

THE MINERAL INDUSTRY OF TURKMENISTAN

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The mineral industry of Turkmenistan is based primarily on the extraction of natural gas with production also of oil and a number of important industrial minerals, including clays, gypsum, iodine and bromine, sodium compounds, sulfur, and table salt, as well as construction materials. Turkmenistan's most important reserves are of natural gas, oil, and industrial minerals, including barite, bentonite, bromine, iodine, sodium compounds, and sulfur. Oil reserves are primarily along the Caspian Sea coast, while gas reserves are along the Caspian Sea coast and in the northern and eastern parts of the country. Following Russia, Turkmenistan was the second largest producer of natural gas among the republics of the former Soviet Union (FSU).

The following information on Turkmenistan's major nonfuel mineral reserves was provided by the Embassy of Turkmenistan in Washington, DC. Reserves are reported using the terminology of the Soviet reserve classification system which is not comparable to western reserve classification systems in that the Soviet system does not apply market economy criteria in assessing reserves as having to be profitable in existing market conditions using existing technology.

Turkmenistan's deposits with proven reserves include large reserves of sulfate brines from the Garabogaz lagoon. The raw material base consists of two deposits (Kazakh cape and Kourgouzoul bay), which allow for the extraction of 342,000 cubic meters per day of buried brine. The Kurgouzoul bay is also under development for the production of sea salt, bischofite, Glauber's salt, and table salt.

The Touarkyr region in the northwest of Turkmenistan in the Amanboulak territory contains both bituminous and brown coal deposits. The bituminous coal strata are at a depth of 197 - 440 meters (m) with proven reserves of 23.5 million metric tons (Mt). The average ash content of the bituminous coal is 40%. The deposit is not being mined currently, but prospecting is being conducted. The Touarkyr region also contains a brown coal deposit. The brown coal strata have a thickness of 0.05 - 1.7 m and the coal is near the surface. The ash content is between 22% and 30%, moisture content is 12%, and sulfur content averages 0.9%. The proven reserves of brown coal comprise 878,000 metric tons (t).

The Gyzlgaya kaolin deposit, which is in production, is located in the northwest of Turkmenistan and is made up of kaolin-bearing sandstone. The reserves of 29.6 Mt are extracted to produce ceramic, porcelain-earthenware items, fire resistant bricks, glass, and paper.

The country has five major salt deposits: Baba-Khoja (7 Mt), the Gaourdak (1.970 billion tons), Kougintang (19 Mt), the

Kououlyu (38 Mt), and Uzoukoudouk (986,000 tons). The Kououlyu and Gaourdak deposits are suitable for producing common salt, chlorine, and caustic and calcined soda. Salts from the Baba-Khoja and Uzoukoudouk deposits are used in cattle-breeding mixtures. Salts from the Kougintang deposits are used in the food industry.

The Oglanly deposit of bentonite clays (14 Mt), the biggest in the Commonwealth of Independent States (CIS) countries, is located in the western part of Turkmenistan. The bentonite clays are suitable for casting production, ceramics, paper, rubber, and complex feeds. The deposits have been mined since 1936. The yearly output is between 50,000 and 100,000 t.

Celestite is present in the Arik and Sakyrmin deposits, located in the far southeast of Turkmenistan. These deposits are the largest found in the CIS countries.

The Gaourdak (205 Mt) and Karajoumala (105 Mt) deposits of limestone that are used for soda reduction are in the far southeast of the country. They reportedly meet the quality standards to produce calcined soda, quarry stone, and concrete filler for road repair and construction.

The raw material base for native sulfur is represented by three deposits: Garagoum (99,000 tons), Gaourdak (18 Mt), and Kougintang (8 Mt).

Three deposits of potassium salts have been found—Karlyu (2.017 billion tons), Karabil (1.452 billion tons), and Gaourdak (160 Mt). They are in the far southeast of Turkmenistan. The average potassium chloride content is 26.6%.

