Translation from Armenian

# REPUBLIC OF ARMENIA

# MINISTRY OF ENERGY INFRASTRUCTURE AND NATURAL RESOURCES STAFF

# STATE COMMITTEE OF RESERVES

# STATE SUBSOIL EXPERTISE

# CONCLUSION N6

ABOUT CONDITION PARAMETERS AND CONFIRMATION OF RESERVES OF ARAGATSOTN REGION TOUKHMANUK GOLD MINE SOUTHERN AND MIRAK SECTIONS AND KOTAYK REGION TSITSKAR GOLD MINE OF REPUBLIC OF ARMENIA

EREVAN 2016

#### STATE SUBSOIL EXPERTISE

#### **CONCLUSION N6**

#### of November 4th, 2016

#### ABOUT CONDITION PARAMETERS AND CONFIRMATION OF RESERVES OF

## ARAGATSOTN REGION TOUKHMANUK GOLD MINE SOUTHERN AND MIRAK SECTIONS AND KOTAYK REGION TSITSKAR GOLD MINE OF REPUBLIC OF ARMENIA

Guided by RA government decision number 1588-U point 1 sub-point "a", Exhibit 1, point 8 and 8, dated September 26, 2002, and finalizing the results of state subsoil expertise of "About report of reserves calculation as of 01.04.2016 and by technical-economical corroboration of condition parameters in Southern, Mirak and Kotayk region Tsitskar sections concerning geological survey works implemented in Toukhmanuk mineral field of Aragatsotn region, Republic of Armenia", discussed in hearing dated November 4, 2016 of state subsoil expertise commission of mineral reserves agency of ministry of energy infrastructure and natural resources of Republic of Armenia, the agency of mineral reserves hold a decision:

- Agreeing with RA mineral reserves state agency (MRSA) state subsoil expertise commission – rename the investigated areas to Southern and Mirak sections of Toukhmanuk gold mine of Aragatsotn region of Republic of Armenia and Tsitskar gold mine of Kotayk region of Republic of Armenia.
- 2. Ascribe Southern and Mirak sections of Toukhmanuk gold mine of Aragatsotn region of Republic of Armenia and Tsitskar gold mine of Kotayk region of Republic of Armenia to complexity level 3 by geological structure.
- 3. Confirm the parameters of conditions for reserves border outlining and calculation of the Southern and Mirak sections of Toukhmanuk gold mine of Aragatsotn region of Republic of Armenia and Tsitskar gold mine of Kotayk region of Republic of Armenia as follows:
  - 1) Outline the mineral bodies by geological borders,
  - 2) Minimum content of gold in border section is 1.0 g/t
  - 3) Consider the minimum power of mineral body in reserves calculation as 1.0m, in case of less power guide by metrogramms,
  - 4) Minimum industrial content of gold in calculation block is 1.6g/t,
  - 5) Stripping border coefficient is not more than 24.2t/t.
- 4. Confirm the reserves of Southern and Mirak sections of Toukhmanuk gold mine of Aragatsotn region of Republic of Armenia and Tsitskar gold mine of Kotayk region of

Reserves	Ore	Ore Average content of			of metals					
classification	reserves,	me								
	thousand	Au. g/t	Ag. g/t	Au, kg	Ag, t					
	ton									
1	2	3	4	5	6					
Souther	Southern section of Toukhmanuk gold mine of Aragatsotn region of RA									
<b>C</b> 1	391.12	6.69	12.65	2616.98	4.95					
C2	1656.90	4.60	10.10	7613.74	16.73					
$C_1+C_2$	2048.02	5.00	10.59	10230.72	21.68					
Mirak	section of Tou	ıkhmanuk golo	l mine of Arag	atsotn region c	of RA					
C <sub>2</sub>	345.25	3.00	8.89	1037.17	3.07					
	Tsitskar gold mine of Kotayk regions of RA									
C2	176.47	4.96	10.44	875.72	1.84					

Republic of Armenia as of 01.04.016, in final border outline of open mine presented by the authors of the report by the following categories and quantities:

- 5. Fact, that the resource potential of Southern and Mirak sections of Toukhmanuk gold mine of Aragatsotn region of Republic of Armenia and Tsitskar gold mine of Kotayk region of Republic of Armenia is not exhausted by the resources confirmed by point 3 of the current conclusion, and until today, pursuant to accumulated geological information, the prospect of increase of reserves in Southern section, on the account of investigation of its deep horizons, pursuant to realistic appraisal of the author, are anticipated to be 2.5 million tons, gold and silver correspondingly 8.0 tons and 17.6 tons, anticipated resources of class P
- 6. Offer RA ministry of energy infrastructure and natural resources (also refer to as MEINR) staff Subsoil state inspection to implement survey of credibility of geological information presented to state subsoil expertise by report of "Mego Gold" LLC.
- 7. Offer "Republican geological fund" state non-commercial company of MEINR to take into registration the reserves confirmed by point 4 of the current conclusion.

Chief of MRSA of RA /signature/ Haykaz Nazaryan

Chief of department of expertise of

material calculations of mineral reserves

of MRSA of RA, responsible of material expertise /signature/ Hrant Avetisyan

## STATE GEOLOGICAL EXPERTISE COMMISSION OF MINERAL RESOURCES AGENCY OF MINISTRY OF ENERGY INFRASTRUCTURE AND NATURAL RESOURCES STAFF, REPUBLIC OF ARMENIA

#### PROTOCOL № 4

#### Yerevan

#### November 4, 2016

# ABOUT GEOLOGICAL SURVEY WORK RESULTS OF TOUKHMANUK GOLD MINE OF ARAGATSOTN REGION OF REPUBLIC OF ARMENIA, SOUTHERN, MIRAK AND KOTAYK REGION TSITSKAR AREAS WITH CONDITIONS PARAMETRES TECHNICAL ECONOMICAL BASE AND STATE SUBSOIL EXPERTISE RESULTS OF CALCULATION OF RESERVES MINERALS AS OF 01.04.2016

#### PARTICIPANTS

Haykaz Nazaryan	-Committee Chairman, Head of Mineral Resources Agency
Ashot Barseghyan	- Committee Chairman Deputy, Deputy Head of Mineral Resources Agency
Gohar Qochinyan	- Committee member, Head of Division of Mines' Geological-
Gayane Harutyunyan	Economic Aassessment Materials' Testing Division - Committee member, Chief Specialist of Mineral Resources Agency Reserves Calculation Materials Expertise Department
Gevorg Hovsepyan	- Committee member, "Republican Geological Fund" SNCO Director
Michael Suqiasyan	- Committee member
Vidok Tovmasyan	- Committee member
Albert Matevosyan	- Committee member
Hrant Avetisyan	- Head of Mineral Resources Agency Reserves Calculation Materials Expertise Department (Materials Expertise Liability)
Anush Petrosyan	- Committee Executive Secretary, Mineral Resources Agency Chief
Specialist	
Aram Mirzoayn	- Deputy Director of Mego Gold LLC
Vigen Vahramyan	- Geologist of Mego Gold LLC, Responsible for Report Executing
Hrachya Harutyunyan	- Report Coauthor
Hamlet Hamazaspyan	- Mineral Resources Agency independent expert
Gagik Gevorgyan	- Mineral Resources Agency independent expert

#### AGENDA

Geological Survey Work Results Of Toukhmanuk Gold Mine Of Aragatsotn Region of Republic of Armenia, Southern, Mirak And Kotayk Region Tsitskar Areas With Conditions Parameters Technical Economical Base And State Subsoil Expertise Results Of Calculation Of Reserves Minerals as of 01.04.2016 materials state geological expertise results discussion is presented by Mego Gold LLC.

- 1. Brief information about the materials presented for state geological expertise by report author
  - Author reference (appendix 1) Reporter- "Mego Gold" LLC geologist V.Vahramyan
- 2. Presentation of expertize results by Mineral Resources Agency Independent Experts
  - Expertise Conclusion (appendix 2) Reporter-G. Gevorgyan
  - Expertise Conclusion (appendix 3) Reporter- H.Hamazaspyan
- 3. State geological expertise process consolidation by the responsible person for the materials expertise
  - Conclusion (appendix 5) Reporter – H. Avetisyan
- 4. Exchange of ideas
- 5. Committee resolution.

#### Discussions

In opening speech H. Nazaryan welcomed committee members and presented agenda which was accepted unanimous.

