TECHNICAL – ECONOMIC STUDY AND EXPLOITATION PROJECT

OF THE MARBLE STONES

Technical – Economic Study and Exploitation Project of the marble stones

Object "Qafe Shtame" – Mat (Albania)

Tirana, March 200

Topographic map of the area
(Requested for Exploitation permit)
Scale 1 : 25 000

Corners	Northing	Easting
1	45 99 951	44 09 030
2	46 00 022	44 09 000
3	46 00 080	44 09 069
4	46 00 100	44 09 191

5	**45 99 960**	**44 09 100**

Total area = 0.015 km^2

Content

4.3. Social objects
4.4. Power supply and phone
4.5. Other objects

5. Economic part

5.1. Forecasted investments
5.2. Investments in roads, platforms and arrangements
5.3. Investments in industrial buildings
5.4. Investments in social buildings
5.5. Investments in equipments and technology
5.6. Calculation of the cost of production up to saleable product
5.7. Market prices. Marketing of the product, etc.
5.8. DCF for the entire duration of the quarry

6. Conclusions and recommendations

7. Data on the identification of the impact on the environment during the object development and exploitation

7.1. Loss of meadows
7.2. Loss of land slope
7.3. Land pollution from flows
7.4. Land contamination by wastes
7.5. Land contamination by muds
7.6. Erosion during the object development and exploitation
7.7. Water plants
7.8. Flora and fauna
7.9.Water treatment
7.10. Noise during exploitation
7.11.Dust during the work
7.12. Effect of explosive in environment
7.13. Effect of gases emited by machineries in environment
7.14. Waste production during exploitation
7.15. Landscape remediation
7.16. Surface damage from digging
7.17. Impact in infrastructure of the area
7.18. Impact in the health of the employees and habitants of the area
7.19. Impact in transport and communication
7.20. Planning of environment monitoring

8. Data on employment and training of Albanian citizens

9. Data on the expected infrastructure requests and related measures

1.General data on the mining object
1.1.General considerations

The compiled project aims the investigation of the possible exploitation of the marble of the object "Qafe Shtama" by the private subject "KUMEGA" sh.p.k., which has presented the request for obtaining the mining exploitation permission.
For the compilation of this technical – economic study and the exploitation project, the following data are considered:

- Geographic location and the relations of the object with the habitable centers.
- Topography and the climate of the area, where the considered object lies.
- Hydrology and hydrography of the surrounding area
- Present state of the infrastructure in total and the one of the subject area, the possibilities for its improvement, constructions and other necessary installations for the exploitation of the object from the mining point of view.
- The available geological material on the area and on the object, quantity and quality of geological and exploitable ore reserves within the exploitation defined limits.
- Measurements and different mappings compiled in field concerning to the geomechanical features, physical – mechanical characteristics and geotechnical parameters of the formations of the deposit, that can condition the size of the rock blocks in surface and depth of the object and need the use of suitable methods for exploitation.
- Different needs for equipment and other investments for the development and exploitation of the object.
- The kind of the final products and their market.

1.2. Location of the object

The object of the marbled limestones "Qafe Shtame", Mat, lies 3 km distant from Qafe Shtama, at the northwestern part of Era mountain and east of the road Burrel – Qafe Shtame – Kruje. From this road, by a branch of 2.5 km, the object is connected with unpaved road.
The area belongs to the municipality of Komsia, under the juridicial administration of Dibra county.
The rural administrative center of the area is the municipality of Komsia, some 6 km distant, and the nearest habitable center is Selita village , that lies 2 km southeast of the object under consideration.

Some 1.5 km far, west of the object, the high voltage line passes.
The object is part of the map sheet, scale 1 : 25 000,with nomenclature K – 34 – 88 – B – d (Frankthi) and it is limitet by the following coordinates (see table Nr.1).

Table Nr. 1. Corners of the license area

Corner	Northing	Easting	Elevation
	X	Y	Z
1	45 99 951	44 09 030	1087
2	46 00 022	44 09 000	1030
3	46 00 080	44 09 069	1010
4	46 00 100	44 09 191	935
5	45 99 960	44 09 100	1083

The requested area for exploitation is 0.015 km^2.

1.3. Geography of the area

From the geographycal and morphological point of view, the area represents a mountainous relief with precipitous summits. It becomes smoother towards south and southwest, while entire the region becomes smoother towards northeast. The highest elevation in the ore deposit is + 1098 m above the sea level and the lowest one belongs to the northern flank where the relief becomes lower up to + 990 m (the side of Valgjata stream).

Southwest of the object is Qafe Shtama with elevation + 1 200 m, while north – northwest, the village Selita with elevation + 700 m. The highest elevations of the area are at its eastern part: Maja e Shkembit te Bardhe + 1542 m and Maja e Shpatit + 1458 m. Near the object, the highest elevation is 1050 m. There are some small lakes west of the area that belongs to Skenderbeu mountain. The area of the object for mining permission is steep and effected by erosion.

1.4.People, climate and infrastructure

People

The nearest habitable center is Selita village with 200 people. They are occupied with agriculture and breeding. Only a small number of the people of the area is occupied in some industrial objects such as the Ferrochrome Smelting Plant) that operates in the area. They live in the surroundings villages Komsia, Frankthi, Karice, etc, and they belong to the municipalities Komsia, Bazi, Gurra. A part of the people works in emigration abroad, in Greece, England, Italy. The total people of the area is 3 900 habitants.

