

CHAPTER 5 ENVIRONMENTAL CONSIDERATIONS

For sustainable development of Albanian mining sector, environmental/social consideration is a key factor and it is essential to improve management system of environment to withhold negative heritage to the future. Along with economic recession of 1990s, many mines reduced or stopped production and some of them were abandoned. Under these circumstances, it is expected that consideration of environmental protection has been forgotten and many sites with potential environmental problems exist. Considering integration of Albania to the European Union (EU) in future, formulation of sound management system of environmental protection and urgent implementation of it are necessary.

Understanding current problems and issues existed in management system of environment and mining activities of Albania, it is necessary to consider remedial measures for each problem and issue for formulation of feasible and sound management system of environment.

5.1 Environmental Legislations

The main legislation related to environmental management in Albania is shown in Table 5.1.1.

5.1.1 “Law on Environmental Protection” as Environmental Basic Law

The framework environmental law in Albania is Law No. 7664 “Law on Environmental Protection” instituted in 1993. The law emphasizes on importance of environmental protection as well as pollution control including air quality, water quality and soil contamination and mitigation of environmental risks, biodiversity, rational development of natural resources, prevention of excessive development, conservation of ecological protection areas, and conservation of ecological balance and living environment. Requirements for license of the Ministry of Environment, Forests and Water Management (MEFWA) for treatment of hazardous and dangerous wastes and implementation of environmental impact assessment (EIA) are regulated by this law.

5.1.2 “Law on Environmental Impact Assessment”

The “Law on Environmental Impact Assessment” was instituted by MEFWE in 2003, and it was partly revised in 2008. The law covers with classification of projects needing Environmental Impact Assessment (EIA), application form of EIA based on the classification, implementation of EIA, official review, council for evaluation of EIA, submission of final report of EIA and procedure of environmental permission. These contents were formulated in alignment with EU Directives (Table 5.1.1 (3)).

According to this law, implementation of EIA is required for mine development and closing of mines including countermeasure plans for mine pollution.

5.1.3 Other Legislation on Environment

Other legislation related to the environment consist of “Law on Protection of Air Pollution”, “Law on Water Reserves”, “Law on Environmental Treatment of Polluted Water”, “Law on Forest and Forestry Management”, specifying on pollution and countermeasures.

The “Law on Management of Hazardous Waste” and “Law on Environmental Management of Solid Waste” were instituted as basic laws on the waste management.

Management of the mining sector is controlled by the “Mining Law”, however the previous law was considered to be insufficient for the prevention of mine pollution. The treatment of mining wastes and tailings caused by mining activities are controlled by the “Mining Law”.

The “Mining Law” has been revised as a “New Mining Law” (adopted in July 2010). The “New Mining Law” obligates a company to submit a “Rehabilitation and Implementation Plan”, which aims to improve the mining environment based on the mine closure after mine development.

5.1.4 Environmental Conventions

Environmental conventions that have been ratified in Albania are shown in Table 5.1.1(4). Among these, “BASEL Convention”, controlling of trans-boundary movements of hazardous wastes and their disposal, is relevant to the mining sector.

5.1.5 Environmental Standards

All of the environmental standards of Albania, including air quality, water quality, noise, etc, are based on EU standards.

Table 5.1.1 Environmental legislation of Albania
(1) Basic laws, etc.

No.	Name of Laws	Law Number and Enacted Year	Contents
1	Law on Environmental Protection	No.7664: 21/1/1993 No.8934: 5/9/2002, revised No.9890: 20/3/2008, revised No.9983: 8/9/2008, revised	Environmental basic law, aiming at importance of environmental protection, air quality, water quality and soil contamination, biodiversity, rational development of natural resources, etc.
2	Law on Environmental Impact Assessment	No.8990: 23/1/2003 No.10059:24/12/2008, revised	Formulation EIA :classification of project, implementation of EIA, submission of EIA report, environmental permission, etc.
3	Law on Protection of Air Pollution	No.8897: 16/5/2002	Protection law for protecting air pollution.
4	Law on Water Reserves	No.8093: 21/3/1996	Basic law for water reserves.
5	Law on Environmental Treatment of Polluted Water	No.9115: 24/7/2003	Protection law for water contamination.
6	Law on Management of Hazardous Waste	No.9537: 18/5/2006	Basic law on controlling hazardous wastes.
7	Law on Environmental Management of Solid Waste	No.9010: 13/7/2003	Basic law on controlling solid wastes.
8	Law on Forest and Forestry Management	No.9385: 4/5/2005	Basic law on forest protection and forestry management.
9	Mining Law	No.7491: 29/4/1991	Basic law on mining development, mining safety and closing mine, and it is presently in process of revising.

Table 5.1.1 Environmental legislation of Albania
(2) Ministerial decrees on EIA

No.	Name of Legislation	Enacted Year	Contents
1	DCM No. 435 *1	12/09/2002	On norms of air discharges in the Republic of Albania.
2	DCM No. 103	31/03/2003	On Environment Monitoring in the Republic of Albania.
3	DCM No. 249	24/4/2003	“On the documentation approval for Environmental License and elements of the Environment Permission”.
4	DCM No. 805	4/12/2003	On the approval of the list of activities which have an impact on environment and need Environmental License.
5	DCM No. 268	24/04/2008	On the approval of regulations of proceedings and criteria to be equipped with EIA specialist certificate and environment audition.

*1 DCM :Decisions of Council of Ministers

(3) EU directives related to environmental impact assessment

No.	EU Directives	Enacted Year	Content
1	EU Directive 85/337/EEC	1985	The environment impact assessment (EIA) resulting from the public and private projects, amended by directive 97/11/EC and Directive 2003/35/EC.
2	EU Directive 2001/42/EC	2001	On EIA of plans and programs.
3	EU Directive 2003/4/EC	2003	On Environmental information.
4	EU Directive 2003/35/EC	2003	On public participation.

(4) Main environmental convention ratified in Albania

No.	EU Directives	Enacted Year	Content
1	RAMSAR Convention	1971	Convention on Wetlands of International Importance especially as Waterfowl Habitat.
2	PARIS Convention	1972	Convention on the Protection of the World Cultural and Natural Heritage.
3	WASHINGTON Convention	1973	Convention on International Trade in Endangered Species of Wild Fauna and Flora.
4	BARCELONA Convention	1976	Convention for the Protection of the Mediterranean Sea against Pollution.
5	BONN Convention	1979	Convention on the Conservation of Migratory Species of Wild Animals.
6	BERN Convention	1979	Convention on the Conservation of European Wildlife and Natural Habits.
7	LONDON Convention	1991	Agreement Conservation of Bats in Europe (EUROBATS).
8	ESPOO Convention	1991	Convention on Environment Impact Assessment in Trans-border Context.
9	RIO Convention	1992	Convention on Biological Diversity.
10	NEW YORK Convention	1992	Framework Convention on Climate Change.
11	BASEL Convention	1992	Convention on the Control of Trans- boundary Movements of Hazardous Wastes and their Disposal.
12	HELSINKI Convention	1992	Convention on the Protection and Use of Trans-boundary Waters and International Lakes.
13	UNCCD (Paris)	1994	Convention on Combat Desertification.
14	HAGUE Convention	1995	African/Eurasian Migratory Water Bird Agreement (AEWA) 1996 (MONACO) Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area.
15	AARHUS Convention	1998	Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters.
16	CARTAGENA Protocol	2000	Protocol on Bio-safety.

5.2 Administrative Organization Related to Environment

5.2.1 Reorganization of MEFWA

The reorganization of MEFWA was carried out in January, 2010. The new organization of MEFWA as of January, 2010 is shown in Figure 5.2.1 and Figure 5.2.2.

The ministry has been newly reorganized into a system of five (5) general directorates, i.e. the General Directorate of Policy, the General Directorate of Assistance and Service, the Directorate of Combined Project, the Environmental Control Directorate and the Internal Auditing Directorate. The biodiversity department, the department of water resources and fishery, the department of forest, pasture and the environment protection department are established in the General Directorate of Policy, and the department of finance and budget and the personnel department are established in the General Directorate of Assistance and Service.

Although the environmental control related to pollution, etc. had been organized by the system of three (3) departments composed of the department of environmental pollution, regulation adjustment department and the department of environmental influence assessment in the year of 2009, the administrative work on regulation for pollution and on environmental control has been carried out by and under the Directorate of Environmental Administration and the work on environmental influence assessment and that on approval, license, etc. has been controlled by the section of environmental influence assessment in the department of environment protection under the Directorate of Combined Project since this reorganization.

The Regional Environment Administrative Office (REA), a member of working group for mine environmental control of the study, has been reorganized as well, and rearranged under the control of the National Administrative Directorate and the Agency of National Environment and Forest in the Ministry of Environment, Forest and Water Administration, and its scope of work has been extended widely in combination with the environmental control and forest administration without specific increase of its number of personnel.

5.2.2 Countermeasures against Pollution, etc. due to Mining under MEFWA

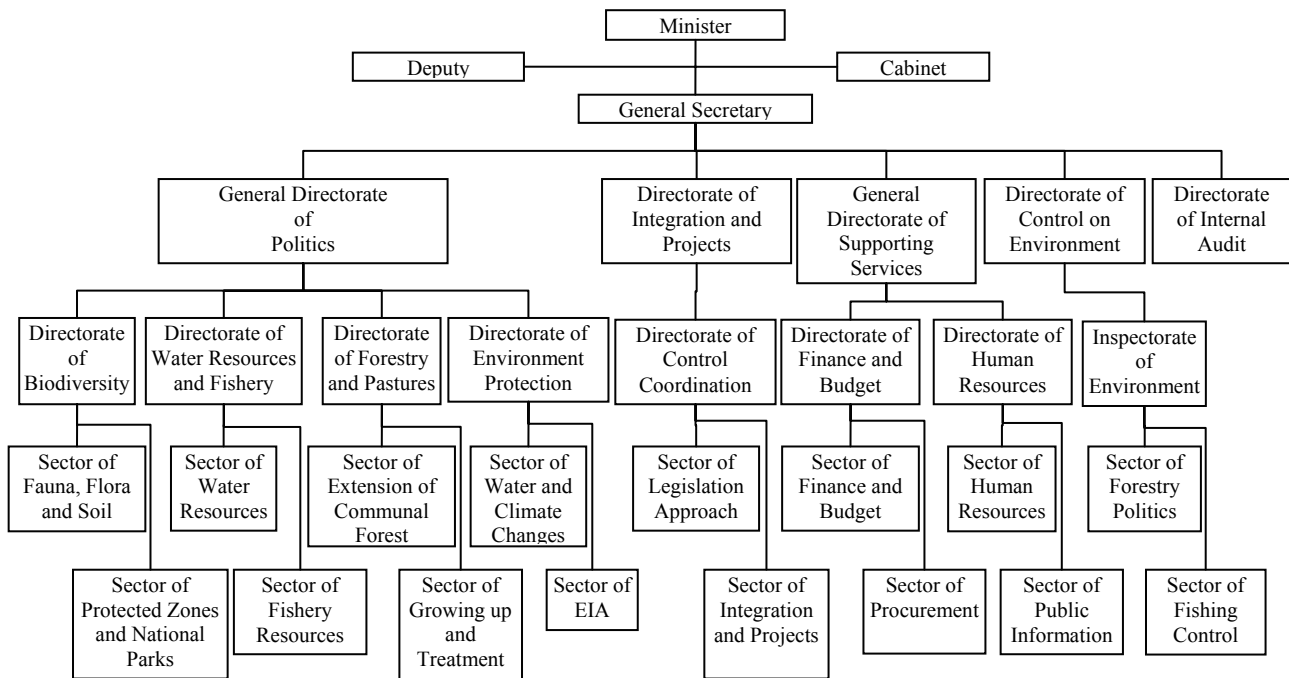
Major policies of MEFWA in connection with mine activities are consisting of the monitoring control of operative mine, the control of environmental influence assessment (EIA) in mine development, the control of improvement plan on pollution due to mining, etc. On the other hand, the dormant or abandoned mine is being controlled by METE. The scope of control and administrative work for both ministries is clearly separated.

As to the monitoring of operative mines, there is a rule that the monitoring of mines shall be carried out by the mine operator four (4) times in a year in accordance with the environmental approval and the results of monitoring shall be reported to MEFWA. Also, as it is not a legal obligation to report the results of monitoring to METE, the situation and results of monitoring are unlikely to be known by METE. Therefore, METE is carrying out the control and administration of mines without knowing the management of environmental control due to operation of mine, and it can be said that the operation of mine and the environmental control have not been consolidated in their control and administration yet so far.

5.2.3 Work of REA (Regional Environmental Administration)

Major works of REA in relation to mining industries are the receipt and/or acceptance of application on approval or license for environment management in mine development, EIA, monitoring, etc.

including the receipt of reports on matters concerned as well as the work executing the policies of MEFWA.



(Source : MEFWA)

Figure 5.2.1 Administrative organization of MEFWA

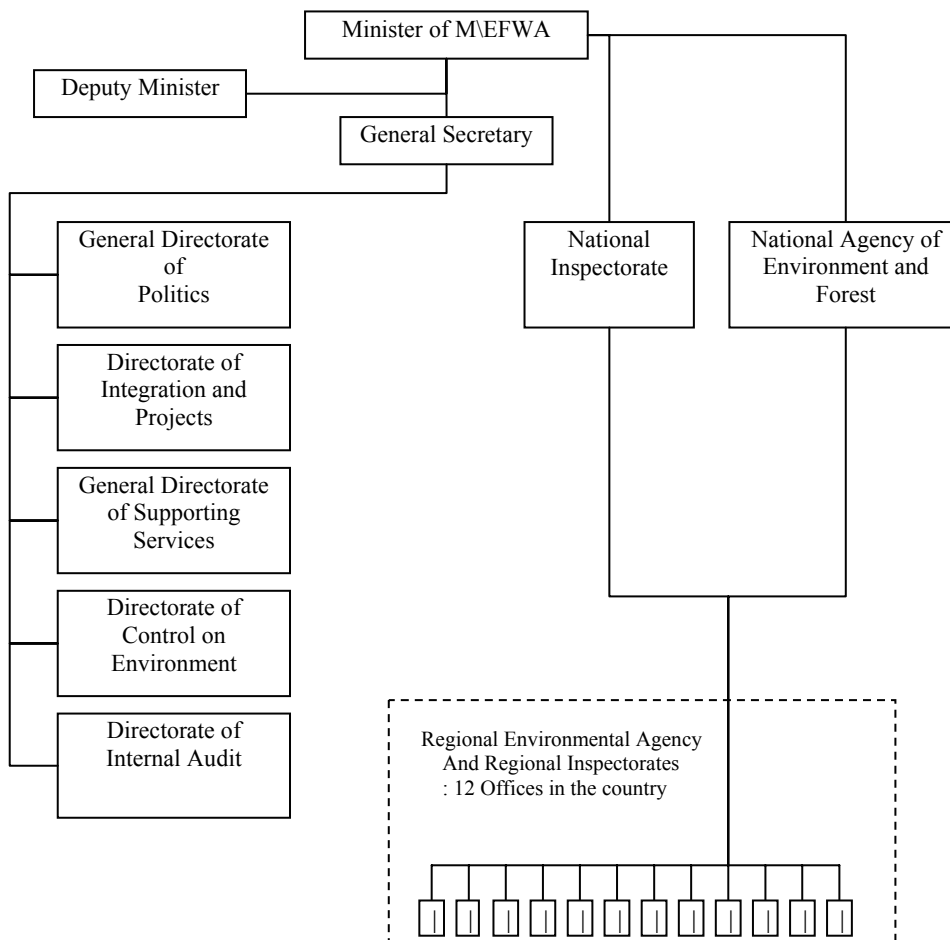


Figure 5.2.2 Administrative organization of MEFWA (as of January/2010)

5.3 Procedure of EIA

EIA is implemented based on the “Law on Environmental Impact Assessment”, instituted in 2003 and revised in 2008. The procedure of EIA are shown in Figure 5.3.1.

5.3.1 Classification of Project by Category and Submission of EIA Application Form

For implementation of EIA, it is necessary for applicant to decide which category, either Category 1 or 2, the project belongs to, according to Appendices 1 and 2 of the “Law on Environmental Impact Assessment”. Submission of the application form of “Profound Report of EIA” is necessary for the project of Category 1 and the application form of “Summary Report of EIA” is necessary for the project of Category 2.

The activities covered by both categories are shown in Table 5.3.1 (1) and (2). Criteria of classification are defined by the scale of impacts such as type, size, capacity, etc. of the project, hence Category 1 (application form of Profound Report of EIA) means that the project has a potential of relatively significant impacts to environment.

The contents of “Profound Report of EIA” and “Summary Report of EIA” are shown in Table 5.3.2. Compared to Summary Report of EIA, additional items must be included for Profound Report of EIA. They are procedures and reasons of selection of project site, detailed description of direct and indirect level of impacts on environment, potential impacts of options on environment and health, risks of accidents and measures to prevent them, trans-boundary impact on environment, technical countermeasure plans, detailed descriptions about sustainable use of energy of natural and mining resources, and potential negotiations plan with stakeholders during the phases of planning, reviewing and implementation of the project.

Both application forms of EIA should be written by environmental expert and/or consultant approved and registered by MEFWA and the proposer submits the application form of EIA to one of the offices of the Regional Environmental Agency (REA) located in 12 regions of whole area of Albania.

5.3.2 Initial Review

The initial review of application form is done by REA, and REA should send answers to the proposer within five days after the confirmation of its category, etc. Results of initial review are provided to main office of MEFWA. It is possible to apply again the project rejected by the initial review after amendment.

5.3.3 Implementation of EIA

EIA is implemented after the project category has been decided by the initial review. The content of the EIA is specified in EIA guideline prepared by MEFWA, and the EIA is conducted by environmental experts and/or consultants in accordance with that guideline.

In case of amendment of project after application, it is necessary to submit an application to REA again and approval of MEFWA is required. If the proposer has an objection against the decision of MEFWA, it is possible to bring before the court. After development of the EIA, the proposer should compile a draft report of EIA and submit it to REA.

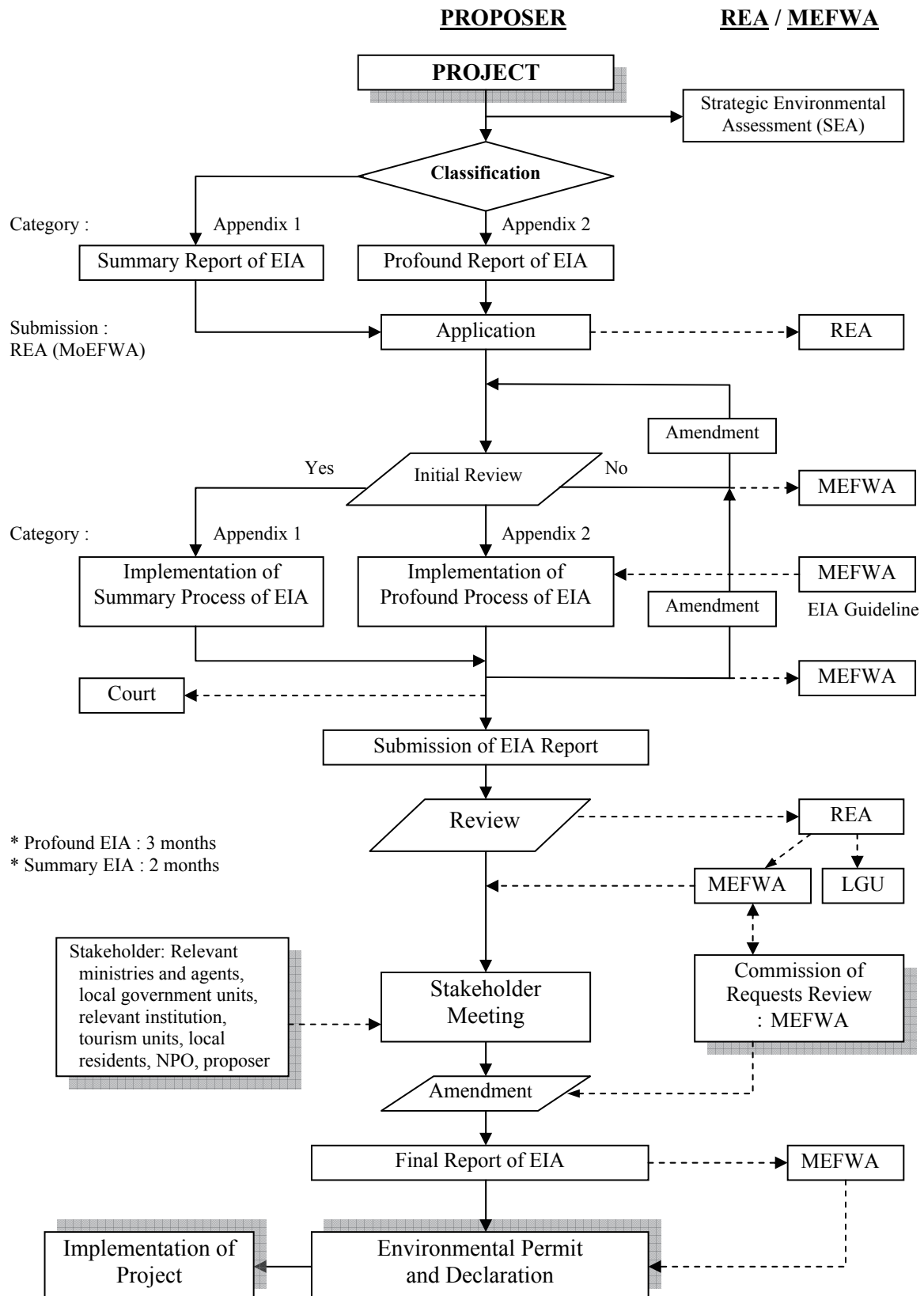


Figure 5.3.1 Procedure of permit on the Environmental Impact Assessment

Table 5.3.1 (1) Activities that undergo profound process of EIA

(Appendix 1 Category)

1. Refineries of diesel and gas, liquidation and processing of coal and bituminous sands, plants for regeneration of used oils higher than 100,000 t/year.
2. Thermo-plants of production of energy, etc. with a production of heat higher than 50 MW.
3. Hydro-plants.
4. Factories of fuse of minerals (including minerals that contain sulfur).
5. Calcining and bake of minerals that contain toxic elements such as Hg, As and Cd.
6. Factories of steel and cast iron casting (primary and secondary communion).
7. Factories and foundries of iron metals (Lamination factoring, etc.).
8. Foundries of iron metals with a production capacity higher than 100 t/day.
9. Foundries or factories for production of colored metals and non-ferric metals from minerals, concentrates or secondary matters of metallurgical, chemical and electrolytic processes, etc.
10. Factories for superficial treatments of metals and plastic materials using an electronic or chemical process in which volume of vats of treatment exceeds 10 m³.
11. Production and processing of alloys for non-ferric metals containing As, Hg and Pb with a higher capacity than 1,000 t/year.
12. Mining and processing of coal, Ignite and bitumen with higher capacity higher than 50,000 t/year.
13. Mining of diesel with higher capacities than 50,000 t/year.
14. Mining of gas for commercial purposes where the mined quantity is higher than 250,000 m³/day for natural gas.
15. Factories for protection of cement in rotary furnaces (burning and drying) with a production capacity exceeding a 300 tons/day.
16. Factory for production of glass including glass fibers with a fuse capacity exceeding 10 t/day.
17. Foundries for fuse of mineral substances including production of mineral fibers with a fuse capacity exceeding 10 t/day.
18. Factories for production of ceramics using fire and in particular, tiles, bricks, porcelain bricks with a production capacity exceeding 30 t/day.
19. Mining of stones and open mines of argyle where the site surface is larger than 5 ha or peat extraction where surface of site is larger than 50 ha.
20. Production of cardboard fibers over 100,000 m²/year.
21. Production of furniture over 10,000 m³/year of raw material.
22. Integrated works for industrial production of substances or groups of substances with chemical processes.
23. Plants for burning, recuperation, chemical treatment or bury of hazardous waste.
24. Plants for burning of urban waste with capacity higher than 1 t/hour.
25. Landfill for deposit of non hazardous waste with capacity higher than 30 t/day.
26. Construction of long distance railways and for airport with base access roads higher or equal to 2,100 m.
27. Construction of a new road with two or more lanes or redirection or widening of an existing road with two or less lanes when are to be provided two or more lanes.
28. Roads of internal waters pass and ports for the traffic of roads of internal waters pass that allows passing of ships of a tonnage greater than 500 t.
29. Merchandise ports, docks for loading - unloading connected with the land or external ports (excluding railway docks) which can hold ships of a tonnage greater than 1,000 t.
30. Extraction of subterranean water or artificial schemes of recharging the subterranean waters where the annual volume of refilled (recharged) water is equal or higher than 5,000,000 m³.
31. Work for transfer of water sources from basins of rivers where the quantity of transferred waters is higher than 100,000,000 m³/year.
32. In all cases works for transfer of water sources from river basins where the multi-annual stream of the basin is higher than 1,000 million m³/year.
33. Barriers and other reservoirs designed for protection and deposit of water, where an additional water quantity is higher than 5,000,000 m³.
34. Tubes for transportation of diesel products or chemicals with diameter greater than 500 mm and a greater distance than 10 km.
35. Plants for intensive cultivation of fowls, pigs and sheep that have more than: a) 10,000 fowls, b) 500 pigs, and c) 1,000 sheep.
36. Construction of high voltage lines with a minimum voltage of 220 kV or with a greater distance than 10 km.
37. Plants of treatment of urban liquid discharges with a higher capacity than 150,000 equivalent inhabitants.
38. Industrial plants for: a) production of pulp from wood or other similar fibers, b) production of paper and cartoon with production capacity higher than 50 t/day.
39. Warehouse for conservation and deposit of diesel, its products, petrochemicals and chemicals with capacity greater or equal to 100,000 t.
40. Plants for initial treatment (operations such as washing, whitening and mercerization), or coloring of fibers and textiles where the capacity of treatment is higher than 10 t/day.
41. Factories for treatment of leather where the treatment capacity is higher than 6 t of ready product/day.
42. Treatment and processing aiming at production of food from raw material of animal origin, vegetable origin, treatment and processing of milk, etc.

Table 5.3.1 (2) Activities that undergo summary process of EIA

(Appendix 2 Category)

1. Agriculture, forestry and aquatic life: a) rehabilitation of rural areas, b) using of non-agricultural lands, c) water management for agriculture, and d) reforestation and deforestation for purposes of destination change of the land use, etc.) intensive fishing farms.
2. Mining industry: a) stone pits, open quarries and mining of peat (projects not included in Appendix 1), b) subterranean mines, c) mineral-gravels from marine and river drainage, d) deep drilling in particular, geo-thermal drilling, drilling for water supply, and e) coal, diesel, gas and bituminous sand.
3. Energy industry (projects not included in Appendix 1): a) generation of electrical energy, steam and hot water, b) industrial plants for storage of gas, etc., c) surface conservation of gas, d) subterranean conservation of burning gases, e) surface conservation of liquid fuels, and f) natural briquette of coal and lignite, g) hydro-electrical generating plants.
4. Production and processing of metals (which are not included in Appendix 1).
5. Mining industry: (projects which are not included in Appendix 1) : a) industrial furnace of coke, b) cement, etc.) glass and glass fibers, d) mineral substances including mineral fibers, and e) ceramics, tiles, bricks, stubborn bricks, stone or porcelain coating through burning.
6. Chemical industry (projects which are not included in Appendix 1): a) treatment of intermediary products and production of chemicals, (b) pesticides and pharmaceutical products, paints, etc., and c) warehouses for trading or conservation purposes of diesel, diesel products and chemical. products.
7. Food industry: a) production of oils and vegetable/animal fat, b) packaging and wrapping of vegetable products, and c) diary products, etc.
8. Leather, wood and paper industry.
9. Rubber industry.
10. Infrastructure projects which are not included in Appendix 1.
11. Other projects (projects which are not included in Appendix 1): a) permanent roads used for testing and rallies of motor vehicles, b) installations used for waste elimination, c) plants for treatment of polluted waters, d) installation for collection of waste, e) warehouses for conservation of iron waste including metallic chassis of out of use vehicles, f) installation for production of artificial mineral fibers, g) installations for recovery or destruction of explosive substances, h) landfills of industrial waste, i) places used for collection of dead animals or undesirable ones, and j) food industries.
12. Tourism and free time: a) ski aerial tramways, vehicles with wiring and developments accompanied by these types of activities, b) tourist ports, c) tourist villages and hotel complexes outside urban areas and of developments accompanied by these types of activities, d) camping places (areas), and e) amusement parks.

