DISCUSSION AND EVALUATION OF MINING AND ENVIRONMENT LAWS OF TURKEY WITH REGARD TO EU LEGISLATION

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ABSTRACT

DISCUSSION AND EVALUATION OF MINING AND ENVIRONMENT LAWS OF TURKEY WITH REGARD TO EU LEGISLATION

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Turkey is trying to become a member of the European Union. Within this frame, studies are proceeding for harmonization of the Turkish legislation with the EU legislation. European legislation might have positive or negative impact on the mineral extraction industry and national mining law. Since there is no title directly related to mining policy in the EU legislation the mining policy of EU was evaluated especially under the titles“energy” and “environment”.

In this thesis, the Turkish mining regulations and the environmental aspects of the mining activities have been investigated and discussed in comparison with those of EU. The latest developments about mining sectors of Turkey and EU have been evaluated and the comparison between EU directives and Turkish laws and regulations about mining have been made.

In this study, modifications that should be realized in laws and regulations and measures that should be taken by Turkey as a candidate country for EU discussed and some proposals have been made.

Keywords: Mining, Environment, European Union, Turkey, Legislation, Law.

ÖZ

TÜRK MADEN VE ÇEVRE KANUNLARININ AVRUPA BİRLİĞİ MEVZUATIYLA KARŞILAŞTIRILMASI VE DEĞERLENDİRİLMESİ

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Türkiye Avrupa Birliği'ne üye olmaya çalışmaktadır. Bu çerçevede Türk mevzuatıyla Avrupa Birliği mevzuatının uyumlaştırma çabaları devam etmektedir. Avrupa Birliği mevzuatı, ulusların maden kanunlarını ve madencilik sektörünü negatif veya pozitif yönde etkilemektedir. Avrupa Birliği mevzutında madencilik politikası ile ilgili tek başına bir başlık olmadığı için, Avrupa Birliği'nin madencilik politikası özellikle "enerji" ve "çevre" başlıkları altında incelenmiştir.

Bu tezde, Türkiye'nin maden mevzuatındaki düzenlemeler ve madencilik faaliyetlerinin çevresel etkileri araştırılmış ve Avrupa Birliği'ndeki mevzuatla karşılaştırılmış ve incelenmiştir. Türkiye ve Avrupa Birliği madencilik sektörlerindeki son gelişmeler değerlendirilerek, madencilik konusundaki AB yönergeleri ile Türk kanun ve yönetmelikleri karşılaştırılmıştır.

Bu çalışmada, Avrupa Birliğine aday konumunda olan Türkiye'nin alması gereken önlemler ile yasa ve yönetmeliklerde yapılması gereken değişiklik önerileri geliştirilmiştir.

Anahtar Kelimeler: Madencilik, Çevre, Avrupa Birliği, Türkiye, Mevzuat, Kanun.

To My Daughter

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LIST OF ABBREVIATIONS

BAT	:	Best Available Technique
BGS	:	British Geological Survey
BREF	:	Best Available Technique Reference Document
BRGM	:	Breaude Recherches Géologiques et Minières
CCA	:	European Calcium Carbonate Association
COM	:	Communication
DG	:	Directorate General
EBA	:	European Borates Association
EC	:	European Commission
ECSC	:	European Community of Steel and Coal
EIA	:	Environmental Impact Assessment
EMAS	:	Eco-Management and Audit Scheme
EMIREC	:	European Mineral Resources Research and Technological Development Council
EN/ISO	:	Environmental/International Organization for Standardization
ERMITE	:	Environmental Regulation of Mine Waters in European Union
ETIMADEN	:	Eti Mine Works General Management
ETP-SMR	:	European Technology Platform on Sustainable Mineral Resources
EU	:	European Union
EUBA	:	European Bentonite Association
EULA	:	European Lime Association
EUROFEL	:	European Association of Feldspar Producers
EUROGEO-SURVEYS	:	Association of European Geological Surveys
EUROMINES	:	European Association of Mining Industries
EUROSIL	:	European Association of Industrials Silica Producers

EUROTALC	:	Scientific Association of European Talc Industry
FEMP	:	Federation of European Mineral Programmes
FFH	:	Flora Fauna and Habitat
FP6	:	Sixth Framework Programme
FP7	:	Seventh Framework Programme
GDMA	:	General Directorate of Mining Affairs
GNP	:	Gross National Product
GNSS	:	Galileo Navigation Satellite System
HLG	:	High Level Group
IDPA	:	International Diatomite Association
IMA	:	Industrial Mineral Association
IMF	:	International Money Fund
IMMIB	:	General Secretariat of İstanbul Mineral and Metals Assocciation
IPPC	:	Integrated Pollution Prevention and Control
JRC	:	Joint Research Center
KPC	:	European Kaolin and Plastic Clays Association
LCV	:	Lowest Calorific Value
MENR	:	Ministry of Energy and Natural Resources
MMO	:	Chamber of Mining Engineers
MTA	:	General Directorate of Mineral Research and Exploration
NESMI	:	Network on European Sustainable Mineral Industries
NGO	:	Non Governmental Organization
No	:	Number
PREEIA	:	Pre-Environment Impact Assessment
PRTR	:	Pollutant Release and Transfer Register
RCHW	:	Regulation on Control of Hazardous Wastes
RCSS	:	Regulation on Control of Solid Substances
R&D	:	Research and Development
RTD	:	Research and Technological Development
SEA		Strategic Environment Assessment

TÇMB	:	Turkish Cement Manufacturers' Association
TKI	:	Turkish Coal Enterprises
TTK	:	Turkish Hard Coal Board
TUMMER	:	Turkish Association of Marble natural Stone and Machinery Producers
UEPG	:	European Aggregates Association
YMGV	:	Mining Development Foundation of Turkey

CHAPTER 1

INTRODUCTION

Turkish mining sector produces more than 50 different types of minerals and some of them are found in considerable amounts in the country. The share of the sector within nation's economy has always been in restricted level. The new mining law of 2004, numbered 5177 was enacted to promote accerelated mineral exploration and development for local and export markets with a commitment to attract foreign and private investment into Turkish mining sector.

Europe retains a modest position in world mining activity in terms of scale of production and mineral reserves but maintains a non negligible role in the world mining industry.

The concept of sustainable development resting on three pillars of economics, environment and social development has become an increasingly important factor in the European mining sector and a major influence on the related policies of the European Commission. Members of European mining industry shall conduct their activities according to the principles which promote sustainable development. A successful minerals planning policy should create the legal administrative environment that is necessary to ensure the sustainable supply of minerals to society within the framework of sustainable development.

Today, there is no comprehensive European legislation regulating all mining activities with their different elements such as exploration, development, extraction, reclamation etc.

European legislation influences the mineral extracting industry and national mining law. European Union has an increasing influence over Member States' national legal structures. It is having an over increasing influence on policy and practice in Member States' especially regarding environmental matters.

The first specific directive 2006/21, the management of waste from the extractive industries, is directly related to mining activities in EU. This directive contributes to a more harmonised and modernised approach to the management of wastes from the sector.

In Turkey, the State both acts through its own exploration and production establishments and as a regulatory body to grant the permissions to explore and exploit minerals and to supervise the activities in this field.

The new mining law No. 5177, contains a number of improvements with respect to the internationally accepted reqirements for a modern mining law. It minimizes the duration, simplifies the procedure of obtaining licences and provides additional supports for the investors.

In this framework, European Union hasn't got any main policy directly under "mining" title such as environment, energy, customs, agriculture etc. The mining legislation are forced under the horizontal legislation especially environment and energy. In this scope, the updating of legislation has a continuity and Turkey should follow this updating studies for adopting her laws and regulations.

In this study, modifications that should be realized in laws and regulations and measures that should be taken by Turkey as a candidate country for EU were discussed and some proposals were made.

CHAPTER 2

MINING INDUSTRY IN TURKEY

Turkey is one of the few countries that have considerable and diverse mineral resources. There are about 4400 known resources of various minerals in Turkey. The availability of this wide range of minerals have contributed to Turkey's industrial development through the supply of materials for its manufacturing industries.

Turkish mining sector produces more than 50 different types of ores and some of them are found in considerable amounts in the country. The public sector is dominant in fossil fuels and while the private sector is engaged mostly in industrial minerals and metallic ores. However further exploration and investment in the minerals sector are required since the current mineral output is not comparatively large as compared with the existing potential of mineral resources. Therefore, in order to extract a higher percentage of the present mineral reserves, new production policies were implemented by the Government to encourage the mining companies to more rapid mineral exploration and more efficient production activities.The Minister of Energy and Natural Resources of Turkey declared that; "the average depth of mineral exploration in Europe is nearly 1100 m. whereas; until now, the average depth of exploration is about 200 m. in Turkey. If the mineral exploration increases for example to 1100 m. depth by drilling, the amount of mineral reserves would be able to increase naturally" [1].

Turkey is luckier than many European and Middle East Countries for the variety of mineral resources. Variety and properties of mineral resources of Turkey reflect the complexity of its geology and structural geology.

The share of the sector within the nation's economy has always been at a limited level. Although Turkey has a wide variety of minerals, its resources are only partially developed. Turkey is the world's largest producer of boron, accounting more than half of world output, and was known for such industrial minerals as barite, celestite (strontium), clays, emery, feldspar, limestone, magnesite, marble, perlite, pumice, and trona (soda ash). Other minerals currently exploited and marketed are copper, chromite, iron, gold, silver, pyrite, manganese, antimony, lead, zinc, and meerschaum.

The main strategy of the mining sector is to meet raw material requirements of the industry as well as to increase national income by exports. The private sector has been encouraged to participate in the exploration, extraction and processing activities since 1980s. However, the results of the opening up of the mining sector to private investment during the 1980s have been disappointing. The recently enacted new Mining Law of May 2004, which has been one of the main components of the IMF-backed studies called "Reform Programme for the Improvement of the Investment Environment" [2], aims at providing more opportunities to the private sector.

The reform programme for improvement of investment environment in Turkey was accepted in 2001 with the principle decision of the council of Ministers. Thus, it is intended to prevent administrive obstacles faced by investors, to reduce or eliminate some unnecessary and repetitive bureaucratic transactions and thereby to complete the procedures rapidly. Mining sector, which is one of the important sectors, has also taken place in this programme.

The new Mining Law is also expected to give a push to the private activities in the sector. Currently, the public sector is dominant in fuel minerals while the private sector is dominant in industrial minerals and metallic ores (mining about 75% of the non-fuel resources). Privatization of some public mining enterprises has already been

completed while some others are still on the agenda. Until now, the completely privatized companies in the mining sector in Turkey [3], are shown in Table 2.1.

Table 2.1 Privatized companies in mining sector (01.01.2006) [3]

Companies	**% shares sold**
Eti Gümüş A.Ş.	100
Eti Krom A.Ş.	100
Eti Elektrometalurji	100
Eti Aluminyum	100
Konya Krom Manyezit Tuğla A.Ş.	100
Divriği-Hekimhan Madenleri Sanayi ve Ticaret A.Ş.	100
Eti Bakır A.Ş.	100
Kümaş Kütahya Manyezit A.Ş.	99,74
Çayeli Bakır İşletmeleri	45
İskenderun Demir ve Çelik	100
Karabük Demir Çelik Fabrikası	100
Bozüyük Seramik San. ve Tic. A.Ş.	100
Çanakkale Seramik Fabrikaları A.Ş.	5,80
Yeni Çeltek Kömür ve Madencilik	16
Kömür İşletmeleri A.Ş.	10

In order the mining sector to add inputs the country's development, to develop and own its place in Turkey's economy, Gross National Product(GNP) share of the sector should be increased. The share of mining sector in GNP has been around 1,1 % although it has shown changes dependent upon the economic changes and the years in Table 2.2, [4].

In spite of this long history of mining and the large mineral resource potential, mining has not contributed more than a few per cent to Turkey's gross domestic product in the past decades. In fact, it has been as low as 1.0 per cent in many years.

Also, the annual growth rate of mining in Turkey in the past few decades has lagged behind the manufacturing industry and the overall Turkish economy. It is believed that the main reason for the relatively low contribution of mining to the Turkish economy is due to a lack of capital investment in the mining sector.

Table 2.2. The Share of Mining in Gross National Product (GNP) [4]

Year	Share of Mining (%)
1993	1,10
1994	1,40
1995	1,27
1996	1,24
1997	1,17
1998	1,08
1999	1,14
2000	1,14
2001	1,17
2002	1,05
2003	1,07
2004	1,20
2005	1,43

As regards the structure of the mining industry, the State both operates through its own exploration and production agencies and has a regulatory body to grant the permissions to explore and exploit minerals, and to supervise the activities in this field. The regulatory function of the State in this area is carried out by the Ministry of Energy and Natural Resources under the Mining Law No.3213 (as amended by Law no 5177, in June 2004) [5], which constitutes the basic mining legislation.

The new mining law of 2004, numbered 5177, was enacted to promote accerelated mineral exploration and development for local and export markets with a commitment to attract foreign and private investment into the Turkish mining sector.

2.1 MINING ORGANIZATIONS IN TURKEY

2.1.1 GOVERNMENTAL ORGANIZATIONS

The mining activities in Turkey is coordinated and monitored by the Ministry of Energy and Natural Resources. The duties of Turkish Ministry of Energy and Natural Resources might be summarized as supplying the energy demand and regulating the production of natural resources in the country.

The Ministry of Energy and Natural Resources of the Republic of Turkey was established in 1963 in order to assist in determining the objectives and policies on the energy sector and to enable exploration, development, production and consumption of the energy resources in compliance with these objectives and policies. In line with these objectives, the Ministry of Energy and Natural Resources carries out its duties through the State Enterprises under her control [6].

The primary organizations of the The State Enterprises of the Turkish mining sector are as follows :

- General Directorate of Mining Affairs (MİGEM)
- General Directorate of Turkish Hard Coal Board (TTK)
- General Directorate of Mineral Research and Exploration (MTA)
- General Directorate of Turkish Coal Enterprises (TKİ)
- Eti Mine Works General Management (ETİMADEN)

The General Directorate of Mining Affairs (MİGEM)

General Directorate of Mining Affairs was founded in 1963 for supervision and inspection of mining and production affairs and arrangement of mining permits in Turkey. According to the new Mining Law, inspections by the General Directorate of

Mining Affairs concerning the mining operations, including environmental issues, are to be carried out during the licensing period [7]. The General Directorate of Mining Affairs is responsible for;

- Arranging licenses for mining rights and supervising and inspecting mining activities in Turkey,
- Taking supportive measures for exploration and production of minerals,
- Taking precautions for the execution of mining activities in order to improve the mining sector in Turkey,
- Controlling of safety and labour health conditions in mines,
- Taking necessary precautions for the harmonization and protection of the surrounding natural environment in the mining area,
- Supervising environmental impacts of mining activities.
- Keeping abreast of mining technology in the world.

General Directorate of Turkish Hard Coal Board (TTK)

Ereğli Coal Enterprise, was established in 1940 as an affiliated establisment of Etibank. After the establishment of Turkish Coal Enterprises (TKI) in 1957, it was transferred to the TKI. It was reorganized in 1983 as a separate organization, namely Turkish Hard Coal Board to manage hard coal mines in the Zonguldak basin on the Black Sea Cost. Mining activities in this basin have been operational since 19^{th} century. The General Directorate of Turkish Hard Coal Board is a state economical enterprise and producing high quality coking coal in and around the city of Zonguldak along the Black Sea Cost. The coal field is approximately 100 km long and 20-30 km wide totalling the area of 13.350 km^2 The hard coal is used for producing coke, house heating and in the thermal power plants [8].

TTK is engaged in;

- exploration,
- exploitation and

- marketing of native hard coal.

In this regard, TTK is responsible for [9];

- providing metallurgical coal for Turkey's iron and steel industry,
- providing coal to coal fired power stations in the area,
- providing training facilities to private undertakings,
- solving unemployment problem in the area,
- training staff, i.e. TTK has specially trained 40 search of rescue teams (400 miners) to help people under emergency conditions such as earthquakes.

General Directorate of Mineral Research and Exploration (MTA)

The General Directorate of Mineral Research and Exploration (MTA) was established in 1935 to conduct scientific exploration of the natural resources in Turkey. The exploration of great majority of known ore deposits and the geological studies in the country have been carried out by MTA [10].

The General Directorate of Mineral Research and Exploration is responsible for the research and the exploration for all kinds of mineral resources and providing geological information for the development of mining sector.

Moreover,

- MTA may take exploration licenses based on the provisions of Mining Law no: 5177,
- Before the expiry of the exploration licenses, MTA may transfer exploration licenses to private and state mining organizations by means of bidding on the base of Mining Law No. 5177.

MTA carries out studies about the following subjects:

- Geological Researches
- Mineral Research
- Geophysics Researches
- Feasibility Studies
- Geotechnical Studies
- Technological Researches

The General Directorate of Turkish Coal Enterprises (TKİ)

The General Directorate of Turkish Coal Enterprises was established in 1957 to operate the coal mines of the country. It is also an important producer of lignite for the thermal power plants in Turkey [11].

TKI is responsible for;

- exploration of indigenous coal (lignite and asphaltite),
- exploitation and marketing of these commodities,

TKI is the biggest lignite producer in Turkey with 45,8 million tonnes annual production capacity and 11,974 personnel.

The followings are its main tasks:

- to operate primary energy resources such as lignite, peat, bituminous schist and asphaltite deposits in parallel to the general policy of the government on energy and fuel,
- to supply coal for the industry and house heating,
- to establish and operate necessary industrial plants related to its activities,
- to contribute to the economy of Turkey as much as possible,

- to prepare plans and programmes,
- to develop strategies and realize them.

Eti Mine Works General Management (ETİMADEN)

Concentrated and refined boron products and various perlite products constitute the product portfolio of Eti Mine Works which, under the law no:2805, determines its duty as exploiting boron mines and producing boron products. Eti Mine Works, which has been the locomotive power of Turkish mining industry in metal mining and industrial minerals and progress it has made since the early years of Turkish Republic is even today one of the important mining firms of Turkey with its capital of 100 Million YTL and 4,370 employees [12].

Eti Mine Works aims;

- to increase its production capacity in refined boron products by developing new boron technologies and production methods by means of the necessary Research & Development work,
- to develop new refined boron products with high added value, to continue the managerial policy based on productivity, quality and profitability in the boron sector,
- to provide higher contribution to the country's economy by investing in new and additional capacities by using the current infrastructure.

2.1.2. NON-GOVERNMENTAL ORGANIZATIONS

A non-governmental organization (NGO) is an organization that is not part of a government and is not founded by the state. NGOs are therefore typically independent of governments. Although the definition can technically include for-

profit corporations, the term is generally restricted to social, cultural, legal, and environmental advocacy groups having goals that are primarily noncommercial.

There are great number of NGO's take place in the mining sector. The most familiar NGO's in mining sector in Turkey are given below and the some of them explained shortly.

- Chamber of Mining Engineers of Turkey (MMO)
- General Secretariat of İstanbul Mineral and Metals Exporters Association (İMMİB)
- Mining Development Foundation of Turkey (YMGV)
- Turkish Cement Manufacturers' Association (TÇMB)
- Turkish Association of Marble Natural Stone and Machinery Producers (TUMMER)
- Association of Miners of Turkey
- Association of Anatolian Miners
- Association of Young Mining Businessman
- General Mine Workers Union

General Secretariat of İstanbul Mineral and Metals Exporters' Association

Exporters' Associations with its subsidiaries located at regions of concentrated export is a professional establishment, which deals with all kinds of the mineral export activities. They affiliated to The Prime Ministry of Republic of Turkey Undersecretariat for Foreign Trade [13].

Their basic aims can be summarised as;

- preserving professional moral and cooperation,
- increasing exports,
- verifying product items,

- ensuring competition power for the products,
- defending members' benefits.

For increasing the mineral exports; association is providing technical observation, sampling and analysis services, publications, advertisement abroad, organisation of fairs and scientific meetings also activities for improvement of the represented sectors as all other professional establishments. General Secretarıat of Istanbul Mıneral and Metals Exporters' Associatıon provides services the products of six Associations included in its body, tries to increase exports as it is accepts the development of the country as its piority goal.

Mining Development Foundation of Turkey (YMGV)

Mining Development Foundation of Turkey organizes national and international congresses, symposiums, seminars and technical trips for the purpose of improving the exploitation of mineral deposits and mining activities in Turkey. In this connection, the foundation realizes technical publications, supports technical and scientific researches and contributes all these activities. It also gives financial support to faculty members, engineers, technical institutions and students to encourage the research and education. Foundation also gives support to the organizations related with evaluation and exploration of natural resources of Turkey. Foundation was established on 14th February 1986 in İstanbul [14].

Foundation tries to develop strategies and plans in cooperation with other organization related to the development of mining in Turkey. The main target of the Foundation is to clarify public opinion including the administrators in the subject of mining.

Turkish Cement Manufacturers' Association

Turkish Cement Manufacturers' Association is the represantative organization of the cement industry in Turkey. The activities of Association can be explained in three categories as [15];

In administrative field ;

- To undertake the sector's problems based on governmental issues,
- To serve the sector on public relations issues,
- To act as an "information centre" for the sector and public,
- Pioneer the sector's worldwide professional relations.

