procedure and are usually preferred to other slurry detoxification processes. This process is still a BAT. It is the solution preferred by gold producers, it has the most extensive track record, having proven its operating performance, and there are many examples of new such installations implemented over the past four years.
- Processes using perhydrol are still used for the detoxification of small volumes or for the shorter term detoxification of slurries or solutions, but are more costly to use in operation compared to the SO_2/air curtains. Therefore, this technology is not yet applicable at Rosia Montana.
- The CombinOx technology (use of perhydrol in combination with SO_2) is used in certain applications on slurries. The process was tested in the initial SO_2/air program designed for the processing of ores at Rosia Montana, but no advantages were found compared to the SO_2/air solution. No work has been done in the meantime with regard to this procedure and its further research is not justified.
- Alkaline chlorination was surpassed by the SO_2/air technology for cyanide detoxification. Chlorination presents a series of disadvantages, including in relation to costs and the presence of chlorides, which make it inapplicable for Roşia Montană.
- Ozone technologies were demonstrated at lab scale, but could not be applied in the processing of the ores from the slurry, due to the cost and problems associated with the very generation of zone. The SO_2/air technology remains preferable to ozonization.
- Biological treatment is limited to low concentration cyanide solutions, and is usually applied as a secondary detoxification procedure. It is not appropriate for slurries and for the climate at Roşia Montană. Therefore, the technology is not worth any further investigation in relation to the process tailings from Roşia Montană.
- The DTOX procedure was used on a limited scale for remediation and batch processing. It is not cost-effective for the slurry volumes processed at Roşia Montană, when compared to the SO_2/air procedure. Therefore, this technology is not considered appropriate or competitive in comparison with SO_2/air.
- The ROLB procedure is appropriate for specific technological flows with a high content of thiocyanate. RMGC assessed this procedure and considered it is inappropriate for the types of slurry which will be generated at Roşia Montană. The process was not applied on a commercial scale because of its specific characteristics, and cannot be considered as BAT. This process has not been used in the meantime and its further research is not justified.

b) Extraction processes:

- Ion exchange processes are more and more used, but many of them are still under development or found to be cost-ineffective. The Vitrokele, Augment and Hannah processes are all based on solid resins for the recovery of cyanide with a view to recycling. These technologies have not been proven commercially yet, and in addition, they present some related technological risks. Therefore, no further exploration hereof is worth being conducted.
- The reserve osmosis process is applicable for solutions and not for slurries. The technological process at Roşia Montană implies the production of slurry. Although reverse osmosis starts being applied in the mining sector, in order to be efficient at Roşia Montană it would require solid/liquid separation and solid washing. It is likely that the final tailings slurry will require further extraction of residual cyanide, and will therefore require the implementation of the SO_2/air technology anyway. Reverse osmosis technologies remain an option, since their development is more advanced and the process economy is changing.
- The SART process has certain applications for the processing of ores very high in cyanide-soluble copper. These ores consume very large amounts of cyanide, which makes the SART process be cost-effective in such cases. As the ores from Roşia Montană do not contain significant amounts of copper soluble in cyanide and do not therefore require so much cyanide, this technology cannot be applied.
- The acidification, volatilization and reneutralization technology (AVR) requires the acidification of the tailings-bearing flows in order to release free cyanides and weak acid dissociable (WAD) cyanides like gaseous HCN. This gas is collected and neutralized with a view to recycling cyanide. The acidified tailings must be then reneutralized in alkaline conditions, in order to avoid the discharge of acidic tailings in the TMF. The process requires a surplus of acid and alkaline reagents to recycle cyanide and results in considerable volumes of gaseous HCN. For these reasons, the process is not considered appropriate for the project at Roşia Montană.

c) BAT

The SO_2/air technology is still considered as BAT for the treatment of tailings resulting from ore processing at Roşia Montană. The use of the tailings thickener for recycle as much cyanide as possible prior to detoxification allows for the recovery of part of the cyanide in the technological process. Only the cyanide remaining in the liquid discharged from the thickener must be detoxified, which reduces the amount of waste, the quantity of cyanide to be transported on the site and the related costs.