Table 5.3.2 Content of summary and profound report of EIA

(Content of Summary Report of EIA)

The content of Summary Report of EIA is shown below:

1. Objective of the project;
2. Detailed objective description;
3. Data on present environment of the area and in its vicinity where the project is implemented;
4. Detailed description of all installations that are part of the project or will be used during its implementation;
5. Construction plan and the deadlines of its implementation;
6. Description of engineered values that are constructed or enlarged and of necessary works for project implementation;
7. Potential impacts on environment and proposed measures to prevent or bumper these impacts;
8. Monitoring program of project impact on environment;
9. Conformity of the project with territory adjustment plan and with economic development plan of area where project will be implemented;
10. Summary of consultations with local government organs, the public and environmental non-for profit organizations and of their opinions;
11. Rehabilitative measures in case of pollution and damage of environment as well as their cost; and
12. A copy of the license of natural or juridical person which has prepared the report of impact assessment on environment.

(Content of Profound Report of EIA)

The content of Profound Report of EIA apart from data of the Summary Report is required to contain in addition the followings:

1. Procedures and reasons of selection of site where project will be implemented, description of at least two additional options of location of project;
2. Its direct and indirect level of impact on environment;
3. Potential impacts of options of project on environment and health;
4. Risks of accidents with significant impact on health and environment and measures to prevent these;
5. Trans-border impact on environment if any;
6. Technical measures plans to prevent and bumper negative impacts on environment;
7. Detailed descriptions about sustainable use of energy, of natural and mining resources; and
8. Potential negotiations plan with local government organs, the public and environmental non-for profit organizations during the phases of planning, review and implementation of the project.

5.3.4 Examination of EIA and Holding Stakeholder Consultation Meeting

The draft report of EIA submitted to REA is sent to the main office of MEFWA and local administrative (Districts and Municipalities) organization. The draft report of EIA is reviewed by the Council of Minister established in MEFWA. The local administrative organization, also, reviews the draft report of EIA and organize stakeholder meeting for collecting comments and opinions of various view points. Participants to the stakeholder meeting belong to various sectors such as relevant ministries and agencies, local government units, relevant institutions, tourism units, local residents, non-profit organization (NPO) and proposer.

5.3.5 Submission of EIA (final) Report and Approval of EIA/Environmental License

Results of review and comments from MEFWA, local administrative organization and stakeholder meeting are informed from MEFWA to the proposer. The proposer submits the final report of EIA to REA after necessary amendment according to the comments from MEFWA, and then the proposer will receive the environmental permission of the project from MEFWA after approval of the final report of EIA.

5.4 Nature Reserve Area(s) in the Republic of Albania

The development of mine or land is not allowed within the nature reserve area(s) in the Republic of Albania. In MEFWA, it is a system that the development in an area of the nature reserve area is prohibited at the stage of permitting development of enterprise and at the stage of EIA.

The regulated area for nature conservation, its classification and distribution are as shown in Table 5.4.1, 5.4.2 and Figure 5.4.1 respectively.

There are 800 regulated areas for nature conservation distributed in whole of the country, and the area is classified into six (6) categories of classification such as 1 - priority nature reserve area, 2 - the national park, 3 - natural treasure, 4 - nature reserve controlling area, 5 - landscape conservation area and 6 - natural resources reserve and control area. Four (4) of the (severe) nature reserve areas and thirteen (13) of the national parks are found respectively in whole country. The landscape conservation areas of seven hundred and fifty (750) places are designated in whole country.

The national parks and the landscape conservation areas are widest in their area accounting for eighty eight percent (88%) of total reserved area and total area of the reserved area is reached to cover ten percent (10%) of whole area of the country.

Table 5.4.1 Environmental protected zones of Albania

No.	The category of the Protected Zone (PZ)	No. PZ	surface in ha	%/ of PZ surface	%/ of Republic Surface	Management Goals
1	Strict Natural Reserves (natural/scientific reserves)	4	14,500	5	0.50	Protected zone mainly for scientific aim and conservation of wild nature
2	National Park	13	88,615	31	3.08	Protected zone managed mainly to protect the echo-system and recreation/tourism
3	Natural Monument	750	3,490	1	0.12	Protected zone/surface mainly managed for keeping/ conservation of specific characteristics of the nature
4	Managed Natural Reserves	24	63,663	22	2.21	Protected zone/surface mainly managed for keeping/ conservation through managing intervention
5	Protected Scenery	5	95,864	35	3.33	Protected zone/surface mainly managed for scenery and seascape keeping and recreation/reposal
6	Protected Zone of the managed natural resources	4	18,200	6	0.63	Zone/surface mainly protected and managed for sustainable use of natural resources/ eco-systems
	Total	800	284,332	100	9.89	

(Source : MEFWA)

Table 5.4.2 Environmental protected zones of Albania and their enlargement by year

No.	Protected Zone (PZ)	Category	In years (ha)					Total	% / Republic Total Surface
			2005	2006	2007	2008	2009		
	PZ situation		183,369	-	-	-	-	183,369	6.38
1	Buna River-Velipoje	Protected Scenery	23,027	-	-	-	-	23,027	
2	Shkodra Lake	Managed Wildlife Sanctuary	26,535	-	-	-	-	26,535	
3	Butrinti	National Park	8,591	-	-	-	-	8,591	
4	Dajti Mountain	National Park	-	29,384	-	-	-	29,384	
5	Mali me Gropa-Bize-Martanesh	Protected Scenery	-	-	25,266	-	-	25,266	
6	Divjake-Karavasta	National Park	-	-	22,230	-	-	22,230	
7	Shebeniku Mountain	Managed wildlife Sanctuary	-	-	-	20,000	-	20,000	
8	Llogara-Karaburun	National Park	-	-	-	35,000	-	35,000	
9	Shengjin-Ishem	Managed wildlife Sanctuary	-	-	-	-	20,000	20,000	
10	Mali i Tomorrit	National Park	-	-	-	-	30,000	30,000	
	Total	-	24,1522	29,384	47,496	55,000	50,000	423,403	14.73



- 1. Strict Natural Reserves
- 2. National Park
- 3. Natural Monument
- 4. Managed Natural Reserves
- 5. Protected Scenery
- 6. Protected Zone of the managed natural resources

Figure 5.4.1 Distribution of environmental protected areas in Albania

5.5 Pollution Control Policy and Environmental Monitoring

MEFWA is in charge of charge of pollution control policy and environmental monitoring. The policies related to the pollution are described below.

5.5.1 Pollution Control Policy

The pollution control policy is managed by the Directorate of Pollution Prevention Policies of MEFWA, and the policy, instituted from 2002 to 2003, is based on each basic law on air quality control, water quality control and solid wastes. Aiming at integration into EU in future, control levels for the pollution need to confirm to those of EU Directives.

On the effluent standards, although METE had established them before 2003 and was supposed to inform them to MEFWA after approval by Ministry of Health (MH), effluent standards of EU were introduced to Albania in 2003, and they were regulated in 2008 after five years of preparation.

On the wastes, the “Law on Environmental Management of Solid Waste” and Law on Management of Hazardous Waste” were instituted in 2003 and 2006, respectively, and waste management is now in the process of adjustment by these laws. Wastes and tailings caused by mining activity are controlled by the “Mining Law”.

1) Environmental pollution

Because the mining industry in Albania had much activity until 1990s, the pollution increased in many industrial areas, because soot without adequate environmental protection and smoke, waste water and industrial wastes from industrial and mining facilities had been mostly discharged and disposed without treatment. However, pollution has decreased since 1990s, because discharge of soot, smoke and waste water from industrial facilities has rapidly decreased since the country shifted to a market economy in 1991, which resulted in reduction of mining and other industrial activities. .

On the other hand, contamination of water, groundwater and soil remain in many places; particularly nine places with high level of contamination are identified as mining and industrial “Hot Spots” by MEFWA and METE. Remediation and/or effective countermeasures have not been implemented for these “Hot Spots” by polluters, because most of national enterprises as polluters have been already closed or abandoned. Although countermeasures have been implemented for some pollution, including Vlore and Fire areas, pollution of other areas are left untouched. Outline of nine mining and industrial “Hot Spots”, shown in Figure 5.5.1, is described below.

- 1) Vlore area : Contaminated due to Hg and PCB.
- 2) Fire area : Contaminated due to As.
- 3) Durrës, Porto Romano area : Contaminated due to pesticides.
- 4) Elbasan area : Contamination by exhaust gas, waste water, contaminated groundwater, hazardous wastes, slag, etc. originated from industrial complex.
- 5) Lac area : Contaminated due to fertilizers.
- 6) Rubik area : Contamination derived from Cu industry.
- 7) Ballsh area : Contamination derived from petroleum industry.
- 8) Puke area : Contaminated due to Cu, etc. derived from Cu mines.

Environmental condition of polluted areas is not clear on water and soil quality because monitoring data are not enough for identifying their contaminations, although there are some data on air quality.

(Hot Spots caused by mining activity)

A preliminary investigation of “Hot Spots” caused by mining activity was carried out by UNDP (2008) and they prioritized 11 sites, including 4) Elbasan, 6) Rubik and 8) Puke mentioned above as mining and industrial hot spots, for site investigation. The locations of 11 hot spots from mining and related processing activities are shown in Figure 5.5.2, and they are described below.

- 1) Fushe Arrez (Puke area) : Cu mine and concentrator
- 2) Gjegjan : Cu mine and concentrator
- 3) Kalimash : Cr mine and concentrator
- 4) Reps : Cu mine and concentrator
- 5) Rreshen : Cu mine and concentrator
- 6) Rubik : Cu smelter
- 7) Krubnesh : Cu mine and concentrator
- 8) Lac : Cu smelter
- 9) Elbasan : Cr and Ni smelter
- 10) Pogradec : Ni concentrator
- 11) Rahove : Cu mine and concentrator

Outline of “Hot Spots” related to mining activity are described in Section 5.6.

2) Pollution control

The pollution control of Albania has been conducted in collaboration with international cooperation including United Nations (UN), World Bank (WB), European Union (EU), European countries, etc., and preliminary investigation and countermeasures concerning water and soil contamination have been implemented for some of the hot spots. Although countermeasures have been implemented to polluted factories to stop operation and discharge of gas and waste water, there are contaminated wastes and soil remaining untouched at the sites waiting for implementation of countermeasures by the Albanian government in future.



(Data source: JICA, 2004)

Figure 5.5.1 Hot spots of environmental pollution due to mining and industrial activities in Albania



(Data source: UNEP, 2008)

Figure 5.5.2 Hot spots of environmental pollution due to mining activities in Albania

5.5.2 Environmental Monitoring

1) Monitoring survey

The environmental monitoring of air quality, water quality and noise are currently conducted by MEFWA, and outline of the environmental monitoring is shown in Table 5.5.1. Monitoring surveys by government and by private companies are, respectively, shown in (1) and (2).

Table 5.5.1 Outline of environmental monitoring
(1) Monitoring survey by Government

Environmental Items	Measuring Items	Measuring Points	Remarks
1. Air quality	1. Ambient air quality 1) SPM 2) PM10 3) NOx 4) SO ₂ 5) Pb 6) O ₃	13 points : - Tirana :5 - Elbasan :3 - Durras :1 - Fier :1 - Shkodar :1 - Korce :1 - Vlora :1	- Institute of Public Sanitation enforces and informs results to MEFWA. - Measurement :15 times (days)/month. - Measuring method : unknown. - Reporting as “Environmental Report”.
	2. Aerosol 1) Radioactivity items: Rn, U, etc.	11 points	- Institute of Nuclear Physics enforces and informs results to MEFWA. - Measurement :11 times (days)/month.
2. water quality	1. Urban sewage	8 cities, 33 points	- Institute of Environment enforces and informs results to MEFWA. - Measurement :4 times/year.
	2. Surface water	River : 11 points Lake : 6 points	- Background measurement.
	3. Sea water	Beach : 15 points	
	4. Groundwater 1) Microorganism 2) Chemical analysis 3) Heavy metals 4) Pesticides 5) Radioactive materials :Rn, U, etc.	Groundwater basin: 39 points	- Analytical objective :Drinking water.
3 Noise	1. Urban area	8 cities	-24 times/day: day and night times -measurement for 5 days

(2) Monitoring survey by private companies

Environmental Items	Measuring Items	Measuring Points	Remarks
1. Water quality	1. Waste water : 1) Items :	-	- Firms including operating mines should conduct the monitoring works. However, mines closed before 2003 are not included (see “6.5”). - Measurement :4 times/year. - Chemical analysis is carried out at “Chemical Laboratory” registered by MEFWA. - Report including analytical results is submitted to the Regional Environmental Agency (MEFWA). - The report is reviewed by Environmental Inspector of the Regional Environmental Agency.

2) Environmental situation in Albania

a. Air quality

Monitoring results of air quality were published as an “Environmental Report” compiled by MEFWA in 1998 and 2008. Table 5.5.2 shows ambient air quality in 2008 as well as environmental standards for air quality. The air quality in Albania is considered to be relatively good, but suspended

particulate matter (PM10) in urban area exceeds environmental standards. PM10 is likely to occur mainly from automobiles, etc., and it is necessary to be improved for human health.

Table 5.5.2 Air quality in 2008 (Albania)

Location	LNP	PM10	PM2.5	NO ₂	SO ₂	O ₃	Pb
	µg/m ³	Mg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³
Tirana 1	202	105	-	52	21	47	0.12
Tirana 2	75	42	-	18	3.0	38	0.028
Tirana 3	-	-	-	33	14	41	-
Tirana 4	-	58	13	-	-	-	0.038
Elbasan 1	145	66	-	22	8.7	46	0.086
Elbasan 2	-	48	-	-	-	-	0.045
Shkodra	228	108	-	28	16	68	0.24
Durrasi	234	116	-	35	18	64	0.27
Fieri	238	112	-	33	32	70	0.32
Norma Shqiptare	140	70	15	60	60	65	1.0
Rekom OBSH	80	50	-	40	50	65	0.5
EU Standards (Upper threshold value for assessment)	-	35 µg/m ³	35 µg/m ³	1400 µg/m ³	75 µg/m ³	120 µg/m ³	0.35 µg/m ³

b. Water quality

Monitoring results of water quality are not shown in the “Environmental Report” of 2008, hence the environmental condition of water quality is unknown. Environmental standards for water quality are shown in Table 5.5.3.

The allowable value of substances included in drainage water for each of related industrial fields is shown in Table 5.5.4.

The objects of criteria are classified into seventeen (17) industries, i.e. mining industry, power generation facility, iron and steel making industry, non-ferrous metal industry, cast iron industry, metal surface treatment, glass and glass wool industry, petroleum refinery and cokes industry, electrical goods manufacture, chemical substance producing, food industry, drinking water and beverage industry, cloth and sewn products manufacturing, cellulose and paper industry, printing, and maintenance and repair of automobile vehicles. Among these industries, only industries related to mining are shown in Table 5.5.4.

**Table 5.5.3 Environmental standard for water quality
(in conformity with EU directives)**

Parameters	Water Quality Standard
1. Micro-organisms	(Number)
- Coliform bacillus	0
- Enterococcus	0
- Number of colony	Without abnormality
- Coliform group	0
- Clostridium perfringens	0
2. Inorganic Components	(mg/L)
- pH	5.5 – 9.5
- Al	0.2
- NH ₃	0.5
- Sb	0.005
- As	0.01
- B	1
- Cd	0.005
- Cl	250
- Cr	0.05
- Cu	2
- CN ⁻	0.05
- F	1.5
- Fe	0.2
- Pb	0.01
- Mn	0.05
- Hg	0.001
- Ni	0.02
- NO ₃ ⁻	50
- Se	0.01
- Na	200
- SO ₄ ²⁻	250
3. Organic Components	(mg/L)
- 1,2-Dichloroethylene	0.003
- Vinyl chloride	0.0005
- Tri(& Tetra)-chloroethylene	0.01
- Benzene	0.001
- Polycyclic aromatic hydrocarbons	0.0001
- Benzo (a) pyrene	0.00001
- Acrylamide	0.0001
- Epichlorohydrin	0.0001
4. Pesticides	(mg/L)
- Pesticides	0.0001
- Pesticides-Total	0.0005
- Aldrin	0.00003
- Dieldrin	0.00003
- Heptachlor	0.00003
- Heptachlor epoxide	0.00003
5. Disinfectants	(mg/L)
- Bromate	0.01

Table 5.5.4 Permitted values for waters discharges from certain industrial sectors in the host-water environments (1)

1. Industrial sector	2. Parameters	3. Permitted values	
1. Mining 1.1 Research and production of crude oil and natural gas from the earth	pH	6	- 9
	Suspended subjects, SS	50	mg/L
	BOD	50	mg/L
	Petroleum products	20 mg/L, 40 mg/L for the production under 10000 t/24 hours	
	Phenols volatile	1.0	mg/L
	Sulfate	1.0	mg/L
	Toxic metals (in total)	5 mg/L	
1.2 Coal mine	pH	6	- 9
	Suspended subjects, SS	50	mg/L
	Oil products	10	mg/L
	Iron metals (total)	3.5	mg/L
		10 mg/L	
1.3 Mining of metals and ore, enrichment of uranium, excluding plants of copper, lead, nickel, zinc, iron, magnesium and uranium.	pH	6	- 9
	COD	150	mg/L
	Suspended subjects, SS	50	mg/L
	Petroleum products	10	mg/L
	Total cyanide	1.0	mg/L
	Cyanide (free)	0.1	mg/L
	Arsenic	0.1	mg/L
	Cadmium	0.1	mg/L
	Copper	0.5	mg/L
	Chromium	0.1	mg/L
	Mercury	0.01	mg/L
	Lead	0.2	mg/L
	Nickel	0.5	mg/L
	Zinc	2.0	mg/L
	Iron	3.5	mg/L
	Uranium	2.0	mg/L
Radium	700 mg/L		
4. Non-ferrous Metallurgy 4.1 Production of copper	pH	6	- 9
	Suspended subjects, SS	50	mg/L
	Arsenic	0.1	mg/L
	Cadmium	0.1	mg/L
	Copper	0.5	mg/L
	Lead	0.3	mg/L
	Mercury	0.01	mg/L
	Zinc	1.0	mg/L
	Iron	3.5 mg/L	
4.2 Production of lead and zinc	pH	6	- 9
	Suspended subjects, SS	50	mg/L
	Arsenic	0.1	mg/L
	Cadmium	0.1	mg/L
	Copper	0.5	mg/L
	Lead	0.3	mg / l
	Mercury	0.01	mg/L
	Zinc	1.0	mg/L
Iron	3.5 mg/L		
4.3 Production of nickel	pH	6	- 9
	Suspended subjects, SS	50	mg/L
	Nickel	0.5	mg/L
	Iron	3.5 mg/L	
4.4 Production of aluminum	pH	6 - 9	
	COD	150	mg/L
	Suspended subjects, SS	50	mg/L
	Fluoride	20	mg/L
	Aluminum	0.2 mg/L	
5. Foundry of metals 5.1 Production of molds of iron and steel, and molds of non-ferrous metal	pH	6	- 9
	Suspended subjects, SS	50	mg/L
	Oil products	10	mg/L
	Copper	0.5	mg/L
	Zinc	2.0 mg/L	

Table 5.5.4 Permitted values for waters discharges from certain industrial sectors in the host-water environments (2)

1. Industrial sector	2. Parameters	3. Permitted values	
6. Treatment of metallic surfaces, including electro-platinum	pH	7	10
	Suspended subjects, SS	25	mg/L
	Oil products	10	mg/L
	Arsenic	0.1	mg/L
	Cadmium	0.1	mg/L
	Chrome sexavalent	0.1	mg/L
	Total chromium	0.5	mg/L
	Copper	0.5	mg/L
	Lead.	0.2	mg/L
	Mercury	0.01	mg/L
	Nickel	0.5	mg/L
	Zinc	2.0	mg/L
	Free cyanide	0.2	mg/L
Total phosphorus	5.0 mg/L		
7. Production of glass and glasswork	pH	6	9
	Suspended subjects, SS	50	mg/L
	COD	50	mg/L
	Petroleum Products	10	mg/L
	Lead	0.1	mg/L
	Arsenic	0.1	mg/L
	Antimony	0.5	mg/L
	Fluoride	20 mg/L	
8.3 Production of coke and coke by-products	Suspended subjects, SS	120	mg/L
	BOD	50	mg/L
	COD	150	mg/L
	Nitrate Ammonia	15	mg/L
	Phenol volatile	1	mg/L
	Cyanide free	0.1 mg/L	

c. Noise

Monitoring surveys of noise have been carried out at eight sites (urban areas) in whole area of Albania, and the monitoring results of 2008 are shown in the “Environmental Report” of 2008, (Table 5.5.5). Noise of Tirana, a capital city, was highest, reaching 71 dB(A) in day-time and 62 dB(A) in night-time. Noise of other cities ranges from 61 to 69 dB(A) in day-time and from 39 to 51 dB(A) in night-time. In the other cities, it is quieter, particularly night-time, than in Tirana.

Table 5.5.5 Monitoring result of noise in Albania (2008)

No.	Location	Average Noise Level dB(A)	
		Day-time	Night-time
1	Tirana	71	62
2	Durras	69	51
3	Fier	64	43
4	Shkodar	68	42
5	Vlora	66	49
6	Saranda	63	46
7	Korca	61	44
8	Elbasan	68	39

3) Environmental inspection

Sector of Environmental Inspection is organized under the Directorate of Control Coordination in MEFWA, and the “Environmental Inspectorate” is staffed in the sector as well as the Regional Environmental Agency (REA). The environmental inspection is enforced by the environmental inspectors based on the Law 59, Law 71 and law of EIA. Main duties of them are monitor environment, review of EIA, review of environmental monitoring data, etc.

The flow of application and approval of the environmental permission is shown in Figure 5.5.3. The Minister of MEFWA approves the environmental permission after reviewing by the REA and Sector of Environmental Inspection of main office.

4) Environmental monitoring by entrepreneur

The environmental monitoring of a business establishment should be carried out by entrepreneur and monitoring results must be reported to MEFWA. The frequency of monitoring is four times per year and the content of monitoring is only water quality. Analytical parameters presently required are four components, namely pH, Cu, Fe and S. Chemical analysis is done by chemical laboratory registered by MEFWA, and the laboratory should issue "Certificate of Analysis" for certifying reliability of analysis.

MEFWA reviews the monitoring results reported from each business establishment and publishes monitoring report in every two years. If there are some environmental problems at a mine site based on the monitoring results, MEFWA should deal with the problems including inspection on operating mine site, monitoring, etc. As results of inspection on the mine site, MEFWA will take actions such as administrative direction, order, penalty, etc. if required. METE, if necessary, also deals with problems including administrative direction, order of improvement, shut down of operation, etc., after reporting from MEFWA.

The monitoring works at closed mines are managed by METE, and METE informs the monitoring results to MEFWA.

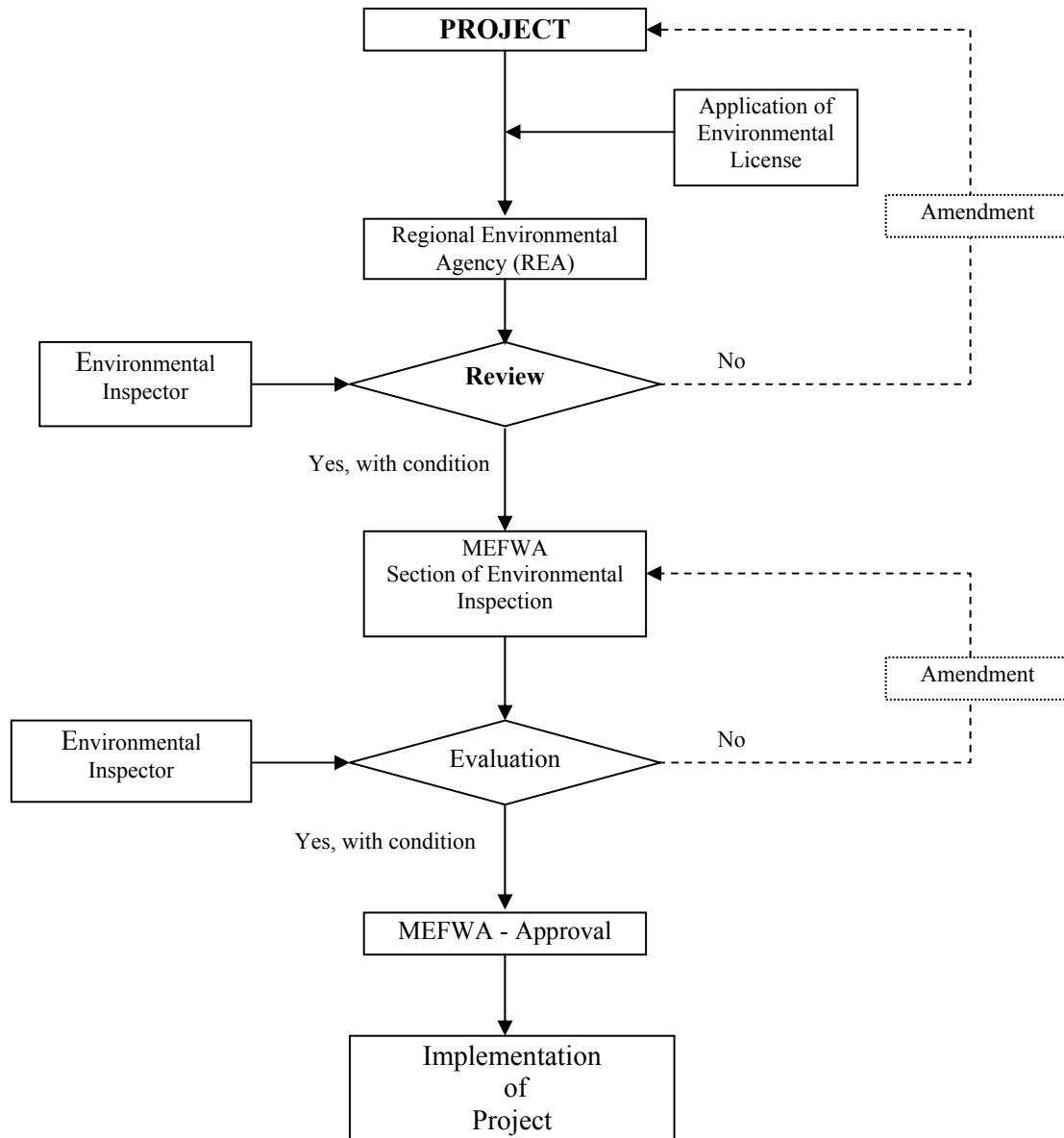


Figure 5.5.3 Application of environmental license and flow of approval

5.5.3 Relationship between “REACH” Regulation in EU and Mining Activities in Albania

1) On “REACH” Regulation in EU

“REACH” is an abbreviation of “Registration, Evaluation, Authorization and Restriction of Chemical substances”, and “REACH Regulation (EU Directive 1907/2006)” means a new regulating system on chemical substances in EU (the European Union). The background of REACH regulation is a part of the frame work for international policy on control of chemical substances on the basis of “Agenda 21” adopted at the United Nation Conference on Environment and Development (the World Summit) in 1992.