Climate

The sector of the object belongs to Mati area. The climate is mediterranean continental with long cold winter and hot short summer. In summer, the temperatures vary from $+25^0$ to 35^0, and in winter from $+7^0$ to -4^0 and less up to -25^0, these temperatures belong to January. The annual rainfalls vary from 400 mm to 1 100 mm, in average 690 mm, mainly at the end of autumn, winter and spring. The thickness of snow reaches 40 cm – 50 cm.

Generally, the object is well exposed. Only its surroundings are forested with pines and shrubs.

Mati is the biggest river in the area. It is 25 km, north of the object, and close to the object, west of it, the stream Zalli i Shtames flows. It captures the waters of the springs and rainfalls of northern part of Qafe Shtama serving as the watershed with Kruja area. Its discharge depends on the rainfalls and in summer it has only some liters/second.

Hydrology and hydrography of the surrounding area of the exploitable object

From the hydrological and hydrographycal point of view, the object lies in good conditions. A small spring is close to the object. The area is flanked by two streams, the one of Valgjata, in west, and an another one, branch of Zalli i Shtames, in east. Their discharges depend mainly on the rainfalls, but they are also fed by some springs outside the area. During the rainfall season, their flows are up to 1 –2 m^3/ sec, while in dry season less than 10 l / sec. Although, the passage over them can be enabled by small simple bridges, especially for the workers.

Vegetation
The area of the object is partly covered by vegetation. The part, totally exposed is selected for exploitation. There are only scarce isolated trees.

Present infrastructure
The object lies east of the road Burrel – Qafe Shtame – Kruje, with which it is connected by an unpaved road, 2.5 km long. It is less maintained, but allows the connection with other areas. During the winter, it is blocked by snow and becomes difficult to pass.

1.5. Economy and other activities in the area
The area is rural one and the people, traditionally, has been occupied of breeding and less of agriculture. Some people is employed in building and mining. A part, mainly young people, has emigrated abroad, in England, Italy and Greece. The economy is of an average level in comparison with the economic level of the whole country.

2 . Brief data on Geology
2.1. Geology of the area
Several geological surveys, prospecting – exploration workings and exploitation workings by the previous establishment "Josif Pashko" and the company "KUMEGA"sh.p.k., are carried out at the area, where the deposit of marble "Qafe Shtame" lies. Since the year 1997, the company "KUMEGA" sh.p.k. has the license to produce blocks near the requested object.

The geology of the area consists of limestones of Upper, Middle and Lower Triassic, ultramafic magmatic rocks, deposits of Palaeogene, Neogene and Quaternary.

Ultramafic magmatic rocks belongs to the ultramafic massif of Skenderbeu Mountains and consists of harzburgites, lherzolites, dunites and serpentinites.
Harzburgites and lherzolites occupy the western part of the massif and are less frequent at the eastern part. They have yellow – green color and less dark one.
Dunites are less frequent and they grade gradually in harzburgites. They have green color. Their mineralogy consists mainly of olivine and other secondary minerals such as serpentine, magnetite and carbonates.
Serpentinites are frequent, especially along the fault zones and the process of serpentinization has affected all the other ultramafic rock types.

Carbonatic deposits of Triass

These deposits consist of sedimentary formations of Lower – Middle Triass and dhe ones of Upper Triass.

The former ones are less frequent. They occur at the southeastern part of the area, like an anticline that represents its highest parts. These deposits can be divided in 3 packages:

- the lower package of sandstones with schist intercalations;
- the middle package of plate limestones with schist intercalations;
- the upper package of schists.

The deposits of Upper Triass occupy a limited area and consist of massive limestones. They form huge blocks of size 300 – 400 m to 900 –1 900 m, due to the faulting well developed in the area.

Deposits of Palaeogene

These deposits are very widespread. They consist of terrigeneous facies, intercalations of sandstones and clays, plate limestones with plate thickness 2 cm to 25 cm, and carbonatic – terrigeneous rocks.

Deposits of Neogene

These deposits are intercalations of conglomerates with sandstones and argillas.

Quaternary

These deposits cover the depressions and consist of alluvium and other products of rock alteration.

2.2. Geology of the ore deposit

The deciphering of the geology of the ore deposit, to which the object belongs is done by the geological survey, scale 1 : 2 000, which enabled the compilation of the geological map. The object has a simple geology, consisting mainly of the formations of Triass.

Formations of Lower – Middle Triass

These formations occur at the eastern part. They are thin layers of limestone intercalated with quartzite and argillaceous schists. Generally, they have northeastern extension and western dip with dip angle 60^0. They have tectonic contact with the deposits of Upper Triass.

Formations of Upper Triass

These formations compose the ore deposit of limestones and marble of Qafe Shtama. They have gray – cream to white color, occur at the upper part of the section and occupy the northern and eastern part of the ore deposit. The limestones are massive and layered with layers 1.5 m – 2 m thick. They extend with 235^0 and have northwestern dip with 35^0- 54^0.. Especially, at the contact with the magmatic rocks, the limestones are recrystallized by dinamometamorphism.

2.3. Brief data on the mineral type

The mineral to be exploited consists of marbled limestone that can be used fpr the production of blocks, which can be sawed to produce plates, that after a slight treatment get good decorative features and can be used in the building industry for inner or outer coating, or like gravel for production of plates for floor covering.

To judge on the field of the use of the material of this object, the necessary samples are picked up and the chemical and physico – mechanical analysis are accomplished.

The chemical composition of the marble of the object is as shown in the table Nr. 2.