As new technologies will be developed or as the operating cost structure changes, it may be appropriate to review the cyanide management process. However, at the moment, and considering the current status of the project, the analyzed process is considered as BAT.

2.5. Alternatives regarding transport issues

According to the „Rosia Montana Route Survey - 2007", addressing the establishment of routes and transport means in relation to the equipment and products needed to build and operate the Project, developed by Panalpina Canada in cooperation with IPTANA Romania, following Romania's accession to the European Union road traffic has increased significantly, hence the need for infrastructure upgrading, mainly by the rehabilitation and expansion of the transport capacities of existing roads, along with the reconstruction of the bridges along these roads. Despite these changes in the road traffic pattern in Romania, the study confirms that the transport routes studied initially in 2002 are still the most appropriate solution for the Project requirements.

2.6. Alternatives for other Project components

For information regarding the updating of the number of jobs, please see the observations under point 2.1 above.

2.7. Project closure alternatives

This does not require updating as a result of time elapsing or as a result of legislative changes.

Updates to Chapter 5 – „Description of the «Zero» alternative (without the project) for Roşia Montană"

2.8. Introduction

This does not require updating as a result of time elapsing or as a result of legislative changes.

2.9. Site conditions

We should mention that Minvest – Roşiamin subsidiary stopped its activity in 2006. In this regard, the Activity Closedown Plan (ACP) was developed for this area. The closedown of the operations of Minvest – Roşiamin subsidiary was approved by the Government Decision 644 / 20.06.2007, the total allocated closure

costs amounting to 98.701 million RON. The ACT was designed taking into account that, in the area of Roșia Montană, the holder of the exploitation concession license is RMGC, which had started the Project permitting procedures. The execution of the closure and environmental rehabilitation works related to the operation of Minvest – Roşiamin subsidiary will be phased depending on the development of the RMGC project, as provided for in the ACP, Annex I:

„The implementation of the closure and environmental rehabilitation works for the sites within the area affected by the project shall be correlated with the Production Decision of the license holder Roșia Montană Gold Corporation SA, as follows:

(a) in the event that Roșia Montană Gold Corporation SA fails to obtain the necessary permits for the Mine Construction Program, the closure and environmental rehabilitation works for the sites within the area will be carried out within the budget approved for such works.

(b) in the event that the title holder Roșia Montană Gold Corporation SA obtains the necessary permits, according to the law, for the mining project within the Roșia Montană area, it shall notify the date of the Production Decision in accordance with the provisions of the Exploitation License no. 47/1999, including to the National Agency for Mineral Resources, and the existing mining activities, including mine closure and environmental rehabilitation as a result of the mining activities carried out by the affiliate Minvest – Roșiamin subsidiary, shall cease and the equipment and installations shall be moved outside the perimeter, according to the license provisions".

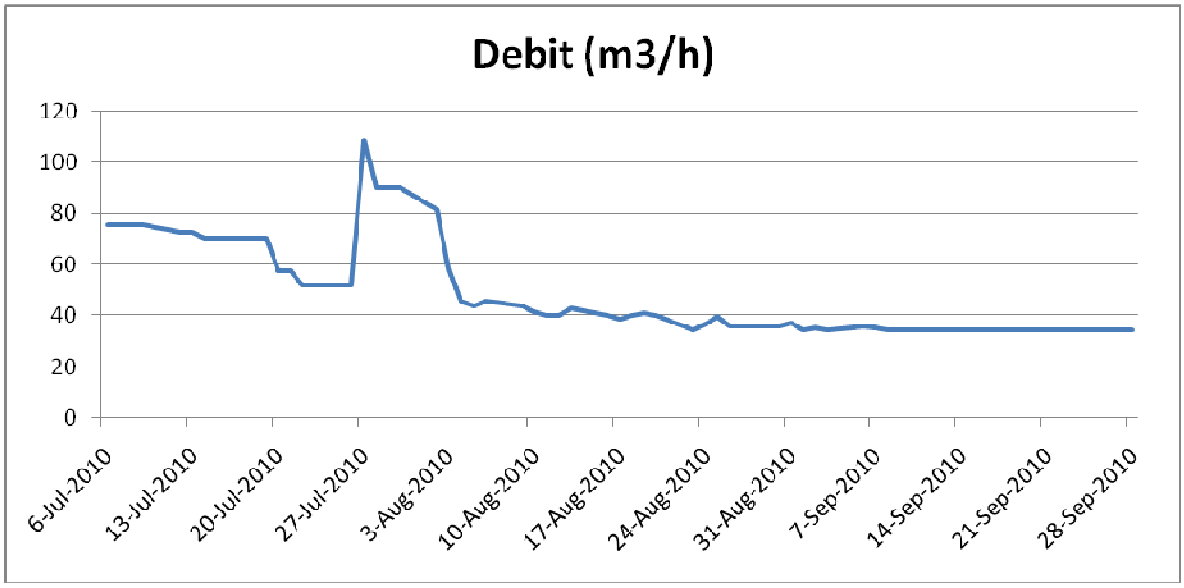
In the Hydrogeology section, reference is made to RMGC's environmental database, which contains the results of the tests on the underground water, performed in 2000-2003. This database has been maintained and further updated, currently containing data regarding underground water tests until 2009.