The purpose of REACH Regulation is for health of human beings, conservation of environment, increasing competitiveness of European industries, and the regulation was proposed at the European Commission in October, 2003, and adopted at the European Parliament in December 2006 and enforced in June 1st, 2007 upon the receipt of the approval from Environmental Council of the European Union. The actual operation of this regulation was commenced since June 1st, 2008.

The specific features of REACH Regulation are that the obligation and responsibility for safety assessment is transferred from the authority concerned to the industrial field, and that the respective entrepreneur shall have the obligation to register and to provide the information on safety assessment of not only the new chemical substance but also the existing one. Accordingly, it can be said as an extreme severe restriction that the entrepreneur to deal with chemical substances cannot manufacture and/or import without registration on the quantity and purpose of use respectively (i.e. No data and No market rule).

a. Obligation to Register

“Obligation to Register” of the regulation is requesting that the entrepreneur to deal with manufacture and/or import the chemical substance(s) of equal or over one (1) ton per annum within the range of EU shall have the obligation to register the chemical substance to be treated, and that the chemical substance without registration cannot be used in the range of EU.

The person who has the liability or obligation to register is the manufacturer and/or importer of chemical substance(s) in the range of EU, and the manufacturer in the outside of EU area can also register through the “Appointed Agent”.

The registration of chemical substances is to be treated at the European Chemicals Agency (ECHA in Helsinki). The chemical substance to be registered in accordance with REACH is classified into “Substance^{*1}” and “Preparation^{*2}”, and all chemical substances have to be registered to ECHA without any relation between the existing chemical substance and the new one. Also, the substance of very high concern included in “Article^{*3} (i.e. formed products)” has to be reported, and the intentionally emissive substance in Article is also required to register. Particularly, the registration of new chemical substance(s) will be performed on the basis of the safety data of the said substance examined and confirmed by the manufacturer and/or importer.

*1 Substance : Chemical substance or its chemical compound obtained as it is in nature from the manufacturing process, and includes all the additive required for maintaining its steadiness and the impurity contained from the process (including the general chemical substance and metal).

*2 Preparation : Mixture or solution composed of two (2) or more substances (alloy metal is also in the category of preparation).

*3 Article : Chemical substance of which particular shape, external surface or design is being provided in order to improve the function of substance.

Person responsible for the registration is not only the manufacturer and/or importer but also the producer and/or importer of the Article (i.e. formed products) which contains the substance(s) under a certain condition (i.e. the intentionally emissive substance or the substance of very high concern to human beings and/or environment). The specific toxic or hazardous substance are restricted or prohibited for use as a rule and it is obliged that the person has to apply the legal system of approval and/or permission and is obliged to make sufficient information transmission in the supply chain.

Schedule for the registration in REACH is shown in Figure 5.5.4.

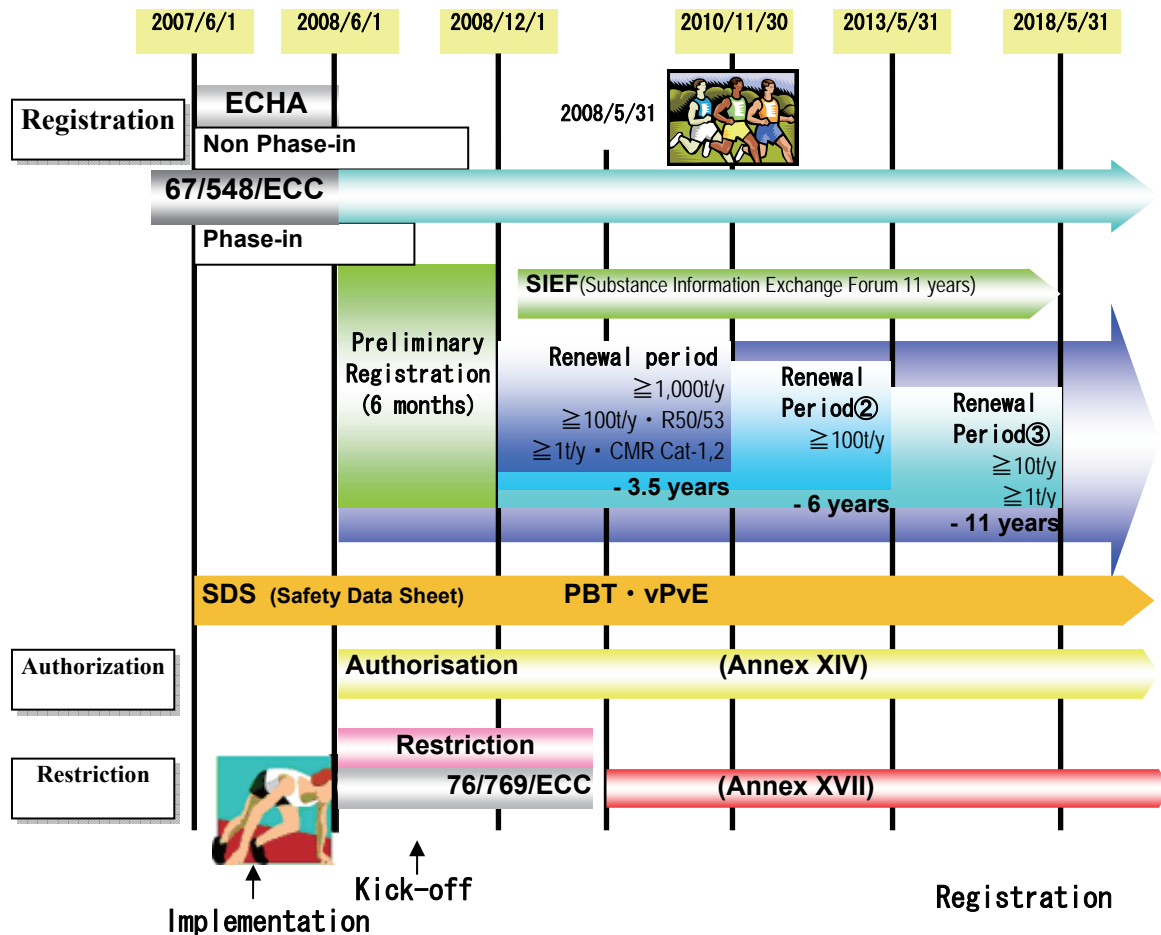


Figure 5.5.4 Registration schedule of REACH

In the schedule on registration of REACH, preliminary registrations for existing substances were commenced since June 1st, 2008, and the time limit to make registration is designated depend on the quantity of substance(s) treated in annum.

(Person Responsible for Registration)

Since June 1st, 2008, it became an obligation of the entrepreneur to register in case of manufacturing and/or importing the substance itself or the preparing substance of equal or more than one (1) ton per annum within the range of EU. The person obliged to register is the manufacturer and/or importer in the range of EU. For the producer and/or the importer in the area outside of EU, there is a legal system that the registration can be made by the unique agent in lieu of himself. The producer outside of EU cannot register by himself.

(Unique Agent)

As the enterprise outside range of EU cannot register by himself, the importer of substance shall have the obligation to make the required registration under the REACH Regulation. From this reason, the

producer of substance outside range of EU shall make contract with the unique agent on the matter of registration as well as the obligation, etc. under the REACH Regulation.

The unique agent has to have sufficient back grounds (i.e. historical facts) of handling such substance(s) and information on the same in order to comply with the obligation of REACH Regulation, and it is required for him to provide SDS (i.e. Safety Data Sheet) as required and to maintain the amount of registered substance(s) imported and the list of customers in the area of EU in the latest states always. The unique agent is a natural person and a legal person as well, and in general, is limitedly to be selected from consulting company or various testing organization, etc, in the area of EU, who has a sufficient knowledge of chemical substances and has actual experience.

b. Assessment

In accordance with REACH, the entrepreneur has the obligation to register the substance to be treated and to provide the information on safety assessment. For the safety assessment, it is the obligation to submit the “Chemical Safety Report (CSR)”. CSR is consisting of Part-A and Part-B, and particularly Part-B has the regulation on “Assessment on the Toxicity and/or Hazardous Properties of Substance”. CSR is as shown in Table 5.5.6.

The European Chemicals Agency (ECHA) is to carry out confirmation on the compatibility of information for registration and to perform assessment of the proposal for testing, and may request to provide the additional information as the case may be required.

The person who completed the registration shall automatically become a member of the “Substance Information Exchange Forum (SIEF)” for the purpose of sharing the information on substances for registration, and has an obligation to share the cost for safety assessment. The “Forum (SIEF)” means the place for exchange the information on substances for the purpose of easy exchange of information between producers and importers of preventing the double execution of testing and of agreement on classification and indication for substances.

Table 5.5.6 Chemical safety report (CSR)

<p>Part A</p> <ol style="list-style-type: none">1. Summary of Risk Management Measures2. Declaration for Implementation of Risk Management Measures3. Declaration for Notification of Risk Management Measures <p>Part B</p> <ol style="list-style-type: none">1. Physiochemical Features of Substance and Preparation2. Production and Use3. Classification and Presentation4. Life Quality in the Environment (Degradable, Distribution in Environment, Biological Accumulation, Secondary Toxicity)5. Harmful Evaluation to human Health6. Hazardous Evaluation of Physiochemical Features7. Harmful Evaluation to wild lives in Environment8. Evaluation of PBT^{*4} and vPvB^{*5}9. Exposure Assessment10. Risk Assessment
--

^{*4} PBT : Persistence, bio-accumulative, and toxic (Appendix XIII)

^{*5} vPvB : Very persistent and very bio-accumulative (Appendix XIII)

c. Authorization

The purpose of approval and/or permission is to control the risk from the substance of very high concern to environment appropriately and ensure a good function of the market in European Union by means of substitution of the alternative substance or technology for that of very high concern step by step in case that such substance of very high concern is possible to be substituted by the appropriate alternative substance or technology from economical and technical point of view.

Among these substances of very high concern, the substance to be approved or permitted (refer to Appendix-XIV) has to obtain an approval or permit from the authority in charge without any relation of quantity of substance in case of marketing and/or using such substance in the area of EU. The substance to be approved or permitted is officially announced (in June, 2009) and is scheduled to be added at the interval of every two (2) years sequentially.

The substances to be approved or permitted are mainly as follows:

- CMR s substance : Substance of Carcinogenic, mutagenicity, and reproductive toxicity
(Substance in Category-1 or Category-2)
- PBT substance : Persistent organic, bioaccumulation and toxic substance
(Criteria designated in Appendix-XIII)
- vPvB substance : Substance having very high Persistent organic & bioaccumulation
(Criteria designated in Appendix-XIII)
- Other substances having concern(s) equivalent to the above influence level with scientific basis on the possibility of serious influence to human health or environment (e.g. endocrine disruptor).

As the basis of approval or permit, the required condition is that 1) the use of such substance is duly under sufficient control, or 2) the social economic advantage is higher than the risk and there is no alternative substance nor technology as well if the condition as stated in Item 1) is not applicable.

d. Restriction

In case of the substance having risk(s) not allowable to human beings and/or environment, there is the restriction (prohibition, permit for specific usage or under certain conditions) for production, selling and use.

2) On “REACH Regulation” of EU

As to the apply scope of REACH Regulation, an example in the case of Aluminum for the scope of metal substance, Preparation and Article is shown in Figure 5.5.5.

For other metals (such as Cr, Cu, Ni, etc.), the scope will be as same as above.

3) Compliance with “REACH Regulation” at the exportation of mineral products made in Albania to EU

The EU Reach Directive (1907/2006) (Registration, Evaluation, Authorization, and Restriction of Chemical Substance) is relevant to the mining sector in Albania. In case of the exportation of mineral products and/or metal articles (i.e. formed metal) from Albania to EU, such materials have to be in compliance with REACH Regulation. Mineral products of Albania prospective in future are Cr, Cu, Ni, etc. Although exportation at the state of ores and/or concentrates as natural raw materials are out of the restriction, the exportation of metal, alloy, rolled or extruded materials is included in the scope of “Substance”, “Preparation” and “Article” and has to be registered for every substance in accordance with the restriction of REACH Regulation.

As the enterprise outside of EU cannot register by itself, the importer shall have the obligation of such registration in lieu of the exporter. In general, the producer outside of EU area shall export mineral products and/or metal articles (i.e. formed metal) upon the completion of a contract with “the Unique Agent” for performing not only the registration but also the obligation of REACH Regulation.

However, it will be necessary to promote the establishment of analytical and/or consulting organization(s) in Albania who can carry out the analysis, etc. required for exportation of mineral products to EU in compliance with the analytical standards of EU and registered in accordance with procedures and conditions in EU in lieu of depending on the importer in EU for all the matters relating to the exportation of mineral products, etc. It is considered that because of this registration that the technical levels in Albania will be improved.

Although the exportation of mineral products to the outside of EU area is not subject to the restriction of REACH Regulation, compliance with the technical level equivalent to REACH Regulation may also be necessary.

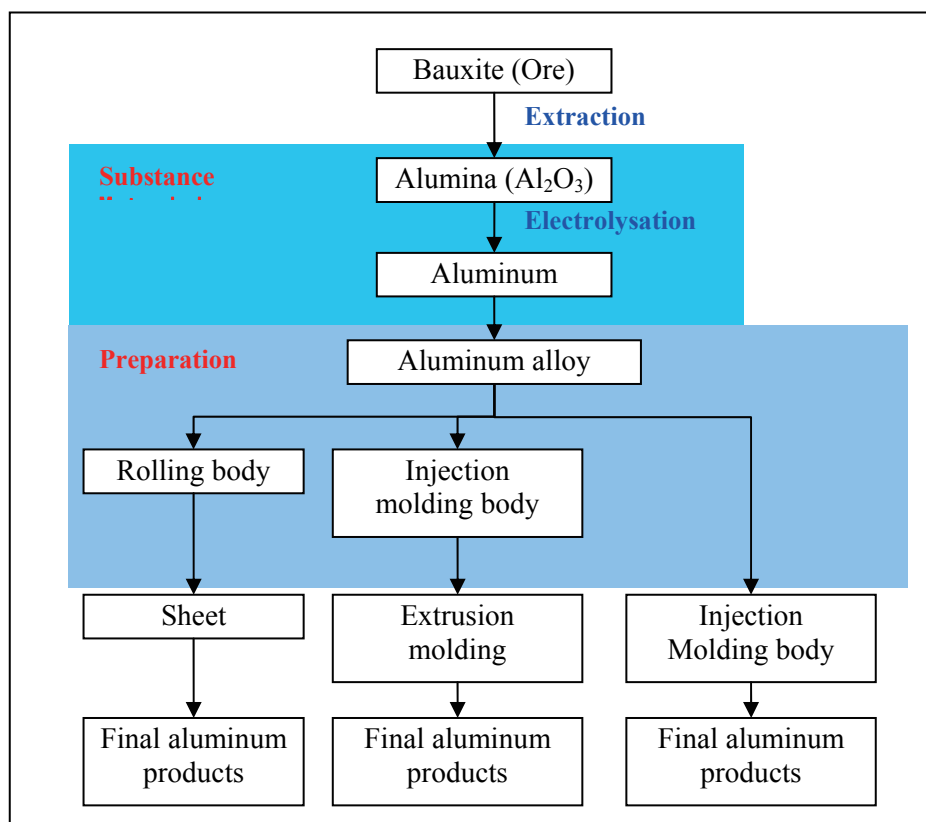


Figure 5.5.5 Sample of raw material, substance, preparation and article : Aluminum

5.6 Environmental Situation at Mine Sites

Administrative works for the operating and closed mines are carried out by the Ministry of Economy, Trade and Energy (METE). Environmental issues of mining are also managed by METE collaborated with MEFWA through the environmental management and monitoring works. However, communication between two the ministries seems to be insufficient.

The environmental management of the operating and closed mines and organization in charge of this are described below.

5.6.1 Environmental Administration System Related to the Mining

The organizations related to environmental management are METE, MEFWA and AKBN, as shown in Figure 5.6.1 and they are described below.

1) Environmental administration system of METE related to the mining

The “Directorate of Mining Industry” of the “General Directorate of Natural Resources Development Policies” of METE supervises mine management in general. Since the Directorate of Mining Industry of METE does not have organization in charge of environment, therefore METE is presently entrusting all environmental matters to “Directorate of Monitoring” of the Mining Department of AKBN.

Concerning the mine development, it is necessary for developer to obtain an “Environmental Permission” from MEFWA before approval of mining concession. EIA must be implemented before approval of environmental permission. According to the law on EIA, scope of the project must be described in EIA (Table 5.3.2). A detailed scope and classification of the project for EIA are given in Table 5.3.2. Although it is specified in Appendix 2 as “Mining Industry” not included in Appendix 1, the item of metal mining industry is not found in Appendix 1. It seems that the item of metal mining industry is missed in the table by mistake. However, the environmental permission as well as EIA is required for all of the mining concessions, hence it should be no problem for METE and MEFWA to systematically control environmental procedure.

EIA is not required for small scale mining, certain type of minerals and mineral exploration, but it is necessary to submit “Environmental Management Plan” to METE and “Environmental Permission” must be obtained from MEFWA.

EIA includes a description of the contents of environmental consideration and monitoring plans. Implementation of those environmental plans can be checked by periodical environmental reports to MEFWA and METE/AKBN.

“Mining Plan” consists of plans of mining, techniques, financial, etc. and is submitted to METE/AKBN. However, the “Mining Plan” does not include environmental measures. The management items related to the environment and mine closure consist of the Monitoring Report, Post-mined Plan, Environmental Rehabilitation Cost Plan and Environmental Conservation Plan. The Monitoring Report and Environmental Rehabilitation Cost Plan are submitted to MEFWA from each mining company, and the Post-mined Plan and Environmental Conservation Plan are submitted to METE/AKBN. However, there are not implementation cases of the Post-mined Plan, Environmental Rehabilitation Cost Plan and Environmental Conservation Plan after enactment of existing “Mining Law (revised in 2004)”.

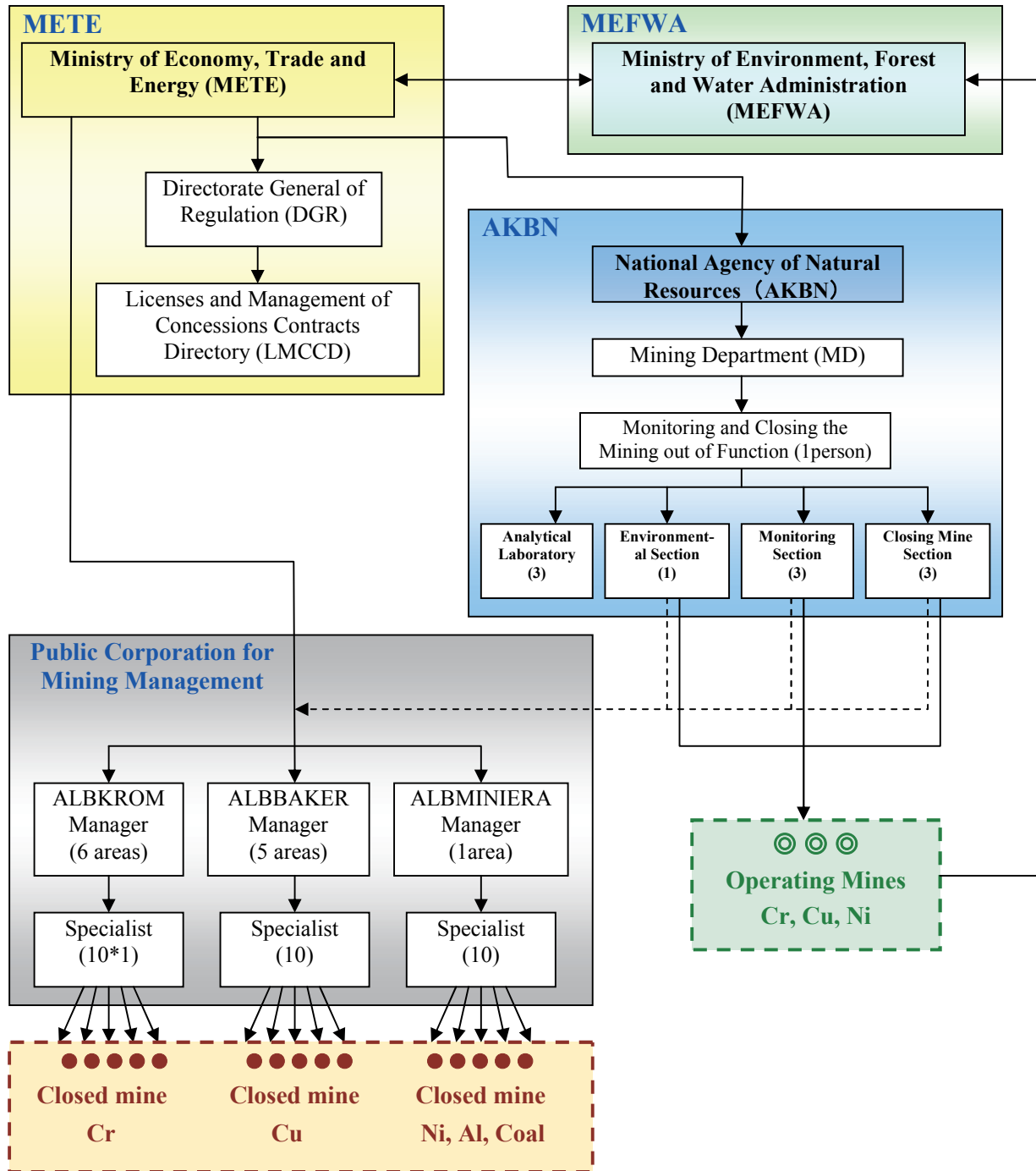
The “Technical Committee Related to Mining” is established in AKBN, and the various reports and plans submitted from each mining company are examined in this committee. The committee members consist of representatives from each division of AKBN, including legal expert, economist and technical experts, but environmental expert and experts from outside are not included.

2) Environmental administration system of AKBN related to the mining

The section of “Monitoring and Closing the Mining out of Function” of AKBN consists of four sub-sections, including Environmental Sub-section, Monitoring Sub-section, Closed Mine Sub-section and Chemical Laboratory, and these sub-sections administer environmental management of operating and closed mines.

MEFWA sends the monitoring results, submitted four times per year from operating mines, to METE. Then, METE hands their data to AKBN for examination and compilation of analytical data. As such, the environmental reports are submitted from AKBN to MEFWA through METE.

Environmental Administration System Related to the Mining



*1 : Number of staff.

Figure 5.6.1 Environmental administration system of METE, AKBN and Public Corporation for Mining Management

3) Environmental monitoring for closed mines

The environmental monitoring of closed mines is carried out by the section of “Monitoring and Closing the Mining out of Function” of AKBN. The monitoring is done four times per year same as MEFWA’s monitoring works. Chemical analysis is conducted in the Sub-section of Chemical Laboratory, equipped with analytical instruments of physical measurements, spectrometry, atomic absorption spectrophotometer, etc. The water samples of monitoring, taken by AKBN, are analyzed in the laboratory.

Analytical parameters for monitoring generally consist of four components, such as pH, Cu, Fe and S. These parameters are not enough for understanding the environmental situation of mine sites, because harmful heavy metals such as Cd, Cr⁶⁺, Hg, Pb, As, etc. are not included.

Sampling methods of water in mine site

Sampling sites for water monitoring in the mining sites are basically selected at two points of upper and lower parts of the mining site. In addition, mine water from gallery, seeped water from tailings dam, etc. are also taken for physical measurement and chemical analysis. The sampling frequency is four times per year and analytical parameters consist of four components of pH, Cu, Fe and S.

4) Public Corporation for Mining Management (tentative name)

After 1990s most of the mines were closed, and the management of these closed mines is enforced by “Public Corporation for Mining Management”, established and funded by subsidy from METE. The public corporation consists of three corporate, namely “ALBKROM”, “ALBBAKER” and “ALBMINIERA”, working for closed mines in whole area of Albania.

The public corporation submits safety measure plans and cost estimations to METE every year and funds for appropriate measures are prepared if they are approved. The main task of the public corporation consists of environment, safety, reforestation, etc. for management of mining facilities, however present work is limited to maintain safety of closed mines such as safety of galleries, caves, etc because of limited budget.

The environmental management of closed mine by the Public Corporation for Mining Management seem to be the best way, for this, it is necessary for METE to increase budget for funding the corporation to bring up experts of environmental management of closed mines and to install necessary instruments and facilities for the environmental management.

5.6.2 Environmental Management System by the “New Mining Law (2010)”

The new mining law, adopted in July 2010, included provision on mine closure and mine rehabilitation plans. Detailed secondary regulations are being developed within the framework of the New Mining Laws.

1) Comparison of environmental consideration between the previous “Mining Law” and the “New Mining Law”

Comparison of environmental consideration between existing “Mining Law” and “New Mining Law” is shown in Table 5.6.1.

According to the existing “Mining Law”, it is necessary for a mining developer to obtain an “Environmental Permission” including EIA from MEFWA before approval of mining right. EIA includes the content of environmental consideration and monitoring, and then the Monitoring Report, Post-mined Plan, Environmental Rehabilitation Cost Plan and Environmental Conservation Plan are submitted as obligations during mine development.

According to the “New Mining Law”, EIA and monitoring requirements are basically the same as the existing “Mining Law”. However, a Mine Closure Plan, Environmental Rehabilitation Cost Plan and Environmental Conservation Plan are required to be integrated into the “Environmental Rehabilitation and Implementation Plan” and “Environmental Rehabilitation Fund System”. The “Environmental Rehabilitation and Implementation Plan” is submitted to METE at the same time as obtaining the mining right and should be approved by METE. The mining developer has an obligation to submit the yearly “Environmental Rehabilitation Report” to METE/AKBN after the start of mining and “Final Environmental Rehabilitation Plan” before mine closure.

The “Environmental Rehabilitation Fund System” is a deposit money system for the environmental rehabilitation fund in bank. There are two cases for implementation of environmental measures and conservation, i.e. one case is that environmental rehabilitation and monitoring work after mine closure are completely implemented by the mining company; the other case is that environmental rehabilitation and monitoring works after mine closure are implemented by METE/AKBN using deposit money of rehabilitation fund.

The procedure of environmental consideration through the mine life from mineral exploration stage to mine closure according to the “New Mining Law” is shown in Figure 5.6.2.