Table Nr. 2. Chemistry of the marble of the object

CaO	$Fe_2 O_3$	MgO	Al_2O_3	Na_2O	K_2O	SiO_2	L.O.I.
54.53 %	0.12 %	0.56 %	0.41 %	0.15 %	0.28 %	0.70 %	42.96 %

The analysed samples show that the physical – mechanical features of these marbles are:

* natural humidity	0.051 %
* capacity of humidity	0.060 %
* specific gravity	2.79 t/m^3
* compactness	99.49 %
* porosity	0.56 %
* resistance under compression in natural state	1000 – 1660 kg/cm^2
* resistance under compression in humid state	956 - 1200 kg/cm^2
* resistance in freeze	950 - 1100 kg/cm^2
* resistance of friction or test DEVAL Do	4.37 %
* volume weight	2.65 t/m^3
* stability in expansion	120 kg/cm^2
* stability in section	170 kg/cm^2
*hardness according to Protodiagonov	9.8 – 10.1

The material produced from them can be used for the production of decorative plates for inner and outer coating of buildings as well as like decorative construction rocks. The size of blocks that can be produced is of the order 1 m x 1 m x 1.5 m to 2 m x 1.5 m x 1 m. Like gravel it can be used for the production of decorative plates for floor covering.

2.4. Hydrogeological conditions of deposit

As above mentioned, the deposit represents a steep mountainous relief with dense hydrographic network. At the southern part, the watershed with elevation + 1200 m, separates Mati area from Kruja one. Outside the area of deposit, there are some small springs, whose waters flow away giving rise to small streams that after joint the river Zalli i Shtames, flow close to the north of object, and then flow away towards Mati river some 20 km in north. These waters do not obstacle the technical conditions of the object exploitation.

The waters are of the carbonate – magnesium type, good for drinking and the highest pH is 5.8 – 7.2.

Based upon the relief, geology and the hydrogeological data obtained by the investigations in field, we can conclude that the hydrogeological conditions are not complicated.

2.5. Technical – mining conditions

As mentioned before, the marbles are sedimentary rocks. They occupy all the area and due to the process of metamorphism that has affected them, the limestones are changed into recrystallized limestones with saccharoidal texture. They occur as tectonic blocks of size from 300 – 400 m to 900 – 1500 m. They have gray to white – cream color. Their layering varies from 1.5 m to 2 m e less higher. They extend with 235^0 and their dip angle varies 35^0 to 45^0.

The fissures are widespread in the limestones. The observation and measurements show that they are of different directions, but the ones with azimuth 41^0- 60^0 (221^0-240^0) and 121^0- 140^0 (301^0-320^0) predominate.
The other deposits present do not condition the selection of the exploitation method.
The rock have a mechanical stability above the intermediate one and with fissure network in intermediate level, especially at the upper part.
The RQD index for these limestones are:

- along the extension of the limestones package: 85 – 89 %;
- along the cross direction with the structure (along the dip): 79 – 86 %.

2.6. Tectonics

The area of Qafe Shtama oer deposit is part of Mirdita tectonic zone. It overlies the ultramafic rocks, part of Skenderbeu massif. The subvertical faulting is evident. It has divided the object in several displaced blocks. The effect of tectonics complicates the search for other new blocks. The limestones are mainly massive and less layered.

2.7. The accomplished workings and the method of reserve calculation, geological and exploited ore reserves in quantity and quality.

Several workings are carried out in this deposit: prospecting – exploration workings by the Geological Enterprise of Tirana, exploitation workings by the Establishment "Josif Pashko" of Tirana in the years '60, and exploitation workings by the company "KUMEGA" sh.p.k. during the period 1997 – 2007 according to a license for an area close to the deposit. Based upon these data and new ones collected in the context of this investigation, we have compiled the geological map of the ore deposit and entire the other attached geological – mining material. These workings have enabled the recognition of the geology of the ore deposit, the calculation of ore reserves, the determination of the boundaries of overburden and their thickness, and the data on tectonics and hydrogeology.
It should be noted that the prospecting – exploration workings consists of a single trench, between the sections I – I and II – II, and of the mapping and description of geological exposures.
The reserves of the object of marbled limestones of Qafe Shtama are calculated with the method of vertical sections, measuring the surface in section for each bench, because the exploitation method will be the open pit. The recognition towards the depth is lack, so the reserves are calculated only for the near surface part.
When the difference between two limiting surfaces is less than 40 %, the used formula for volume calculation is:

$$V = \frac{S_I + S_{II}}{2} \times L$$

While, when this difference is higher than 40 %, the used formula is:

$$V = \frac{S_I + S_{II} + \sqrt{S_I + S_{II}}}{3} \times L$$

The exploitable reserves are calculated after subtraction of the overburden thickness consisting of quaternary deposits and the altered part of limestones that can not be used for the block production. The empties formed by karst activity are subtracted as well. Following the experience and the recommended literature, in the exploitable reserves it is

operated with block coefficient of the limestone (percentage of block volume against the total reserves to be mined).
The forecast development and production in the exploitation project is based upon the reserves and overburden calculated for each bench, and precisely from the bench + 1080 m to the one + 1040 m, shown in the tables below.

Table Nr. 3 Total areas in sections, in m^2

Horizon	Area in section I –I, in m^2	Area in section II – II, in m^2
1080	108	132
1070	300	301
1060	365	352
1050	375	408
1040	430	475

Table Nr.4. Geological reserves in benches and between sections

Horizon	S_I	S_{II}	Mean S, m^2	L, m	Reserves, m^3
1080	108	132	120	70	8 400
1070	300	301	300.5	70	21 035
1060	365	352	358.5	70	25 095
1050	375	408	391.5	70	27 405
1040	430	475	452.5	70	31 675
				Total	113 875

3 . Mining part

3.1. General data

For the compilation of the mining part of this study, selection of the mining method and order and other elements, the followings are considered:

- topography of the exploitable part of the objects and its surroundings;
- quantity of the exploitable reserves in different elevations of the object;
- quantity of overburden and wastes to be displaced outside the exploitable area;
- mean ezposure coefficient;
- possibility of the connection of object with the road Burrel – Qafe Shtame – Kruje;
- the physical – mechanical and geotechnical charakteristics of the formations of the deposit;
- fissure system, their orientation and their filling material;
- important geomechanical and geotechnical indexes.