**Concerning first issue of agenda** V. Vahramyan presented "Geological Survey Work Results Of Toukhmanuk Gold Mine Of Aragatsotn Region of Republic of Armenia, Southern, Mirak And Kotayk Region Tsitskar Areas With Conditions Parametres Technical Economical Base And State Subsoil Expertise Results Of Calculation Of Reserves Minerals as of 01.04.2016" report mane sections.

V. Vahrmanyan and report coauther H. Harutyunyan clarified the questions raised by M. Suqiasyan, V. Tovmasyan, A. Matevosyan. Especially, M. Suqiasyan and G. Hovsepyan mentioned that explored areas names must be edited. H. Avetisyan mentioned that that question was discussed during expertise also and presented by appropriate suggestion in "Conclusion".

V.Tovmasyan mentioned that areas exploration has been done by boreholes and for the deep horizons reserves assessment underground mountain cuttings are needed. The suggestion was accepted by H. Harutyunyan who mentioned that undergroung mountain cuttings will be done during the exploration of deep horizons.

A. Matevosyan asked about the mineral veins structure. In response, H. Harutyunyan mentioned that 5/1, 5/3 and 5/4 veins are the apophyses of 5/2, which despite of its low mineralization is characterized as stronger and belongs to earlier stage of mineralization.

A. Barseghyan raised internal and external control analyses comparability issue. H. Harutyunyan mentioned that both internal and external control analyses have been done in compani'es and "Analitic" CJSC's laboratories. Due to modern equipment of laboratory the degree of accuracy of the test results increased by 15%. The results of internal and external analyses are comparable which is affirmed in Report appropriate table appendixes. Associated components analyses have been done in "Alex Stuart" laboratory.

G. Hovsepyan mentioned that in the areas presented in Report is noticed the sharp increase in the average content of metals between the past fund materials and present results. H. Harutyunyan told that only excessive levels characterized and industrial importance veins have attended in calculation, resulting the average content of metals are increased.

**Concerning second issue of agenda** G. Gevorgyan and H. Hamazaspyan presented the results of expertise conclusion concerning the second issue of agenda. G. Gevorgyan mentioned that despite of some defects in work, expertised materials allowed to confirm Toukhmanuk Gold Mine Of Aragatsotn Region of Republic of Armenia, Southern, Mirak And Kotayk Region Tsitskar Areas resources with the contours and quality presented by the authors classifying Mirak and Tsitskar areas resources wholly as C<sub>2</sub> category resources.

Concerning mine geological economical assessment issue H.Hamazaspyan mentioned that mine exploitation technical economic indicators are grounded, conditions parameters content and it's counting methodology are correct and are chosen according to acting directives. H. Hamazaspyan suggested to confirm the conditions parameters for mine resources counting supported by the authors for the mine.

Concerning the **third issue of agenda** the responsible person for expertise materials H. Avetisyan summarized state geological expertise results.

H.Avetisyan mentioned that omissions and defects in report have been removed by the authors.

#### Suggested

- 1. To rename explored areas into Toukhmanuk Gold Mine Of Aragatsotn Region of Republic of Armenia, Southern, Mirak area and Kotayk Region Tsitskar gold mine.
- 2. To confirm Toukhmanuk Gold Mine Of Aragatsotn Region of Republic of Armenia,Southern, Mirak area and Kotayk Region Tsitskar gold mine conditions parameters for resources contouring and counting edited by author (appendix 1).
- 3. To confirm Toukhmanuk Gold Mine Of Aragatsotn Region of Republic of Armenia,Southern, Mirak area and Kotayk Region Tsitskar gold mine resources as of 01.04.2016 in the borders of mine final contours and quality presented by auther, in Southern area with the categories presented by author, Mirak and Titskar areas mine resources completely attribute as C<sub>2</sub> class (appendix 5):

Summarizing discussion results H. Nazaryan put to the vote explored areas renaming, confirm Toukhmanuk Gold Mine Of Aragatsotn Region of Republic of Armenia,Southern, Mirak area and Kotayk Region Tsitskar gold mine conditions parameters and resources confirmation issues.

Vote results. for-8, against-0, abstain-1

H. Nazaryan mentioned that the appendixes presented to committee discussion are the undividable part of this protocol:

Committee Chairman	Haykaz Nazaryan
Committee Deputy Chairman	Ashot Barseghyan
Committee member	Gohar Qochinyan
Committee member	Gayane Harutyunyan
Committee member	Gevorg Hovsepyan
Committee member	Michael Suqiasyan
Committee member	Vidok Tovmasyan
Committee member	Albert Matevosyan
Committee Executive Secretary	Anush Petrosyan

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About geological survey results of Toukhmanuk Gold Mine Of Aragatsotn Region of Republic of Armenia, Southern, Mirak And Kotayk Region Tsitskar Areas with conditions parameters technical economic base and resources calculation Report as of 01.04.2016.

With the aim of strengthening and expanding the resource potential of Aragatsotn and Kotayk regions mine areas and Toukhmanuk MEP impact zone complex geological survey explorations of mine field and surrounding areas have been done since 2001.

Either Toukhmanuk gold mine "central" area resources, which are being exploited from 2004, or mine surrounding areas and other occurrences of mining field have been explored during years, geological study of the works of which started back in the geological department of the Armenian SSR.

Kotayk Region Hankavan mining field western part gold mining occurrences are included in geological exploration works from the sight of administrative separation of RA geological and structural features of which are a number of the Toukhmanuk mining field occurrences analogs and their ore can be processed and enriched in constructed mining plant by the same technology of enrichment. This is the main reason why some occurrences of Hankavan mining field (except copper and molybdenum occurrences) attributed to Toukhmanuk mineral field occurrences. Based on this the areas, occurrences and mines existing in this Report have been presented as Toukhmanuk mining field parts during Mining Rights documents formatting process.

This report was formed by the results of work implementation provided by the work project of subsoil geological exploration mine exploitation agreement for mine exploitation permit number b之ゆ 29/136 issued on July 2, 2012 by the agenda of implementation of occurrences geological survey works and areas with possible industrial importance in the zone of affection of active mine enrichment plant and Toukhmanuk mine area of Aragatsotn region of RA.

Geological exploration work has been carried out in Tukhmanuk gold mine "South" area (No. 5 vein zone), in Mirak, Vanatun, Lusagyugh, Bacatlich, Voskedzor, Tsitskar, Talma and Melik Gyugh areas. In addition to this, the search included other parts of the known mineralized area and mineralogical points also.

The works were carried out in 1:10000 scale survey routes crossing through superficial mountain openings and surface pipe drilling. The most perspective occurrences have been explored. Fund materials are collected and analyzed.

Gold and polymetallic mineralization mineral zones and vein surfaces with mountain hollows, bore holes are explored in mining field and company influence zone as a result. This ore bodies are calculated as C<sub>1</sub> and C<sub>2</sub> category resources and estimated as P1 category forecasting resources. Technical economic evaluation has been done which becomes the base of acting company indicators. The areas industrial importance is confirmed as a result. Toukhmanuk mining field and company influence zone territory given for exploration attracts more than 5380 hectares covering the areas east and north-east from Toukhmanuk mine.

Exploration territory specifically includes Kasakh and Marmarik rivers watershed areas including Hankavan mine field western area. In terms of the total study area is located in the north-western slope of the mountain range Tsaghkunyats.

Starting in 1983, by an expedition group of the Geological Department, in Mirak-Toukhmanuk gold occurrence aeas survey-evaluation works have been done intended to gold quartz-sulphide zones mapping and study.

In Touhkmanuk mining field geological structure are existing upper proteroz metamorphic complex, upper-lower chalk, neogen and quaternary age volcanic, sedimentary and volcanic rocks and sedimentary formations which are torn by the lower and upper chalk and acid composition of medium height and subvolcanic intrusive formations.

The studied area, under the name of Toukhmanuk mineral field, is the northwestern part of Tsaghkunyats anticlinoria. Tsaghkunyats anticlinoria is one of the most complex structures Transcaucasia. It's situated in Bazum-Zangezur intense corrugated tectonic zone fully occupying contemporary Tsaghkunyats Ridge area. It is divided from north located Sevan-Shirak sinclinoria by Marmarik deep rupture. Anticlinoria's southern and south-western boundaries, respectively, Yerevan oregon moles concavity and Kasakh (Aparan) newest rupture-sinclinoria are also tectonic (Bjni Arzakan-Buzhakan-Gegharot). Thus, Tsaghkunyats anticlinoria is being bordered by abyssal fractures from three sides and in fact, represents a real horstanticlinoria.