The Kougintang lead and zinc deposit, where mining ceased in 1968, is located in the far southeast of the country. The ores contain galena, pyrite, and sphalerite, and are hosted by Jurassic limestones. The average lead and zinc contents of the ore is 4.6% and 4%, respectively.

The country also has a number of mineral deposits that are under exploration, including the Touarkyr deposit located in the northwest with five gold mineralized zones with the gold content averaging 1.0 - 2.0 grams per ton (g/t). Six platinum and one palladium horizons have been located together with the gold zones. The platinum content in ore ranges from 0.1 to 2.6 g/t and averages 0.17 to 0.66 g/t; the palladium content ranges from 0.1 to 0.4 g/t. Prospecting at the deposit was being conducted in 1996.

The Karaiman manganese deposit in the northwest of the country also was being explored. In addition, there are copper and molybdenum deposits with reported copper contents of up to 1% and molybdenum contents of 0.11% to 0.3%. Two alunite deposits with grade of up to 50% alunite, the Zoulfagar and Zakley, are in the far south of the country (Embassy of

Turkmenistan, 1997).

The Embassy of Turkmenistan also lists the following nonfuel mineral production enterprises and their capacity by ministry. The information on mining and mineral enterprises below was abstracted from this list.

List of Nonfuel Mineral Enterprises

A. Enterprises Subordinate to the Turkmenistan Ministry of Energetics and Industry

1. The Industrial Association Turkmenmineral

The industrial association Turkmenmineral is located in the city of Gaourdak in the Lebep velayat. The enterprise was established in 1934. The Gourdak sulfur enterprise was formed on the basis of the Gaourdak sulfur deposit. It employs about 5,000 persons.

Turkmenmineral has the following production capacity:

- Lumpy sulfur—300 thousand tons
- Ground sulfur—40 thousand tons
- Gypsum—300 thousand tons
- Wall stone—25 thousand tons
- Construction material—130 thousand tons
- Salt—25 thousand tons
- Limestone—10,000 tons
- Limestone flour—10,000 tons

2. Maryazot Association

The association is located 12 kilometers from Mary. It comprises the Turkmen plant of nitrogenous fertilizers and the "Turkmencarbamide" plant. The number of personnel is 2,400. The enterprise uses natural gas from the Shatlyk deposit.

The Maryazot Association has the following production capacities:

- Ammonium nitrate—450 thousand tons
- Ammonia—400 thousand tons
- Nitric acid—360 thousand tons
- Carbonic acid: liquid—3,000 tons; solid—1,500 tons
- Carbamide—400 thousand tons
- Defoliant—12 thousand tons

3. Nebitdag plant

The plant is located in the Vyshka settlement, 26 kilometers south-west from the city Nebitdag in the Balkan velayat; the plant was commissioned in 1969. The number of personnel employed is 335. Nebitdag utilizes raw materials from the Monjoukley deposit.

The Nebitdag plant's production capacities include:

- Iodine—255 tons
- Ferrous bromine—3,200 tons

4. Cheleken Chemical Plant

The plant is located 2 kilometers north of the city of Cheleken in the Balkan velayat.

The Cheleken plant's production capacities includes:

- Iodine—335 tons
- Ferrous bromine—6,400 tons
- Iodine potassium—60 tons
- Iodate potassium—45 tons
- Iodineform—60 tons
- Sodium hypochloride—100 tons

5. "Gouvloudyz" Complex

The complex is located in the Gouvly-Mayak settlement in the Turkmenbashi etrap of the Balkan velayat. The complex was established in 1965, based on a mine in operation since 1895. The complex employs 470 people. The Kououlyu deposit provides the raw material. The complex has the capacity to produce 680,000 tons per year of coarse salt and 160,000 tons per year of common salt.

