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THE IMPACT ASSESSMENT ON THE HEALTH STATUS WITHIN THE PROTECTED AREA IN ORDER TO ESTABLISH THE ACTIVITIES AND FURNISHING OF THE PROTECTED AREA AND THE IMPACT ASSESSMENT REGARDING THE HEALTH STATUS IN THE AREA

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GENERAL DATA

Rosia Montana is located in Apuseni Mountains, at a distance of approx. 11 km from the town of Abrud, approx. 15 km from Campeni town and 76km from the city of Alba Iulia. It is also situated at approx. 135 km from Cluj-Napoca city and from Deva city at approx. 79 km.

Rosia Montana village, commune residence (with the same name) is located in a depression spread along the Rosia valley, which forms a corridor surrounded by mountain massifs namely Rotundul, Varsul, Curmatura, Ghergheleu, Cetate, Orlea, Tille. It starts at the mouth of Rosia river into Abrudel (place where locality Gura Rosie is situated) and climbs gradually west-east direction for a distance of approx. 6 km up in the area of a natural amphitheatre, bordered to the north by the massifs Orlea and Jig, to the south by Carnic and Cetate massifs, to the east by the smooth peaks of Lety and Sulei massifs.

These mountains are ancient volcanic cones hiding deep gold-silver ore, being the leading cause of millennial mining development in this land.

GENERAL STATEMENT PRESENTATION OF Rosia Montana ZUP-CP (Zonal Urbanism Plan), Rosia Montana commune, Alba County

The built protected area of the town of Rosia Montana, also called “Historic Center Rosia Montana” was outlined by a preliminary survey entitled “Historical survey - Urban - Complete documentation for Rosia Montana PUG (General Urban Plan)”, aimed at restructuring the historical centre, additional to the PUG, obtaining the Opinion No 61/14.02.2002 of MCC - Department of Historical Monuments.

The built protected area is a surface within the administrative area of Rosia Montana, identified using certain defining criteria and limited by establishing a common manifestation surface of these criteria, based on general historical studies and historical regional studies, the criteria considered are: historical, architectural-environmental, urban, semi-public, landscape. The General Historical Survey defined the two reference historical areas:

- Reference historical area 1 – PROTECTED AREA (ZIR1)
- Reference historical area 2 –TOURISM DEVELOPMENT BEARING AREA (ZIR2)

The General Historical Survey defined and outlined 12 historical reference sub-areas for the PROTECTED AREA (ZIR1) and 4 historical reference sub-areas for TOURISM DEVELOPMENT BEARING AREA (ZIR 2). Thus the definition and delimitation of historical reference sub-areas (HRS) and those built protected within the historical reference area was made based on the identification within the sub-urban tissue of the sub-areas that show similar and consistent characteristics in terms of urban, architectural, landscape, historical point of view

Related to the built protected sub-areas, it was defined the level of protection as well as the agreed intervention method taking into consideration the category of value that monuments in that sub-area have. It was also defined the method, the level and the limits of possible development for each sub-area.

Built protected area, including its related protection zone of 1,378,600.00 square meters total, includes the two historical areas of reference, within which there are the following categories of protection:

- Build protected area of local interest–ROSIA MONTANA HISTORIC CENTRE OF TOWN – (of local interest), delimited by NCC-DMI OPINION no. 61/14, 09.2002

- category ”monument”, some of which are included in the HISTORICAL CENTRE of the perimeter, and the others are scattered within the protected area – all of them being of local interest, whose delimitation area is covered by this ZUP-CP (Zonal Urbanism Plan, including the related protected area).
- category „ site” : Archaeological site Alburnus Maior Rosia Montana (without a precise demarcation), of national interest – applicable both in and outside the city built, where historical and archaeological research involves or confirms the existence of archaeological remains.

In the town of Rosia Montana but outside the built protected area covered by this ZUP - CP, are five objectives such as: Roman settlement, Roman mining, Roman remains, funerary, Roman mining galleries – all framed as national importance and defined by coordinate points in STEREO 70 system. These targets are located in the perimeter area of the future exploitation under SC Rosia Montana „GOLD CORPORATION SA.

Outside the built protected area referred in the hereby ZUP-CP, there are also included in the „monument” category, of local importance, five (5) houses, the Greek - Catholic church and the memorial „SIMION BALINT”, all these being of local importance.

For the monuments not included in the historical references areas (mentioned above), there were set up arbitrary protected areas (defined according to the drawings attached to the General Historical Survey – APPENDIX 1.

In terms of protected natural areas an indication is made that the natural monument “PIATRA DESPICATA” will be relocated (as per the approved GUP) in the built protected area covered by this ZUP-CP. The natural monument “PIATRA CORBULUI” maintains its current location in the future exploitation perimeter surface, with the necessary protection measures and placing it in a visiting tourist circuit, according to the urban documentation ZUP - Rosia Montana Industrial Area, prepared by SC PROIECT - ALBA S.A.

According to the „National Spatial Plan”:

- The 3-rd section – PROTECTED AREAS (approved by Law 5-2000) the elements of the cultural heritage of Rosia Montana are in the following categories of exceptional national historical value:

- urban assembly (Appendix III, no 174, position g. 3)
- industrial architecture (Appendix III no 483, position I. 1)
- monuments of folk architecture (Appendix III, no 497, position no 2)
- administrative units with high concentration of cultural value built heritage of national interest (Appendix III, NO 663, position „communes”)

In terms of framing, according to Law 422-2001, republished, within “monument” and “site”, representative patrimonial category for the Historic Centre of town area – THE SITE - one can find the following:

- Archaeological site Alburnus Maior – Rosia Montana (CODE LMI 2004: AB – I – S - A – 00065), without a precise demarcation, but adds up all the Roman remains and covers the Historic Centre by default;
- Historic Centre of Rosia Montana town(code LMI 2004: AB – II – S – B – 00270)

To the „monument” category, which has the most numerous representation and includes 35 houses (code LMI, 2004: from AB – II – B – 00277 to AB – II –m – B – 00311), is added „Catalina– Monulesti gallery” located in the protected area of the Historic Centre of the town, coded as AB – I – m – A – 00065,05.

Outside the Historic Centre area, the cultural value of the site is complemented by the following heritage values:

- Roman settlement from Alburnus Maior

Orlea Area

- Roman mining from Alburnus Maior

Orlea Mountain

- Roman remains from Alburnus Maior

Carpeni Area

- Funerary from area of „Hop – Gauri”.
- Roman galleries from Carnic mountain massif, point of Piatra Corbului coded LMI 2004: AB – I – m – A – 00065, 01 – 00065, 04 respectively AB – I – s - A – 20329)
- 5 houses, coded LMI 2004: AB – II - m - B – 00271 to 00275
- Greek – Catholic „Adormirea Maicii Domnului”, coded LMI 2004: AB – II – m – B – 00269
- Simion Balint Memorial, coded LMI 2004: AB – II – m –B – 00417, located in the Greek – catholic cemetery.

The lists containing both protected areas and the Historical Monuments is attached to the this General Survey.

Among all types of monuments/site, the surface of archaeological sites and underground mining component prevail as importance of national and world value, the other historic monuments being representative for the local cultural heritage, although that in the National Spatial Plan (NSP) containing these monuments (NSP / III) they are nominated as „ national monuments of exceptional value, whose protection and enhancement of public utility are items of national interest.”(Law 5 – 2000, Art.3)

From the natural protected areas point of view, in addition to the protected cultural heritage elements, one can find:

- Piatra Despicata (group 2, 0, from Appendix I la Law 5 – 2000, position 2, 8), a related area of 0.20 Ha.
- Piatra Corbului (group 2, 0, from Appendix I la Law 5 – 2000, position 2, 83,), a related area of 5.00 Ha.

At present, although the relevant legislation requires demarcation of protected areas, only the Historical Centre has a marked area established by a planning documentation accepted and approved according to law.

1. CHARACTERIZATION OF THE EXPOSURE LEVEL OF THE POPULATION TO HAZARDOUS SUBSTANCES AND SITUATIONS

- The Project is located on the administrative territory of Rosia Montana commune and Abrud town, Alba County, at approximately 80 km north-west form the county capital, Alba Iulia, and at 90 km north - north-east from Deva city, in the central-western part of Romania (Chart 1.1 Project location in Romania). This site is in the Rosia Montana existing mining area, northeast of Abrud. The project is located in the region known as the Quadrilateral Gold Ore Mountains, part of a regional massif called the Apuseni of Transylvania Mountains (Chart 1.2 Geographical location of the project). The Quadrilateral Gold Ore is an important goldmine area of Europe for over 2 000 years.
- The Project is located inside the perimeter of the Rosia Montana operating license (number 47/1999, occupying an area of 2,388 ha). The license was granted SC Rosia Montana Gold Corporation SA (RMGC) in the contract concluded on December 21, 1998, published in the Official Gazette on June 10, 1999, and represents one of the two licenses held by the company in this region (Sheet 1.3 RMGC Operating License). The operating license Rosia Montana entitles the holder to mine gold and silver reserves on operating parameters specified in this document.
- The existing exploitation owned by the Romanian state through the National Company of Copper, Gold and Iron named MINVEST S.A. Deva, by Rosia Montana’s subsidiary Roşiamin, consists of a quarrying of reduced and degraded. Roşiamin ore processing plant and related equipment are not included in the current operating license for Rosia Montana. The proposed Project will be developed to replace the existing operation to

date. It will be a large modern mine with an advanced technology for the recovery of gold and silver, which will set a new standard for mining in Romania.

- The Project development works started in 1997, with exploration activities. The development phase will continue with obtaining the approvals and permits, followed by the construction and operation phase, culminating in actual operation. Main stages of Project scheduling are presented in Chart 1.4. Operating activities will run continuously for 16 years, depending on gold reserves already confirmed that the development of this Project proposal is based on. Operating period may be extended depending on future geological exploration results. The Project activity will be at least 25 years, after which a process of closure and environmental rehabilitation of the exploitation will begin, followed by post-closure monitoring activities.
- Development of proposed activities includes, in addition to specific operational and processing activities, the following:
  - Improving the harmful environmental effects created by centuries of mining in ancient and more recent eras;
  - Activities to preserve cultural heritage (archaeological research, evaluation, rescue excavations, sorting and preservation of artefacts, preservation *in situ* of the most important and most representative archaeological items);
  - Assistance for closing the current mining operation, subsidized by the government (RosiaMin); and,
  - Displacement of persons and existing facilities in affected areas and social activities related to these activities.
- Centuries of exploitation of underground deposits – the oldest galleries are certified as belonging to the period after the Roman conquest - with more recent surface exploitation, by uncontrolled waste disposal service as a result of underground and surface activities and preparatory activities, generated disorganized dumps, active and abandoned ponds and reservoirs for unmanageable ARD (ARD–Acid Rock Drainage). The site area is characterized by contaminated streams and land adjoining the existing settlements. Heavy metal and acid water pollution is currently at a level that far exceeds the Romanian and international standards and current conditions of toxicity led to intense contamination of rivers and watercourses in the area. These rivers are part of the Aries River basin, one of the tributaries of the upper Mures, a tributary of the Tisza, which is part of the Danube basin.
- Existing pollution will remain untreated if Rosia Montana Project will not be developed, or if it won't be developed an alternative plan for future development. The Project scope includes facilities necessary to mitigate these impacts through systematic interception and retention rates of contaminated water by treating the contaminated water, and by isolating and then exploiting many of the existing ore heaps within the project boundary. The Project was planned and will be developed to meet international standards, implementing best available techniques (BAT – Best Available Techniques) and best management practices at the international level. The goal is the safe operation and environmental protection as direct means to minimize potential impacts and to improve existing environmental conditions.
- Coal mining industry in Romania has declined considerably in recent years and still suffers a significant process of reorganization and restructuring. In 1977, more than 185,000 people were employed in the mining, today less than 65,000 remained. Most mines are unprofitable and restructuring is expected soon.
- The government subsidizes the existing exploitation. Gradual closure of the mine has already led to the loss of more than 800 jobs and restructuring of another 500 jobs will have a significant social, environmental and economic impact on Rosia Montana, Abrud and the communities in surrounding areas. Another state mining, copper and gold exploitation in Rosia Poieni open pit, SC Cuprumin SA, is also expected to close in the near future, for

reasons of economic return, if not privatized. S.C. Cuprumin SA is located near the Rosia Montana Project, about 4 km northeast. Closing the two mines will have a considerable negative impact on the economic vitality of the entire region.

- The Project proposed by RMGC, in partnership with Minvest, the Romanian Government and local communities, would result in solving partial reduction of some of these effects. The project represents a large investment in Romania and it expects to encourage the successful implementation of other foreign investments in natural resources in this region.
- It should be recognized that, unlike other industrial companies whose projects remain fixed, mining projects, by their very nature, are dynamic and will continue to evolve to cope properly with environmental conditions. Therefore, we will institutionalize a process of continuous improvement, Environmental and Social Impacts Management System (ESMS), to ensure a dynamic design and operation and to underpin management plans and procedures. They must be adaptable to improve compliance status throughout entire duration of the Project.
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- ***Project Promoters***

RMGC owns and manages Rosia Montana Project. Gabriel Resources Ltd. (the main shareholder of RMGC) began exploration work in May 1995 through a research program by geological drilling on Gura Rosiei TMF treatment of Roşiamin enterprise (reference coordinates 350278E 535114N). The pond is located south of the existing processing Plant at Gura Rosiei, on Abrudului valley, and is parallel to the road Abrud-Câmpeni. At that time, there was an agreement between Gabriel Resources and Autonomous Copper Deva (Deva Minvest currently), which authorized the activities of the Geological existing tailings (Gura Rosiei ponds) and their eventual processing.

In 1997, S.C. Eurogold Resources S.A. (Eurogold), a joint stock company between Autonomous Deva Copper (later Minvest) (19.31%), Gabriel Resources Ltd (Canada) (80%), and three minority shareholders (Cartel Bau, Foricon S.A. and Comat S.A., each with 0.23%), was registered for the purpose of performing research and exploration activities in the area.

In 1999, S.C. Eurogold Resources S.A. changed its name into S.C. Rosia Montana Gold Corporation S.A. (RMGC). In December 1998, we obtained the exploitation concession license from the National Agency for Mineral Resources (NAMR), as per the Mining Law no. 85/2003. The license was issued for Minvest (holder) and RMGC (affiliated company), with date of entry into force in June 1999. In October 2000, the license was transferred from Minvest to RMGC, Minvest remaining the affiliate owner, according to the company status. As such, Minvest have the right to continue mining activity in the small current operating mining, through its subsidiary Roşiamin from Rosia Montana, while RMGC handle for the initial exploration and project development activities. Until the date RMGC will decide to enter into production, Minvest will manage all activities conducted at Roşiamin mine, unless one will take a decision to terminate the activity before that date. All environmental liabilities related to operating activities and prior preparation, including closing activity of Subsidiary Roşiamin, remain up to Minvest and will not be affected by any changes in the status of operation.

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RMGC makes and funds all exploration and development activities associated with the new Project. To operate a new service on the proposed production capacity (13 million t/year), the current operating license will have to be modified in accordance with the new requirements. To operate a new service on the proposed production capacity (13 million t / year), the current operating license will be modified in accordance with the new requirements. It will be released from NAMR, RMGC looking to complete the changing request after EIA approval. The license has an initial validity period of 20 years and can be renewed for successive periods of 5 years.

Table 1-1 shows a summary of main features of the Project. Table 1-1, Main Data of the Project.

Table 1-1. Main Data of the Project

Aspect	Description
Project Background	- Located in Rosia Montana, Alba County, central-western Romania, 80 km from Alba Iulia - Old mining area into a community of subsistence farms - Mountainous terrain and narrow valleys - Temperate continental climate, temperatures between -22.5 ° C (Dec-Feb) and 28.7 °C (August) - old winters, significant falls of snow for 4-6 months per year - Annual rainfall: 600 mm - 883 mm
Existing infrastructure	- National roads (paved) to the main commercial and residential areas; at a distance of 2-3 hours of airports with international flights - Electricity: the national network - Water: there is potential to capture Aries River, about 13 km north of Rosia Montana; most residents depend on springs and seepage, rather than the treated drinking water supplied through pipelines. - Sewerage: most of the region does not have active treatment systems. - Fire protection: No - Hospital: First aid facility available in the area - Urban Center: Urban area is dwindling; buildings are in different conditions of operation and repair.
Mining Activities	- Four open pit: Cetate, Cârnic, Orlea and Jig - Exploitable ore reserves 215 Mt, 1.46 g / t Au and 6.9 g / t Ag recovered metals, production of : 247.7 t (7.9 million ounces) Au and 898.5t (28.9 million ounces) Ag - Annual ore production: between 7.3 and 15.4 Mt - The stripping report during the operational phase: 1,2:1 - Drilling of boreholes and detonating explosive load by millisecond delay methods – loading and transport activity - 19.5 m3 hydraulic excavators and trucks of 150t
Ore processing	- Ore processing activity duration: about 16 years - Single stage crushing ore from the pits with a gyratory crusher - Wet milling with a SAG mill and two ball mills - Cyanide leaching of grinding ore using a conventional process Carbon-in-leach (CIL) - Elution process to transfer precious metal into concentrated solution, recovering the active carbon for revival. - Recovering precious metals from solution by electrolysis and metallurgical processes for producing gold bullion - Tailings thickening and recycling the largest part of the process water - Neutralization of cyanide process tailings and storage it in the tailing pond
Technological infrastructure	- Pond with a second storage downstream dam - Clarified water circulation system of the pond to processing plant - dams collecting ARD from old mining areas and those potentially acid from the new operating areas (waste dumps, piles of ore, etc.) - Water treatment plant to neutralize acidic water in order to comply with discharge standards envoy or use it in the technological process - Metallurgical Laboratory - Warehouses and other storage facilities - Administrative and maintenance building

Description of the Project in the pre-construction period

Current pre-construction period include the following:

- Continue exploration activities at local and regional level;
- Maintain links and support for Minvest in planning the closure of current mining subsidized by government;
- Identifying and planning to mitigate negative effects on the environment caused by old mining activities and other related activities;
- Financing Activities;
- Obtaining approvals and permits required for operation;
- Detailed design activities;
- Arrange tenders for design and contract (s) for construction management;
- Purchase of property and land concession contracts necessary for the development of Project;
- Activities related to cultural heritage and cultural property;
- Relocation and resettlement activities (including residential construction, commercial and municipal construction, and county infrastructure);
- Support in planning the local and regional development;
- Coordinate with the relevant stakeholders.

Description of the Project during construction period

It is expected that RMGC will contract, based on an auction, a company specializing in engineering, procurement and construction management (hereinafter called "EPCM Contractor"), for the Project planning and construction activities. EPCM Contractor, whoever will be, is required to meet the project's legal obligations and any other commitments assumed by it. The proposed period for Project construction is approximately 2 to 3 years. Activities will begin with site organization, administrative building construction and mobilization of the main contractors.

During this period, temporary housing will be required for about 800 workers. During construction, the project's primary activities will be:

- Construction of resettlement infrastructure (houses, churches, commercial, municipal and county government offices) using, whenever possible, Romanian contractors and suppliers;
- Resettlement and relocation of residents from areas affected by Project development;
- Fitting mine sites (topsoil stripping and storage, and subsoil to a depth of about 1 to 1.5 m);
- Opening and quarrying for building materials (for roads, concrete production, etc.);
- Working with Minvest for environmental rehabilitation and closing existing activities;
- Connection to the high voltage national network;
- Construction of an industrial water supply pipeline from the river Aries;
- Construction of access road from the Gura Rosiei to the Processing Plant;
- Processing Plant Construction;
- Construction of a new access road to Rosia Poieni;
- Tailings pond dam construction, including initial dam and second storage dam from Corna Valley;
- Arrange temporary housing needed for construction workers;
- Infrastructure Construction;
- Build other structures and channels for water management and retention.

During the construction phase there will be significant works involved creating a series of permanent structures and facilities. At the end of the construction phase, will commission and deliver the Project to the management team of the economic activity as an operating unit.

The proposed mining activities planned for Rosia Montana will spread over a period of 16 years. These activities will consist of conventional open pit mining in the techniques of drilling, blasting, loading hydraulic excavators and ore transport with tilted trucks.

Four open pits will be operated (Cetate, Cârnic, Orlea and Jig). The four mines are located within the same exploitation that will feed ore processing station at the site. Cetate and Carnic open pits will begin simultaneously. Until the 9th year, the exploitation will end at the open pit Carnic , and that from Cetate will continue until all ore is consumed. Jig and Orlea open pits exploitation will be initiated in the 7th, 9th year respectively.

In the first six years, will create a low-grade ore stockpile, as the best quality ore will initially be selected and processed. Low-quality ore stockpile will be processed in the years 14-16, after closing the pit operations.

Proposed systems for the preparation and processing of ore include the following elements:

- **Crushing and stockpiles: A** gyratory crusher crushes the ore and then stored in stockpiles;
- **Wet milling:** The ore stored in a stack of crushed ore is still milled wet;
- **Leaching and adsorption:** Cyanide is added to the solution of water and ore this passes then through a series of tanks where the solution is agitated. In these tanks gold and silver attaches to carbon and separate from the rest of the solution.
- **Electrolysis:** Gold and silver are extracted by a classical process of electrolysis (passing an electric current through the solution) that separates the gold and silver at a carbon electrode to another electrode, depending on the polarization.
- **Melting:** Gold and silver are then poured into ingots by a metallurgical process.
- **Cyanide Neutralization:** Gold and silver extraction is performed in the presence of concentrated cyanide solutions and reagents. Due to high concentrations of cyanide, water can be dangerous if it enters the environment. Therefore, after extracting gold and silver cyanide water is recycled and thickened slurry will be detoxified in a facility to neutralize the cyanide before being pumped into a tailings pond dam.
- **Tailings storage:** Tailings are sent through a hydro system and deposited behind the dam in the tailings pond facility (TMF) form Corna Valley; and
- **Water Recycling:** The water in TMF will be recycled in the Processing Plant and reused in the technological process. The aim is to compensate for the necessary flow of water in the process and minimize the use of clean water, only to prepare reagents.

Major components of the Project, from a visual standpoint, will be open pits, Cetate retention dam for ARD, Cetate rock dump, tailings dam facility (TMF) from Corna Valley, waste rock dumps, ore stockpiles and those of soil. Cetate Dam is built on Rosia Creek, which will ensure retention of surface water contaminated by mine water from the historical exploitation and runoff of potential operating acid from new areas of service, preventing the spread of pollutants in water courses downstream. Water from this pond will pump in a wastewater treatment plant located on the plant site, to be used in the technological process, and the excess will be discharged into the environment to maintain stream flow of Rosia creek. This will achieve a significant improvement in water quality over the current situation. TMF consists of a dam that will be initially built in the construction phase, and then raised during the existence of exploitation. This will ensure the tailings storage facility after detoxification in the neutralization of cyanide. TMF will also include a second storage dam to capture and retain seepage from the tailings pond. From here, the water will be pumped back into the TMF.

It was prepared a Cyanide Management Plan (“CMP”) specific for this Project, in accordance to the International Cyanide Management Code (“The Code”). The Code was developed under the auspices of the United Nations Environment Program (UNEP), to help the world's gold mining industry to improve the management of cyanide, thereby minimizing risks to workers, communities and environment from the use of cyanide in gold extraction.

Also, the Code was developed to help minimize the concerns expressed by the community about the use of cyanide.

A certified company will provide transportation of cyanide in solid form, in special containers, sealed by the manufacturer, until the Project site. These special containers are for transport of cyanide from the cyanide factory to the Processing Plant in Rosia Montana, without requiring them to handle or open.

A modern technology for treatment of cyanide will be built within the processing Plant. This technology will reduce the level of cyanide in water at the maximum concentration values well below safety guidelines provided by the European Union and North America, before discharge tailing from the process Plant in the tailings pond dam. This proven technology is used successfully internationally in over 70 similar mines to replace older technologies. Because of solar radiation, cyanide concentration in the sap further reduces in TMF by the biodegradation.

Description of Project closing operation

The plan for rehabilitation and mine closure describes decommissioning of plants and reducing the impact after completion of mining activities. In the EIA process and obtaining necessary approvals and permits, will be defined and agreed terms of implementing the closure plan, the execution due dates and structure of financial guarantees. Preparing a strategy for decommissioning and clean up of the site before the development Project is part of the process.

This approach and planning of exploitation recognizes that mining operation, although produce some permanent changes in topography of the area, is a temporary use of land and the closure for the activity must be in accordance with the sustainable use of mineral resources. The main objective of the closure plan and its design process is to ensure that the potential environmental impact, safety and health activities associated with closure, and environmental rehabilitation activities (and their associated legal and financial liability) are still measured and predicted in the early stages. This impact can then be minimized because of the actions taken in the design, construction and operation phases of the Project.

Rehabilitation objectives must address the requirements of the regulations, site-specific issues, RMGC policies and the best industry practices, among which:

- Protect the public health and welfare;
- Meet the objectives agreed on land use after closure;
- Geo-technical stability of the mine related structures (pit slopes, waste rock dumps, etc);
- Landscape restoration to minimize the phenomena of subsidence and erosion, and potential environmental hazards; and
- Protect the Water Quality.
- Based on these approaches, the objectives of the rehabilitation Plan and mine closure are the following:
- Supporting the executive management to ensure labour safety and public health during and after mine closure and its related facilities;
- The possibility of closure and gradual environmental rehabilitation activities before production phase;
- Reduce or eliminate potential environmental impact;
- Restoration of affected land up to its original state, as soon as possible;
- Minimize, whenever possible, immobilization of mineral resources remaining;
- Serve as a resource upon which RMGC to conduct their activities of establishing the budget for this project and to plan activities.
- Ensure open dialogue between stakeholders and company representatives related to planning and closing its operation life cycle.

Urban and current uses of land and infrastructure

The general concept in draft documentation was presented in the General Urbanism Plans (GUP) submitted to the administrative bodies of Rosia Montana and Abrud cities. The PUG indicates the proposed location of Project activities, with special mention of:

• Rosia Montana Industrial Area which consists of mining activities, waste, grinding and recovery of gold ore processing in a processing plant, tailings storage in a proper tailings dam and provided with secondary containment; mention is also made on waste water management affected by historical mining activity or those with acid potential, generated by future activities, by means of water retention dams, hydro-transport system, clean conventional water diversion channels and a waste water treatment plant;

• new residential construction area, Piatra Alba, for population resettlement, small businesses and public utilities affected by the Project; and,

• area of cultural heritage value, which will be designated for protection of cultural heritage; that includes the historic center of town, the Square, streets Brazi and Berg, the eastern part of the Rosia Montana settlement and a cluster of buildings declared with architectural value, as well as churches and access to ancient and more recent mine workings.