3.2. Selection of the mining method, with open pit or underground
After the preliminary calculation, the geological and exploited reserves, separated for each bench, and the other indexes, are given in the following tables.

Table Nr. 5. Calculation of overburden, unused for block production

Horizon	S_I	S_{II}	Mean S, m^2	L, m	Overburden, m^3

1080	62	54	58	70	4 060
1070	24	22	23	70	1 610
1060	28	32	30	70	2 100
1050	30	28	29	70	2 030
				TOTAL	9 800

Table Nr. 6. Summarized indexes of reserves and overburden

Horizon	Reserves m^3	Overburden, m^3	Reserves without overburden, m^3	Carst, m^3	Reserves in situ, m^3	Converted reserves, m^3	Reserves inblock,m^3
1080	8 400	4 987	3 413	341	3 072	2 150	538
1070	21 035	2012	19 023	1 902	17 121	11 984	2 996
1060	25 095	2625	22 470	2 247	20223	14 156	3 539
1050	27 405	2 450	24 955	2 496	22 460	15 722	3 930
Total	81 935	12 074	69 861	6986	62 875	44 012	11 003

The selection of the open pit method, although the high overburden to be displaced, is conditioned mainly by the mining technology for the marble blocks, that in surface is applied with a technology not so advanced.

The use of this exploitation method is conditioned also by the present geological knowledge belonging only the near surface part of the deposit and the lack of the data concerning the depth. Other factors that favor this exploitation method are:

- hydrography of the area, that does not creates problems for the entire area in general as well for the object, in particular.
- Hydrology and springs, that are lack in the exploitation zone and its surroundings.

3.3. Extractive capacity of the mine, work regime, daily shifts, days per month or year, schedule of exposure workings and schedule of production for all the mine

Extractive capacity

The production of this mine will be destined for use in the domestic construction industry as well as for export abroad. The part of the material not suitable for block production, will be treated separately to produce gravel for the construction industry, as well. For this reason, depending on the studied and expected market, the subject forecasts to produce some 1 000 m^3 / year.

Work regime

For the completing of the forecasted production, the open pit will work some 180 – 200 daysper year (6 months stopped due to the winter conditions), 20 – 22 days per month, with 1 shift per day.

For the first year of its activity, the open pit will work with high intensity to complete the exposure, the road of development of the lower part, different arrangements of production.

Schedule of exposure and production

The total quantity of exposure of this open pit is 9 800 m^3 and it is foreseen to be completed within 9 years, with high intensity in the first year, and then proportionally for

the next years. During the exploitation will be displaced also a quantity of reserves that do not ensure the standards for block production. This volume is calculated to be 33 009 m^3.
For the first year, the production of 700 m^3 marbled limestone blocks and 1 200 m^3 exposure of overburden.
For the first year, the daily volume for the exposure will be 6 -7 m^3 /day, the suitable material for block 12 – 17 m^3 / day, while the daily block production will be 3 – 4 m^3 / day. The exposure and production belong to the benches + 1010 m and + 1000 m.
In the following years, the daily exposure volume will be 6 – 8 m^3 / day, the suitable material for block 18 – 24 m^3 / day and the block production 5 – 7 m^3 /day.
The exposure in the quarry is foreseen to be done along the whole extension and dipping of the marbled limestone orebody, to displace the overburden up to 2.5 m thick. The other material that from the process of mining results unsuitable for block production, will be displaced and stored within the area of the requested license.

The forecasted production for year in each bench is given in the table below.

Table Nr. 7. The forecasted block production for year in each bench

Horizon	Reserves in block	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
1080	538	538									
1070	2 996	162	1033	1034	767						
1060	3539				266	1034	1034	1034	172		
1050	3930								861	1034	1034
total	11003	700	1033	1034	1033	1034	1033	1034	1033	1034	1034

3.4. Variants of the development of ore deposit, argumentation and selection of development method

The followings are considered for the study of the ore deposit development variants:

- quota of the present road;
- the upper quota of the exploitable zone;
- geometric parameters of the exploitable zone;
- presence of the altered part of the area to be exploited;
- distribution of the extracted reserves against the total ones;
- the highest and lowest average slope of the object area and surroundings;
- possibility of the connection with road for the lower part of the quarry, above the quota + 960 m up to the quota + 1080 m at the southern part;

The development of this deposit will be done with outer trench. The development trench will be the continuation of the branch opened from the road Burrel – Qafe Shtame, that needs to be reconstructed. The trench will start at the quota + 1000 m and ends at the quota + 1080 m, with 90 m difference in level.

3.5. Mining method and related technical – economic indexes

The following factors are considered for the selection of the mining method:

- method for the production of marbled limestones blocks;
- method of loading and transport of wastes;
- method of exposure workings;
- method of loading and haulage of marbled limestone blocks within and outside the quarry.

The exploitation of this deposit will start after the opening of the main trench of development, the cutting trench, displacing of the overburden and the material that surrounds the blocks of limestone reserves. The opening of the main trench will be done by holes and explosion for shattering. The displacement of the material from the trench will be done by excavator and loaded on lorry, and when possible to put it on the flanks of the trench. The opening of the cutting trench and the displacement of the overburden and other material (mainly the karst one) will be done without the use of explosive to avoid the artificial damage of the block recovery, but using the excavator.