There are two solid large gaps in Toukhmanuk mining field- Lusaghyugh and Hankavan as Kotlyar showed. On Aghamalyan's map are shown some large gaps also which according to the author are fixing Aparan series supposed 3 layer group borders. East from Melikgyugh, Lusagyugh rupture is connecting by sharp angle with Hankavan rupture north-western continuation in North. In eastern part Hankavan rapture is the border of transform complex separated in the North and Hankavan intrusive quartz diorites in South, till Toukhmanuk gold mine continuing through metamorphic complex.

Some areas are separated in Toukhmanuk mining fileld that structurally belong to the same tectonic structures. They are alike from the sight of metal emergence, mine emergence and mine accumulation and are the reason of the same metal emergence genetic processes. In initial phase of exploration of these mining occurrences and mineralized areas were considered as single Toukhmanuk mining field occurrences due to their uniform structural feature.

Mineralization of this occurrences are enclosed in upper chalk tectonic formations and upper proteros plagiogranites which are torn by rhyolite porphyries, granodiorit porphyrins dyke complex rocks and shtock bodies. The last phase of inset of intrusive bodies was accompanied by intense hydrothermal metasomaphic changes forming in them and enclosing rocks argil, beresite, propylitic and quartz-sericite metasomatik and altered rocks crowns. In many areas of magmatic insets and exocytosis parts are formed broken rocks parts which were cemented by hydrothermal quartz-carbonate cement composition and consists gold- polymetallic mineralization.

Either in Toukhmanuk mine or within occurrences other veins of mining field mineralization is presented by quartz-carbonate-gold mining type and veins he structural features of which are conditioned by tectonic medium and small gaps in rocks. Mineralization basically is localized with tectonic gaps and bretch zones, but mineral columns are recorded in different directions and kinds gaps connecting areas.

Mineral field rocks are characterized with intensively expressed isocheimal and allochemical modifications which have been occurred during different periods and processes of geological history.

Area's rocks metamorphic and metasomatic modifications are genetically connected with regional metamorphism, auto metamorphism, contactmetamorphism, hydrothermal metamorphism and nearmining metasomatic modifications.

During the geological survey works provided by the company in the mining field occurrences exploration stage had been the target goal to implement the evaluation of previous years geological explorations and discovered quartz-sulphide veins and mining zones through crossing mountain openings from surface and drill holes drilling conjunction with 1:10000 scale search routes. The challenge was to get the new data compression through chain compression, to perform ore bodies connections either by depth or by separation.To accomplish resources calculation.

With the results of previous works is proven the noble metal existence in metasomatic modification zones which became a base for survey works implementation in occurrences field. Geological exploration works within occurrences have been implemented through ditches, clearings mechanicalcolumn drilling, documentation and sampling of geological routes.

Ore bodies mineralogical composition, their structural- textural feature, the exploration of minerals paragenetic associations' age relationship allows to differentiate quartz pyrite-chalcopyrite, gold-pyrite-arsenopyrite, gold-polymetallic,

antimony and quartz-carbonate mineralization paragenetic associations which are correspond to the individual phases of mineralization.

	Hypogenor	us minerals		
Minerals prevalence	mineral	non mineral	Hypergenous minerals	
The main minerals	Pyrite arsenopyrite galen sphalerite chalcopyrite tennantite tetraedrite congenital gold	quartz chalcedony calcite anchorite kheritsite chlorite kaolinite epidot opalite	limonite bornite koveline khalkozine	
secondary	Magnetite markazite antimonite bulanzherit retile	rodokhrozit manganokaltsit	Ceresit amitosis anglesite	
rare	molybdenyt burnonite tetradimite vismutin telurobismutite krenerite kalaverite Altaic hesit	dolomite Adulyan gypsum	malachite azurite	

Toukhmanuk mine field ore bodies mineral compound

#### Toukhmanuk mine "Southern" area

#### (fifth mine zone)

Toukhmanuk gold mine is situated in the coupling loop of Hankavan-Bjni-Gegharot breaches. The minerals that form the mine are presented with middle jurassic hydrothermal altered volcanic origin torn by medium and small sized stock chalk age granodiorite compound bodies.

Mine volcanic minerals are presented with andesites, andesite dacite and with their pyroclassic fire stump base individual fragments. Effusive and intrusive minerals are torn with post neo Neocom age subvolcanic and dyke young formations presented with quartz porphyrites, diorit-porphyrites and gabro-diabaz composition of rocks.

Tectonic zones and gaps surrounding areas are subjected to strong hydrothermal rocks and metasomatik modifications. Hydrothermal modified zones are generally associated with north-western direction cracks. There are areas also near Meridian and western extension modified areas. Hydrothermal altered minerals have no any lithological connection with certain minerals. Being the result of area development last stages such modifications are common to all types of minerals.

Touhkmanuk gold mine bodies placement elements predetermined by the morphology of gaps and cracked areas. It has near crossing (equatorial) in north-western area, south-western sharp decline of 70-85 ° angle with mine environing crack building characterizing. The veins power is reaching 0.8-1.5 m, in swells-3.0m. They are characterized by a very inhomogeneous mineralization. Quartz-sulphide veins intermittently persecuted for several hundred meters, some of which stretch over 1000 meters.

From the sight of geological structure complexity degree the area belongs to the 3rd group.

Mineralization is located about 1 km square area. It has presented 4 vein bodies. 5/1, 5/3 and 5/4 mineral bodies are the separated apophyses of 5/2 mineral vein by their geological structure conditioned with tectonic disruption coulisse lift-off structure formation during formation period. All 4 mineral apophyses have vertical slide marks conditioned with slide mirror surface and tectonic clays formed during the slide process. Tectonic clays are dark, with black minerals in plenty of sections, absorbed mineral pyrite, rare chalcopyrite and Galen minerals and thicker mineral aggregates. All mineral bodies have sharp approximately vertical drop corners.

For the implementation of survey works the ditches and drilled wells have passed by 13 survey cuts located with 80-110m distance from each other.

Mineral bodies are examined up to 150 meters in length streams by spreading and 100-120 m depth by angle with 200 m length of wells.

Mining bodies connection and contouring according to mining minerals proliferation survey cuttings was implemented by gold and silver sampling results only in geological frames. Copper-polymetallic mineralization within ore bodies represented by separate subtle vein and rare rash inclusion which have no any industrial importance.

Mineralization is presented by pyrite, rare chalcopyrite and galen nests and separate inclusions. Its sizes ranges from 03-05mm, rarely reach 0.8-1.5 mm. Mining bodies are generally oxidized in surface but are retaining residual iron oxides conditioned compounds. Fully oxidized ore bodies depth is 2-3 m. Then the degree of oxidation of minerals and rocks are weakened sharply, but it should be noted that in mining veins of drill wells even with the depth of 40-50 m are noticed iron oxide traces.

Ore bodies are explored in depth through 34 oblique 65-85<sup>o</sup> drill wells. The mineralization by depth of the ore bodies are presented by fresh unmodified sylphide primary minerals (pyrite, rare chalcopyrite and Galen) inclusions. Mining bodies localization and formation specifications are caused by tectonic breaches format. This was caused mining bodies contouring specifications also due to which mineral bodies are contoured in geological circumstances, repeating the contours of tectonic breaches. The calculation of useful components enclosed in mining bodies have been done in geological circumstances and is not applied gold contour concentration because of silver law industrial importance.

#### Mirak area

Mirak area is placed south-west from Toukhmanuk mining field. It's located 2.5-3 km north-east from Mirak village.

Mineralization is enclosed in Mirak intrusion quartz diorites and Aparan layer group basalt-andesite basalt lavas and tuff breccia.

Hydrothermal modified zones (10-15m) are controlled with north-eastern gaps along which rocks are severely broken, modified and filled with quartz-carbonate quartz-mineral mineral veins and little veins. Veins are about 100-120m in length and up to 0.3-0.6 m capacity, decline in the southeast corner of 60-80<sup>o</sup>. Little veins capacity is not exceeding 2-3sm. Mineral bodies contact with lateral rocks is sharp, sometimes conditioned with the presence of clays. Gradual transitions are also observed.