In technical field

- Execution of basic and applied research for the sector,
- Finding solutions to the problems of producers that may be encountered during production,
- Supervising the production compliance of the members with the Turkish and International standards,
- Inter-laboratory testing applications,
- To serve as an information centre in technical and administrative issues,
- Cooperate with institutions and universities related to cement and concrete,
- Measurements and consultancy service for environmental issues.

In training filed;

- Providing training to the members and cement industries of developing countries,
- Organize seminars, symposiums, and conferences,
- Inform and update members about the world cement industry, trade and fuel markets,
- Publish periodical magazines and books about cement and concrete.

Turkish Association of Marble Natural Stone and Machinery Producers (TUMMER)

TUMMER's vision is to make Turkey the leading country in the world natural stone production and exportation by developing natural stone mining in Turkey [16].

The activities of TUMMER can be summerized as ;

- To carry out studies with the purpose of securing production of natural stone reserves in a productive way,
- To provide coordination for the members to attend international fairs with the purpose of increasing the exportation of the marble sector,
- To present incentive mechanisms to the government which will accelerate the development of the sector and become determinant in conferring these incentives,
- To inform its members about the developments in natural stone sector in Turkey and in the world,
- To represent our natural stone mining in Turkey and in the world,
- To provide coordination for joining international fairs with the purpose of increasing the exportation of the marble sector.

2.2 ORE RESERVES OF TURKEY

Turkey, being a geologically and mineralogically diverse country with some notable exceptions, is characterized by a relatively large number of small deposits rather than a few large ones. Resources of metallic commodities mineable by large scale-methods are known for bauxite, chromite, copper, lead, zinc, gold, iron and silver in Turkey. For boron minerals, apparently Turkey has over 64% of the world's known reserves.

In terms of industrial minerals Turkey's most significant resources are barite, boron, limestone and marble, feldspar, clays magnesite, pumice, strontium and trona. The known ore reserves of Turkey is shown in Table 2.3, [17].

Turkey has the largest and highest quality boron reserves in the world. Three major types of boron minerals in Turkey are colemanite, ulexite and tincal ores. The largest tincal deposits are located at the Eskişehir-Kırka region. Colemanite ore is obtained in the Emet region of Kütahya, Bigadiç-Balıkesir and Mustafakemalpaşa- Bursa. Ulexite is produced in Bigadiç region of Balıkesir. All boron minerals operations in Turkey are carried out by the General Management of Eti Mine Works.

Table 2.3 Ore Reserves of Turkey [17]

Ore Type	**Reserves(proven+ probable) (Tonnes)**	**Explanations**
Gold	338	Metallic Au
Alunite	4,000,000	7.54% K_2O
Antimony	106,306	Metallic Sb
Asphaltite	82,000,000	(LCV) 2896-5536 Kcal/kg
Asbestos	29,646,379	Fibre content over 4%
Copper	1,697,204	Metal Cu
Barite	35,001,304	71-99% $BaSO_4$
Bentonite	250,543,000	Drilling mud additive
Bauxite	87,375,000	55% Al_2O_3
Boron Minerals	2,071,854,000	24.4-35 % B_2O_3
Mercury	3,820	Metallic Hg
Zinc	2,294,479	Metallic Zn
Iron	132,100,000	55 %Fe (82 458 750 tonnes metallic iron)
Diatomite	44 224 029	Good quality
Kynite	3,840,000	21-52 % Al_2O_3
Dolomite	15,887,160,000	Over 15 % MgO
Feldspar	239,305,500	Albite and orthoclase
Phosphate	70,500,000	19 % P_2O_5
Fluorite	2,538,000	40-80 % CaF_2
Graphite	90,000	2-17 % C
Silver	6,062	Metallic Ag
Kaolinite	89,063,770	5-37 % Al_2O_3

Table 2.3 continued

Ore Type	Reserves(proven+ probable) (Tonnes)	Explanations
Rock salt	5,733,708,017	Over 88,5 % NaCl (200,000,000 tonnes lake reserves)
Clay	354,362,650	Ceramics&refractory grade
Chromite	25,931,373	Over 20% Cr
Lead	860,387	Pb content
Quartz sand	1,307,414,250	Over 90 % SiO_2
Quartzite	2,270,287,821	Over 90 % SiO_2
Sulphur	626,000	32 % S
Lignite	8,300,000,000	(LCV) 868-5000 Kcal/kg
Meerschaum	1,483,000(box)	Good and medium quality
Manganese	4,560,000	34.54% Mn content (1 576 000 tonnes)
Marble	5,161,000,000 m^3	Total potential reserve
Magnesite	111,368,020	41-48 % MgO
Perlite	5,690,027,600	Expansion in different porsions
Pumice	1,479,556,876 m^3	Good quality
Pyrophyllite	6,644,000	Ceramics+cement quality
Sepiolite	13,546,450	Sepiolite content over 50 %
Sodium Sulphate	16,536,000	81 % $NaSO_4$ (13,040,000 tonnes lake water reserves)
Celestite	665,082	Over 72 % $SrSO_4$
Talc	482,736	Good quality
Hard Coal	1,126,548,000	Good quality
Trona	233,317,680	Over 56 % trona
Thorium	380,000	0.24 % ThO_2
Uranium	9,137	0.05-0.1 % U_3O_8
Tungsten	36,719	Metallic W
Zeolite	345,148,875	Clinoptilolite+ Heulandite
Emery	3,725,082	Good quality

Turkey has one of the largest trona deposits in the world. Ankara-Beypazarı trona deposit has a proven reserve of over 200 million tonnes, and the investment started in September 2004, at a project cost of approximately 155 million USD, with the aim of producing 1 million tonnes of soda ash and 100,000 tonnes of bicarbonate in the second half of 2006 [18].

Over half of the perlite reserves of the world are situated in Turkey. Mining operation of perlite are in Cumaovası district of İzmir province, Manisa, Biga, Soma, Dikili-İzmir, Konya, Mollaköy-Erzincan.

Turkey has immense reserves of marble, calcerous stones, travertine, onyx, conglomerate, breccia, magmatic stones like granite, syenite diabase, diorite, which are in various colors and textures. These are the types of stone which can be treated as high quality stones in the international markets.

Turkey has a large quantity of marble reserves, which include a wide range of colors. Among more than a hundred varieties of Turkish marble, marbles having shades ranging from very light gray to black and brilliant white are available in Turkey.

Currently exploited metallic ore reserves mainly include iron, manganese, gold, silver, lead, copper, zinc, chromite, antimony, strontium. Turkey has a share of 6% in the world chromite mining. Ferrochromium is the most important product in production and exports [19].

2.3 MINERAL PRODUCTION

Turkey possesses quite big mine resources in some of minerals in the world and it is one of the world's richest countries. Excluding petroleum and coal, there are 4,400 known mineral deposits in Turkey. The ores which are produced from these deposits are used as raw materials for the domestic industry and excess of production is exported. Turkey's major ores other than metallic ores produced are borates, magnesite, marble, granite, perlite, pumice, baryte, bentonite and feldspar.

In Turkish mining 85% of production is realized by public sector and 15% is done by private sector in the last decade. However, the share of the private sector is getting bigger in mine production in the last few years in Turkey. The main producers are Eti Mine Works, Turkish Coal Enterprise and the Turkish Hard Coal establishments and the private sector companies. The public sector is dominant in fossil fuels and borate production while the private sector is concentrated in metallic ores and industrial mineral production [19]. Annual Turkish mining production belonging to year 2004

is given in Table 2.4. These production have been realized by the government and the private companies [20].

Table 2.4 Annual Mining Production(2004) [20]

	TOTAL (tonnes)	**PUBLIC (tonnes)**	**PRIVATE (tonnes)**
Hard Coal	2.842.952	2.842.952	-
Lignite	43.754.159	40.301.915	3.452.244
Asphaltite	738.915	738.915	-
Crude Oil	2.275.529	1.542.755	732.774
Iron	3.856.536	2.524.345	1.332.191
Chromium	436.639	43.880	392.759
Copper	2.356.147	2.356.147	*
Bauxite	365.836	365.836	-
Antimony	20.107	20.107	*
Manganese	13.751	13.751	*
Gold	-	0	*
Lead-Zinc	407.637	-	407.637
Silver	612.496	612.496	-
Marble	668.996	6.004	662.992
Lime	250.099	-	250.099
Dolomite	2.109.362	351.594	1.757.768
Quartz Sand	1.188.271	19.006	1.169.265
Kaolinite	536.008	11.748	524.260
Clay	4.458.402	157.540	4.300.862
Bentonite	643.153	1.443	641.710
Filintstone	1.130	-	1.130
Boron	2.878.930	2.878.930	-
Pyrite	765.432	765.432	-
Barite	134.504	49.065	85.439
Fluorite	880	880	*
Sodium Sulphate	-	-	*
Celestile	0	-	0
Alunite	0	0	
Zeolite	-	0	*
Magnasite	3.732.952	8.196	3.724.756
Rock Salt	6.100	6.100	-
Lake Salt	1.566.202	1.566.202	-
Sea Salt	582.440	582.440	-
Springwater Salt	2.976	2.976	-
Graphite	-		*

Table 2.4 continued

	TOTAL (tonnes)	PUBLIC (tonnes)	PRIVATE (tonnes)
Emery	7.902	0	7.902
Meerschaum	0	-	0
Chalcedony	-	-	*
Calcite	492.339	0	492.339
Perlite	133.829	0	133.829
Talc	-		*
Diatomite	-		*
Feldspar	1.983.336	0	1.983.336
Quartzite	2.961.932	112.852	2.849.080
Nephelin-Syenit	16.817	0	16.817
Pyrophyllite	-	-	*
Sepiolite	-	-	*
Olivine	0	0	0
Pumice	1.035.975	317.501	718.474

* : Annual production figures from one or two private companies are kept confidental according to Law No:53.

2.4 MINERAL EXPORT AND IMPORT VALUES

To understand better either the share of or the effect of the mining sector in the Turkish economy, it is necessary to analyse the foreign trades figures. The share of the sectoral exports within the total exports and the sectoral imports within the total imports are the main indicators to show various trends of the dependence of the economy on the sector.The above mentioned shares are shown in the Tables 2.5 and 2.6, [21].

Table 2.5 The Share of Mining Sector in Foreign Trade (Exports) [21]

	Exports(million USD)				
	2000	2001	2002	2003	2004
Turkey total (million USD)	27,775	31,334	36,059	47,252	63,121
Mining foreign Trade (million USD)	567	536	607	823	1,299
Share (%)	2.04	1.71	1.73	1.74	2.06

Table 2.6 The Share of Mining Sector in Foreign Trade (Imports) [21]

	Imports(million USD)				
	2000	2001	2002	2003	2004
Turkey total (million USD)	54,503	41,399	51,553	69,339	97,540
Mining foreign Trade (million USD)	1,013	573	1,066	1,314	1,925
Share (%)	1.86	1.38	2.07	1.89	1.97

As they are seen from the tables that, the share of mining sector within the exports and the imports seem to have stayed in an extremely limited range. When the exports values are looked at it seems that there has been sudden increases in the years 2003 and 2004. In the same manner, the import value increased sharply reaching the value of 1,925 million USD in 2004. The mining foreign trade values according to the mineral-mine classification system are given in Tables 2.7 and 2.8, [21].

Table 2.7 Export Values of Group of Minerals [21]

	Exports Value (million USD)			
	2001	2002	2003	2004
Industrial Raw Materials	218.3	198.9	277.4	385.4
Marble and Natural Stones	225.8	301.1	435.8	692.5
Metallic Minerals	88.1	105.9	107.7	218.4
Energy Raw Materials	4.2	1.9	2.1	3.5
TOTAL	536.4	607.8	823.0	1.299.8

Table 2.8 Import Values of Group of Minerals [21]

	Imports Value (million USD)			
	2001	2002	2003	2004
Industrial Raw Materials	90.5	120.2	146.1	189.8
Marble and Natural Stones	23.4	24.8	30.6	51.2
Metallic Minerals	110.4	183.9	188.5	248.7
Energy Raw Materials	348.5	737.9	949.5	1.435.4
TOTAL	572.8	1.066.8	1.314.7	1.925.1

Boron and the marble take place as the most valuable mine resources of Turkey. Turkey earned almost half of its export revenues from boron salt exportations. Almost 40% of the boron mineral production is exported as lumpy ore and the remaining as concentrate. While the share of boron in exports in 1990s was bigger than that of marble and natural stones, the second one made growth sharply in the last decade.

The share of marble and natural stones in the export values is getting bigger depending on the factors of development made in natural stone industry significantly by modern production equipment and methods in last ten years. The increase in production, the recovery of the construction sector in the market and the presence of new technologies have contributed the wide spread use of natural stones. Turkey is one of the few countries capable of producing over 5 million m^3 of raw marble blocks [16]. It has got an important role in the international market particularly in finished products. Total natural stone exports reached 692 million USD in 2004 [21].

CHAPTER 3

MINING INDUSTRY IN EUROPEAN UNION

Europe is rich in natural resources and the extraction and supply of minerals continue to play a crucial role in the European economy and society as it has done for thousands of years.

Although the European mining industry has a long tradition, it continues to be innovative and modern. Discovery of new deposits, mining and ore dressing need an important R&D sector. Exploration, mining and beneficiation support high level technologies. It promotes expertise in the areas of environmental and health and safety management. Through its subsidiaries around the world, the European Mining Industry transfers technologies, know how, as well as social benefits such as education and training.

In many cases it provides new jobs in the European Union (EU) where otherwise little job opportunities are given. Europe is almost self-sufficient in producing many industrial minerals and aggregates. However, it is a significant net-importer of most metals and metal ores. Consumption of aggregates, industrial minerals and metals in Europe has grown rapidly over the past decade varying by commodity about 2,5% annually.

The industry is actively present across the Community. Extraction of industrial and construction minerals is relatively evenly spread within the EU. For example, extraction of aggregates (crushed stone) and sand and gravel for construction purposes being carried out in all Member States. On the other hand, the mining

sector where production is more concentrated concerns mainly metallic minerals, where Finland, Greece, Ireland, Portugal, Spain and Sweden together account for some 75% of the total EU production. In the case of quarrying of natural stone, the most prominent Member States, France, Greece, Italy, Portugal and Spain account for some 90% of EU production [22].

In Europe, while there has been an increasing awareness of mine closures, which have tended to make headlines, increasing awareness of environmental issues and job creation has also ensured a high degree of media interest. Although many mines (iron, lead, zinc, copper, bauxite, etc.) have indeed closed over the last 20 years, major discoveries have also been made, which in some cases have changes in the economy of a country or had an impact on the trading conditions of the international market. The Neves-Corvo copper-tin deposits in Portugal, that make this country the leading producer of copper and tin in the EU and the rich mercury deposits at Las Cuevas which is the satellite of the Spanish Almaden deposit exploited for more than 2000 years, are the examples in this respect. Gold, copper, tungsten are less important reserves which have also been identified over the last 20 years and are now being mined [23].

Europe has long traditional of mining as some mines close, others are opened. Mineral exploration continues to produce new prospected regions over a long time due to the improvements in the techniques employed.

Europe is not pre-eminent in the field of metallic ores. Similarly, where non-metallic minerals are concerned, confirmed reserves in Europe are rarely of great commercial potential compared with those of world, apart from a few notable exceptions such as; mercury, 75% of the world's reserves are in the Europe (mainly Spain, but also Italy, Slovenia, etc.); potash for which huge deposits are stil mined in Germany, France and the United Kingdom; fluorite, for which Europe remains second number in the world after China; andalusite, a refractory mineral mined intensively in Brittany and

for which a French group has become world leader; an kaolinite and ball clay in South West of England.

The EU is a major user of metals, for some accounting for 25-30% of global consumption [24]. Some EU countries, for example, Finland, Ireland, Greece, Poland and Sweden are major producer of particular metals.

The EU Commission had accepted that the non extractive industry covers the extraction of all solid minerals except lignite, peat, brown coal, oil shale and uranium.

The minerals are considered mainly in three sub-sectors in the EU [25],

- metallic minerals (e.g. iron, copper, zinc),
- construction minerals (e.g. natural stone, aggregates, sand and gravel, limestone, chalk, gypsum),
- industrial minerals; the latter group may be divided into;
    - physical industrial minerals (e.g. kaolinite, feldspar, talc)
    - chemical industrial minerals (e.g. salt, potash, sulphur).

Although there are no reliable statistics, there are, more than 60,000 non-energy mining operations in the EU. Total direct employment in the mining industry in the EU is estimated to be of the order of 300,000. The total annual sellable material production is estimated at 8,000 Mt (with total extraction around 20,000 Mt) per year [26].

The total annual turnover of these three sectors in the EU is about €30 billion. More than 70.000 people are estimated to be employed in the industry in the EU enlargement countries. It is estimated that the indirect employment provided by the industry is up to 4 times the directly employed [27].

Europe currently retains a modest position in world mining activity in terms of scale of production and mineral reserves, but maintains a non-negligible role in the world mineral industry due to the fact that many companies in the sector are domiciled in Europe (often based in London). Although the mineral industry is modest within the European frontiers, it preserves a major role in the management of world resources on the international market. In addition to that, many engineering organisations and equipment manufacturers are located in Europe.

3.1 MINING ORGANIZATIONS IN EU

3.1.1 OFFICIAL ORGANIZATIONS

There are mainly four directorates of general working under the European Commission as key players in the mining field, in the following :

- Directorate General Energy and Transport,
- Directorate General Environment,
- Directorate General Joint Research Centre,
- Directorate General Enterprise and Industry.

Directorate General Energy and Transport

Transport and energy are at the heart of European policies and have a considerable impact on the everyday life of citizens. Transport policy, plans for which began in 1957, is aimed at sustainable mobility combining Europe's competitiveness with the welfare of its citizens, making for greater safety and security and enhanced rights.

Energy policy also dates back to the beginnings of European integration, with the European Community of Steel and Coal (ECSC) Treaty on coal and steel and the Euratom Treaty on the civil use of nuclear energy. However, it really took off in the

1990s with the creation of a genuine internal market for electricity and gas, the promotion of new energy sources and a more coordinated approach to security of supply.

The Directorate-General (DG) for Energy and Transport has a staff of over 1 000 in ten Directorates located in Brussels and Luxembourg. The two Directorates in Luxembourg are responsible for coordinating nuclear policy, nuclear safeguards and radiation protection inspections [28]. The DG exercises political scrutiny over the aviation, maritime and railway safety agencies, the Galileo Joint Undertaking and the Europoean GNSS (European Galileo Navigation Satellite System) Supervisory Authority. The Intelligent Energy Europe Executive Agency, which implements the financial aid programmes in the energy sector, and the Euratom Supply Agency, which monitors imports of nuclear material, also report to the Directorate-General.

Action at present in the field of energy is based on two Commission reference documents as The Green Papers;

- Towards a European Strategy for the Security of Energy Supply [29],
- A European Strategy for sustainable, competitive and secure energy [30].

They reflect a marked change in policy aimed at speeding up the reforms needed, preparing for enlargement and slanting European policies towards citizens.

The action of DG Energy and Transport during 2005 was focused on a number of priorities as;

- Contributing to the EU's competitiveness,
- Better protection for citizens,
- Encouraging sustainable development,
- Delivering the trans-European networks,
- Increasing safety and security,

- Managing globalisation through practical international cooperation.

DG Energy and Transport has some important support programmes as, Sustainable Energy Europe 2005-2008 and Intelligent Energy-Europe which contribute to achieve the European Union's energy policy targets within the fields of renewable energy sources, energy efficiency, clean transport and alternative fuels.

Directorate General Environment

The Environment Directorate General is one of 36 Directorates-General (DGs) and specialised services which make up the European Commission. Its main role is to initiate and define new environmental legislation and to ensure that measures, which have been agreed, are actually put into practice in the Member States [31].

The Environment DG, is based largely in Brussels, has around 550 staff work in the DG. An organisation chart ,showing the structure of the DG can be found on the web site at : http://europa.eu.int/comm/dgs/environment/directory.htm

Before it issues draft legislation, the Environment DG carries out extensive preliminary soundings and discussions with representatives of governments, environmental NGOs, industry, special interest groups and, where necessary, technical experts. It takes account of these often competing interests when it prepares its proposals.

- To maintain and improve the quality of life through a high level of protection of natural resources, effective risk assessment and management and the timely implementation of the community legislation,
- To foster resource-efficiency in production, consumption and waste-disposal measures,
- To integrate environmental concerns into other EU policy areas,
- To promote growth in the EU that takes account of the economic, social and

environmental needs both of our citizens and of future generations,

- To address the global challenges facing us notably combating climate change and the international conservation of biodiversity,
- To ensure that all policies and measures in the above areas are based on a multi-sectoral approach, involve all stakeholders in the process and are communicated in an effective way.

Directorate General Enterprise and Industry

The EU Treaty requires that environmental requirements are integrated into the definition and implementation of all Community policies and activities. This implies striking an appropriate balance between environmental, economic and social objectives. The European Commission, Directorate-General for Enterprise and Industry promotes the integration of sustainable development into enterprise policy and aims to ensure that the definition and implementation of policy instruments for achieving environmental goals foster entrepreneurship and encourages innovation, thus contributing to competitiveness [32].