The cutting of blocks will be done using holes and helical wire and the holes by pneumatic hammer. The air for the pneumatic hammers will be supplied by a compressor, put on the quarry. The blocks will be square or rectangular. The holes will be 5 – 10 cm distant from each other, depending on the frequency of the fissures within the block. The depth of the holes will be the same as the block thickness. The bench horizon will be divided in blocks 20 m wide and as long as the width of the bench. The trend of exploitation will be northeast – southwest, the one of advancement west – east. The blocks will be cut by holes on their four sides. Their displacement and haulage will be done by excavator.

The blocks of higher size will be cut by helical wire. The electric power will be supplied from the cabin of power, near to the quarry. The helical wire will be fed with water which helps the cutting process.

It is foreseen that half of the block production be done by pneumatic hammer and the other half by helical wire. The most effective length of the cutting by helical wire is 10 m – 15 m. At the beginning will be produced the blocks by pneumatic hammer and later, after having ensured the blocks of higher size, the helical wire will be used.

Based upon above mentioned, the forecasted mining method is simple with the transport of wastes within the quarry up to 150m distance and its storage near the quarry, at its lower part.

The elements of the mining method to be used are:

- height of the quarry bench is 10 m;
- width of the working space is 10 m – 20 m;
- the angle of the bench scarp is 70^0 ;
- daily capacity 5 – 6 m^3;
- mechanized displacement and haulage;
- the cutting of marbled limestone by holes and helical wire;
- production per effective workday of the direct workers 1.2 m^3 /workday;
- production per effective workday of the total workers 1 m^3 /workday.

3.6. Order and trend of exploitation and the related schedules

a) Order and trend of exploitation

After the exposure of the upper part of the quarry in the first year and other arrangements, in the same year it is foreseen to start the production of the limestone in the quantity of 10 000 m^3. The exploitation in benches to reach this production will be:

- at the bench + 1080 m, 0.5 year with a total production of 538 m^3;
- at the bench + 1070 m, 3.1 years with a total production of 2 990 m^3;

- at the bench + 1060 m, 3.3 years with a total production of 3 540 m^3;
- at the bench + 1050 m, 2.5 years with a total production of 2 800 m^3;

After the opening and development of the bench + 1080 m, the production will start and continue successively.

The trend of exploitation will be from east towards west. The general direction of the benches will follow the contour lines of the relief (see the quarry plan in final state).

b) Geometrical elements of the quarry in final state

Considering the location of the quarry, relief and the geometrical parameters of benches, the quarry will be a stair of southwest – northeast direction, with the following parameters:

- Vertical depth of the quarry, 37 m;
- Number of benches 4;
- Width of the upper part of the quarry in plane will be 70 – 80 m;
- Width at the lower part of the quarry in plane will be 70 – 75 m;
- Length of the quarry at its upper part 70m;
- Length of the quarry at its lower part 75 m;
- Angle of smooth of benches depending on the quarry extension is 65^0 ;
- Bench height 10 m;
- Height of exploitation slide is 2 – 3 m along the whole bench length;

The quarry area in plane together the trenches and stockpile place is 0.015 km^2.

3*.7. Passports of hole – explosion for exposure and the production fronts; calculation of the quantity of explosive to be used.*

The forecast of the hole – explosion is based upon these factors:

- need to use explosion for the opening of the main trench outside the contour of the quarry reserves;
- drilling of holes will be done by hand pneumatic hammer.

Determination of dangerous zones by the hole – explosion workings

The work with the use of explosive in quarry is limited only for the opening of the road branch to the object and the main trench to be used for the exploitation. The explosive will not be used for block production, because it damages the block quality for other use purposes.

The quantity of explosive that will be used is limited. The explosive is the ammonite with detonator and common wick, but can be used the electrical detonators, as well. In the process of block production, the black powder and electrical detonators will be used for the displacement of the blocks.

The powder quantity in a hole is 60 g – 70 g and there will be 5 – 6 holes.

The use of explosive and black powder will follow the instructions described later.

3.8. Argumentation and selection of drilling, loading and haulage equipments

As mentioned in the part "exposure and production", the daily volume for the first year will be 20 – 30 m^3 /day, and for the other years 30 – 40 m^3/ day.

During the exploitation process, the handy pneumatic hammers will be used.

For the reaching of this daily production, for the first year as well as for the other years, one excavator and one lorry are needed.

It should be mentioned that the technical indexes of these loading and transport equipments are of the kind that they can face higher production capacities, so they can be used even for other activities the subjects carries apart the one of marbled limestone exploitation.

3.9. Selection of stockpiles for wastes and other byproducts storage

The operations for the exposure, opening of the road and trench and the ones of production will be completed as follows:

For exposure: the total exposure for whole the quarry will be completed during all the years, the last one excluded.

The total quantity of exposure and of the unsuitable material for block production is 45 083 m^3, and this quantity will be storaged at the western part of the quarry, outside the exploitation contour. The stockpile contour is shown in the plan related to this study.

3.10. Technical security in the working process for the development – exploitation and object management

a) execution of norms of regulation of technical security

During the exercise of the mining activity, the subject should always consider and execute the problems of security in working process.