Zonal Urbanism Plan (ZUP) of Rosia Montana Industrial Development Area has been prepared and submitted to the Council of Alba County (District Technical Commission for Spatial, Urban Planning and Public Works), which issued the Unique Agreement No.7, in July 1st, 2002. Detailed development of the Project from last period required modification of ZUP and, therefore, upon approval of the Certificate of Urban Planning, a new application will be filled drafted in accordance with the current approved proposals submitted by the Project.

The Certificate of Urban Planning (No 78/ 26.04.2006) shows the Rosia Montana Industrial Area perimeter, with a total area of 1,257.31 ha. The Industrial Area does not include the Protected Area of cultural heritage.

The total area includes small parcels of land, which will not be directly affected by project activities, but will remain isolated from different workstations. These totals 195.7 ha. The proposed area to be affected by industrial facilities consists of the following components:

Rosia Montana Industrial Area comprises four administrative-territorial units: Rosia Montana, Abrud, Câmpeni and Bucium. Current use of lands within the perimeter of the Industrial Area is the following:

Land use category	Area (ha)
Build able	146.6
Forests	234.8
Arable	3.6
Hayfields	740.5
Cemeteries	2.6
Roads	37.8
Unproductive land	79.8
Waters (lakes and flowing)	11.61
TOTAL INDUSTRIAL AREA	1257.31

National Commission of Historical Monuments, Ministry of Culture and Religious Affairs (MCC), Bucharest, approved the establishment of Protected Area, according to permit no.61/ February 2002 and permit no.178/ June 2002. The second provides that in a later design stage, to submit a ZUP of the Protected Area and a *Management and Rehabilitation Plan* of Protected Area, which will be prepared with the progressive appointment of valuable building and their legal status. Protected Area comprises thirtythree historical monuments, including three churches, Catalina-Monulesti mineshaft entrance, and proposing a new museum location. The ZUP for Protected Area will be a separate document filed with the Alba County Council.

Changes in Project Environmental Impact Assessment phase for improving environmental performance and prevent/ minimize/ eliminate potential impacts

The Mining Project covered by zonal urbanism plan "ZUP Change for Rosia Montana Industrial Area" belongs to SC Rosia Montana Gold Corporation S.A., joint venture formed by the main shareholders of Gabriel Resources Limited - Canada (80%) and C.N.C.A.F. MINVEST Deva - Romania (19.31%). Zonal Urbanism Plan for Industrial Development Area of Rosia Montana Gold Corporation S.A. was initiated, developed and approved for the first time in 2002. For this plan were obtained all the approvals and consents necessary under the law. This ZUP approved by the Local Council of Rosia Montana, the City Council of Abrud and County Council of Alba. In addition, based on the Environmental Assessment as part of the ZUP, Alba Iulia Inspectorate for Environmental Protection issued for this plan the Environmental Agreement no 181/ 03.07.2002. The ZUP issued and approved in 2002 provides for the area considered, the following functions: industrial area, storage area, the access roads, equipment and technical-urban area, protected area and living area.

During the progress process of Environmental Impact Assessment for the Rosia Montana Project, in order to obtain the environmental agreement, there were changes in the mining Project in order to mitigate the negative impact of proposed mining and processing activities, especially on the protected areas and the natural monuments complex.

The Rosia Montana Project's main changes are *minor* and have *a positive impact on the natural and built environment*. These changes to the project are:

- Extract ore from four open pits, Cetate, Carnic, Jig and Orlea, instead of two, Cetate and Carnic. In this respect, it is stated that the General Urbanism Plan for Rosia Montana and ZUP Rosia Montana Industrial Development, issued and approved in 2002 are analyzed only for a period of five years, which is the validity duration of an urbanism plan. As a result, in the ZUP issued in 2002, Jig and Orlea open pits have been considered as a future development stage-mining operations, which will come into operation in a subsequent period of the validity duration of the ZUP. The definite proof that these open pits were taken into account in the GUP and ZUP of 2002, is the declaring of the annual production capacity of 13 million tonnes/ year of ore mined over a period of about 16 years, capacity that can be ensured only by exploiting the four open pits. Both urban plans refer to the Feasibility Study prepared for the Rosia Montana ore deposit, where there are clear stipulations on the areas to be exploited, namely the four open pits: Cetate, Carnic, Jig and Orlea.
- Reshaping open pits exploitation in order to extend the Protected Area Historic Center from 15 ha (in ZUP of 2002) to 135 ha at present.
- Decreasing the surface of waste rock dumps Cârnic and Cetate, considering the new provisions of the Plan for future mine closure and environmental rehabilitation of affected areas, by refilling the waste rock dumps Carnic, Orlea and Jig with waste rock resulting from exploitation. The only pit that will remain open will be the Cetate waste rock dump, following the legal provisions contained in the Mining Law no. 85/2003, amended by Law no. 237/2004 and supplemented by Law No. 284/2005 that prohibits blocking of mineral resources by re-stockpiles.
- Reshape paths of industrial roads bypassing the protected area, in order to reduce the impact on Historic Center Rosia Montana.
- Introduce a water pipeline from the Aries river.
- Reduction of industrial zone surface related to Rosia Montana Project in favour of establishing and expanding the protection zone of Rosia Montana Protected Area.

In order to provide the legal framework to achieve the changes proposed by the new version of the Rosia Montana Project was developed in 2006 a new urban area, respectively, „Zonal Urban Plan Change for the Rosia Montana Industrial Development Area". In this ZUP was assessed the long term development of industrial activities, about 25 years, related to all phases of Rosia Montana mining project: construction, operation, closure/rehabilitation and post closure.

Rosia Montana mining Project foresees the development and expansion of gold and silver mining operation near the village of Rosia Montana, Alba County, and a number of other objectives relating to the cultural, social and economic development of the area, of environmental protection and infrastructure development. Zonal Urbanism Plan includes the objectives of the Project itself, as well as the town planning regulations for placement of facilities necessary for carrying out industrial activities.

Rosia Montana is situated 10 km from Abrud and is known as the center of the gold mining still since the Roman era known as Alburnus Maior. The area where is located the administrative territory of Rosia Montana is bordered on the north by Câmpeni city, south - west by Abrud, east and south - east by Bistra, Lupsa and Bucium municipalities, and on the west by village Sohodol.

Localities components of the administrative territory of Rosia Montana are 15 in number as follows: Balmosesti, Blidesti, Bunta, Carpinis, Coasta Hentii, Corna, Curaturi, Daroaia, Girda-Barbulesti, Gura Rosiei, Iacobesti, Ignatesti, Soal, Tarina, Vartop and the administrative center Rosia Montana.

The territory proposed to develop the mine project and subject of the Project is situated to the built, in accordance with the General Urbanism Plan of Rosia Montana, in the territorial unit of reference - UTR - ID.

SEE ENVIRONMENTAL IMPACT ASSESSMENT AND APPENDICES

2. CHARACTERIZATION OF EFFECTS ON HEALTH, AFTER REACHING THE OBJECTIVE

Within this document the aspects of novelty characterizes the exposure assessment represented by both measurements and estimates (qualitative and quantitative) of the magnitude, frequency, duration and route of exposure. Our exposure assessment considered the current exposure based on measurements of hazardous substances incriminated both in environmental factors, and in the human body - dosimetry (specific biomarkers of exposure to the substance incriminated), as well as the future exposure based on the forecast of hazardous tracked substances distribution, forecast made by mathematical modelling (forecast distribution of hazardous substances in the environment is included in the environmental risk assessment, assessment submitted to the Ministry of Environment).

Assessment of group of subjects' exposure to hazardous tracked substances was based on a complex evaluation that took into account exposure by inhalation and digestive, including in the case of metals and cyanide specific biomarkers allowing the integration of all exposure routes. Exposure to hazardous substances under investigation was modelled for the assessment of body compartments, as blood lead, cadmium, arsenic, mercury, chromium, nickel and thiocyanates in urine. Obviously, some hazardous substances (breathable particles, nitrogen oxides and sulphur) and those dangerous situations (noise) do not receive specific biomarkers of exposure (as these substances or their metabolites in the human body does not exist as such), which made them to be measured in terms of modelling of exposure point of view, and indirectly by assessing the effect biomarkers specific to be associated to the subjected exposure. When some of the measurements performed have shown presence of xenobiotic in bloodstream, it could estimate exposure based on these data. This contaminant in biological samples is the most direct indicator that demonstrates the existence of exposure. As a rule, the route of exposure determines the capacity/ level of absorption. Exposure assessment in this paperwork consists of two phases:

- *preliminary assessment* and

- *detailed assessment*

Preliminary assessment began by taking into account the risk and impact to be established.

Identification of the most likely area of exposure was conducted in accordance with the materials prepared by the ZUP designer and the existing information in the Environmental Impact Assessment. Preliminary assessment of the exposure data was combined with information on toxicity in order to perform a preliminary self-analysis.

As a result of this analysis, it was decided the need for a detailed exposure assessment and complete information by modelling that included estimates and forecasts.

Thus were taken into account:

- information available in each area, including at the subject level, necessary for a proper evaluation;
- qualitative and quantitative nature of the reliable data/ information;
- capacity limits of exposure assessment.

Finally, exposure assessment was based on multiple measurements, estimation models and assumptions about the simulation parameters used in approximating the current and future exposure conditions in different phases (those with more intense activity) of the mine operation.

In this paper the ***detailed assessment*** of exposure covered the next phases:

General features

It has set the goal of exposure assessment and identification of the xenobiotic to be investigated (breathable dust, nitrogen oxides and sulphur, lead, mercury, arsenic, cadmium, chromium, nickel, cyanide, noise), routes of exposure and exposed population groups and the distances from the mine area.

Integrated Exposure Analysis

Integrated exposure analysis combined estimating concentrations in the environment (information about the source and mechanisms) with the description of the exposed population depending of the exposure profile. There are taken into account data on the size of population exposed, duration, frequency, intensity of exposure and exposure pathways. For a more detailed assessment, estimating environmental concentrations due to the type of exposure took into account both the spatial distribution of subjects investigated and the spatial distribution of hazardous substances in the environment. At the same time was estimated the behaviour and biology of populations exposed to different concentration profiles.

The calculation of exposure involved:

Estimation of concentrations defined the geographical areas and environmental factors. The purpose of the evaluation was to describe the human subjects and the environment for which to calculate exposure. The degree, level of detail that was used in defining the exposed population distribution has considered this issue on geographical area as special component for this type of exposure possible variable by distance. Quantitative estimation of contaminants followed each specific route of exposure.

Exposure distribution

It could be estimated based on spatial and temporal distributions of environmental concentrations and exposed populations, behavioural characteristics and critical elements of toxicological exposure and associated risks and impact.

Exposure calculation results were presented in a consistent format that covered aspects of function dose - response, as it was later used in risk assessment. For example, if one follows the health risk caused by exposure over a long period then would be calculated the daily average exposure during exposure period. On the contrary, if one follows the health risk caused by exposure to a short period, exposure rates are calculated at short intervals to ensure that risk peaks are followed. Many exposure assessments are based on an average exposure that is measured during exposure. In our case, we performed a comprehensive assessment with a possible range of exposure, which took into account the situations of exposure for each interval. For each route, the exposure of subjects was determined by the sum of the contribution of each source to that route of exposure. When exposure has involved more than one route of exposure (metals investigated), the relative amount of absorbed substance was characterized by modelling the existing levels of environmental factor investigated. Following this aspect, exposure estimation was done through a complex modelling, and led to presentation of results on exposure assessment, astonishing as scientific value.

Human dosimetry and biological measurements

Biological measurements made were very complex and also specific and had a major hand in exposure assessment, both for the investigated metals (lead, arsenic, cadmium, mercury, chromium and nickel) and cyanide (thiocyanate) making the most of existing analytical methods available. Moreover, although an answer could be relatively easy to detect for some compounds in the body, allocation of body load only to specific elimination of the compound in the environment could be difficult due to limited ability to obtain environmental measurements and reliable metabolic data, which makes at least for the two types of exposure (metals and cyanide mentioned above) to have very detailed information that increases the value of exposure assessment.

Development of exposure scenarios and profiles

Depending on the purpose of assessing exposure, total exposure was divided into several scenarios to help quantify the exposure. For each scenario, the topics needed to quantify exposure included exposure characteristics, characteristics of the exposed population at individual level and distance from mining exploitation. In the present work was taken into account and made an assessment of exposure in terms of area and complexity of exposure pathways by taking into account different scenarios. The more extensive and comprehensive is the purpose of evaluation the more they will use several scenarios, something that we applied in this document. It is generally advantageous when evaluating exposure scenarios to identify, to quantify exposure for each scenario and then to incorporate these scenarios in order to estimate the total exposure. In this integrated analysis of exposure, summarizing of independent exposures from different scenarios will often lead to distribution of sub-populations depending on the exposure; in fact, scenarios usually treat exposure at the sub-populations level. As a result, scenarios integration or integrated analysis of exposure will often result in an exposure profile. In this respect for each sub-population exposed depending on spatial (the distance from mining) that we investigated, a profile exposure included the group size, group data (age, sex, occupational exposure, etc.), and pathways exposure. There were presented clearly, comprehensively, the assumptions and uncertainties associated with each scenario and profile.

Assessment of uncertainties

Uncertainty characterization methods for exposure assessment took into account the estimated parameters, type and complexity of existing data and estimation procedures used. The level of uncertainty related to estimating population characteristics. For example, when was estimated exposure distribution of the exposed population depending on distance, uncertainty characterization addressed possible differences of distribution estimation and the true distribution of exposure of the exposed population by specific indicators (biomarkers of exposure and effect).

Assessment of exposure quantified the hazardous substances contact, and contact measurement (ex.: environment and dose levels - characterized by specific biomarkers of exposure - metals investigated and thiocyanates) took into account those aspects that are necessary to predict the risk and impact on health of population groups investigated. Exposure for each member of the sub-population is, in the present work, an amount of the exposures measured and estimated/ predicted at individual level.

Assessment based on exposure data

A large reduction of the uncertainties associated with assessment of exposure of the population groups investigated was done by direct and indirect exposure measuring, at each subject level, of the whole investigated group and for all hazardous substances investigated, namely: breathable particles, sulphur and nitrogen oxides, lead, arsenic, cadmium, mercury, chromium, nickel, cyanide, noise. Measured exposure levels were directly used to estimate population exposure distribution and estimated confidence intervals of percentiles for exposure distribution. The estimated confidence interval was also processed for other characteristics of exposure distribution, such as average exposure, and finally led to the complex estimates and forecasts of exposure distribution to subjects investigated. This comprehensive approach for exposure assessment has on one hand, a novelty character, on the other hand allows a comprehensive assessment of risk for subjects categories investigated, taking into account the special nature of their exposure at the individual level, in terms of space and physical delimitation of it, at intensities, frequencies and different durations of exposure.

The purpose of this comprehensive assessment of exposure was to enable its networking both in terms of space (distance from the mine area at individual level) and in terms of time (in terms of frequency and duration of exposure but also to remove the uncertainties due to period latency required for development of an adverse effect associated with a specific exposure). For this reason, it was done this complex methodological approach of associating probable adverse effects of current and projected exposure, at individual level and variable to distance from the mining operation.

3. IMPACT ASSESSMENT REGARDING THE HEALTH STATUS OF THE POPULATION

Data on health, information specific to this objective in terms of probability of developing adverse effects according to exposure to hazardous substances and situations were used as reference value in the risk assessment. Risk assessment and impact on health status was based on measurements to determine the background and to estimate the specific emission of activities associated with the operation of the objective. This approach is the only way that an objective, which is to be located and operate in a populated area, can be evaluated in terms of association of any risk to the health of people in the immediate neighbourhood.

METHODOLOGY OF WORK

Effects of chemicals and/ or dangerous situations on the health can be classified into acute (immediate) and chronic effects (late).

Chronic effects are characteristic of long exposures to moderate levels of exposure and are far more frequent.

In the case of a dose - response to threshold effects can be classified as follow:

- general effects (from acute to chronic);
- effects produced at the level of a particular organ.

A dose-response relationship implies the existence of a threshold value of exposure below which effects are not detectable. Increasing exposure beyond this value is associated with increased intensity of the biological effect. There may also be other biological effects because of rising average levels of exposure.

Selection of subjects included in the study had as criterion the distance at which their home is located in relation to future mining.

Information on the subjects and their health was collected using a questionnaire (see APPENDICES). The questionnaire included questions regarding age, gender, subjects address, personal history of pathological (disease diagnosed during the life of different devices, systems and sense organs, including occupational disease), toxic consumption (cigarettes, alcohol), questions relating to social items and economic background, occupational history.

The questionnaire was applied by a trained interviewer to each subject separately.

Information on the acute and chronic pathology of subjects was collected from the consultation file of the family general practitioner (GP) in Rosia Montana.

Methodology for calculating body mass index

Calculation formula: BMI = weight (kg)/ square of height (cm) * 10,000

The categories of body mass index on which one finds the child nutrition status are:

- underweight - less than 5 percentile
- normal weight - between 5-85 percentiles
- risk of overweight - between the 85-95 percentiles
- overweight - over 95 percentile

Interpretation is made pursuing the growth chart appropriate to age and body mass index of the child and framing in the above percentile ranges.

The adult body mass index values are interpreted according to the following table:

Nutrition Degree	**Body mass index for adults**
Underweight	under 18.5
Normal	18.5 - 24.9
Overweight	25.0 - 29.9
Obesity	Greater than or equal to 30

The methodology for determining blood pressure

Subjects whose blood pressure were measured, they must not smoke, do not exercise, not sit in the polluted atmosphere, 30 minutes before measuring. Then they were placed in supine rest 5 minutes before measurement.

Measurement was made at the left arm, in supine, several times, and every few minutes.

Technique of determination was as follows:

- Device cuff was wrapped around the arm, which is maintained at the height of the heart, the semi-flexible forearm resting on a horizontal plane (cuff device is 20% wider than the arm and was placed at 2.5 cm above the elbow bend).
- It increased the pressure by pumping until the radial artery pulse disappeared and another 30 mmHg over that, then put a stethoscope over the artery to the humerus, medial biceps tendon.
- Deflation was performed with a speed of 3 mmHg / s or 2 mmHg for two revolutions heart, until the ear has collected at least two consecutive heart beats in the form of Korotkoff sounds.
- Systolic blood pressure is marked by the pointer in the same time as the first audible sound, corresponding to the forced passage of blood under the cuff that compresses the artery;
- Diastolic blood pressure is marked by the pointer when the sounds disappear, which means that the artery is not compressed any longer and intraluminal pressure balances that of the cuff.

The methodology for conducting ventilation functional test

Subjects who were investigated had not to smoke, not to use bronchi-dilators drugs, not present severe respiratory accuses, not to eat before conducting determinations.

Subjects sat at rest for at least 15min before test.

The technique of test proceeding was the following:

- The standing subject took the part in which followed to blow, with both hands, and then executed a forced inspiration followed by placing the tube (part) of the device in the mouth (lips tightening it so that exhaled air can not escape between the lips and tube), forced inspiration followed by a quick and forced expiration to be extended by exercise (4-6 seconds) to complete emptying of the air inside the lung.
- For recording capacity and lung volumes were performed every three determinations for each subject, taking into account best value; or in some cases the average of best three determinations from a total of up to eight.
- Volume and flow measurements were corrected by ventilation device in terms of BTPS conditions (Body Temperature, Pressure and Saturated), meaning at 37 ° C, 760 mmHg atmospheric pressure and water vapour saturation.

The methodology for sampling and transporting blood and urine samples

Blood sampling was performed by venous puncture after applying the tourniquet and disinfecting the area approach, the sample was collected in metal free blood collection container, tagged with an identification number.

Urine was collected in plastic containers previously immersed for 24 hours in 10% nitric acid, and rinsed thoroughly with deionised water. One collected a "spot" urine sample. Immediately after sampling containers were tightly closed and were labelled with an identification number. The urine sample for determination of metals was collected in plastic containers, metal free, which had been previously demineralised to remove any metal trace, and was acidified immediately after collection with high purity nitric acid up to pH = 2, the sample being frozen at -20 ° C. The urine sample fo r determination of thyocynates was frozen at -20℃, immediately after collecting it.

Blood and urine samples were transported to the laboratory for analysis, in insulated bags containing previously frozen elements.

The methodology for determining the constituents of blood counts

The method used for counting the figurative elements is impedance method. One does counting and cell size is determined by measuring the impedance modification when the cell passes through the aperture. Determination was performed using an ABACUS automatic analyzer.

The methodology for the determination of haemoglobin

The method used to determine haemoglobin is Drabkin method (cyanmethemoglobin method). It is used the diluted sample 1:96, lysated. By lysis haemoglobin is released of the cells and Fe^{2+} ion is oxidized to Fe^{3+} which will form methemoglobin. This reacts with potassium cyanide forming cyanmethemoglobina. Measuring the concentration of haemoglobin is made photo metrically.

The methodology for determining the hematocrit

Hematocrit (Ht) values are calculated based on the number of red blood cells and the average particle volume using the formula: % Ht = number of red x average volume particle x 100.

The methodology for the determination of serum iron

Iron was determined colorimetrically. Fe^{3+} forms with B chromium-azure a colourful compound. The iron concentration is determined photo-colorimetric by reading extinction at a wavelength of 630 nm. Use the following formula: iron micrograms / dl = sample absorbance x standard concentration/ standard absorbance.

The methodology for determining the total protein

Total proteins were determined by biuret method. In alkaline medium, peptide bonds of proteins interact with cupric ions to form blue-coloured complex. Proteins are determined photo-colorimetric by reading extinction at a wavelength of 546 nm. Use the following formula: total protein grams/dl = sample absorbance x standard concentration/ standard absorbance.

The methodology for the determination of serum calcium

Calcium was determined colorimetrically. Calcium forms with a phenolphthalein a coloured compound. Serum calcium concentration is determined colorimetrically by reading extinction at a wavelength of 578 nm. Use the following formula: sample absorbance / standard absorbance *standard concentration = mg/dl or mmol/l serum calcium – is made directly by the device. The device with which determinations were made: Screen Master

The methodology for the determination of serum magnesium

Magnesium was determined colorimetrically. Magnesium forms with calmagite a coloured compound. Serum magnesium concentration is determined colorimetrically by reading extinction at a wavelength of 546 nm (500-550 nm). Use the following formula: sample absorbance / standard absorbance *standard concentration = mg/dl or mmol/l serum magnesium – is made directly by the device. The device with which determinations were made: Screen Master.

The methodology for the determination of lead

The technique used to determine the concentration of lead is stripped anodic voltammetry; this technique allows the analysis of lead concentration with a sensitivity of 0.1 μg/ dL and 99% accuracy in three minutes. The device used is a Lead Care System, manufactured in 2000, this type of device being used in the U.S.A. for screening and risk assessment of exposure to lead in community and approved for use in the health system in Romania by the Ministry of Health. Determination is made of 50μl capillary blood, obtaining results on the spot within three minutes.

The methodology for sampling of soil and dust samples

The soil samples were collected in plastic bags free of metal, at a depth of 5 cm. The soil samples were then labelled, sealed and transported to the lab where they were treated in order to analyze them by X-ray fluorescence technique, using the Niton XL 700 device.

Inside the house, dust samples were collected on special wipes impregnated with deionised water and containing benzalkonium chloride.

Preparation of soil samples for analysis was as follows: from the collected soil sample was extracted a quantity of about 50 grams, which was desiccated by heating on the plate in a container. Soil so dry was crumbled in a mortar and passed through the three strains of the device, fitted to the finest. One then prepared the special container, used for storage during the sample analysis, by fixing a thin film at one end of the container. The homogenized and brought to fine grain sample has been deposited in the container up to 2/3 of its height, then the free remaining space was filled with special cotton, and closed container with a lid.

The container thus prepared was placed with the film foil down, being placed on a piece of paper to prevent contamination. After preparing the device, the soil sample as prepared is analyzed using X-ray fluorescence.

The methodology for the determination of heavy metals (As, Cd, Pb, Ni, Cr, Hg) in dust and soil by X-ray fluorescence

Analysis of soil and dust samples was made by X-ray dispersion using the NITTON XL700 device. This device is based on X-ray fluorescence method.

X-ray fluorescence analysis is a method in which the sample is irradiated with an X-ray beam (primary X-ray) passed at an angle from the sample. These processes occur in the sample:

a) inner electrons of the sample are expelled due to collisions with X-ray photons of the primary X-ray source.

b) electrons in the outer layers occupy vacant seats on the lower layers (K, L, M)

c) As a result of the transition that takes place, there are released quanta of energy of X-rays type, which leave the sample in all directions.

The energy of X-ray source is between 5 and 100 keV. Primary X-rays, as they called radiation emanating from the source, are routed to the sample under analysis. "Typical" X-rays specific to elements of sample and re-issued by it, leave the sample, containing information for determining the concentration of each element of the sample.

The methodology for the determination of metals in urine

The specific recommended method for determining metals in biological samples is that of determining by atomic absorption spectrometry method. Elements of any chemically neutral atoms are able to absorb electromagnetic radiation of wavelengths well defined. The amount of radiation absorbed is proportional to the concentration of atoms in the sample.

All reagents that were used for measurements were at least of analytical purity and the purity acids for spectrometry were of atomic absorption. The device used is an atomic absorption spectrometer type SpectrAA 880 background correction with deuterium source and hollow cathode lamps specific for each given element, equipped with GTA 100 graphite furnace and continuous flow system for generating the hydrides VGA 77, all manufactured by Varian USA.

The methodology for determining the concentration of nickel in urine

The technique of determination is Graphite Furnace - Atomic Absorption Spectrometry (GF-AAS). Before analysis, the urine sample is subjected to digestion in acid environment. Prepare standards, adjust oven settings and then start reading the sample followed by calculating concentrations.

The methodology for determining the concentration of arsenic and mercury in urine

Determination of As and Hg was made by atomic absorption method of chemical vapour generation. In this method the analyte is separated from the sample matrix by generating gaseous species as a result of a chemical reaction.