The Enterprise and Industry Directorate General will ensure that EU policies contribute to the competitiveness of EU enterprises and ensure that EU policies facilitate job creation and economic growth.

Particular attention is given to the needs of manufacturing industry and small and medium sized enterprises. The Enterprise and Industry DG works toward the objective set at the Lisbon European Council of a competitive and dynamic knowledge based economy in the European Union and is a central contributor to the reenergizing of the "Lisbon Process" set in train after the review of late 2004 and early 2005. Its activities are based on Articles 28,29 and 30 (Free Movement of Goods), 95 (Internal Market), 152 (Public Health), 157 (Competitiveness) and Title XVIII (Innovation and Research) of the Treaty. The Enterprise and Industry

Directorate General employs over 930 people and is responsible for a budget of some 250 million Euro.

Main objectives of the Enterprise and Industry DG;

- Support the Lisbon process,
- Lower barriers to entrepreneurs in Europe and encourage potential entrepreneurs;
- Foster innovation both in the technical sphere as an adjunct to research, and in the business process;
- Continue to enhance the efficiency of the internal market, with particular attention paid to its operation in the new Member States, and aim to extend its benefits to other regions;
- Enhance the global competitiveness of European industry within a framework of sustainable development.

Competitiveness, energy and environmental policies are closely interrelated and their impact is of significant importance in particular for many basic and intermediate product industries.

Given the need for consistency of policy and legislative initiatives in these areas and in order to exploit fully the synergies between them, a High Level Group (HLG) on Competitiveness, Energy and the Environment has been launched on 28.02.2006, aiming at [33];

- fostering closer coordination between policy and legislative initiatives and the development of an integrated approach,
- contributing to creating a more stable and predictable regulatory framework,
- exploring ways to unleash the growth potential of basic and intermediate product industries by further integrating competitiveness, energy and environmental policies.

Directorate General Joint Research Centre

The Joint Research Centre(JRC) is a research based policy support organisation and an integral part of the European Commission. The JRC's principal task is to provide the Commission and its policy-making Directorates-General (DGs), as well as the Council, European Parliament and Member States, with independent scientific and technical advice.

It consist of mainly several institutes that carry out extensive research of direct concern to European citizens and industry. The JRC has developed special skills and unique tools to provide autonomous and Europe-wide expertise to improve links between technology, the economy and society.

The basis of the JRC'S research is multi-annual work programme 2003 to 2006 which supports the Commission's Sixth Framework Programme(FP6) for Research and Technological Development. This programme is organised into four areas (including budgets) is shown in Table 3.1 [34]. After the year 2006, the Seventh Framework Programme (FP7) will be operational as of 1 January 2007 and will expire in 2013.

Table 3.1 6th Framework Programmes [34]

Programme Types	**Budget €(million)**
Food, chemical products and health	212
Environment and sustainability	286
Nuclear activities	290
Horizontal activities	262

The JRC has about 1600 staff (2004) and uses a budget of over 300 million Euro per year stemming from the European Commission's research budget and from competitive income. Table 3.2 lists the European Commission (EC) services involved in mining/environmental issues.

Table 3.2 Services Related to Mining and Environmental Issues at the EC

Service	**Area of Interest**
DG Environment	• Mining Waste Directive Proposal • Environmental liability Directive • Water Framework Directive • IPPC Directive and the BAT Document on management of tailings and waste-rock in mining activities • Seveso
DG Enterprise	Mining and Industries
DG Transport and Energy	Energy policy (coal) and the mining sector
DG Research	Research in environmental impact of mining
Joint Research Center	Policy support for environmental impact of mining

3.1.2. NON-GOVERNMENTAL ORGANIZATIONS IN EU

Over the last two decades, the partnership between the European Union and the Non Governmental Organizations (NGOs) continued on all sectors. This cooperation covers a range of issues from policy dialogue to project and programme management. At present, it is estimated that, €1,000 million is allocated to NGO projects directly by the European Commission. Several hundreds NGO's in Europe and world-wide are receiving funds from the EU [35].

There are considerable number of NGO's dealing with the earth sciences in Europe. The most popular NGO's in mineral sector can be seen in the following;

- European Association of Mining Industries (Euromines)
- The European Industrial Minerals Association (IMA-Europe)
- The European Aggregates Association (UEPG)
- The Association of the European Geological Surveys (EuroGeoSurveys)
- European Lime Association (EuLA)

European Association of Mining Industries (Euromines)

Euromines is the recognised representative of the European metals and minerals mining industry in Europe. Its main objective is to promote the industry and keep relations with the European institutions at all levels. Additionally, it provides services to its members with regard to the EU policy and a network for information exchange and co-operation throughout the sector within Europe.

The present membership of Euromines comprises nine national mining federations, sixteen direct company members and five associate members. Euromines represents large and small companies and subsidiaries in Europe and in other parts of the world with many thousands of professionals. Through the activities and operations of these members more than 42 different metals and minerals are produced. For some metals and minerals Europe is the world-leading producer [36].

The federation is based in Brussels and holds membership meetings twice a year. Its working committees and groups meet regularly throughout the year.

Its major activities cover the areas of environment, health & safety, R&D, communication, and international cooperations.

It promotes expertise in the areas of environmental and health and safety management. Through its subsidiaries around the world, the European Mining Industry transfers technologies, know how, as well as social benefits such as education and training.

The European Industrial Minerals Association (IMA-Europe)

IMA-Europe is an umbrella organisation which brings together a number of European associations specific to individual minerals, currently [37]:

- CCA, Europe Calcium Carbonate Association-Europe
- EBA, European Borates Association
- EUBA, European Bentonite Association
- EUROFEL, European Association of Feldspar Producers
- EUROSIL, European Association of Industrial Silica Producers
- EUROTALC, Scientific Association of European Talc Industry
- KPC-Europe, European Kaolinite and Plastic Clays Association
- IDPA, International Diatomite Association

IMA-Europe's primary mission is to represent the interests of the industrial minerals sector at EU level on all non-commercial issues. First priority of IMA-Europe is the sustainable development of the sector.

IMA-Europe monitors the EU regulatory field and keeps its members updated on all relevant developments. It also ensures documented and coordinated positions on matters of concern.

IMA-Europe provides scientific support to its members. IMA generates and coordinates reviews and research projects on specific topics related to health & safety, environmental protection, and sustainable development. The Association also

engages in the collection and exchange of scientific and socio-economic data and acts as an information centre for the industrial minerals industry.

IMA-Europe is a partner to the national and European authorities in providing accurate and relevant information on the sector and coordinating industry's contributions to the stakeholder consultation processes.

The European Aggregates Associaiton (UEPG)

The European Aggregates Association - UEPG was founded on 24 September 1987. At present, there are 16 national associations as members, representing the gravel, sand and natural stone industries in their respective countries [38].

The UEPG represents the interests of its members at a European level before the European Parliament, the European Commission and other European institutions.

UEPG´s main activities cover technology, recycling and, with growing importance, environment. The emphasis lies in the standardisation of mineral construction materials, process and plant engineering, and the possible use of aggregates from recycling, including the legal framework for their use, as conditions in Europe still vary widely.

Another importans task of UEPG is to portray to the general public the industry´s achievements.

The Association of the European Geological Surveys (EuroGeoSurveys)

EuroGeoSurveys is the Association of the European Geological Surveys, representing over 7,500 persons working in all the numerous applications of

geosciences to the EU society and economy. It is a non-profit organisation working only in the public interest.

Based in Brussels, its main aim is to provide the European Institutions with expert, advice and information as an aid to problem-solving, policy, regulatory and programme formulation in areas such as [39]:

- the use and the management of on- and off-shore natural resources related to the subsurface of the Earth, (energy, including the renewable geothermal energy; minerals and water, soils, underground space and land);
- the identification of natural hazards of geological origin, their monitoring and the mitigation of their impacts (deficit or excess of trace elements in soils and waters, earthquakes, natural emissions of hazardous gases, landslides and rockfalls, land heave and subsidence, shrinking and swelling clays;
- environmental management, waste management and disposal; land-use planning;
- sustainable urban development and safe construction;
- e- government and the access to geoscientific metadata and data;
- the development of interoperable and harmonised geoscientific data at the European scale.

MTA, known as the Geological Survey of Turkey, has not been yet a member of the EuroGeoSurveys.

European Lime Association (EuLA)

European Lime Association is founded in 1990 and based in Brussels since January 2003. EuLA is the business and industry organisation for the lime industry in Europe [40].

The organisation's tasks are:

- to maintain a close relationship with the European Institutions, the International and European Trade Associations;
- to position and communicate the lime industry's views on issues, policies and strategies being developed in various areas such as industry competitiveness, environmental protection, energy consumption, climate change, health & safety at workplace, sustainability, technical progress, product quality, and normalisation;
- to promote lime acknowledgement in regulatory and scientific authorities.

There are great number of establisments and the organizations, both governmental or non-governmental, in different areas in the mining sector of EU. The existing separate structures in different areas such as, environment, enterprise, research e.g. need to create a more streamlined framework for dialogue. In order to be successful for sustaining the development of the extractive industry, the dialogue must involve both sides of the sector, NGO's as well as the Commission. The Commission is willing to facilitate a framework to strengthen and intensify the dialogue on all priority issues affecting the mineral industry.

3.2 ORE RESERVES AND PRODUCTION IN EU

Within Europe's relatively restricted land area, there exists a remarkable geological variety. It includes ancient cyristalline 'shields', massifs, complex younger fold belts penetrated by igneous intrusions, deep sedimentary basins containing coal and other minerals. As a consequence, Europe has a rich endowment of all the major group of minerals.

In general, the minerals can be classified according to the their source of origin, into two main groups [41] :

- Endogenic : created during the crystallisation of magma,
- Exogenic : created through the dynamics of sedimantation.

Endogenic minerals are commonly found in the rocks of Precambrian and in the mountains of Alpine orogeny. Sulphides of lead, zinc, copper are associated with acidic volcanic rocks. They are principally found in Norway, Finland, Sweden, Central France, Germany and the Southern Iberian Peninsula. Iron ore deposits are particularly important in Kiruna region of Sweden.

A second group of endogenic minerals is formed in conjunction with granitic intrusions. It includes uranium, tin, tungsten, gold, antimony, arsenic and mercury. These minerals are found in the South West England, Central France and the Northern Portugal.

A third endogenic mineral group is found in association with basic rocks, including copper sulphides in Cyprus and Norway, and chromite, asbestos and talc found in Cyprus and Greece.

Exogenic minerals include a wide range of naturally occuring sedimantary rocks. They have been deposited in association with sedimentary rocks such as oolitic ironstone, found in central England, Brittany (France), Germany, Luxembourg and Portugal. Copper deposits have also been formed in this way in Germany. Displacement deposits of lead and zinc are common in sedimentary rocks. Thus, Europe is one of the most important parts of the world for these minerals.

Commercial deposits of lead and zinc have been mined in Austria, Finland, France, Germany, Greece, Italy, Poland, Sweden, Spain and Ireland. Other parts of Europe contain substantial deposits of bauxite (aluminium). The mineral occurs and is produced in Greece, Hungary, Italy, the Netherlands and Spain.

A third group of exogenic minerals consists of solid fuels and hydrocarbons. Hard Coal is deposited in Belgium, Czech Republic, United Kingdom, France, Germany, Hungary, Ireland, Poland, Portugal and Spain. There remain large reserves of Brown coal or lignite which are principally found in Austria, Czech Republic, France, Germany, Greece, Hungary, Poland, Slovak Republic, and Spain.

The metallic ore deposits mined in the European Union mainly concentrated in [23] :

- The Mediterranean part of the EU (Portugal, Spain, Greece)
- Ireland which has become the leading country in Europe for the production of zinc and lead,
- The two countries that recently joined the European Union (Sweden and Finland), particularly in Scandinavia with the Baltic shield.

In Germany, France and Italy, and in the Benelux countries, nearly all the metallic mines have been shut down or anticipate closure.

In contrast, the non-metallic substances extracted in the member countries are varied (sand, gravel, stone, calcium carbonate, slate, clays, gypsum, phosphate rock, salt, barite, fluorspar, kaolinite, bentonite, etc.). The building sector in particular reflects the abundance of natural non-metallic resources, while demonstrating the low value per tonne of product obtained and thus its restricted mobility.

The European minerals production and its proportion in total world production are shown in Table 3.3 [42]. As can be seen from the table that, metals production in Europe is insignificant by world production. The EU is a globally important producer of some industrial minerals. The European producers of industrial minerals operate more than 650 mines and quarries and 600 plants throughout Europe [37]. The European industrial minerals sector is present in nearly all of the EU member states from the North of Scandinavia to Mediterranean Cost.

Table 3.3 Mineral Production in Europe [42]

Ores	t(metal)	% Proportion World
Bauxite(Aluminum)	2,467,255	1.8
Chromite	288,343	5.6
Copper ores	715,689	5.2
Iron ore	11,878,949	1.6
Lead ores	271,190	8.8
Nickel ores	22,201	1.9
Zinc ores	843,810	9.5
Barite	398,936	5.8
Bentonite	2,586,585	24.7
Diatomite	128,387	12.0
Feldspar	4,684,413	52.1
Fluorspar	314,381	7.1
Graphite	21,479	3.6
Magnesite	2,649,830	19.0
Perlite	1,014,165	46.1
Salt	44,878,991	21.9
Talc	1,274,770	17.2
Potash	4,936,875	19.9

They offer direct employment to some 40,000 people and process an annual volume of some 100 million tonnes, contributing a value of around € 10 billion to the EU's Gross Domestic Product. If downstream industries such as glass, foundries, ceramics, paper, paint, plastic etc. are included these figures are several order in magnitude greater.

The European Aggregates Association (UEPG) estimates that the average annual production of primary aggregates in only 18 European countries is 2,860 million tonnes [38].

All European Countries gather annual statistics of national mineral production and trade. The symbol EU25 defines the 25 EU members (as May of 2004). EU

associates Norway and Switzerland and the EU candidate countries Bulgaria, Romania, Croatia and Turkey, this group of 31 countries are referred to as EU31 in most of the literatures.

If some selected minerals production figures are studied for EU31 (Turkey is included), European production supplies fairly high proportion of the continent's requirements in contrast to the metallic ores. However, in the cases of several minerals, production is dominated by one country and the majority are still dependent on imports for all but a few of these minerals. The proportion of selected minerals produced by Europe is given in Table 3.4 [43].

As mentioned in the second chapter, Turkey has got considerable reserves in some certain minerals such as boron, chromium, sephiolite in world scale and feldspar, magnesite, kaolinite and bentonite in EU scale.

Table 3.4 Production of Selected Industrial Minerals as World Percentages [43]

Industrial Minerals	**%World**	**E31 countries with> 2% of world output in 2004**
Feldspar	49.0	Italy(19%), Turkey, France, Spain, Czech Republic, Poland
Magnesite	33.7	Turkey(16.7%), Slovakia, Austria, Spain, Greece
Kaoliniteite	25.7	UK(8.6%), Germany, Czech Republic, Turkey
Gypsum	23.5	Spain(10.3%), France
Bentonite	23.5	Greece(5,9%), Turkey, Spain, Italy, Germany
Talc	15.7	Fınland(5,8%), France
Potash	14.7	Germany(11.3%)
Barites	7.5	-
Fluorspar	7.2	Spain(3.1%), France

Certain European countries are major mine producers of particular metals, for example; Poland (3.7% world total in 2004), Finland and Turkey for chromium (3.2% and 2.4% respectively) and Ireland for zinc (4.7%). The overall European position with regard to mine production of the major non-ferrous metals in 2004 is shown in Table 3.5 [43].

Taking into consideration the large quantities of minerals required by the European society and industry, sustainable development in Europe will depend on actions at the European level, and at national level.

Table 3.5 EU31 Mine Production of Selected Metals as World Percentages [43]

Metal	**% World**	**E31 countries with> 1% of world output in 2004**
Silver	10.0	Poland(7.0%), Sweden
Zinc	9.4	Ireland(4.7%), Sweden, Poland
Titanium	8.7	Norway (8.7%)
Lead	7.3	Ireland(2.1%), Poland, Sweden
Copper	6.0	Poland(3.7%)
Chromium	5.6	Fınland(3.2%), Turkey
Tungsten	4.0	Austria(2.6%), Portugal
Iron	2.2	Sweden(1.6%)
Bauxite	2.2	Greece(1,5%)
Mercury	2.0	Finland(2.0%)
Nickel	1.7	Greece(1.4%)
Gold	0.8	-
Manganese	0.6	-

3.3 SUSTAINABILITY OF MINING SECTOR IN EU

The most commonly used definition of the term sustainable development is found in the 1987 report ,named as "Our Common Future", by the World Commission on Environment and Development (known as the Brundtland Commission). This defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Achieving this in practice requires that economic growth, social progress and improving environmental quality go together. These three pillars can not be developed in isolation since they are strongly interdependent. Economic growth can provide the additional financial resources for improving the quality of the environment and reinforcing social cohesion. Social policy underpins economic performance and helps citizens to take up their responsibility. Environmental policy contributes to preserving the natural resource base of the economy and to enhanced quality of life [44].

Sustainable development has four overarching goals :

- Economic prosperity,
- Environmental health,
- Social equity for the present generation,
- Equal opportunities for future generations.

The concept of sustainable development resting on the three pillars of economics, environment and social development has become an increasingly important factor in the European mining sector and a major influence on the related policies of the European Commission. However, the question of the relationship between the economic development and the environmental protection is one of the most complex and difficult to resolve in describing the content and the concept of sustainable development.

Members of the European mining industry shall conduct their activities according to principles which promote sustainable development. The European mining industry shall promote society's recognition that access to and use of mineral resources is integral to sustainable development for present and future generations. Members shall implement risk management strategies based on valid data and sound science [45].

The Brundtland definition has been incorporated in the EU Strategy for sustainable development, adopted at the Gothenburg Council in 2001 [46]. This strategy requires that all policies should be judged by how they contribute to sustainable development. As far as the extractive industries are concerned the most relevant document is the Communication on "Promoting sustainable development in the EU non-energy extractive industry" (COM (2000) 265) [47]. This was the first document to discuss the problem of sustainable mining. In spite of its limited scope, it gave a complex review of the mining industry and made valuable statements such as ;

- mining is increasingly influenced by other competing land uses, such as urban development, agriculture, nature conservation;
- the balanced consideration of economic, environmental and social aspects to ensure the sustainable development of the industry is needed;
- a coherent community policy is necessary.

The Communication raises two kinds of concern from the point of view of sustainable development. These concerns are the use of non-renewable resources themselves, which may mean that these "resources will not be available for future generations" and the quality of the environment, pointing to general and specific risks since mining may affect the quality of the environment. These risks are:

- air pollution (mainly dust),
- noise and sometimes ground vibration also,

- soil and water pollution and effects on ground water levels,
- destruction or disturbance of natural habitats,
- the visual impact on the surrounding landscape.

Therefore, the priority issues for sustainable development of the mining sector are;

- preventing accidents,
- improving the environmental performance of the industry in general which also requires action by the Member States aimed at creating an inventory
- restoring abandoned mine sites.

DG Enterprise and Industry the Raw Materials Supply group started work on the development of a set of sustainable development indicators for the non-energy extractive industries. A first draft was presented in March 2002; this contained 13 indicators at company level and 7 at member state level. These indicators describe the economic, social and environmental performance of the industry [48].

Most Member States have taken measures to implement the principles of sustainable development. These range from legislation implementing the concepts of sustainable development to the formulation and publication of specific policies aimed at sustaining minerals supply and the flow of benefits from mining. In most Member States the emphasis has been on environmental protection, promoting reduced use of minerals, and recycling of materials. Land use planning as an instrument to protect minerals from other developments is used by some Member States.

The Communication on "Promoting sustainable development in the EU non-energy extructive industry" (COM (2000) 265 final) refers to land use planning as one of the key factors impacting on the competitiveness of the non-energy extractive industries.

Land use and spatial planning policies directly affect sustainable development strategies for the industry. Land-access is an essential per-requisite for further development of the industry. However, land access may have considerable environmental impacts, which need to be assessed.

Although land use planning is mainly the responsibility of public authorities in the Member States a number of key initiatives of a strategic nature at the EU level provide scope for developing a more integrated approach. In accordance with the Habitats [49] and Birds Directives [50], Member States should, when designing land use measures, comply with the requirements of the Natura 2000 network as they conserve the natural environment of the sites.

In addition to reducing the consumption of minerals and protecting mineral deposits from other developments, a further strategy to achieve a sustainable supply of minerals is the development of new technology with the following objectives :

- to develop better exploration technologies to assist in the search for new mineral deposits,
- to develop extraction methods which allow for the more complete extraction of mineral bodies,
- to develop cheaper and more efficient methods of extraction and mineral processing to allow for the economic extraction of lower quality mineral deposits,
- to develop extraction and mineral processing methods which minimise environmental impact and damage caused by mining,
- to develop processes which minimise mining waste production,
- to develop technologies which are less mineral resource intensive,
- to develop and use substitute materials and
- to investigate in the upgrading of minerals and in finding new uses for minerals.