The technical director of the workings, before it starts and during whole the process, should execute the regulations and norms defined in:

1. Regulation of the Technical Security in Mines and Quarries of the year 1999, approved by the Order of the Minister, Nr. 132, dated 07.04.1999, based upon the article 17 of the Albanian Mining Law, Nr. 7796,dated 17.02.1994, published in the year 2001.
2. Regulation of the Technical Security for Works with Explosives in Mines and Oil, published in March, 2002.

These regulations will be executed in each working process defined in the planning of the exploitation compiled by the technical director and approved by the director of company and it should contain:

- planning of the working organization compiled before the exploitation starts;
- planning of the working organization is compiled by the technical director of the workings;
- the technical director or the charged person should carry out the technical control and the accurate updating of the mining workings of every kind, for which the subject has the exploitation permission;
- the order of workings is defined in detail in the planing and should be approved by the director of company;
- in this technical – organization planning, the measures on technical security should be of the first order;
- the technical director should execute regular monthly and three – monthly instructions, treating specific themes for all the professions;
- the workers that will work on the block production, control of the bench slopes, loading platforms, roads, maintenance of bench slopes and the direct or subcontracted miners will be tested every three months by the company.
- Special care will be for the creation of working conditions, clearing of bench platforms, roads, bench slope maintenance, etc.
- A severe control will be executed on the applying of the technical passports of the workings with explosive for the opening of the road and the main trench, as well as of the work with black powder for the displacement of the blocks, preliminary compiled by the technical director and approved by the director of company;

- A severe control will be executed on the applying of the technical passports of the inner transport workings, from one bench to the other.

b) security from land slides and maintenance of the calculated slope angles

Considering the geomechanical indexes of the rock formations, the slope angle of scarp and it is agreed to be 70^0. The scarp angle at the convex parts of the benches (quarry caps) is accepted to be 4^0-6^0 lower.

To ensure a normal stability of scarps and work platforms, it is foreseen that these laters have an inclination of 1-2 % towards the main trench allowing the normal water flow and avoiding the watering of the argjillaceous formations.

3.11. Work organization and manpower

Considering the geographical and climatic conditions of the quarry area, it is foreseen that the duration of exploitation will be more than 10 years.

The manpower for one shift will be as follows:

1. Technical director 1
2. excavator driver 1
3. lorry driver 1
4. miner + assistant miner 1
5. watchman, quarry worker 1
6. ……..
7. ……..
8. ……..
9. ……..
10. ……
11. ……
12. ……..
13. ……
14. ……

Total

The working regime will be with one shift / day and 20 – 22 working days / month, for 9 months per year.

The employees will be with experience in mining workings of this kind.

4.Construction part

The exploitation of the marbled limestone of this object is a mining activity of the subject, for the providing of the raw material for the production of byproducts of limestone and lime.

For the exposure, development, exploitation and processing of limestones, and the service to equipments, the following objects will be built:

4.1. Road for the object development and exploitation

Some 650 m – 700 m road will be reconstructed. It is near the object and it is built by "KUMEGA" company that have exercised activity in the area.

For the lower part: connection of the new road with the existing one at the site with coordinates , northing 45 04 170 and easting 44 98 640, and then the road with some turns, runs through these sites:

Table Nr. 8. Coordinates of the road axis for the lower part of quarry

Nr.	Site	X	Y	Z	Notes
1	a	44 00 200	44 09 000	+ 985 m	Beginning of main road
2	b	44 09 000	44 00 000	+1040 m	Entrance to quarry

The road inclination is 8 % - 12 %. It will be 5 m wide and its scarp angles will be 70^0 – 72^0.

4.2. Industrial and equipment service objects

The foreseen objects of this kind will be:

4.3.Social objects

Since the beginning of the activity, it is foreseen the construction of one building to serve like office and refreshment environment.

4.4. Power supply and phone

The forecasted equipments in the quarry will not electrical power. An electrical cabin, completed with transformer and other necessary accessories, will be built to supply power to the processing installation.

The phone connection will be by mobile phone.

4.5.Other objects

Other objects to be built are a storehouse and some arrangements at the center of the object.

5. Economic part

5.1.Forecasted investments

For the exploitation of the marbled limestone of "Qafe Shtama", the forecasted investments are as follows:

5.2.Investments in roads, platforms and sistemations

These investments in total will be 1 200 000 lek.

5*.4. Investments in social buildings*

These investments will be 100 000 lek.

5.5.Investments in equipments and technology

Table Nr. 9. Investments for equipments and technology

Nr.	Equipment	Value, in lek
1	Compressor	
2	Excavator > 10 t	
3	Installation of wire cutting	
4	Electrical cabin	
5	Water pump	
6	Pneumatic hammer, 2 units	
7	Total	
8		
9		
10		
11		

12		
13		
14		
15		

All the forecasted investments will be completed within 2 years, separated in 2 investment phases.

Table 10. Summarized table of investments

Nr.	Items of investments	Total value, lek	First phase: 01.07-31.12.2007	Second phase:01.01.-30.12.2008
1	Construction - assembling			
2	Machinery - equipment			
3	Other investments			
4	Equipment - furniture			
5	Total investments			

5.6. Calculation of the cost of production up to saleable product

Considering the forecasted cost for all items of annual production and the related investments, the forecasted cost of production is given in the table below.
The amortization value is assumed taking into account that the activity of exploitation will be only 10 years.

Table Nr. 11. Cost of production for 1 m^3 limestone in the object

Nr.	Item							
1	Block production							
2	Product cost							
3	Product expenses							
4	Selling price							
5	Input from selling							
6	Tax over added value							
7	royalty							
8	Area tax							
9	Study/project							
10	Permission fee							
11	Total cost							
12	Total return							
13	Fee on return 25%							
14	Net return							

5.7. Market prices. Marketing of the product, etc.

In the domestic market, the marbled limestone blocs to be used for the production of plates and decorative stones, there is demand and the price for 1 m^3 block is some 20 600 lek /m^3.