By the results of geological survey works only 1 mineral body has industrial importance which is presented with north-eastern spreading and south-eastern 60<sup>o</sup> declined tectonic disruption structure. It's characterized with clearly contacts, in the laying rib of which exists a mirror slide and the hanging rib is characterized by intensive broken and clay quartz-carbonate las cemented substances, 1-1.5 m capacity varying degrees mineralized rocks. According to the ditches data tectonic fault rupture has a lift-off of 1-3 m vertical deviation amplitude.

Other tectonic buildings exiting in the area have alike structure but are differing from 1 mineral body with law mineralization and don't have industrial importance.

#### Tsitskar area

Tsitskar area is located in the south-western part of mining field, south-east from Lusagyugh marble mine in the distance of 0.9 km.

Hydrothermally modified granitoid intrusive rocks granosienits, adamelites and granodiorites are exiting in geological structure of the area.

Second-order slide feature north-eastern and north-western spreading tectonic gaps are denominated in eastern part of Tsitskar area. The largest gap zone of area stretches Tsitskar-Ttujur-Sarnaghbyur line. Tsitskar-Ttujur-Sanraghbyur line minerals with more than 100-150m capacity are broken and mineralized by pyrite. This fact is mentioned in previously drilled wells deep horizons. Granodiorites mineralized with pyrite have been found in 300-400m depth. The same fact is mentioned in vertical direction more than 200m depth mountain hollows. In more than 300m capacity hydrothermally modified minerals area are evident 100m capacity brekched and broken rocks presented with quartz-sericite and malonate metasomatites.

In the surface minerals are impregnated with iron oxides, quartz and quartzsulphide veins with small capacity (1-2sm-02-0.4 m capacity). There are definite contacts with lateral minerals with clays existence.

North-western spreading quartz-sulphide vein chalcopyrite, antimonite and arsenopyrite mineralization is documented in eastern area. Such mineralization is typical for eastern ridge and beyond its borders in Marmarik estuary parts, where there are many old mountain cuttings.

0.3-0.8m capacity quartz bodies, pyrite galen and sphalerite subtle vein and inclusions have been chased in surface mountain openings of Tsitskar area modified minerals. The bodies have north-eastern spreading og 60-70°. Due to tectonic gaps the spreading is being modified in The East. Quartz bodies are spreading in distances of 50-60 m.

From the sight of geological structure complexity, the area belongs to the 3rd group.

Due to mining and mineral enrichment works in Toukhmanik gold mine material composition and quality quite deep and comprehensive characteristics have been given. The mining enrichment technologies are developed in "Lernametalurgiayi Istitute" CJSC technology laboratory. As a result, the liability and productivity of developed enrichment technologies are reflected in Toukhmauk mine central area ore enrichment results.

#### "Southern" Area

Choosing areas resources calculation methodology mining bodies geological, morphological and structural feature has taken into account. As a result the resources have been contoured and calculated in all mining veins in geological borders.

The mine was explored by surface mountain recesses and column drilling oblique wells cross type to spreading of mining bodies and almost parallel to each other.

Considering the morphological features of the exploration method and nodules geological block calculation method in vertical cuts was adopted, implementing mineralized areas contouring on longitudinal incisions according to obtained information.

Survey chain concentration formed with wells in mine allows to contour the resources by C<sub>1</sub> and C<sub>2</sub> category.

Resources calculation has been implemented in 5/4, 5/3 and 5/1 bodies in which gold and silver resources were calculated.

Following conditions parameters are confirmed for mining bodies resources calculation.

- Contouring of mining bodies by capacity in geological borders
- Gold minimum content in marginal facet is accepted 0.1 g/t
- Gold minimum industrial content in counting block accepted 1.6g/t
- The resources calculation process attended mining body minimum capacity is accepted 1.0m, in the case of less capacity but gold high concentration must be used appropriate metagramms.

The contouring and calculation of resources have been implemented with longitudinal incisions projected in mining bodies vertical plane by the methodology of geological blocks (graph appendix 7). Mining bodies are characterizing with different degree of exploration. Explored resources have been assessed as C<sub>1</sub> and C<sub>2</sub> category conditioned by exploration chain density. Also, P<sub>1</sub> category forecasthuq resources are assessed.

Resources calculation works results are proving the economical high potential of mine.

Southern area ore and metals resources calculation by mineral bodies and calculation blocks

	Mining body		Mine body		Mineral body		Ore resources,	Metals c	content	Metals r	resources
numbers and	capacity, m	vertical	falling	surface (S2), 2		t/m <sup>3</sup>	t	1		Ţ	
resources category	1	plane (S1)	angle,	m	block, m <sup>3</sup>	1		Au	Ag	Au	Ag
	1	m <sup>2</sup>	degree		·   ·	1		<b> </b>		·'	+'
					 			g/t	g/t	kg	t
1	2	3	4	5	6	7	8	9	10	11	12
					vein 5/4						; 
Block 5/4-1-C2	2.36	11148	75	11542	27238.10	2.84	77356.20	4.56	11.75	352.52	0.91
Block 5/4-2-C2	2.53	19228	75	19907	50364.26	2.84	143034.50	4.88	11.36	697.86	1.62
Block 5/4'-3-C2	2.07	38328	75	39681	82288.74	2.84	233700.01	4.88	10.47	1139.90	2.45
Block 5/4-4-C2	1.73	17473	75	18090	31295.47	2.84	88879.12	3.62	7.50	321.98	0.67
Block 5/4-5-C2	1.64	3488	75	3611	5922.27	2.84	16819.25	4.01	9.30	67.47	0.16
Block 5/4-1-P1	2.18	131832	75	136486	298085.81	2.84	846563.71	3.23	7.27	2731.31	6.15
Total C2		, 	· '		· ,		559789.08	4.61	10.37	2579.74	5.80
Total C2+ P1		,   ,	'		· ,		1406352.79	3.78	8.50	5311.05	11.95
					vein 5/3						
Block 5/3-1-C2	2.36	5896	80	5987	14099.4	2.84	40042.27	4.71	10.02	188.71	0.40
Block 5/3-2-C2	2.06	26735	80	27148	55807.8	2.84	158494.15	3.81	8.16	603.13	1.29
Block 5/3-3-C2	2.15	20524	80	20841	44859.8	2.84	127401.77	3.83	8.08	488.44	1.03
Block 5/3-4-C2	2.40	17205	80	17471	41929.3	2.84	119079.29	4.48	9.86	533.27	1.17
Block 5/3-5-C2	1.72	34688	80	35223	60584.2	2.84	172059.24	4.01	8.72	690.55	1.50
Block 5/3-1-P1	2.14	169444	80	172059	367629.3	2.84	1044067.15	2.88	6.21	3005.18	6.48
Total C2					,		617076.72	4.06	8.75	2504.11	5.40
Total C2+ P1	1				,		1661143.87	3.32	7.15	5509.29	11.88
	ıt		· · · · · · · · · · · · · · · · · · ·		· [ '					· ,	