Critical issues for the sustainability of the industry are :

- The geographic location of mineral deposits,
- The environmental impact of mineral extraction,
    - Landscape,
    - Water and soil,
    - Dust,
    - Noise and vibration,
    - Transport,
- Temporary land use during the period of extraction,
- Land use after completion of extraction,
- Conflicts with other land uses,
- A lack of understanding of importance of minerals for the economy.

The challenge for sustainability is to find a balance between securing minerals supply, protecting the environment and achieving social progress. The point of balance depends on the range of policies adopted by governments. The social component of sustainability in the mineral industry has become less important in recent years. Because, high level of mechanisation applied in most fields of mineral instruction. As a result of that, number of persons decreased in the mineral industry. Except that, there is still some regions of EU where the mining industry is one of the main employers. In particular Poland, where large numbers of persons are still engaged in mineral extraction.

3.4 MINING POLICY OF EU

Mining affairs have been of interest in the history of the European Community from the very beginning. The word “coal”, an important fossil fuel, appears in the name of the European Coal and Steel Community , the original predecessor of the European Union.

Historically, many European nations were large producers of a wide range of minerals. Sustained mining over the centuries depleted many known mineral deposits and locating new deposits has become increasingly difficult. With the exception of common construction minerals, most European Nations are not perceived by exploration experts as highly prospective. The decline in geological prospectivity has been a cornerstone of recent changes in national mineral policies. For example, most European nations have greatly reduced the role and size of their geological survey departments over the past decade [51].

The increased globalization of world commodity markets has reduced the perception of policy makers that it is a necessity to achieve national self-sufficiency in minerals. In addition, economic diversification and increased job opportunities in other sectors have made it easier for workers in the mineral sector to find alternative employment.

The substantial growth of environmental awareness has made mining less popular to both the public and politicians, and has resulted in the development of some of the world's most extensive (and costly) environmental laws. For these and other reasons, policies that provided various subsidies, protection and economic incentives to the mineral sector have been increasingly eliminated or substantially scaled back.

While coal and base metals production has declined, the industrial mineral sector has prospered. The production of sand, gravel, clay and dimension stone now constitute the main part of mining activity in most developed European nations. Many of these operations are small although some large operations also exist. There has been a trend to decentralize regulatory control, at least in part, of these industrial mineral operations to local government.

The Lisbon strategy, also known as Lisbon Agenda is an action and development plan for the European Union. It was set out by the European Council in Lisbon in March 2000. It aims to make the EU “the most competitive and dynamic knowledge-

driven economy by 2010" [52]. Enterprise policy aims at creating a favourable environment for enterprises and business in Europe, thus creating productivity, growth and the job and wealth necessary to achieve the objectives of Lisbon strategy.

From the point of view of an industrial policy the following priorities can be identified as key issues driving the competitiveness of the sector in the future:

- Resource saving, efficient production,
- Reduction, recovery, and recycling of wastes,
- Cost-efficient and environmentally sound disposal methods for wastes,
- Cost-efficient rehabilitation of abandoned mine sites.

The Commission of European Communities set policy lines for promoting sustainable development for the mining sector in the communication "Promoting sustainable development in the EU non-energy extractive industry" of May 3rd, 2000. This communication reviewed present and future legislation and initiatives in the context of sustainability to that date, stressed the need for improvement in the environmental performance of the mining industry and invited member states, industries and stakeholders to set a framework for improvement.

The European Commission adopted a communication on "Safe operation of mining activities: A follow up of recent mining accidents",COM (2000) 664 [53]. This Communication describes the Aznalcollár in Spain and the Baia Mare in Romania accidents and gives an overview of the Community environmental legislation with special emphasis on tailings pond safety. The Communication sets out three priority actions intended to improve the safety of mining waste mangement. These are ;

1. The amendment of the Seveso II Directive in order to include mineral processing of ores, in particular, tailings ponds or dams used in connection with such mineral processing of ores,

2. An initiative to investigate the management of mining waste,
3. The creation of a Best Available Techniques(BAT) reference document (BREF) in order to assist the implementation of the Integrated Pollution Prevention Control (IPPC) directive in the non-ferrous metals mining sector.

The BREF covers the management of waste rock and tailings in mining activities in European Union. It was developed by the European Integrated Pollution and Prevention Control Breau, based on exchange of information between the Member States of EU and mining industry. It was formally adopted in July 2004. The BREF could deal with techniques to reduce "everyday" pollution and with techniques to prevent or mitigate accidents [54].

The objective of the BAT document is to both reduce everyday pollution and prevent or mitigate accidents. The BAT document concentrates on:

- waste-rock management,
- mineral processing relevant to tailings management,
- tailings management, e.g. in ponds/dams, heaps or as backfill,
- topsoil and overburden if they are used in the management of tailings,
- includes topsoil and overburden, if they are used in the management of tailings.

Moreover, the White Paper proposes a "directive on environmental liability" seeks to improve the implementation of key principles such as polluter-pay, prevention or precaution, and of existing EU environmental laws and also to ensure restoration of the environment [55].

On the basis of the results of these studies, the need for a proposal for a new directive specially focusing on the management of mining waste is determined. This proposal

aims to establish a specific legal framework in respect of waste stream with a view for complementing the other two priority actions [56].

After the intensive studies, European Commission realized the directive on the management of waste from extractive industries in Strasbourg on 15th March 2006 [57].

The aim of this Directive is to provide the measures, procedures and guidance to prevent or reduce as far as possible negative effects on the environment, in particular on surface water, groundwater, fauna, flora and soil, as well as any resulting risks to human health from the management of waste from the extractive industry.

The emergence of environmental protection (EU) legislation/policy has added a number of additional factors that impact on the authorisation process for mineral extraction. The influence of EU legislation and policy on national legislation and practice has grown markedly in recent years, especially regarding environmental matters. Many national laws have been amended to implement EU legislation. While this is having a harmonising effect with regard to environmental matters, it has also had an impact on the extractive industry by increasing restrictions on mineral extraction, and increasing the time and costs required for approval of permit applications.

Except the environmental protection, the social performance and employment, research and technological development and enlargement are the other issues of the competitive and social characteristics of the mining industry in EU Member States.

In the field of health and safety, industry has improved its performance in recent years, leading to a marked decline in accidents. However, accident statistics show that the mining industry is a high risk sector and improvements need to be achieved. A highly skilled wokforce is essential for maintaining the competitiveness of the

mining sector. The Commission recommends that Member States study the industry's needs for higher education in order to support the future competitiveness of the mining industry in EU.

The Commission welcomes the initiative taken by a number of technical universities and European mining industry to set up a network for co-operation and student exchange in the field of mining and mineral engineering which is supported by the Community through the Socrates programme. In this respect, The Federation of European Mineral Programmes (FEMP), consists of nine universities in seven EU countries (Finland, Germany, Hungary, Poland, Slovakia, the Netherlands and the United Kingdom) has created a good model for adding good quality graduates into the mining industry [58].

The rate of developments of new technologies in the mining industry has been very rapid, particularly in the metallic mineral sector. Research and Technological Development (RTD) in the extractive industries has led to numerous technical, economic and environmental benefits such as reduced wastes and emissions, increased productivity, reduction of unit cost and improved safety performance. Euromines has established a European Mineral Resources Research and Technological Development Council (EMiReC), aiming at establishing research priorities and giving guidance to researchers in the mining sector [59].

More effective exploration methods and monitoring of extractive operations, involving remotely sensed data acquisition and digital processing techniques, laboratory analysis and assessment of environmental impact has increased productivity and environmental performance. Through its programmes for RTD in Europe, The Community is supporting a wide range of actions by financing themes such as mining and tunneling technologies, clean processing technologies for ores and industrial minerals and exploration technologies.

In previous years the EU funded network EUROTHEN (European Thematic Network on Extractive Industries) supported networking in the EU 15. Under the 5th Framework programme a new network NESMI (Network on European Sustainable Mineral Industries) was adopted and supported with the aim of developing a research and development strategy for the extractive industry by the EU. The EU-25, and in the future the EU-27, has a large extractive industry sector and a series of research facilities. This process has begun under NESMI and needs to be continued in the future [60].

In terms of realising the European Research Area, maintaining and cultivating the research network in Europe will be a challenge for the institutions and the extractive industry.

The European Technology Platform on Sustainable Mineral Resources (ETP-SMR), which started to develop in March 2005 in the context of Seventh Framework Programme (FP7), represents the vast majority of the EU minerals industry and of its supporting organisations. It is composed of many superior companies, associations and several geological surveys and academic and research institutes. Its main aim is to modernise and reshape the European minerals industries [61].

The several key objectives of ETP-SMR, to contribute to continuing growth of the European economy, are given as ;

- Identification of the EU minerals potential, prospecting of yet underprospected areas,
- Securing future supply of high quality raw material resources through development of advanced technologies for improving access to hidden, deeper and smaller mineral deposits,
- Improving supply of high quality raw materials through advanced production processes,

- Ensuring future economic, environmental and social sustainability by an improved use of the existing resources and the reduction of waste by enhancing resource efficiency,
- Decreasing the geopolitical risks related to high dependence on metalic minerals and metals imports through improved access to EU resources,
- Development and adaption of advanced technologies to improve hazard identification and risk assesment,
- Reducing the environmental impact throughout the raw material supply chain.

As can be seen from the explanations that, the EU mining policy focused on the balanced consideration of economic, environmental and social aspects to ensure the sustainable development of the mining industry. The policy includes also the safety management and prevention of industrial risks, cover best available techniques for the mining industry and focus on the specific requirements for management of mining waste as well as environmental liability.

The several Community policies and programs, notably in relation to environment, enterprise, employment and research directly or indirectly affect these industries.

Consequently, the elements of mineral policy of EU consists of;

- The legal and administrative framework, which regulates access to mineral deposits, defines mineral ownership rights and provides conflict resolution mechanism.
- Supply of minerals
- Access to mineral deposits
- Acceptable mining and environmental performance
- Health safety mining conditions
- Appropriate restoration and aftercare after completion of mining operations
- Monitoring

A successful minerals planning policy should therefore create the legal and administrative environment that is necessary to ensure the sustainable supply of minerals to society within the framework of sustainable development.

CHAPTER 4

DIRECTIVES RELATED TO MINING SECTOR IN EU

The main aim of modern mining legislation is to provide a legal framework for an orderly development of the mining industry, taking into account the specific requirements of mineral extracting activities. Especially, these activities can be considered as mining rights, health and safety and environment.

Mining policy is a part of country's economic and overall policy. Therefore the legislation must be considered within the general design of this policy and in connection with other relevant legislations, especially that concerning the environment, health and safety, taxation, customs, corporate law, and investment intensives.

Today, there is no comprehensive European legislation regulating all mining activities with their different elements such as exploration, development, extraction, reclamation, liability. This is partly due to the fact that individual countries have sovereignty over their natural resources. They are also free to determine how they will use these resources.

European legislation influences the mineral extracting industry and national mining law not that much on a comprehensive basis but more and more on a sector basis, especially in the areas of licensing and administrative procedures, health and safety and the environment [62].

Mining today, like other industrial activities, is subject to environment protection laws, regulation and standards. Mining operation and environment protection requirements are most commonly implemented through a variety of different legal tools, such as:

- Mining legislation,
- Environmental planning and assessment legislation,
- Environment protection legislation,
- Other legislation and standards, including occupational health and safety.

Legal Framework of mining in the European Union can be considered as shown in Figure 4.1.

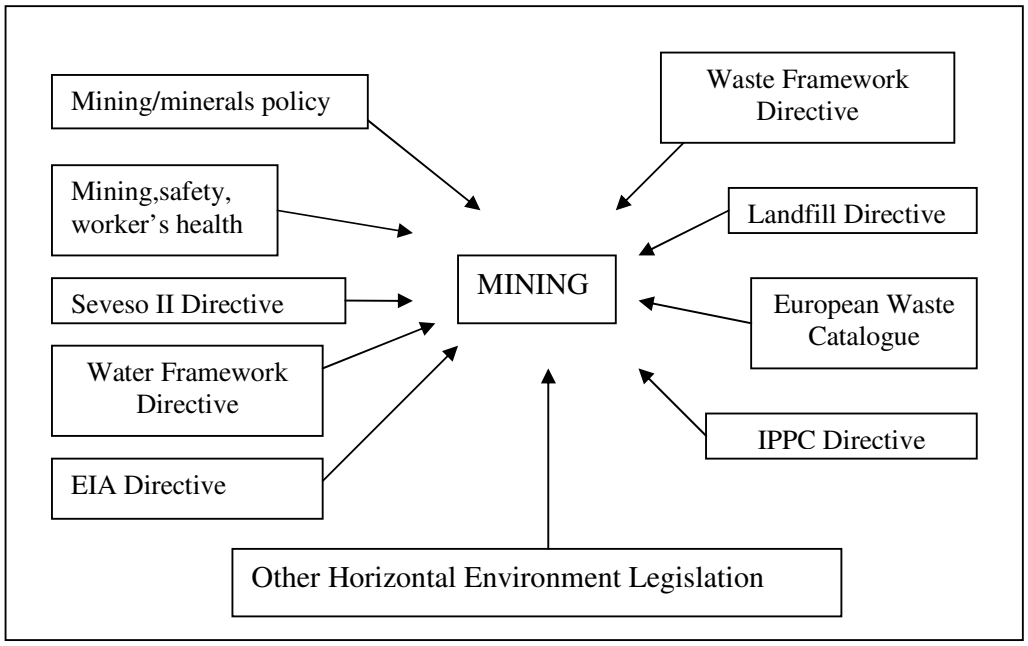

Figure 4.1 Legal Framework of mining in the EU

Government roles in environment protection are gradually evolving in response to changing perceptions in mining operations. Developments in the ownership and control of mines and metal production facilities have greatly influenced both the locations of mining and investment in new mines in Europe and around the world [63].

The administrative structures for supervising the ownership and exploitation of minerals in the Member States display many similar features. All Member States have some form of hierarchical government structure, with the national government at the apex and legal and administrative structures following the "cascade" principle, i.e. regional, county and local law and practices, which are consistent with national law and practice and, especially European law and practice [41].

The emergence of environmental protection, EU legislation or policy, has added a number of additional factors that impact on the authorisation process for mineral extraction. The influence of EU legislation and policy on national legislation and practice has grown markedly in recent years, especially regarding environmental matters.

Many national laws have been amended to implement EU legislation. While this is having a harmonising effect with regard to environmental matters, it has also had an impact on the extractive industry by increasing restrictions on mineral extraction, and increasing the time and costs required for approval of permit applications.

Both aspects have adverse effects on the ability of the industry to exploit available mineral reserves. Extractive activities depend on geology and the particular location of mineral deposits. As a result access to the deposits is of crucial importance for the competitiveness of the extractive industry. Some directives, such as the Habitats Directive, have restricted areas of land which are available to the industry.

The European Union has an increasing influence over Member States' national legal structures. EU is having an ever increasing influence on policy and practice in Member States, especially regarding environmental matters.

In this context the main legal instruments are the European Directives, the essential element of which is that Member States are obligated to implement it. Only after a directive has been cast into a Member States' national law, it is implemented by people in the nations.

European Directives having an impact on national mining law and the mineral extracting industry can be categorized into :

- Specific Directives applying only to the mineral extracting industry.
- General Directives applying to all sectors covering also mineral extracting industry.

There are relatively few specific directives applying only to the mineral extracting industries. The most important are :

- Directive 94/22 EEC concerning the conditions for granting and using authorizations for the prospection, exploration and production of hydrocarbons [64],

- Directive 92/91 EEC concerning the minumum requirements for improving the safety and health protection of workers in the mineral extracting industries through drilling (eleventh individual directive within the meaning of article 16 (1) of directive 89/391 EEC) [65],

- Directive 92/104 EEC on the minumum requirements for improving the safety and health protection of workers in surface and undergroung mineral

extracting industries (twelfth individual directive within the meaning of article 16 (1) of directive 89/391 EEC) [66].

Directive 94/22 European Parliament and of the Council on the conditions for granting and using authorizations for the prospection, exploration and production of hydrocarbons is the first and only directive regulating main stream mining activity.

This directive concerns only oil and gas, but it also sets out framework rules for all stages of mining process. The aim of the directive is to encourage best possible oil and gas exploration and production practices in the Community, by ensuring non discriminatory access to percuit of activities in the upstream hydrocarbons sector. In order to achieve this aim, the articles in the directive focuses on two major issues for establishing common rules on:

- Procedures and criteria governing authorizations for oil and gas exploration and production,
- State participitation in such activities.

Directives 92/91 EEC and 92/104 EEC have a comparable specific impact on mineral extracting industry and mining legislation issues in the field of safety and health at work. These directives have a rather similar content, the first applying to drilling especially for oil and gas, the latter to mineral extraction from mines and quarries.

Both directives have some general articles which aim to safeguard the safety and health of workers, the employer shall take the necessary measures to ensure that;

- Workplaces are designed, constructed, equipped, commissioned, operated and maintained in such a way that workers can perform the work assigned to them without endangering their safety and/or health and/or those of other workers;
- All safety instructions are comprehensible to all the workers concerned,

- The operation of workplaces when workers are present takes place under the supervision of a person in charge,
- Work involving a special risk is entrusted only to competent staff and carried out in accordance with the instructions given,
- Appropriate first-aid facilities are provided,
- Any relevant safety drills are performed at regular intervals.

Both directives, which are the framework directives, contain a certain flexibility according to the subsidiarity in order to encourage the actors, employers and workers, as self responsible partners. The legislator thus avoids a continuous adaption of the Directives if new techniques or standards are developed. When implementing directives 92/91 EEC and 92/104 EEC, the national legislator has to consider this general principle of flexibility and subsidiarity [62].

The other directive 99/92 EEC, is related to the mineral processing environment in the mining sector [67]. This is not only related with mineral processing but includes all the other sectors needs on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres (15th individual Directive within the meaning of Article 16 (1) of Directive 89/391/EEC).

The directives 92/104/EEC and 92/91 EEC do not include the mineral processing operations at the laboratory environments, although the mineral processing is accepted as the mineral production chain considered as part of the mining industry. The directive 99/92 EEC is applied for the workers potentially at risk from the explosive atmospheres except mineral-extracting industries covered by Directive 92/91/EEC or Directive 92/104/EEC.

The main directives related to safety and health of workers in the mining sector in EU is shown in Table 4.1 [68]

Table 4.1 Directives related to safety and health of mine workers in EU [68]

No	EU LEGISLATION
1	DIRECTIVE 92/91/EEC, 3 November 1992, concerning the minimum requirements for improving the safety and health protection of workers in the mineral extracting industries through drilling(eleventh individual directive within the meaning of article 16(1) of directive 89/391 EEC.
2	DIRECTIVE 92/104/EEC, 3 December 1992, on the minimum requirements for improving the safety and health protection of workers in surface and underground mineral extracting industries (twelfth individual directive within the meaning of article 16(1) of directive 89/391 EEC).
3	DIRECTIVE 99/92/EC, 16 December 1999, on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres (15th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC).
4	DIRECTIVE 89/391/EEC, 12 June 1989, on the introduction of measures to encourage improvements in the safety and health of workers at work.
5	DIRECTIVE 90/270/EEC, 29 May 1990, on the minimum safety and health requirements to encourage improvements in the safety and health of workers at work.
6	DIRECTIVE 2003/18/EC, 27 March 2003, on the protection of workers from the risks related to exposure to asbestos at work.(amending 83/477 EEC)
7	DIRECTIVE 1999/38/EC, 29 April 1999, on the protection of workers from the risks related to exposure to carcinogens.
8	DIRECTIVE 1998/24/EC, 7 April 1998, on the protection of the health and safety of workers from the risks related to chemical agents.
9	DIRECTIVE 1989/686, 21 December 1989, on the personal protective equipment.
10	DIRECTIVE 1990/269, 29 May 1990, directive on manual handling.
11	DIRECTIVE 1989/656/EEC, 30 November 1989, concerning the minimum safety and health requirements for the use of work equipment by workers at work.

Commission communications have no legal outreach on member states but they contain community policies and action plans. The communication from the Commission "Promoting sustainable development in the EU non-energy extractive industry" (COM 2000/265), as mentioned in chapter 3, was the first document to tackle the problem of sustainable mining. In spite of its limited scope, it gave a complex review of mining industry and made valuable statements such as ;

- Mining is increasingly influenced by other competing land uses, such as urban development, agriculture, nature conservation,
- The balanced consideration of economic, environmental and social aspects to ensure the sustainable development of the industry is needed,
- A coherent community policy is necessary.

Among its follow-up actions, the communication develop an action plan which was the communication from the commission on "Safe operation of mining activities : a follow up of recent mining accidents" (COM 2000/664). This communication describes the Aznalcollár and Baia Mare accidents and gives an overview of the community environmental legislation with a special emphasis on tailings pond safety. The identified three key follow-up actions are the amendment of the Seveso II Directive, an initiative on the management of mining waste and a BAT reference document under the Integrated Pollution Prevention and Control (IPPC) directive.

Apart from these relatively few directives, there is a steadily growing number of general EU Directives applying to all sectors, covering also the mineral extracting industries especially with respect to environmental and waste management issues.

These directives can be categorized under the three topics in this study, these are;

- Directives related to environmental legislation,
- Directives related to waste management legislation,
- Directives related to water management legislation.