6. "Karabogazsulfate" Association

The Association, established in 1929, is located in the Bekdash settlement of the Balkan velayat. It employs 2,013 personnel. The association uses the buried intercrystalline brines of the Garabogassulfate bay as raw material.

Karabogazsulfate's production capacities include:

- Sodium sulfate—400 thousand tons
- Bischofite—100 thousand tons
- Epsomite—35 thousand tons
- Glauber's salt—10 thousand tons
- Common salt—20 thousand tons

B. Enterprise Subordinate to the Ministry of the Construction Materials Industry

1. Byuzmein Cement Plant

The plant, established in 1950, is located in the city of Byuzmein in the Akhal velayat and employs 787 personnel. The cement plant uses local raw materials such as pebbles and loamy soils of the Byuzmein deposit and argyllites and gypsum of the Yagman and Gaourdak deposits. The plant has the capacity to produce about 1 million tons per year of portland cement as well as certain construction materials.

C. Enterprise Subordinate to the Ministry of the Oil and Gas Industry and of Mineral Resources

1. Oglanly Mine

The mine, located in the Oglanly settlement 37 kilometers from Jebel in Balkan Velayat, was built in 1934. Industrial

exploration began in 1936. It employs 94 people. The mine has the capacity to produce about 100,000 tons per year of bentonite which is exported to Russia, Kazakstan, Ukraine, Uzbekistan and Belarus.

Source: Embassy of Turkmenistan, Processing Enterprises. (Accessed at <http://mh102.infi.net/embassy/>)

Turkmenistan was seeking to begin or expand development at a number of nonfuel mineral deposits. These include the Oglanlinskiy deposit, which contains high quality bentonite clays and is being mined by the Oglanly mining complex, the undeveloped Kailyu marble onyx deposit on the Turkmenbashi peninsula, the Tuarkyr deposit of kaolin-bearing sandstones, and the alunite deposits in the Zulfagar Field 120 kilometers (km) southeast from Serakhs and the Zaklin Field 160 km southeast from Serakhs, which are to be developed for alumina production in Turkmenistan. A mining facility is being constructed near Serakhs and an alumina production plant with an annual capacity of 100,000-120,000 metric tons per year (t/yr) of alumina is planned (Mining Industry in Turkmenistan, 1997).

Some foreign investment was occurring in the nonfuel mineral sector. A new kaolin production facility with a planned annual capacity of 20,000 t/yr of kaolin was being erected by the Iranian company "Iran Industrial Design Co." near Ashgabat (Ashgabat TMI Television Network, 1997; Tehran IRIB Television First Program Network, 1996).

The Export-Import Bank of Turkey plans to lend Turkmenistan \$79.5 million to build a steel mill with capacity to produce 400,000 t/yr of steel. Turkish companies will help build the plant, which will be fed mainly on scrap metal purchased in Turkmenistan and possibly in Iran and Afghanistan. The plant should lessen Turkmenistan's dependence on steel imports (Interfax Mining and Metals Report, 1996.)

In 1996, industrial output in Turkmenistan increased by 17.9% compared with 1995. (Interfax Statistical Report, 1997). However, in the first half of 1997 Turkmenistan's industrial output decreased by 25% compared with 1996, which was primarily caused by Turkmenistan suspending gas exports to former Soviet Republics which owed Turkmenistan about \$2 billion; about one-half of this amount was owed by Ukraine (Reuters, 1997).

Turkmenistan reported that in 1996 production increased for its major mineral commodity, natural gas, to 35.2 billion cubic meters compared with 32.3 billion cubic meters in 1995. Production increases were reported for some mineral commodities, while production decreases were reported for others. (See table 1). As can be seen by comparing tables 1 and 2, Turkmenistan's mineral industries were producing far below capacity.

Turkmenistan's program for privatizing its industry was formalized in a new state plan for intensification of economic development proposed by the country's President, in a program entitled "1,000 days." According to this program, in 2-1/2 years before the end of the 20th century, most of Turkmenistan's industry is to be transferred into private hands. Excluded will be

435 enterprises in the oil and gas sector and railroad and air transport, which will remain under state control (Rossiyskaya Gazeta, 1997).