Arsenic

For arsenic determination, acidified urine sample was treated with sulphamate acid 10% and potassium iodide 10%. To prevent foaming Antifoam B was added as a surfactant agent. Final dilution of urine sample was 1/5. Reduction reaction was performed in acid environments 10M HCl, using a 0.6% $NaBH_4$ solution in 0.5% NaOH. The determination was made at 193.7 nm wavelength and background correction with deuterium source.

Mercury

For Hg determination, urine samples were subjected to digestion with a mixture of nitric acid, sulphuric acid and potassium permanganate. After digestion samples were treated with hydroxyl amine hydrochloride and brought to volume with deionised water so that the final dilution was 1 / 5. Elemental mercury reduction was achieved with a solution of 25% $SnCl_2$ in 20% HCl. The determination was made at 253.7 nm wavelength and background correction with deuterium source

Quantification of all elements was made by reference to a calibration curve made with standard addition to low metal content urine.

The methodology for determining the concentration of cadmium and chromium in urine

Cd and Cr were determined by atomic absorption method with atomization in graphite tube platform. The urine diluted 1/2 was injected directly into the graphite tube with a chemical modifier that facilitates in situ digestion of the sample. To determine Cr was used as a chemical modifier solution 1% Mg $(NO_3)_2$, and for Cd was used a mixed modifier of 0.3% Pd+0.2% Mg $(NO_3)_2$. The determination was made at the wavelength of 357.9 nm for Cr and to 228.8 nm for Cd. For both elements was used background correction by deuterium lamp.

The methodology for the determination of creatinine

Creatinine determination was made by Jaffe method: creatinine reacts with alkaline picric acid, resulting in a coloured picrate, photometry measurable at 550 nm. WHO recommends reporting the concentration of metals to urinary creatinine because the elimination of urine influences the urinary excretion of metals. In addition, urinary creatinine is indicated more as guidance. If creatinine values are outside the range of 0.5 - 2.5 g / L, spot urine is not suitable for monitoring exposure to toxic metals.

The methodology for the determination of thiocyanates in urine

Thiocyanates form with ferric nitrate the ferric thiocyanate, of red-brown colour and colorimetric measurable. By adding mercuric nitrate, selective colour disappears due to thiocyanate, which allows removal of interferences of other compounds that give colour reaction with ferric nitrate. Colorimetric measurement is made at wavelength of 470nm, before and after addition of mercuric nitrate.

Statistical data processing methodology

Databases have been developed by introducing electronic exposure data (concentrations of breathable dust, nitrogen dioxide, sulphur dioxide in the air, heavy metals in the air, soil and dust, noise, vibration) and the health of the population (data from the questionnaire sheet and from the medical sheet shown by the family GP, medical analysis results performed in blood and urine, ventilation functional tests results, ECG results, blood pressure values) and other possible risk/ error factors in the Microsoft Excel Program, from where they were transferred to STATA 5.0 Software, and were statistically processed (statistical tests).

Graphical representations have been made in Microsoft Excel.

Statistical data analysis was performed using summary statistical measurements and advanced statistical tests. Preliminary exposure data were analyzed using these summary statistic tests: measurement of central tendency (average and median value), variability measurement (interval - minimum and maximum value, percentiles distribution, standard deviation, Skewness, Kurtosis).

Environmental data (concentrations of breathable dust, nitrogen dioxide, sulphur dioxide in the air, the percentage composition of heavy metals particles in suspension and deposition on soil, noise, vibration), currently and as projected values for year 9 10, 12, 14, 19 of mining, were supplied by the beneficiary.

concentrations of breathable dust, nitrogen dioxide, sulphur dioxide in the air, the percentage composition of heavy metals particles in suspension and deposition on soil have been provided as a range of values, so that processing were developed in two scenarios - one for the lower limit of the range (minimum value) and another one for the upper limit of the range (maximum values).

Statistical data processing was done taking into account the distance at which investigated homes of subjects ranged against the four open pits (Jig, Orlea, Carnic, Cetate).

They also created variables that were introduced in the measurement results to determine blood biomarkers (lead) or urine biomarkers (arsenic, cadmium, chromium, mercury, nickel, thiocyanates).

Forecast values of biological biomarkers (blood - lead, urine - arsenic, cadmium, chromium, mercury, nickel, thiocyanates) was done in Microsoft Excel based on the values of biological biomarkers measured in the present and on predicted values of certain hazardous substances in environmental factors for different periods of the Project operation. The results were processed graphically in the same Microsoft Excel program.

In terms of linking the exposure to breathable particles, nitrogen dioxide and sulphur dioxide in the air with the frequency of acute and chronic respiratory diseases in population groups that was investigated and linking noise exposure with the occurrence of adverse health effects, at the current time, and forecast frequency of occurrence of acute and chronic diseases in the population groups investigated in terms of exposure to predicted values concentrations of breathable particles, nitrogen dioxide and sulphur dioxide and prediction of the occurrence of adverse health effects in the population groups investigated as expected from exposure to noise levels in different conditions and operation periods of the Project, this was done in STATA, using a logistic regression model that allowed estimation of the risk of adverse effects on health of population due to exposure .

Definitions of statistical terms mentioned in the methodology:

Skewness represents a measurement of asymmetry degree measure for data distribution. Distribution of a data set is symmetric if it looks the same on both sides of a central point.

Kurtosis is an indicator that informs on the appearance of sharp or flat distribution curve of data set compared to a normal distribution. This means that a data set with high Kurtosis tend to have a distinct peak near the average value and a set of data that has a small Kurtosis tends to have a flattened appearance near the average value.

The Variant is one of the few indicators of variability used in statistics to characterize the dispersion in a set of statistical data. To calculate the Variant, it is necessary to first calculate the average and more how much deviates from average each value of data set (standard deviation). The Variant is represented by the average square of several standard deviations against the average.

Percentile is a value on a scale of one hundred values that indicates the percentage of distribution equal to or falling below it.

Confidence interval is a range of values with a high probability of containing the parameter that was estimated.

Odds ratio is a way of comparing whether the probability of an event is the same for both groups.

The relative risk reflects the extent to which a particular risk factor influences the risk of a particular adverse effect.

The differences were highlighted by comparing the test data by the value of P (p-value). P value represents the probability that differences at least as large as those found in the observed data would come as a result of chance (zero hypothesis). Zero hypothesis is accepted or rejected depending on the value of P, which may be higher or lower than the level of significance, which is usually chosen at level of 0.05 (5%). If P value is below the level of significance shows that it is unlikely (but not impossible) that the observed results to be determined only by chance, zero hypothesis being rejected.

Exposure assessment and risk assessment

Descriptive presentation of the information collected through the questionnaire applied to the sample investigated subjects

The sample included 111 subjects investigated in Rosia Montana, of which 55 were women and 56 were men, aged between 5 and 70 years old, the average age being 33 years. The largest number of subjects ranged in age category 18-30 years, more than half of the investigated subjects with age between 18-40 years.

In terms of personal history of pathological (disease diagnosed during the life of different devices, systems and sense organs, including occupational diseases) of the subjects included in the study, noted that in most investigated cases (over 90% of investigated subjects) chronic pathology is absent. As mentioned, somewhat elevated frequencies of responses with "Yes" (14 to 16% of investigated subjects) to questions investigating chronic digestive diseases (ulcers, hepatitis), kidney and bladder ailments and joints diseases - arthritis, osteoarthritis, 37% of investigated subjects stated they had been hospitalized for any disease, so about 6% were more than 20 days sick, which required absence from work and only one subject said he was diagnosed with an occupational disease. 88% of investigated subjects said they now follow a medical treatment.

Regarding toxic consumption (cigarettes, alcohol), 36% of investigated subjects said they were smokers who smoked between 3 and 40 cigarettes per day, which means in a more detailed analysis that 40% of smokers consumed less than 10 cigarettes per day, 42% of smokers consumed between 10 and 20 cigarettes per day and 18% of smokers consumed more than 20 cigarettes per day. Regarding alcohol, 25% reported drinking beer and hard alcohol.

As elements of socio-economic background, 93% of subjects included in the study reported having an income that exceeds the amount of 500 RON, more than half (62%) have secondary education and 70% of them are employed.

As an occupational history, tables show current occupations and jobs and the previous occupations and jobs, seniority at the current work and at previous ones, and affirmative on the presence or absence of exposure to various substances and / or dangerous situations in the workplace.

Distribution of subjects included in the assessment by sex and age

age_c	sex female	male	Total
<18	9	7	16
	16.36	12.50	14.41
18-30	20	13	33
	36.36	23.21	29.73
30-40	13	16	29
	23.64	28.57	26.13
40-50	9	10	19
	16.36	17.86	17.12
>50	4	10	14
	7.27	17.86	12.61
Total	55	56	111
	100.00	100.00	100.00

Pathologic personal case history

Sight problems other than those corrected with glasses

sight problem	Freq.	Percent	Cum.
No	107	96.40	96.40
Yes	4	3.60	100.00
Total	111	100.00	

Hearing problems

hearing problem	Freq.	Percent	Cum.
No	108	97.30	97.30
Yes	3	2.70	100.00
Total	111	100.00	

Paralysis or another neurologic disorder

neurologic disorders	Freq.	Percent	Cum.
No	109	98.20	98.20
Yes	2	1.80	100.00
Total	111	100.00	

Recurrent headache, migraines

recurrent headache	Freq.	Percent	Cum.
No	99	89.19	89.19
Yes	12	10.81	100.00
Total	111	100.00	

Dizziness , stagger, tinnitus

dizziness	Freq.	Percent	Cum.
No	106	95.50	95.50
Yes	5	4.50	100.00
Total	111	100.00	

Cardiovascular disorders - arterial hypertension

AHT	Freq.	Percent	Cum.
No	102	91.89	91.89
Yes	9	8.11	100.00
Total	111	100.00	

Cardiovascular disorders – ischemic cardiopathy

ICP	Freq.	Percent	Cum.
No	110	99.10	99.10
Yes	1	0.90	100.00
Total	111	100.00	

Other cardiovascular disorders

other cardiovascular disorders	Freq.	Percent	Cum.
No	109	98.20	98.20
Yes	2	1.80	100.00
Total	111	100.00	

Asthma

asthma	Freq.	Percent	Cum.
No	111	100.00	100.00
Total	111	100.00	

Chronic bronchitis

chronic bronchitis	Freq.	Percent	Cum.
No	110	99.10	99.10
Yes	1	0.90	100.00
Total	111	100.00	

Other chronic breathing disorders

other breathing disorders	Freq.	Percent	Cum.
No	103	92.79	92.79
Yes	8	7.21	100.00
Total	111	100.00	

Chronic digestive disorders – ulcer, chronic hepatic disorders

chronic digest. dis.	Freq.	Percent	Cum.
No	95	85.59	85.59
Yes	16	14.41	100.00
Total	111	100.00	

Renal or bladder disorders

chronic renal disorders	Freq.	Percent	Cum.
No	95	85.59	85.59
Yes	16	14.41	100.00
Total	111	100.00	

Arthritis, arthrosis, rheumatism

arthritis, arthrosis, rheumatism	Freq.	Percent	Cum.
No	93	83.78	83.78
Yes	18	16.22	100.00
Total	111	100.00	

Hematological disorders including anemia

hematological disorders	Freq.	Percent	Cum.
No	101	90.99	90.99
Yes	10	9.01	100.00
Total	111	100.00	

Eczema, dermatitis, other dermatologic disorders

dermatologic disorders	Freq.	Percent	Cum.
No	103	92.79	92.79
Yes	8	7.21	100.00
Total	111	100.00	

Diabetes mellitus

diabetes mellitus	Freq.	Percent	Cum.
No	110	99.10	99.10
Yes	1	0.90	100.00
Total	111	100.00	

Thyroid disorders or other endocrine disorders

endocrine disorders	Freq.	Percent	Cum.
No	105	94.59	94.59
Yes	6	5.41	100.00
Total	111	100.00	

Allergies to drugs, animals etc.

allergy	Freq.	Percent	Cum.
No	100	90.09	90.09
Yes	11	9.91	100.00
Total	111	100.00	

Malignant tumors

cancer	Freq.	Percent	Cum.
No	110	99.10	99.10
Yes	1	0.90	100.00
Total	111	100.00	

Hospitalized for any disorders

hospitalized	Freq.	Percent	Cum.
No	70	63.06	63.06
Yes	41	36.94	100.00
Total	111	100.00	

Sick for more than 20 days in the last year, without going to work

sick for more than 20 days	Freq.	Percent	Cum.
No	104	93.69	93.69
Yes	7	6.31	100.00
Total	111	100.00	

Diagnosed with any occupational disease

occupational disease	Freq.	Percent	Cum.
No	110	99.10	99.10
Yes	1	0.90	100.00
Total	111	100.00	

Lung radiography in the last year

lung radiography	Freq.	Percent	Cum.
No	92	82.88	82.88
Yes	19	17.12	100.00
Total	111	100.00	

Ongoing medical treatment

medical treatment	Freq.	Percent	Cum.
No	98	88.29	88.29
Yes	13	11.71	100.00
Total	111	100.00	

Consumption of toxics

Smoker

smoking	Freq.	Percent	Cum.
No	71	63.96	63.96
Yes	40	36.04	100.00
Total	111	100.00	

Number of cigarettes per day

cig_c	Freq.	Percent	Cum.
<=10	16	40.00	40.00
10-20	17	42.50	82.50
>20	7	17.50	100.00
Total	40	100.00	

Consumption of alcohol

consumption of alcohol	Freq.	Percent	Cum.
No	83	74.77	74.77
Yes	28	25.23	100.00
Total	111	100.00	

Socio-economic background elements

Employed

employed	Freq.	Percent	Cum.
No	33	29.73	29.73
Yes	78	70.27	100.00
Total	111	100.00	

Last graduated school

education	Freq.	Percent	Cum.
Elem. school	11	10.19	10.19
Gen. school	12	11.11	21.30
High school	67	62.04	83.33
College	3	2.78	86.11
University	9	8.33	94.44
Vocational	6	5.56	100.00
Total	108	100.00	

Monthly income

Monthly income RON	Freq.	Percent	Cum.
More than 500	89	92.71	92.71
200-500	3	3.12	95.83
100-200	3	3.12	98.96
Less than 100	1	1.04	100.00
Total	96	100.00	

Occupational background

Current occupation, workplace, work seniority at the current workplace and exposure to hazardous substances and/or situations at the workplace

Occupation 1	Freq.	Percent	Cum.
administrator	1	0.90	0.90
security agent	1	0.90	1.80
administrative department employee	1	0.90	2.70
social department employee	1	0.90	3.60
occupational safety and health employee	1	0.90	4.50
environmental department assistant	1	0.90	5.41
assistant geologist	2	1.80	7.21
assistant manager	1	0.90	8.11
cook	1	0.90	9.01
housewife	2	1.80	10.81
public relations consultant	1	0.90	11.71
accountant	1	0.90	12.61
administrative coordinator	1	0.90	13.51
electrician	2	1.80	15.32
student	12	10.81	26.13
cleaning leady	1	0.90	27.03
driller	1	0.90	27.93
advertising trailer associates	1	0.90	28.83
occupational safety and health inspector	1	0.90	29.73
human resources inspector	1	0.90	30.63
plumber	2	1.80	32.43
laboratory assistant	1	0.90	33.33
social worker	2	1.80	35.14
foreman	1	0.90	36.04
mechanic	1	0.90	36.94
auto mechanic	2	1.80	38.74
worker	7	6.31	45.05
unskilled labor	36	32.43	77.48
social pedagogue	1	0.90	78.38
pensioner	2	1.80	80.18
pre-school pupil	2	1.80	81.98
reviewer	1	0.90	82.88
social department manager	1	0.90	83.78
patrimony restorer	1	0.90	84.68
secretary	1	0.90	85.59
head of office	1	0.90	86.49
driver	1	0.90	87.39
unemployed	6	5.41	92.79
student	3	2.70	95.50
knitter	1	0.90	96.40
salesman	2	1.80	98.20
mason, painter, dyer	1	0.90	99.10
painter	1	0.90	100.00
Total	111	100.00	

Current workplace

Workplace 1	Freq.	Percent	Cum.
Nicu impex srl	1	1.01	1.01
RMGC	79	79.80	80.81
alba council	1	1.01	81.82
law school	1	1.01	82.83
faculty of economic sciences cluj	1	1.01	83.84
campeni enterprise	1	1.01	84.85
high school	3	3.03	87.88
pie shop	1	1.01	88.89
sc eurojoul srl campeni	1	1.01	89.90
general school	5	5.05	94.95
primary school	4	4.04	98.99
university	1	1.01	100.00
Total	99	100.00	

Work seniority at the current workplace

Variable	Obs	Mean	Std. Dev.	Min	Max
F1c	84	2.997619	2.910346	.1	13

Exposure to hazardous substances and/or situations at the current workplace

exposure 1 Yes/No	Freq.	Percent	Cum.
No	75	94.94	94.94
Yes	4	5.06	100.00
Total	79	100.00	

Previous occupations, previous workplaces, work seniority at the previous workplaces and exposure to hazardous substances and/or situations at the previous workplaces

occupation	Freq.	Percent	Cum.
administrator	1	1.35	1.35
underground miner assistant	1	1.35	2.70
army employee	1	1.35	4.05
maid	1	1.35	5.41
garment worker	2	2.70	8.11
accountant	2	2.70	10.81
ore crushing/processing coordinator	1	1.35	12.16
parking lot dispatcher	1	1.35	13.51
electrician	1	1.35	14.86
electrician and mechanic	1	1.35	16.22
steel bender	1	1.35	17.57
clerk	1	1.35	18.92
treasurer	2	2.70	21.62
flyer distribution and cleaning	1	1.35	22.97
mining engineer	1	1.35	24.32
caretaker	1	1.35	25.68
schoolmistress	1	1.35	27.03
laboratory assistant	1	1.35	28.38
warehouse keeper	1	1.35	29.73

foreman	1	1.35	31.08
construction work foreman	1	1.35	32.43
mechanic	1	1.35	33.78
auto mechanic	1	1.35	35.14
miner	6	8.11	43.24
worker	3	4.05	47.30
unskilled labor	5	6.76	54.05
chemical operator	1	1.35	55.41
preparation operator	2	2.70	58.11
flotation preparation operator	1	1.35	59.46
crushing operator	1	1.35	60.81
well guard	1	1.35	62.16
painter	1	1.35	63.51
time clerk	1	1.35	64.86
underground tester	2	2.70	67.57
secretary	1	1.35	68.92
secretary/waiter/typist	1	1.35	70.27
furniture polisher	1	1.35	71.62
driver	5	6.76	78.38
tools driver	1	1.35	79.73
roughneck	2	2.70	82.43
refractive products transport supervisor	1	1.35	83.78
turner	1	1.35	85.14
student	3	4.05	89.19
substitute	1	1.35	90.54
design technician	1	1.35	91.89
manual weaver	1	1.35	93.24
translator	1	1.35	94.59
saleswoman	1	1.35	95.95
salesman	2	2.70	98.65
painter	1	1.35	100.00
Total	74	100.00	

Workplace 2

workplace 2	Freq.	Percent	Cum.
IPL Campeni	1	1.37	1.37
RMGC	23	31.51	32.88
SC refractara sa Baia Mare	2	2.74	35.62
SMA gherla	1	1.37	36.99
abrud	3	4.11	41.10
private business	1	1.37	42.47
bradet	1	1.37	43.84
brazi chalet	1	1.37	45.21
children’s house abrud	1	1.37	46.58
motul campeni cooperative	1	1.37	47.95
simeria storage facility	1	1.37	49.32
gura rosiei operation	1	1.37	50.68
baia de aries mining operation	1	1.37	52.05
rosia montana mining operation	11	15.07	67.12
rosia montana and CM mining operation	1	1.37	68.49
rosia montana and ro mining operation	1	1.37	69.86
rosia poieni mining operation	8	10.96	80.82
baia de aries clothing factory	1	1.37	82.19
UBB cluj communication faculty	1	1.37	83.56
abrud spinning factory	1	1.37	84.93
gemfor	1	1.37	86.30
motu campeni	1	1.37	87.67
certified natural person	1	1.37	89.04
rosia montana school	2	2.74	91.78
tanyard	1	1.37	93.15
rosia montana commercial unit	2	2.74	95.89
military unit	1	1.37	97.26

university	1	1.37	98.63
turda chemical plant	1	1.37	100.00
Total	73	100.00	

Work seniority at workplace 2

Variable	Obs.	Mean	Std. Dev.	Min	Max
F2c	71	6.067606	6.928797	.1	30

Exposure to hazardous substances and/or situations at workplace 2

exposure 2 Yes/No	Freq.	Percent	Cum.
No	55	77.46	77.46
Yes	16	22.54	100.00
Total	71	100.00	

Occupation 3

occupation 3	Freq.	Percent	Cum.
administrator	1	2.08	2.08
tanyard administrator	1	2.08	4.17
roughneck assistant	2	4.17	8.33
baker	2	4.17	12.50
cashier	1	2.08	14.58
accountant	1	2.08	16.67
dressmaker	1	2.08	18.7 radio-
tv maintenance technician	1	2.08	20.83
electrician	2	4.17	25.00
electrician and mechanic	3	6.25	31.25
spinner	1	2.08	33.33
stoker	1	2.08	35.42
veneer jointer	1	2.08	37.50
mining engineer	1	2.08	39.58
laboratory assistant	1	2.08	41.67
foreman	1	2.08	43.75
mechanic	2	4.17	47.92
auto mechanic	1	2.08	50.00
underground locomotive mechanic	1	2.08	52.08
cars and machines mechanic	1	2.08	54.17
miner	4	8.33	62.50
worker	2	4.17	66.67
officer	1	2.08	68.75
operator	1	2.08	70.83
preparation operator	1	2.08	72.92
preparation operator-miner	1	2.08	75.00
restoration of old furniture	1	2.08	77.08
relocation of people	1	2.08	79.17
secretary	1	2.08	81.25
driver	1	2.08	83.33
student	1	2.08	85.42

	Freq.	Percent	Cum.
welder	1	2.08	87.50
carpenter	1	2.08	89.58
ore transporter	1	2.08	91.67
knitter	1	2.08	93.75
metallurgy caster	1	2.08	95.83
salesman	2	4.17	100.00
Total	48	100.00	

Workplace 3

workplace 3	Freq.	Percent	Cum.
IPL campeni	1	2.27	2.27
RMGC	5	11.36	13.64
alba butchery	1	2.27	15.91
home	2	4.55	20.45
church	1	2.27	22.73
rosia montana bakery	2	4.55	27.27
construction works bistrita nasaud	1	2.27	29.55
banat oravita mining operation	1	2.27	31.82
rosia montana mining operation	8	18.18	50.00
rosia poieni mining operation	8	18.18	68.18
zlatna mining operation	1	2.27	70.45
campeni beer factory	1	2.27	72.73
campeni furniture factory	2	4.55	77.27
abrud spinning factory	1	2.27	79.55
abrud enterprise	1	2.27	81.82
alba mechanical enterprise	1	2.27	84.09
portelanu alba	1	2.27	86.36
rosia montana	1	2.27	88.64
taxis	1	2.27	90.91
abrud commercial unit	1	2.27	93.18
hunedoara commercial unit	1	2.27	95.45
rosia montana commercial unit	1	2.27	97.73
bucuresti military unit	1	2.27	100.00
Total	44	100.00	

Work seniority at workplace 3

Variable	Obs.	Mean	Std. Dev.	Min	Max
F3c	47	6.934043	7.698116	.1	29

Exposure to hazardous substances and/or situations at workplace 3

exposure 3 Yes/No	Freq.	Percent	Cum.
No	32	69.57	69.57
Yes	14	30.43	100.00
Total	46	100.00	

Occupation 4

occupation 4	Freq.	Percent	Cum.
advertising agent	1	3.85	3.85
reeler	1	3.85	7.69
baker	2	7.69	15.38
geologic sample collector	1	3.85	19.23
accountant	1	3.85	23.08
beautician	1	3.85	26.92
stoker	1	3.85	30.77
laboratory assistant	1	3.85	34.62
locksmith	2	7.69	42.31
mechanical locksmith	1	3.85	46.15
maintenance mechanic	1	3.85	50.00
mechanic/driver	1	3.85	53.85
miner	2	7.69	61.54
cable fitter	1	3.85	65.38
worker	1	3.85	69.23
construction worker	1	3.85	73.08
officer	1	3.85	76.92
cyanide preparation operator	1	3.85	80.77
driver	1	3.85	84.62
student	1	3.85	88.46
road construction supervision	1	3.85	92.31
carpenter	2	7.69	100.00
Total	26	100.00	

Workplace 4

workplace 4	Freq.	Percent	Cum.
ACE campeni	1	4.00	4.00
IPL campeni	1	4.00	8.00
IRTA	1	4.00	12.00
RMGC	3	12.00	24.00
alba iulia	1	4.00	28.00
beauty parlor	1	4.00	32.00
alba ironworks	1	4.00	36.00
rosia montana cooperative	1	4.00	40.00
baia de aries mining operation	1	4.00	44.00
rosia montana mining operation	4	16.00	60.00
rosia poieni mining operation	3	12.00	72.00
campeni beer factory	1	4.00	76.00
turda cement factory	1	4.00	80.00
spiru haret faculty–philosophy/journal.	1	4.00	84.00
abrud spinning factory	2	8.00	92.00
rosia montana commercial unit	1	4.00	96.00
cluj napoca military unit	1	4.00	100.00
Total	25	100.00	

Work seniority at workplace 4

sum F4c

Variable	Obs.	Mean	Std. Dev.	Min	Max
F4c	25	4.204	3.994421	.1	15

Exposure to hazardous substances and/or situations at workplace 4

exposure 3 Yes/No	Freq.	Percent	Cum.
No	19	76.00	76.00
Yes	6	24.00	100.00
Total	25	100.00	

The results of sample analysis performed in subjects investigated

Erythrocyte count, hemoglobin, hematocrit, red cell index, white blood cell counts

Red line investigation results in subjects included in the survey showed the number of red blood cell values within the range of normal values (3800000-5400000/mm3 for women and 4000000-6000000/mm3 for men) for the great majority of subjects investigated for both female and the male population. Only one female subject and a male subject had values in the number of red blood cells located below the normal range, and a rate of 3% for men and 13% for women had values number of red blood cells above the upper limit of normal range.

In terms of hemoglobin level, in the case of 89% of female subjects (normal values 12-16 g / dl) the determined hemoglobin values were within normal range. In the case of 4% of female subjects, values were below the lower limit of the range of values considered normal, while in the case of 7% of female subjects, the values were above the upper limit of the normal.