				vein 5/1						
2.27	43608	80	44281	100628.74	2.84	285785.61	6.99	13.17	1997.83	3.76
1.33	27445	80	27869	37090.58	2.84	105337.24	5.88	11.23	619.15	1.18
2.47	15555	80	15795	38950.68	2.84	110619.93	5.21	11.55	576.25	1.28
1.78	56254	80	57122	101791.86	2.84	289088.89	5.13	11.53	1483.93	3.33
1.15	24256	80	24630	28283.89	2.84	80326.24	5.85	11.44	469.71	0.92
1.77	120344	80	122201	216296.59	2.84	614282.31	3.69	8.06	2266.36	4.95
						391122.85	6.69	12.65	2616.98	4.95
						480035.07	5.27	11.52	2529.89	5.53
						871157.92	5.91	12.03	5146.86	10.48
						1485440.23	4.99	10.39	7413.22	15.43
			Tota	l in Southern	Area					
						391122.85	6.69	12.65	2616.98	4.95
						1656900.8	4.60	10.10	7613.74	16.73
						2048023.7	5.00	10.59	10230.71	21.68
						2504913.1	3.19	7.02	8002.84	17.59
	1.33 2.47 1.78 1.15	1.33274452.47155551.78562541.1524256	1.3327445802.4715555801.7856254801.152425680	1.33   27445   80   27869     2.47   15555   80   15795     1.78   56254   80   57122     1.15   24256   80   24630     1.77   120344   80   122201	2.27436088044281100628.741.3327445802786937090.582.4715555801579538950.681.78562548057122101791.861.1524256802463028283.891.7712034480122201216296.591.151.151.151.151.151.151.151.151.151.151.171.1203441.151.151.171.1203441.151.151.171.151.151.151.171.151.151.171.151.151.171.1203441.151.171.151.151.171	2.27436088044281100628.742.841.3327445802786937090.582.842.4715555801579538950.682.841.78562548057122101791.862.841.1524256802463028283.892.84	2.27436088044281100628.742.84285785.611.3327445802786937090.582.84105337.242.4715555801579538950.682.84110619.931.78562548057122101791.862.84289088.891.1524256802463028283.892.8480326.241.7712034480122201216296.592.84614282.31391122.85871157.92391122.85391122.85391122.85 <t< td=""><td>2.27   43608   80   44281   100628.74   2.84   285785.61   6.99     1.33   27445   80   27869   37090.58   2.84   105337.24   5.88     2.47   15555   80   15795   38950.68   2.84   110619.93   5.21     1.78   56254   80   57122   101791.86   2.84   289088.89   5.13     1.15   24256   80   24630   28283.89   2.84   80326.24   5.85     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69     1.77   120345   6.69   1485040.23   4.99   1485440.23&lt;</td><td>2.27   43608   80   44281   100628.74   2.84   285785.61   6.99   13.17     1.33   27445   80   27869   37090.58   2.84   105337.24   5.88   11.23     2.47   15555   80   15795   38950.68   2.84   110619.93   5.21   11.55     1.78   56254   80   57122   101791.86   2.84   289088.89   5.13   11.53     1.15   24256   80   24630   28283.89   2.84   80326.24   5.85   11.44     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69   8.06     1.15   24256   80   12201   216296.59   2.84   614282.31   3.69   8.06     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69   8.06     1.65   12031   145240.23   4.99   12.65   11.52     1.6   1   1   1   1485440.23   4.99   10.39     1.65   1   <t< td=""><td>2.27   43608   80   44281   100628.74   2.84   285785.61   6.99   13.17   1997.83     1.33   27445   80   27869   37090.58   2.84   105337.24   5.88   11.23   619.15     2.47   15555   80   15795   38950.68   2.84   110619.93   5.21   11.55   576.25     1.78   56254   80   57122   101791.86   2.84   289088.89   5.13   11.53   1483.93     1.15   24256   80   24630   28283.89   2.84   80326.24   5.85   11.44   469.71     1.77   120344   80   12201   216296.59   2.84   614282.31   3.69   8.06   2266.36     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69   12.65   2616.98     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69   12.65   2616.98     1.77   120344   80   12201   116296.59   2.84   614282.31   3.9</td></t<></td></t<>	2.27   43608   80   44281   100628.74   2.84   285785.61   6.99     1.33   27445   80   27869   37090.58   2.84   105337.24   5.88     2.47   15555   80   15795   38950.68   2.84   110619.93   5.21     1.78   56254   80   57122   101791.86   2.84   289088.89   5.13     1.15   24256   80   24630   28283.89   2.84   80326.24   5.85     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69     1.77   120345   6.69   1485040.23   4.99   1485440.23<	2.27   43608   80   44281   100628.74   2.84   285785.61   6.99   13.17     1.33   27445   80   27869   37090.58   2.84   105337.24   5.88   11.23     2.47   15555   80   15795   38950.68   2.84   110619.93   5.21   11.55     1.78   56254   80   57122   101791.86   2.84   289088.89   5.13   11.53     1.15   24256   80   24630   28283.89   2.84   80326.24   5.85   11.44     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69   8.06     1.15   24256   80   12201   216296.59   2.84   614282.31   3.69   8.06     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69   8.06     1.65   12031   145240.23   4.99   12.65   11.52     1.6   1   1   1   1485440.23   4.99   10.39     1.65   1 <t< td=""><td>2.27   43608   80   44281   100628.74   2.84   285785.61   6.99   13.17   1997.83     1.33   27445   80   27869   37090.58   2.84   105337.24   5.88   11.23   619.15     2.47   15555   80   15795   38950.68   2.84   110619.93   5.21   11.55   576.25     1.78   56254   80   57122   101791.86   2.84   289088.89   5.13   11.53   1483.93     1.15   24256   80   24630   28283.89   2.84   80326.24   5.85   11.44   469.71     1.77   120344   80   12201   216296.59   2.84   614282.31   3.69   8.06   2266.36     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69   12.65   2616.98     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69   12.65   2616.98     1.77   120344   80   12201   116296.59   2.84   614282.31   3.9</td></t<>	2.27   43608   80   44281   100628.74   2.84   285785.61   6.99   13.17   1997.83     1.33   27445   80   27869   37090.58   2.84   105337.24   5.88   11.23   619.15     2.47   15555   80   15795   38950.68   2.84   110619.93   5.21   11.55   576.25     1.78   56254   80   57122   101791.86   2.84   289088.89   5.13   11.53   1483.93     1.15   24256   80   24630   28283.89   2.84   80326.24   5.85   11.44   469.71     1.77   120344   80   12201   216296.59   2.84   614282.31   3.69   8.06   2266.36     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69   12.65   2616.98     1.77   120344   80   122201   216296.59   2.84   614282.31   3.69   12.65   2616.98     1.77   120344   80   12201   116296.59   2.84   614282.31   3.9

#### Mirak Area

Resources calculation has been implemented with 1 mineral body in which gold and silver resources are calculated.

Resources contouring and calculation has been implemented with longitudinal incision projected in vertical plane by the method of geological blocks (graph appendix 10). Area's mineral body is characterized by relatively homogeneous degree and explored resources are evaluated as C 1 and C2 categories conditioned by exploration chain factual homogeneous concentration. The intensity decreased by depth according to data obtained from drilling operations. This fact practically is limiting the mineral body industrial importance and resource potential.

No. 1 mineral vein extends to about 600 m northeast with  $40^{\circ}$  azimuth, falls in southwest with  $60^{\circ}$  angle. Due to this mineral body exploration degree the resources have been calculation with C<sub>1</sub> and C<sub>2</sub> category.

Calculation	Mining	Surface in	Mine body	The real	Mineral	Ore mass	Ore	Metals c	ontent	Metals re	sources
blocks	body	vertical	falling	surface (S2), 2	body	t/m <sup>3</sup>	resources, t				
numbers and	capacit	plane (S1)	angle,	m	volume in						
resources	y, m	$m^2$	degree		block, m <sup>3</sup>						-
category								Au	Ag	Au	Ag
								g/t	g/t	kg	t
1	2	3	4	5	6	7	8	9	10	11	12
					Vein 1						
Block 1-C1	1.30	8014	60	9254	12061.05	2.73	32926.66	3.31	9.42	108.86	0.31
Block 2-C1	1.34	9278	60	10713	14355.42	2.73	39190.30	3.75	8.41	146.93	0.33
Block 1-C2	1.57	4507	60	5204	8157.27	2.73	22269.35	2.13	11.22	47.46	0.25
Block 2-C2	1.42	30280	60	34965	49795.99	2.73	135943.05	2.78	8.42	377.84	1.15
Block 3-C2	1.67	21885	60	25271	42094.3	2.73	114917.35	3.10	9.00	356.08	1.03
					Total M	lirak area 1	vein				
C1							72117.0	3.55	8.87	255.79	0.64
C2							273129.7	2.86	8.89	781.39	2.43
C1+C2							345246.7	3.00	8.89	1037.17	3.07

Mirak area ore and metals resources calculation by mineral bodies and calculation blocks

#### Tsitskar area

Choosing the methodology of resources calculation in 1 and 1 ap mineral bodies structural and beneficial components localization geological feature is taken into account. Mineralization is enclosed in hydrothermally somatic modified granodiorite type intrusive minerals in tectonic disruption building development boundaries. Mineralization is localized within disruption broken and postmagnatic hydrothermal operation results being limited between tectonic contacts. Taking into consideration mineralization insertion and development feature, the resources have been contoured and calculated in geological boundaries.

Resources calculation has been implemented with number 1 mineral body and with number 1 ap mineral body in east in which gold and silver resources have been calculated. Resources contouring and calculation has been implemented with longitudinal incision projected in vertical plane by the method of geological blocks (graph appendix 13). Area's mineral body is characterized by relatively homogeneous degree and explored resources are evaluated as C 1 and C2 categories conditioned by exploration chain factual homogeneous concentration. Within mineral body 7 calculating blocks are contoured by exploration degree.