4.1 DIRECTIVES RELATED TO ENVIRONMENTAL LEGISLATION

The chapter "Environment, consumers and health potection", and especially subchapters "Nuclear Safety and radioactive waste", "water protection and management", "waste management and clean technology" of the acquis contain direct provisions relevant to mining. There are a few horizontal directives which regulate general environmental management issues.

The EU Commission's objective is to create systems and sets of rules for the European Union, which advances a uniform set of limit values for certain pollutants, in order to reduce emissions.

Directive 99/30 obliges the Member States to define limit values and alert thresholds for sulphur dioxide, nitrogene dioxide and oxides of nitrogene, particulate matter and lead. Nitrogen oxides are mainly derived from process of combustion, sulphur dioxide can result from smelting operation [69].

The limit values defined by Directive 99/30 for dust particles may also influence the extracting industry on several levels such as extraction and processing. Dust particles from rock and mineral extraction industries form as a result of all grinding processes. A potential source of dust is further traffic inside and outside extraction sides.

In order not to exceed the guideline values, the extractive industry is obliged to take approprite measures to reduce emissions.

Taking into account this parameter of climate, current dust emission limits applied in European countries and regions vary between 20 and 150 mg/m³/day for ambient dust measured around quarries [70].

Directives, which are mainly environmental legislation, affecting the extractive industry in EU, are given in Table 4.2.

Table 4.2 Environmental legislations related to mining sector in EU

No	EU LEGISLATION
1	DIRECTIVE 85/337/EEC, 27 June 1985, on the assessment of the effects of certain public and private pojects on the environment (amended by directive 97/11/EC).
2	DIRECTIVE 2001/42EEC, 27 June 2001, on the assessment of the effects of certain plans and programmes on the environment.
3	DIRECTIVE 96/61, 24 September 1996, concerning integrated pollution prevention and control(IPPC).
4	DIRECTIVE 96/82, 9 December 1996, control of major accident hazards involving dangerous substances (SEVESO II Directive) (amended by directive 2003/105 EC).
5	DIRECTIVE 2004/35, 21 April 2004, environmental liability with regard to the prevention and remedying of environmental damage.
6	DIRECTIVE 2002/49, 25 June 2002, assessment and management of environmental noise.
7	DIRECTIVE 92/43, 21 May 1992, conservation of natural habitats and wild flora and fauna (FFH Directive).

4.1.1 DIRECTIVE 85/337 EFFECTS OF CERTAIN PUBLIC AND PRIVATE PROJECTS ON THE ENVIRONMENT

Council Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment(amended by 97/11/EC) requires an environmental impact assessment of economic activities that are likely to have significant effects on the environment [71].

The main objective of this directive is to ensure that projects or proposals that are likely to cause significant effects on the environment are carefully considered in a publicy transparent manner before the Competent Authority issues a permit.

Among the projects of obligatory assessment several entries might be applicable for mining activities [72] :

1- Installations designed solely for the final disposal of radioactive waste,
2- Installations for the production of non-ferrous crude metals from ore by chemical processes,
3- Installations for the extraction of asbestos,
4- Waste disposal installations for landfill of hazardous waste,
5- Waste disposal installations for chemical treatment of non-hazardous waste with capacity > 100 t/day,
6- Groundwater abstraction or artificial groundwater recharge schemes where the annual volume of water abstracted or recharged is ≥ 10 million m^3,
7- Extraction of petroleum and natural gas for commercial purposes where the amount extracted > 500 t/day in the case of petroleum and 500 000 m^3/day in the case of gas,
8- Dams and other installations designed for the holding back or permanent storage of water, where a new or additional amount of water held back or stored > 10 million m^3,
9- Pipelines for the transport of gas, oil or chemicals with a diameter of > 800 mm and a length of > 40 km,
10- Quarries and open cast mining where the surface of the site > 25 ha, or peat extraction, where the surface of site > 150 ha.

Projects for which member states have the freedom to judge whether to prescribe the assessment are;

- Quarries, open-cast mining and peat extraction,
- Underground mining,
- Deep drillings (geothermal drilling, drilling for the storage of nuclear waste material, drilling for water supplies with the exception of drilllings for investigating the stability of the soil),

- Surface industrial installations for the extraction of coal, petroleum, natural gas, ores and bituminous shale,
- Installations for the processing and the storage of radioactive waste,
- Installations for the disposal of waste,
- Waste-water treatment plants.

In particular, quarries, open-cast and underground mining and drillings are included in the scope of this Directive.

EIA is a process for anticipating the effects on the environment by an activity. An Environmental Impact Statement (EIS) is the document produced as a result of that process. The EIS provides information which the competent authority uses in determining whether consent should be granted or not. This information is also available to affected parties in order to evaluate the acceptability of the development and its impacts.

The directive 2001/42 on the assessment of effects of certain plans and programmes on the environment is known as SEA (Strategic Environment Assessment) and aims to achieve a high level of protection of the environment and contribute to the integration of environmental aspects in the preparation and adoption of plans and programmes with the aim of promoting sustainable development [73].

The Directive 2001/42 places special emphasis on:

- Initial environmental information: collection and presentation,
- Prediction of significant environmental effects,
- Identification of strategic alternatives and their effects,
- Consultation with the public and with environmental authorities,
- Monitoring of environmental effects.

The Directive 2001/42 defines Environmental Assessment as a procedure that includes:

- Preparation of an environmental report on the possible significant effects of the draft plan / programme,
- Consultation on the draft plan and the environmental report,
- Consideration of the environmental report and the consultation,
- Process in decision-making.

The EU Eco-Management and Audit Scheme (EMAS) is a management tool for companies and other organisations to evaluate, report and improve their environmental performance [74]. The scheme has been available for participation by companies since 1995 and was originally restricted to companies in industrial sectors. Since 2001 EMAS has been open to all economic sectors including public and private services, EMAS was strengthened by the integration of EN/ISO 14001.

The objective of EMAS is to promote continual improvements in the environmental performance of the organizations. The Commission welcomes the efforts made by extractive industry in this respect and encourages it to further adopt such systems which can be the vital tool not only for improving environmental management but also with regard to external communication. It allows the voluntary participation of the companies in the mining sector in an audit and eco-management scheme. The EMAS database also shows the number of EMAS-registered companies in the non-energy extractive companies [75].

Council Directive 85/337 lays down the general principles for the evaluation of the impact of certain projects have on the environment. The principles are listed in Annex II. Metalliferous ores extraction, as being subject to Environmental Impact Assessment (EIA), in case Member States consider that their characteristics so require. The amended Annex I.4 stipulates that “installations for the production of

non-ferrous crude metals from ore, concentrate or secondary raw materials by chemical processes" are installations subject to EIA. However, there are no EU wide standards for tailings containment and so each country has its own procedure.

There is no common pattern as far as environmental assessments are concerned in the Member States. Limit values for the preperation of EIA Report rates from 5 hectares in Ireland up to 500 hectares in the case of state owned minerals in the Netherlands. It can cause unfavourable competitive market conditions between and within Member States in case of such minerals which are traded on international markets.

In addition to that, there can be a negative attitude of potential investors who fear long duration and high cost Environmental Impact Assessment procedures. Investors can distract from investment in mineral projects.

4.1.2 DIRECTIVE 96/61 INTEGRATED POLLUTION PREVENTION AND CONTROL (IPPC)

The fundamental objective of the directive is to prevent and to reduce pollution from certain industrial sources and to avoid or cut polluting emissions into the air, water and the soil. At source prevention of pollution from industrial installations is being aimed at [76].

The IPPC Directive requires that all the appropriate preventive measures be taken against pollution and to prevent pollution, accidents and to limit their consequences. It allows for the operation of installations if measures ensuring protection of the soil and ground water and measures concerning the management of waste generated by the installation are taken.

The IPPC Directive provides the framework for the licencing and emissions of industrial installations. Installations covered by Annex I of the directive are required to obtain an operating permit containing emission limit values or equivalent parameters based on the use of best available techniques.

The Directive applies to new or substantially changed installations with effect from October 1999 for new activities and no later than October 2007 for existing installations. These permits must contain conditions based on best available techniques (BAT) as defined in the article 2.11 of the Directive, to achieve a high level of protection of the environment as a whole.

The starting point for the BAT Document is the communication from the European Commission COM (2000/664) on the "Safe Operations of Mining Activities". As a follow up to the tailing dam bursts at Aznalcollar and Baia Mare, this communication proposed a follow up action plan to be taken, which includes detailed BAT Reference Document based on exchange of information between the EU's Member States and the mining industry. This document is the result of this information exchange. It has been developed as a Commission initiative of the proposed directive on the management of waste from extractive industries. BAT document is generally focused on the mineral processing and the tailing dams [54].

The non-ferrous metals BREF (Best Available Techniques Reference Document) has been accepted in September 2000 by the participants of the information exchange process. One of the ten groups of metals it discusses, is the group of precious metals. Also, all common processes and equipment are being considered in an introductory chapter. The document concludes that the choice of BAT is strongly dependent on the raw material composition. No single process is the best; processes have to be designed for the specific raw material. This document does not cover cyanide leaching.

"The Reference Document on Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities" was launched in July 2004. The BAT document results from the information exchange between the European Union's Member States and the mining industry. The aim of the BAT document is also to promote good management principles and life-cycle management.

The IPPC directive covers "Installations for the production of non-ferrous crude metals ore, concentrates or secondary raw materials by metallurgical, chemical or electrolytic process". The application of this category to mining is very limited; it depends on the definition of extractive industry. Moreover cyanides are listed among the main polluting substances, limit emission values of which are being fixed, so mines are at least partly covered by this directive.

Other categories might apply for mining waste management;

- Installations for the disposal or recovery of hazardous waste with a capacity > 10 t /day,
- Installations for the disposal of nonhazardous waste with a capacity > 50 t /day,
- Landfill receiving > 10 t /day or with a total capacity > 25,000 ton, excluding landfills of inert waste.

According to these categories, the directive covers a part of mining sites where tailing ponds and waste rock heaps are associated. Landfills are not defined in the directive, but the Landfill Directive provides for a definition "a waste disposal site for the deposit of the waste onto or into land"

The IPPC Directive is applicable since 1999 for new activities and in 2007 at the latest for existing ones.

The regulation number 166/2006 EC establishes an integrated pollutant release and transfer register (PRTR) at Community level to improve public access to information on the environment. Thus it contributes in the long term to the prevention and reduction of pollution [77].

The register will contain information on releases of pollutants to air, water and land, as well as transfers of waste and pollutants, where emissions exceed certain threshold values and result from specific activities.

Annex II lists the waste and pollutants covered by the register, which include greenhouse gases, acid rain pollutants, ozone-depleting substances, heavy metals and certain carcinogens such as dioxins.

The activities covered are specified in Annex I, and include those associated with thermal power stations, mining, quarrying and metalworking industries, chemical plants, paper and timber industries and also waste and waste-water treatment plants, given in Table 4.3 [77].

Table 4.3 Activities in Mining Industry for PRTR [77]

Activity	**Capacity threshold**
Underground mining related operations	No capacity (all facilities are subject to reporting)
Open pit mining and quarrying	Where the surface of the area efeectively under extractive operations equals 25 hectares

4.1.3 DIRECTIVE 96/82 CONTROL OF MAJOR ACCIDENT HAZARDS INVOLVING DANGEROUS SUBSTANCES

Major accidents in chemical industry have occurred world-wide. In Europe, the Seveso accident in 1976 in particular prompted the adoption of legislation aimed at the prevention and control of such accidents. In 1982, the first EU Directive 82/501/EEC, so-called Seveso Directive, was adopted. On 9 December 1996, the Seveso Directive was replaced by Council Directive 96/82/EC, so-called Seveso II Directive. This directive was extended by the Directive 2003/105/EC. The Seveso II Directive applies to some thousands industrial establishments where dangerous substances are present in quantities exceeding the thresholds in the directive [78].

This directive concerns production, manipulation, treatment, storage, transportation, transboundary transfer and disposal of dangerous substances and waste. Its classical field of application are chemical plants and storage facilities where dangerous substances are present in quantities above certain threshold levels.

Directive 96/82EC aims the prevention of major accidents which involve dangerous substances and the limitation of their effects on the environment. It obligates the industrial operators to put into effect safety management systems including safety reports and emergency plans which involve a detailed risk assessments which use accident scenarios.

According to Article 4e Directive 2003/105 EEC applies not to the exploitation (exploration, extraction and processing) of minerals in mines, quarries or by means of boreholes, with the exception of chemical and thermal processing operations and storage related to those operations which involve dangerous sustances, as defined in Annex I [79].

According to Article 4g Directive 2003/105/EEC applies to waste landfill sites with exception of operational tailings disposal facilities, including tailing ponds or dams, containing dangerous sustances as defined in Annex I, in particular when used in connection with the chemical and thermal processing of minerals. This sub-article refers to exemptions from the Directive. Therefore certain major tailings facilities are now within the scope of this directive.

The potential impact of this development for the extractive industries cannot be assessed at this stage. However it couldn't mean that, tailings dams from mining operations involving sulphide ores could fall under the Seveso II.

The most important extensions of the scope of that Directive are to covering risks arising from storage and processing activities in mining, from pyrotechnic and explosive substances and from the storage of ammonium nitrate and ammonium nitrate based fertilizers.

This Directive is addressed to the Member States. They shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive before 1 July 2005.

The Commission decision, 2002/605 EC, concerning the questionaire related with Seveso II directive, addresses to Member States, draw up a report which includes many answers for the questions about the enforcement of the Seveso II. These reports, cover the 2003-2005 period, might be given to Commission until the 30 September 2006 at the latest [80].

4.1.4 DIRECTIVE 2004/35 ENVIRONMENTAL LIABILITY WITH REGARD TO THE PREVENTION AND REMEDYING OF ENVIRONMENTAL DAMAGE

The purpose of this Directive is to establish a framework for environmental liability based on the 'polluter-pays' principle, to prevent and remedy environmental damage. Industries would thus internalise the cost to the environment in the form of pollution, waste, resource consumption and destruction of ecosystems. The expected result should be that preventive measures be taken in order to avoid damage [81].

The Directive aims to establish a framework that would prevent significant environmental damage after it has occurred. "Significant environmental damage" will be defined by reference to:

- biodiversity, whether protected at EU or national levels,
- waters covered by the Water Framework Directive,
- human health (including land contamination when it is a threat to human health).

Directive (Article 3) shall apply to environmental damage caused by any of the occupational activities listed in Annex III, and to imminent threat of such damage by reason of any of those activities such as, waste management operations including collection, transport, recovery and disposal of waste, landfill of waste etc. Therefore, it also may apply to the extractive industries to the extent the Waste Framework Directive and the Landfill Directive apply.

In addition to the costs for the preventive and remediate measures, the operator shall also bear the costs for the assessment of damages to the environment and the threat of environmental damages.

Thus all raw materials extracting business which could cause damages to protected Flora/Fauna-habitats are potentially affected by the Environmental Liability Directive. The directive shall be brought into force by 30 April 2007.

4.1.5 DIRECTIVE 2002/49/EC ASSESSMENT AND MANAGEMENT OF ENVIRONMENTAL NOISE

Directive 2002/49, Environmental Noise Directive, establishes a common approach to the reduction of the harmful effects of environmental noise. It aims to do so by [82];

- Determining exposure to environmental noise through noise mapping,
- Making information on environmental noise and its effects available to the public,
- The adoption of action plans aimed at preventing and reducing the harmful effects of environmental noise.

The maximum limit values for noise emission in European countries or regions varies between 50-85 dB(A) during day-time and 35 – 70 dB(A) during evening and night-time.

4.1.6 DIRECTIVE 92/43/EC CONSERVATION OF NATURAL HABITATS AND WILD FLORA AND FAUNA (FFH DIRECTIVE)

The aim of Directive 92/43 is to contribute towards ensuring bio-diversity, the conservation of natural habitats and of wild fauna and flora in the European territory of the Member States to which the Treaty applies [49].

It serves as a way to protect whole species. The directive does not only aim at the protection of certain species such as wild birds, but also at the preservation of natural habitats and the European natural heritage as a whole. Bird Directive 79/409 EC

seeks the protection of all wild bird species living in the wild within the European territory of the Member States [50].

Directive 92/43 aims at the creation of a coherent European ecological network for the restoration or maintenance of favourable conservation status of natural habitats and species. For that purpose, special protection areas have been nominated by the member states for designation.

In view of Member State's obligation to designate protection areas on a natioanal level as a part of the "coherent European ecological network of special protection area with the title Natura 2000" according to the article 3 (1) Directive 92/43 has an indirect effect on the future of the availability of raw materials.

Natura 2000 protection areas strongly compete with the raw material industry in the field of land utilization. Because, deposits are often found in combination with undeveloped, mostly natural areas. Extractive activities depend on geology and the particular location of mineral deposits. As a result, access to suitable deposits has a high importance for the future and the competitiveness of the extractive industry. The designation of areas of lands as Natura 2000 sites will usually prevent the extractive industry from exploiting any mineral resources on that land. However, the directive allow for the reasons of national importance development to impact on the integrity of notified sites.

Additional costs can result as a consequence of impact assessment which is obligatory for mining projects in Natura 2000 areas. Such costs could be a problem for a smaller businesses. Thus a crucial aspect is to carry out an appropriate assessment, according to article 6 directive 92/43, in an efficient way.

4.2 DIRECTIVES RELATED TO WASTE MANAGEMENT LEGISLATION

Mining waste can be defined as part of the materials that results from the exploration, mining and processing of substances governed by legislations on mines and quarries. It may consist of natural materials without any modification other than crushing of natural materials, processed to varying degrees during the ore-processing and enrichment phases, and possibly containing chemical, inorganic and organic additives. Overburden and topsoil are classified as waste. Mining waste types, during the mining activities, are shown in Figure 4.2. [63].

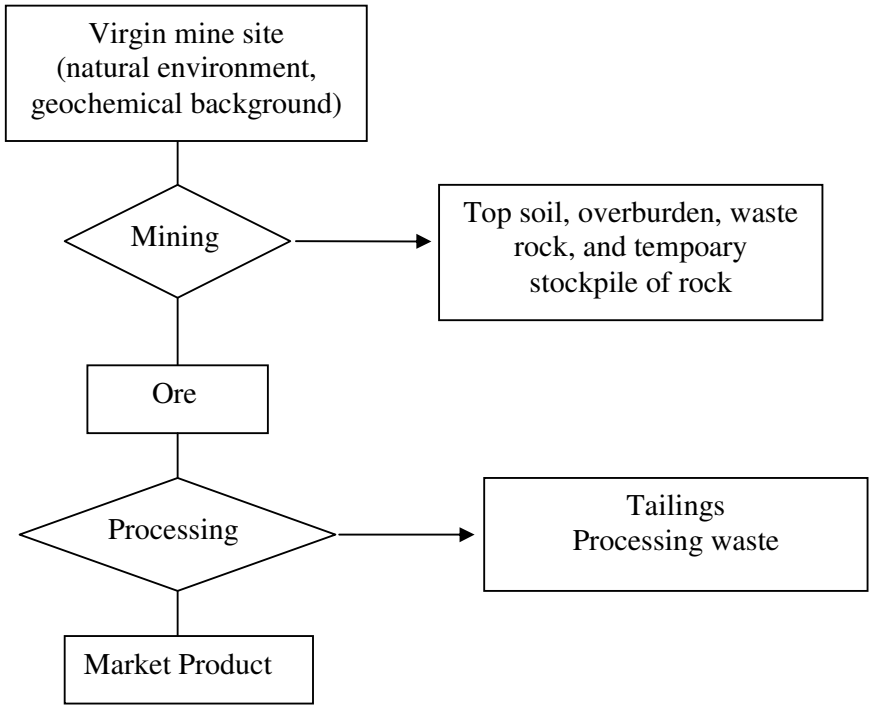

Figure 4.2 Mining waste types [63]

It is estimated that such waste amounts to about 29% of total waste generated in the EU each year, with an annual volume in excess of 400 million tonnes [83].

The pollution of Danube river caused by a cyanide spill following a damburst of a tailings pond in Baia Mare/Romania in 2000 and an accident that occurred in 1998 in Aznalcóllar/Spain where a damburst poisoned the environment of the Coto Doñana National Park have increased public awareness on the environmental and safety hazards of mining activities. These accidents, like other similar ones, have in particular illustrated the significant environmental and health risks associated with the management of mining waste as a result of their volume and pollution potential.

There was no specific legislation until now, on waste from mining operations, neither the extraction of industrial minerals, the processing of ores nor industrial materials. Each of the Member States has its own mining and environmental legislation which is more or less adapted from the EU legislation.

European legislation distinguishes between horizontal legislation relative to environmental management and vertical legislation by specific sectors, products or types of emission (air, water, and waste.). The horizontal legislation concerns the environment management: the collection and assessment of the information on the environment and on the impact of a large number of human activities. The vertical legislation concerns the specific sectors. The Directives about waste and management of waste related to extractive industry in EU are shown in Table 4.4.

In this scope, the Directive 2006/21/EC "Management of Waste from Extractive Industries (amending Directive 2004/35/EC) is accepted by the European Parliament and of the Council on 15 March 2006. The waste framework Directive 75/442/EC was applying to waste of the extractive industry until the new directive is entered into force by Member States [57].