In the case of male subjects (normal values 13-18 g / dl), hemoglobin values determined were located within the range of normal values, for 86% of the subjects studied, while in the case of 14% values were below the lower limit of normal range.

With regard to hematocrit, if the 69% of female subjects (normal values 36-48%) had hematocrit values in the range of normal values, 2% of female subjects had values below the range of values normal while 29% of subjects had values above the upper limit of normal values.

For male subjects (normal values 39-50%), hematocrit determined values were situated within normal range for 80% of the subjects investigated. In the case of 8% of investigated subjects, values were below the lower limit of normal range and in the case of the rest of 12% of investigated subjects, values were above the upper limit of normal values.

Distribution of sample subjects investigated according to the values of erythrocyte

Erythrocyte index- MCV - medium corpuscular volume (normal values 80-100 femtolitri (fl)), as shown in the table below, for the great majority of subjects investigated (85%), this indicator had values in the range of normal. Only in the case of 5 subjects, this indicator was situated below the normal range.

Erythrocyte index - HEM - average hemoglobin red blood cells (normal values 27-33 pg / cell), note that, as with the MCV, a percentage of 88% of the subjects assessed had the indicator values located within the range of values considered normal. As in the case of MCV, there were 9 subjects with values of this indicator located below the normal range.

VEM	Frequency	Percentage
<80	5	5.00
80-100	85	85.00
>100	10	10.00
Total	*100*	*100.00*

HEM	Frequency	Percentage
<27	9	9.00
27-33	88	88.00
>33	3	3.00
Total	100	100

Erythrocyte indexes – CHEM – the average hemoglobin erythrocyte concentration (normal values 32-36 g/dl), as it can be seen in the table below, the values of this indicator for more than half of the investigated subjects were below the lower limit of the normal values range.

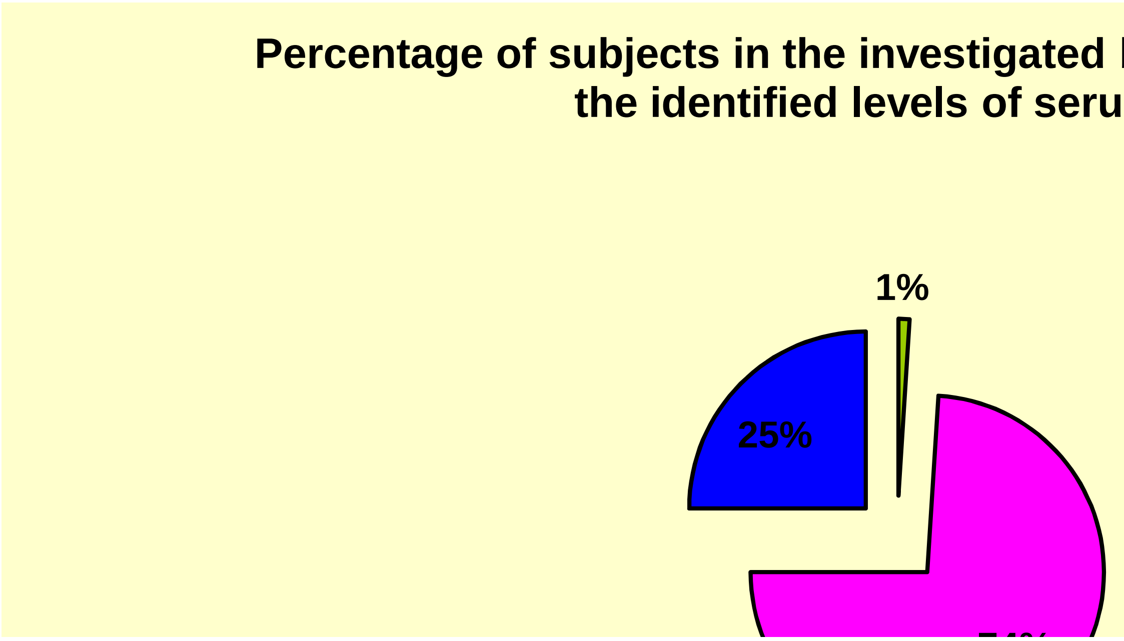
CHEM	Frequency	Percentage
<32	52	52.00
32-36	48	48.00
Total	100	100.00

As far as the number of thrombocytes is concerned (normal values 150000-450000/mm^3) on investigated subjects, as it can be seen in the table below, all the investigated subjects displayed values of the thrombocytes number within the range of values considered as normal.

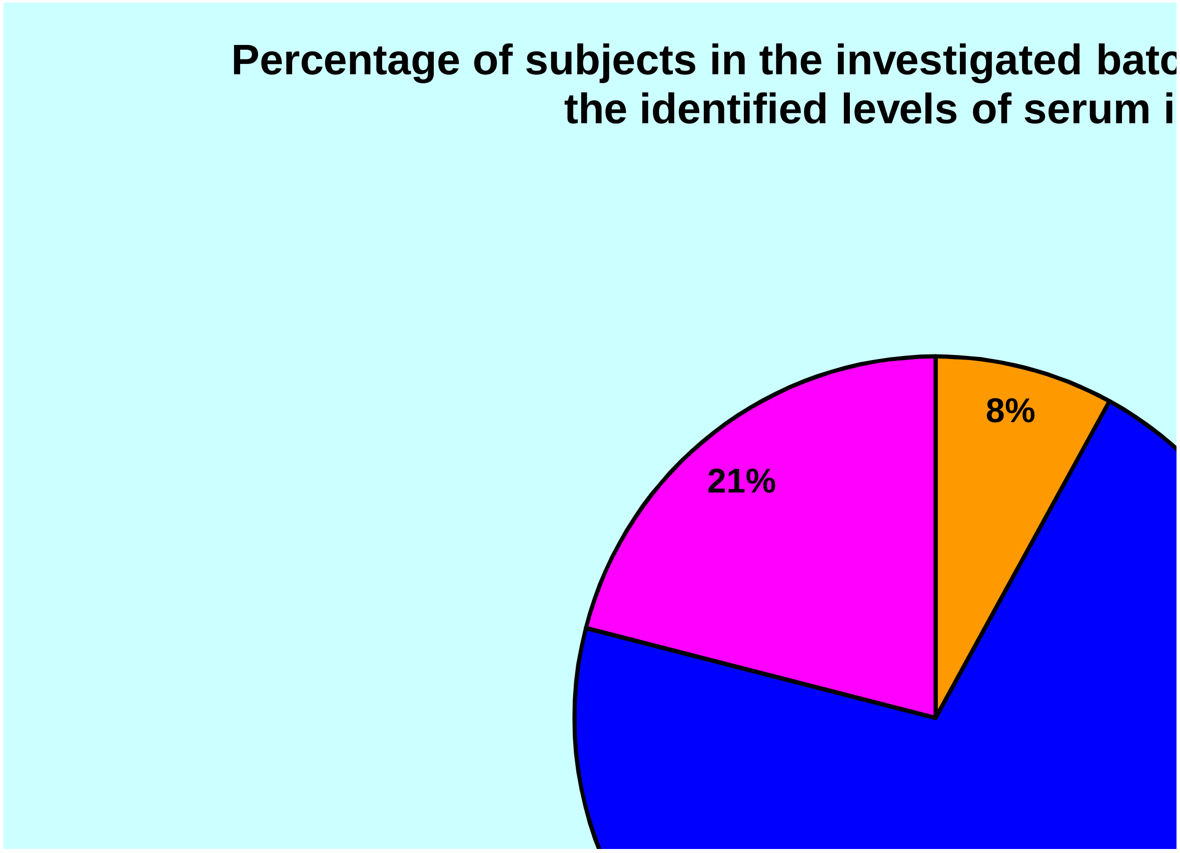
Thrombocythemia	Frequency	Percentage
150000-450000/mmc	100	100.00
Total	100	100.00

Regarding the number of leucocytes, 93% of the investigated subjects displayed values situated within the limits of the normal range (normal values 4000-10000/ mm^3). An extremely small percentage of the subjects (1%) displayed values of the number of leucocytes that were situated below the lower limit of the normal range while 6% of the investigated subjects displayed values of the number of leucocytes above the upper limit of the normal values range.

Levels of serum calcium, magnesium, iron and total proteins

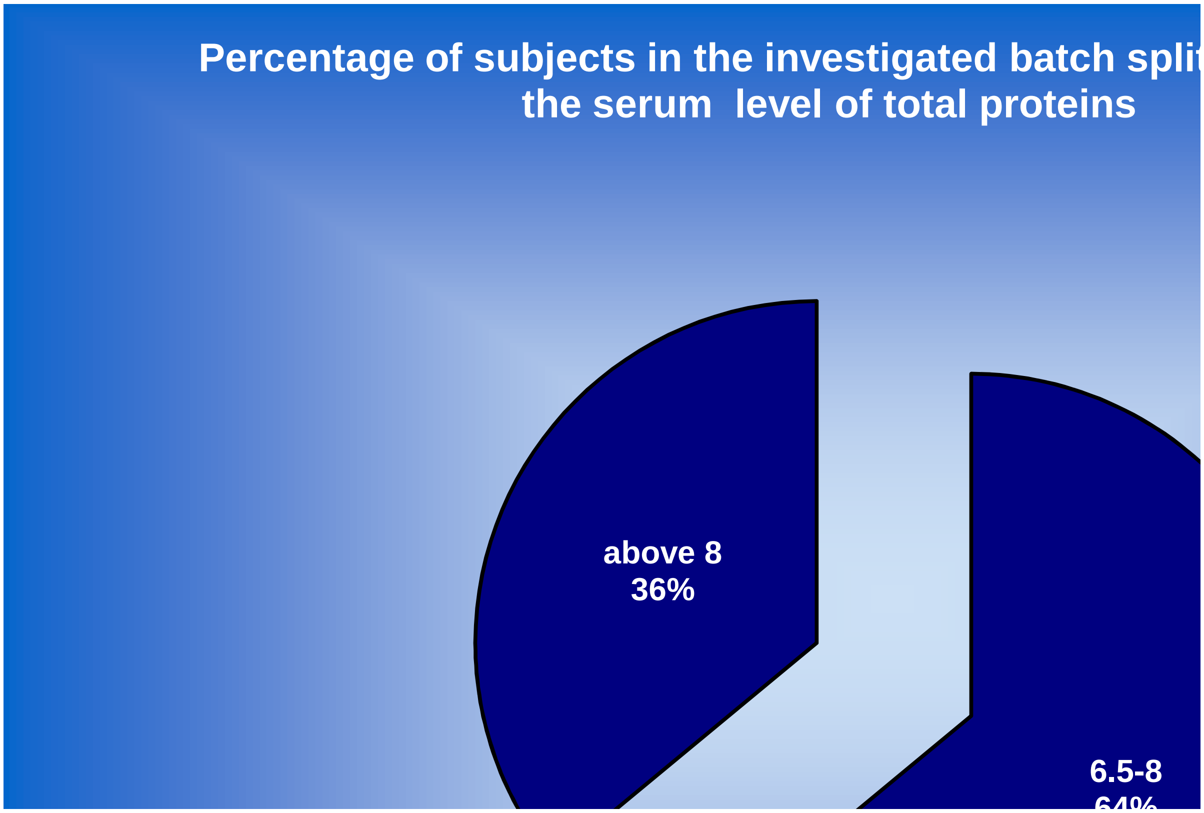


With respect to the levels of serum calcium and magnesium, the charts display similar percentages (74% for calcium, 72% for magnesium) for values situated within the range of normal values (normal values for calcium 8.8-10.4 mg/dl; magnesium 1.9-2.5 mg/dl), and a higher percentage (23% for magnesium compared to 1% in the case of calcium) for values situated below the lower limit of the normal values range and, once again, a higher percentage for values, this time in the case of serum calcium, (25% for calcium, 5% for magnesium) above the upper limit of the normal values range.

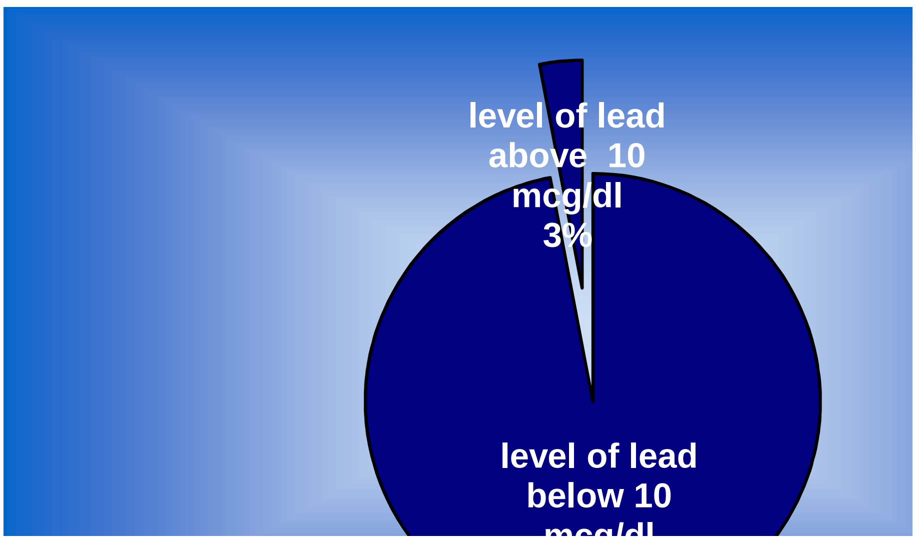


Regarding the values of serum iron, 71% of the investigated subjects displayed values situated within the range of normal values (normal values 50-150 µg/dl), 8% displayed values below the lower limit of the normal values range and 21% displayed values situated above the upper limit of the normal values range.

Total proteins displayed normal values (normal values 6.5-8 g/dl) for 64% of the investigated subjects, the rest of the values exceeding the upper limit of the normal range.

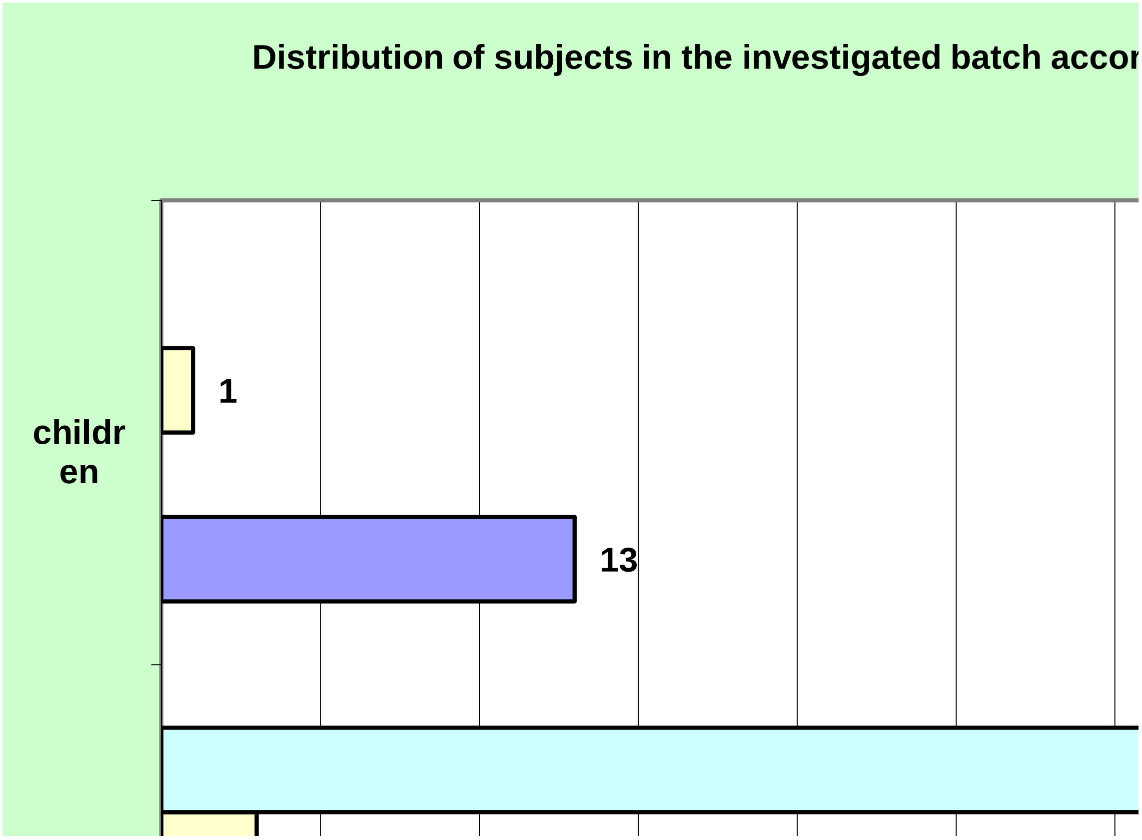


The levels of lead concentration in the bloodstream determined in the case of the investigated subjects (normal values below 10 µg/dl)

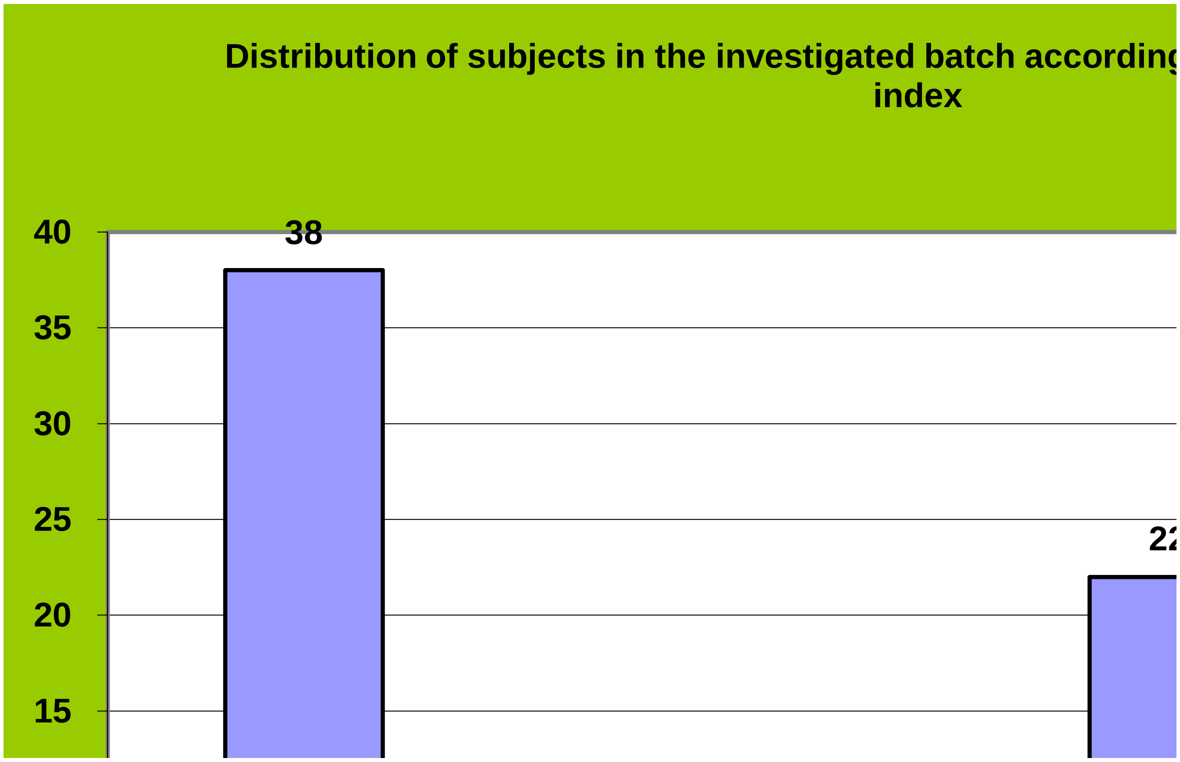


One can see that out of the 100 subjects whose level of lead was investigated, only three displayed levels of lead above the limits considered as normal.

Body mass index



As it can be seen from the above chart, most of the children in the investigated batch had a normal weight with only one underweight. Regarding the adults, most of them classified in the normal weight category, still a great number of subjects made it in the overweight and obesity category; the total frequency of the latter categories equal the frequency of normal weight subjects.

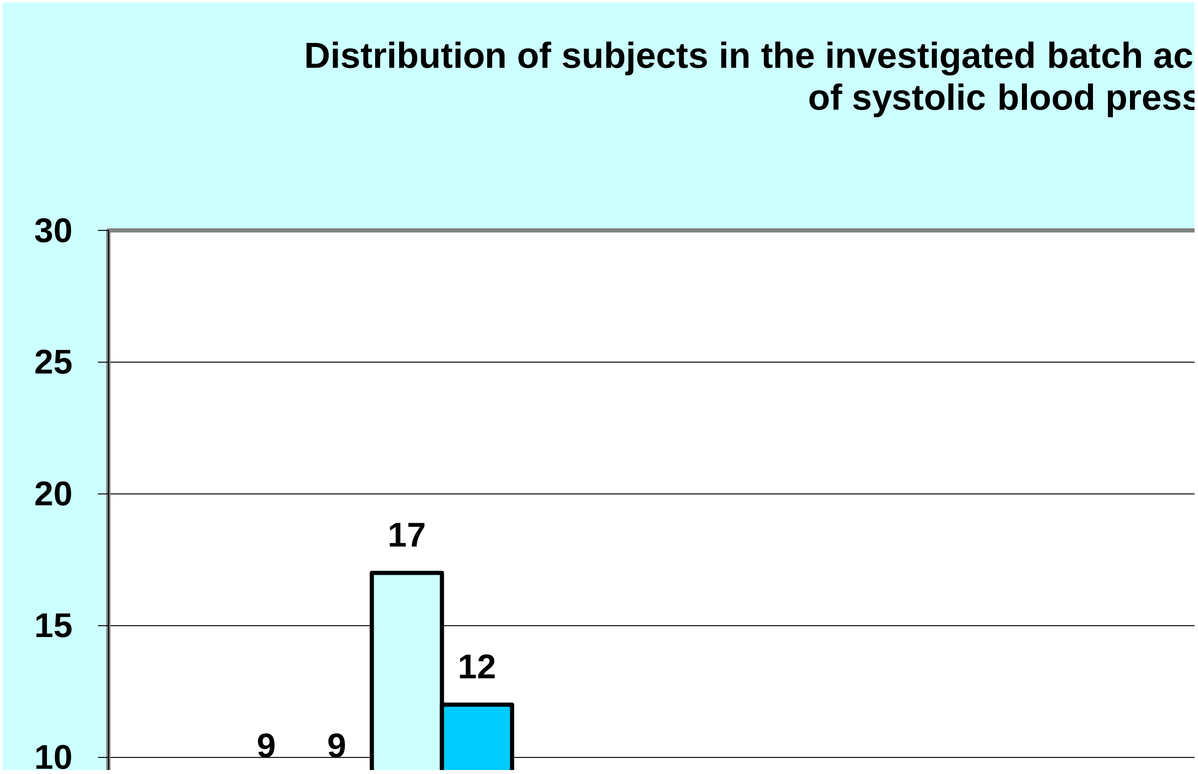


Comparing the two genders, we can notice a higher number of women in the normal weight category and a smaller number of women in the overweight and obesity category, whilst in the case on men we can notice a higher frequency in the overweight and obesity categories. Also, it is to be noted that in the case of men, the underweight category is missing, which can be noticed, in exchange, in the case of women.