Considering the trend of the construction industry in Albania, there will be not difficulties for the market of the marbles and marbled limestone blocks for the production of plates.

5.8.DCF for the entire duration of the quarry

Table Nr. 12. Calculation of expenses and return during the entire life of the mine, object Qafe Shtama

Nr.	item	unit	value	I year	II year	III year	IV year	V year	VI year	VII year	VIII year	IX year	X year
1	Block production	m^3	10 000	700	1033	1034	1033	1034	1033	1034	1033	1033	1033

6. *Conclusions and recommendations*

The compiled project aims the possibility of exploitation of the marbled limestones of the object "Qafe Shtama" by the private subject "KUMEGA" sh.p.k., that has presented the request for mining permission.
This object lies some 3 km far from Qafe Shtama, at the northwestern part of mountain Era, and east of the road Burrel – Qafe Shtame - Kruje. The object is connected with this road by a branch of 1.5 km unpaved road.
The area is part of the territory of Komsia municipality and under the jurisdiction of Dibra county. The rural administrative center is Komsia, some 6 km distant, and the nearest habitable center is the village Selita, some 2 km southeast of the object under consideration.
Some 1.5 km far from the object, the high voltage line passes.
The object area lies at the sheet of the topographic map, scale 1:25 000,with nomenclature K-34 – 88 – B – d (FRANKTHI) and is limited by the following corners:

Nr.	Northing	Easting	Elevation
1	45 99 951	44 09 030	1087
2	46 00 022	44 09 000	1030
3	46 00 080	44 09 069	1010
4	46 00 100	44 09 191	935
5	45 99 960	44 09 100	1083

The requested area is 0.015 km^2.

The relief of the area is steep and eroded, with enormous clastic deposits at the lower part of the object.
The requested area is not fertile land.
The forests are almost totally lack. There are only some shrubs, typical for the area.
The biggest river is Mati, that runs through the northern part of the region, while at the area of the object there is only the stream Zalli i Shtames. The area is dried with simple

hydrogeological conditions. It is connected with the old road Burrel – Qafe Shtame – Kruje.

The quantity of the exploitable reserves in the requested area is 11 610 m^3, the overburden is 9 800 m^3 and other 33 009 m^3 that are not suitable for block production.
For the development of this deposit the forecasted investments are 5 338 500 lek.
The longevity will be over 10 years with annual production of 1000 m^3 / year.
After the exploitation of this deposit, the forecasted net return is 6 670 400 lek.
During the exploitation process, the Regulation of Technical Security in Mines and Quarries, published in 2001, will be executed with care.
The normal course of the exploitation process needs the care for the maintenance of the widths of the working platforms and bench scarps.
Another problem is the maintenance of the inclination of the working platforms for the drainage of the waters.
The exploitation of this object does not affect the water flows, does not occupies fertile land and does not damages meadows and forests.
The production of blocks will be done by holes and helical wire cutting, their displacement by excavator or by the use of black powder.

7. Data on the identification of the impact on the environment during the object development and exploitation

7.1. Loss of meadows

The total area occupied by the object during the exploitation is 15 ha. It is not fertile land and does not represent a meadow. After the exploitation finishes, all the area will be arranged and planted with trees. All the area will be covered by the alluvial deposits of the displaced overburden, allowing the planting and cultivation of different local plants and trees.
So, there will be not loss of meadows.

7.2. Loss of land slope

In project, the slope of bench scarps is foreseen to be 70^0. This slope is higher than the natural one of the relief of the object. After the final arrangement and filling, the will decrease with other 10^0.

7.3. Land pollution from flows

The inclination of working platforms and channels of the road are determined in project to allow the decantation of scarce mud by the waters within the working area. During the dried season, these decantations will be moved to the stockpile.

7.4.Land contamination by wastes

The waste by exposure will be stockpiled at the site planned in the project. Later, they partly will be brought back to fill the bench platforms and the lower platform + 950 m. They are friable material that do not contain contaminants for the environment. These deposits are fertile and serve for the remedy of the quarry.

7.5.Land contamination by muds

There are not foreseen muds during the exploitation process.

7.6.Erosion during the object development and exploitation

The project foresees a such exploitation order that together with the other measures of filling, arrangement and treatment, avoid the erosion and landslide of the quarry scarps and of the surrounding land.

7.7.Water plants

There are none water plants in the exploitation area.

7.8.Flora and fauna

There are none species of flora and fauna protected by special status. The local flora and fauna will be not affected by the exploitation because the object area is almost exposed in surface without any vegetation.

7.9.Water treatment

The mining technology foresees the use of the technological water to help the block cutting process and block separation. These waters that are in small quantities together with the ones of rainfalls, will be arranged to follow their natural flow.

7.10. Noise during exploitation

The cumulative noise from the simultaneous function of the machinery at 7 m distance is 180 dB. Considering the expression of the acoustic intensity level of a noise by the relation:

$$L = 10 \lg (I_1 / I_0)$$ where:

L – acoustic level of the considered noise;
I_I – acoustik intensity of cumulative noises;
I_0 – referred acoustic intensity;

we can conclude that acoustic level of noise in road is lower than the one of a car which runs through it. Practically, it is 40 – 50 dB, that is the one of a normal talk.
Analysis of the noise frequency emited by these machineries shows that they are below the mean frequency 200 – 2000 Hz that is acceptable by the human ear.