Tsitskar area ore and metals resources calculation by mineral bodies and calculation blocks	

Calculation blocks numbers and resources category	Mining body capacity, m	Surface in vertical plane (S1) m <sup>2</sup>	Mine body falling angle, degree	The real surface (S2), 2 m	Mineral body volume in block, m <sup>3</sup>	Ore mass t/m <sup>3</sup>	Ore resources, t	Metals c	content	Metals res	sources
	'					'		Au	Ag	Au	Ag
1								g/t	g/t	kg	t
1	2	3	4	5	6	7	8	9	10	11	12
					vein 1						
Block 1 1-C1	0,95	14809,00	70	15761,00	14950,43	2,66	39768,16	4,97	10,86	197,76	0,43
Block 1 2-C1	0,87	8790,00	70	9355,00	8115,46	2,66	21587,13	4,95	8,49	106,82	0,18
Block 1 3-C1	0,82	22818,00	70	24285,00	19981,16	2,66	53149,88	5,22	11,48	277,29	0,61
Block 1 1-C2	0,54	13829,00	70	14718,00	7947,72	2,66	21140,94	4,38	7,65	92,58	0,16
Block 1 2-C2	0,64	10202,00	70	10858,00	6927,40	2,66	18426,89	5,31	11,49	97,85	0,21
Total C1				·	,		114505,17	5,08	10,70	581,87	1,23
Total C2		<u> </u>		<u>'</u>	,		39567,83	4,81	9,44	190,42	0,37
Total C1+C2							154073,00	5,01	10,38	772,30	1,60
					vein 1 ap						
Block 1 ap 1-C1	0,55	9384,00	70	9987,00	5447,45	2,66	14490,23	4,36	9,84	63,14	0,14
Block 1 ap 1-C2	0,45	6256,00	70	6658,00	2973,91	2,66	7910,59	5,09	12,83	40,28	0,10
Total C1+C2	ı						22400,82	4,62	10,90	103,42	0,24
				Tot	tal Tsitskar ar	rea	·				
C1		<u>ا</u>		· ا			128995,40	5,00	10,61	645,02	1,37
C2		ا <u></u> ا		<u>ا</u>	;		47478,42	4,86	10,00	230,70	0,47
C1+C2	, ,	<u> </u>		<u> </u>	'		176473,82	4,96	10,44	875,71	1,84

Further prospective areas and occurrences research is largely conditioned with more advanced and less stringent and safe environmental technologies development and introduction. Company upcoming projects will give an opportunity to make researches in other mining areas and already explored occurrences areas and deep horizons.

The gold occurrences explored in the area basically are characterized with middle and law gold and silver concentration within 0.5-3.0 g/t. Occurrences samples explored during years with recorded 10 g/t and higher concentration have been attributed to "gold accidental seed" impact. This is the reason why company aims to invest the hydrometallurgical technology of extraction metals from poor ore.

In general the area total mineral resource potential is estimated at more than 40 tons of gold. Theoretically the investment of such technologies will give an opportunity to extract law concentration copper, lead, zinc and other metals from ore which have no industrial importance currently and are not calculated in resources.

Toukhmanuk mine "Southern" area 5 vein zone mineral bodies structural feature, installation conditions, exploration methodology and exploration degree predetermined conditions parameters following compound.

- 1. To contour and implement the calculation in mining veins geological boundaries.
- 2. To accept resources calculation mineral body minimum capacity as 1.0 m, in the case of lower capacity use metrogramms.
- 3. Gold minimum concentration in marginal facet is 0.1 g/t.
- 4. Gold minimum industrial concentration in calculating block is 1.6 g/t.
- 5. To implement the resources calculation within pits final contours.

# INDEPENDENT EXPERT OF MINISTRY OF ENERGY AND NATURAL RESOURCES STAFF

# STATE COMMITTEE OF RESERVES

# GAGIK GEVORGYAN

Yerevan 07, 2016 October

## EXPERTISE CONCLUSION

# ABOUT GEOLOGICAL SURVEY WORK RESULTS OF TOUKHMANUK GOLD MINE OF ARAGATSOTN REGION OF REPUBLIC OF ARMENIA, SOUTHERN, MIRAK AND KOTAYK REGION TSITSKAR AREAS WITH CONDITIONS PARAMETRES TECHNICAL ECONOMICAL BASE AND STATE SUBSOIL EXPERTISE RESULTS OF CALCULATION OF RESERVES MINERALS AS OF 01.04.2016

According to the Employment Agreement signed with the chief of stuff of Ministry of Energy and Natural Resources in this expertise conclusion includes the provisions of report which matches the following issues proposed by Mineral Resources Agency.

## 1. About the Mine and Mine Area geological structure

Mining area geological structure is based on 1:10000 map prepared by V. Aghamalyan (1987) and is accepted for changes. The area geological structure is investigated deeply and does not contradict the geological structure of the area.

#### 2. About the Mine (area) investigation methods and dimensions

The geological survey works in Toukhmanuk mining field Southern, Mirak and Tsitskar areas have been implemented since 2007. Within mining area occurrences veins and mining zones evaluation has been implemented in the base of previous year's explorations. In order to calculate the resources the ditches column drilling, geological documentation methods have been used. The geological survey works have been projected to implement according to "Инструкция по применению классификации запасов к золоторудным месторождениям" directive's recommendations according to which mining field occurrences are evaluated as 2-rd category from the sight of complexity.

The implemented works in areas give reliable information about the occurrences inner structure and metal concentration and provides areas reserves realistic evaluation. Implemented analyzing researches and its geological control has been done due to acting HCAM method.

## *3. About the mineral quality technology feature*

The mineralization by mineral bodies is presented by fresh not modified sulphide primary minerals (pyrite, rare chalcopyrite and galen) inclusions.

Mirak area mineralization is enclosed in Mirak intrusive quartz diorites and Aparan streak group basalt andesite basalt tuff breckches.

Hydrothermally modified zones (10-15m) are under control of north-eastern gaps, across which minerals are too broken and modified and full of quartz-carbonate-mining and quartz-mining veins and law veins.

In Tsitskar area modified minerals exists 0.3-0.8m capacity quartz bodies. Mining enrichment technologies are developed by "Lenrnametalurgiayi Institute" CJSC laboratory. As a result, the liability and productivity of developed enrichment technologies are reflected in Toukhmauk mine central area ore enrichment results. Thus, high gold ramp is predicted.

Mentioned quality technology characteristics do not raise objections. Additional laboratory and technological researches are needed in Mirak and Tsitskar areas for ore research.

# 4. About mine exploitation natural conditions (hydro, engineer geological, geotechnical, environmental)

During area surveying hydro geological, engineer geological, geotechnical conditions research was implemented. Aquatic horizons, flows mode have been explored. Physical mechanical comparison indicators of minerals are determined. Mining inclusive minerals stability and infiltration feature, its evaluation during exploiting process is evaluated. Hydro geological monitoring is implemented for aqua quantity and quality assessment. The implemented researches are enough for mine resources evaluation and calculation. It's taken into consideration that mine underground quarrying is influencing negatively the environment like empty rock dumps, flowing of underground and surface waters in pools and ect.

5. About the resources contouring validness and calculations liability Southern area (5 mining zone)

Choosing Toukhmanuk mine <<Southern area>> mineral resources calculating methodology mining bodies exploration degree, contact validness between surveying

lines, spreading azimuth towards each other, falling angle have been taken into consideration.

According to surveying method and mineral bodies morphology feature, the method of geological block calculating in vertical cuttings is accepted which is completely acceptable.

The resources calculating by 1 mine body in Mirak area are classified as  $C_1$  and  $C_2$  categories. Within 2 blocks of C1 category spreading exploration chain concentration is 95-100m which is appropriate to  $C_2$  category. Therefore, blocks resources (block 1- $C_1$ , block 2-  $C_2$ ) should be attribute to  $C_2$  category.

In Tsitskar area 1 and C2 categories resources are calculated. In upper horizon 1-2-C blocks drilled part's drill holes distance from each other by spreading is 100m, which is appropriate to C2 category resources chain. It's advisable to attribute C1 category blocks resources to C2 category also because of incomplete technological exploration degree.

6. About the converging of expertise and stock materials geological information The stock materials studying by me showed the accordance of report geological information to stock materials.