2) On the “Environmental Rehabilitation and Implementation Plan”

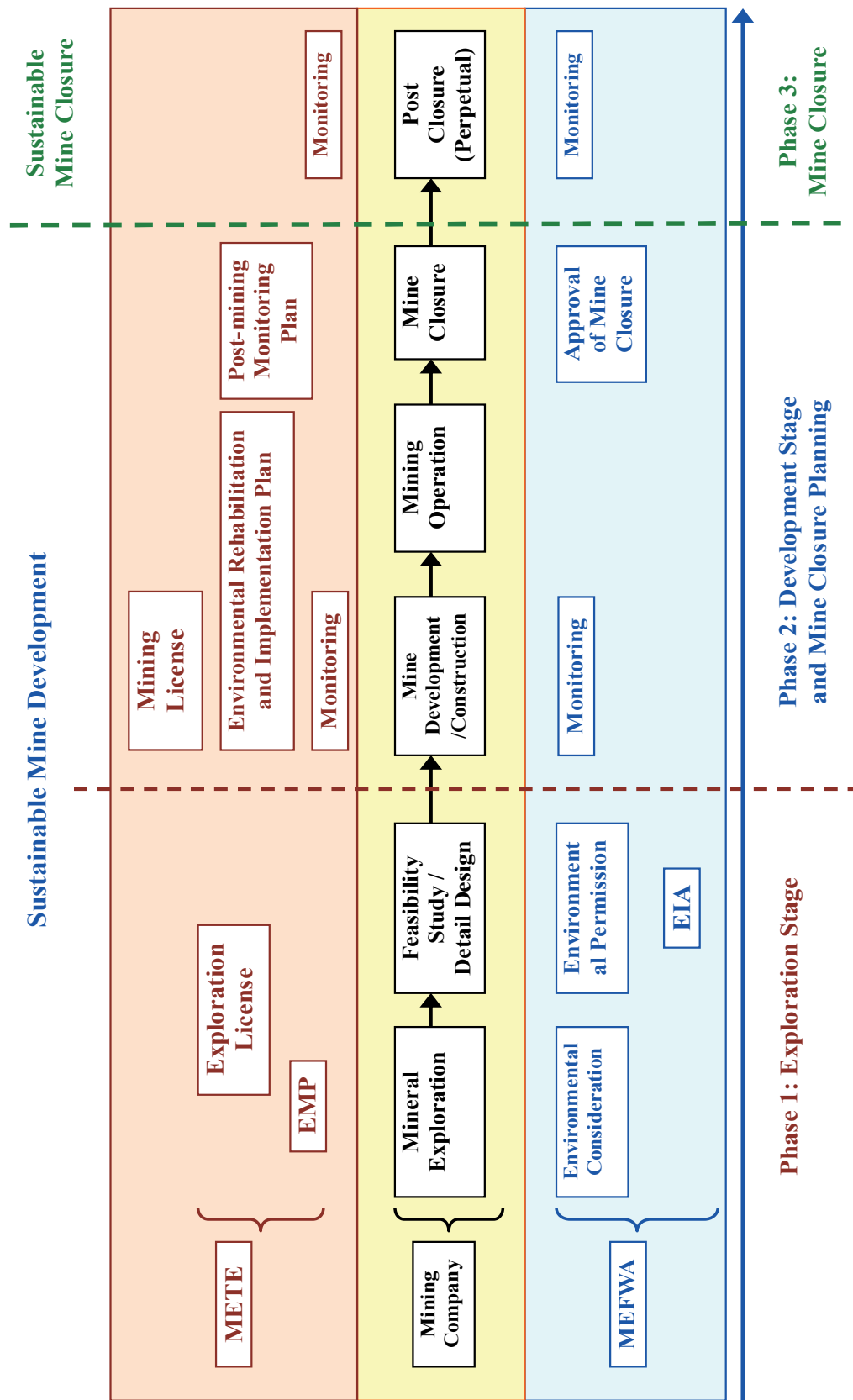
On the “Environmental Rehabilitation and Implementation Plan” of the New Mining Law, conceptual comments formulating a policy for the sustainable mining development and mine closure are shown as below.

- **Conformable contents between EIA and “Environmental Rehabilitation and Implementation Plan”:** The directions of environmental consideration between environmental contents of EIA during the mine development and the “Environmental Rehabilitation and Implementation Plan” for the mine development should be consistent. The “Environmental Rehabilitation and Implementation Plan” is planned and submitted after EIA, therefore the environmental contents of the “Environmental Rehabilitation and Implementation Plan” should be adequately examined at the time of EIA study. These environmental contents are thought to be an important guarantee for the environmental conservation.
- **Environmental Management System:** The operation management and environmental management of a mine are completely linked, hence operation of a mine should be conducted simultaneously together with environmental management. Therefore, the environmental inspection inside of the mine area should be conducted together with the inspection of mine operation by METE/AKBN at the same time, and then regional environment outside of mine area should be managed by MEFWA.
- **Environmental Monitoring Management:** Monitoring is one of the important tools for environmental management. The sampling area of monitoring includes inside and surroundings of mine area, i.e. monitoring result of regional area surrounding mine should be managed by MEFWA, and monitoring result of inside of mine area should be managed by METE/AKBN. As the monitoring results of both areas should be concurrently informed to MEFWA and METE/AKBN, concurrent environmental management of both offices is essential.
- **Expanded Technical Committee:** Since, presently, technical committee examining environmental management has not been established yet, it is impossible to fully examine the monitoring results as technical management. Therefore, it is necessary to establish the “Expanded Technical Committee”, including members of relevant ministries, agencies,

university, etc. aiming at sustainable environmental management of mine. For this purpose, particularly, a strong environmental inspection system is required under the agreement between MEFWA and METE.

Table 5.6.1 Comparison of environmental consideration between existing “Mining Law” and “New Mining Law”

Items	Existing “Mining Law”	“New Mining Law”
1. Environmental Impact Assessment (EIA)	- Environmental Permit including EIA should be obtained from MEFWA before applying mining right to METE.	- Same as left.
2. Mining Plan	- Mining Plan including aspects of mining, technical, financial, etc. is submitted to METE/AKBN. However, it does not include environmental aspect and measuring methods.	- Same as left.
3. Monitoring Report	- Reporting to MEFWA and METE (1 or 2 times/year, operational mine). - The content of monitoring plan should be included in EIA Report.	- Same as left. However, the monitoring works after closing mine and implementing final environmental rehabilitation will be carried out by AKBN.
4. Mine closure Plan	- This plan should be submitted to METE before end of mining operation, but there is no example of implementation.	- This plan will be integrated to Item No. 7 of the “Environmental Rehabilitation and Implementation Plan”.
5. Environmental Rehabilitation Cost Plan	- This plan should be submitted to MEFWA before end of mining operation, but there is no case of implemented.	- This plan will be integrated to Item No. 7 of the “Environmental Rehabilitation and Implementation Plan”.
6. Environmental Conservation Plan	- This plan is same as outline of environmental measures of EIA, and the plan should be submitted to METE/AKBN, but there is no case of implementation.	- This plan will be integrated to Item No. 7 of the “Environmental Rehabilitation and Implementation Plan”.
7. Environmental Rehabilitation and Implementation Plan	- No regulation.	- This plan will be submitted at the same time as application of mining right. Environmental Rehabilitation Report will be submitted once per year. - The Final Environmental Rehabilitation Plan will be submitted to METE/AKBN at the end mining operation.
8. Environmental Rehabilitation Fund System	- No regulation.	- This system is a deposit money system for the environmental rehabilitation fund to bank. - There are two cases: one case is that environmental rehabilitation and monitoring work after mine closure are completely implemented by the mining company, the other case is that those are implemented by METE/AKBN using deposit money of rehabilitation fund.



*EMP : Environmental Management Plan

Figure 5.6.2 Procedure of environmental consideration through mine life

5.6.3 Environmental Situation of Mines

The environmental situation of mine sites in Albania is described below.

1) History of mining activity of Albania

Albania has rich mineral resources such as Cr, Ni and Cu. In the 1970s and 1980s, it was the world's 3rd largest producer of Cr and exported significant amount of Cr to other countries including Japan. However, mining sector had come to deadlock in 1991 due to management of over-scale expansion as national enterprise, absence of competition, disregarding of cost, etc.

After that, the production of the mining industry has rapidly decreased due to deterioration of the domestic economy, rapidly decreasing of international competitive power of mining sector, etc. during the country being shifted to a market economy and privatization.

Keeping step with innovation of central government during the shift to the market economy, the "Mining Law" was instituted in 1994 and innovation of the mining sector as well as privatization of national enterprises had been progressed and the mining concession had also been started to be issued. As a result of innovation of mining sector, the privatization of mining sector had been accomplished. However, most of mines and smelters being economically inefficient had been obliged to close.

Although an indication of the increase of recent mining production can be observed, the present quantity of production of Cu and Cr have decreased to 1/10 and 1/4 respectively as compared with those of the 1980s, and it seems that the recovery and increase of industrial production depend on the reconstruction of mining sector.

2) Impacts on the environment (as mine pollution)

Since mining development had been carried out based on the management of over-scale expansion, disregarding cost, etc. in 1970s and 1980s, exhaust gas and waste water from mining and smelting facilities had mostly been discharged without any treatment and the potential for pollution was increased. In particular, exhaust gas from smelters in Elbasan, Lac, Rubic, etc. had been recognized as cause of air pollution.

Most mines and smelters were closed after 1990s and most of mining, concentrating and smelting utilities were sold, but mined out sites, mining facilities, tailings, etc. remained and uncontrolled in the sites. Mine water including mined out sites and tailings dams have been discharged without any treatment. Although the Public Corporation for Mining Management is managing the safety of galleries, caves, etc., the environmental management can not be covered by their activities.

At the sites of smelters, although closed smelters without exhaust gasses have definitely contributed to improve air pollution, wastes including slugs, etc. were remained and uncontrolled in the sites.

3) Environmental situation of operating mines

Presently, major operating metal mines are Bulqiza Cr Mine and Munelle Cu Mine. Many quarries of construction materials including limestone, other rocks and river gravels are operating in many places.

During 2nd Study in Albania, the environmental study team visited the site of Bulqiza Cr Mine and its surroundings and their environmental condition is reported below. Locations of visited mines are shown in Figure 5.6.3.

ACR (Albanian Chrome) owns main part of Bulqiza Mine, Burrel Cr smelter, Klos Cr concentrator, Bulqiza Cr concentrator and Elbasan Cr smelter. Presently, among them Bulqiza Mine, Bulqiza Cr concentrator and Elbasan Cr smelter are operational.

(Mineral concentrator at Bulqiza Cr Mine)

- Cr concentrator : Presently, old tailings and low grade Cr ore are treated by this plant. Tailings are under 2.5 mm in diameter of grain size and 8 to 20 % of Cr₂O₃, and treating volume is 224,000 t per year. New tailings are dumped in new dam located on eastern side of old tailings dam (Photograph 5.6.1).
- Old Cr tailings dam : Old Cr tailings dam is relatively small size. Tailings include 8 to 10 % of Cr₂O₃, so that Cr of tailings is presently extracted. Recovery of Cr from tailings is considered to be the same activity as mitigation of impacts from tailings. Therefore, recovery of Cr from tailings is thought to be improving environmental situation.
- Cr tailings after retreatment: New Cr tailings are dumped in new tailings dam (Photograph 5.6.2). Water quality of seeped water from tailings dams is necessary to be checked on heavy metals.
- Water quality of mine and seeped water: Although it is said by many people that water quality of mine and seeped water from tailings and waste dump areas are good, there are no monitoring results. Therefore, it is necessary to monitor water quality for few years at reliable chemical laboratory.



Photograph 5.6.1 View of Bulqiza concentrator



Photograph 5.6.2 Old tailings dam (left side) and new tailings dam (right side)

(Bulqiza Cr Mine)

- Bulqiza Cr Mine: The operation of this mine is conducted to deep level, so that a part of old town site of Bulqiza Town has been affected by serious land subsidence (Building of elementary school in old town site was collapsed).
- Waste dump areas: Vast quantity of Cr wastes is being dumped around the mine mouths and shafts. Cr wastes seem to be in a state of nature. As some people are illegally taking Cr ore remained on slope and foot of waste dump areas, slope failure of wastes is anticipated because of destabilizing of slope of waste dump.
- Environmental situation: Since there are not any data of mine water and seeped water from wastes and tailings, it is necessary to monitor water quality for few years.

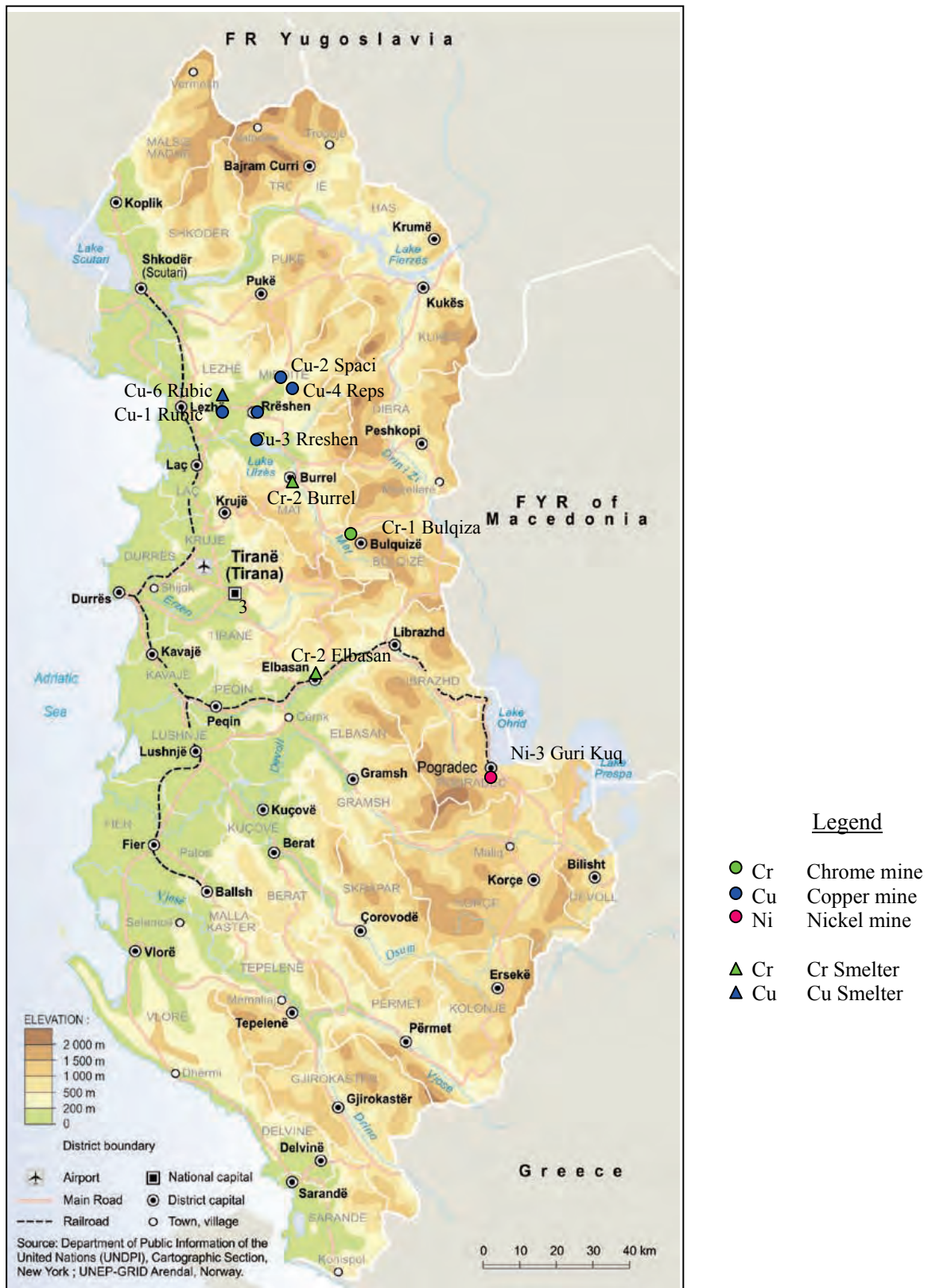


Figure 5.6.3 Mines for on-site environmental investigation

(Burrel Cr smelter)

- Cr smelter: The smelter was operated for 27 years from 1979 to 2006. There were three furnaces with total capacity of 70,000 t-ore/year. As three furnaces have been already corroded and, they are not ready for operation.
- Environmental situation: Presently, a large amount of Cr slag has been dumped in front of factory along small creek. They are uncontrolled, eroded and some of them are flowing to the downstream along creek. It is necessary to monitor the water quality of seepage from slag dump areas (Photographs 5.6.3 and 5.6.4).
- Smelting: Concerning the environmental condition during operation of the smelter, exhaust gas from furnaces is thought to have been discharged directly without any treatment (or with insufficient treatment), because scrubber or bag-filter as smoke control systems are not found in the site.

(Klos concentrator)

- Cr Concentrator: Capacity of concentrator is 400,000 t/year, but it has no record of operation.
- Environmental situation: There is no environmental problem because there is not any record of operation.



**Photograph 5.6.3 Burrel Cr smelter
Cr slag dump area**



**Photograph 5.6.4 Cr slag dump area and
stream (outflow of Cr slag)**

(Elbasan Cr smelter)

- Smelter: The first electric furnace was started operation in 1989, and other two electric furnaces had been installed after that. Presently, ACR is operating No.1 electric furnace for high-carbon ferrochrome (capacity :1,500 t/month) and is conducting running test of No.3 electric furnace for low-carbon ferrochrome (capacity :1,300 t/month), but No.2 electric furnace is not operational.
- Smoke control system before ACR: Exhaust gas from electric furnaces before ACR was controlled by bag-filter as smoke control systems. Presently, the smoke control systems are also used for the operation of high-carbon ferrochrome electric furnace.
- Slag before ACR: Slag produced before ACR contains several % of Cr, so that the slag is reused as crude ore for the high-carbon ferrochrome production after rough crushing. Therefore, recovery of Cr from old slag gives positive impact for environmental issues.

- Low-carbon ferrochrome electric furnace: Concerning the smoke control systems for the operation of new low-carbon ferrochrome electric furnace, ACR has a plan to install new bag-filter. Although testing of smelting has been already started in the site, its implementation schedule of new bag-filter systems seems to be not decided.
- Wastes: Except slag, treatment of other wastes including refractory materials, soot and dust, etc. are unknown.

4) State of environment

For the purpose of field investigation on present state of environment in Albania, quarry of limestone in Kruja and the industrial wastes treatment plant in Elbasan were visited and inspected, and the present state of environment in these areas has been examined and discussed.

a. Quarries

In Albania, many quarries for limestones, marble, serpentinite, sandstones, mudstones, etc. and stopes for river sands and gravels are being operated.

Quarries of limestones for cement and for crushed stone and/or rubble, and the quarry of clay for fired bricks in Kruja have been inspected.

The satellite image map on the area around Kruja and Fushe Kruja are shown in Figure 5.6.4.

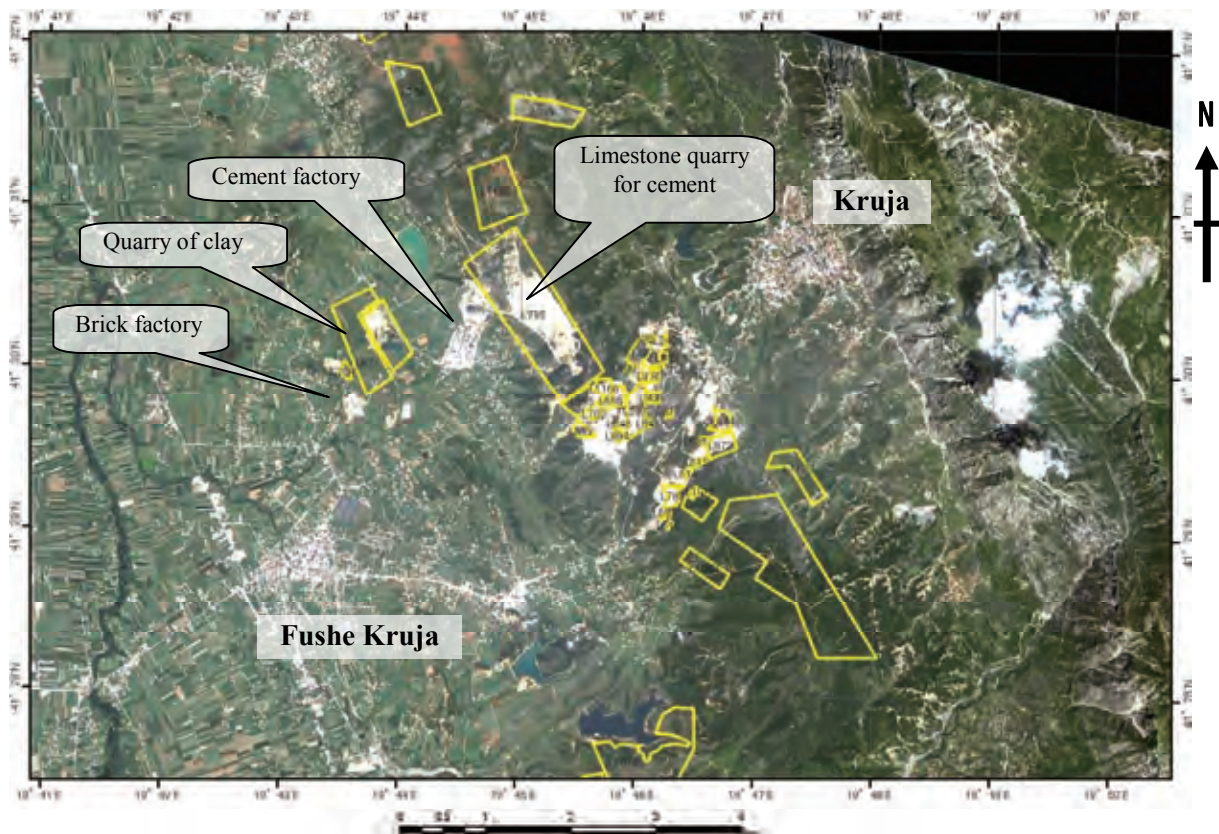


Figure 5.6.4 Distribution of limestone quarry in Kruja

(Quarry of limestone for cement)

As shown in Figure 5.6.4, the cement plant and quarry for limestone in Kruja are located adjacent to each other.

In the limestone quarry, limestones ~ muddy limestones in upper zones of the Cretaceous period are mined by open pit mining. The factors affecting the environment are drain water, dust, noise, vibration, etc. From the present state, the issue should be less since the generation of dusts is less and the quarry is located at the area very far and completely separated from residential area. In the cement plant, the countermeasures against dust dispersal are taken into consideration by means of covering crushing area and stock yard with roof.

(Limestone quarry)

The crushing plant in small scale limestone quarry (Photograph 5.6.5 and Photograph 5.6.6) is located at the area close to the town area of Fushe Kruja located at the lower land. A large amount of dusts and fine particles are generated and dispersed as well as noise, and accordingly there will be high concerns on the influence to inhabitant around the plant especially by dusts and fine particles.



Photograph 5.6.5 Crushing plant for limestone quarry



Photograph 5.6.6 Screening equipments for limestone quarry

(Quarry of clay for fired brick)

The clay quarry for fired bricks is located at a lower hill side in the area of west-south-west direction downstream from the cement plant in Kruja. In the quarry of clay zone, there is a pond in the place where exploitation was carried out, and filling back and covering up with soil for recovery are required in case that it is not used as a pond. Mine clays are formed and fired at brick factory for the architectural bricks.

(Stope for river sand and gravel)

At the downstream areas of rivers and streams in various regions, the collection work of sands and gravels for construction is being carried out. The approval for collection of sands and gravels and the permission on environment conservation are obtained from the local government and MEFWA. However, the collection work without appropriate planning causes the lowering of river bottoms and bringing about unsteady state of river bottom as well in some cases even development after acquiring such approval and/or permit. There are cases where the area of unsteady state due to exploitation work and the constructs such as bridge (especially piers of bridge), water-intake facility, etc. located near unsteady area will be seriously impacted. Therefore, it is necessary for the local government and MEFWA to conduct strict monitoring of exploitation site of river gravel, particularly for exploitation activities without planning.

5) Environmental situation of closed mines

Many closed metal mines and mining facilities are distributed in whole area of Albania. During 2nd Study in Albania, three mine areas, other than Bulqiza mine, were visited, including concentrator of Guri Kuq Ni Mine, Reps concentrator, tailings dam of Spaci Cu Mine and Rreshen tailings dam of Gurth Mine. The environmental situation of each mine site (Figure 5.6.3) is described below.

a. Concentrator of Guri Kuq Ni Mine

- Guri Kuq Mine: Guri Kuq Mine is located on west side of Pogradec railway station on west bank of Ohrid Lake. Ni concentrator and stockpile of Ni ore are closely located in south and southwest of the railway station.
- Guri Kuq concentrator: Ruins of concentration plant remain without any equipments and utilities for concentration (Photograph 5.6.7).
- Environmental situation: There is no waste dump around the site, presently. Stockpile of Ni concentrates is located on counter side of the national road (beside railway station), and a stock pile of reddish brown Ni concentrates (about 100m long×50m wide) remains in the site (Photograph 5.6.8). There is excavated pit in the center of piling yard. Small fishes and water plants were found in the pit. Water quality seems to be not bad, because fish and water plants are living.



Photograph 5.6.7 Concentrator of Guri Kuq Ni mine



Photograph 5.6.8 Ore stockpile and seeped water at excavated site

b. Concentrator of Spaci Cu Mine

- Spaci Mine: Spaci Mine site is located 8 km from Reps where the concentrator is located along the highway.
- Reps concentrator: Concentration plant has been laid in ruins without equipments for ore concentration. Ore and tailings are scattered in the site and ore is mostly oxidized.
- Tailings dam: There are three tailings dams, namely No.1, No.2 and No.3 tailings dams. No.1 and No.2 tailings dams are “Flat type” dam, located on left bank of Fane River, a tributary of Mati River (Photographs 5.6.9 and 5.6.10).

The flat type tailings dam has three faces of dyke to the riverbeds as shown in Figure 5.6.5. Therefore, the length of dyke is relatively long. As the dyke is easily subject to river erosion during rain season, it is necessary to construct more strong protection, particularly foot of dyke, against river erosion. In

general, a full maintenance is necessary for old tailings dam. In case of overage tailings dam, the dyke becomes weak against river erosion and there are possibilities of spillage accidents of tailings due to collapse of dyke.



Photograph 5.6.9 Reps No.1 tailings dam Photograph 5.6.10 Reps No.2 tailings dam
(flat type tailings dams of reps concentrator of Spaci Cu mine)

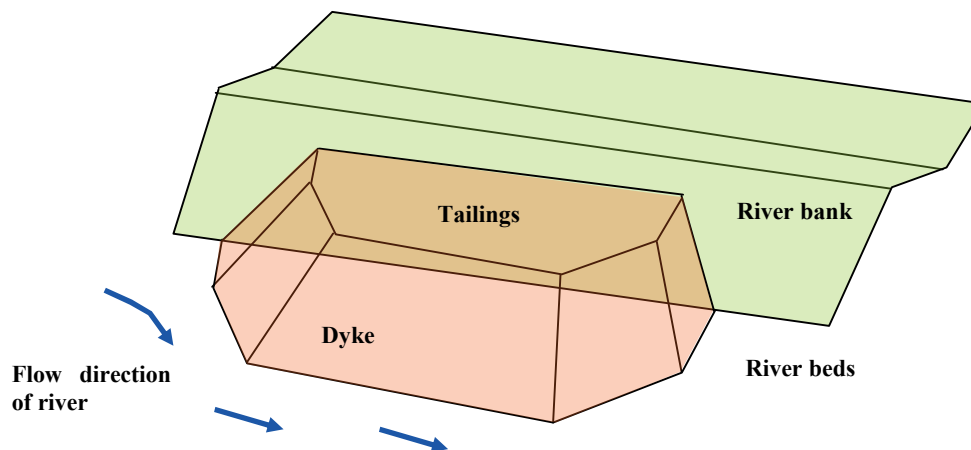


Figure 5.6.5 Tailings dam of “Flat type”

- No.3 Tailings dam: No.3 tailings dam, located in a tributary of Fane River, is “Valley type” and upstream dumping tailings dam (Photographs 5.6.11 and 5.6.12). Model and structure of the valley type tailings dam is shown in Figure 5.6.6.
- “Valley type” tailings dam: Valley type tailings dam has a dyke perpendicular to the valley and tailings are piled on the upper part of the dyke. Dyke is generally made by piling of coarse grained tailings. River water from upper stream and hill side is usually drained by drain pipe and basal culvert. Although No.3 tailings dam was also installed by culvert and hillside drain pipes, drainage system had been broken as shown in Photograph 5.6.13 and river water is mostly infiltrated into the tailings.
- Seepage: Seeped water is found in the lower part of dyke of the tailings dam. Surroundings of seepage are unstable due to erosion and slope failure. However, concrete (sand control) dam was being set at the lowest part of the dam for protection of slope failure of dyke. As seeped water is pH 3.03, concrete dam has easily been dissolved by acid water. It is necessary to take measures for protection against slope failure and acid water.