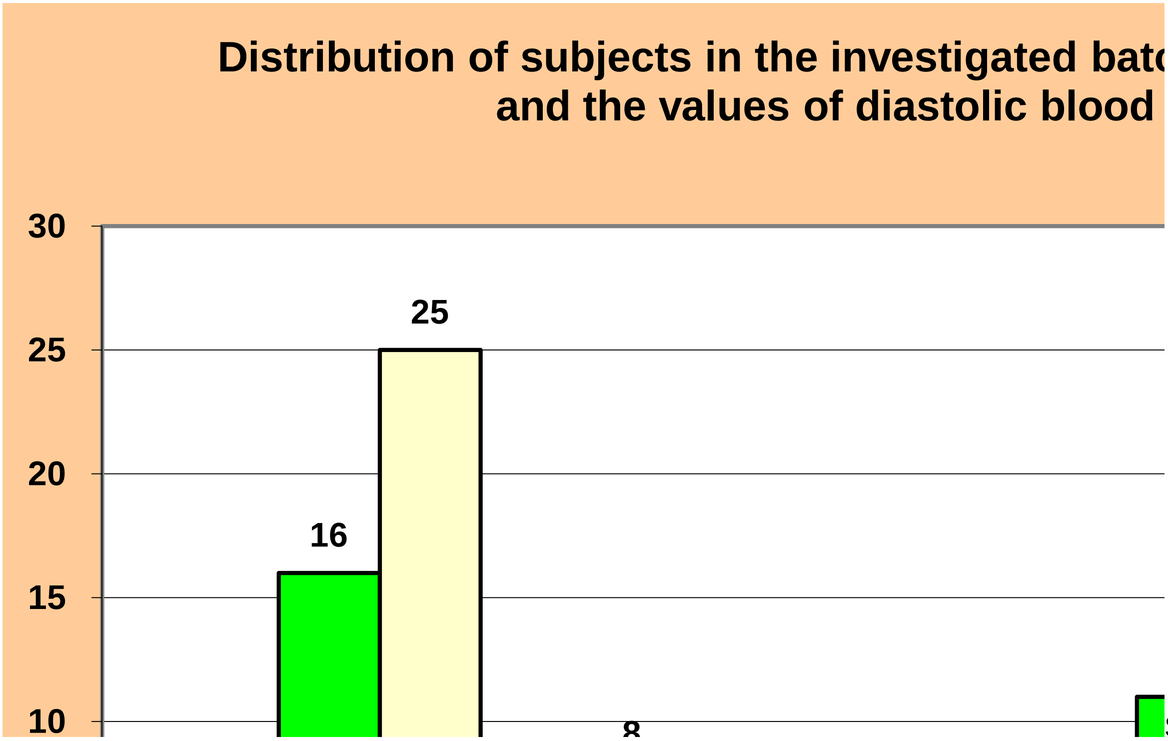
The values of arterial pressure and electrocardiogram

Classification of the values of arterial pressure and levels of arterial hypertension:

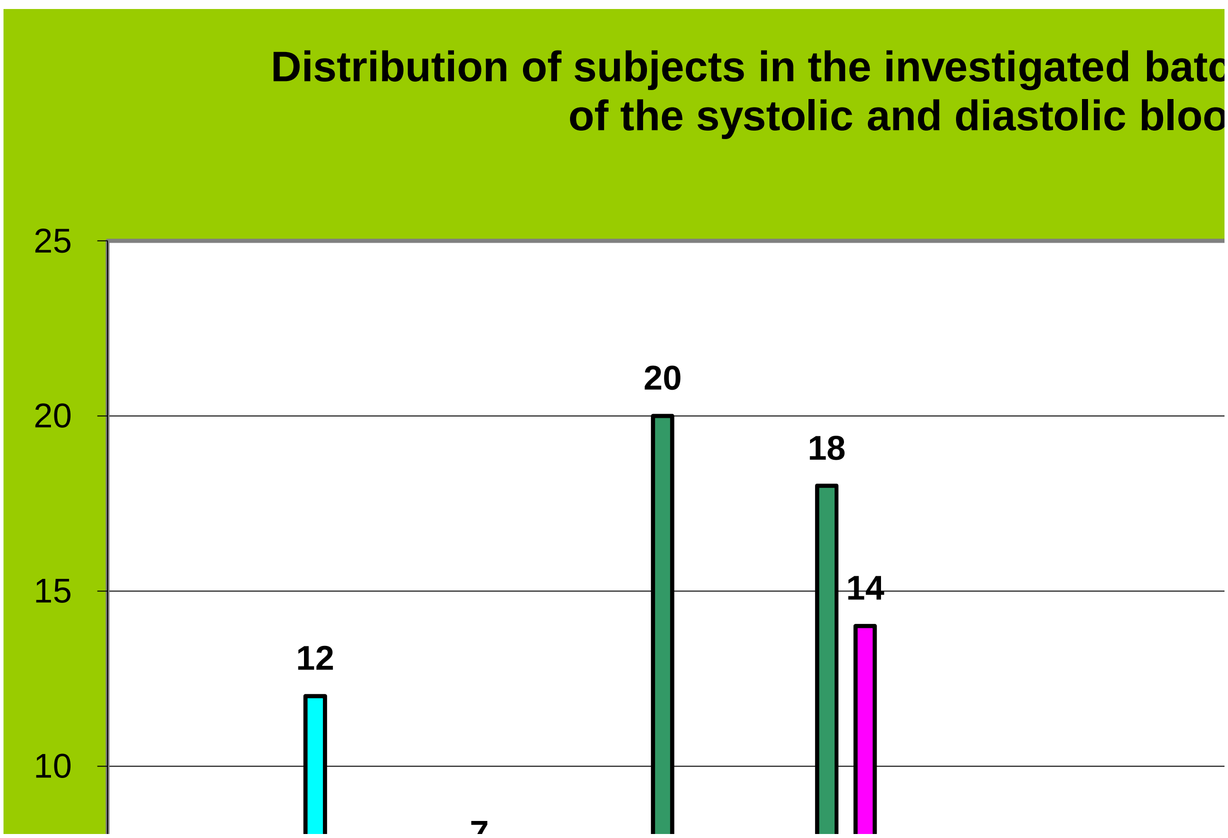
Classification	Systolic blood pressure	Diastolic blood pressure
Optimal	<120	<80
Normal	<130	<85
Normal – Enhanced	130-139	85-89
Hypertension Gr.1 ("mica")	140-159	90-99
Hypertension Gr.2 ("moderate")	160-179	100-109
Hypertension Gr.3 ("severe")	180	110



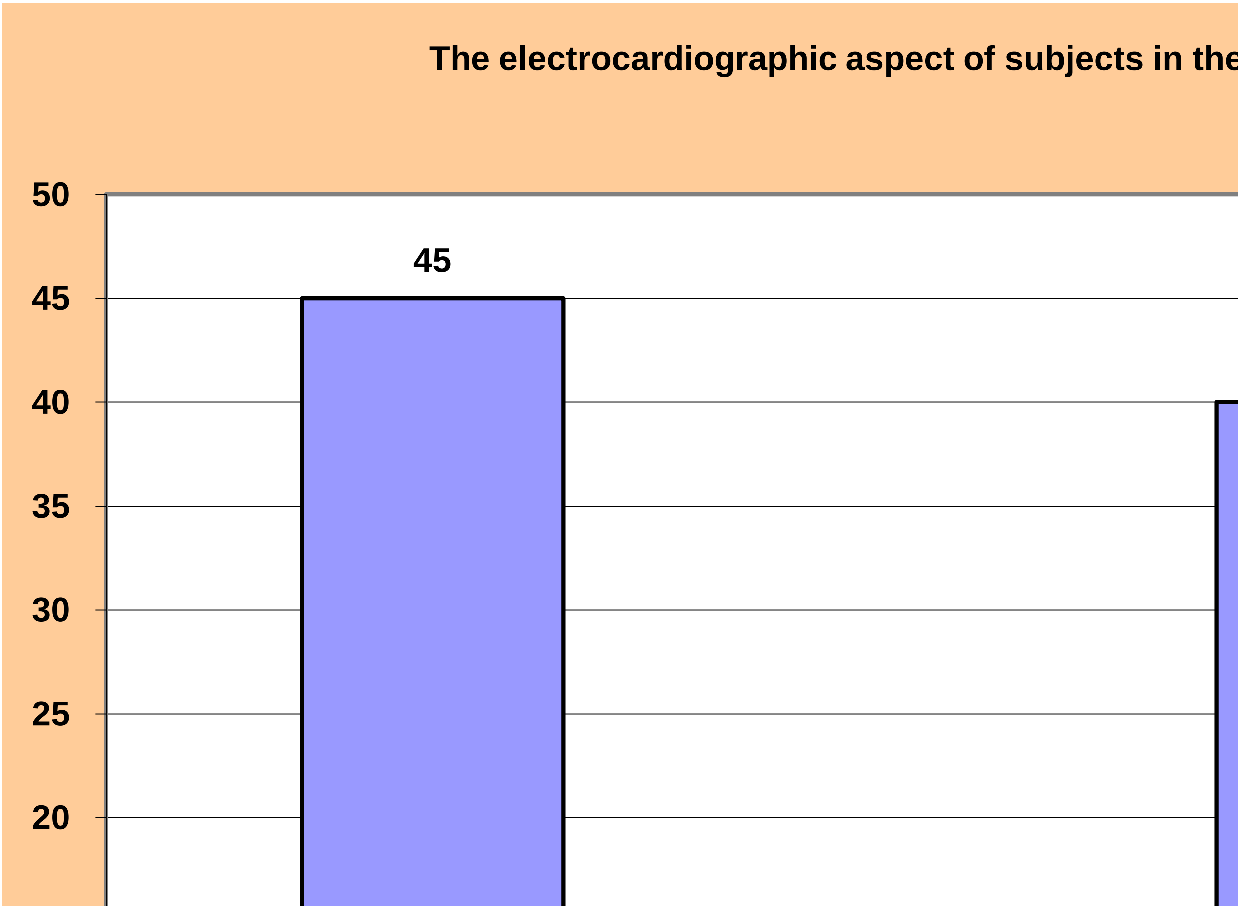
As far as the recorded systolic blood pressure values are concerned, a relatively small number of subjects displayed values higher than 130 mmHg, a value which marks the limit between normal and high values. Most subjects displayed values considered to fall within the normal limits of systolic blood pressure.



Similar with the systolic blood pressure, most of the subjects in the investigated batch displayed values considered to fall within the normal limits of diastolic blood pressure.

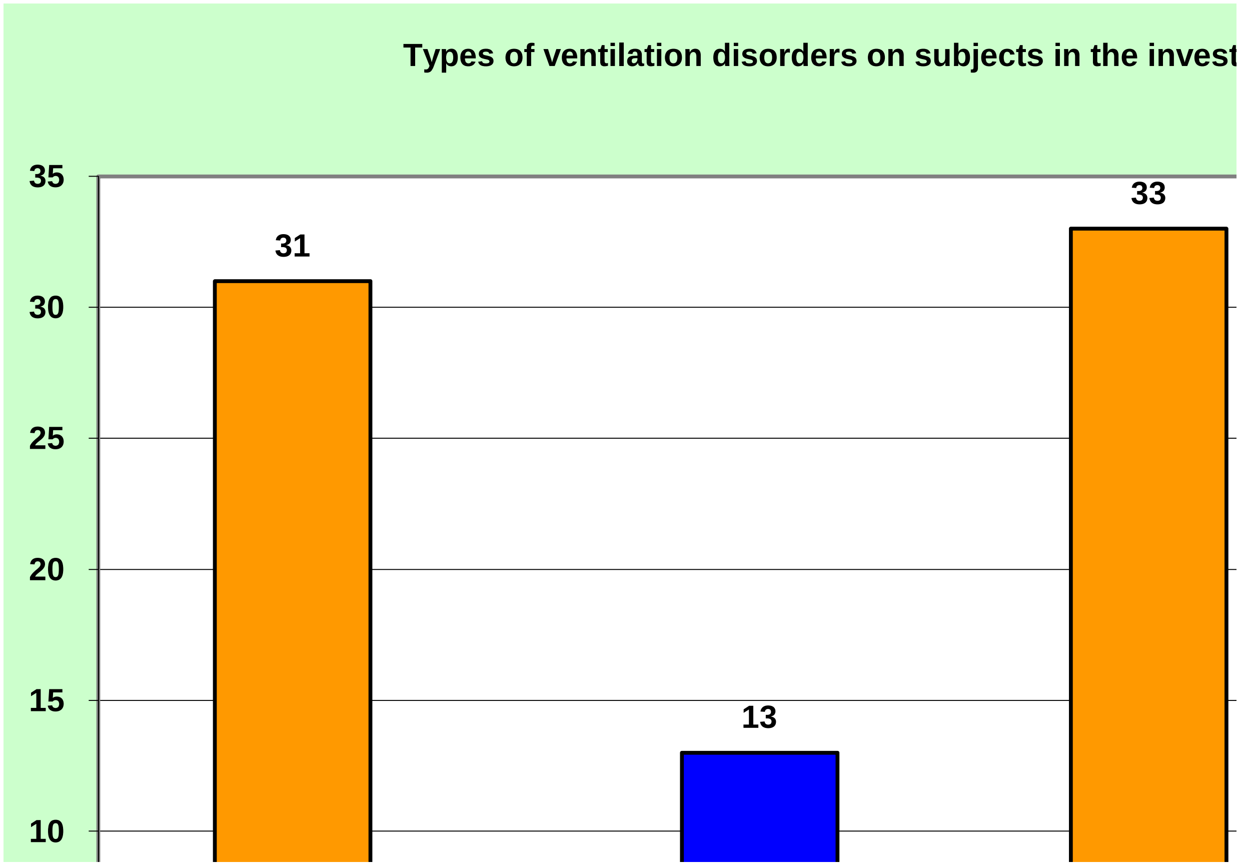


From the simultaneous presentation of the systolic and diastolic blood pressure values, in a few cases, one can notice the presence of normal values for diastolic blood pressure and increased values for the systolic blood pressure.



Regarding the electrocardiographic aspect, most of the subjects in the investigated batch did not show signs of pathological changes, the latter being present only in the case of 17 subjects.

Ventilation functional tests



Ventilation functional tests have displayed normal values on most of the subjects in the investigated batch. Obstructive ventilation disorders have been diagnosed, slight obstruction being present on a relatively high number of subjects while medium and severe obstruction were diagnosed on a smaller number of cases.

Soil samples collected from the perimeter of the households of the investigated subjects and dust samples collected from inside their houses

Detailed statistic description (average value, standard deviation, maximum value, minimum value, percentiles, version, Skewness, Kurtosis) of the cadmium concentration determined in the soil samples collected from the perimeter of the households of the investigated subjects

Percentile		Minimum		
1%	**1**	**1**		
5%	**1**	**1**		
10%	**1**	**1**		
25%	**1**	**1**	**No. Obs.**	84
50%	**1**		**Average**	3.242976
		Maximum	**Standard Deviation**	5.94934
75%	**1**	**20.06**		
90%	**9.94**	**26.53**	**Version**	35.39464
95%	**20.06**	**26.53**	**Skewness**	3.017649
99%	28.5	28.5	Kurtosis	11.43587

The values of the cadmium concentration found in the soil samples collected from the perimeter of the households of the investigated households were between 1-28.5 mg /kg dry matter with an average value of 3.2 mg /kg dry matter and a standard deviation of 5.9 mg /kg dry matter.

Detailed statistic description (average value, standard deviation, maximum value, minimum value, percentiles, version, Skewness, Kurtosis) of the lead concentration determined in the soil samples collected from the perimeter of the households of the investigated subjects

Percentile		**Minimum**		
1%	**19**	**19**		
5%	**23.06**	**22.51**		
10%	**28.21**	**22.51**		
25%	**62.41**	**23.06**	**No. Obs.**	***84***
50%	**87.24**		**Average**	***92.26286***
		Maximum	**Standard Deviation**	***50.98483***
75%	**110.19**	**203.49**		
90%	**172.13**	**203.49**	**Version**	***2599.453***
95%	**203.49**	**203.49**	**Skewness**	***1.112139***
99%	**288.34**	**288.34**	**Kurtosis**	***4.808493***

The concentrations of lead determined in the soil samples collcted from the perimeter of the households of the investigated batch of subjects were between 19-288.3 mg/kg dry matter, with an average value of 92.2 mg/kg dry matter and a standard deviation of 50.9 mg/kg dry matter.

Detailed statistic description (average value, standard deviation, maximum value, minimum value, percentiles, version, Skewness, Kurtosis) of the arsenic concentration determined in the soil samples collected from the perimeter of the households of the investigated subjects

Percentile		Minimum		
1%	11.89	11.89		
5%	16.21	11.9		
10%	22.66	11.9		
25%	53.69	15.73	No. Obs.	84
50%	81.105		Average	84.96417
		Maximum	Standard Deviation	51.17891
75%	102.545	164.04		
90%	137.89	172.75	Version	2619.281
95%	154.81	186.39	Skewness	2.167748
99%	374.43	374.43	Kurtosis	13.47694

The concentration of arsenic in the collected soil samples displayed values between 11.8-374.4 mg/kg dry matter, with an average concentration of 84.9 mg/kg dry matter and standards deviation of 51.1 mg/kg dry matter.

Detailed statistic description (average value, standard deviation, maximum value, minimum value, percentiles, version, Skewness, Kurtosis) of the mercury concentration determined in the soil samples collected from the perimeter of the households of the investigated subjects

Percentile		Minimum		
1%	0.2	0.2		
5%	0.2	0.2		
10%	0.2	0.2		
25%	0.2	0.2	Observations	84
50%	1.09		Average	2.33631
		Maximum	Standard Deviation	2.806939
75%	3.075	9.63		
90%	5.84	9.63	Version	7.878905
95%	6.49	13.28	Skewness	1.947664
99%	13.28	13.28	Kurtosis	7.219152

The values of the mercury concentration found in the soil samples collected from the perimeter of the households of the investigated subjects were between 0.2-13.2 mg /kg dry matter with an average value of 2.3 mg /kg dry matter and standard deviation of 2.8 mg /kg dry matter.

Detailed statistic description (average value, standard deviation, maximum value, minimum value, percentiles, version, Skewness, Kurtosis) of the nickel concentration determined in the soil samples collected from the perimeter of the households of the investigated subjects

Percentile		*Minimum*		
1%	2	2		
5%	2	2		
10%	2	2		
25%	2.045	2	No. Obs.	***84***
50%	14.275		Average	***19.89929***
		Maximum	Standard Deviation	***19.31493***
75%	30.29	59.35		
90%	46.87	60.57	Version	***373.0666***
95%	58.3	84.15	Skewness	***1.293743***
99%	**86.72**	**86.72**	**Kurtosis**	***4.554645***

The nickel concentration found in the soil samples displayed values between 2-86.7 mg/kg dry matter, with an average concentration of 19.8 mg/kg dry matter and standard deviation of 19.3 mg/kg dry matter.

Detailed statistic description (average value, standard deviation, maximum value, minimum value, percentiles, version, Skewness, Kurtosis) of the chromium concentration determined in the soil samples collected from the perimeter of the households of the investigated subjects

Percentile		Minimum		
1%	**2**	**2**		
5%	**2**	**2**		
10%	**2**	**2**		
25%	**2**	**2**	**No. Obs.**	***84***
50%	**30.175**		**Average**	***40.86774***
		Maximum	**Standard Deviation**	***42.63151***
75%	**70.915**	**123.59**		
90%	**101.8**	**131.1**	**Variation**	***1817.446***
95%	**123.04**	**133.14**	**Skewness**	***0.9778942***
99%	**180.95**	**180.95**	**Kurtosis**	***3.185948***

Chromium found in the soil samples displayed values between 2-180.9 mg/kg dry matter, with an average value of concentrations of 40.8 mg/kg dry matter and standard deviation of 42.6 mg/kg dry matter.

Concerning the level of metals found in the dust samples collected from inside the houses of the investigated batch of subjects, no chromium, mercury or nickel traces were found, the concentrations of lead displaying values between 0-5912.3 µg/m^2 surface, with an average value of concentrations of 128.8 µg/m^2 surface and standard deviation of 650 µg/m^2 surface, while the arsenic concentrations in the dust samples collected from inside the houses, displayed values between 0-44.6 µg/m^2 surface, with an average value of concentrations of 4.3 µg/m^2 surface and standard deviation of 11.4 µg/m^2 surface.

Detailed statistic description (average value, standard deviation, maximum value, minimum value, percentiles, version, Skewness, Kurtosis) of the lead concentration found in the dust samples collected from inside the houses of the investigated subjects

Percentile		*Minimum*		
1%	0	0		
5%	0	0		
10%	0	0		
25%	0	0	No. Obs.	*87*
50%	0		Average	*128.8037*
		Maximum	Standard Deviation	*650.0754*
75%	0	476.9		
90%	467.69	804.61	Version	*422598*
95%	476.9	804.61	Skewness	*8.265793*
99%	5912.3	5912.3	Kurtosis	*73.72798*

Detailed statistic description (average value, standard deviation, maximum value, minimum value, percentiles, version, Skewness, Kurtosis) of the arsenic concentration found in the dust samples collected from inside the houses of the investigated subjects

Percentile		Minimum		
1%	0	0		
5%	0	0		
10%	0	0		
25%	0	0	No. Obs.	*87*
50%	0		Average	*4.362644*
		Maximum	Standard Deviation	*11.44501*
75%	0	40		
90%	25.76	44.23	Version	*130.9882*
95%	40	44.61	Skewness	*2.585226*
99%	44.61	44.61	Kurtosis	*8.338982*

The results of toxicity tests performed on urine – heavy metals (As, Cd, Hg, Cr, Ni) and thiocyanates

Detailed statistic description (average value, standard deviation, maximum value, minimum value, percentiles, version, Skewness, Kurtosis) of the cadmium concentration found in the urine

µg Cd/g creatinine				
Percentile		**Minimum**		
1%	**0.09**	**0.07**		
5%	**0.21**	**0.09**		
10%	**0.27**	**0.16**		
25%	**0.395**	**0.16**	**No. Obs.**	***104***
50%	**0.68**		**Average**	***0.9228846***
		Maximum	**Standard Deviation**	***0.7584011***
75%	**1.195**	**2.71**		
90%	**2.01**	**3.04**	**Version**	***0.5751722***
95%	**2.25**	**3.23**	**Skewness**	***1.787623***
99%	**3.23**	**4.36**	**Kurtosis**	***6.853217***

The values of the cadmium concentration found in the urine of examined batch of subjects, were between 0.07-4.3 µg/g creatinine, with an average value of 0.9 µg/g creatinine and standard deviation of 0.7 µg/g creatinine.

The concentration of mercury found in the urine of the examined subjects had values between 0.3-444.8 µg/g creatinine, the average value of the identified concentrations being of 37.4 µg/g creatinine with standard deviation of 67.9 µg/g creatinine.

Detailed statistic description (average value, standard deviation, maximum value, minimum value, percentiles, version, Skewness, Kurtosis) of the mercury concentration found in the urine

µg Hg/g creatinine				
Percentile		**Minimum**		
1%	**0.84**	**0.31**		
5%	**3.03**	**0.84**		
10%	**3.42**	**0.95**		
25%	**5.9**	**0.97**	**No. Obs.**	***104***
50%	**11.74**		**Average**	***37.40221***
		Maximum	**Standard Deviation**	***67.94597***
75%	**35.975**	**178.93**		
90%	**112.48**	**194.84**	**Version**	***4616.655***
95%	**143.74**	**393.98**	**Skewness**	***3.88286***
99%	**393.98**	**443.89**	**Kurtosis**	***20.82165***

Detailed statistic description (average value, standard deviation, maximum value, minimum value, percentiles, version, Skewness, Kurtosis) of the chromium concentration found in the urine

µg Cr/g creatinine				
Percentile		**Minimum**		
1%	**0.07**	**0.07**		
5%	**0.08**	**0.07**		
10%	**0.09**	**0.07**		
25%	**0.125**	**0.08**	**No. Obs.**	***104***
50%	**0.24**		**Average**	***0.3628846***
		Maximum	**Standard Deviation**	***0.3410853***
75%	**0.51**	**1.12**		
90%	**0.77**	**1.25**	**Version**	***0.1163392***
95%	**1.05**	**1.81**	**Skewness**	***2.098548***
99%	**1.81**	**1.88**	**Kurtosis**	***8.472399***

Regarding the concentration of chromium found in the urine of the examined subjects, the values were between 0.07-1.9 µg/g creatinine, with average values of 0.4 µg/g creatinine and standard deviation of 0.3 µg/g creatinine.

Detailed statistic description (average value, standard deviation, maximum value, minimum value, percentiles, version, Skewness, Kurtosis) of the arsenic concentration found in the urine

µg As/g creatinine				
Percentile		**Minimum**		
1%	**0.55**	**0.52**		
5%	**0.61**	**0.55**		
10%	**0.72**	**0.56**		
25%	**1.465**	**0.57**	**No. Obs.**	**104**
50%	**2.695**		**Average**	**4.451538**
		Maximum	**Standard Deviation**	**6.659555**
75%	**4.165**	**23.56**		
90%	**7.93**	**34.54**	**Version**	**44.34968**
95%	**13.68**	**37.2**	**Skewness**	**3.869789**
99%	**37.2**	**40.28**	**Kurtosis**	**18.87165**

Regarding the concentration of arsenic found in the urine of the examined subjects, the values were between 0.5-40.3 µg/g creatinine, with average concentration values of 4.4 µg/g creatinine and standard deviation of 6.6 µg/g creatinine.

As far as the nickel concentration found in the urine of the examined subjects, the values were situated below the detection limit of the used method.

Creatinine g/l				
Percentile		**Minimum**		
1%	**0.21**	**0.17**		
5%	**0.37**	**0.21**		
10%	**0.4**	**0.3**		
25%	**0.74**	**0.33**	**No. Obs.**	106
50%	**1.11**		**Average**	1.10717
		Maximum	**Standard Deviation**	0.4632674
75%	**1.43**	**2.1**		
90%	**1.6**	**2.18**	**Version**	0.2146167
95%	**1.8**	**2.2**	**Skewness**	0.1114704
99%	2.2	2.22	Kurtosis	2.660624

The creatinine served as quantitative expression in µg/g creatinine of identified values for the concentrations of arsenic, mercury, cadmium, chromium and nickel. The values of creatinine found within the examined group of pupolation fell within the range 0.2- 2.2 g/l, with an average value of 1.1 g/l and standard deviation of 0.5 g/l.

Detailed statistic description (average value, standard deviation, maximum value, minimum value, percentiles, version, Skewness, Kurtosis) of the thiocyanates concentration found in the urine

Percentile		Minimum		
1%	0.01	0.01		
5%	0.02	0.02		
10%	0.04	0.04		
25%	0.17	0.04	No. Obs.	*31*
50%	0.31		Average	*0.5122581*
		Maximum	Standard Deviation	*0.5092132*
75%	0.65	1.09		
90%	1.09	1.48	Version	*0.2592981*
95%	1.7	1.7	Skewness	*1.636881*
99%	2.13	2.13	Kurtosis	*5.25699*

The concentration of thiocyanates found in the urine of the examined subjects had values between 0.01 and 2.1 µg/g creatinine with an average value of identified concentrations of 0.5 µg/g creatinine and standard deviation of 0.5 µg/g creatinine.

Distribution according to gender of the average value and standard deviation of the concentration of thiocyanates found in the urine of the examined batch

Gender	Average	Standard Deviation	Frequency
Feminine	0.34166666	0.29132403	12
Masculine	0.62000001	0.59046124	19
Total	0.51225807	0.5092132	31

In the above table, one can notice a higher average value of the thiocyanates concentration in the urine of the examined male subjects compared to the average value of the thiocyanates concentration in the urine of the examined female subjects in the group.

Distribution per age categories of the average value and standard deviation of the thiocyanates concentration found in the urine of the examined batch

Age	Average	Standard deviation	Frequency
<18	0.52999997	0	1
18-30	0.7623077	0.65630476	13
30-40	0.32666666	0.30850444	9
40-50	0.21	0.2364318	3
>50	0.374	0.2470425	5
Total	0.51225807	0.5092132	31

Regarding the distribution per age categories, one can notice the highest average value of the thiocyanates concentration identified in the urine of the examined batch under the 18-30 years category (average value 0.8 mg/l) followed closely by the under 18 category (average value 0.5 mg/l) while the smallest average value was identified for the 40-50 years category (average value 0.2 mg/l) while for the categories 30-40 and above 50 years, the calculated average values were very close (0.32 for the 30-40 category and 0.37 mg/l for the above 50 category).

Distribution according to exposure at the current workplace of the average value and standard deviation of the thiocyanates concentration found the urine of the examined batch

Exposure: YES/NO	*Average*	*Standard Deviation*	*Frequency*
NO	0.51925926	0.53866593	27
YES	0.47	0	1
Total	0.5175	0.52867849	28

In relation with the exposure at the current workplace, one can see a higher average value of the concentration of thiocyanates found in the urine (0.51 mg/l compared to 0.47 mg/l) of those who didn't say they're exposed to hazardous substances at their current workplace compared to those who said that they're exposed to hazardous substances at their current workplace.