Summarizing abovementioned I am suggesting to confirm Geological Survey Work Results of Toukhmanuk Gold Mine of Aragatsotn Region of Republic of Armenia, Southern, Mirak and Kotayk Region Tsitskar Areas with Conditions Parametres Technical Economical Base and State Subsoil Expertise Results of Calculation of Reserves Minerals as of 01.04.2016 report with the contours and quality presented by authors classifying Mirak and Titskar area resources wholly as C<sub>2</sub> category.

Independent expert of Mineral Resources Agency, RA Gagik Gevorgyan

# INDEPENDENT EXPERT OF MINISTRY OF ENERGY AND NATURAL RESOURCES STAFF

## STATE COMMITTEE OF RESERVES

# HAMLET HAMAZASPYAN

## EXPERTISE CONCLUSION

# ABOUT GEOLOGICAL SURVEY WORK RESULTS OF TOUKHMANUK GOLD MINE OF ARAGATSOTN REGION OF REPUBLIC OF ARMENIA, SOUTHERN, MIRAK AND KOTAYK REGION TSITSKAR AREAS WITH CONDITIONS PARAMETRES TECHNICAL ECONOMICAL BASE AND STATE SUBSOIL EXPERTISE RESULTS OF CALCULATION OF RESERVES MINERALS AS OF 01.04.2016

Resp. performer V.Vahramyan

According to the N 6-U/U Employment Agreement signed with the employer the expert commits to get acquainted with the materials, to evaluate its content and formatting conformity to acting demands, to participate with materials authors and expertise responsible person in material's work discussions, to present suggestions about the defects of material, to present the expert conclusion to Agency within a month.

The subject of expertise is Toukhmanuk mining field Souther, Mirak and Tsitskar areas resources calculation conditions parameters form and technical economical validity clarification which is composed in 1 book.

Presented work is includes all source materials in general from the view of formation and semantics which is a base to substantiate resources calculation conditions form and quantity. However, some remarks are mentioned by expert that must be taken into consideration.

According to expert heading last part must be changed to "Southern, Mirak and Tsitskar areas resources calculation with conditions parameters technical economical base and resources calculation by 01.04.2016".

As all parts of the report is the base of mine evaluation and conditions parameters proposition its expedient to touch briefly its meaning.

The chapter 1 of report is dedicated to exploration area geographical economical description. Toukhmanuk mining field localization, nearest locations, river chains and other conditions are reflected in the work. Unfortunately, there is no information in this part about Toukhmanuk mining factory. In this part schematic map is needed to make visible exploration object localization conditions.

In the chapter 2 mine geological exploration history is described which was ended in 2008, although new operations have been implemented since that.

Area geological structure, geological survey works methodology and results are posted in chapter 5. Detailed description of Southern area is posted in this section which mineral bodies with its localization conditions, mineral components are homogenous with Central area. Mirak and Tsitskar areas are described considering probably that areas are homogeneous with Southern area mineral bodies.

Ore quality technical description is important for proposition of conditions parameters which is included in chapter 6. Toukhmanuk factory technological process is described in this section which can be used for explored areas ore enrichment proceeding from material composition analogy. Acting factory technological scheme includes ore gravitation and gravitation tailings flotation. Gold recovery concentrate is 85 %.

Taking into consideration abovementioned circumstances ore processing technology can be considered as grounded.

The 7 chapter is dedicated to exploration areas hydro geological and engineer geological conditions. Area explorations and exploration results are posted in this part and the information got during exploitation also. According to report there are no aqua horizons in mine, spring thaw and rain water flows are seasonal and are leaving the area through rocks cracks. Additional drainage measures are not undertaken. Engineer geological conditions are homogeneous with Central area conditions. Additional ore volume and moisture test was done.

In the environmental protection section (chapter 8) is mentioned that appropriate environmental action is designed during Touhkmanuk mine exploitation and factory building project. In this part is needed brief description of abovementioned operations.

As for Southern area open pit mining method, its chosen correctly based on explored areas and exploiting Toukhmanuk mine Central area mining body's morphology, placement geotechnical, hydro geological comparison. However here (9.2) is needed company productivity size per year which depends on enrichment factory capacity. Open pit schematic cuttings are needed to show in the work.

In resources calculation conditions parameters quality determination base Toukhmanuk mine de facto indicator are accepted. In appropriate sections stripping border coefficient, open pit productivity per year, open mountain works technology, gold ramping are shown. Conditions parameters composition and the calculation of its variables are done appropriate to the directives demands. This qualities can be used for Mirak and Tsitskar areas resources calculation also on the base of mining bodies structure, insertion conditions, ore material composition similarity with Southern area. It should be noted that authors have taken into account the distance from enrichment factory and dumps. Due to calculations mining, transportation and processing cost of 1 t ore is not exceeding 30 \$.

There are some technical mistakes in table 10.6.1 which is pointed to work authors.

Summarizing expertise results we can tell that geological survey works in Toukhmanuk mining field should be continued. Southern, Mirak and Tsitskar areas exploitation which are already explored will be productive.

Mine exploitation open method and opening scheme is acceptable.

Ore enrichment technological scheme is accepted with the Central area analogy which can be used for processing or ore in explored areas.

Mining exploitation technical economical coefficients are grounded.

Conditions parameters composition and its calculating methodology is chosen correctly and is appropriate to directives.

For resources calculation is suggested to confirm Southern, Mirak and Tsitskar area resources calculation conditions following parameters.

- To contour mining bodies in geological boundaries
- Gold minimum concentrations in marginal facet is 1.0g/t
- Gold minimum industrial concentrations in counting block is 1.6g/t
- To accept mineral body's, included in resources calculation, minimum capacity as 1.0m, in the case of lower capacity use metragramms.
- To accept stripping borde coefficient as 24.2 t/t.

Independent expert of Mineral Resources Agency, RA Hamlet Hamazaspyan

# STATE COMMITTEE OF RESERVES

Republic of Armenia Yerevan, Aygedzor 67

# MINISTRY OF ENERGY AND NATURAL RESOURCES STAFF HEAD OFMINERAL RESOURCES AGENCY HAYKAZ NAZARYAN

Dear Mr. Nazaryan

In response to your 28.06.2016 N27.2/[78556]-16 letter, I am informing you that no restrictions were applied toward "Mego Gold" LLC 's liabilities established by State Committee of Reserved according to 02.07.2012  $\P$ -136 agreement and can't be applied till 31.12.2016 according to 30.07.2015 N 839 U resolution of Government, RA. Therefore it's not possible to provide information about company contractual obligation.

Best Regards Head of State Committee of Reserves Subsoil chief inspector

ANUSHAVAN AYVAZYAN

## FINAL CONCLUSION

# About geological survey works results in Southern, Mirak and Kotayk Region, RA, Tsitskar areas with conditions parameters technical economical base and resources calculation as if 01.04.2016 report materials state subsoils expertise results presented by "Mego Gold" LLC

Summarizing state subsoil expertise results, taking into account independent experts expertise conclusions it's concluded

- Presented report consists of 3 Books, from which Book 1- the main text- 161 pages, Book 2- text and table appendixes-159 pages, Book 3- a folder (graphic appendixes)-13 pages.
- 2. "Mego Gold" LLC geological survey works results within July 2, 2012 じえゆ 29/136 exploitation license given by Ministry of Energy and Natural Resources of the Republic of Armenia are posted in presented report.
- 3. Mine geological economical assessment with the base of conditions parameters and resources calculation presentation herewith in report in small size case does not raise any objection.
- 4. By its structure and meaning report is appropriate to acting directive documents demands, copyright notice reflects report main provisions.
- 5. According to mining bodies' morphology and feature, useful components spatial distribution regularity, geological structure degree and geological indication modification degree, observed areas attribution into geological structure 3-rd group complexity by authors is acceptable.
- Mining area geological structure is due to Aghamalyan's (1987) 1:10000 scale map which is accepted.
  Toukhmanuk gold mine explored area geological structure is revealed deeply and

does not contradict area's geological structure.

- 7. The methods of geological survey works are connected with the geological structure feature of areas and are providing resources complete quality and quantity assessment.
- 8. Minerals' furrow sampling in surface mountain scoops and extracting methods of boreholes does not generate any objection. Samplings processing (sawing, grinding, ect.) scheme does not rise for comments.

Sampling analyzes have been done in company's and "Analitic" CJSC's and chemical analyzes- in company's laboratories.