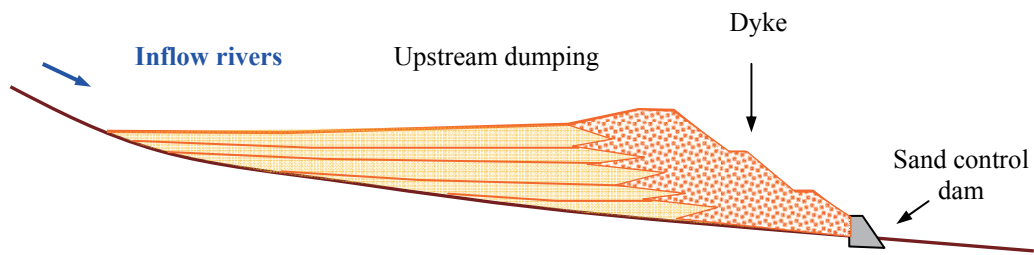


Figure 5.6.6 Tailings dam of “Valley type”



Photograph 5.6.11 Reps No.3 tailings dam



Photograph 5.6.12 Upper part of No.3 tailings dam and vegetation on the dam



Photograph 5.6.13 Drain pipe (hillside) at No.3 tailings dam



Photograph 5.6.14 Slope erosion at dyke of No.3 tailings dam

- Water sampling: Seeped water was sampled for monitoring of water quality. Chemical analysis was done at the laboratory of AKBN. Analytical results are shown in Table 5.6.2. Reversed pH (RpH) shows strong acid of 3.03, the concentrations of heavy metals, including Cu, Pb, Ni, Fe and Mn, exceed the environmental standards of water quality as shown in Table 5.5.3. Therefore, the seeped water is clearly contaminated by harmful heavy metals. Currently, this contaminated water is constantly flowing out to the river.

Table 5.6.2 Analytical results of seeped water at Reps No.3 tailings dam

Analytical Items	Results
Reserved pH (RpH)	3.03
Conductivity	92 μ S/cm
Salinity	5.1 mg/L
Cu	2.9 mg/L
Zn	14 mg/L
Pb	0.10 mg/L
Ni	0.30 mg/L
Cr	ND *1
Fe	180 mg/L
Mn	33 mg/L

*1 : Non detective (Analysis :AKBN)

c. Rreshen tailings dam at Gurth (closed) Mine

- Rreshen tailings dam of Gurth Mine: Rreshen tailings dam is located beside concentration plant along highway (Photograph 5.6.15).
- Tailings dam: There is only one tailings dam of valley type (Photograph 5.6.16). Dyke of the dam is about 150 m wide, about 60 m high and more than 400 m long. The dyke has four steps and is considerably eroded, but tailings of dyke are well compacted and large scaled slope failures are not found on the dyke.
- Culvert and basal culvert: Culvert pipes and basal culvert were installed in the dam for drainage of surface and river water. However, both culverts had been broken and are nonfunctional. In addition, as basal culvert is broken in middle of the dam, spillage accidents of tailings had occurred.
- Caves: Two big caves occur due to spillage accidents of tailings and are filled by water (Photograph 5.6.17). Cave located in lower part shows almost round shape with a diameter of about 20 m. Mechanism of formation of caves is shown in Figure 5.6.7.
- Erosion of dyke: Right side of dyke is deeply eroded (Photograph 5.6.18). Deep erosion increases instability to the tailings dam.



Photograph 5.6.15 Concentrator of Rreshen Cu mine



Photograph 5.6.16 Dyke of tailing dam



Photograph 5.6.17 Two caves occur in the tailings dam side of dyke (approximately 20 m in diameter, filled with water)



Photograph 5.6.18 Deep erosion on the right

- Slope failure: In case of leaving damage of basal culvert, spillage of tailings will occur again and caves will be expanded. When caves reach up to the dyke, the function of dyke will be lost due to erosion of dyke. The dyke will successively become unstable and there would be possibility of collapse of a whole tailings dam. It is necessary to carry out periodical monitoring and to drain surface water and groundwater of the tailings dam.
- Dyke: Seeped water (Photograph 5.6.19) was sampled for monitoring water quality. Chemical analysis was done at the laboratory of AKBN. Analytical results are shown in Table 5.6.3.
- Analytical results: RpH shows strong acidity of 3.07 and the concentrations of heavy metals of Ni, Fe and Mn exceed the environmental standards of water quality as shown in Table 5.5.4. Consequently, seeped water from tailings dam is contaminated water mainly by Ni.

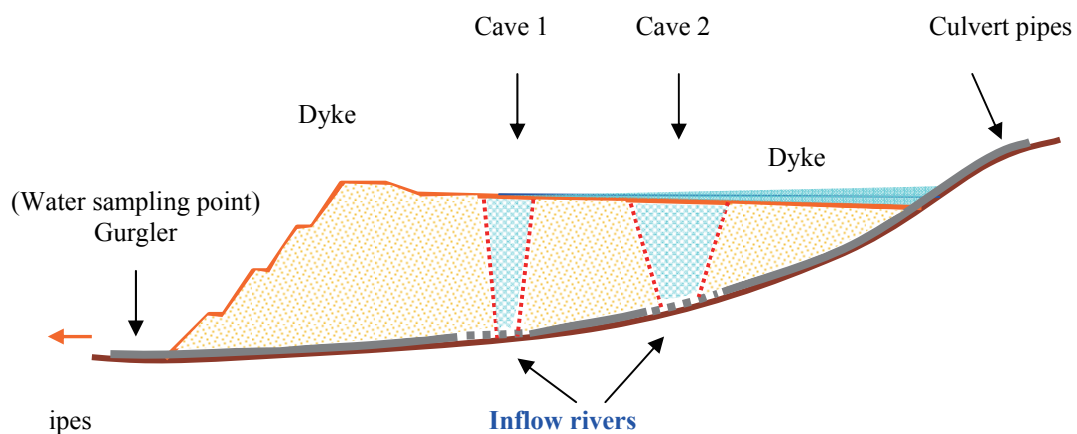
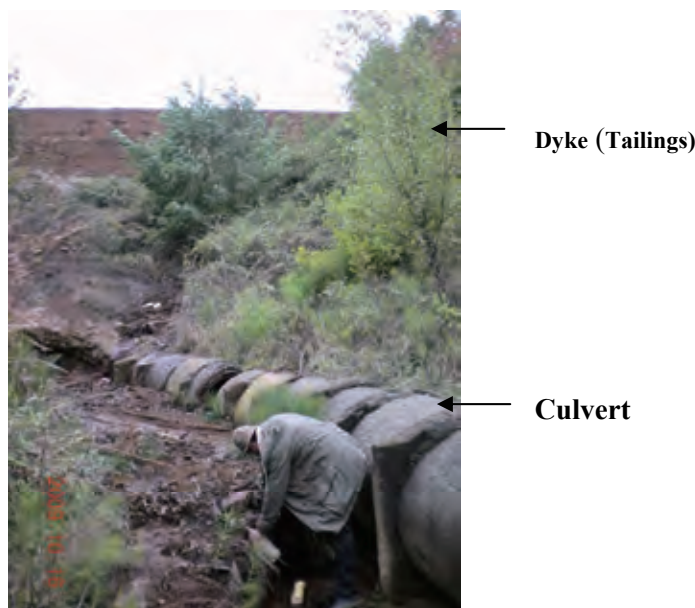


Figure 5.6.7 Occurrence of caves in Tailings Dam



Photograph 5.6.19 Water sampling of seepage from Rreshen tailings dam

Table 5.6.3 Analytical results of seepage water from Rreshen tailings dam

Analytical Items	Results
Reserved pH (RpH)	3.07
Conductivity	55 μ S/cm
Salinity	2.91 mg/L
Cu	0.99 mg/L
Zn	4.8 mg/L
Pb	0.009 mg/L
Ni	0.79 mg/L
Cr	ND *1
Fe	130 mg/L
Mn	18 mg/L

(Analyzed :AKBN)

5.6.4 Environmental Investigation and Countermeasures for Mine Pollution

Although the site investigations for mine pollution conducted by the study are not enough to draw definite conclusions, the environmental situations of closed mines are mostly uncontrolled, and seeped water is discharged to the rivers without any treatment. Therefore, environmental risks at the mine sites are clearly impacting to the downstream water sources and the surroundings of the mine.

METE, which has responsibility of managing the operation and closure of mines, should make arrangements to carry out the inventory survey for understanding the environmental situation of each closed mine in the whole area of Albania as soon as possible and should make prioritization of closed mines based on the environmental risk, and then it is possible to start planning and implementing reasonable countermeasures for mine pollution.

Concerning the countermeasures for mine pollution, although countermeasures against pollution are not clearly defined in Appendices 1 and 2 of the law on EIA (MEFWA) (Table 5.6.4), according to the comments of MEFWA and AKBN, an EIA is required for planning countermeasures of closed mines. Therefore, implementation of EIA is considered to be important step for sustainable development of mining sector.

Table 5.6.4 Mining project with requirement of EIA

(1) Activities that undergo profound process of EIA (abstracted from Appendix 1)

1. Factories of fuse of minerals (including minerals that contain sulphur).
2. Calcimining and bake of minerals that contain toxic elements such as Hg, As and Cd.
3. Foundries of iron metals with a production capacity higher than 100 t/day.
4. Foundries or factories for production of colored metals and non-ferrous metals from minerals, concentrates or secondary matters of metallurgical, chemical and electrolytic processes, etc.
5. Production and processing of alloys for non-ferrous metals containing arsenic, mercury and lead with a higher capacity than 1,000 t/year.
6. Mining of stones and open mines of argyle where the site surface is larger than 5 ha or peat extraction where surface of site is larger than 50 ha.

(2) Activities that undergo Summary process of EIA (abstracted from Appendix 2)

1. Mining industry: a) stone pits, open quarries and mining of peat (projects not included in Appendix 1), b) subterranean mines, c) mineral-gravels from marine and river drainage, d) deep drilling in particular, geo-thermal drilling, drilling for water supply, and e) coal, diesel, gas and bituminous sand.
2. Production and processing of metals (which are not included in Appendix 1).
3. Mining industry: (projects which are not included in Appendix 1) : a) industrial furnace of coke, b) cement, etc.) glass and glass fibers, d) mineral substances including mineral fibers, and e) ceramics, tiles, bricks, stubborn bricks, stone or porcelain coating through burning.

5.7 Industrial Waste Related with Mining Activity

5.7.1 Industrial Estate in Elbasan and Present State of Industrial Waste Disposal Site

There are industrial waste disposal sites distributed within the industrial estate in Elbasan, and the disposal site for slag, etc. from ironworks (for production of pig iron) and that for chrome smelter have been inspected. Overall satellite image map of the industrial estate and respective locations of both disposal sites are shown in Figure 5.7.1.



- Waste Dump Area for Chrome Smelter : Western Area
 - Waste Dump Area for Iron Foundry : Eastern Area
- 0 1km

Figure 5.7.1 Elbasan industrial area

1) Industrial waste disposal site for ironworks (for pig iron)

The ironworks for pig iron is located at the southern area of east side of Elbasan Industrial Estate, facing to Shukumbini River (Shukumbini Kava). The distribution of industrial waste disposal site as a form of plan view is shown in Figure 5.7.2.

The waste is mainly composed of slag from ironworks, and the scale of site is South-to-North 400m x East-to-West 800m and the waste is piled up 10 ~ 15m high along the river. The wastes show coarse sands to breccia appearance, it is presumed that some parts of wastes are eroded by the river water and flown out.

The leachate from surface of piled up wastes and the generation of dust were not specifically observed.



Figure 5.7.2 Present condition of waste dump area (slag) for iron foundry

2) Industrial waste disposal site for chrome smelter

The chrome smelter is located at the south side of Elbasan Industrial Estate and faces towards Zaramika River (Zaramika Kava). The distribution of industrial waste disposal site as a form of plan view is shown in Figure 5.7.3, and the distant view of disposal site along the river is shown in Photograph 5.7.1.

The waste is composed of slag from smelter, and the scale of site is South-to-North 200m x East-to-West 500m and piled up 4 ~ 8m high along the river. The wastes show an appearance of granule conglomerate (i.e. fine gravel) to breccia of several tens of centimeters across (Photograph 5.7.1) and a considerable amount of broken pieces of ferrochrome remained in the slag.

There is a concave of 15 ~ 20m wide and 40m long around the end of the disposal site, and filled up with water - probably rain water (Photograph 5.7.2). As the result of convenient measurement (Pack Test: Ion Selective Test Paper is used, made by Kyoritsu Rikagaku Co. Ltd., Japan), it is detected that

the water is neutral since pH value is 7 and approximately 1mg/L of chromium (VI) is included in the water. Accordingly, the leachate from slag waste discharged from chrome smelter contains chromium (VI) which is a toxic substance, and most probably has a value beyond the allowable standard value (0.5mg/L). It is presumed that this leachate penetrates into underground again or leaches out to the area around the concave and diffuses to circumferences.

However, the leachate from wastes and the erosion of wastes by river stream could not specifically be observed or confirmed at the time of inspection.

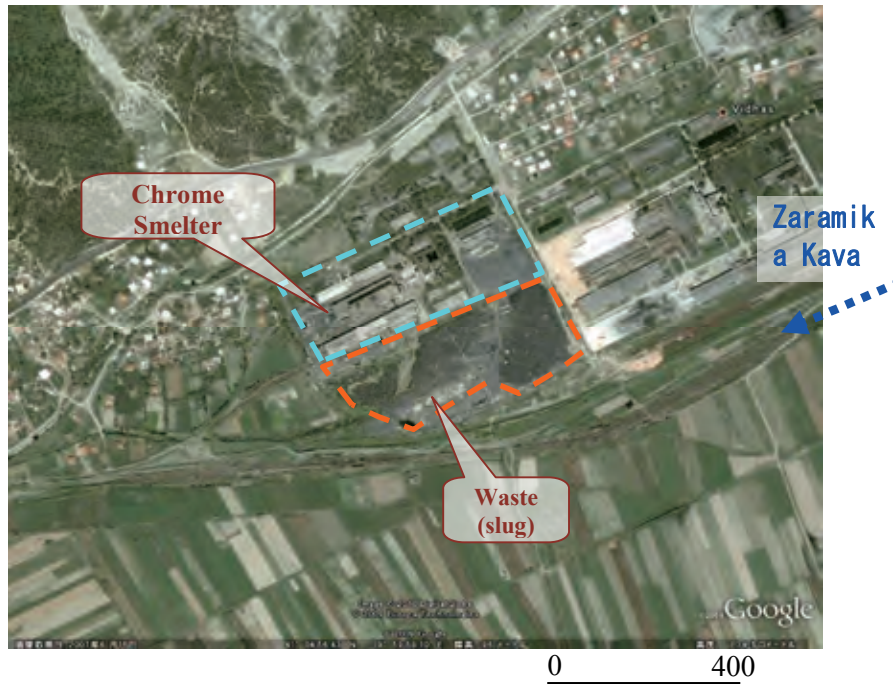


Figure 5.7.3 Chrome smelter and waste dump area (slag)



Photograph 5.7.1 Present condition of waste dump area (slag) of chrome smelter



Photograph 5.7.2 Concave portion and water pool in waste dump area of chrome

5.8 Action Program for the Environmental Consideration

Various issues were discussed with Albanian experts in the Working Group on the preparation of the action program for the environmental and social considerations for sustainable development of mining and the discussion on “Environmental Rehabilitation and Implementation Plan” of the “New Mining Law” was conducted.

5.8.1 Environmental Issues of Sustainable Development of Mining

The environmental issues for sustainable development in the mining sector are given below.

1) Environmental Issue - 1 : Awareness on Mine Pollution

Improvement of the awareness on mine pollution is a basic concept for the development of the country and is deemed to be an index for the sustainable development of safe and healthy lives of the Albanian population. Particularly, as can be seen in Japanese case, it is necessary to understand the fact that the improvement of mine pollution requires considerable burdens of many peoples, manpower, technologies, funds and time, and if mine pollution results in disease, then there are serious impact.

2) Environmental Issue - 2 : Environment Management System

Concerning the mining management system of METE, considering the regulation that the mine developer should obtain an “Environmental Permission” from MEFWA before approval of mining right from METE, the management system of the environmental consideration of METE itself seems to be insufficient. Then, most of the environmental works are carried out by AKBN. It is, therefore, necessary for METE to set up a post in charge of general environmental management for environmental consideration and inspection. In addition, establishment of the “Expanded Technical Committee” for a technical assistant organization consisting of members of relevant ministries and agencies, university, etc., is recommended as shown in Figure 5.8.1.

3) Environmental Issue - 3 : Environmental Monitoring

Concerning the monitoring system, the environmental inspection inside of the mine area should be managed by METE/AKBN and regional environment outside of the mine area should be managed by MEFWA. As the monitoring results of both areas should be concurrently informed to MEFWA and METE/AKBN, concurrent environmental management of both offices is possible.

4) Environmental Issue - 4 : Investigation on the Implementation of Action Plans in the EIAs

Environmental Impact Assessment (EIA) is carried out for the environmental and social considerations at the initial stage of a project, and there may be chances of amendments or changes in a case of change of plan or influence from the ones that were expected at the initial stage according to the progress of project. The system carrying out “Investigation of EIA” at the interval of every five years is applied in many cases in accordance with the recognition that the influence not expected at the initial stage is normally probable. Therefore, it would be proposed to introduce such an Investigation of EIA in every five years interval.

5) Environmental Issue - 5 : Understanding on Potential of Mine Pollution and its Countermeasures

Although the potential for mine pollution in Albania seems to be relatively high, the systematic monitoring based on the accurate chemical analytical data seems to be insufficient. It is necessary to carry out more detailed inventory survey in whole area of the country based on the accurate chemical

analysis, to evaluate the potential of mine pollution and to examine the countermeasures based on the environmental risk analysis.

5.8.2 Comments on “Environmental Rehabilitation and Implementation Plan” to the “New Mining Law”

On the “Environmental Rehabilitation and Implementation Plan” of the “New Mining Law”, conceptual comments formulating a policy for the sustainable development of mining and mine closure are described below.

- Conformance contents between EIA and “Environmental Rehabilitation and Implementation Plan”: The directions of environmental consideration between environmental contents of EIA during the mine development and the “Environmental Rehabilitation and Implementation Plan” for the mine development should be consistent. The “Environmental Rehabilitation and Implementation Plan” is planned and submitted after EIA, therefore the environmental contents of the “Environmental Rehabilitation and Implementation Plan” should be adequately examined at the time of EIA study. These environmental contents are thought to be important guarantee for the environmental conservation.

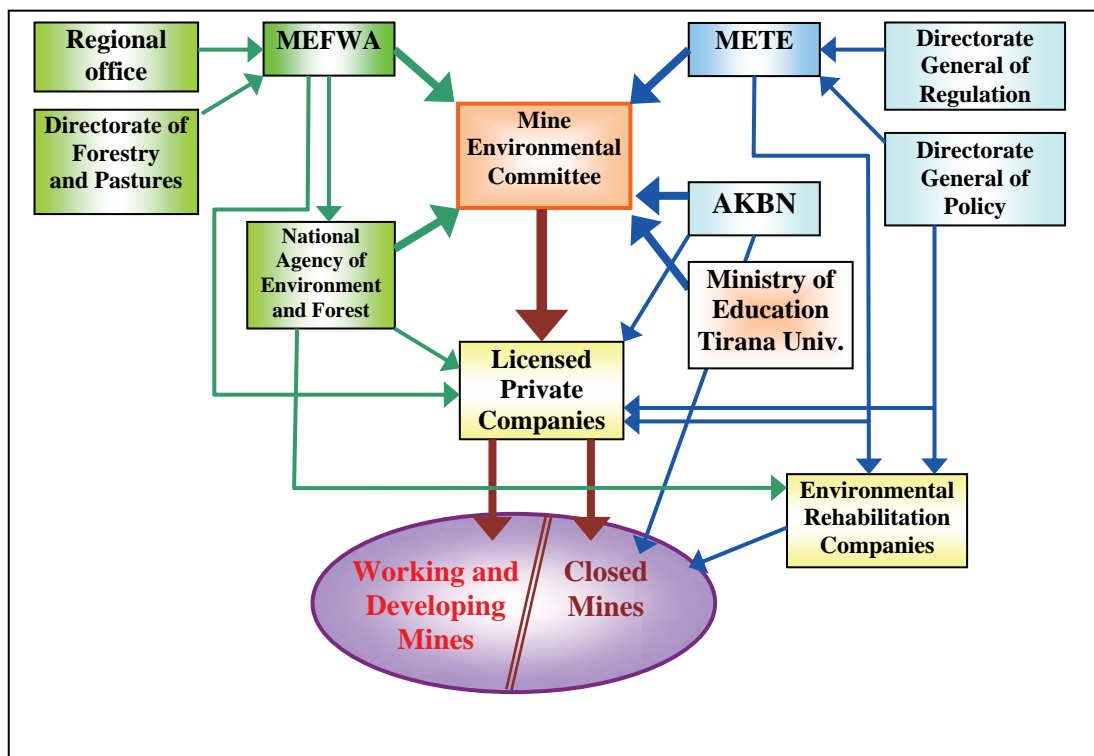


Figure 5.8.1 System and organization of mine environment management

- Environmental Management System: The operation management and environmental management of mine are completely linked, hence operation of a mine should be conducted simultaneously together with environmental management. Therefore, the environmental inspection inside of the mine area should be conducted together with the inspection of mine operation by METE/AKBN at the same time, and then regional environment outside of mine area should be managed by MEFWA.
- Environmental Monitoring Management: Monitoring is one of important tools for environmental management. The sampling area of monitoring includes inside and

surroundings of mine area, i.e. monitoring result of regional area surrounding mine should be managed by MEFWA, and monitoring result of inside of mine area should be managed by METE/AKBN. As the monitoring results of both areas should be concurrently informed to MEFWA and METE/AKBN, concurrent environmental management of both offices is essential.

- Expanded Technical Committee: Since, presently, technical committee examining environmental management has not been established yet, it is impossible to fully examine the monitoring results as technical management. Therefore, it is necessary to establish the “Expanded Technical Committee”, including members of relevant ministries, agencies, university, etc. aiming at sustainable environmental management of mine. For this purpose, particularly, a strong environmental inspection system is required under the agreement between MEFWA and METE.

CHAPTER 6 ENHANCED GIS AND INFORMATION SERVICE

The aim of this chapter is to describe a concept design of a GIS database for the mining sector, and a recommended strategy for the implementation of GIS.

6.1 Survey of Counterpart Agencies for the Development of a GIS Database

A survey was undertaken of the state of CAD and GIS utilization, and existing systems within the counterpart agencies METE, AKBN and AGS.

6.1.1 Ministry of Economy, Trade and Energy (METE)

1) Managing mines using ArcGIS

GIS (ArcGIS 9.3) is used to manage mine licensing. There is only one engineer within the ministry (METE), however, who through self study can use ArcGIS; and it is not being used at an institutional level. There is no one else in the ministry who can operate ArcGIS.

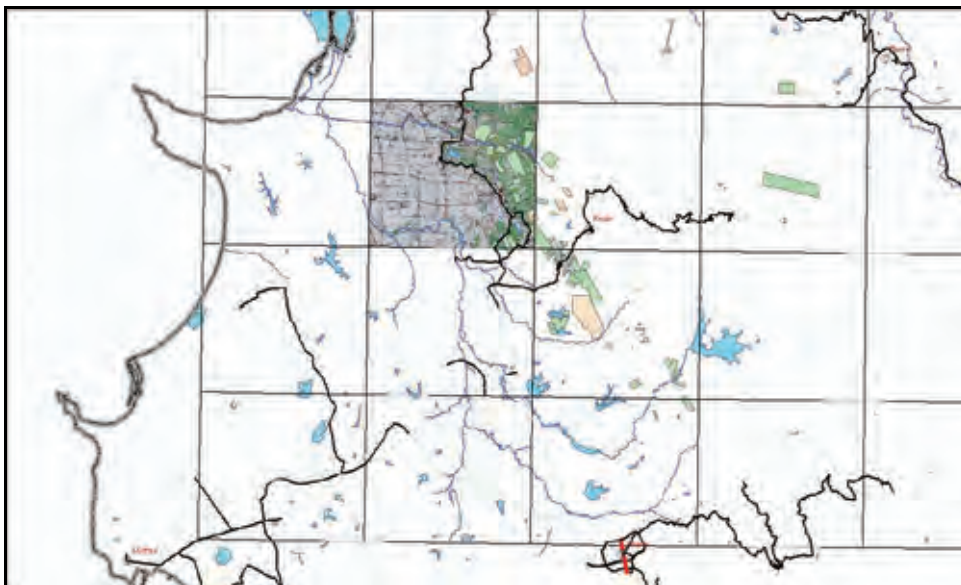


Figure 6.1.1 Example of METE mine management

The main data is licenses and polygons. Mine polygons are classified as:

- Exploration
- Exploration—Prospecting
- Prospecting
- Exploitation

Other data includes topographic maps (contour lines, roads, rivers, water bodies, major cities) and administrative boundaries.

Method of inputting mining polygons:

1. Make the polygon at an arbitrary location.
 2. Type in the coordinates (usually made up of 4 to 6 points) entered on the mining application, editing the polygon so these coordinates are correct.
- ✘ Coordinates can be gained easily by GPS; detailed surveying results are not required. The coordinate system used is Gauss-Kruger, and the geodetic system is Pulkovo 1942.

- Applications are not accepted using the World Geodetic System.
3. Otherwise, the coordinates can be read from an Excel file and use ArcGIS to connect each point.

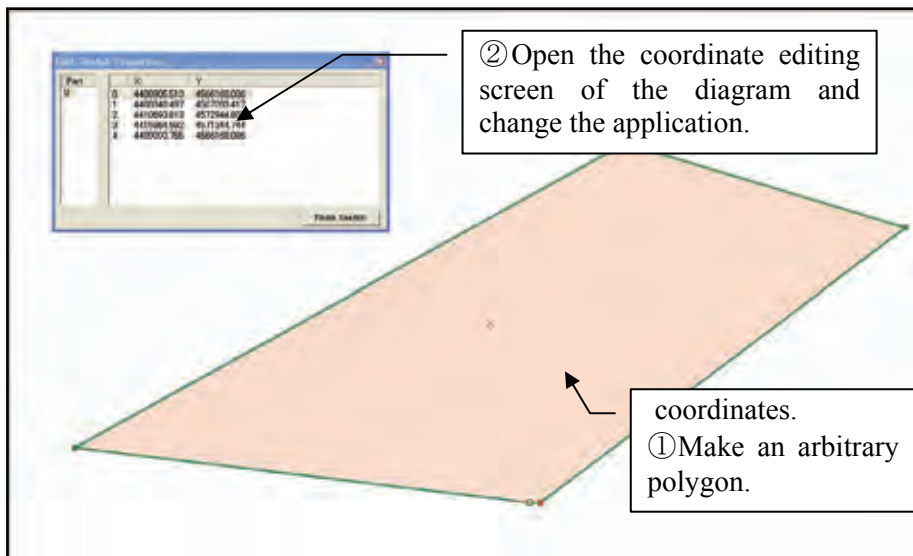


Figure 6.1.2 Method of inputting mining polygon

2) Mine management with MS Access

Licenses, production and so forth are managed with MS Access. Again, however, this database is operated on an individual, not institutional, level. It is mostly managed with table calculation software. Moreover, this database was made by ministry staff who studied it by themselves. As a result, and the fact it is encoded, the database cannot be shared by many.