Table 4.4 Waste Management Legislation for Mining Sector in EU

No	EU LEGISLATION
1	DIRECTIVE 75/442, 15 July 1975, Waste Framework Directive (amended by Directive 91/156).
2	DIRECTIVE 99/31, 26 April 1999, Landfill of Waste.
3	DIRECTIVE 2006/21/EC, 15 March 2006, , Management of Waste from the Extractive Industries.

4.2.1 DIRECTIVE 75/442 WASTE FRAMEWORK DIRECTIVE (AMENDED BY 91/156/EEC)

The Waste Framework Directive lays down general provisions and principles for the handling of waste, as defined in Article 1(a) of the Directive. Article 2(1)(b)(ii) of the Directive establishes that waste resulting from prospecting, extraction, treatment and storage of mineral resources and the working of quarries will be excluded from the scope of Directive 75/442/EEC where they are already covered by other legislation [84].

As already clarified by the Commission in its Communication on "Safe operation of mining activities: a follow-up to recent mining accidents", at present there is no specific Community legislation on this type of waste and, therefore, Directive 75/442/EEC was applying to waste from the extractive industries.

At this moment, the Directive 2006/21 which establishes customised minimum requirements for an industrial activity, in the light of the significant volumes of waste involved and their high potential for environmental and health hazards, cannot be properly addressed through the general Waste Framework Directive alone.

Since Directive 2006/21 is adopted, it will be complementary to Directive 75/442/EEC. The complementarity will be based on Article 2 (2) of Directive 75/442/EEC and specifying that, unless otherwise stated, the new Directive will supplement the provisions of the Waste Framework Directive.

European Council Directive 91/689/EEC (Hazardous Waste Directive) on hazardous waste (last amended by 2001/118/EEC), sets the framework within Member States of the European Community for provisions to control the movement of arisings of hazardous wastes. The aim of the directive 91/689 is to provide a precise and uniform European-wide definition of hazardous waste and to ensure the correct management and regulation of such waste. It codifies all waste types according to generation source, waste composition and other criteria.

In 1993, based on Directive 75/442, a list of wastes was introduced for the first time the European Waste Catalogue (EWC). It represents a standardized basis for the definition of wastes in the European Union. EWC lists types of several types of mining waste which are resulting from exploration, mining, quarrying and physical and chemical treatment of minerals.

4.2.2 DIRECTIVE 99/31 LANDFILL OF WASTE

The aim of Directive 99/31 is, by way of operational and technical requirements on the waste and landfills, to provide the measures, procedures and guidance to prevent or reduce as far as possible negative effects on the environment, especially; the pollution of surface water, soil and air, on the global environment as well as resulting risk to human health [85].

The Directive 99/31, is the most relevant daughter directive of the Waste Framework Directive. However, “the deposit of unpolluted soil or non-hazardous inert waste resulting from prospecting and extraction, treatment and storage of mineral resources

as well as from operation of quarries" are excluded from the scope which implies that, the directive applies for the management of hazardous and non-inert mining waste. Given that certain fractions of waste from extractive industry are hazardous and are in practice often mixed together with non-hazardous and inert waste elements, the Landfill of Waste Directive also aplies to the latter.

The Landfill Directive is designed for general and common aspects of landfill management that could arise in connection with the deposition of municipal, commercial or industrial waste in a typical landfill, with a view to reducing their negative environmental effects. Some of its provisions are thus not tailored to accommodating best management practice or dealing with management challenges specific to the extractive sector.

In particular, the Landfill Directive contains the following provisions that are problematic in this regard for the management of waste from the extractive industries:

- Prohibition of disposal of liquid waste into landfill,
- A general ban on the co-disposal of non-hazardous waste with hazardous waste,
- A requirement to install a barrier and a liner.

Prohibition of disposal of liquid waste into landfill : This renders the operation of tailings ponds illegal. In fact, tailings ponds are an essential feature of certain mining operations (such as in the metal mining sector and certain coal extraction industries). The prohibition of the disposal of liquid waste under the Landfill Directive would stop this disposal practice.

A general ban on the co-disposal of non-hazardous with hazardous waste (with very limited exceptions that could also apply to mining waste) or with inert waste is

provided. In mining operations, the waste that is generated (i.e. overburden, waste rock, tailings) may well consist of hazardous, non-hazardous and inert materials, all mixed together. In practice, this mixed waste is usually disposed of into the same engineered infill structure, as these wastes originate from the same extraction site. It would therefore make neither economic nor environmental sense to take them to different disposal sites.

A requirement to install a barrier and a liner to be put under a landfill site in order to prevent groundwater pollution is enforced. In terms of the extraction of mineral resources, this particular requirement is not necessary and not even advisable for certain types of waste heaps (for example, where the presence of a liner might well cause a slippage of the heap with subsequent risk of collapse of the installation). It is therefore questionable whether the insertion of a barrier and liner in facilities containing waste from the extraction industries would produce a net environmental benefit.

Therefore, it is evident that some of the provisions of the Landfill Directive are not the most suitable way of ensuring the safe management of waste generated from mineral extraction operations. Instead, appropriately tailored controls need to be introduced in respect of the management of such waste, also bearing in mind that the Landfill Directive does not contain adequate provisions to prevent accidents, in particular relating to the stability of dams in tailings ponds.

4.2.3 DIRECTIVE 2006/21 MANAGEMENT OF WASTE FROM THE EXTRACTIVE INDUSTRIES

This is the first specific directive which is directly related to mining activities in EU. The directive 2006/21 will contribute to a more harmonised and modernised approach to the management of wastes from the sector. The sector has been promoting regular seminars on mine waste management in the Eastern European Countries in order to foster the information and technology exchange.

This Directive provides the measures, procedures and guidance to prevent or reduce as far as possible any adverse effects on the environment, in particular water, air, soil, fauna and flora and landscape, and any resultant risks to human health, brought about as a result of the management of waste from the extractive industries.

Directive 2006/21 seeks to set minimum requirements in order to improve the way in which waste from the extractive industries is managed by specifically addressing environmental and human health risks that may arise from the treatment and disposal phases of such waste [57].

This Directive aims to contribute to the conservation of resources in serving to reduce pressure on the exploitation of virgin natural materials by encouraging waste recovery in particular. The promotion of recovery could also reduce overall environmental impact by lessening the need to open new mines.

The Directive covers waste coming from all sectors of the extractive industry. However, its provisions are expected mainly to affect those sectors most likely to be the cause of significant environmental and health hazards or major accidents (such as metal mining, especially if it involves the use of dangerous substances).

It excludes from its scope waste which represents a low environmental risk, such as unpolluted soil and waste from the exploration of mineral resources, while inert waste is covered with a limited set of requirements. It also excludes waste which, although generated in the course of mineral extraction or treatment operations, is inappropriate to be managed under the provisions of this Directive, such as food waste or waste from offshore operations.

The Directive contains the basic objectives and basic requirements for waste management in the main body of the text. Three annexes complete the legal

provisions with technical requirements. Specifically the Directive focuses on the following aspects;

- The operational issues connected with waste management
- Prevention of soil and water pollution
- Ensuring stability of waste management facilities (in particular tailing ponds)

The Directive contains:

- The range of conditions to be attached to operating permits: this is to allow for sufficient environmental and safety measures when authorising waste management facilities. The requirements laid down should strike an appropriate balance between, on the one hand, the amount of administrative burden falling on operators or competent authorities when applying for or delivering a comprehensive waste management permit and, on the other hand, the benefits arising in terms of environmental protection and accident prevention,

- The range of general obligations covering waste management: the purpose is to ensure that, prior to beginning extraction operations, an operator duly considers and accounts for the amount of waste that is going to be generated, its characteristics and best practice tools to deliver appropriate safe management of waste,

- The obligation to characterise waste before disposing of it or treating it: this is in order to ensure that waste management methods are tailored to the particular characteristics of the waste, in particular with a view to ensuring long-term stability of any heaps or ponds involving the permanent storage of large amounts of waste,

- Measures to ensure the safety of waste management facilities: these provisions are similar to the relevant measures contained in the Seveso II Directive: major-accident prevention policy, safety management system, adequate information provision to the public. Such measures would apply to waste management facilities that present a high risk and are not going to be included in the scope of the revised Seveso II Directive,

- The requirement to draw up closure plans for waste management facilities: this is a key provision to ensure that closure operations form an integral part of the overall exploitation plan of the operator,

- The obligation to provide for an appropriate level of financial security: the aim of this provision is to reinforce the "polluter-pays" principle and ensure that sufficient funds are available to leave waste sites in a satisfactory state after closure.

At the European legislative level, the management of mining, quarrying and mineral processing waste is included in the environmental impact assessment of industries. These systems already exists in some countries of European Union.

The adoption of the Mining Waste Directive shall impose a demand on national administrators to either create or adapt and then maintain regulatory, inspection and enforcement systems meeting the obligations established by the new Directive. Thus the Directive leaves the Member States room for manoeuvre and enables them to adopt the most appropriate measures to reach the objectives laid down. This means that certain elements such as, content or scope of the waste management plan and some technical issues remain as a subject for further specific deliberation by the relevant national competent authority. Local conditions must be taken into consideration while drafting or adapting the national legislation to meet the Directive requirements.

In order to have the new national regulations efficiently implemented they need to besupported by more effort that deals with developing and publishing model plans, policies and technical guidance to which operators and individual officials can refer to.

4.3 DIRECTIVES RELATED TO WATER MANAGEMENT LEGISLATION

4.3.1 DIRECTIVE 2000/60 WATER FRAMEWORK DIRECTIVE

Directive (2000/60/EC; European Commission 2000), which is meant to be a general framework for the protection of all waters including rivers, lakes, groundwaters, basin management plans have to be set up until the year 2009.

A key aim of the Water Framework Directive is to reach a good chemical and ecological status of all water bodies in the European Union. It is meant to be a framework and therefore does not regulate every issue into detail but will be amended if necessary, one of those amendments being the proposed Groundwater Directive. Directive 2000/60 and other regulatory elements affect European mining [86].

The aim of the Water Framework Directive is to provide a general framework for the protection of all waters. Although not explicitly mentioned, point sources of water pollution such as, acid drainage generated by tailings ponds will have to be covered by the characterisation of pressures and impacts in a river basin. The requirements of the Water Framework Directive apply also to the pollution originating from abandoned facilities of the extractive industries.

Mining, and consequently mine water, is not directly mentioned in the Water Framework Directive. The only reference to mining is article 11(3j) of Water Framework Directive, which allows the injection of water from hydrocarbon

exploration and exploitation and the reinjection of pumping water from mining or quarrying operations :

Member States may authorise;

- injection of water for technical reasons into geological formations from which hydrocarbons or other substances have been extracted or into geological formations which for natural reasons are permanently unsuitable for other purposes;

- reinjection of pumped groundwater from mines and quarries or associated with the construction or maintenance of civil engineering works;

A direct confrontation (mining/water) can arise because of the re-injection of water into the ground as part of mining operations. Article 11(3)j makes certain exemptions for mining activities. The extractive industry is able to reinject water, provided that it does not increase the level of pollution of surface water bodies. This is important for the extractive industry.

In addition to that, Directive 2000/60 represents a comprehensive framework of provisions for water protection. The impact of the extractive industry could be given by the water protection sites listed in annex IV (Protected Areas).

The new directive 2006/21, management of waste from the extractive industry, is more likely to cover mine water pollution. Mining is known to be one of the largest generators of waste in the EU. Since water is the major pathway for mine-sourced contaminants, it is important that any new directive clearly takes into account mine water questions. The First European Stakeholder Group Meeting (ERMITE-Environmental Regulation of Mine Waters in the European Union) highlighted that the first source of pollution in mining is mine voids and mine waters and not mine waste [87].

ERMITE seeks to provide integrated policy guidelines for developing European legislation and practice in relation to water management in the mining sector. These guidelines need to be coherent with the catchment management approach defined by the Water Framework Directive and the sustainability principles enshrined in the Amsterdam Treaty. ERMITE was a three year research and development project which commenced on 1st February 2001, and was successfully completed on 31st January 2004.

ERMITE Research Project based on prospective analysis, such as this one is ensuring that new policy initiatives consider a common environmental policy, which is the integrated water/river basin management in Europe. This is one of the founding concepts of the recently adopted European Water Framework Directive.

As a result of the Aznalcóllar (Spain, 1998) and Baia Mare (Romania and Hungary, 2000) dam failures causing major environmental contamination, the EU has taken a number of initiatives, most notably the Baia Mare Task Force, which was charged with learning lessons from the events to guide future policy and practice. The findings of this Task Force highlighted the need for a review of the current status and future requirements of EU legislation related to mining activities. Although a variety of EU legal instruments address environmental issues questionably relevant to mining activities, the Task Force concluded that mining was insufficiently covered by the European legislation [88].

The major output from the project will be guidelines coherent with the catchment management approach defined by the newly adopted European Water Framework Directive 2000/60/EC.

As a result of 2000/60 Water Framework Directive, the access to mineral resources could become significantly more difficult for the extractive industry because of declaration of water protection sites and the protective character these sites.

The Directive 1980/68 is on the protection of groundwater against pollution caused by certain dangerous substances. This Directive requires a prior investigation concerning the disposal of tipping for the purpose of dangerous substances leading to indirect or direct discharges to groundwater. The dangerous substances include Zn, Cu, Cr, Pb, As, Cd, Hg etc.

There are other directives relevant to the qualitative water management but having no direct referances to mining.

CHAPTER 5

LEGISLATION RELATED TO MINING SECTOR IN TURKEY

The main policy objectives of the mining sector in Turkey are [89];

- To provide raw material requirements of the industry economically and safely;
- To increase the value added to the national economy by processing mining products within the country,
- To encourage exploration and exploitation activities of domestic mining firms carried out abroad to provide required inputs to the related industries,
- To ensure sustainable utilization of natural resources,
- To support R&D activities to make best use of the technological developments.

In this regard the laws and regulations are made for realizing these goals. Turkish legislation related to the mining sector will be discussed in detail. In this scope, the main law and the related regulations are given in titles below.

- Mining Law No. 5177 (2004) and No:3213 (1985)
- Implementing Regulations of the Mining Law
  - Regulation on the implementation of The Mining Law (Official Gazette, Date: 03.02.2005, No:25716)
  - Mining Operations Licensing Regulation (Official Gazette Date: 21.06.2005, No:25852)

- Labour Law No: 4857 (Official Gazette, Date: 10.06.2003, No: 25134)
  - Regulation of Health and Safety Measurements for Mines (Official Gazette, Date: 02.02.2004, No: 25380)
- Environment Law (Official Gazette Date : 9.8.1983, No: 2872)
  - Environmental Impact Assessment Regulation (1993, 1997, 2002, 2003, 2004 and 2005)
  - Control of Air Pollution from Industry Regulation (Official Gazette Date: 7.10.2004, No: 25606)
  - Control of Soil Pollution Regulation (Official Gazette, Date: 31.05.2005, No:25831)
  - Control of Solid Waste Regulation (Official Gazette, Date: 14.3.1991, No: 20814)
  - Control of Hazardous Waste Regulation (Official Gazette, Date: 14.3.2005, No:25755)
  - Control of Water Pollution Regulation (Official Gazette, Date: 31.12.2004, No:25687)
  - Assessment of Management of Environmental Noise (Official Gazette, Date:01.07.2005, No: 25862)
  - Wild Life Protection and Improvement Regulation (Official Gazette, Date: 8.11.2004, No: 25637)

In Turkey, the State both operates through its own exploration and production agencies and has a regulatory body to grant the permissions to explore and exploit minerals and to supervise the activities in this field. The regulatory function of the State in this area is carried out by the Ministry of Energy and Natural Resources under the Mining Law No.3213 (amended by 5177) which constitutes the basic mining legislation in Turkey [90].

5.1 MINING LAW

The Law No. 5177 amending Mining Law and Certain Laws, came into force in June 2004 and brought legislation unity to the mining sector, secured mining licenses, removed preliminary operating license period and also removed certain obstacles and restrictions of other legislations on the mining operations [5]. Also the Ministry of Energy and Natural Resources was made the single authority for many permissions and certifications.

The new Mining Law of May 2004 (numbered as 5177), enhances the opportunities to the private sector and facilitates the privatization. The General Directorate of Mining Affairs has already completed preparations to tender the reserves of some 45 different types of minerals. The aim of the new Law is to minimize the duration, simplify the procedure of obtaining licenses and, to provide additional support for the investors.

This Law will help to improve investments, production and exports in the mining sector. The new Law:

- removes the limitation of mining activities on certain types of lands,
- includes all minerals, which were not covered by the previous Law,
- shorten and eases the permitting process, removes preliminary operating license period,
- reduces the fees to be paid by license holders,
- ensures the unification of the mining sector legislation and security of mining licenses.

5.1.1 MINING RIGHTS AND LICENCING

The New Mining Law No. 5177, divides minerals into five groups and separately details the licensing procedures for each group of minerals. These sectors are sub-divided into 5 main groups in Turkey as [5];

- Construction Minerals,
- Marble and Decorative Stones,
- Salts, CO_2 gas,
- Industrial minerals, metallic minerals and energy raw materials,
- Precious stones and minerals

Mining rights may be granted to the Turkish citizens who are able to practise all civil rights set forth by the law, to legal entities formed pursuant to Turkish Legislation, to the State enterprises authorized in the mining activities, or other relevant public administrations.

According to the Turkish Legislation, companies may be established by foreign persons. In other words, companies that their all partners are foreign, may be established pursuant to the Tuskish Commercial Code. As a result, in Turkey, real foreign persons are not able to posses the mining rights; however, companies established under the Turkish Commercial Code and consisting of foreign partners are able to possess the mining rights.

In this regard, exploration licenses are granted by General Directorate of Mining Affairs (GDMA) for minerals grouped into five categories. Mining licenses are granted for anywhere which is not licensed in the same minerals group. The duration of exploration license is 3 years (for group 4, it could be expanded to 5 years). For the 1st group mines there is no exploration license, since exploitation right is directly obtained with the operation license in this group.

In that time period, if an economic ore deposit is discovered, license holder may claim for operation license. Operation license is given for the mines where economical reserve has been proved. Before exploitation, license holder has to get necessary permissions by applying to GDMA or governorship where the mine occurs or directly to the related government office. Exploitation can only be done after obtaining all necessary permissions.

The licence holder is deemed to be the discoverer of the minerals. In the case the mine is operated by any entity other than its discoverer, the discovery right accrued for the minerals produced in that area is paid by those who perform production in the holder of the right by the end of June every year. Discovery right is 1% of the annual ex-quarry sales amount.

The right of exploration and operation of boron mine deposits belongs only to Eti Mine Works General Management. Eti Mine Works is also required to obtain the necessary permits related to exploration, mine operation, Environmental Impact Assessment in pursuance with the laws and regulations.

General Directorate of MTA, based on the Mining Law, performs its works in the licensed and unlicensed areas while it may take only exploration licenses. MTA, once completed necessary exploration work, may transfer exploration licenses to private and state organizations by bidding.

5.1.2 LAND USE PROCESSES/ROYALTY

According to the Mining Law, minerals are under the ownership and domination of the State, and are not considered to be the property of the landowner where they are found. The State transfers only the exploration and exploitation rights to individuals or companies for specific periods by granting licenses. Therefore, as the State has granted exploitation and exploration rights, the State possesses the royalty.

License holders are required to make royalty payments. For 1st and 5th group ores, the royalty is 4% of sold ore; for 2nd, 3rd and 4th group of ore 2% of produced ore. If the mining area is forest or government owned, the royalty is paid 30% more; If the mining area is in the municipality border, the royalty is paid 0,2% of sold ore. In addition, 1% of produced ore is paid as discovery right to the person/company who discovers the ore.

Licenses are subject to fees the amount of which is determined by the Ministry of Finance annually (2,296.50 YTL for 2006, which is approximately 1500 USD).

As the right of exploration and operation of boron mine deposits belongs only to Eti Mine Works General Management, if the mine field is not a property of the institution, it can be rented, purchased or expropriated depending on whether the field is owned by private persons or the treasury. If the exploration or the mine operation field is a special environmental protection field or military zone, additional permits are required. The royalty is 10% of mineral mine site price if the mine is at the outside of the municipal neighbouring field, while 0.2 % of the mineral mine site price is added to 10% provided that the field is at the inside of the municipal neighbouring field.

The Mining Law is implemented by means of the two regulations, namely the Regulation on the implementation of The Mining Law and the Mining Operations Licensing Regulation.

5.2 OCCUPATIONAL HEALTH AND SAFETY

Mining operations are carried out in compliance with the regulations implemented by the Ministry of Labour and Social Security. The Mining Law assigns due concern to safety in the mines, and envisages sanctions for preventing dangerous activity.

Article 29 of Mining Law 3213 states that;

"In the event dangerous circumstances are detected with regard to the operation, the license holder shall be granted a six-month period to remedy these circumstances, this period cannot be extended except for cases of force majeure. In the event activities do not become in conformity of the project or the dangerous circumstances are not remedied at the end of this period, the guarantee deposit shall be accounted as revenue and the activities of the operation shall be suspended."

The Regulation, published in Official Gazette No: 25381, is concerning on minimum health and safety requirements for improving the safety and health protection of workers in the mineral-extracting industry through drilling [91]. Implementation of the Regulation;

- Determine competent authority for reporting of serious accidents,
- Determine skills and competence of person in charge,
- Establish work permit system.