Distribution according to exposure at the previous workplace (workplace 2) of the value and standard deviation of the thiocyanates concentration found the urine of the examined batch

Exposure: YES/NO	Average	Standard Deviation	Frequency
NO	0.53777778	0.59614011	18
YES	0.5	0.24637369	3
Total	0.53238096	0.55527387	21

In relation with the exposure at the previous workplace (workplace 2), one can see that, like the previous case, a higher average value of the concentration of thiocyanates could be found in the urine (0.53 mg/l compared to 0.50 mg/l) of those who didn't say they were exposed to hazardous substances at their previous workplace (workplace 2) compared to those who said that they were exposed to hazardous substances at their previous workplace (workplace 2).

Distribution according to exposure at the previous workplace (workplace 3) of the value and standard deviation of the thiocyanates concentration found the urine of the examined batch

Exposure: YES/NO	*Average*	*Standard Deviation*	*Frequency*
NO	0.236	0.2048414	10
YES	0.47999999	0.27513633	3
Total	0.29230769	0.23566055	13

In relation with the exposure at the previous workplace (workplace 3), one can notice a higher average value of the concentration of thiocyanates in the urine (0.47 mg/l compared to 0.23 mg/l) of those who said they were exposed to hazardous substances at their previous workplace (workplace 3) compared to those who didn't say that they're exposed to hazardous substances at their previous workplace (workplace 3).

Distribution according to exposure at the previous workplace (workplace 3) of the value and standard deviation of the thiocyanates concentration found the urine of the examined batch

Exposure: YES/NO	Average	Standard deviation	Frequency
NO	0.145	0.10082989	4
YES	0.415	0.30446674	4
Total	0.28	0.25478282	8

In relation with the exposure at the previous workplace (workplace 4), as in the case of workplace 3, one can notice a higher average value of the concentration of thiocyanates in the urine (0.41 mg/l compared to 0.14 mg/l) of those who said they were exposed to hazardous substances at their previous workplace (workplace 4) compared to those who didn't say that they're exposed to hazardous substances at their previous workplace (workplace 4).

ACUTE BREATHING DISORDERS

Scenario performed for the maximum values of the nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and respirable dust (PM_{10}) concentrations identified in the air

Acute breathing disorders

Current status

The logistic regression model relation of the acute breathing disorders frequency of occurrence within the examined group of people, with exposure to nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and respirable dust (PM_{10}) (current measured concentrations) didn't emphasize a statistically significant risk regarding a more frequent occurrence of these disorders as a result of exposure, and it didn't emphasize statistically significant differences concerning the occurrence frequency of these disorders given the distance to the mining operation established for the sanitary protection area and the protected area.

The relation between acute breathing disorders and exposure to NO_2 in logistic regression model, correcting the distance to the mining operation

ac_breath.	Odds Ratio	Standard deviation	z	P>|z|	95% Confidence interval	
no2max0	**1.161053**	**0.1327672**	**1.306**	**0.192**	0.9279325	1.452738
Idist2_2	**0.324926**	**0.3664416**	**-0.997**	**0.319**	0.0356308	2.963081
Idist2_3	1.090405	1.398306	0.067	0.946	0.0883141	13.46312

```
describe I*
67. Idist2_2    byte   %8.0g          dist2==2
68. Idist2_3    byte   %8.0g          dist2==3
```

The relation between acute breathing disorders and exposure to SO_2 in logistic regression model, correcting the distance to the mining operation

ac_breath.	Odds	Standard	z	P>|z|	Confidence interval 95%

	Ratio	deviation				
so2max0	**1.34482**	**0.3050968**	**1.306**	**0.192**	0.8620918	2.097851
Idist2_2	**0.324926**	**0.3664416**	**-0.997**	**0.319**	0.0356308	2.963081
Idist2_3	1.090405	1.398306	0.067	0.946	0.0883141	13.46312

describe I*

67. Idist2_2 byte %8.0g dist2==2

68. Idist2_3 byte %8.0g dist2==3

The relation between acute breathing disorders and exposure to PM_{10} in logistic regression model, correcting the distance to the mining operation

ac_breath.	Odds Ratio	Standard deviation	z	P>|z|	Confidence interval 95%	
pmmax0	**0.8684551**	**0.1167854**	**-1.049**	**0.294**	0.6672402	1.130349
Idist2_2	**0.2069477**	**0.2429583**	**-1.342**	**0.180**	0.0207273	2.066228
Idist2_3	0.4871356	0.6101319	-0.574	0.566	0.041834	5.672447

describe I*

67. Idist2_2 byte %8.0g dist2==2

68. Idist2_3 byte %8.0g dist2==3

CHRONIC BREATHING DISORDERS

Current status

The logistic regression model relation of the chronic breathing disorders frequency of occurrence within the examined group of people, with exposure to nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and respirable dust (PM_{10}) (current measured concentrations) didn't emphasize a statistically significant risk regarding a more frequent occurrence of these disorders as a result of exposure, and it didn't emphasize statistically significant differences concerning the occurrence frequency of these disorders given the distance to the mining operation established for the sanitary protection area and the protected area.

The relation between chronic breathing disorders and exposure to NO_2 in logistic regression model, correcting the distance to the mining operation

chr_breath.	Odds Ratio	Standard deviation	z	P>|z|	Confidence interval 95%	
Idist2_3	19	30.19884	1.853	0.064	0.8430297	428.2174

describe I*

67. Idist2_2 byte %8.0g dist2==2

68. Idist2_3 byte %8.0g dist2==3

The relation between chronic breathing disorders and exposure to SO_2 in logistic regression model, correcting the distance to the mining operation

chr_breath.	Odds Ratio	Standard deviation	z	P>|z|	Confidence interval 95%	
Idist2_3	19	30.19884	1.853	0.064	0.8430297	428.2174

describe I*

67. Idist2_2 byte %8.0g dist2==2

68. Idist2_3 byte %8.0g dist2==3

The relation between chronic breathing disorders and exposure to PM_{10} in logistic regression model, correcting the distance to the mining operation

chr_breath.	Odds	Standard	z	P>|z|	Confidence interval 95%

	Ratio	deviation				
pmmax0	**1.125413**	**0.3515527**	**0.378**	**0.705**	0.6101213	2.075904
Idist2_3	9.850598	15.65619	1.439	0.150	0.4371126	221.9892

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

Scenario performed for the minimum values of the nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and respirable dust (PM_{10}) concentrations identified in the air

Acute breathing disorders

Current status

The logistic regression model relation of the acute breathing disorders frequency of occurrence within the examined group of people, with exposure to nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and respirable dust (PM_{10}) (current measured concentrations) didn't emphasize a statistically significant risk regarding a more frequent occurrence of these disorders as a result of exposure, and it didn't emphasize statistically significant differences concerning the occurrence frequency of these disorders given the distance to the mining operation established for the sanitary protection area and the protected area.

The relation between chronic breathing disorders and exposure to NO_2 in logistic regression model, correcting the distance to the mining operation

ac_breath.	***Odds Ratio***	***Standard deviation***	***z***	***P>|z|***	***Confidence interval 95%***	
no2min0	2632304	2.98e+07	1.306	0.192	**0.0006083**	**1.14e+16**
Idist2_2	0.324926	0.3664416	-0.997	0.319	**0.0356308**	**2.963081**
Idist2_3	**1.090405**	**1.398306**	**0.067**	**0.946**	**0.0883141**	**13.46312**

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

The relation between chronic breathing disorders and exposure to SO_2 in logistic regression model, correcting the distance to the mining operation

ac_breath.	***Odds Ratio***	***Standard deviation***	***z***	***P>|z|***	***Confidence interval 95%***	
so2min0	1.60e+64	1.81e+66	1.306	0.192	**6.94e-33**	**3.68e+160**
Idist2_2	0.324926	0.3664416	-0.997	0.319	**0.0356308**	**2.963081**
Idist2_3	**1.090405**	**1.398306**	**0.067**	**0.946**	**0.0883141**	**13.46312**

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

The relation between chronic breathing disorders and exposure to PM_{10} in logistic regression model, correcting the distance to the mining operation

ac_breath.	***Odds Ratio***	***Standard deviation***	***z***	***P>|z|***	***Confidence interval 95%***	
pmmin0	0.0009968	0.0065684	-1.049	0.294	**2.45e-09**	**404.9639**
Idist2_2	0.2069477	0.2429583	-1.342	0.180	**0.0207273**	**2.066228**

Idist2_3	**0.4871356**	**0.6101319**	**-0.574**	**0.566**	**0.041834 5.672447**

describe I*
67. Idist2_2 byte %8.0g dist2==2
68.Idist2_3 byte %8.0g dist2==3

Chronic breathing disorders

Current status

The logistic regression model relation of the chronic breathing disorders frequency of occurrence within the examined group of people, with exposure to nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and respirable dust (PM_{10}) (current measured concentrations) didn't emphasize a statistically significant risk regarding a more frequent occurrence of these disorders as a result of exposure, and it didn't emphasize statistically significant differences concerning the occurrence frequency of these disorders given the distance to the mining operation established for the sanitary protection area and the protected area.

The relation between chronic breathing disorders and exposure to NO_2 in logistic regression model, correcting the distance to the mining operation

chr_breath.	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*Confidence interval 95%*
Idist2_3	**19**	**30.19884**	**1.853**	**0.064**	**0.8430297 428.2174**

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

The relation between chronic breathing disorders and exposure to SO_2 in logistic regression model, correcting the distance to the mining operation

chr_breath.	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*Confidence interval 95%*
Idist2_3	**19**	**30.19884**	**1.853**	**0.064**	**0.8430297 428.2174**

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

The relation between chronic breathing disorders and exposure to PM_{10} in logistic regression model, correcting the distance to the mining operation

chr_breath.	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*Confidence interval 95%*
pmmin0	326.7952	5002.078	0.378	0.705	**3.06e-11 3.49e+15**
Idist2_3	**9.850598**	**15.65619**	**1.439**	**0.150**	**0.4371126 221.9892**

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

Hazardous situations – Noise

Current status

The logistic regression model relation of the occurrence of negative effects on the health status as well as the effects on the hearing functions or the occurrence of increased values of blood pressure with exposure to noise didn't emphasize a statistically significant risk regarding the occurrence of the mentioned negative effects in case of exposure to noise values currently measured (average value of approx. 41 dB).

The relation between the effects on the hearing function and exposure to noise (currently measured levels)

Effect on the hearing function	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*95% Confidence interval*	
noise_curr_sit	1.091853	0.2064969	0.465	0.642	0.7536685	1.581786

The relation between arterial hypertension and exposure to noise (currently measured levels)

Arterial hypertension	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*95% Confidence interval*	
noise_curr_sit	1.283709	0.1823321	1.758	0.079	0.9717756	1.695772

4. COMPLIANCE CONDITIONS FOR THE PREVENTION OF EFFECTS

The environmental impact assessment (EIA) and health impact assessment (HIA) present a set of binding conduct both during the design, construction, operation and prior and after closure.

4.1. Hazardous substances

It requires the formulation, design, development and implementation of the program for surveillance of the health of the population dynamics, after Project completion, in order to establish and emphasize the environmental factors harmful to the living environment and work environment and their effects on employees and local population health. In this case, it requires a precise record for each precinct, location specific to different protection areas delineated in the HIA.

These plans must be part of the RMGC general management plan management and individual responsibilities and tasks to be included in "personal job description" as an appendix to the individual employment contract.

It is necessary to develop operational plans by RMGC on short-term and long term measures, which must be taken regularly or in cases where there are changes on the distribution of dangerous situations and substances and environmental factors at other levels/ concentrations than those used in HIS, before starting the mining operations or if the technological flow changes in service, to reassess the situation to date and to provide the documentation necessary to obtain approvals.

Only contractors performing those impact assessments will make necessary changes.

It requires the formulation, preparation and development of the implementation plan for the surveillance program regarding population health in dynamics and in relation to mining for biomarkers of exposure used in HIA (lead, cadmium, mercury, arsenic, chromium and thiocyanates) after obtaining the environmental agreement, but before the start of mining activities in the project. Display must exist to inform the population of the delimited area about the most likely area of exposure; thus were marked and defined territories: SANITARY PROTECTION ZONE, HISTORC CENTER PROTECTED AREA and ADJACENT AREA. For these areas are set out the permitted and the prohibited activities, which must be appropriated by RMGC leadership, local authorities and people concerned, as some of these activities are even taking the nature of health and requires special sacrifices.

Operational records are necessary for xenobiotic surveillance during finding and investigation of pollution factors identified throughout the mining operation (breathable particles, nitrogen oxides and sulphur, lead, mercury, arsenic, cadmium, chromium, nickel, noise) and routes of exposure, exposed population groups and distances from the mine perimeter.

4.2. Dangerous Situations

Dangerous situations with serious impact on health of workers and local population can occur through:

- accidental spill of pressed cyanide briquettes during transport both within operation site and the route map;
- explosions and fires during the technological flow in the open pit, at place of crushing and grinding of the ore, during preparation and extraction of gold by cyanide and additives adding, or even during the cyanide elimination remaining of the tailings slurry, before discharging it into the TMF;
- accidental explosion and fire at the enterprise thermal power station;
- overfilling or failure of the tailings dam.

To avoid unwanted accidents it must also implement an operational plan for intervention and warning, and evacuation. The plan should be prepared with the assistance of local and county specialized bodies, to meet the legal provisions stipulated for special events, and disasters, calamities (provide special equipment, access roads easily accessible, qualified, experienced personnel, transportation and competent leadership by teamwork between groups organized for these special situations).

5. MONITORING PLAN FOR THE IMPLEMENTATION OF THE COMPLIANCE CONDITIONS AND EFFECTS ON THE HEALTH STATUS

5.1. Hazardous substances

In general dangerous substances means the basic chemical compounds or substances that if enter the body the by any penetration means, can cause acute situations with damage to vital organs, with immediate serious consequences, life threatening, or cause permanent serious disability.

The HIA has strung cyanide, hydrogen cyanide, hydrochloric acid and sulphuric acid. The remaining risk factors identified in the HIA affect the health of people who are in contact with these factors after a longer exposure time, by their accumulation in the body, such as heavy metals, certain organic compounds, noise and vibration.

For the above-mentioned factors is necessary to have a plan to minimize possible direct contact with these harmful factors, and in case of need, namely accidents, to intervene only with special equipment and in special conditions. The intervention plan must specify equipment of exposed persons, isolation and ensuring the security zone, the means of rescue, resuscitation and re-balancing manoeuvres in special areas, where vital functions should be ensured until the arrival of special intervention crews and transferring them to relevant hospitals. The intervention plan must nominate the medical facilities that can treat the disease in question.

For the other types of harmful risk factors on human health will apply the exposure monitoring measures by biomarkers control shown within EIA, at fixed time intervals set in the monitoring plans.

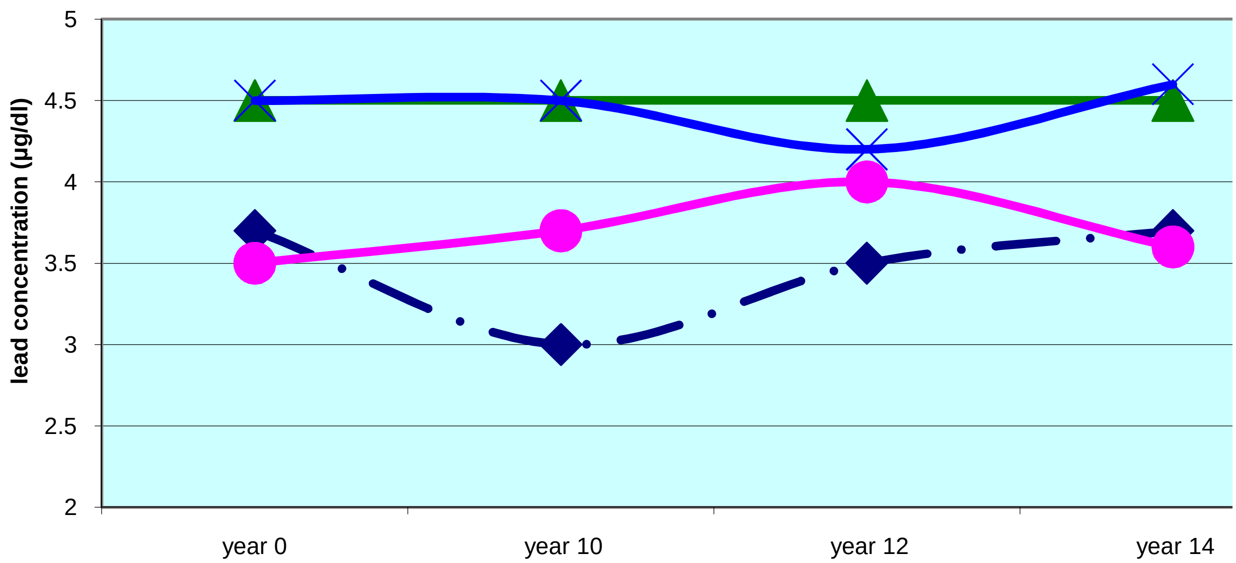
5.2. For special situations that are mentioned in paragraph 4.2 will include in the monitoring and prevention plans similar measures which apply in specific and special situations, respectively in disaster situations, through operative and synchronized cooperation between operational teams within Rosia Montana enterprise and county and local professional bodies.

6. RISK FORECAST AND CHARACTERIZATION OF EFFECTS THROUGH RISK ASSESSMENT

A. BIOMARKERS

Scenario forecasts made for the minimum values of exposure concentrations - Evolution of predicted values for biomarkers in the 10th, 12th and 14th years of mining operation depending on distance from mining, because of exposure to specific hazardous substances (heavy metals) to be present in the environment because of the mining activities

Evolution of predicted values for biomarker represented by lead concentration in 10th, 12th and 14th year of operating depending on the distance from mining area



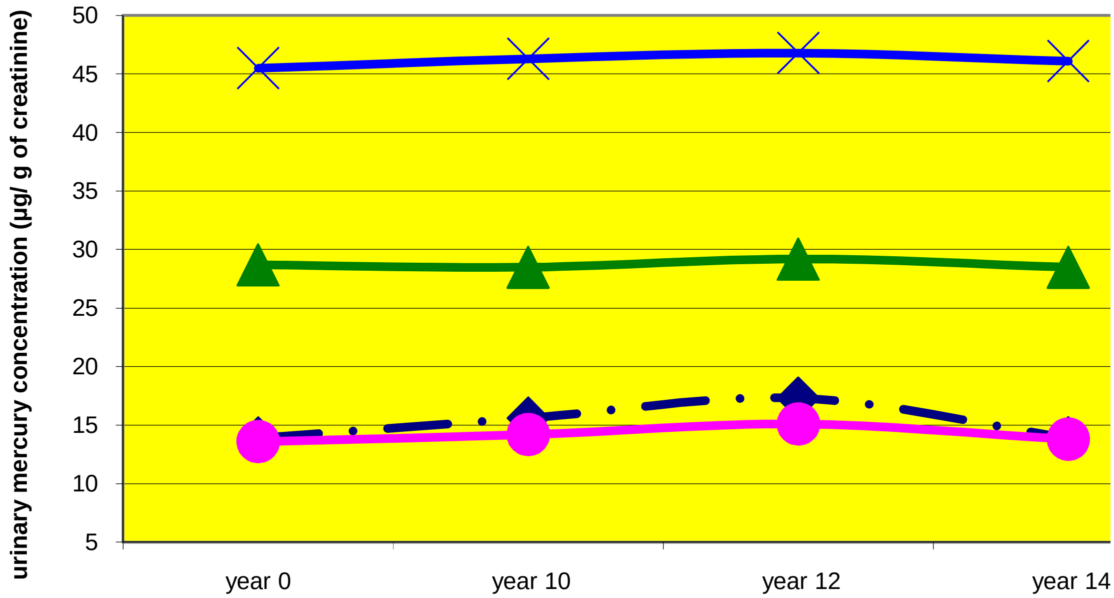
Evolution of lead predicted values in the 10th, 12th and 14th year of mining operation depending on the distance from mining, reveals, at less than 50 m from the future mining, the average predicted values of lead; they decrease in the 10th year of operation compared with the current situation (year 0), decreased in the 10th year followed by an increase in the 12th year, a continuing growth in the 14th year, but both average values forecast for the 12th year and the 14th year are under the current value (year 0) and within the limits of the normal values range (under 10 µg/dl).

The distance between 50 and 100 m from the future mining operation, the average predicted lead values designates an uptrend in the 10th and 12th year of operation compared with the current situation but average values stay within the range of normal levels, decreasing in the 14th year very close to current values.

At a distance of between 100 and 200 m from the mining operation, the average forecast values for the biomarker represented by lead did not change compared to the current situation in the 10th, 12th and 14th years of mining operation.

At a distance of over 200 m from future mining, the difference from the current situation does it in the 12th year, when the average forecast values of lead decrease compared to the current situation, in the other years the average forecast values of lead does not change compared to the current situation.

Evolution of predicted values for biomarker represented by concentration of mercury in urine 10th, 12th and 14th year of operating depending on the distance from mining area



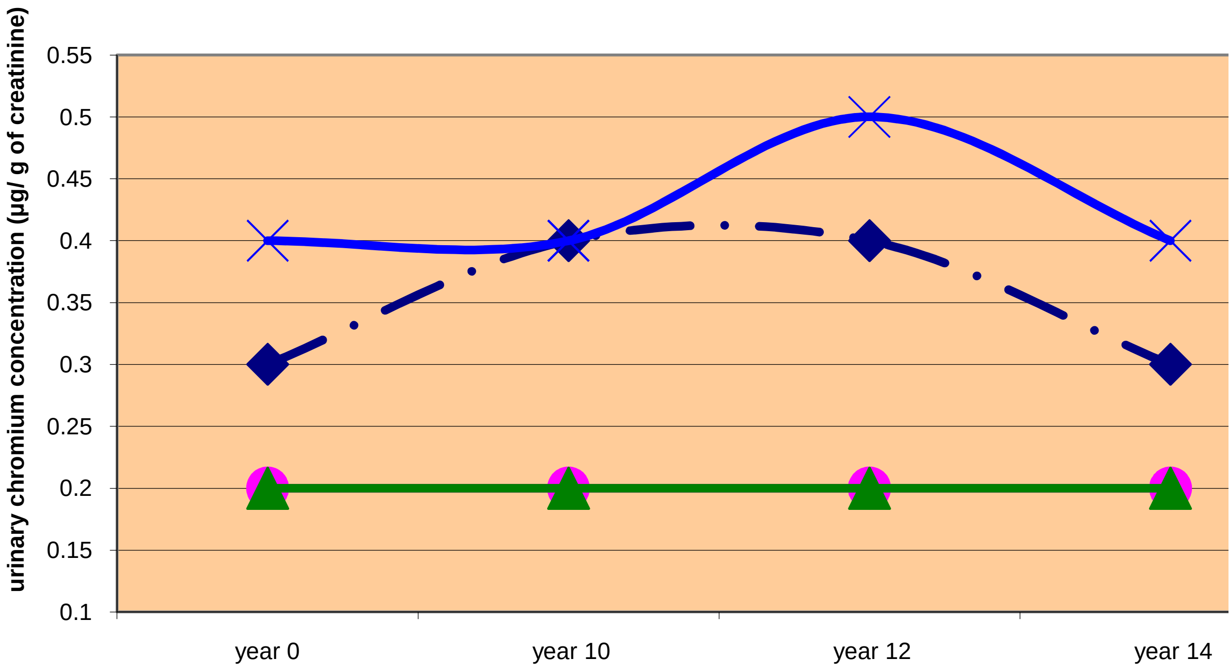
Regarding the expected average values of mercury in urine at a distance of less than 50 m from mining, they recorded an increasing trend towards the current situation in the 10^{th} and 12^{th} years of mining, then average values decrease in the 14^{th} reaching the current average value.

The same pattern describes the average predicted values for a distance between 50m and 100 m from the mining operation, noting that in the 14^{th} year the average forecast is very close to an order of magnitude of the current value, without being equal (13.8 µg/ g creatinine in the 14^{th} year compared to 13.6 µg/ g creatinine in year 0).

At the distance between 100 m and 200 m from mining operation, compared to the current situation, the average values predicted for the 10^{th}, 12^{th} and 14^{th} years vary within the limits of a very short range, the higher average predicted value within this range is noticed in the 12^{th} year (29.2 µg/g creatinine compared to 28.7 µg/g creatinine the baseline value of the mercury concentration in urine).

At a distance of over 200 m from future mining, one can observe a slightly increasing trend of average values predicted, from the current average to the average forecast for the 14^{th} year of the mine operation, again growth being achieved in a short range of values (from 45.5 µg/g creatinine to 46.8 µg/g creatinine), the higher average predicted value being recorded, as in the previous case, in the 12^{th} year.

Evolution of predicted values for biomarker represented by concentration of urinary chromium 10th, 12th and 14th year of operating depending on the distance from mining area

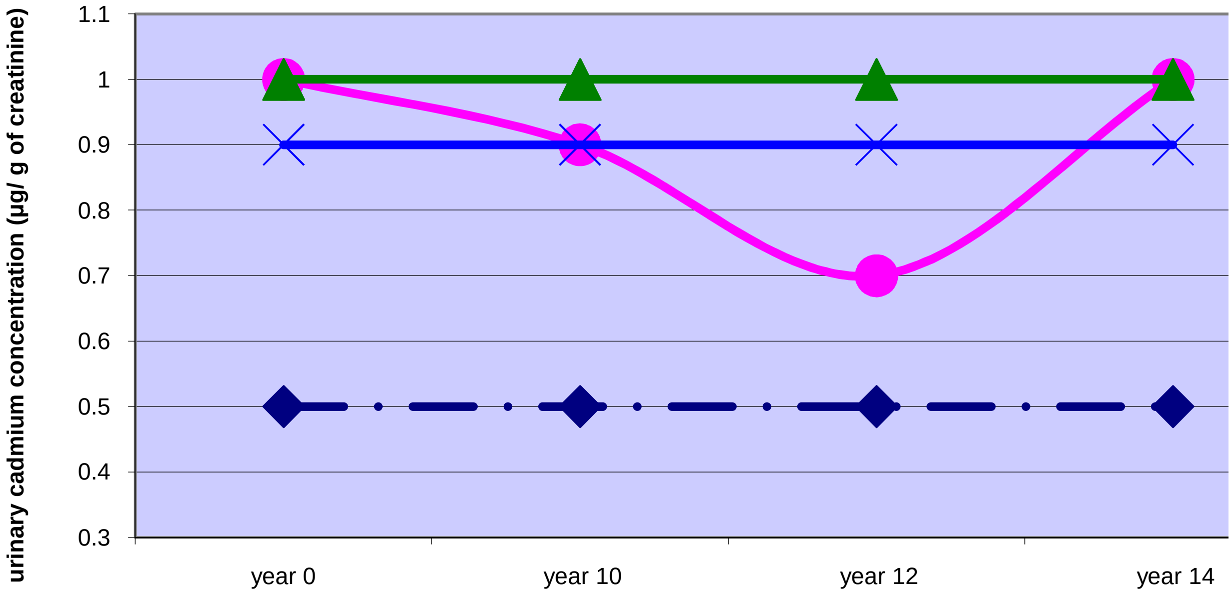


Regarding the chromium concentration in urine, the average forecast values for the 10th and 12th years of mining operation, for a distance of less than 50 m from the future mining, showed an increasing trend compared to the baseline average, increase followed by a decrease in the 14th year down to the baseline value.