The below figure is the mine management information input page. These are some of the entry fields:

- a. License number, permit date
- b. License type (exploration, exploration-prospecting, prospecting, or exploitation)
- c. License location (address, coordinates of permitted area, map sheet number, etc.)
- d. Name of local authority for tax purposes
- e. Type of mine, permitted mineable volume, mineral content amount, surface area, calculated volume, etc.
- f. License holder (company, representative, technical supervisor, employee numbers, etc.)
- g. Remarks (production status, etc.)
- h. Raster Map file name
- i. File name of license documents

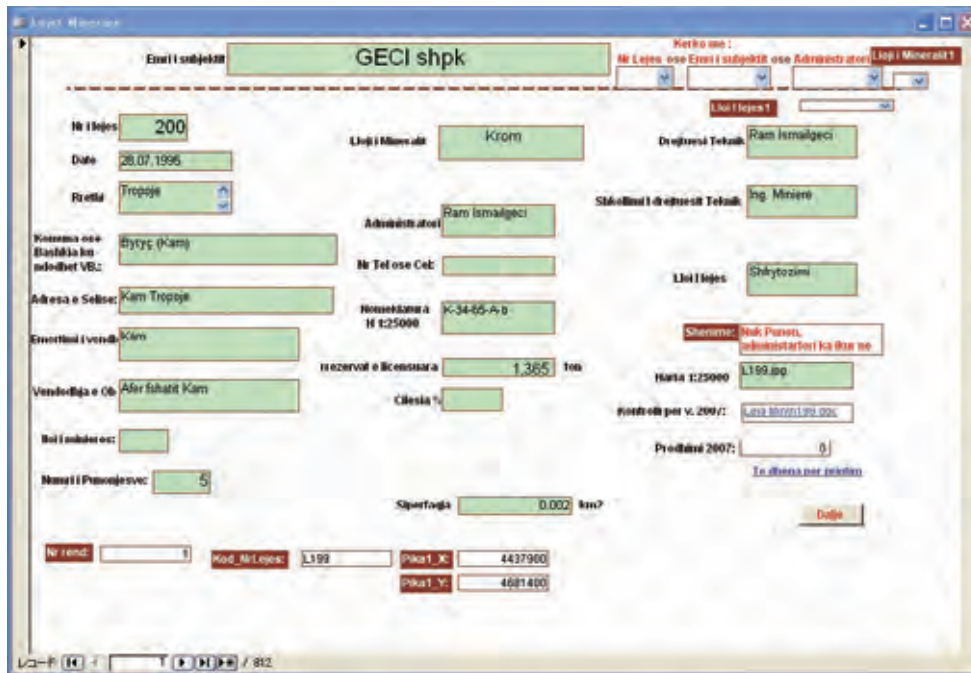


Figure 6.1.3 License information input page

Figure 6.1.4 shows functions for calculating yearly production output, estimated mine capacity, and for confirming the amount remaining.

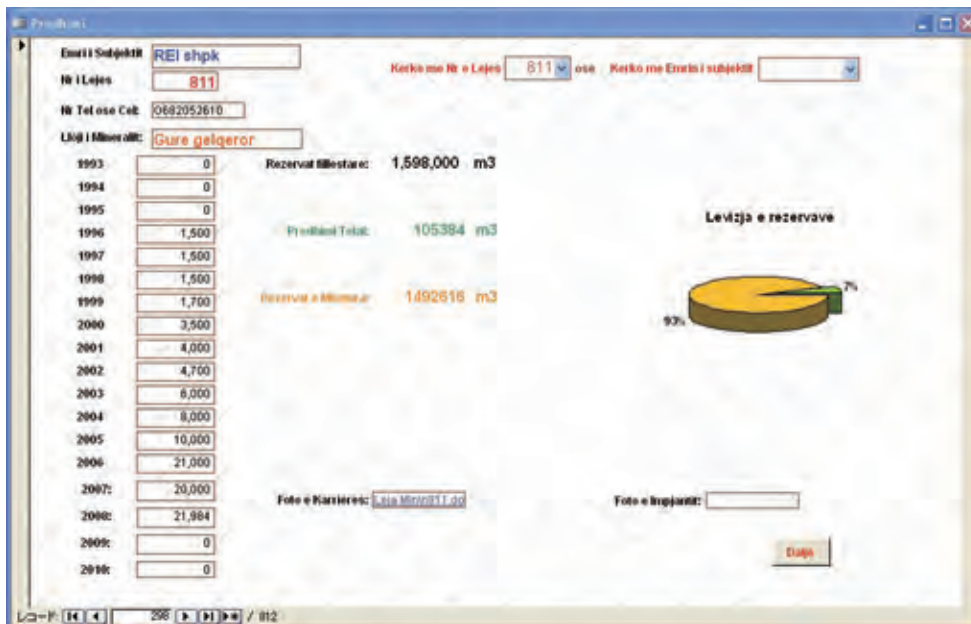


Figure 6.1.4 Search page for calculating yearly production, etc.

3) Mining license applications

In June 2009, the National Licensing Center (hereinafter NLC) under METE was established with the support of USAID. This organization is not just for mining, but aims to be Albania's one-stop-shop for business permit applications. With the establishment of this center, license management is planned to shift from METE to NLC and AKBN. A summary application flow of the planned exploration license (mining) is shown in Figure 6.1.5.

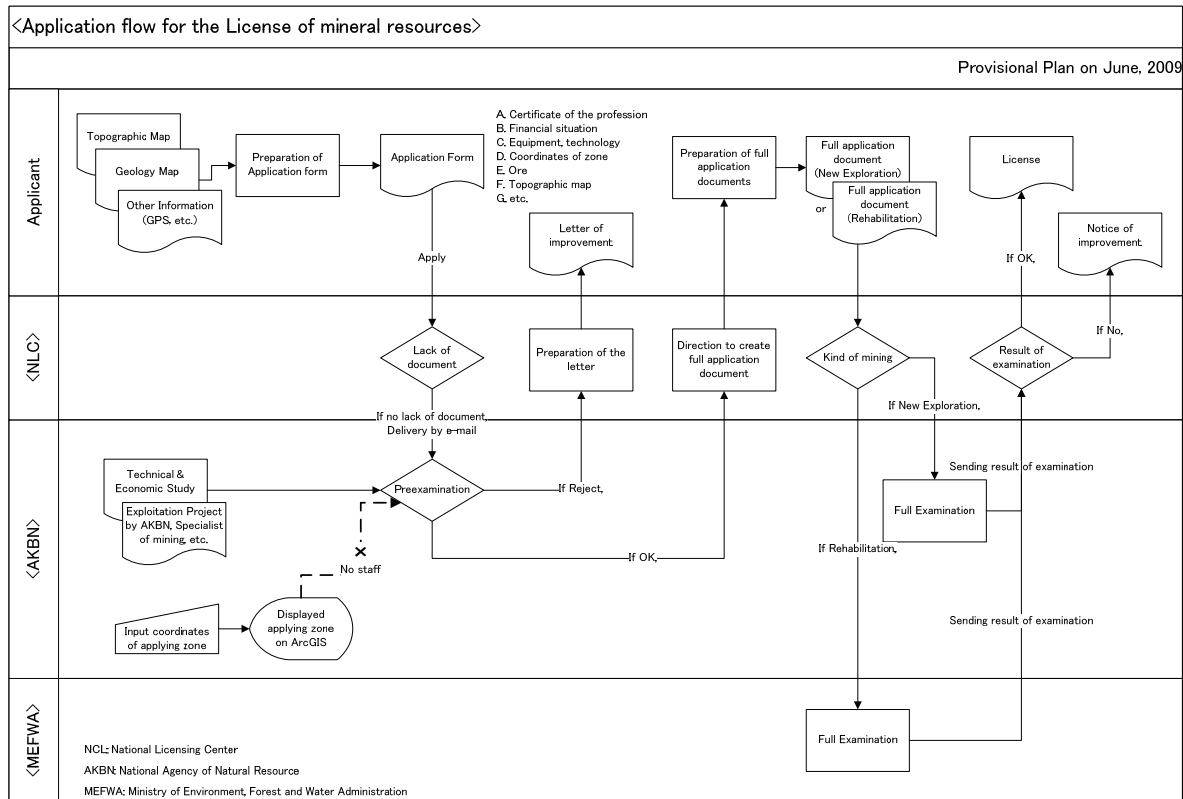


Figure 6.1.5 Summary exploration license application workflow

6.1.2 National Agency of Natural Resources (AKBN)

This agency does not have experience operating GIS, nor have the personnel to utilize it. Currently, AutoCAD Map 2005 is mainly being used to make various maps. MicroStation95 (including I/Ras B, C) is used for some tasks. About 5 staff are using AutoCAD. It has the equipment necessary for CAD: a computer, scanner (outsourced for A0 size), printer and plotter. However, taking the computer as an example, it is only barely capable of operating CAD. The specifications of the main equipment are as follows:

No	Type	Product name	Specifications
1	Computer	Home built computer	Windows XP pro, CPU: Pentium IV 2.26GHz, RAM:448MB, HDD:80GB
2	Server	HP ProLiant ML150	Windows 2000, CPU:3.2GHz, RAM:2GB, HDD:550GB,
3	Scanner	MUSTEK P3600 A3 PRO	Can scan up to A3
4	Plotter	HP Design Jet 100Plus	A1 (60x80cm)
5		HP Design Jet 1055 cm plus	Can handle A0
6	Printer	HP color Laserjet 3700	

Further, a computer was installed as a server, but it has hardly been used.

Below are examples of maps made by AKBN. Besides these, it makes national thematic maps on limestone distribution, such as:

- Limestone distribution areas.
- Nature reserves.
- Archeological sites.
- Licensed areas.

- Geo-monuments.
- Recommended limestone mining areas.



Figure 6.1.6 Mine tunnel map (1) made with AutoCAD

6.1.3 Albania Geological Survey (AGS)

AGS was established based by the law for *Albanian Geological Survey(1988)*. It is the only agency responsible for geological survey, and has the following roles:

- Make geological maps and systematic basic geological surveys of the whole country.
- Geophysical and geochemical surveys.
- Estimating and evaluation of metallic and non-metallic minerals and groundwater resources.
- Hydrogeological surveys regarding water resource evaluation.
- Environmental geological surveys.
- Geological surveys regarding soil and erosion.
- Develop a database of mineral resources and geology, and provide data to central and local government agencies.

Therefore, it has an important role surveying and providing geological information in Albania.

1) Organization

As of September 2009 it was made up of the nine departments listed below.

- Department of Geology
- Department of Mineral Resources
- Department of Geo-engineering & Geophysics-Geodesy
- Department of Hydrogeology
- Department of Hydrocarbons
- Department of Programming and Development
- Department of Geo-information
- Department of Laboratory
- Department of Support Services

Its main roles and functions are:

- preparing geological information, and
- geological information services.

The geo-information department is mainly in charge of GIS and is made up of three sections: digitizing section, seven staff; geo-data section, three staff; and publication section, three staff.

Roles and functions of the geo-information department:

- Operating GIS.
- Digitizing maps and geological information.
- Making various scale maps and digitizing literary information.
- Making mineral resource maps.

(1) Digitizing Section

- ✓ Making various thematic maps (new, analogue) .
- ✓ Making data for ArcGIS (with attributes).
- ✓ Making and printing maps (thematic maps) requested by third-party organizations.

(2) Geo-data Section

- ✓ Developing database.
- ✓ Releasing database information.
- ✓ Providing information with the database and ArcGIS.
- ✓ Providing information on licensing.

(3) Publication Section

- ✓ Publication of geological maps, annual reports, atlases and survey findings beneficial to society.
- ✓ AGS website
- ✓ Exchanging information with foreign geological departments.
- ✓ Managing the survey's library.
- ✓ Dissemination of geological survey outputs and AGS activities.

2) Department's equipment

Geo-information department is divided into geo-data, publication and digitizing sections, with the latter not within the ministry.

It seems there are some problems maintaining the computers because they are not so new. Additionally, some problems can be expected when handling large volumes of data because the computer only just meets the minimum requirements for operating CAD and GIS software.



Photograph 6.1.1 Work scene in the digitizing section

3) Status of database development in the geo-data section

This section is developing the following three databases. It manages these and GIS mapping and attribute data.

(1) Mineral resources database

Mineral resources information (only from the first survey) provided by AKBN. These data (points) are then linked with map data to make a mineral map. Further, the programming for this database is carried out by AGS staff.

- a. Mineral number, mineral name.
- b. Geographic information (state, region, city/town, geodetic coordinates).
- c. Geological information (geological structure, era, origin, distribution, depth, other).
- d. Scale of mineral deposit (scale, volume and thickness of stratum, distribution, depth, other).
- e. Estimated reserves (mining survey, geological survey, deposit volume, extracted volume, remaining volume).
- f. Others.

(2) Borehole database

Borehole data, mainly from old publications, such as borehole head and size, survey content, recovery status, investigative analysis of contained amount and so on is being made into a database.

(3) Publication database

This is an index database of approximately 10,000 publications on geology in AGS's possession. These are some of the input fields:

- a. Publication type
- b. Year of publication
- c. Author, co/author
- d. Title
- e. Brief summary (area, survey type and so forth)
- f. Ore body, mineral type, mineral name and so forth
- g. Other (inventory number, number of pages and copies)

4) State of data production in the digitizing section

This section produces various types of geological thematic maps such as:

- geological maps,
- hydrogeological maps,
- hazard maps, and
- mineral resource maps.

The coordinate system adopted is the Gauss-Kruger method and the geodetic coordinate system is Pulkovo 1942.

Meanwhile, AGS does not digitize 1:25,000 topographic maps, but purchases them from a company called GIS Albania. It is digitizing 1:100,000 topographic maps, however, this is done by compilation of 1:200,000 topographic maps from the 1:100,000 maps (old format) in the possession of the Military Geographic Institute, Ministry of Defence (mentioned later).

The thematic map production process in this section is as follows:

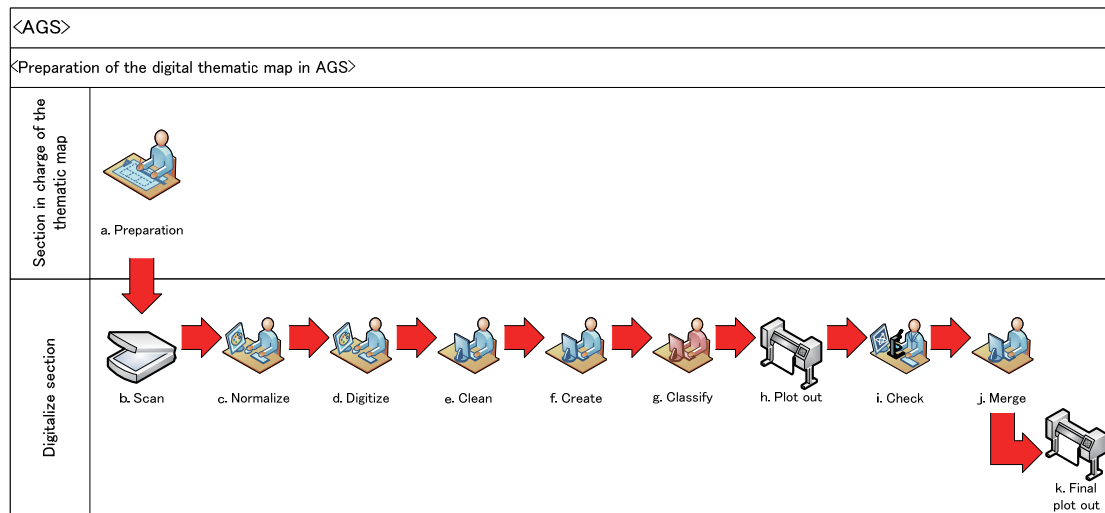


Figure 6.1.7 Work flow of thematic map making in the digitizing section

- a. Preparing base maps for measurement
The section in charge of each thematic map is to make base maps for digitizing.
- b. Scanning
This section does not have a large scanner, so the main office's scanner is used, and raster data from the base map is formulated.
- c. Normalize (georeference)
Normalize the raster scanned data in AutoCAD Map and use as base (background) data for digitizing.
- d. Digitize
Digitize each specified layer. The main items to be input are geological classification/boundary line and encoded symbols. Also, input necessary marginal information onto the map.
- e. Data cleaning
Edit the geological classification/boundary line using the functions in AutoCAD Map. Automatically edit the primary data, which has intersecting points, overshoots and undershoots, into line data that polygons can be made from. And where necessary, the data is edited by hand.
- f. Making polygon data
Automatically make polygons with the functions in AutoCAD Map.
- g. Classify polygon data
Layer the produced polygons into each thematic map classification. This work is carried out by hand, so some kind of improvement is needed to reduce work time.
- h. Plot out
Plot out the input data with a large plotter.
The large plotter in this section has broken down and cannot be repaired. Therefore, a plotter in the main office is being used.
- i. Checking the input data
The input data is plotted out and verified against the base map for digitizing to check for missing data.
- j. Topographic map reference file
Merge the produced thematic map with topographic map data for referencing.
- k. Final plot out
Merge the thematic and topographic maps, and then plot out with a large plotter.

5) Central Archive of Geology Section

This section is a part of the department of programming and development. It is located in a separate building of the AGS where work is underway making a database of basic information in the geological publications (approximately 10,000) stored there. These documents contain information necessary to investors in mining development. Every page of the publications is scanned in A4 size and made into a PDF file. With 100 to 300 pages per publication this is taking a considerable amount of effort, and it is unknown when it will be completed. In the future the information is planned to be released by establishing a database system where the publication database and PDFs are linked, enabling them to be searched and displayed.

6.2 Confirmation of the Current State of GIS in Albania and the Data Necessary

In order to survey the state of GIS use in Albania, government agencies making maps and private companies in the GIS field are to be visited and interviewed.

6.2.1 Government Agencies making Maps

1) Military Geographic Institute

Small scale topographic maps^{*1} are managed by the Military Geographic Institute, under the Ministry of Defence. Being an agency within the military means its information management is naturally very strict and confidential. So, to purchase and use maps a written request from METE to the Ministry of Defence was necessary.

The latest maps use the WGS-84 coordinate system and are updated every five years. Aerial photos, not satellite imagery, are used in updating. The format is uncertain, and so is whether it is willing to provide map information; however, it does possess and use a great deal of software, such as AutoCAD Map, ArcGIS, LPS (Leica Photogrammetry Suite).

2) Immovable Property Registration System (IPRS)

This agency is within the Ministry of Justice, and develops cadastral maps and information. It is currently digitizing national maps, with approximately 65 % of the country complete. The remaining area is diligently being digitized.

Cadastral maps of urban areas are on 1:500 and 1:1000 scales, with a sheet size of 60×90 cm. All other areas are on a scale of 1:2,500, with a sheet size of 50×50 cm. They have only x and y coordinates, with no height information. The coordinate system is Gauss-Kruger, and the geodetic system is Pulkovo 1942. Further, some of the data has been transferred to ArcView and made into a GIS database. Each plot in the database is polygonized, with owner, record of ownership (sale and purchase situation) and other attributes.

^{*1} The Military Geographic Institute, under the Ministry of Defense, manages topographic maps of scales: 1:10,000, 1:25,000, 1:50,000, 1:100,000, 1:200,000, 1:500,000, 1:1,000,000.



Figure 6.2.1 Cadastral map made by IPRS

3) Agency for the Legalization, Urbanization and Integration of Informal Zones/Buildings (ALUIZNI)

This is a new agency, established three years ago, within the Ministry of Public Works, Transport and Communications. Its role is to survey illegally constructed buildings, and its scope covers the whole of Albania. In the case of Tirana City, where unauthorized building construction is increasing, one measure is to increase the city area from 50 km² to 180 km². There are an estimated 750,000 unauthorized buildings nationwide.

It makes maps on scales of 1:500 and 1:5,000. However, these do not consist of many layers, only buildings, roads, fences, etc., and are not full-spec topographic maps.

Scale 1:500 maps are made for the 62 local authorities classed as cities. Of the 1,062 km² total area of these authorities, 400 km² was mapped by an outsourced Croatian company, while ALUIZNI made the remainder. Rural areas make up 3,064 km², and of this 1,000 km² has been completed on a scale of 1:500, while the remainder is planned to be finished this year on a scale of 1:2,500.

The coordinate system used is WGS-84. It is possible to convert the old coordinate system data, as conversion parameters were decided upon in discussions with the Military Geographic Institute.

It has a total of 15 licenses for AutoCAD Map 2004-2007 and 10 licenses for ArcGIS3.2. The data is digitized using AutoCAD, and transferred to ArcGIS. Attributes such as buildings are then added to make the database.

Orthophotos and Digital Terrain Models (DTM) were made with Albanian government budget from 2007 to 2008. Urban areas were taken on a scale of 1:500, rural areas 1:2,000, and mountainous areas 1:5,000. Moreover, if requested by a government agency, permission can be gained to use the orthophoto data.



Figure 6.2.2 Map made by ALUIZNI (AutoCAD)

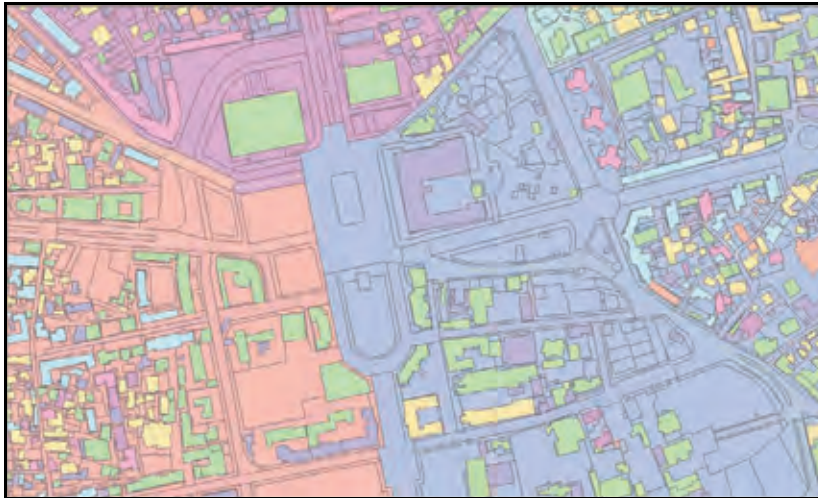


Figure 6.2.3 Map made by ALUIZNI (ArcGIS)

6.2.2 Private GIS Companies

1) Geo Consulting ALBANIA (GC)

This company was established in 2001 and has carried out a great deal of GIS work for foreign aid agencies such as GTZ, and local authorities in Albania. It also participated in the JICA Tirana City sewage system project.

It is working towards open source GIS or Web GIS, and is developing its own software. It is also developing its own orthophoto search system. It has a total of just under ten employees, with four expert technicians and four operator level staff. It is developing the orthophoto system for tourism purposes in conjunction with a GTZ and Ministry of Tourism project. It is planned to be a system similar to the Albanian version of Google Earth. For example (see Figure 6.2.4) by clicking on 'i' at the top of the screen, then selecting one of the icons such as hotel or restaurant, it will display information on those buildings. It contains approximately 3.3 terabytes of orthophoto data, and approximately 3 to 5 gigabytes of other map data.



Figure 6.2.4 Orthophoto system

2) GIS Albania Company Co. Ltd.

Founded in 1992, it makes maps and sells archive data. The main topographic map data it sells and has in its possession:

- 1:10,000 : only coastal areas
- 1:25,000 and 1:50,000 : whole country
- 1:500 : only urban areas

It uses AutoCAD Map and ArcView GIS software. Its topographic map (paper map) is that produced by the Military Geographic Institute in the 1980s. It has not updated all of the data due to cost. However, it has updated areas such as the roads it can confirm.

It is transferring the coordinate system to WGS-84, and can provide data in these coordinates. However, how precise this is has not been confirmed.

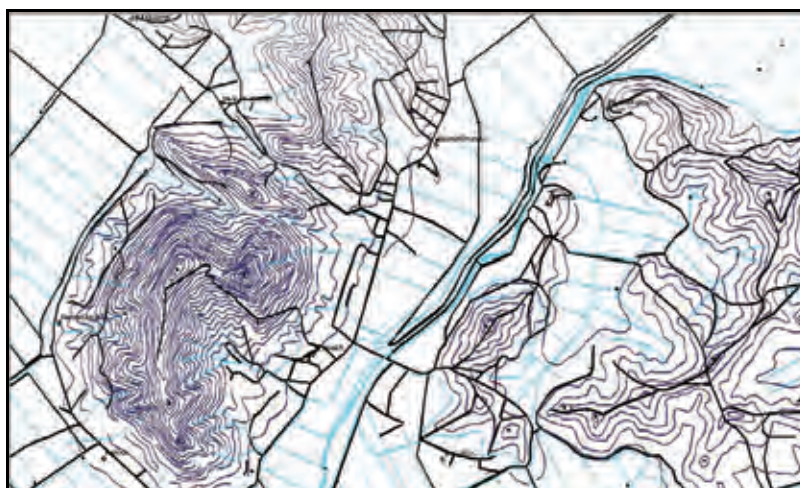


Figure 6.2.5 Sample of 1:25,000 topographic map (ArcGIS)

3) GISDATA Albania

The GISDATA Group has offices mainly in the Balkan peninsular and some other European countries; and is a distributing agent for ESRI products. GISDATA Albania was established this year as a local subsidiary of the GISDATA Group. It currently only has two employees, but plans to expand. It is

still difficult to find employees in the GIS field in Albania. The GISDATA Group however, has around 250 technicians, and so can provide rapid support when necessary.

GISDATA Albania is the only company that can sell ESRI products in Albania. So far, it has sold ESRI products to METE, ALUIZNI and Tirana City. However, GIS still has not taken hold in Albania as yet.

It has experience developing Tirana City's Geographic Information System for land management, taxation, urban planning and so forth. It also developed ALUIZNI's system. Further, GISDATA Group has experience in the mining industry in countries such as Croatia, Serbia, Montenegro, Slovenia and Hungary.

Some of the services it can provide:

- ✓ Desktop and Web GIS development (in Albanian and in any platform)
- ✓ Customizing ESRI products
- ✓ Making GIS databases
- ✓ Training in GIS

6.3 Basic Concept of the GIS Database

The basic concept of the GIS database, in line with the aim of this study, the state of GIS utilization and available spatial information, was proposed at working group meetings and workshops.

6.3.1 Purpose of Developing the Database

The following two points were proposed in line with the aim of this study as the purpose of developing a GIS database. Basic approval was gained on these, so the basic concept of the GIS database was formulated. Its purpose is:

- To allow mining industry investors access to mineral resource and mining information, and
- To ensure related agencies can function effectively.