The other important regulation published in Official Gazette No: 25380 deals with the minimum requirements for improving the safety and health of workers in the surface and underground extractive industries. The objective of this regulation is to extend the protection of workers in the extractive industries to surface and underground mines and quarries [92].

Some of the recent changes made in rules and regulations to improve in health and safety standarts in Turkey are given in Table 5.1 [68]. These changes are made by considering the health and safety standarts based on ILO Convention 155 and EU directives [68].

Table 5.1 Regulations related to safety and health of mine workers in Turkey [68]

No	EU LEGISLATION
1	regulation published in Official Gazette No: 25381,22.02.2004, is concerning on minimum health and safety requirements for improving the safety and health protection of workers in the mineral-extracting industry through drilling
2	regulation published in Official Gazette No: 25380, 21.02.2004, deals with the minimum requirements for improving the safety and health of workers in the surface and underground extractive industries
3	regulation published in Official Gazette No: 25328, 26.12.2003, on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres.
4	regulation published in Official Gazette No: 25311, 09.12.2003, on the introduction of measures to encourage improvements in the safety and health of workers at work.
5	regulation published in Official Gazette No: 25325, 23.12.2003, on the minimum safety and health requirement to encourage improvements in the safety and health of workers at work.
6	regulation published in Official Gazette No: 25328, 26.12.2003, on the protection of workers from the risks related to exposure to asbestos at work.
7	regulation published in Official Gazette No: 25328, 26.12.2003, on the protection of workers from the risks related to exposure to carcinogens.
8	regulation published in Official Gazette No: 25328, 26.12.2003, on the protection of the health and safety of workers from the risks related to chemical agents.
9	regulation published in Official Gazette No: 25368, 09.02.2004, on the personal protective equipment.
10	regulation published in Official Gazette No: 25370, 11.02.2004, on manual handling.
11	regulation published in Official Gazette No: 25370, 11.02.2004, concerning the minimum safety and health requirements for the use of work equipment by workers at work.

5.3 ENVIRONMENT LAW

Environmental regulations were specificly introduced into the Turkish legal system with the 1982 constitution. Before 1982, all environmental protection and reclamation practices in mining were voluntary in nature and insufficient. After the enactment of Environment Law 2872 in 1983 and Environmental Impact Assessment (EIA) Regulation in 1993 and the other main Regulations concerning on air, water, waste, noise systematic treatment of the matter took effect.

In August 1991, the Undersecretariat for the Environment was replaced by the Ministry of Environment. This change led to a diversification of the Ministry's responsibilities and an expansion of its staff, and empowered the administration with authority to implement and enforce policies for the protection and conservation of the environment.

In 2003, the Ministry of Environment was merged with the Forestry Ministry. With its goal to join the EU, Turkey has made commendable progress in updating and modernizing its environmental legislation.

Today, the activities of the Ministry of Environment cover issues such as appropriate land use, conservation of natural resources, protection of plant and animal species, prevention of pollution and raising public awareness. Setting environmental policies and strategies; coordinating environmental activities on local, national and international levels, issuing environmental licenses, collecting information etc [93]. All these activities shall be conducted in close cooperation with other ministries, especially for mining activities, with the Ministry of Energy and Natural Resources, related institutions, local governments and non-governmental organisations.

The Environment Law of 1982, which came into force in 1983, also endorsed many additional measures. The aim of the law, which considers the environment as a whole, is not only to prevent and eliminate environmental pollution, but also to allow the management of natural resources and the land. It is also stated in the Law that in all economic activities every measure should be taken to minimise pollution. In line with the Environment Law, several regulations have been issued since 1983 and some of which related to mining activities are given below [94] :

- Air Quality Control Regulation (1986)
- Environmental Impact Assessment Regulation (1992)
- Water Pollution Control Regulation (1988)
- Control of Solid Waste Regulation (1991)
- Control of Hazardous Wastes Regulation (1993)
- Noise Control Regulation (1986)

Environment Law is amended lastly by the new law number of 5491 on 26th April 2006 [95].

5.3.1 ENVIRONMENTAL IMPACT ASSESSMENT REGULATION

Environmental impact assessments are conducted in pursuance with "Regulation on the Environmental Impact Assessment" (Official Gazette: 16/12/2003-25318), which has been harmonized with the EU legislation by the Ministry of Environment and Forestry [96].

Environmental Impact Assessment (EIA) is the process of examination of impacts that might occur from the beginning of the planning phase of the projects related to the activities which might have important impacts on environment to the construction and operation of the activities and the effects that might occur after the completion of the activities using scientific methods and techniques before deciding about the

project; avoidance from the negative impacts if there are any and determining the necessary precautions; surveillance and control of these impacts and precautions during the project's every phase of execution.

The objective of EIA is to protect environmental values against the economic policies, to determine all the negative possible environmental impacts of a planned activity and to provide that necessary precautions are taken without hindering economic and social development.

Also with the application of EIA; the application of the regulations on Protection of Air Quality, Noise Control, Management of Solid Wastes, Water Pollution Control which are issued within the framework of the Environmental Law and other current legislations becomes possible.

EIA regulation first entered into force on 02.07.1993 and has been revised many times since then. EIA regulation was ultimately revised on 16.12.2003 with respect to the EU legislation and the conditions of Turkey. Due to the modifications in the Mining Law in 06.05.2004 some of the provisions of the Regulation were modified. In Turkey, the activities within the scope of EIA Regulation are divided into two groups according to their pollutability features as applied in EU countries. Projects in the first group; appear on "List of Projects for Which Environmental Impact Assessment is Required" (Supplement 1 list of the Regulation) and these are projects with high pollutability features.

Projects in the second group have a relatively low pollutability characteristics. These projects appear on "Projects for which Selection, Elimination Criteria is Required" (Supplement 2 list of the Regulation). A "Project Introduction File" needs to be prepared for such projects.

Mining projects types are listed in Supplement 1 and Supplement 2 of the EIA Regulation. Due to the change in the Mining Law on 06.05.2004, Supplement 1 and Supplement 2 lists have been modified with the Regulation About the Change in the EIA Regulation. The mining projects on Supplement 1 and Supplement 2 lists of the EIA Regulation are given in Table 5.2 and Table 5.3 in their final forms.

For the mining projects on Supplement 1 list of the Regulation, EIA Report is required; for the projects on Supplement 2, Project Introduction File needs to be prepared.

In the EIA Report or Project Introduction File, the possible impacts on environment of the projects for which investment is planned requires due examination. The subjects that will be included in the Environmental Impact Assessment Report and Project Introduction File appear on the "General Format of Project Introduction" (EIA Regulation, Supplement III) and "Selection Elimination Criteria for the Preparation of the Project Introduction File" (EIA Regulation, Supplement IV) of the Regulation.

Table 5.2 Lists of Mining Projects in EIA Regulation (Supplement I)

25-Mining Projects. Without taking into consideration the license law and phase
a) open pits on working field of 25 hectares or more (the sum of excavation and disposal area),
b) coal mining using open pit method on working field of more than 150 hectares (the sum of excavation and disposal area),
c) ore enrichment facilities where biological, chemical, electrolytic and thermal processing methods are applied,
d) projects with a capacity of 100,000 m^3/year or more, about all kinds of processing (breaking, screening, grinding, washing etc.) of the first and second group mines appearing on the revised 2nd clause of the Mining Law numbered 3213 and, dated 6/4/1985.

Table 5.3 Lists of Mining Projects in EIA Regulation (Supplement II)

35-Mining projects: Without taking into consideration the license law and phase
a) Extraction of any kind of mine (which does not appear on Supplement I)
b) Extraction and processing of marble blocks and pieces and stones with decorative purposes having a capacity of 5,000 m^3/year and more, and marble cutting, processing and sizing facilities which have a capacity of 100,000 m^2/year or more,
c) Extraction and storage of methane gas 1,000,000 m^3/year or more,
d) Facilities with a capacity of 10,000 tons/year or more where carbondioxide and other gasses are extracted, stored and processed,
e) Any kind of processing (breaking, screennig, grinding, washing, etc.) of the 1st and 2nd group mines which appear on the revised 2nd clause of the Mining Law (25,000 m^3 and more),
f) Extraction of salt 50,000 tons/year or more and/or any kind of salt processing facilities,
g) Ore preparation and enrichment facilities (which do not appear on Supplement I)" (Regulation On the Changes in EIA Regulation, 2004) .

According the environmental impact assessment procedure, the wastes likely to result from the mining activities will cause and the precautions to be taken to decrease their impacts on the environment should be determined during the project stage.

There is not a special legislation in Turkey towards overcoming the effects that mines cause and rehabilitation of spoiled land. There is a search for bringing solutions to such problems within the general environmental legislation. To make up for this deficiency, the regulations on "Reacquiring of the fields spoiled due to mining operations, other excavations and storages" and "Waste management in mining enterprises" are in the draft phase [97].

5.3.2 REGULATION ON THE CONTROL OF INDUSTRIAL AIR POLLUTION

With the Regulation on the Preservation of Air Quality which was prepared based on the articles 8, 9, 10, 11, 12, 13 of the Environmental Law and became effective by being published in the Official Gazette dated 11.02.1986, numbered 19269, it is targeted to take under control the emissions in forms of soot, smoke, dust, gas, vapour and aerosol emitted into the atmosphere resulting from any kind of activity.

For the industrial and energy production facilities including mining sector, Regulation on the Control of Industrial Air Pollution became effective was published in the Official Gazette numbered 25606, dated 10.07.2004 and become effective and the clauses of this regulation are applied for such activities [98].

Within this context, for the mining activities appearing in A and B lists of Supplement III are subject to permission of emission.

5.3.3 REGULATION ON WATER POLLUTION CONTROL

The objective of Water Pollution Control which first became effective in 09.04.1998 is; to introduce legal and technical standards necessary to realize the prevention of water pollution in accordance with the sustainable development targets in order to achieve preservation and best use of the potential and underground and surface water resources of the country.

This regulation covers quality classifications and usage purposes of water environments, planning standards and prohibitions regarding the preservation of water quality, discharge principles and standards of waste waters, standards regarding the waste water infrastructure facilities and procedures and standards of surveillance and control aimed at prevention of water pollution.

Regulation on Water Pollution Control was rearranged and became effective on 31.12.2004. The limit values for water pollution is given in the regulation [99]. Articles 17, 18, 19, 20 and 31 of the Regulation especially related to mining sector are explained below [99] :

In the 17th article of the Regulation, mining activities are prohibited in the so-called absolute protection zone which has 100 meters of width and begins from the maximum water level for drinking and potable water reservoirs. In the 18th clause the so-called the short-distance protection zone is defined with a 900 meters of width beginning from the absolute protection zone for the drinking and potable water reservoirs.

In the 19th article of the Regulation, the intermediate protection zone having 1 km width is described which begins band with a 1 km width beginning from the short distance protection zone border.

Although the article 19 (e) of the old Regulation prohibits the opening and operation of mines totally in the intermediate protection zone in any case (1988 Regulation), this clause has been modified by the revised Regulation as follows:

“In this area blasting with the coyote method, breaking, screening, washing, ore preparing and enrichment processes are not allowed. Mine extraction can be allowed by the Ministry on the condition that the activity owners must submit a notarized written commitment. In this commitment, itmust be clearly declared that there is no drawback in terms of health, the excavation would not spoil the current quantity and quality of water, would not cause waste water discharge into the receiving environment and the land would be abandoned by reacquisition after the activity.”

According to the 20th article of the Regulation, all of the water collection basin outside the defined protection zones of the drinking and potable water reservoirs are determined to be long distance protection zones.

According to the Regulation, in long distance protection zones, while blastings with coyote method, chemical and metallurgical enrichment processes are not allowed, extraction of mines are allowed on the condition that there is a notarized written commitment by the activity owners to the Ministry of Environment and Forestry that there is no drawback in terms of health, that the excavation would not spoil the current quantity and quality of water, that the land would be abandoned by reacquisition after the activity. Among the 16 sectors determined to be related to the discharge standards of industrial waste waters, the mining activities related to mining sector and described in the 31st article of the Regulation are as follows:

31-c) Mine industry sector: Iron and non-ferrous metal ores, coal production and transportation, boron ore, ceramics and brick industry, cement, stone breaking, and such industrial establishments.

31-e) Coal preparing, processing and energy production sector; hard coal and lignite preparing, coke and coal gas production, thermal power plants, nuclear power plants, geothermal powerplants, cooling water and such, industrial cooling waters operating in closed-circuit, fuel oil and steam boilers working with coal and such facilities.

k) Metal industry sector: Iron and steel processing facilities, general metal preparing and processing, galvanizing, branding, electrolytic coating, metal coloring, zinc coating, quenching-hardening, conductive plate production, accumulator production, glazing, silvering, enameling facilities, metal stoning and emerying facilities, metal polishing and varnishing facilities, lacquering-painting, non-ferrous metal production, aluminum oxide and aluminum smelting, iron and non-ferrous foundry and metal shaping and such.

In the Regulation, besides the matters explained about the mining sector, there are arrangements generally related to administrative and penal clauses.

In addition; about the discharge standards of the mine waste waters to receiving environments, there are discharge standards for the Fisheries and Aqua-culture Regulation of the Ministry of Agriculture.

According to the Water Pollution Control Regulation, about the expected quality of sea and coastal waters in fisheries sites, receiving environment standards that are determined by the Ministry of Agriculture should be met.

According to the article 11 of the Regulation of Fisheries and Aqua-culture, the dumping of hazardous substances into inland waters and production sites in seas is prohibited. The substances that are prohibited to be dumped into inland waters and production sites in seas and limit values of wastes to be dumped to waters are specified in Supplement 5 and Supplement 6 lists of Fisheries and Aqua-culture Regulation.

The discharge standards appearing on Fisheries and Aqua-culture Regulation and Water Pollution Control Regulation specify different limit values. This situation creates problems in practice [100].

5.3.4 REGULATION ON SOLID WASTES CONTROL

Regulation on Solid Wastes Control was published by the Ministry of Environment in 1991 in the light of the following general principles [101]:

- Reduction of wastes in their sources (production phase) or selection of technologies that causes less waste formation.

- Recovery of wastes (collection and separation)
- Recycling of wastes (re-use, secondary raw material and product manufacturing, composting)
- Burning for energy recovery
- Storage

The objective of this regulation which plans to bring all the municipalities to a common acceptable waste management is; to determine the relevant technical and administrative standards about any kind of waste and remnant's storage, transportation, removal, disposal and giving to the receiving environment (air, water, soil) directly or indirectly without causing any harm to the environment.

Industrial wastes and medical wastes having dangerous features are kept outside the scope of this Regulation.

With this Regulation dumping of the solid wastes by their producers and carriers to seas, lakes and such receiving environments, streets, forests and places where the environment might be affected negatively is forbidden.

The only clause that might be related to mine wastes appears in 23rd article of the Regulation which is about the storage of excavation soil. With this clause dumping of the excavation soil to places outside the ones that the municipalities indicate is forbidden. Also, dumping of excavation soil to seas, lakes and rivers and filling with those is forbidden with the same article.

Within the scope of the Regulation on Solid Wastes Control there is no other clause about mine wastes except excavation soil. But this clause is more about the excavation soil that occurs during construction activities, so cannot completely cover the disposal of mine wastes.

5.3.5 REGULATION OF HAZARDOUS WASTES CONTROL

With the aim of preventing illegal waste traffic from developed countries to Turkey and forming a management system for hazardous wastes, Regulation on Control of Hazardous Wastes was prepared based on Basel Accord and became effective on 27 August 1995. Waste categories and waste list on the Regulation were adapted from the Basel Accord and detailed according to the conditions of Turkey. With this regulation all kinds of waste import to Turkey is forbidden.

The regulation which was rearranged to be harmonized with the EU waste directives became effective on 14 March 2005 [102].

Mine wastes appear on special wastes section of the article 48th of the regulation. According to this; it is stated that the standards related to the collection, transportation, processing and disposal of mine wastes that appear under title (01) of the Regulation's Supplement 7 section (Hazardous Waste List), oil and fuel-oil wastes under title (13), used batteries and accumulators under title (16 06), wastes arising from human and animal health and/or researches on these subjects under title (18) and used tires would be determined by the Ministry of Environment and Forestry. Mine wastes are included in the class of "special wastes", and it is decreed that a separate legislation would be prepared on this subject.

5.3.6 REGULATION ON CONTROL OF SOIL POLLUTION

The objective of this Regulation is to provide that necessary precautions for the prevention of pollution of soils as receiving environment and overcoming the pollution [103].

This Regulation includes technical, administrative standards and penalty sanctions about the activities that cause soil pollution and the discharge, disposal and leakage

of hazardous substances and wastes into soil and the usage in soil of refinement mud and compost resulting from the purification of the industrial waste waters that are inert and of inert nature.

With the Regulation, discharge and storage of any kind of waste and hazardous substances to soil against the values appearing in the supplements of the Regulation is forbidden.

5.3.7 REGULATION ON ASSESSMENT AND MANAGEMENT OF ENVIRONMENTAL NOISE

Regulation on Noise Control which was published on 12.11.1986 was revised and by being published in the Official Gazette, numbered 25862, dated 01.07.2005 became effective. This regulation has been prepared with the objective of developing an environment that will not disrupt people's physical and mental health, comfort and peace with noise, determining the standards and criteria towards fighting the effects of exposure to environmental noise and application of these criteria on noise sources base [104].

Principle objectives of the Regulation are as such;

- To determine the levels of exposure to the environmental noise with the help of noise maps prepared by utilising assessment methods and acoustic reports,
- To inform the public about the environmental noise and its effects,
- By taking as a basis the noise maps and results of acoustic reports; to prepare and apply action plans towards prevention and reduction of noise especially in places where the levels of exposure to environmental noise could lead to harmful effects on human health and where it is necessary to maintain the environmental noise quality,

- To take measures of control towards the reduction of environmental noise diffusing from other noise sources for which there is not a requirement to prepare noise map and acoustic report.

In 5th article of the Regulation, in order to prevent the structural damage resulting from the blasting operations in mines and stone quarries and on sites of similar activities, limits of vibration levels to be allowed on the ground outside of the nearest building is given. These limit values are shown in Table 5.4. Monitoring must be carried out in three coordinate directions and the peak (highest) value must be considered. Vibrations are measured as peak value in 1/3 octave bands.

Table 5.4 The highest values allowed for ground vibrations measured at outside the nearest building which arises from blasting operations in mines and stone quarries and such areas [104]

Vibration Frequency (Hz)	The Highest Velocity Allowed (Peak Value-mm/s)
1	5
4-10	19
30-100	50

In the 38th article of the Regulation, enterprises that cause noise pollution due to their operation and structure and that, for the establishment and operation of the activities specified on A and B lists of Supplement-VII of the Regulation, are subject to the control permit certificate from institutions and establishments which have Competence Certificate from the Ministry are specified. While List A covers mostly ore enrichment facilities, List B covers mines and quarries.

5.3.8 PROTECTION OF WILD LIFE REGULATION

Several Laws such as the Law on Environment, the Law on National Parks and the Law on Land Hunting and related regulations harmonise the measures for the protection of natural habitats and wild fauna and flora in Turkey. Moreover, the Ministry of Environment and Forestry in cooperation with the Ministry of Culture and Tourism takes necessary steps to further improve the protection of the biodiversity and habitat. In this respect, mining activities are carried out within the framework of those regulations.

Protection of Wild Life Regulation is implemented by the Ministry of Environment and Forestry on 08 November 2004. Article 21 of regulation "every kind of activity is prohibited except scientific study and exploration and eco tourism activities" [105]. Any kind of mining activity is prohibited in the protected areas. This is related to General Directorate of Mining Affairs on behalf of permission procedure.

As a site shall be decided to be protected for wild flora and fauna, sustainable development criteria should be considered.

In Table 5.5, the information is summarized about the regulations issued related to mining activities in accordance with the Environmental Law [106], [107] .

Table 5.5 Regulations About the Mining Activities Within the Meaning of Environmental Law

Regulation	Date	
EIA Regulation	07.02.1993	All the activities relating to extraction and enrichment of any kind of mine, except exploration are within the scope of EIA. Also getting any kind of mine license except mine exploration license depends on getting the certificate of EIA positive.
	23.06.1997	Searching activities are within the scope of PREEIA.
	06.06.2002	Any kind of mine exploration activities were again taken out of EIA and PREEIA.
	16.12.2003	EIA process has been shortened for the activities subject to Supplement I list, competence application was introduced for whom that prepares the EIA report, information and scoping meetings being done during the EIA process were joined. For the activities subject to Supplement II, list the obligation of preparing PREEIA report was cancelled, preparation of project introduction file was rendered sufficient.
	26.04.2006	Mine exploration activities are out of the scope.
Regulation on Control of Air Pollution of Industrial Origin	02.11.1986 07.10.2004	Air Quality limit values, gas and emission limit values for the facilities subject to permission (including facilities related to mining activities) are specified in long-term and short-term.
Regulation on Control of Water Pollution	04.09.1988 31.12.2004	The standards that should be met before the discharge of the waste waters that comes out during the preparation of iron and non-ferrous metal ores, calcium fluoride, graphite, boron and smilar ores to receiving environment are specified separately. Besides the discharge standards of coal preparing, processing and energy production facilities to receiving environment is specified with this regulation.
Regulation on Control of Solid Wastes	14.03.1991	There is not any other clause related to mine wastes besides excavation soil.
Regulation on Control of Hazardous Wastes	27.08.1995 14.03.2005	Mine wastes were put under wastes that are subject to special processing. Within this context it was decreed that a separate legislation be prepared including transportation, collection, follow-up and disposal of mine wastes.