In order to detect accidental and systematic mistakes size during chemical and worth laboratory works inner and external control has been performed. External control works have been done by "Analitic" CJSC laboratory. Ordinary and inspection analyzes data are proceeding annually by concentration consolidated classes. The data show satisfactory reproduction of primary concentration analyzes. Thus, ordinary analyzes quality is satisfying for resources calculation. Ordinary and inspection analyzes comparison is demonstrating absence of systematic mistakes in ordinary analyzes.

In Toukhmanuk gold mine ore material composition more than 30 minerals are existing from which gold and silver have industrial importance.

Associated components qualities have been invested during laboratory explorations of 39 ore samples. Associated minerals resources calculation was not done based on sampling results because of non industrial law concentration in ordinary samples which is acceptable.

Area surveying scoops and appropriate natural pieces sampling has done. As a result area's ore volume and rawness has been determined.

Toukhmanuk mine ore processing (enrichment) is being implemented in company owned enrichment factory by gravitation and gravitation tailings flotation way. Gravitation and gravitation tailings flotation way using is providing 85% factual ramp of gold from ore.

Mine enrichment technologies are processed in "Lernametalurgiayi Institute" CJSC laboratory. As a result enrichment technologies liability and efficiency is stated by Toukhmanik mine "Central" area mining enrichment results.

The methodology of implemented quality technological feature exploration does not raise any objection. Additional laboratory technological research is needed for Mirak and Tsitskar are ore exploration which was mentioned independent expert G.Gevorgyan (appendix 2).

9. Hydro geological and engineer geological researches have been done in Toukhmanuk gold mine "Central" area, aquatic horizons have been explored with its surface flows quantity.

Mineral bodies ore and inclusive rocks physical mechanical characteristic has been explored. Additionally, area ore volume and rawness tests have been implemented.

10. The base for resources calculation has become the works implemented during geological surveying phase and the data received from previous phases of geological exploration. Areas have been explored by surface mountain scoops and mining bodies spreading crosswise and almost parallel oriented to each other column drilling pits sorted on survey lines.

In choosing resources calculation methodology in areas the mining bodies surveying degree, mining bodies contact liability between survey lines, the elevation towards each other, spreading azimuth, falling angle and ect. have been taken into account. Considering exploration method and mining bodies morphological feature geological blocks method on vertical cuttings has been accepted implementing contouring of mineralized areas on vertical cuttings. Surveying resources are classified as C<sub>1</sub> and C<sub>2</sub>. P category forecasting resources assessment was given also which is acceptable. In Mirak area resources calculated by 1 mining body are attributed to C<sub>1</sub> and C<sub>2</sub> category. However within C<sub>1</sub> category two blocks (Block 1- C<sub>1</sub>, Block 2- C<sub>2</sub>) survey chain consistence is 95-100m, which is appropriate to C<sub>2</sub> category resources exploration chain.

C1 and C2 category resources are calculated in Tsitskar area also. In inner horizon of Block 1-1-C1 and Block 1-2- C1 part surveyed by wells the distance between each other by spreading is 100m, which is appropriate to C2 category resources chain. Mirak and Tsitskar resources should be attributed to C2 category wholly which was told by independent expert G.Gevorgyan too (appendix 2).

11. The determination base for resources calculation conditions parameters is accepted Toukhmanuk MEP factual indicators and technical economical calculations also. Stripping boundary coefficient, open pit annual productivity, open mountain technologies, gold concentrate ramp are given in appropriate subsections. Conditions parameters compounds and its size calculation is done due to appropriate directive demands.

Conditions parameters compounds and size can be used for Mirak and Tsitskar area resources calculation also considering mining body structures, insertion conditions, ore substantial composition similarity to "Southern" area.

Areas exploitation open method and opening scheme is acceptable.

Ore enrichment technological scheme is accepted with Central MEP similarity. Resources calculating conditions parameters needed compounds and its counting sizes are appropriate to mine geological structural feature. Condition parameters compounds and bordering quantities due to chosen exploitation way suggested in report are providing ore resources definite contouring and calculation.

Following condition parameters are contemplated for mining body resources calculation

- To contour mining bodies in geological plane
- Gold minimum concentration in bordering cross section- 1.0 g/t
- Resources calculation including mining body minimum capacity- 1.0m, use metragramms for lower capacity
- Gold minimum industrial concentration in counting block- 1.6 g/t
- Stripping border coefficient-24.2 t/t
- 12. Source geological information for resources calculation is presented thoroughly. The information about mine was used without modifications by the author what was told by independent expert G.Gevorgyan (appendix 2).
- 13. There is no objection about resources contouring and recalculation process illustrating graphical materials and tablet appendixes content and formation. Area

resources calculation is implemented with computer program usage. Illustrated tablet data is appropriate to graphical materials and are easily checking.

Counting blocks contouring and resources block up principles, extrapolation usage in geologically based boundaries and resources category attribution methods are correct. The shortcomings and defects of report have been eliminated by "Mego Gold" LLC in presented edited version.

Considering abovementioned it's suggested

- 1. To rename explored areas as Aragatsotn Region Toukhmanuk gold mine Southern and Mirak areas, RA and Kotayk Region Tsitskar gold mine, RA.
- To attribute 3-rd category complexity group the Aragatsotn Region Toukhmanuk gold mine Southern and Mirak areas, RA and Kotayk Region Tsitskar gold mine, RA by geological structure.
- To confirm Aragatsotn Region Toukhmanuk gold mine Southern and Mirak areas, RA and Kotayk Region Tsitskar gold mine, RA condition parameters following edition for resources contouring and calculation
  - To contour mining bodies in geological plane
  - Gold minimum concentration in bordering cross section- 1.0 g/t
  - Resources calculation including mining body minimum capacity- 1.0m, use metragramms for lower capacity
  - Gold minimum industrial concentration in counting block- 1.6 g/t
  - Stripping border coefficient-24.2 t/t
- 4. To confirm Aragatsotn Region Toukhmanuk gold mine Southern and Mirak areas, RA and Kotayk Region Tsitskar gold mine, RA resources as if 01.04.2016 with the quantities in open pit final contour boundaries presented by report author, with the categories in Southern area suggested by author. To attribute Mirak and Tsitskar mine resources to C<sub>2</sub> categeory wholly.

Resources	Ore resources	Metals midd	le conc.	Metals quantity						
category	Thous/t	Au g/t Ag g/t		Au kg	Ag kg					
1	2	3	4	5	6					
Aragatsotn Region Toukhmanuk gold mine Southern area, RA										
<b>C</b> <sub>1</sub>	391.12	6.69	12.65	2616.98	4.95					
C <sub>2</sub>	1656.90	4.60	10.10	7613.74	16.73					
$C_1+C_2$	2048.02	5.00	10.59	10230.72	21.68					
	Aragatsotn Regi	on Toukhmar	nuk gold mine M	irak area, RA	1					
C2	345.25	3.00	8.89	1037.17	3.07					
	Kotayk Region Tsitskar area, RA									
C2	176.47	4.96	10.44	875.72	1.84					

- 5. To state that Aragatsotn Region Toukhmanuk gold mine Southern and Mirak areas, RA and Kotayk Region Tsitskar gold mine, RA resources potential is not exhausted with the resources confirmed by conclusion 3-rd point. By existing geological information there is increasing opportunity due to deep horizons exploration and according to author realistic assessment ore 2.5 million t. gold and silver and accordingly 8.0 and 17.6 t P1 category forecasting resources are expected.
- 6. To concentrate soil manager attention to following
  - 1) additional exploration is needed for mining bodies resourcing potential assessment
  - it's risky to begin exploitation process with exploration low degree characterized small scaled C1 category resources existence and in non completely assessed ore technological feature conditions.
- To suggest MINISTRY OF ENERGY AND NATURAL RESOURCES, RA staff State Committee of Reserves implement geological information validity confirmation operation presented by "Mego Gold" LLC for state subsoil expertise.
- To suggest MINISTRY OF ENERGY AND NATURAL RESOURCES "Republican Geological Fund" SNCO, RA to register in state balance confirmed resources by 4rd point of this conclusion.

Mineral resources counting materials

Expertise department head,

Materials expertise responsible

#### H.Avetisyan

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Annotation- State subsoil expertise N 6 conclusion package is consist of 44 pages

All the pages of conclusion package are numbered and signed by agency stamp

Agency head

H.Nazaryan

Responsible for materials expertise

H.Avetisyan

November 8, 2016