2.10. Identification of environmental pollution sources upon closure

In addition to tables 3.1 and 3.2 presented in this section in the EIA Report (as a result of the continuous activity undertaken by the titleholder to monitor these parameters), we enclose the table below, which contains updated results of the surface water tests on the monitoring point Gallery 714 in the period 2006-2010. These results confirm the conclusions of the EIA Report.

Date	**22.03.2006**	**04.09.2006**	**20.11.2006**	**15.05.2007**	**23.08.2007**	**23.10.2008**	**19.05.2010**
As T [µg/l]	71.58	134.6	807	2040	1040	1630	1670
Cd T [µg/l]	235	289.4	623	193	375.8	303	220
Cu T [µg/l]	3034	2310	2790	1540	3160	2140	1740
Fe T [mg/l]	277.7	506.75	679.084	718.9	277.42	302.8	364,00
Ni T [µg/l]	757	689.1	824	1848	1011	110	866
Pb T [µg/l]	51.6	87.7	14.3	14.9	40	46.9	3,19
Zn T [µg/l]	40388	17800	62150	34130	122300	58630	63240
Cr T [µg/l]	3570	57.2	354	196.5	358.9	115	47,1
Co T [µg/l]	805	91.58	54	51.9	51.07	489	39,0
Se T [µg/l]	64.2	44.55	50.97	132	8.225	218	141
Mn_2+ [mg/l]	432.3	277.58	763.8	282	439.5	442.8	416,50
Temp. [°C]	10.1	10.8	9.8	14.6	11.9	12.5	10,5
pH [units]	2.9	2.8	2.8	3	2.9	2.8	2,96
Dissolved oxygen [mg/l]	5.8	3.8	6.6	4.4	5.4	10.1	8,22
Potential Redox [mV]	392	444	413	417	417	406	461
BOD [mg/l]	5.71	0.59	6.28	3.8	5	9.9	6,44
COD [mg/l]	3.8	17.1	42.4	10.5	19	37.4	22,4
Ca_2+ [mg/l]	104.71	181.45	92.02	357	311.3	288	255
SO_4^{2-} [mg/l]	2500	3232	3771.99	5237	5195	5669	6021

In addition to the observations regarding the mine effluent discharge rate, we enclose below a table showing its evolution. The data in the chart confirm the conclusions of the EIA Report in this respect.



2.11. Potential remediation and rehabilitation measures (BAT)

In addition to the observations regarding the cost estimates for the mine closure activities required upon termination of the Minvest – Roşiamin subsidiary activity, we would like to point out that the Activity Closedown Plan (ACP) was drafted subsequently for this area, plan which was published in Governmental Decision 644/20.06.2007; the total allocated closure costs amount to 98.701 million RON, i.e. 27.561 million EUR. At the same time, the estimate given in the EIA Report amounted to 23.2 million EUR, taking into account a contingency factor of 20%. This confirms the conclusions of the EIA Report.

2.12. Conclusions

This does not require updating as a result of time elapsing or as a result of legislative changes.

2.13. References

The Activity Closedown Plan of Rosiamin, published in GD 644 / 20.06.2007, will be added in this section.