Table 5.5 continued

Regulation	Date	
Regulation on Control of Soil Pollution	10.12.2001 31.05.2005	In this regulation in which rehabilitation of the spoiled soils, where discharge and storage of any kind of waste and hazardous substance into the soil against the limit values given in Supplement-1A and 1B which determines technical, administrative standards and penal sanctions about discharge, disposal and leakage of hazardous substances and wastes into soil is forbidden, by the owners of the activity leading to this spoilage is adjudicated, mining sector should fullfill its obligations, too.
Regulation on Assessment and Management of Environmental Noise	01.07.2005	In order the explosions in mines and quarries and sites of similar activities not to harm the surrounding buildings, the vibration level limits to be measured on the ground outside the nearest building is given. Besides enterprises carrying out ore enrichment and all kinds of mining activities are subject to this regulation.

CHAPTER 6

COMPARISON AND DISCUSSION OF EU AND TURKISH LEGISLATIONS RELATED TO MINING SECTOR

The objective of the policy on the non-energy extractive industry is to set the broad policy lines for promoting sustainable development by reconciling the need for more secure and less polluting extractive activities while maintaining the competitiveness of the industry.

The EU remains highly dependent on imports for its raw materials supply. It is the world's largest consumer of minerals.

From the point of view of the environment, extractive operations raise two types of concern: the use of non-renewable sources may mean that these resources will not be available for future generations and extractive operations harm the environment (air, soil and water pollution, noise, destruction or disturbance of natural habitats, visual impact on the surrounding landscape, effects on groundwater levels).

The waste produced by the extractive industry is a major problem. Mining waste is among the largest waste streams in the Community and some of that waste is dangerous.

Abandoned mine sites and unrestored quarries spoil the landscape and can pose severe environmental threats due especially to acid mine drainage.

Priority issues for the integration of the environment into the extractive industry include prevention of mining accidents, improvement of the overall environmental performance of the industry and sound management of mining waste.

The objective of the new Turkish Mining Law No 5177 is to modernise the Mining Law 1985 in order to provide investors with a more investment friendly environment by;

- creating a uniform law for Turkey (except oil and gas),
- setting up a new classification system for minerals,
- simplifying the licencing process by shortening and easing procedures, e.g. removing the preliminary license period,
- reducing the fees to be paid by license holders,
- reducing bureaucracy.

With regard to the unification aspect, the new Mining Law foresees that the licences in mining are under one authority.

The minerals are considered mainly in three sub-sectors in the EU such as;

– metallic minerals (e.g. iron, copper, zinc),
– construction minerals (e.g. natural stone, aggregates, sand and gravel, limestone, chalk, gypsum), and
– industrial minerals. The latter group may be divided into;
  *physical industrial minerals (e.g. kaolinite, feldspar, talc)
  *chemical industrial minerals (e.g. salt, potash, sulphur).

Minerals are sub-divided into 5 main groups in Turkey (Mining Law 5177) as;

-Construction Minerals,
-Marble and Decorative Stones,

-Salts, CO_2 gas,
-Industrial minerals, metallic minerals and energy raw materials,
-Precious stones and minerals

Minerals are grouped in five categories to facilitate the production of different types of ore in the same area. So, the efficiency of mining is increased and licence holders are protected against the obstructions of other licence holders producing the same group of ore.

There are two types of licences in the mining legislation; exploration and exploitation licences. The exploration licences are given according to the above written groups in Turkey.

The licensing system as such is improved with respect to internationally accepted requirements for a modern mining law. License security is much better than in the previous mining law in the perspective of investors. The upper limit for mining license areas avoids blocking of large areas unnecessarily.

The permissions which are given by several public units concerning mining activities have been simplified and the bureaucracy has been reduced to a certain degree. The issue of the relationship of mining law with other laws concerning sectors such as environment, health and safety being still needs some attention.

Exploration activities are not included in the scope of environment impact assessment (EIA) in conformity with European Legislation. A mining operation license for an area with adequate reserves is granted only if the EIA report is approved and the other necessary permits have been obtained.

The new Mining Law, No.5177, achieves an improvement of the previous situation by modifying Mining Law No. 3213. It does not include a comprehensive sector

specific framework of provisions on firstly, health and safety of workers (which is a traditional matter of mining legislation) and secondly, environmental protection (which is also matter of mining legislation).

The German Federal Mining Law of 1980 follows the latter integrated approach and deals not only with licensing matter but also deals with health and safety and environmental issues. It implements both issues in the mining legislation but not in the general health and safety or environmental legislation; such as 92/91 EEC, 92/104/EEC and the EIA Directive 85/337 EEC for mining activities. So that there is a comprehensive legal framework for mining activities in the Mining Law covering all major aspects under the control of one single specialised authority (the mining authority) with the advantage of an integrated risk prevention and an investor friendly "one-shop" system [108] .

Although Turkish Mining Law No.5177 is a step towards the right direction, it does not clarify most of the permissions that must be obtained from several ministries other than General Directorate of Mining Affairs (GDMA). For instance, mining licences and permissions are given by GDMA, EIA reports are inspected and approved by the Ministry of Environment and Forestry, and the issues about occupational health and safety are taken in the fieldwork of the Labour and Social Security Ministry.

Environmental impact assessments are conducted in pursuance with "Regulation on the Environmental Impact Assessment" (Official Gazette: 16/12/2003-25318), which has been harmonized with the EU legislation by the Ministry of Environment and Forestry. In this regard, permissions are granted by the the Ministry of Environment and Forestry. Meanwhile, MTA takes role in checking out the geological and mining related issues of the EIA reports and, if needed, contributes geological and natural resource information for the EIAs. MTA also provides consultancy in that matter.

The new Mining Law No.5177 contains a number of improvements with respect to internationally accepted requirements for a modern mining law. It minimizes the duration, simplifies the procedure of obtaining licences and provides additional support for the investors. The New Mining Law may be considered as one of the initial steps orientating to liberal investment attempts. The Turkish Government wishes to attract more investment in exploration and the development of Turkey's natural resources [1]. This law also states the approach of the Turkish Government to foreign investors and it has been prepared to make the mining sector more attractive for foreign investment.

This law is step into the right direction and will help to improve investments production and exports in the mining sector. In comparison with the internationally accepted requirements for a modern mining law and relevant European Legislation a number of further measures are advisable.

Although the activities in the mining sector are in compliance with the Turkish legislation, the overburden of existing EU legislation and provisions set either for the safety and health of workers or treatment of extracts from mine sites or mining operations shall impose extra costs and investments for the continuation of operations. In other words, the adaptation of Turkish mineral industry to the standarts of EU legislation will take some time and some extra costs.

However, beside its adverse effects, there will be benefits of the implementation of EU legislation such as improved working conditions for workers and environment friendly mine operations.

After the general lookout of the Turkish and EU legislation about mining activities, the comparison of the directives and regulations should be considered. Table 6.1 shows the Directives of EU and the matched Turkish regulations in mining sector.

Table 6.1 Comparison of EU Directives and Turkish Legislation in mining sector

EU Legislation	Turkish Regulations	Remarks
DIRECTIVE 92/91/EEC, 3 November 1992, concerning the minimum requirements for improving the safety and health protection of workers in the mineral extracting industries through drilling	Regulation on the safety and health protection of workers in the mineral-extracting industry through drilling Official Gazette : 25381, 22 February 2004	harmonious
DIRECTIVE 92/104/EEC, 3 December 1992, on the minimum requirements for improving the safety and health protection of workers in surface and underground mineral extracting industries	Regulation on the safety and health of workers in the surface and underground extractive industries. Official Gazette : 25380, 21 February 2004	harmonious
DIRECTIVE 1999/92/EC, 16 December 1999, on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres	Regulation on Protection of workers at risk from explosive atmospheres, Official Gazette No: 25328, 26 December 2003.	harmonious
DIRECTIVE 89/391/EEC, 12 June 1989, on the introduction of measures to encourage improvements in the safety and health of workers at work.	Regulation, on the introduction of measures to encourage improvements in the safety and health of workers at work. Official Gazette No: 25311, 09.12.2003.	harmonious
DIRECTIVE 90/270/EEC, 29 May 1990, on the minimum safety and health requirements to encourage improvements in the safety and health of workers at work.	Regulation on the minimum safety and health requirements to encourage improvements in the safety and health of workers at work. Official Gazette No: 25325, 23.12.2003	harmonious

Table 6.1 continued

EU Legislation	Turkish Regulations	Remarks
DIRECTIVE 2003/18/EC, 27 March 2003, on the protection of workers from the risks related to exposure to asbestos at work. (amending 83/477 EEC)	Regulation on the protection of workers from the risks related to exposure to asbestos at work. Official Gazette No: 25328, 26.12.2003.	harmonious
DIRECTIVE 1999/38/EC, 29 April 1999, on the protection of workers from the risks related to exposure to carcinogens.	Regulation on the protection of workers from the risks related to exposure to carcinogens. Official Gazette No: 25328, 26.12.2003.	harmonious
DIRECTIVE 1998/24/EC, 7 April 1998, on the protection of the health and safety of workers from the risks related to chemical agents.	Regulation on the protection of the health and safety of workers from the risks related to chemical agents. Official Gazette No: 25328, 26.12.2003.	harmonious
DIRECTIVE 1989/686, 21 December 1989, on the personal protective equipment.	Regulation on the personal protective equipment. Official Gazette No: 25368, 09.02.2004.	harmonious
DIRECTIVE 1990/269, 29 May 1990, directive on manual handling.	Regulation on manual handling. Official Gazette No: 25370, 11.02.2004,	harmonious
DIRECTIVE 1989/656/EEC, 30 November 1989, concerning the minimum safety and health requirements for the use of work equipment by workers at work.	Regulation concerning the minimum safety and health requirements for the use of work equipment by workers at work. Official Gazette No: 25370, 11.02.2004.	harmonious

Table 6.1 continued

EU Legislation	Turkish Regulations	Remarks
DIRECTIVE 85/337/EEC, 27 June 1985, on the assessment of the effects of certain public and private projects on the environment (amended by directive 97/11/EC)	Regulation on Environmental Impact Assessment, Official Gazette No: 21489, 07 February 1993. It was revised in 1997, 2002, 2003 and 2006.	Turkish EIA Regulation was modified in 2002 within the framework of EU Directive.
DIRECTIVE 96/61, 24 September 1996, concerning integrated pollution prevention and Control (IPPC)	There is not any legal arrangement that corresponds to this Directive in Turkey.	It is considered that this Directive, which aims the use of environment friendly technologies so that the environment could be preserved as a whole, to be included in the Turkish legislation.
DIRECTIVE 96/82, 9 December 1996, Control of Major Accident Hazards Involving Dangerous Substances (SEVESO II Directive) (amended by directive 2003/105 EC)	There is not any legal arrangement that corresponds to this Directive.	It is quite important for environment and human health that the accidents arising from hazardous substances (especially if these kinds of accidents would cause really serious effects on environment and human health) would be prevented or their consequences would be reduced when these kinds of accidents happen. In 1996 the Directive of Seveso I was translated into the Turkish, Notice on Local Emergency Plan was prepared and sent to all of the provinces. In the scope of Seveso II Directive (96/82/EC. Seveso II Directive could not be assessed in this National Program (July 24th 2003) due to the high investment need the relevant legislation would require for both public and private sectors.

Table 6.1 continued

EU Legislation	Turkish Regulations	Remarks
DIRECTIVE 2002/49, 25 June 2002, Assessment and Management of Environmental Noise	Regulation on Assessment and Management of Environmental Noise Official Gazette : 25862, 01 July 2005	Harmonious
DIRECTIVE 92/43, 21 May 1992, Conservation of Natural Habitats and Wild Flora and Fauna (FFH Directive)	Conservation of Wild Fauna and Flora Official Gazette:25637, 08 November 2004.	Any kind of mining activity is prohibited in the protected areas in general. This is related to GDMA on behalf of permission procedure. It means that, GDMA can provide permission for exceptional projects provided that a sound and reliable EIA report is submitted. Sustainable development criteria should be emphasized rather than emphasizing the environment only.
DIRECTIVE 75/442, 15 July 1975, Waste Framework Directive (amended by Directive 91/156). This directive (75/442/EEC) does not cover mining wastes, if they are assessed within the scope of another regulation. (Clause 2(1)(b)(ii))	Regulation on Control of Hazardous Wastes Official Gazette:25755, 14 March 2005.	Regulation on Control of Hazardous Wastes corresponds to most of the definitions and clauses of Waste Framework Directive. Waste categories, disposal procedures, recycling procedures are the same with the ones in the Directive. Mining wastes were included in special wastes class just as in the Regulation on Dangerous Wastes. It was decreed that a separate legislation concerning collection, transportation, follow-up and disposal of mining wastes be prepared. Within this scope there is need for a separate regulation that will create a framework concerning mine wastes. 2006/21 EEC waste management directive for extractive industry has been made on 15 March 2006.

Table 6.1 continued

EU Legislation	Turkish Regulations	Remarks
		The Directive No.75/442 which was issued many years ago will lose its importance when member countries put the new directive into effect
DIRECTIVE 99/31, 26 April 1999, Landfill of Waste.	Regulation on Control of Hazardous Wastes (RCHW) Official Gazette:25755, 14 March 2005. Regulation on Control of Solid Substances (RCSS)	EU Directive does not cover unspoiled bulks of soil or inert wastes free from danger arising from mining exploration, extraction, exploitation and storage and stone quarries. In addition, storage of wastes free from danger arising from mining activities except inert wastes that are being stored in a way that does not have an impact on environmental pollution . In RCHW it is stated that mining wastes are special wastes. However, since there is not any current legal arrangement concerning mine wastes, mine wastes are subject to RCHW clauses. In the Supplement 2 section of the Directive waste acceptance criteria and procedures to storage sites are specified. In RCSS, for the wastes to be stored in storage facilities, the storability conditions stated in (Supplement 11-A) are required.

Table 6.1 continued

EU Legislation	Turkish Regulations	Remarks
DIRECTIVE 2006/21/EC, 15 March 2006, , Management of Waste from the Extractive Industries.	There is not any legal arrangement that corresponds to this Directive in Turkey. Turkey should start to establish a regulation on wastes from mining activities as it is already been written in article 91 of Mining Permits Regulation. This regulation will raise the investment and mining cost and affect the compatibility of especially small companies. After that kind of regulation, small and generally amateur actors will disappear.	This Directive provides for measures, procedures and guidance to prevent or reduce as far as possible any adverse effects on the environment, in particular water, air, soil, fauna and flora and landscape, and any resultant risks to human health, brought about as a result of the management of waste from the extractive industries. Covers waste from "prospecting, extraction, treatment and storage of mineral resources as well as from the working of quarries" in so far as they are not covered by other (Community or equivalent national) legislation. It contains waste management plan, exchange of information on BAT, and concerns waste placed back into excavation voids for rehabilitation or construction purposes. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive before 1 May 2008. To be adopted by the Commission within 2 years from entry into force. This directive should be adapted

Table 6.1 continued

EU Legislation	Turkish Regulations	Remarks
DIRECTIVE 2000/60/EC, 23 October 2000, Water Framework Directive.	Regulation on Control of Water Pollution Official Gazette:25687, 31 December 2004.	In the Regulation the standards for the waste waters related to mining activities before their release to receiving environment are stated. In the Supplement 9 list of the Directive there are directions concerning the discharge prohibition and limited discharge of the dangerous substances arising from industrial facilities into waters.

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

The EU mining policy focused on the balanced consideration of economic, environmental and social aspects to ensure the sustainable development of the mining industry. In this thesis, the Turkish and EU legislations about mining are studied, compared and discussed in similar approach. The main conclusions drawn from this research study are given below.

- The sector is promoting the newly created and EU funded network of mining regions which will provide a platform (The European Technology Platform on Sustainable Mineral Resources, ETP-SMR) for information exchange between local and regional authorities that have extractive operations in their regions.

- Also in Turkey, policies and visions towards the future of the sector, providing sustainable mining should be established by forming large platforms that all the representatives of the sector participate in and these established visions should be compatible with the facts of the country. In these platforms there should be institutions and establishments such as state establishments, private sector, non-governmental organizations and universities.

- Environmental and social aspects have adverse effects on the ability of the industry to exploit available mineral reserves. Extractive activities depend on geology and the particular location of mineral deposits. As a result access to the deposits is of crucial importance for the competitiveness of the extractive industry. Some directives, such as the Habitats Directive, restrict areas of land which are available to the industry. In Turkey, the habitat law should be considered in an efficient way with regard to the conditions of the country and the importance of economic development.

At the European legislative level, the management of mining, quarrying and ore processing waste are included in the initial Environment Impact Assessment of industries. These systems do already exist in some countries of the European Union.

There is a strong case for trying to secure minimum requirements for good pactice based on careful review of the most successful aspects of minerals planning in each country. The European Commission is currently following this approach in its initiatives on the safety of mining activities announced in the Communication.

The European legislation has vocation to be applied to the Central and Eastern European countries, candidate for integration. For some of them such as Turkey and Poland, the mining activity plays an important social and economic role. At the beginning of the planned economy period in Turkey (1960s), the environmental management was practically non-existent. Putting into practice the European standards in the field of the mining activity should follow an appropriate timetable.

- Turkey should act taking into consideration the issues only in the “regulation to be issued concerning the management of wastes arising from mines” and the conditions of the country should be kept in mind. Since Turkey is not an EU member yet, with respect to the duration needed for these directives to

become part of the national law and start to be enforced, it has an advantage over EU countries. Turkey should make best use of this advantage.

- The most important elements of waste management are the amount of waste produced during the mining activities and a series of measures to be taken. Within this context the amount of waste is calculated using various estimates in EU. 2006/21 Directive specifies that their statistics be kept and be updated continuously. Turkey should also take initiatives to prepare and enforce similar regulation.

- The directives issued by EU are framework directives and each country forms its own legal legislation by applying these directives with respect to its own economic and social conditions. National legislation should not be formed by translating these directives and applying them directly. Exploration activities are not included within the scope of environment impact assessment (EIA) in Turkey in conformity with European Legislation. On the contrary; even though EIA directive emphasises that a report should be prepared for the sites over 25 hectares, each country determines this limit according to its own conditions. Hence Turkey can modify this limit value by taking into account its own conditions.

- In Turkey, even though there is no relevant legislation, rearrangement and rehabilitation operations are performed, especially concerning mine sites where activities are over. But there is a need for these kinds of operations to be set on legal grounds and sustained on a scientific basis.

- European Union places great importance upon best available techniques (BAT) documents in mining sector. These documents help to provide reciprocal exchange of information and experience to solve any kind of problem the sector encounters. Also In Turkey, by compiling and publishing

the methods and techniques applied in mining sector, one can create useful resource that all sector could make use of as a reference document.

- European Union places great importance upon R&D operations and supports these operations financially. Within this context EU especially prioritises projects aimed at the protection of environment. The projects within the scope of 7th framework program of EU or of other programs that EU finances, such as ERMITE which is about assessing or drawing up an inventory of the harm that mines cause to the environment, should take place among the prioritized projects for Turkey.

- While new legislations are being prepared within the framework of harmonization in EU, the dialog between institutions is really good and these institutions operate in coordination with each other. Also in Turkey, the dialog between two major ministries preparing these legislations, The Ministries of Energy and Natural Resources and Environment and Forestry, and dependent establishments; should be good and these institutions should operate in coordination. At the same time they should also get assistance from universities and non-governmental organizations.

- The implementation, control mechanisms and updating regulations are more important than issuing them.

- The institution related to mining in Turkey could be on its own as “one shop” like in Germany. This structuring could be important in terms of reducing bureaucracy in mining sector and encouraging foreign investors to enter into the sector.

- The New Mining Law is a step into the right path and will help to improve investments, production and exports in the mining sector. In comparison with

the internationally accepted requirements for a modern mining law and relevant European Legislation a number of further measures are advisable.

Although the activities in the mining sector are in compliance with the Turkish legislation, the overburden of existing EU legislation and provisions set either for the safety and health of workers or treatment of extracts from mine sites or mining operations shall impose extra costs and investments for the continuation of operations. In other words, the implementation of EU legislation during the accession period will cause some of the mining operations to cease or stop permanently due to high costs of implementation.

However, beside its adverse effects, there will be benefits of the implementation of EU legislation such as improved working conditions for workers and environment friendly mine operations.

7.2 RECOMMENDATIONS

The main recommendations arising from this research study are presented below :

- Integrated Pollution and Prevention Control Regulation must be prepared and implemented in Turkey

- A regulation on control of major accident hazards involving dangerous substances must be prepared in Turkey similar to 96/82 EC Directive.

- Since there is no regulation on keeping the statistics of and managing the mining wastes properly, the preparation of a special regulation is recommended.

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