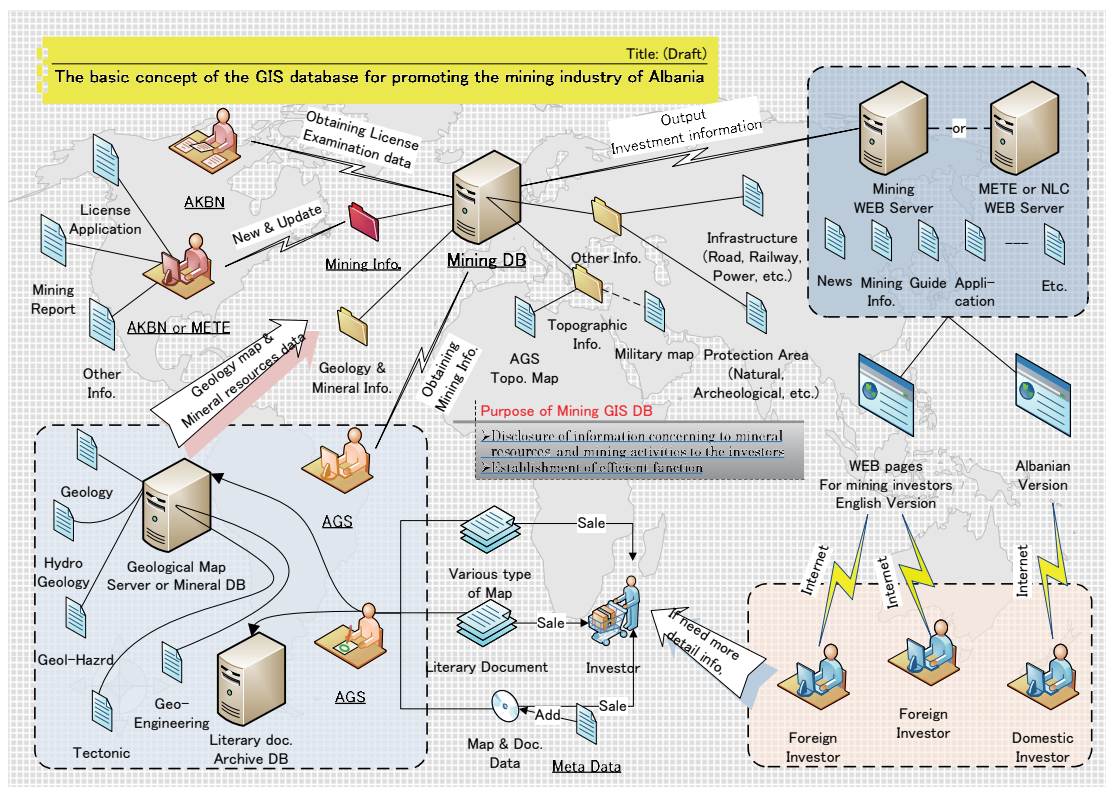


Figure 6.3.1 Basic concept of the GIS database

Development of a mining database comes under the scope of this study. This study's database is to include mining activity, and topographic and geological map data; the mining database will not include detailed geological information. The reason being that AGS has already started developing its own database; and so, it is assumed that a mechanism will be further developed for investors wishing to acquire detailed geological information from AGS.

The right side of the above basic concept of Figure 6.3.1 is for external users such as foreign investors, while the left side is for internal users such as METE, AKBN and AGS.

6.3.2 Similar Systems

Neighboring Kosovo's Independent Commission for Mines and Minerals has already established a website and a GIS based system aimed at investors. And there was a desire amongst the counterparts for this kind of system.



Figure 6.3.2 Main menu of Kosovo's Web GIS system

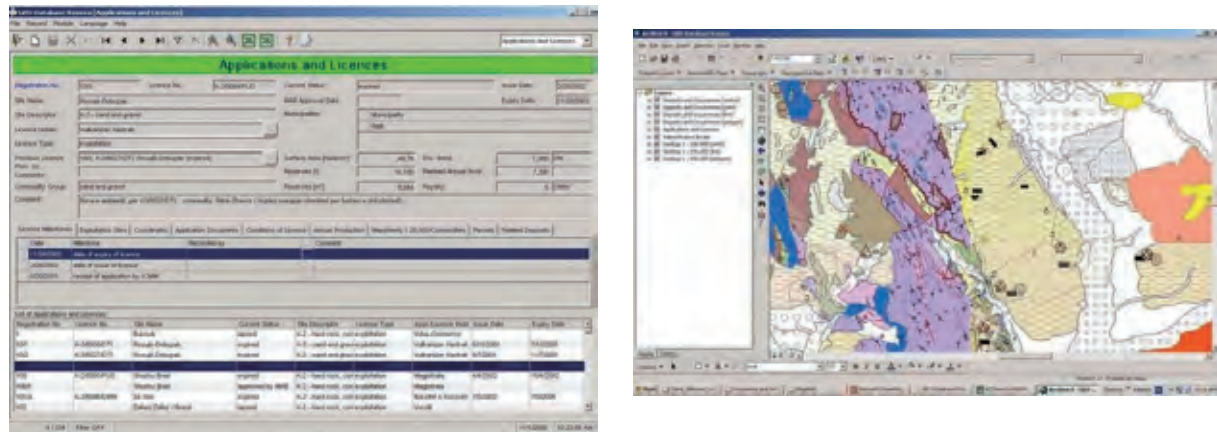


Figure 6.3.3 License information; geology and mine concession map

6.3.3 System Development Prerequisites

The development of a GIS database is an output of this study; however, when taking into account matters such as the counterpart agencies' utilization of GIS, hardware set up including network environment, and GIS capable human resources; it has been necessary to support:

- development of a system (including hardware) which incorporates the existing system;
- development of a framework for operation and maintenance of the system;

- development of the system (including system functions and a database); and where necessary support tendering and documentation;
- basic training on GIS software, and
- human development for system management (outsourcing also considered).

Most personnel have a background in geology or mining, but not one has an education in GIS or IT. For the establishment, utilization and maintenance of GIS and IT after this study is over, human resources need to be developed urgently in counterpart agencies as leaders in these fields and as core GIS technicians. Knowledge on operating a system on an organizational level that many users can share and use together is needed particularly in METE and AKBN, where system operation is mainly on an individual level.

6.4 Conceptual Design of the GIS Database

The conceptual design of the GIS database was formulated on the basis of the existing systems developed by the counterpart organizations, METE (the Ministry of Economy, Trade and Energy), AKBN (the National Agency of Natural Resources) and AGS (the Albanian Geological Survey), and information obtained from interviews conducted at the Working Group Meetings.

Since the following two measures had been proposed and approved, in principle, as the purpose of developing the database, they were used as the basis for formulating the conceptual design.

- To disclose information on mineral resources and mining activities to investors in mining; and
- To establish a mechanism for efficient service provision by the relevant organizations.

After the Albanian counterparts reviewed this conceptual design document by the next survey, the design document was revised.

6.4.1 Composition of the Conceptual Design Document

The following were selected as the components of the Conceptual Design Document so that the C/P organizations will be able to use them in detailed design and programming.

- a. Outline of the System
 - Background of the Survey
 - Outline of the GIS Mining Database
- b. Components of the Project
 - Components of Database Development
 - Data Flow Diagram
- c. Functional Requirements
 - Outline of the Functions
 - Display Screen Design
 - Form Design
 - Thematic Map Design
- d. Database Design
 - Map Information
 - Attribute Information
 - Code Tables
 - Entity Relation Diagrams
- e. System Composition
- f. System Introduction Schedule
- g. Miscellaneous

In the beginning, the possibility of focusing only on database design for detailed data models was considered, since the “Mineral Resource GIS Database Design” was one of the Project outputs. However, since the C/P organizations intend to develop a GIS-based system, it was decided to include

the specifications required by the system in the Conceptual Design Document with the intention of facilitating transition to the subsequent process of detailed design and programming.

6.4.2 Points to Note in the Conceptual Design

The outcomes of the Working Group Meetings during the second and third Field Surveys, the interviews at the individual organizations and the discussions among the Survey Team were used to select the types of work to be systematized and included in the database in the GIS Mining Database development as shown below:

Works to be included in the database	Competent authorities
➤ License management	Responsibility to be transferred from METE to AKBN
➤ Monitoring	AKBN
➤ Mining statistics	METE and AKBN
➤ Mineral resources	AGS and AKBN
➤ Documentary information on geological surveys	AGS
➤ Development of an investment database	Responsibility to be transferred from METE to AKBN

The selection of works to be included in the database made AKBN, which is responsible for the majority of the works, the main user of the database and gave METE and AGS the role of supporting AKBN.

Points to note in the Conceptual Design are as follows:

1) Display Screen Design

(1) Display languages

Input data are expected to be converted into data for external information disclosure (or translated into English) semi-automatically. Code tables containing item names both in Albanian and English described below will be used to produce such data.

At the same time, since the number of input items for each entity in the database is small, the entered data will be displayed both in Albanian and English wherever possible to allow users to verify the input data.

(2) Grouping

The input items for the mineral resource data in the existing database are grouped on the display screen. The data input operation will be simplified by making it a rule to display related input items in groups on the screen.

2) Form Design

The existing database does not have a form output function. However, since such a function is essential for actual work and verification of input data, a function to print out the main data on individual forms and the code tables on single forms as a list will be developed.

3) Map Information

(1) Topographic maps

It is still unclear whether up-to-date topographic map data from the Military Topographic Institute will be available or not. Therefore, topographic map data on a scale of 1:200,000 (produced by editing 1:100,000-scale topographic maps) and 1:25,000 owned by AGS will be used. However, should the up-to-date topographic map data be available, replacement of the AGS-owned data with the up-to-date data will be considered.

Meanwhile, in order to utilize the existing data, the coordinate system established using the Pulkovo Geodetic System and the Gauss–Krüger Coordinate System, which are used in Albania, will be used. Use of the World Geodetic System will have to be considered in future. However, since development of the database is the urgent issue at the moment, the switchover of the geodetic system will be considered once the database development has been completed.

(2) Geological maps

Although AGS is digitizing 1:25,000-scale geological maps, such detailed data will not be required for the work at AKBN, which will be the main user of the database, or as data for external information disclosure. Therefore, only geological map information on a scale of 1:200,000 will be used in the database.

(3) Infrastructure

Information on infrastructure is essential for investors in the mining industry. However, as mentioned in the preceding section, the available old topographic maps cannot serve as the basis of infrastructure information. Therefore, only the minimum required information on electricity, roads, railways, the airport, and ports and harbours will be produced anew.

- a. Electricity Power plants, substations and power transmission lines
- b. Roads Limited to expressways and national highways
- c. Railways Limited to passenger and freight lines
- d. Airport Limited to one airport
- e. Ports and Harbours Limited to four ports and harbours

The following show examples of the infrastructure information produced from the existing data.

(4) Protected zone maps

Law No. 8906 Dated 6.6.2002 on Protected Zones protects certain areas from development. The purpose of the law is to establish natural reserves in which eco-system biodiversity, natural habitats, species, natural landscapes and protected zones are conserved.

The information on protected zones was included in the map information in the database as a component of external information disclosure to investors because it concerns mining development. Law No. 8906 classifies protected zones into the following six types:

- a. Strict Natural Reserve
- b. National Park
- c. Nature Monument
- d. Nature Park
- e. Protected Landscape
- f. Management Resource Area

The level of protection in each of the six types of protected zone is based on the classifications of the IUCN (International Union for Conservation of Nature).

(5) Digital Orthophotos (Optional)

Use of digital orthophotos will be considered as substitutes for the outdated topographic map information in which detailed information is not represented (as the 1:200,000-scale topographic maps were produced by editing the 1:100,000-scale topographic maps). Their use is assumed in the approval of license applications and monitoring of mining activities. However, digital orthophoto data are large in size. Coordinate conversion will be required because the coordinate system of digital orthophotos is the World Geodetic System. For these reasons, the possibility of the use of digital ortho-photographic images in developing the database will be investigated further.

4) Various Data

(1) Mining licenses

In the existing database, the primary keys are managed as internally stored sequential numbers. Such numbers are not displayed on the screen. The same system can be used if the issuance of licenses only is to be recorded. However, in the case of managing the licensing process from the application stage, defining primary keys with application numbers will facilitate subsequent procedures. For this reason, the license application numbers were used as the primary keys in the database design.

In the existing license database, coordinate data for all areas of mining activities included in an application are stored in a single row allocated to a single license number. The maximum number of coordinate data which can be stored in one record is 22 in the existing database. It is assumed that, when the number of coordinate data exceeds this maximum number, the number of field items within the record is increased to store the whole data. In order to eliminate the need to change the database structure frequently, a record was designed without setting a limit on the number of coordinate data in the new database.

Example of data storage in the existing database

License No.	X1	X2	X3	---	---	X22	Y1	Y2	Y2	---	---	---	Y22
1234	110	110	115				100	120	120				
1101	99	90	89				45	43	100				
1568	111	125	250			350	12	20	25				45

Example of data storage in the new database

License No.	Seq. No	X	Y
1234	1	110	100
1234	2	110	120
1234	3	115	120
1234	4	120	100
1101	1	99	45
1101	2	90	43
1101	3	89	100
1101	4		
1101	5		

1568	1		

Figure 6.4.1 Examples of coordinate data storage

(2) Information on the work of AKBN

As AKBN has never developed a database, the whole database will have to be designed from the beginning. The types of information to be included in the database are:

- a. Basic information on mining activities;
- b. Records of inspection and supervision at mining centres; and
- c. Information on temporarily and permanently abandoned mines.

However, as AKBN failed to provide sufficient information, items generally considered necessary for database design were identified and used in the design. AKBN is expected to review and verify the details of the design.

(3) Information on engineers at AKBN

This information needs to be linked to the information on the above-mentioned work of AKBN when the latter is made into a database. This type of information is not found in the existing database.

This database will have a simple design not including detailed personal or career information. Although it is possible to include such detailed information in the database, inclusion of such

information might overstretch the scope of the database. Therefore, it was decided that only names, designations and affiliations, and not detailed information, would be included in the database.

(4) Mining statistics

Since the design of the existing database only allows entry of yearly production for a single year, it is assumed that the database structure will have to be modified every year. In addition, mining statistics require other data items such as operators and volume of shipments. For these reasons, the mining statistics were designed so that such data can be entered into the database.

Article 43 Clause 3 of the new Mining Law (July 2010) provides the competent authority with the obligation to submit a mining statistics report every six months. To comply with this obligation, flags indicating the whole, the first half and the second half of the year were added to part of the key in the mining statistics.

(5) Mineral resource data

The mineral resource database in the existing system consists of two major parts, basic data and chemical analysis data. While the items in the basic data are the same for all minerals, those in the chemical analysis data vary significantly. Therefore, chemical analysis data are stored in the database using a display screen and entity prepared separately for each of the various groups of minerals. As a consequence, the existing database has more than 30 screen displays and entities.

The existence of a large number of common items led to the conclusion that it would be more effective to adopt an efficiency-oriented design for ease of programming and system maintenance. However, it will be necessary to control data input by programming when the need to seek higher data accuracy arises. The options for screen display and database design are as follows:

- Proposal 1 : Common screen displays and common entities for chemical analysis data (without input control)
- Advantage : It is easy to program and maintain the system.
- Disadvantage : There is a high probability of erroneous data input.

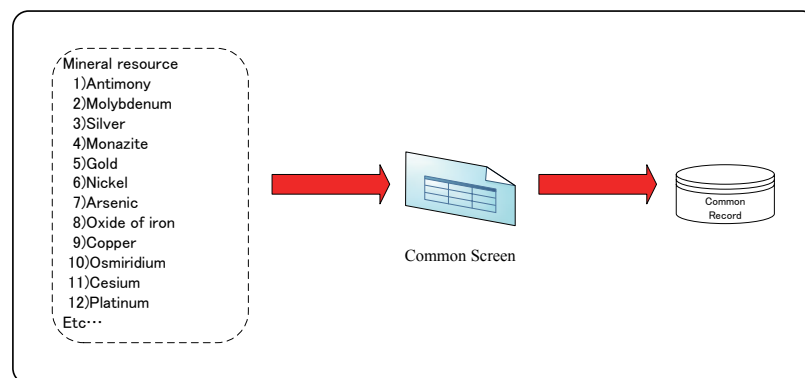


Figure 6.4.2 Common screen display and common entity (without input control)

- Proposal 2 : Common screen displays and common entities for chemical analysis data (with input control)
- Advantage : It is easy to maintain the system.
- Disadvantages : Complex programming is required. There is a possibility of erroneous data input.

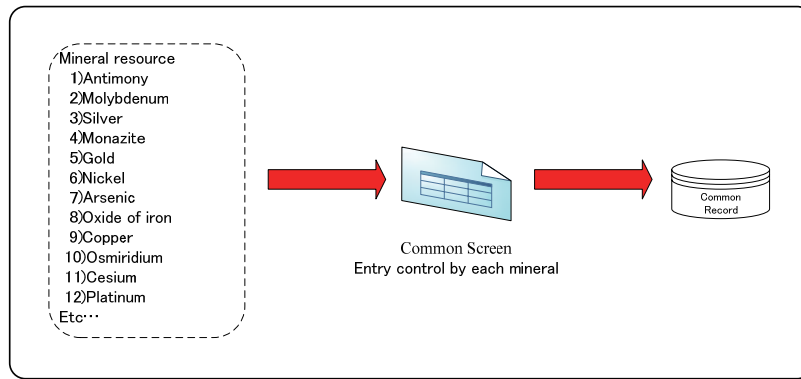


Figure 6.4.3 Common screen display and common entity (with input control)

Proposal 3 : Individual screen displays and common entities for chemical analysis data (with input control on the screen)

Advantage : There is little possibility of erroneous data input.

Disadvantages : Complex programming is required. System maintenance is rather cumbersome.

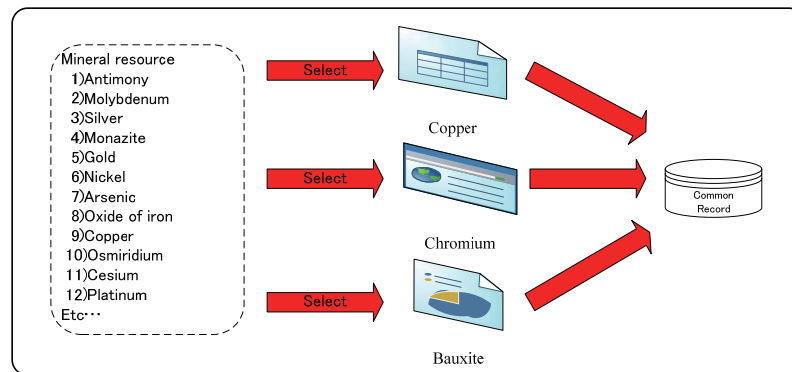


Figure 6.4.4 Individual display screen and common entity

Proposal 4 : Individual display screens and individual entities for chemical analysis data

Advantage : There is little possibility of erroneous data input.

Disadvantage : Cumbersome programming and system maintenance are required.

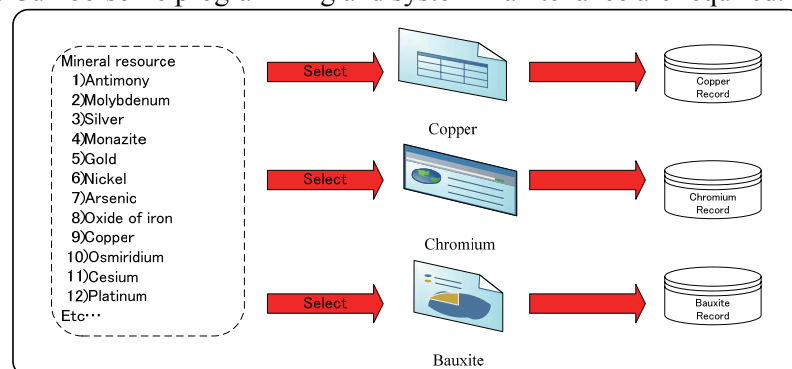


Figure 6.4.5 Individual display screen and individual entity

Although Proposal 4 follows the concept of the existing database, application of this proposal should be avoided as far as possible from the viewpoint of efficient system maintenance.

Proposal 2 was adopted in this design. Input items were defined for each type of mineral to ensure the accuracy of the data input. However, there are more than 180 input items for chemical analysis in the existing database. Therefore, reduction in the number of the input items is recommended when defining the actual input items in the database design.

In addition, encoding seems appropriate for some of the input items. However, since consolidation of the input items has not been implemented and there is a possibility of the entities in the database becoming complicated due to consolidation, such encoding is not included in the design.

(6) Index data of survey document on geological surveys

Development of the existing index data of survey document search database has almost been completed by AGS. The data in this database are expected to be extremely useful in searching documentary geological information in Albania. Therefore, the database is being developed under the assumption that it will be made available to the general public as part of the information to promote investment in mining. However, the database has problems. For example, some of the data are written in Albanian. The existence of misspelled words and the use of different synonyms resulting from the absence of encoding are also problematic.

A database including a function to present the major items in English was designed on the assumption that the database will be made available to the general public.

5) Adoption of code tables

Most of the existing database is not encoded. However, it allows users to select input data from tables of the existing data input for some of the data items. In this conceptual database design, encoding was adopted wherever possible for the following reasons:

- Encoding will enable the system to display data both in Albanian and English simultaneously.
- Misspelled words and use of different synonyms will have to be eliminated in order to maintain the accuracy of the data.
- Criteria for data input will have to be established assuming use of the database by multiple users.

However, it is considered difficult to establish universal standards for geological data input because of ever-changing evaluation criteria and differences in opinion. Therefore, while encoding will be considered wherever possible, conventional free-format data input will be maintained for items on which differences in opinion persist.

Principal points to note in preparing code tables are as follows:

(1) Code table for the types of licenses

The new Mining Law (drafted in 2009) classifies mining activities into the following four types,

- a. Prospecting,
- b. Exploration,
- c. Exploitation,
- d. Combination of points as in letters a”, “b” and “c”
(Combination of “a,” “b” and “c,” in practice, “from Prospecting to Exploitation)

and provides granting of licenses for each of the four types of activities. Therefore, a code table will be established in accordance with this classification.

(2) Code table for the status of license applications

As part of its investment promotion activities, the government of Albania has established a National Licensing Centre with the aim of providing a one-stop-service for approval/permission for business activities. Work associated with evaluation of licence applications for mining will be transferred from METE to AKBN because technical knowledge of mining is required for the evaluation. AKBN is preparing for the transfer.

The database equipped with a license management function will play an essential role in sharing information on the evaluation of license applications.

(3) Code table for the types and names of minerals

The new Mining Law (drafted in 2009) defines more than 150 types of minerals classified into seven groups. It was decided that the code tables used in the database design be defined in accordance with the definitions of the law. As a consequence, the existing data on mineral resources will have to be edited and sorted in accordance with the newly defined codes.

(4) Code table for mineral resource data

Encoding of the geological components in the mineral resource data, *i.e.* geological structures, rock complexes, geological ages, pedogenic processes and occurrences, with the existing data input will be considered.

(5) Code table for the administrative units (local governments)

This table is used for input of data on licenses, mineral resources and index data of survey document. Data at regional level and district level coexist in the existing database. To eliminate this confusion, the table will be designed so that data at the provincial and district levels can be entered into the database separately.

6.4.3 Points to Note when Converting the Existing Data and Producing New Data

It is assumed that the existing data owned by METE, AGS and other organizations will be utilized efficiently in developing the Mining GIS Database, instead of developing a large number of new data. However, since it is impossible to achieve the purpose of data production by simply converting the existing data, data processing will be required. The points to note in data conversion and production are described in the following:

1) Map information

(1) Licenses (Mining zone maps)

In order to achieve consistency between map information and attribute information, the coordinate data stored in the license information in the existing database will be used to reproduce license polygons.

(2) Topographic maps and geological maps

The use of the data available from METE and AGS will eliminate the need for large-scale data processing.

(3) Infrastructure and protected zone maps

While this type of map information is not available from METE, AKBN or AGS, it is available from the Ministries of Public Works and Environment. The data obtained from these ministries will be used either for data processing or for new data input.

(4) Digital orthophotos (optional)

Since digital ortho-photographic images are based on the World Geodetic System, the use of the data in the database will require conversion of the coordinate system and confirmation of the consistency with other data.

2) Various data

(1) Sorting and revising of the existing data

Items to be encoded will be sorted and unnecessary items will be removed. Misspelled words and use of different synonyms will be identified and, if necessary, appropriate measures will be taken to deal with such problems.

(2) Definition of code tables

Code tables will be prepared after the existing data have been sorted as mentioned in the preceding paragraph.

(3) Processing of the existing data

The data on mining licenses, mineral resources and the index data of survey documents will be processed.

The prepared code tables will be used in processing the existing data. An encoded input will be entered for an appropriate item.

There may be cases in which the existing mineral resource data, local government data, etc. have not been fully encoded or are not consistent with the new encoding system. In such cases, the content of the data will have to be analyzed and processed accordingly.

Translation of data into English will also be required in order to disclose information to the general public. In particular, because document titles in the document index are all in Albanian, they will have to be translated into English before being entered into the database.

6.4.4 Steps to be taken in Developing the GIS Database

The Albanian counterparts are expected to implement the following works for system development after the completion of this survey:

- (1) Decision on the system development method
 - 1) Selection of self-implementation or outsourcing
 - 2) Decision on the system environment (DBMS, GIS, network environment, system maintenance, etc.)
 - 3) Decision on the budget for system development
- (2) Detailed design and programming (outsourcable)
 - 1) Detailed design and programming based on the adopted basic software
 - 2) Logical and physical design of the database (including common tables)
 - 3) User management design (including exclusive control)
 - 4) Error messages
- (3) Conversion and entry into the database of the existing data
 - 1) Data on mining licenses
 - 2) Map data including topographic and geological maps
 - 3) Mineral resource data
 - 4) Data for search of documents on geological surveys
- (4) Entry of the basic data used in the database
 - 1) Basic data on mining activities
 - 2) Various types of code tables
 - 3) Map data including infrastructure and protected zone maps
- (5) System introduction
 - 1) Procurement and installation of hardware
 - 2) Procurement and installation of the basic software
 - 3) Network construction
 - 4) Establishment of the user environment
- (6) User training
 - 1) Training for system managers
 - 2) Training for users

As mentioned above, system development usually involves a wide variety of work. Therefore, coordination between and within those organizations involved in system development is crucial for system development. In other words, personnel familiar with both IT and GIS and work within their organizations will be required as a key element for successful database and system development.

In order to obtain such personnel, human resource development in IT will be required in AKBN as mentioned above. The developed human resources will play a crucial role in system development and operation of the Mining GIS Database. For the same reason, support from GIS and IT engineers for METE and AGS, which are at a more advanced stage in introducing IT than AKBN, is considered essential. For the reasons mentioned above, it is recommended that the Albanian counterparts fully understand the work related to system development in future and focus on coordination among the relevant organizations, personnel assignment and capacity development.

6.5 Conceptual Design of a Website based on the GIS Database

The purpose of building a website, as proposed in this project, is to make information on mining resources public and to provide information to local and international investors in order to promote investment in the Albanian mining sector.

To do this, a mining resources map using a GIS database on mining resources and organized mining resource information should be released on the website, and a website design that will actively promote investment in Albanian mining sector should be considered.

Furthermore, this survey did not go into specific website design (layout, color, font size or type and so on), but did only consider the development policy and constituent elements of the website.

6.5.1 Necessary Conditions of the Website

In today's society, especially the business world, gathering information via the internet is vital, while at the same time, because information can be provided effectively and efficiently to an unspecified number of people via the internet, how it can be ever more effectively utilized is constantly being considered. It is also clear that it is an effective tool in promoting investment in the mining sector, one of the purposes of this project.

Firstly, the following trends with regards to building websites will be considered:

✧ From making a website to achieving results from a website

In the early days of the internet, organizations and corporations were competing to make websites. At the time the aim was to build a website. However, the trend is now changing to: how to get the most out of the developed website, or rather, how best to increase profits from it.

✧ From an organizational mindset to an investment mindset

When developing a website, emphasis is moving from the developer's perspective to the end-user's perspective. This springs from the thinking of just how to get customers to use one's website. There needs to be a rethink, for example, of whether the content such as announcements and news from an organization, which often accounts for a large part of their site, are really in the customer's best interest. There is a possibility that investors rarely use the site and that the only purpose it fulfils is the self-gratification of the organization concerned.

✧ Utilizing data analysis

In order to realize the abovementioned *achieving results from a website* and *investment mind* it is necessary to regularly analyze the data relevant to the website. As such, it is important to come up with new policies through methods such as log analysis^{*2}, then to reflect these in the website.

^{*2} Log analysis is the analysis of a 'site log,' which is a record of the state of use of a website.