For distance between 50-100 m and 100-200 m there are no changes in any direction of the average forecast values for the 10th, 12th and 14th years of mining operation.

For distance of over 200 m from the future mining, one can observe a slightly increasing trend of average values predicted in the 12th year compared to those recorded in the 0, 10th and 14th years.

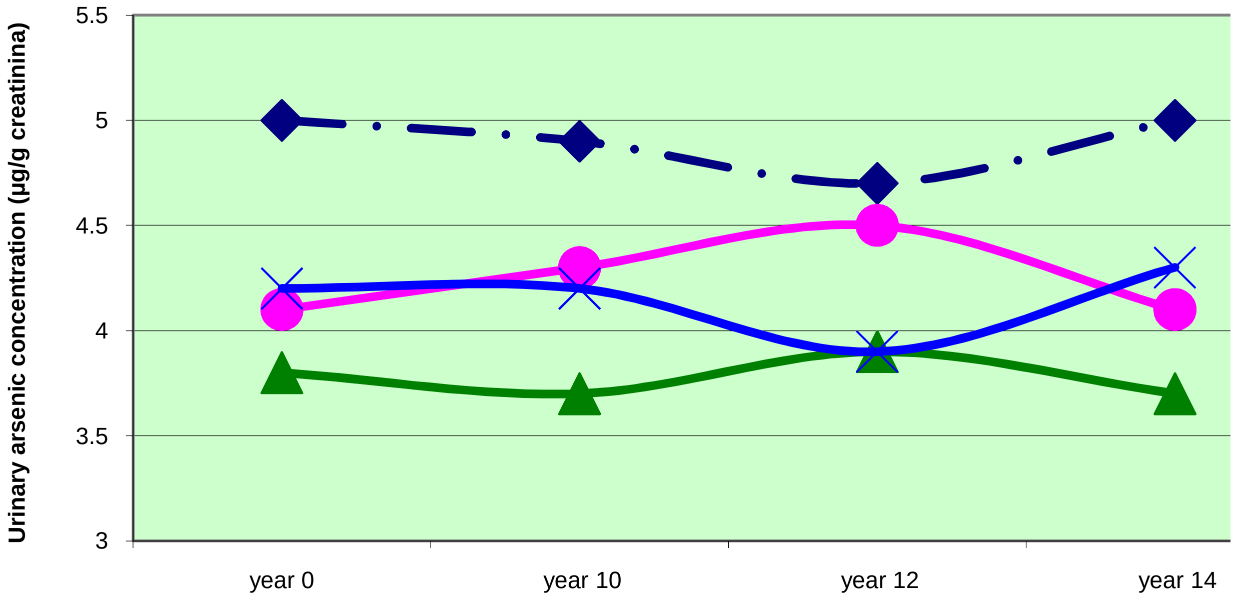
Evolution of predicted values for biomarker represented by concentration of urinary cadmium urinary cadmium concentration (µg/ g of creatinine) 10th, 12th and 14th year of operating depending on the distance from mining area



Regarding the cadmium concentration in urine, for distance of less than 50 m, 100m-200 m and over 200m from the future mining, the average forecast values for the 10th, 12th and 14th years din not recorded variations from the baseline value, which is within the range of normal values.

For distance of 50-100 m from the future mining, one can observe a decreasing trend of the average values predicted for the 10th and 12th year, followed in the 14th year by an increase up to the baseline value.

Evolution of predicted values for biomarker represented by concentration of urinary arsenic 10th, 12th and 14th year of operating depending on the distance from mining area



Regarding the arsenic concentration in urine, for distance of less than 50m from the future mining, the average forecast values for the 10th, 12th years show a decreasing trend, and the 14th year forecast value is the same as the current value.

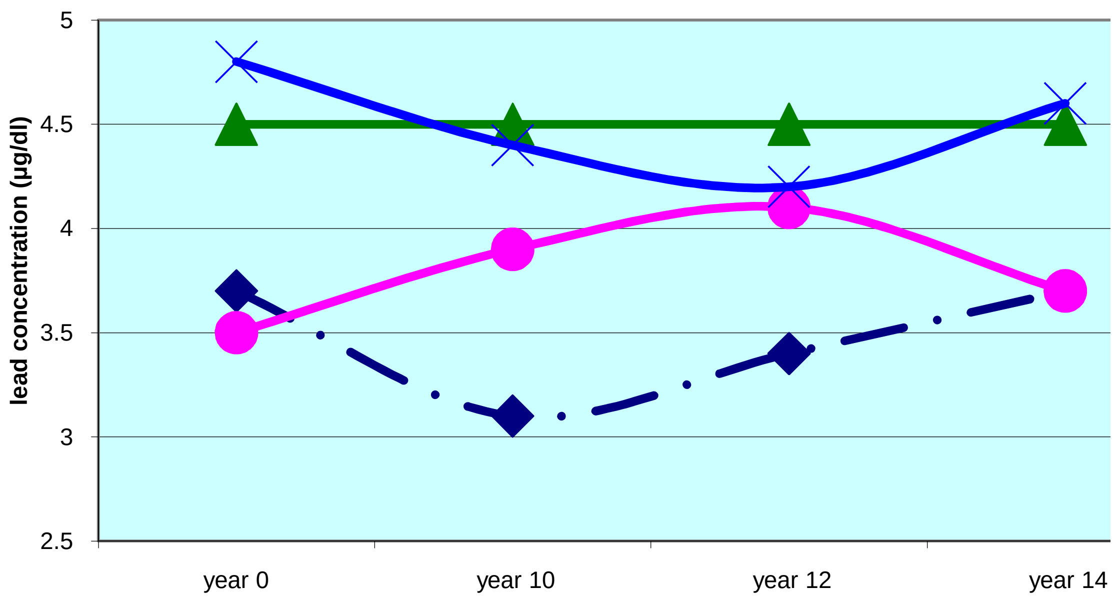
At a distance between 50m and 100m from future mining operation, the average forecast value increases within range 4-4.5 µg/g creatinine in the 10th and 12th years of mining operation, decreasing to the baseline value in the 14th year.

At a distance between 100m and 200m from future mining operation, the average forecast value decreases in the 10th, increases in the 12th compared to the baseline and decreases again in the 14th year down to a smaller value than the baseline value.

At distances of over 200m from the future mining, the average forecast values show a decreasing trend compared to the current values and compared those recorded in the 10th year, following to increase in the 14th year up to a higher value than the baseline.

Scenario forecasts made for the maximum exposure concentrations – Evolution of predicted values of biomarkers in the 10th, 12th and 14th years of mining depending on distance from mining area, because of exposure to specific hazardous substances (heavy metals) to be present in the environment because of the mining activities

Evolution of predicted values for biomarker represented by lead concentration in the 10th, 12th and 14th year of operating depending on the distance from mining area



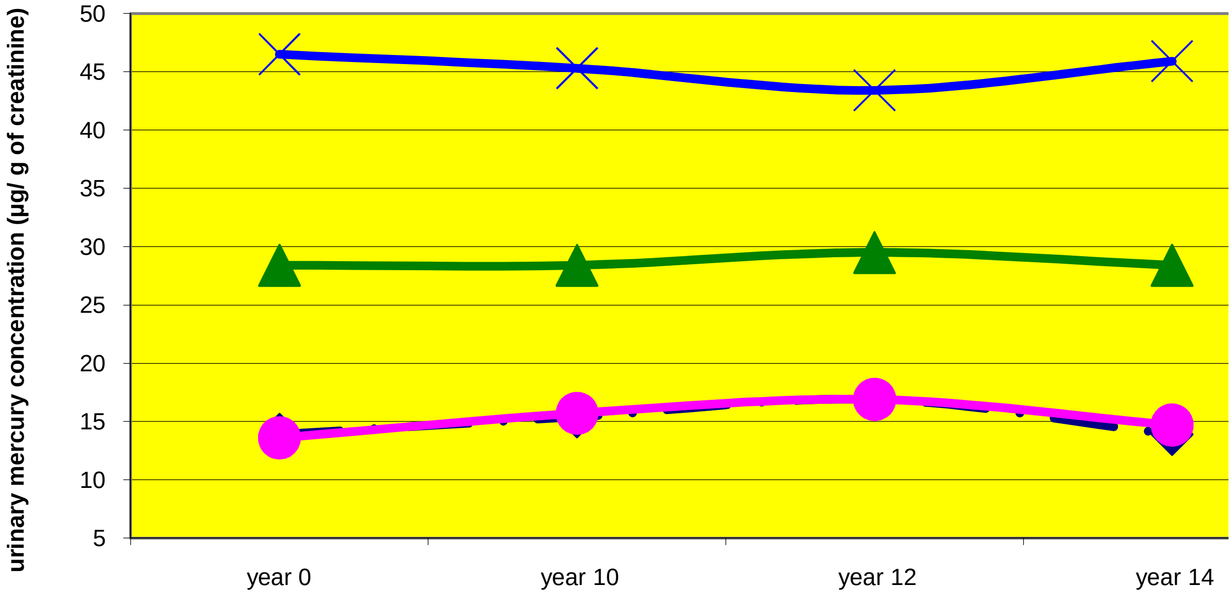
For the maximum values scenario, regarding the average forecast values of lead concentration, at a distance of 50m from the mining, it records a decreasing trend in the 10th and 12th years of mining compared to the current situation, the average forecast values increase in the 14th year reaching the current average value, which situates within the normal values range.

The average predicted values at a distance between 50m and 100 m from the mining describes an increasing trend, mentioning that in the 14th year the average predicted value is very close to an order of magnitude of the current value, without being equal.

At distance between 100m and 200m from mining, compared to the current situation, the average forecast values in the 10th, 12th and 14th do not differ.

At distance of over 200 m from future mining operation, the average forecast values decrease from the current average values down to those predicted for the 12th year of mining, slightly increasing in the 14th year, without reaching the baseline.

Evolution of predicted values for biomarker represented by concentration of mercury in urine - 10th, 12th and 14th year of operating depending on the distance from mining area



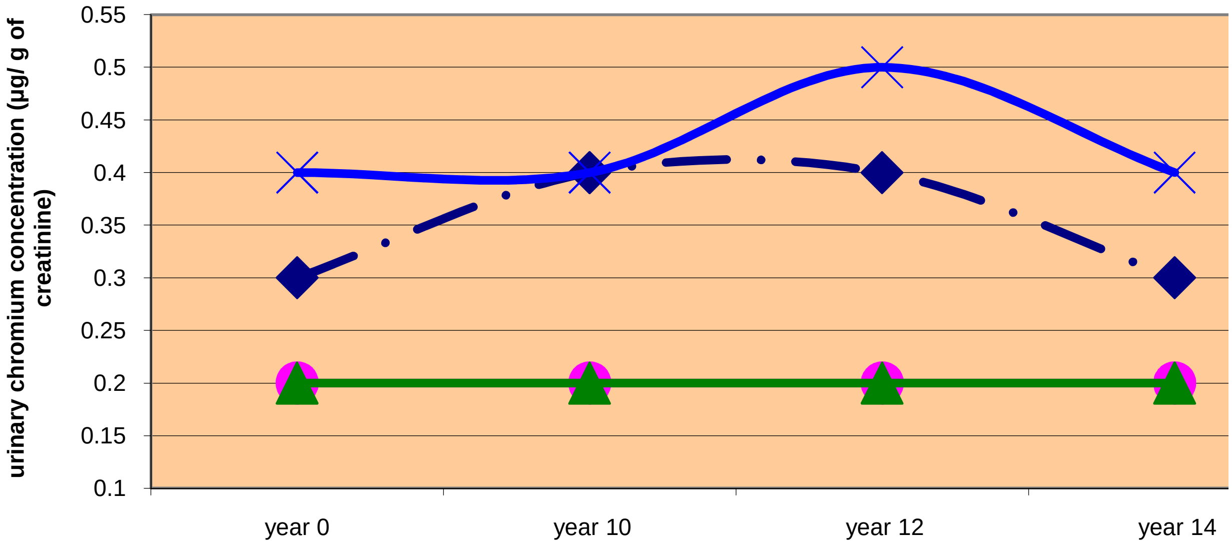
Regarding the expected average values of mercury in urine at a distance less than 50 m from mining, recorded an increasing trend towards the current situation in the 10th and 12th years of mining, then average values decrease in the 14th reaching the current average value.

The average predicted values for a distance between 50 and 100 m from the mining operation recorded the same pattern as that described previously for under 50 m, noting that the 14th year decrease did not reach the baseline value.

At the distance between 100 m and 200 m from mining operation, the average values predicted for the 12th one can observe a slightly increasing trend followed by a decrease in the 14th year down to the baseline value.

At a distance of over 200 m from future mining, one can observe a slightly decreasing trend of the average values predicted for the 10th, 12th years, followed by a slight increase in the 14th year of mining, the value remaining under the baseline value.

Evolution of predicted values for biomarker represented by concentration of urinary chromium - 10th, 12th and 14th year of operating depending on the distance from mining area

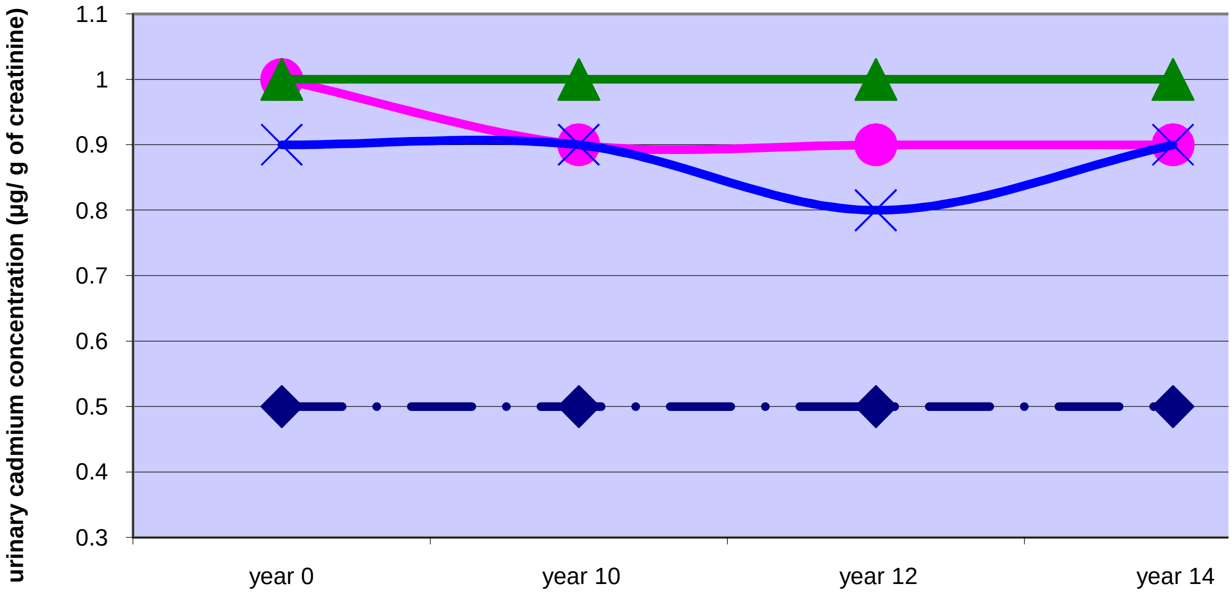


Regarding the chromium concentration in urine, the average forecast values for the 10th and 12th years of mining operation, for a distance of less than 50 m from the future mining, recorded an increasing trend compared to the baseline average, increase followed by a decrease in the 14th year down to the baseline value.

For distance between 50-100 m and 100-200 m there were no changes in any direction of the average forecast values for the 10th, 12th and 14th years of mining operation.

For distance of over 200 m from the future mining, one can observe a slightly increasing trend of average values predicted in the 12th year compared to those recorded in the 0, 10th and 14th years

Evolution of predicted values for biomarker represented by concentration of urinary cadmium urinary cadmium concentration (µg/ g of creatinine) - 10th, 12th and 14th year of operating depending on the distance from mining area

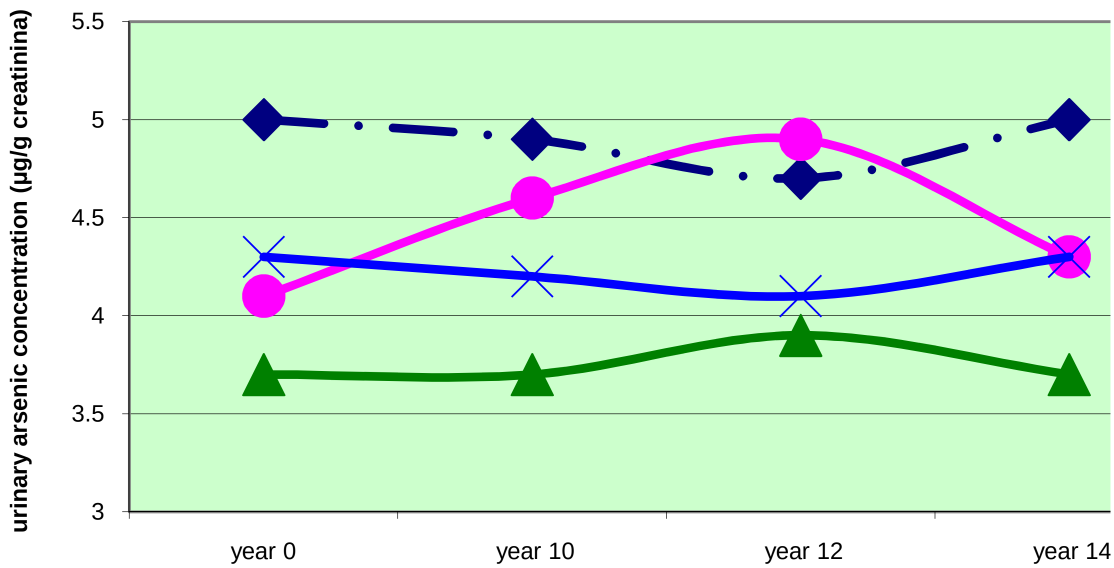


Regarding the cadmium concentration in urine for the maximum average values scenario, for the distance of less than 50 m, 100-200 m from the future mining, the average forecast values for the 10th, 12th and 14th years din not recorded variations up or down from the baseline value, which is within the range of normal values.

For the distance between 50-100 m from the future mining, one can observe a decreasing trend of the average values predicted for the 10th year of mining compared to the baseline value, the value remaining constant for the 12th and 14th year of mining operation.

At distance of over 200 m from the future mining, one can observe a decrease of average values predicted for the urinary cadmium concentration in the 12th year compared to the baseline value.

Evolution of predicted values for biomarker represented by concentration of urinary arsenic - 10th, 12th and 14th year of operating depending on the distance from mining area



Regarding the arsenic concentration in urine, for the maximum values scenario, for the distance of less than 50 from the future mining, the average forecast values for the 10th, 12th years show a decreasing trend, and the 14th year forecast value is the same as the current value.

At the distance between 50 m and 100 m from future mining operation, the average forecast value increases within range 4-4.5 µg/g creatinine in the 10th and 12th years of mining operation, decreasing to the baseline value in the 14th year.

At the distance between 100 m and 200 m from future mining operation, the average forecast value increases in the 12th compared to the baseline value.

For distance of over 200 m from the future mining, the predicted concentrations describe a decreasing average value in the 12th year compared to the current value and to that recorded in the 10th year, following to increase in the 14th year up to the baseline value.

B. ACUTE BREATHING DISORDERS

Scenario performed for the maximum values of the nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and respirable dust (PM_{10}) concentrations forecasted in the air

Acute breathing disorders – Forecast for the 9th year of mining operation

The logistic regression model relation of the acute breathing disorders frequency of occurrence within the examined group of people, with exposure to the forecasted concentrations of nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and respirable dust (PM_{10}) during the 9th year of mining operation didn't emphasize a statistically significant risk regarding a more frequent occurrence of these disorders as a result of exposure, and it didn't emphasize statistically significant differences concerning the occurrence frequency of these disorders given the distance to the mining operation established for the sanitary protection area and the protected area.

The relation between acute breathing disorders and exposure to NO_2 (values of the concentration forecasted for the 9th year of mining operation) in logistic regression model, correcting the distance to the mining operation

ac_breath.	Odds Ratio	Standard deviation	z	P>|z|	95% Confidence interval	
Idist2_2	**0.2857143**	**0.3185243**	**-1.124**	**0.261**	0.0321353	2.540278
Idist2_3	0.6666667	0.798146	-0.339	0.735	0.063802	6.965999

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

The relation between acute breathing disorders and exposure to SO_2 (values of the concentration forecasted for the 9th year of mining operation) in logistic regression model, correcting the distance to the mining operation

ac_breath.	Odds Ratio	Standard deviation	z	P>|z|	95% Confidence interval	
so2max9	**1.041784**	**0.159845**	**0.267**	**0.790**	0.7712134	1.407281
Idist2_2	**0.2993114**	**0.333947**	**-1.081**	**0.280**	0.0336065	2.665776
Idist2_3	0.7350739	0.8977123	-0.252	0.801	0.0671116	8.051276

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

The relation between acute breathing disorders and exposure to PM_{10} (values of the concentration forecasted for the 9th year of mining operation) in logistic regression model, correcting the distance to the mining operation

ac_breath.	Odds Ratio	Standard deviation	z	P>|z|	95% Confidence interval	
pmmax9	**0.8572997**	**0.2512632**	**-0.525**	**0.599**	0.4826771	1.52268
Idist2_2	**0.3061224**	**0.3419292**	**-1.060**	**0.289**	0.034287	2.733132
Idist2_3	0.7142857	0.8565758	-0.281	0.779	0.0680935	7.492695

describe I*
67. Idist2_2 byte %8.0g dist2==2

68. Idist2_3 byte %8.0g dist2==3

Acute breathing disorders – Forecast for the 19th year of mining operation

As in the case of the forecast for the 9th year of operation, the logistic regression model relation of the acute breathing disorders frequency of occurrence within the examined group of people, with exposure to the forecasted concentrations of nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and respirable dust (PM_{10}) during the 19th year of mining operation didn't emphasize a statistically significant risk regarding a more frequent occurrence of these disorders as a result of exposure, and it didn't emphasize statistically significant differences concerning the occurrence frequency of these disorders given the distance to the mining operation established for the sanitary protection area and the protected area.

The relation between acute breathing disorders and exposure to NO_2 (values of the concentration forecasted for the 19th year of mining operation) in logistic regression model, correcting the distance to the mining operation

ac_breath.	Odds Ratio	Standard deviation	z	P>|z|	95% Confidence interval	
no2max19	**1.041806**	**0.1263004**	**0.338**	**0.735**	0.8214743	1.321235
Idist2_2	**0.2857143**	**0.3194383**	**-1.121**	**0.262**	0.0319345	2.556255
Idist2_3	0.6666667	0.8001323	-0.338	0.735	0.0634305	7.006796

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

The relation between acute breathing disorders and exposure to SO_2 (values of the concentration forecasted for the 19th year of mining operation) in logistic regression model, correcting the distance to the mining operation

ac_breath.	Odds Ratio	Standard deviation	z	P>|z|	95% Confidence interval	
so2max19	**1.157422**	**0.2703433**	**0.626**	**0.531**	0.732274	1.829406
Idist2_2	**0.2755102**	**0.3081927**	**-1.152**	**0.249**	0.0307583	2.467819
Idist2_3	0.6428571	0.7719103	-0.368	0.713	0.0610991	6.763853

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

The relation between acute breathing disorders and exposure to PM_{10} (values of the concentration forecasted for the 19th year of mining operation) in logistic regression model, correcting the distance to the mining operation

ac_breath.	Odds Ratio	Standard deviation	z	P>|z|	95% Confidence interval	
Idist2_2	**0.2952381**	**0.3289994**	**-1.095**	**0.274**	0.0332379	2.622473
Idist2_3	0.6888889	0.8244414	-0.311	0.755	0.0659868	7.191865

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

Chronic breathing disorders – Forecast for the 9th year of mining operation

The logistic regression model relation of the chronic breathing disorders frequency of occurrence within the examined group of people, with exposure to the forecasted concentrations of nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and respirable dust (PM_{10}) during the 9th year of mining operation didn't emphasize a statistically significant risk regarding a more frequent occurrence of these disorders as a result of exposure, and it didn't emphasize statistically significant differences concerning the occurrence frequency of these disorders given the distance to the mining operation established for the sanitary protection area and the protected area.

The relation between chronic breathing disorders and exposure to NO_2 (values of the concentration forecasted for the 9th year of mining operation) in logistic regression model, correcting the distance to the mining operation

chr_breath.	Odds Ratio	Standard deviation	z	P>|z|	Confidence interval 95%	
Idist2_3	7.166667	9.764925	1.445	0.148	0.4960375	103.5428

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

The relation between chronic breathing disorders and exposure to SO_2 (values of the concentration forecasted for the 9th year of mining operation) in logistic regression model, correcting the distance to the mining operation

chr_breath.	Odds Ratio	Standard deviation	z	P>|z|	Confidence interval 95%	
Idist2_3	18	28.61773	1.818	0.069	0.7979386	406.0463

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

The relation between chronic breathing disorders and exposure to PM_{10} (values of the concentration forecasted for the 9th year of mining operation) in logistic regression model, correcting the distance to the mining operation

chr_breath.	Odds Ratio	Standard deviation	z	P>|z|	Confidence interval 95%	
Idist2_3	7	9.53926	1.428	0.153	0.4843083	101.1752

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

Chronic breathing disorders – Forecast for the 19th year of mining operation

For the 19th year of operation, the logistic regression model relation of the chronic breathing disorders frequency of occurrence within the examined group of people, with exposure to the forecasted concentrations of nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and respirable dust (PM_{10}) during the 19th year of mining operation didn't emphasize a statistically significant risk regarding a more frequent occurrence of these disorders as a result of exposure, and it didn't emphasize statistically significant differences concerning the occurrence frequency of these disorders given the distance to the mining operation established for the sanitary protection area and the protected area.