Privatization, up to this time, was not implemented intensively in Turkmenistan. Only facilities for commerce and public services were transferred to private ownership. This was done in accordance with the Government's concept of avoiding "shock therapy" in the shift to a market economy. The country's economy has retained most features of its former planned economic operations including the administrative structure and the imposition of state targets (Rossiyskaya Gazeta, 1997).

This policy has slowed the pace of economic development. Inflation is the highest of any country in the FSU. Turkmenistan's currency has fallen sharply in value. The country remains dependent on Russia for most of its trade. Foreign investment in the country remains minimal (Rossiyskaya Gazeta, 1997).

The Government realized that maintaining state control over most industrial enterprises was inefficient and took more decisive steps towards market oriented reforms. Certain innovations were introduced in holding auctions and investment competitions. While previously the members of enterprise labor collectives had priority rights in privatization sales, now all participants in privatization competitions, whether they are enterprise employees, natural persons, legal entities from outside, or foreigners can compete under equal conditions (Rossiyskaya Gazeta, 1997).

The Ministry of Energetics and Industry, the Ministry of the Construction Materials Industry, and the Ministry of the Oil and Gas Industry and of Mineral Resources are now the state bodies responsible for mineral development in Turkmenistan. According to reporting by the American Embassy in Ashgabat, Turkmenistan, on July 2, announced the reorganization of the Ministry of Oil and Gas along with other reorganizational measures that affected other mineral industry sectors. In this reorganization, the Ministry of Oil and Gas was renamed the Ministry of the Oil and Gas Industry and of Mineral Resources and also incorporates "Turkmen Geology," which used to report directly to the Cabinet of Ministers as a separate agency. In addition, three concerns and two corporations were created to oversee all oil, gas, and mineral-resource associations.

The staff of the Ministry of Oil and Gas Industry and Mineral Resources was to be reduced in size to 50 direct ministry employees. More than 100 employees had worked for the Ministry throughout the country. The new Ministry will have three strategic objectives: 1) providing in-depth economic analysis and statistics for the oil and gas industry, 2) engaging in long-term strategic planning and creating investment programs (including foreign investments), and 3) the development and transfer of science and new technology for the industry.

The state concern "Turkmenneft" will be responsible for all five oil-producing associations throughout the country. The state concern "Turkemengas" will be responsible for all gas-producing associations throughout Turkmenistan. All oil and gas construction organizations will be under the administration of the state concern "Turkmenneftigasstroy." The state trade

corporation "Turkmenneftgas" will be responsible for the refineries (Turkmenbashi and Seidi) and for sales of natural gas, crude oil, and refinery products. The state corporation "Turkmengeology" will be responsible for all geologic issues and exploration for oil and gas and other mineral resources.

In August, it was announced that Russia's Gazprom and the Government of Turkmenistan established a joint venture Turkmenrosgas that will control production and sales of all natural gas exports from Turkmenistan. Gazprom will hold a 45% interest in the venture, Turkmenistan 51%, and an international corporation OTERA will hold the remaining 4% (East-West Executive Guide, 1996).

Turkmenrosgaz also will do prospecting and exploratory work and build and operate facilities for the extraction of hydrocarbon resources, and for the shipping, refining, and sale of oil, condensate, and gas inside and outside Turkmenistan. The company will also develop the gas region on the right bank of the Amu Darya. After the new joint-stock company becomes financially independent, the Government of Turkmenistan hopes to include it in the construction of a gas pipeline to Pakistan (Delovoy Mir, 1996).