Further, the following issues are conceivable in the development of a website for promoting investment:

- Search key words
With appropriate key words it is possible to search for websites using a search engine. For example, inputting Albania and Mining as key words in a typical search engine such as Google or Yahoo will return a list of websites.
- Responding to inquiries
It is necessary to be able to respond to inquiries from investors. For example, question and answer content such as frequently asked questions (FAQ) on obtaining a mining license, and responding to individual emails. At the same time it is necessary to clarify the contact details for each type of information and to establish a system for responding to inquiries. It is not merely sufficient to make an email inquiry page; rather, it is important to set up a system whereby an inquiry receives a rapid and appropriate response.
- Provision of information to promote investment
Provide investors with an outline of services of the applicable agencies that are conducive to promoting investment. Some examples could be, introducing the agencies' roles, preferential treatment for promoting investment, and outlining investment procedures.
- Provision of technical information
Provide information that investors need. Examples of such information are: an introduction to Albania, current mining activity (information such as mine licensing areas, mining statistics), geology of the whole of Albania, an overview of the geological structure, and a list of documents obtainable from relevant agencies.
- Online applications
Electronic government is being able to undertake various applications via the internet. In Albania, the National Licensing Center (NLC) --for the application of various licenses, not only those in the mining sector-- is operational and it is now possible to process some applications. Therefore, it is necessary to consider a method of directing traffic to the NLC website. And at the same time, the necessity of handling other applications electronically should also be considered.
- Management of investor information
Provide individual services for investors. Public agencies need to keep one-on-one service in mind. One way about this, for instance, is to allow online search of subjects such as license updating, submission of reports and so on.
- Website links
Set links to the websites of relevant agencies. It should be positioned as a portal site of the mining sector in Albania and be linked to relevant agencies' websites in order to heighten its convenience for investors.

The analysis on the current state of websites in Albania outlined in the following sections will be undertaken with these abovementioned conditions in mind

6.5.2 State of Website Development of Relevant Agencies in Albania

When entering three keywords, Albania, Mining and Geology, in a Google or Yahoo search as of June 2010, the websites of the relevant Albanian agencies could not be found immediately. Their search ranking is very low. Further, it is vital to increase the number of English websites for foreign investors. Herein are the results of analysis of websites developed by the relevant agencies.

1) METE

The Ministry of Economy, Trade and Energy's (METE) English website is shown in Figure 6.5.1. Some of the issues to consider are:

- It is clear that it is in control of economic activity; however, it is unclear where mining sector information is located. Trade and small- and medium-sized businesses are listed on the menu.
- METE announcements and news take up a large part of the homepage, making it difficult to find other information. Mining sector links are located at the bottom of the homepage.

- There is a licensing section, however, it is unclear what licenses these are. It is not easy to grasp that these are mining licenses.
- There is no link for information on licenses on the English site. There is a link on the Albanian site.
- Relevant agency logos are displayed, however, for a foreign investor just seeing the logo gives no clue as to what agency it is. Only Albanians familiar with these logos have any idea as to what they represent.
- There is the National Licensing Center's (QKL, the agency responsible for license applications) logo, however, there is no explanation to promote investment.

This website, from the above issues, can not be regarded as providing interested foreign investors with sufficient information.



Figure 6.5.1 The lower part of METE's homepage

METE's website can be found at: <http://www.mete.gov.al/>

2) AGS

Figure 6.5.2 shows part of the Albanian Geological Survey's website. Some of the issues to consider are:

- There is only an Albanian site, and none in English. Therefore, foreign investors cannot access information (for this reason it could not be analysed sufficiently).
- It is oriented towards introducing the organization's activities and not towards investors.
- Its design is changed frequently, causing confusion amongst viewers.
- There is a lack of information and items that have not been linked.
- EuroGeoSurveys is the only other agency linked to the site.



Figure 6.5.2 AGS homepage

The Albanian Geological Survey website can be found at: <http://www.gsa.gov.al/>

3) AKBN

The National Agency of Natural Resources' website is shown in Figure 6.5.3. Some of the issues to consider are:

- There is insufficient information for investors. In particular, it is necessary to make it easier to reach information such as for acquiring licenses.
- It mainly introduces AKBN's activities, and is not an investor-oriented site.
- There is insufficient information included in each section.
- The central image obstructs the main menu operating properly. This image also obstructs access to other information.
- There needs to be links to websites of other relevant agencies such as the National Licensing Center.

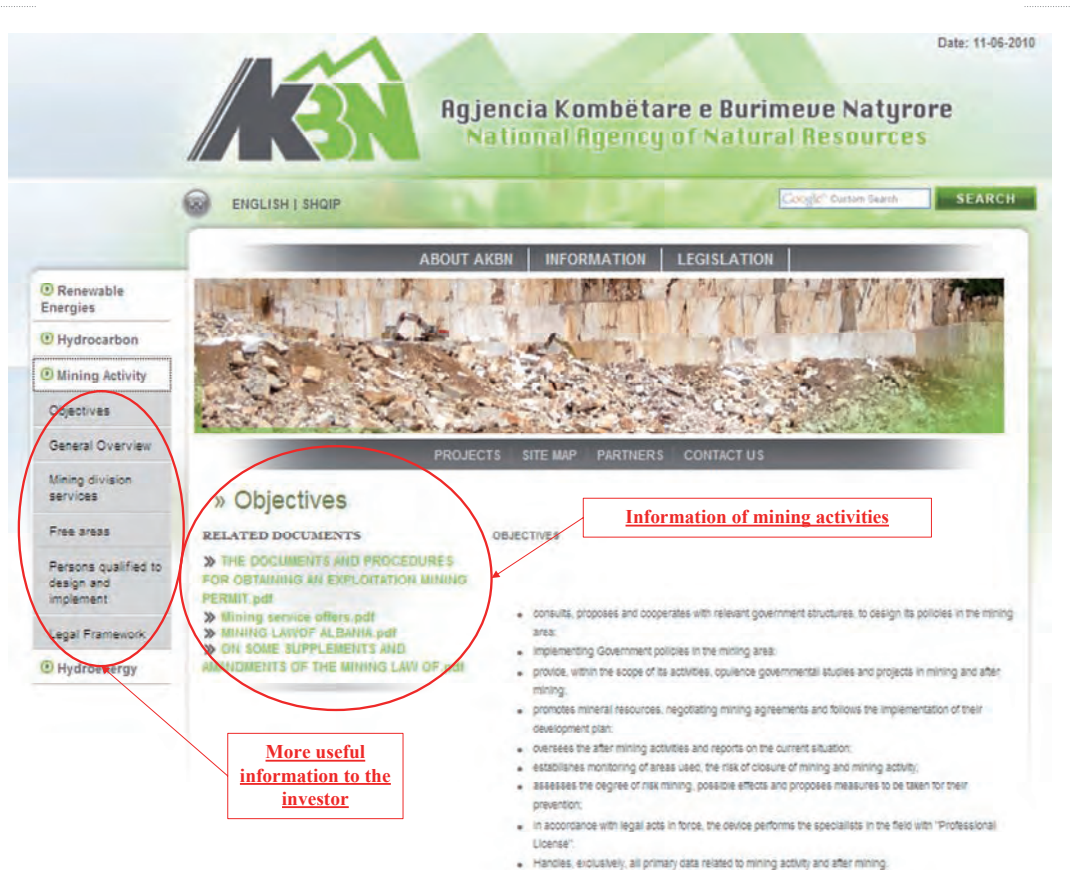


Figure 6.5.3 AKBN's homepage

AKBN's website can be found at: <http://www.akburimevenatyrore.com/>

6.5.3 Analysis of Websites in Kosovo

Figure 6.5.4 is the website of Kosovo's Independent Commission for Mines and Minerals. This is also a GIS system the counterpart wishes to refer to. This site can be considered to be an investor-oriented website that provides the necessary information and puts the investors first.

The following is the analysis of the website content and lists of the sub-headings found under each of the main menu headings across the top of the page.

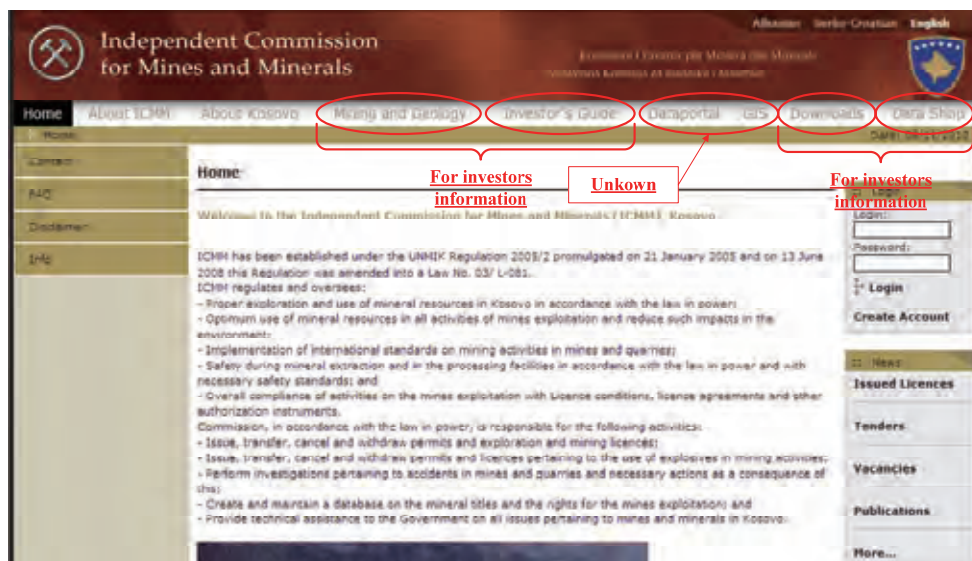


Figure 6.5.4 ICMM's homepage

a. HOME

When the keywords *Kosovo* and *mining* were searched online, this homepage had the most hits.

- Contact
- FAQ: General questions
- Disclaimer
- Info
- News: Issued licenses, tenders, vacancies and news.

b. About ICMM

This includes an overview of the organization and information on its activities.

- The Mission
- Structure of ICMM
- ICMM Board and Directorate
- ICMM Staff
- Provided Data
- Partners and Links
- Blackboard
- Archives
- Jobs
- Tenders
- Application
- Issued Licenses

c. About Kosovo

This includes information on Kosovo and its natural environment.

- Kosovo Brief
- Geography
- Climatic Conditions
- Hydrology
- People
- Infrastructure
- Economical Summary

d. Mining and Geology

This gives a geological overview of Kosovo for investors and information on mining activity.

- Regional Geological Position
- Geology
- Structural Geology
- Metallogeny
- Mineral deposits
- Exploration potential
- Long Term Strategy
- Legislation
- Statistics

e. Investor's Guide

This provides information for investors including on the Privatisation Agency of Kosovo.

- Investing in existing mines
 - There is a link to the website of the Privatisation Agency of Kosovo (PAK), which is a portal for private investment.
- Application Forms
 - Various application forms for mining licenses.

f. Data portal

This could not be accessed while in Albania, however, it could be in Japan. The following data can be searched for. Further, the message board on this site reports that this system is in its early stages and is not complete; as is the case with the next section, GIS.

- Mineral licences
- Companies
- Boreholes
- Mineral deposits and occurrences (Map 1:200,000)
- Map of Construction Minerals (1:50,000)
- Processing plants
- Exploitation sites

g. GIS

The following map layers can be selected and displayed.

- Thematic Layers
- Topography
- Geoscientific maps
- Basis Data

These are made up of data such as topographic raster and DEM data.

h. Downloads

Legislation such as that on the establishment of the ICMM, publications and so on can be downloaded.

- Legislation
- Application Forms
- Publications

i. Data shop

This lists the maps that can be purchased from ICMM, their year of publication and price. The following are the main map types.

- 1:200,000 General map of minerals; Geological map of Kosovo
- 1:100,000 Geological maps
- 1:50,000 Maps of construction raw materials

The website of the Independent Commission for Mines and Minerals (ICMM) can be found at:
<http://www.kosovo-mining.org/>

6.5.4 Information Necessary for an Investor-oriented Website in Albania

The analysis of the three abovementioned Albanian agencies' revealed that they possess fundamental website making skills. Therefore, the construction of a new website will be feasible with advice on development policy and investor perspective.

1) User-friendliness

The analysis of the three agencies' websites revealed that they are not investor-oriented sites. Therefore, whether a new investor-oriented site should be developed or the existing sites redeveloped needs to be considered. For this, it is recommended that the following points are taken into consideration.

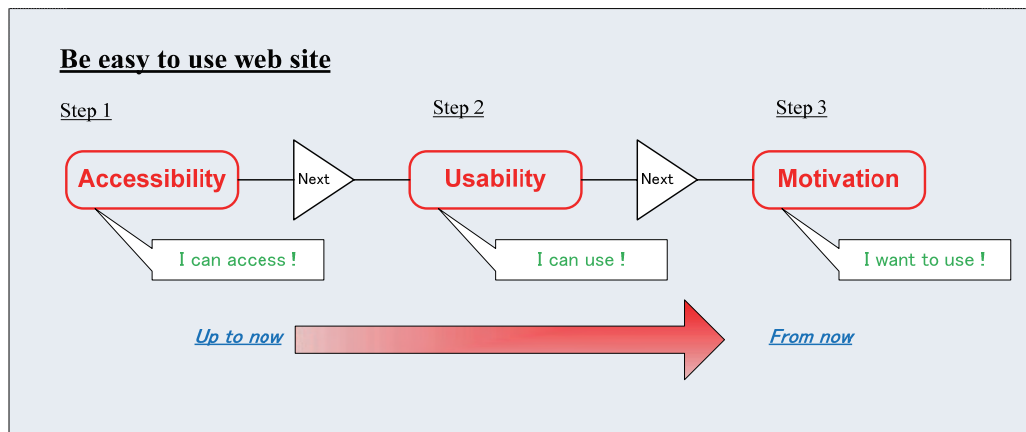


Figure 6.5.5 Perspectives on website user-friendliness

a. **Accessibility**

In the website industry the aim is to build a website that anyone can use. This project proposes, as specific policies, that:

- the website can be searched using a search engine,
- not only an Albanian, but also an English version is developed,
- a stable environment is provided; including that the overall design of the site is not changed frequently, and
- the menu format makes it easy to understand where the contents are located.

b. **Usability**

After the information has been accessed, the content can be easily understood, and then the next action can be undertaken. In particular, it is important to give the users the sense that this website is easy to use. This project proposes, as some specific policies, that:

- the menu format makes it easy to understand where the contents are located,
- the necessary information is represented in an appropriate manner,
- the contact information is clearly stated (organisation name, address, representative, phone number, FAX, email, map, etc.),
- when necessary, questions and inquiries can be made; a system is also necessary whereby prompt and appropriate replies are possible, and
- websites of other agencies are linked.

c. **Motivation**

The aim is get users motivated to want to actively use the website. It is very difficult to get to this stage in website development; however, some policies regarding this are that:

- specific investor information can be searched; in particular, browsing for license application status (NLC has already undertaken this), and confirmation of license renewal dates, and of report submission status and deadlines,
- information and results of tenders of mining areas and so on can be obtained,
- application and report forms can be downloaded, and
- technical information necessary for investing such as geological maps can be obtained.

2) Content sections

Content sections and points to keep in mind when developing a website based on the abovementioned policies are herein listed. Moreover, making an English version is vital.

- a. Overall homepage
 - The website is searchable using a search engine.
Develop the website upon confirming the search engine guidelines so that it corresponds to envisaged search keywords.
 - Make sure the announcements and news sections do not take up a lot of space on the homepage.
 - Make a menu that is easy for investors to understand and make selections.
 - Make the contacts clear and make email inquiries possible. It is also necessary to have an organizational system whereby responses can be made quickly.
- b. Organization
 - Introduce roles and duties
 - Introduce activity content
 - Organizational chart
 - List of board members
 - List of relevant agency websites
- c. Introduction to Albania
 - Including information on Albania and natural conditions
 - Introduction to Albania
 - Natural conditions (brief description of conditions such as topography, climate and hydrology)
 - Social conditions (population, ethnicity, etc.)
 - Economic conditions (economic situation, infrastructure brief, etc.)
- d. Mining activity in Albania
 - Outline of geology and geological structure
 - State of mineral distribution
 - State of exploitation of various minerals
 - Summary of mining development plan
 - Overview of mining licenses
 - Mining statistics
- e. Investment guide
 - Introduction and link to the National License Center
 - Guide to investment incentives
 - Introduction to investment procedures
 - Explanation of points for investment approval
- f. Basic data
 - The maps and data are to be PDF files, which are to be made based on the data in the mining GIS database. They will be downloadable, therefore it is necessary consider their size and precision so they can be provided. It is not necessary to provide all of the detailed information, the sale of this can be considered at another time.
 - Geological maps
 - Mineral resource maps
 - Mining area license maps
 - Main infrastructure maps
 - Document index data
 - Index map of geological maps
 - List of geological maps
 - List of mining licenses
- g. Downloads
 - Legislation (laws on the establishment of organizations and mining)

- Method of applying for licenses (including application documents)
 - License forms
 - Report forms
- h. Tender information
- Information on planned tenders
 - Regulations for tenders
 - Public notification of mining licenses
 - Public notification of tender results

6.6 Establishment of Policies for Operation and Management of the GIS Database

After this study and the mining GIS database design are finished, it will be time to move into the database development phase. Then, the Albanian counterparts will take over the operation and update of the mining GIS database on its own. Therefore, some recommendations will be given on policies for the operation and management of the database so that it is used effectively.

6.6.1 Operation and Management of the GIS Database

The main user of the mining GIS database, as mentioned in *Chapter 6 System Installation* of the database design specifications, will be AKBN. At the same time, the operation and management of the system is also AKBN's responsibility. This is also because it is AKBN's legal responsibility to promote mining in Albania, and because it is the agency for mining licenses and for collecting information regarding mining activities. Namely, it can be said that AKBN, by rights, must play a major role regarding the mining GIS database.

Therefore, there is basically no need for METE and AGS to assign new personnel for the mining GIS database. Both agencies are expected to be users of the database; however, their position is essentially to support the development of the database.

AKBN on the other hand, has so far not undertaken sufficient measures or policy for organizational system utilization. As such, it is necessary to consider developing a system whereby IT and GIS are used on an organizational level. The following roles, for instance, can be envisaged as part of an IT and GIS support system considering AKBN's size:

- (1) System and database administration
 - Overall system and database administration
 - Coordination with internal and external organizations relevant to the system
- (2) System and database support (in charge of hardware)
 - Hardware and network administration
 - Server and network monitoring
 - Security measures
 - User management
 - Data and database backup
 - Data and database input-output management
 - Management and procurement of IT equipment consumables
 - Management and procurement of IT equipment
- (3) System and database support (in charge of software)
 - Software operation support
 - Software operation user training (including CAD and GIS software)
 - Installing and updating software
 - Maintenance of database codes and tables

At the same time as assigning personnel to these abovementioned roles, it is also necessary to consider measures to improve the computer literacy of the technicians and employees who will be the users of the mining database. Some possible examples:

- Allocate computers depending what the position encompasses. One computer each would be ideal, however, computer allocation should be considered with regards to budgetary constraints so as to not impede their work.
- Establish an IT and GIS user support system and aim to respond promptly.
- Decide on a plan for constant IT training and set it in motion. Consider making a training manual specifically for AKBN.
- Promote the use of CAD and GIS software in regular work such as thematic mapping. To do this, decide on, and implement a plan for constant CAD and GIS training.

The following figure is a schematic of the operation of the mining GIS database.

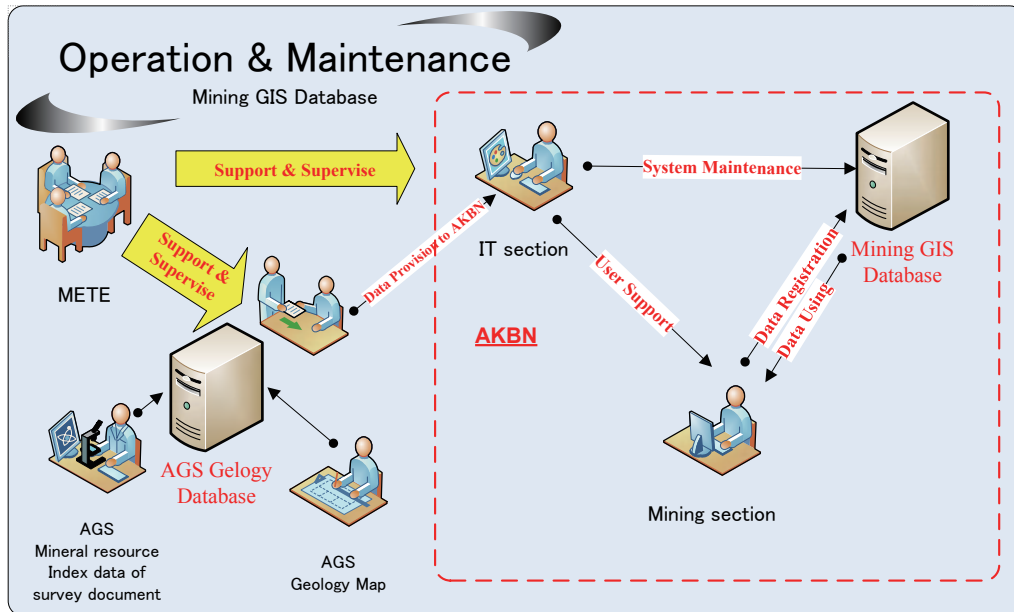


Figure 6.6.1 Schematic of the mining GIS database operation

Further, in order to introduce the mining GIS system it is necessary to strengthen the organization including establishing an IT section, as shown in the following figure, and also to improve work methods within the agency. The development of a GIS system alone can be expected to cause problems to the actual operation of the GIS.

By making the GIS system and establishing a system so it can be operated, GIS can contribute to strengthening AKBN organizationally and its technical capacity. And consequently, it is also expected to lead to the promotion of mining in Albania.

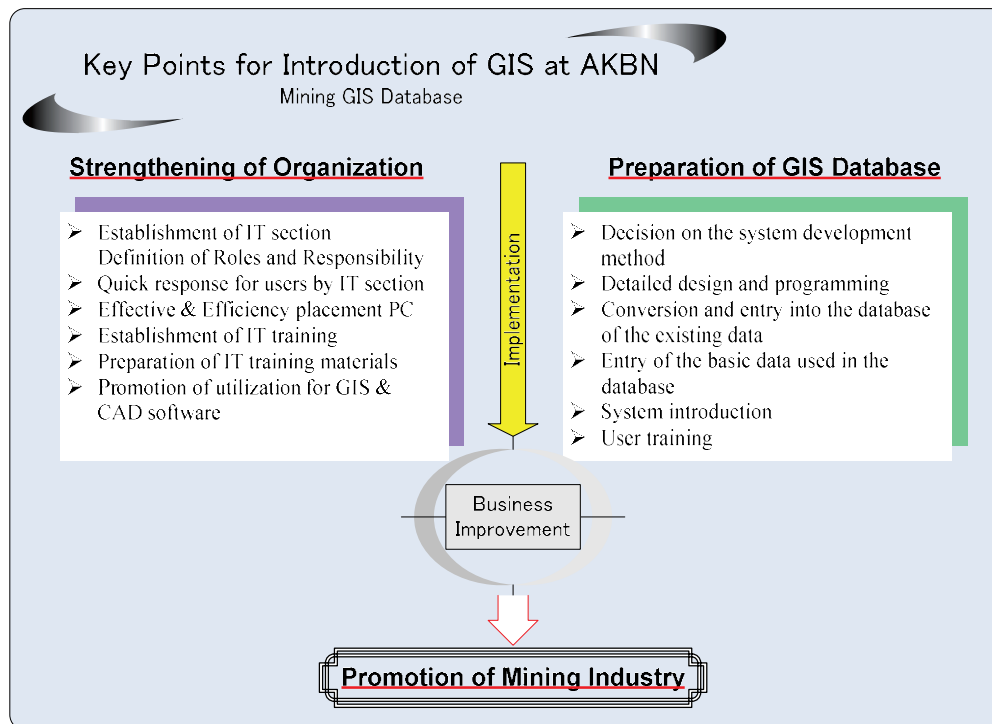


Figure 6.6.2 Action plan for introduction of mining GIS database

6.6.2 Outlook for after the Design of the GIS Database

After this project comes to an end the Albanian counterparts will progress to the next phase, the actual development of the database. As there are no technicians in the relevant agencies with practical programming skills, there is a high possibility that the detailed design and programming and so on will be outsourced. Therefore, whether or not an outsourcing company would be able to undertake this was investigated.

Initially, three Albanian companies specializing in IT and GIS were asked about their technical capacity to develop a database, based on the draft database design specifications. However, because of the limited time available for questioning, sufficient replies could not be obtained from any of the companies. Therefore, it could not be confirmed whether or not the database development could be outsourced in Albania. As such, there is a possibility that it may not be able to be outsourced to a private company. If this is the case, then:

- Use only the commercial versions of GIS and DBMS applications
Development of work applications will have to be abandoned. Therefore, the operators of the applications will need a lot of knowledge and operation of GIS and DBMS, and there is a high possibility that firstly time will have to be taken to train GIS technicians.
- Employ a GIS programmer and develop the database internally
Employing many programmers and GIS technicians is not realistic in Albania; therefore, it is likely that only a few could be employed. Further, as the agency does not have the programming skills to build on, it is highly likely that it will take a long time to develop the database. Moreover, there is no guarantee that the employed GIS programmers will be of a sufficient skill level.
- Change the content of the database by lowering its functionality so that it can be outsourced to an Albanian company.
If private Albanian companies cannot programme the design content, it will have to be changed to that which they are capable of. In this case, it will take time to survey their programming technical capability, and there will be a gap between the actual programming

and the required functions, meaning sufficient results cannot be expected from the GIS implementation.

The abovementioned measure can be expected to result in a GIS being introduced sometime in the future, however, it will be difficult to get sufficient results quickly.

Furthermore, there is the possibility that the GIS database can be developed by outsourcing to a GIS development company from a third country. In this case, it will be necessary to take the following points into consideration:

- the budget to develop the GIS database will increase,
- there is a possibility that the GIS database will not be up to standard in Albanian, and
- there is a possibility that the system maintenance after the GIS database has been developed will be insufficient.

Finally, as the Albanian counterparts progress to the mining GIS database development phase, it is hoped that they will develop an independent mining GIS database based on the abovementioned points to consider and measures. Also, it is hoped that GIS will contribute to the promotion of mining in Albania, that many GIS technicians are trained, and that improvements to work using GIS are made.

6.6.3 Recommendation to the Design, Operation and Management of the GIS Database

The recommendation to the design, operation and management of the GIS database is as follows;

- It is important that the development of GIS is implemented on a step-by-step basis. There are many examples in countries where major GIS systems that are over-detailed and complicated have been designed, but implementation has not been successful because of the need for a major increase in capacity and also the need for much expensive computer hardware.
- The next step will be the detailed design of the GIS database, selection of software and customisation of the software to the needs of METE and its agencies.
- Some training of Albanian personnel in GIS has been carried out in Albania and in Japan during the JICA project. However, the most important aspect of a future GIS database is to strengthen capacity in AGS and AKBN for its implementation and use. There are currently major capacity shortfalls in terms of the number of staff and the skills of the staff for GIS database management. It will be important to recruit staff and to implement detailed training programmes on GIS.
- It is important that the data and information are efficiently shared amongst institutions for their use, and that an efficient mechanism is available for potential private sector investors to easily obtain data and information. It is important for information to be clear about the data reliability.
- Responsibilities for data management and future GIS need to be clearly defined. In particular, AGS and AKBN both receive important data, from survey work, company reports, etc. Responsibilities for AGS and AKBN must be clearly defined in the future implementation of GIS so that the two agencies co-operate on improved data management and availability.
- It is recommended that METE discuss potential funding opportunities with international donor organisations for a Technical Assistance (TA) project for the development of the detailed design for the GIS database, the customisation of the software, advice on responsibilities, development of data management procedures and detailed training of personnel.