The relation between chronic breathing disorders and exposure to NO_2 (values of the concentration forecasted for the 19th year of mining operation) in logistic regression model, correcting the distance to the mining operation

chr_breath.	Odds Ratio	Standard deviation	z	P>|z|	Confidence interval 95%	
Idist2_3	6.666667	9.087928	1.392	0.164	0.4608504	96.44007

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

The relation between chronic breathing disorders and exposure to SO_2 (values of the concentration forecasted for the 19th year of mining operation) in logistic regression model, correcting the distance to the mining operation

chr_breath.	Odds Ratio	Standard deviation	z	P>|z|	Confidence interval 95%	
Idist2_3	6.5	8.862261	1.373	0.170	0.4491217	94.0725

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

The relation between chronic breathing disorders and exposure to PM_{10} (values of the concentration forecasted for the 19th year of mining operation) in logistic regression model, correcting the distance to the mining operation

chr_breath.	Odds Ratio	Standard deviation	z	P>|z|	Confidence interval 95%	
Idist2_3	7.333333	9.99059	1.462	0.144	0.5077668	105.9104

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

Scenario performed for the minimum values of the nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and respirable dust (PM_{10}) concentrations forecasted in the air

Acute breathing disorders – Forecast for the 9th year of mining operation

Neither in the case of the scenario considering the minimum values of the investigated hazardous substances forecasted for the 9th year of mining operation, did the logistic regression model relation of the acute breathing disorders frequency of occurrence within the examined group of people, with exposure to the forecasted concentrations of nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and respirable dust (PM_{10}) during the 9th year of mining operation emphasize a statistically significant risk regarding a more frequent occurrence of these disorders as a result of exposure, and it didn't emphasize statistically significant differences concerning the occurrence frequency of these disorders given the distance to the mining operation established for the sanitary protection area and the protected area.

The relation between acute breathing disorders and exposure to NO_2 (values of the concentration forecasted for the 9th year of mining operation) in logistic regression model, correcting the distance to the mining operation

ac_breath.	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*Confidence iInterval 95%*

Idist2_2	0.2857143	0.3185243	-1.124	0.261	**0.0321353 2.540278**
Idist2_3	**0.6666667**	**0.798146**	**-0.339**	**0.735**	**0.063802 6.965999**

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

The relation between acute breathing disorders and exposure to SO_2 (values of the concentration forecasted for the 9th year of mining operation) in logistic regression model, correcting the distance to the mining operation

ac_breath.	***Odds Ratio***	***Standard deviation***	***z***	***P>|z|***	***Confidence iInterval 95%***
so2min9	3449.582	105327.2	0.267	0.790	**3.53e-23 3.37e+29**
Idist2_2	0.2993114	0.333947	-1.081	0.280	**0.0336065 2.665776**
Idist2_3	**0.7350739**	**0.8977123**	**-0.252**	**0.801**	**0.0671116 8.051276**

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

The relation between acute breathing disorders and exposure to PM_{10} (values of the concentration forecasted for the 9th year of mining operation) in logistic regression model, correcting the distance to the mining operation

ac_breath.	***Odds Ratio***	***Standard deviation***	***z***	***P>|z|***	***Confidence iInterval 95%***
pmmin9	2.40e-07	6.96e-06	-0.525	0.599	**4.81e-32 1.20e+18**
Idist2_2	0.3061224	0.3419292	-1.060	0.289	**0.034287 2.733132**
Idist2_3	**0.7142857**	**0.8565758**	**-0.281**	**0.779**	**0.0680935 7.492695**

describe I*
67. Idist2_2 byte %8.0g dist2==2
68. Idist2_3 byte %8.0g dist2==3

Acute breathing disorders – Forecast for the 19th year of mining operation

Regarding the model that considers the minimum values forecasted for the 19th year of the mining operation, for the hazardous substances investigated, no statistically significant risk regarding a more frequent occurrence of acute breathing disorders as a result of exposure and no statistically significant differences have been emphasized regarding the occurrence frequency of these disorders, given the distance to the mining operation established for the sanitary protection area and the protected area.

The relation between acute breathing disorders and exposure to NO_2 (values of the concentration forecasted for the 19th year of mining operation) in logistic regression model, correcting the distance to the mining operation

ac_breath.	***Odds Ratio***	***Standard deviation***	***z***	***P>|z|***	***Confidence iInterval 95%***
no2min19	57.66504	692.0948	0.338	0.735	**3.51e-09 9.48e+11**
Idist2_2	0.2857143	0.3194383	-1.121	0.262	**0.0319345 2.556255**
Idist2_3	**0.6666667**	**0.8001323**	**-0.338**	**0.735**	**0.0634305 7.006796**

```
describe I*
67. Idist2_2   byte    %8.0g            dist2==2
68. Idist2_3   byte    % 8.0g            dist2==3
```

The relation between acute breathing disorders and exposure to SO_2 (values of the concentration forecasted for the 19th year of mining operation) in logistic regression model, correcting the distance to the mining operation

ac_breath.	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*Confidence iInterval 95%*
so2min19	4.81e+31	5.61e+33	0.626	0.531	**2.97e-68 7.81e+130**
Idist2_2	0.2755102	0.3081927	-1.152	0.249	**0.0307583 2.467819**
Idist2_3	**0.6428571**	**0.7719103**	**-0.368**	**0.713**	**0.0610991 6.763853**

```
describe I*
67. Idist2_2   byte   %8.0g              dist2==2
68. Idist2_3   byte   %8.0g              dist2==3
```

The relation between acute breathing disorders and exposure to PM_{10} (values of the concentration forecasted for the 19th year of mining operation) in logistic regression model, correcting the distance to the mining operation

ac_breath.	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*Confidence iInterval 95%*
Idist2_2	0.2952381	0.3289994	-1.095	0.274	**0.0332379 2.622473**
Idist2_3	**0.6888889**	**0.8244414**	**-0.311**	**0.755**	**0.0659868 7.191865**

```
describe I*
67. Idist2_2   byte   %8.0g              dist2==2
68. Idist2_3   byte   %8.0g              dist2==3
```

Chronic breathing disorders – Forecast for the 9th year of mining operation

The logistic regression model relation of the chronic breathing disorders frequency of occurrence within the examined group of people, with exposure to the forecasted concentrations of nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and respirable dust (PM_{10}) during the 9th year of mining operation did not emphasize a statistically significant risk regarding a more frequent occurrence of these disorders in relation with the exposure to the forecasted concentrations of sulfur dioxide for distances within 50 m of the mining operation.

The relation between chronic breathing disorders and exposure to NO_2 (values of the concentration forecasted for the 9th year of mining operation) in logistic regression model, correcting the distance to the mining operation

chr_breath.	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*Confidence iInterval 95%*
Idist2_3	**7.166667**	**9.764925**	**1.445**	**0.148**	**0.4960375 103.5428**

```
describe I*
67. Idist2_2   byte   %8.0g              dist2==2
68. Idist2_3   byte   %8.0g              dist2==3
```

The relation between chronic breathing disorders and exposure to SO_2 (values of the

concentration forecasted for the 9th year of mining operation) in logistic regression model, correcting the distance to the mining operation

chr_breath.	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*Confidence iInterval 95%*
Idist2_3	**18**	**28.61773**	**1.818**	**0.069**	**0.7979386 406.0463**

```
describe I*
67. Idist2_2   byte   %8.0g          dist2==2
68. Idist2_3   byte   %8.0g          dist2==3
```

The relation between chronic breathing disorders and exposure to PM_{10} (values of the concentration forecasted for the 9th year of mining operation) in logistic regression model, correcting the distance to the mining operation

chr_breath.	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*Confidence iInterval 95%*
Idist2_3	**7**	**9.53926**	**1.428**	**0.153**	**0.4843083 101.1752**

```
describe I*
67. Idist2_2   byte   %8.0g          dist2==2
68. Idist2_3   byte   %8.0g          dist2==3
```

Chronic breathing disorders – Forecast for the 19th year of mining operation

Regarding the model that considers the minimum values forecasted for the 19th year of the mining operation, for the hazardous substances investigated, no statistically significant risk regarding a more frequent occurrence of chronic breathing disorders as a result of exposure and no statistically significant differences have been emphasized regarding the occurrence frequency of these disorders, given the distance to the mining operation established for the sanitary protection area and the protected area.

The relation between chronic breathing disorders and exposure to NO_2 (values of the concentration forecasted for the 19th year of mining operation) in logistic regression model, correcting the distance to the mining operation

chr_breath.	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*Confidence iInterval 95%*
Idist2_3	**6.666667**	**9.087928**	**1.392**	**0.164**	**0.4608504 96.44007**

```
describe I*
67. Idist2_2   byte   %8.0g          dist2==2
68. Idist2_3   byte   %8.0g          dist2==3
```

The relation between chronic breathing disorders and exposure to SO_2 (values of the concentration forecasted for the 19th year of mining operation) in logistic regression model, correcting the distance to the mining operation

chr_breath.	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*Confidence iInterval 95%*
Idist2_3	**6.5**	**8.862261**	**1.373**	**0.170**	**0.4491217 94.0725**

```
describe I*
67. Idist2_2   byte   %8.0g          dist2==2
68. Idist2_3   byte   %8.0g          dist2==3
```

The relation between chronic breathing disorders and exposure to PM_{10} (values of the concentration forecasted for the 19th year of mining operation) in logistic regression

model, correcting the distance to the mining operation

chr_breath.	***Odds Ratio***	***Standard deviation***	***z***	***P>|z|***	***Confidence iInterval 95%***	
Idist2_3	**7.333333**	**9.99059**	**1.462**	**0.144**	**0.5077668**	**105.9104**

```
describe I*
 67. Idist2_2    byte   %8.0g                dist2==2
 68. Idist2_3    byte   %8.0g                dist2==3
```

Hazardous situations – Noise

Forecast for the 9th year of mining operation

The logistic regression model used in relation with the occurrence of negative effects on health conditions (damage of the hearing function, discomfort, recurrent headaches, increased blood pressure values) with the display of the forecasted values for the levels of noise associated with the mining operation during the 9th year, didn't emphasize a statistically significant risk regarding the occurrence of the mentioned negative effects in case of exposure.

The relation between the effects on the hearing function and exposure to noise (levels forecasted for the 9th year of the mining operation)

Effect on the hearing function	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*95% Confidence interval*	
nois_year 9	1.067291	0.1232333	0.564	0.573	0.8511376	1.338337

The relation between recurrent headaches and exposure to noise (levels forecasted for the 9th year of the mining operation)

Discomfort Recurrent headache, migraine	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*95% Confidence interval*	
nois_year 9	**1.034476**	**0.0649658**	**0.540**	**0.589**	**0.9146701**	**1.169975**

The relation between arterial hypertension and exposure to noise (levels forecasted for the 9th year of the mining operation)

Arterial hypertension	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*95% Confidence interval*	
nois_year 9	**1.04638**	**0.0737412**	**0.643**	**0.520**	**0.9113873**	**1.201368**

Forecast for the 10th year of mining operation

Regarding the levels of noise forecasted for the 10th year of the mining operation, the logistic regression model used in relation with the occurrence of some negative effects on health conditions (damage of the hearing function, discomfort, recurrent headaches, increased blood pressure values) with exposure to the forecasted levels of noise didn't reveal a statistically significant risk regarding the occurrence of the mentioned negative effects in case of exposure.

The relation between the effects on hearing and exposure to noise (levels forecasted for the 10th year of the mining operation)

Effecs on the hearing function	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*95% Confidence interval*	
nois_year 10	**0.7783705**	**0.2530772**	**-0.771**	**0.441**	**0.4115562**	**1.472121**

The relation between recurrent headaches and exposure to noise (levels forecasted for the 10th year of the mining operation)

Discomfort, recurrent headache, migraine	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*95% Confidence interval*	
nois_year 10	**1.064176**	**0.0437494**	**1.513**	**0.130**	**0.9817926**	**1.153473**

The relation between arterial hypertension and exposure to noise (levels forecasted for the 10th year of the mining operation)

Arterial hypertension	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*95% Confidence interval*	
nois_year 10	**1.049633**	**0.0498321**	**1.020**	**0.308**	**0.9563698**	**1.15199**

Forecast for the 12th year of mining operation

Regarding the levels of noise forecasted for the 12th year of the mining operation, the logistic regression model used in relation with the occurrence of some negative effects on health conditions (damage of the hearing function, discomfort, recurrent headaches, increased blood pressure values) with exposure to the forecasted levels of noise didn't reveal a statistically significant risk regarding the occurrence of these negative effects in case of exposure.

The relation between the effects on hearing and exposure to noise (levels forecasted for the 12th year of the mining operation)

Effects on the hearing function	Odds Ratio	Standard deviation	z	P>|z|	95% Confidence interval	
nois_year 12	1.07291	0.0757115	0.997	0.319	0.9343224	1.232053

The relation between recurrent headaches and exposure to noise (levels forecasted for the 12th year of the mining operation)

Disconmfort, recurrent headache, migraine	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*95% Confidence interval*	
nois_year 12	1.059162	0.0429756	1.417	0.157	0.9781937	1.146833

The relation between arterial hypertension and exposure to noise (levels forecasted for the 12th year of the mining operation)

Arterial hypertension	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*95% Confidence interval*	
nois_year 12	1.024102	0.0515508	0.473	0.636	0.9278883	1.130292

Forecast for the 14th year of mining operation

The same comment (meaning that the modeling did not reveal a statistically significant risk) is also valid in the case of the relation between the previously mentioned negative effects with exposure to the levels of noise forecasted for the 14th year of the mining operation.

The relation between the effects on hearing and exposure to noise (levels forecasted for the 14th year of the mining operation)

Effects on the hearing function	Odds Ratio	Standard deviation	z	P>|z|	95% Confidence interval	
noi_year 14	1.228615	0.897117	1.333	0.182	0.907781	1.662841

The relation between recurrent headaches and exposure to noise (levels forecasted for the 14th year of the mining operation)

Disconmfort, recurrent headache, migraine	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*95% Confidence interval*	
nois_year 14	1.130421	0.1054827	1.314	0.189	0.9414828	1.357276

The relation between arterial hypertension and exposure to noise (levels forecasted for the 14th year of the mining operation)

Arterial hypertension	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*95% Confidence interval*	
noi_year 14	1.139887	0.1182095	1.263	0.207	0.9302289	1.396799

Forecast for the 19th year of mining operation

Regarding the levels of noise forecasted for the 19th year of the mining operation, the logistic regression model used in relation with the occurrence of some negative effects on health conditions (damage of the hearing function and increased blood pressure values) with exposure to the forecasted levels of noise didn't reveal a statistically significant risk regarding the occurrence of these negative effects in case of exposure. In exchange, the model has revealed a statistically significant risk regarding the occurrence of discomfort and recurrent headaches for those living within 100 m of the mining operation.

The relation between the effects on hearing and exposure to noise (levels forecasted for the 19th year of the mining operation)

Effects on the hearing function	Odds Ratio	Standard deviation	z	P>|z|	95% Confidence interval	
noi_year 19	1.194654	0.1417218	1.499	0.134	0.9468125	1.507371

The relation between recurrent headaches and exposure to noise (levels forecasted for the 19th year of the mining operation)

Disconmfort, recurrent headaches, migraine	Odds Ratio	Standard deviation	z	P>|z|	95% Confidence interval	
nois_year 19	1.199527	0.1062306	2.054	0.040	1.008387	1.426897

The relation between arterial hypertension and exposure to noise (levels forecasted for the 19th year of the mining operation)

Arterial hypertension	*Odds Ratio*	*Standard deviation*	*z*	*P>|z|*	*95% Confidence interval*	
nois_year 19	1.154407	0.1064695	1.557	0.120	0.963541	1.383133

7. CONCLUSIONS AND RECOMMENDATIONS

Recommendations for the sanitary protection zone and protected area of the Historic Center

Sanitary protection zone will be interposed between the outer perimeter of the mine area (surface pits), including traffic routes with heavy traffic in the industrial ones - and the protected area of Rosia Montana Historical Center.

Delimitation between the sanitary protection zone and the protected area of Rosia Montana Historical Center will be on the outline (perimeter) for the protected areas.

1. Destination of activities for the sanitary protection zone and the historic protected area

1.1. Sanitary protection zone:

1.1.2. Prohibited destinations and activities:

- Use the area for housing and holiday homes.
- Kindergartens, schools and other educational institutions including part-time forms of education (summer schools, etc.).
- Institutions with social and socio-medical activities: daycares, homes, elderly homes, orphanages, etc.
- Medical institutions (clinics, hospitals, outpatient centres, medical centres, public health centres, etc).
- Public catering units with dining arrangements.
- Sale of food other than packaged as PET bottles, cans, foil vacuum, etc.
- Attachments household allowing cultivation of agricultural products (vegetables, herbs, etc.) used for commercial food, medicine and livestock.

1.1.3. Permitted destinations and activities:

- Housing service with respect to paragraph 2 mentions.
- Museums and traditional mining.
- Units of foodstuffs without dining, such as: bars, discos, etc.
- Service delivery units, craft workshops and small production activities, with respect to mentions of point 2.

1.2. Protected area of the historic center:

The permitted activities are those prohibited in the area of sanitary protection zone with respect to paragraph 2 mentions.

2. Recommendations for activities permitted

2.1. Sanitary protection zone:

- Existing housing can be set up as housing service.
- You cannot build more housing service than existing.
- Those who live in areas like housing for the service will integrate into health outreach program developed for the field of occupational health and the health community.
- It will prohibit the sale of any food product without packaging as well as serving meals in any of the spaces located in the sanitary protection zone (pet, canned, plastic, and vacuum).
- In catering units such as bars, discos will serve alcoholic and non-alcoholic beverages.
- Weddings or any other forms of festive dinners in the sanitary protection are prohibited.

- In areas used for tourism (museums, etc.) cannot serve or sell packaged food and/ or fresh prepared food.
- Service delivery units, craft workshops, shops and other small production units can perform activities if they do not lead to the appearance of significant levels of pollutants similar to those generated by mining. The level of significance will be determined through health impact assessment for every objective.

2.2. Protected area of the historic center

Activities that are prohibited in the area of sanitary protection zone are permitted here with prior assessment for every objective.

3. Recommendations for improving the natural environment as compensatory measures

3.1. For sanitary protection zone:

- Planting a protection screen (trees, hedges, etc.) on surfaces as extended.
- Establishment of surfaces, areas, height and type of vegetation by specialists on a case by case, depending on the tasks/ obligations of the institutions within this area of sanitary protection and in accordance with paragraph 1.
- Paving of traffic routes, periodic cleaning (washing, extraction, transport and storage in appropriate circumstances), to avoid generating dust.
- Cover the soil with vegetation except the paved areas (asphalt, concrete, gravel, etc).
- Ensure the wastewater and rainwater collection system and their transport to the wastewater treatment plant.
- Develop a plan of action and intervention measures for certain special circumstances, the specific case for each objective inside the perimeter.

3.2. Protected area of the historic center: see above-3.1

4. Crops and Livestock - recommendations for the two areas

4.1. Sanitary protection zone:

- It prohibits the cultivation of plants used for food purposes and livestock
- It prohibits the cultivation of plants used for medical purposes.

4.2. Protected area of the historic center

It allows the keeping of livestock and cultivation of plants used for food purposes under the following conditions (determined by impact assessment of case):

- Providing the conditions for maintaining cleanliness, waste management and avoidance of impact on the neighbourhood population.
- Implementation of conditions that will prevent food and plant contamination by dangerous substances.

General conclusions:

All recommendations, prohibitions and prescriptions are valid during the mine activity and a number of years after its completion, the period established by an assessment to be issued before closing the mine.

It requires the formulation, design, development and implementation of tracking the health of the population dynamics, after completion, in order to establish the date on

which the recommendations, prescriptions and prohibitions mentioned above will be cancelled, before the completion of the project.

It requires the establishment of measurable indicators to allow process assessment and progress associated with the implementation of above-mentioned plan prior to Project completion.

RMGC should establish a short and long term program with measures to be taken if there are changes on the distribution of dangerous situations and substances in environmental factors at other levels / concentrations than those used in the present work, establishing responsibilities in the case, after obtaining the environmental agreement but before the commencement of mining activities in the Project.

It requires the formulation, design, development and implementation plan for health population surveillance in dynamics and in relation to mining, for biomarkers of exposure used in the present work (lead, cadmium, mercury, arsenic, chromium and thiocyanates), after obtaining the environmental agreement but before the commencement of mining activities within the Project.
The list containing housing with each status specification is in the Annex.

The hereby document was based on the location plan from the Annex containing postal office numbers of the buildings. The assessment has established compulsory inclusion of real estate related areas, in addition to the initial situation plan and in accordance with sketch A.3.1. – URBAN SETTING REGULATIONS PLAN.

This paper refers only to the situation characterized by the distribution of hazardous substances and situations in the environmental factors, as they were made available by RMGC.

8. APPENDICES

8.1. The list of the households' status

locality	street	house_number	category	protected area*	sanitary protection**	exterior***
rosia montana	principala	224	100			X
rosia montana	principala	341	200	X		
rosia montana	piata	330		X		
rosia montana	sosasi	293	100		X	
campeni	way to bistra	20				X
rosia montana	principala	306	200	X		
rosia montana	brazi	470		X		
rosia montana	principala	105				X
rosia montana	vaidoaia	421			X	
rosia montana	berg	363	50		X	
gura rosiei		837				X
rosia montana	brazi	477		X		
carpinis	towards cimpeni	844				X
rosia montana	piata	407	200	X		
corna		696				X
corna		698				X
rosia montana	piata	327		X		
rosia montana	piata	317		X		
rosia montana	gura rosiei	776				X
rosia montana	brazi	471		X		
rosia montana	principala	383	200	X		
rosia montana	piata	376		X		
campeni	teiului	8				X
rosia montana	berg	355	50		X	
rosia montana	principala	455		X		
rosia montana	razna	260	200			X
rosia montana	brazi	523	P	X		
rosia montana	orlea	149	200			X
rosia montana	piata	328		X		
rosia montana	brazi	465		X		
rosia montana	brazi	467		X		
rosia montana	brazi	483		X		
rosia montana	piata	443		X		
rosia montana	brazi	461		X		
rosia montana	vaidoaia	442		X		

ignatesti		1162				X
rosia montana	piata	333		X		
rosia montana	piata	374	200	X		
rosia montana	principala	388		X		
rosia montana	principala	236	100			X
rosia montana	bloc stadion	1	100			X
rosia montana	near the health centre	545	P	X		
rosia montana	principala	251	200			X
rosia montana	in the maternity	274			X	
rosia montana	berg	346	100		X	
rosia montana	blocuri	222	100			X
rosia montana	brazi	472		X		
rosia montana	piata	277		X		
rosia montana	blocuri	221	50			X
rosia montana	brazi	481		X		
rosia montana	piata	321		X		
rosia montana	piata	547	P	X		
rosia montana	piata	546	P	X		
rosia montana	gura minei	73				X
rosia montana	piata	303		X		
rosia montana	blocuri	226	100			X
ignatesti		1169				X
rosia montana	principala	420	200		X	
rosia montana	brazi	487		X		
rosia montana	sosasi	294	50		X	
rosia montana	piata	316		X		
rosia montana	piata	385	200	X		
rosia montana	principala	28				X
rosia montana	gura minei	14				X
rosia montana	brazi	521	P	X		

protected area* -
X – will comply with the conditions in the sanitary protection area
X- will be included in the sanitary protection area, with special provisions
sanitary protection**
exterior***
X – cannot be inhabited, no activities can be developed

8.2. Questionnaire

Name and Surname: …………………………………………. ……………….....................

Date of birth: ………………………………………….. Gender: …………

Current address: ……………………………………………………………………………………

……………………………………………………………………………………………………

Tel.: ………………..…………………………………

Pathological personal case history

Have you ever suffered from any of the following disorders?

	YES	**NO**	**If YES, provide details where necessary**
Sight problems other than those corrected with glasses			
Hearing problems			
Paralysis or another neurologic disorder			
Recurrent headaches, migraine			
Dizziness, stagger, tinnitus			
Cardiovascular disorders - arterial hypertension			
Ischemic cardiopathy			
Other cardiovascular disorders			
Asthma			
Chronic bronchitis			
Other chronic breathing disorders			
Chronic digestive disorders – ulcer, chronic hepatic disorders			
Renal or bladder disorders			
Arthritis, arthrosis, rheumatism			
Hematological disorders including anemia			
Eczema, dermatitis, other dermatologic disorders			
Diabetes mellitus			
Thyroid disorders or other endocrine disorders			
Allergies to drugs, animals etc.			
Cancer			

Have you ever been?

	YES	**NO**	**If YES, provide details where necessary**
Hospitalized for any disorders?			
Sick for more than 20 days in the last year, without going to work?			
Diagnosed with any occupational disease?			

Lung radiography in the last year? If YES, what was the result?			
Are you under ongoing medical treatment?			
Are you a smoker? If YES, how many cigarettes do you smoke a day?			
Do you drink alcohol? If YES, state the daily quantity and type of alcohol.			
Height (m)			
Weight (kg)			

Socio-economic background elements

	YES	**NO**	**If YES, provide details where necessary**
Employed			
Unemployed for more than 6 months			

Last graduated school:

- Elementary school
- General school
- High school
- College
- University

Monthly income:

- Above 500 RON
- Between 200 - 500 RON
- Between 100 - 200 RON
- Less than 100 RON

Occupational background

Occupation	**Workplace**	**Work seniority at the workplace (years)**	**Exposure to the following hazardous substances**

For those who worked or who are currently working in the mining industry:

	YES	**NO**	**If YES, provide details where necessary**
Are you involved in any current mining activities?			
In which mining sector are you involved?			
Extraction of charcoal			
Salt ,Gypsum operation			
Metal operation: Au, Cu, Sn, Zn, Cd, Pb etc.			
Clay operation, Quarry			
Does your work involve any manual aspects of the mining activity? If YES, in which sector?			
Do you use compressed air or explosives in your activity?			
Do you suffer from any breathing disorders generated by your profession?			
Have you been under treatment for any breathing disorders?			

Signature .... Date ....

8.3. Dispersion of hazardous substances