7.11.Dust during the work

Because the use of water, there will be not dust during the exploitation.

7.12. Effect of explosive in environment

The explosive will be used only for the opening of the road and outer trench, so in this case it will have not effect in the environment.

7.13. Effect of gases emited by machineries in environment

There will be not emission of gases, liquids and other toxic products that can affect the health of workers, and the plants and animals of the surrounding environment.

7.14. Waste production

During the development and exploitation of the object there will be a temporary stock for some 9 800 m^3 wastes that at the end of exploitation will be brought back to the quarry,

and other 33 009 m^3 of permanent wastes to be arranged and treated in situ. They are not dangerous and have the characteristics of the surrounding environment.

7.15. Landscape remedeation

Area planning

To avoid the erosion and landslides, the project plans the combined exploitation of the area and of the quarry benches.

Arrangements, construction of connecting road and start of exploitation are planned to be completed in the first year and continue over 10 years.

The filling, arrangement and covering of an area of 1.5 ha is planned to be done step by step up to the end of the activity.

This will allow to replant different local trees that will contribute to avoid the erosion and to improve the landscape of the area.

Technical measures

To prevent erosion and landslide, the subject plans to carry out each year the following works:

After the exploitation of the first bench above the quota +1090 m, whose reserves represent less than 3 % of the deposit, different waste quantities, consisting of fertile alluvial deposits, will be put back here. This to prevent slope erosion and to precede the planting of typical local plants and trees.

During the activity, the geometric and geomechanical parameters of the exploitation benches will be maintained as suggested by project.

During the exploitation, the inclination of the benches and other areas will be maintained to allow the normal flow of rainfall water and to prevent their accumulation and liscivation of the exploited and covered areas.

Aesthetic and ecological measures

During its activity, the subject will accomplish each year these works:

- arrangement of final scarps of the quarry benches following their geomechanical and geometric parameters;
- leaving of protective strips between the exploitation area limits and the surroundings;
- arrengement, treatment and covering of the horizontal areas of benches turning them in small terraces;
- arrengement,treatment and covering of stockpile area;
- creation of suitable conditions for planting and cultivation of different plants and trees;
- planting of bench areas with typical local plants and trees, mainly pines, etc.

7.16. Surface damage from digging

At the end of exploitation the area surface will have the view of e terraced complex of 6.6 ha, partly filled and arranged.

7.17. Impact in infrastructure of the area

The object will be connected with the road Burrel – Qafe Shtame. The haulage of the material from the object to the destination will be done by lorries 20 ton following this road. This transport does not affect the traffic in this road, because usually the daily number of cars is scarce, 1 car / day.

7.18. Impact in the health of the employees and habitants of the area

The employees will be protected, especially by the noise affect, providing them the necessary equipment.
The process will not have environmental impact and consequences in the people health, so people displacement due to this activity are not expected.

7.19. Impact in transport and communication

The haulage activity of the object does not affect the traffic on the road Burrel – Qafe Shtame – Kruje, because usually the daily number of cars is scarce, 1 car / day.

7.20. Planning of environment monitoring

a) Monitoring planning

Because we have to exploit limestones in the environment of a mountain slope, this needs the continuos monitoring of the area to be exploited.
The monitoring planning will consist of:

- monitoring of the geometrical parameters of the quarry benches: inclination, height, scarp angle, inclination of working platform as well as the geometrical ones planned in the project;
- Monitoring of the behavior of rock formations at the outer quarry contours and the prevention of possible slides and subsidences;
- Monitoring of the possible area of dust distribution during exploitation;
- Monitoring of behavior of present vegetation in the area and prevention of their damages;
- Monitoring of areas filled by material and fertile land to prevent the leaching and formation of holes;
- Monitoring of planted areas, cultivated plants and trees and their normal development. The damaged plant and trees will be substituted by new ones. This monitoring will continue for 4 years, time this sufficient for them to be independent from human care.

Measures for environment remedy

The step by step measures, beside the exploitation, will consist of:

- creation of areas for planting;
- arrangement of the material of exposure stockpiled at the limits of permission area;
- planting of new areas with pine trees and other plants;
- maintenance of the planted areas.

b.1. Accumulation of active soil on the quarry area

The area to be remedied from the subject during whole its activity, is 0.56 ha.
The soil volume only for the quarry is 5 600 m^2 x 0.20 m (thickness) = 1120 m^3.
The necessary soil quantity will be taken by the exposure material that will be brought back to the quarry. Apart this, there is the area of the material stocked during the exploitation, to be remedied, some 0.72 ha. The soil to be used is in situ but it should be distributed in evenness.
This process is planned to start in the second year to continue for several others. The cost is included in the production cost.

b.2. Planting of young trees

Table of the foreseen cost for environment remedy.

1	Tree buying	unit	400	600	240 000
2	Hole opening	unit	400	100	40 000

3	Soil accum. + transport	m^3	1120	20	22 400
4	planting	unit	400	30	12 000
5	service	unit	400	30	12 000
6	Total cost , in lek				326 400

8. Data on employment and training of Albanian citizens

There will be 5 persons employed in the quarry. They will be skilled in different work processes of mining.

9. Data on the expected infrastructure requests and related measures

The development and exploitation of this quarry needs only the reconstruction of a road, branch of the main road Burrel – Qafe Shtame – Kruje, which passes close to the quarry. The exploitation of the quarry needs the installation of an electrical cabin, while the power line is built since before. The phone line is not necessary.

Technical-Economic Project Was Developed by doctor.htm of the Company Kumega Ltd

ADOPTED

President of the company Kumega Ltd Albania
Engineering Geologist Shefki Hysa