Turkmenistan's Vice Premier and Foreign Minister stated that Turkmenistan still adhered firmly to the positions it expressed at the conference of Caspian states' foreign ministers held in November 1996 in Ashgabat. At this conference, Iran, Russia, and Turkmenistan spoke in favor of granting Caspian countries sovereign rights within 45-mile national zones while concurrently maintaining the common zone extending beyond those borders where activity is possible only on the basis of consensus and taking into account the interests of all five states (Nezavisimaya Gazeta, 1997).

Turkmenistan is disputing Azerbaijan's claims of ownership of Caspian Sea oil fields. According to Turkmenistan, all of the Azeri field and part of the Chirag field which are being developed by Azerbaijan in conjunction with an international consortium are situated within Turkmenistan's territory (Nezavisimaya Gazeta, 1997).

Also, in accordance with the position put forth by Turkmenistan on the use of the economic resources of the Caspian Sea, the Turkmenistan Foreign Ministry issued a protest regarding the clause contained in the Russian-Azerbaijani agreement on joint projects in the Caspian Sea with respect to the development of the Kapyaz oilfield. In the opinion of Turkmenistan, this field, which is called by Turkmenistan Sedar, belongs to Turkmenistan. The Foreign Ministry of Turkmenistan categorically demanded annulment of the agreement (Moscow RIA, 1997).

Turkmenistan in the spring of 1997 issued a decree "On Holding an International Tender for Prospecting for and Extraction of Hydrocarbons Within the Caspian Sea Shelf." A specially created state commission, working jointly with the European Union (EC) Commission within the framework of the Technical Assistance for the CIS (TACIS) program will be responsible for preparing, organizing, and conducting the tender, whose results were to be announced not later than February 1998. About 20 oilfields on the Caspian shelf near the Turkmenistan coast are being offered to potential investors who

are offered packages of data on the geophysical research carried out by U.S. specialists over the past 2 years. The data reportedly confirm the presence of 3.3 billion tons of oil in the Turkmenistan part of the Caspian shelf. Among the companies that had already acquired packages on the results of geophysical prospecting are Italy's Agip, Malaysia's Petronas, the U.S.'s Mobil, Exxon, and Unocal, and the Japanese National Oil Company (Nezavisimaya Gazeta, 1997).

By its decision to hold an international tender, Turkmenistan has appeared to some to have contradicted its position regarding the right to conduct prospecting for and extraction of oil in the Caspian Sea. Turkmenistan has objected to the interpretation of this step by some officials of the Caspian states who issued statements about the drastic change that has supposedly occurred in Turkmenistan's stance on the problem of defining the Caspian Sea's status. With regard to the properties Turkmenistan was tendering on the Caspian shelf, Turkmenistan stated that it was not at variance with the above because, until the new status of the Caspian is worked out, Turkmenistan has complied with the existing procedure, i.e., delimitation of the administrative-territorial borders along the median line. In conformity with such a division, the sectors offered for tender, according to Turkmenistan, belong to Turkmenistan (Nezavisimaya Gazeta, 1997).

The President of Turkmenistan on March 7, 1997, signed the Republican Law on Hydrocarbon Resources passed by the Turkmenistan parliament on December 30. The preamble of the law points out that it is aimed at ensuring rational and effective uses of hydrocarbon resources and the conservation of natural resources of Turkmenistan for generations to come. The law aims to create conditions for attracting investments in the development of hydrocarbon resources and insurance of their rational and effective use. The document was prepared in conjunction with all interested organizations in Turkmenistan with the active participation of experts from the European Union. The main purpose of the law is to introduce forms of cooperation such as agreements on joint activity and production sharing widely used in other countries. The law regulates relations arising in the process of doing work for oil production, including operations at offshore and inland water body deposits. It defines the conditions for the granting of licences and making and fulfilling agreements on work to be done. It regulates the rights and duties of state bodies, as well as companies, enterprises and organizations. Hydrocarbon resources, both underground and at the surface of the country's territory, are recognized to be the exclusive birthright of Turkmenistan. Powers to own, use, and dispose of hydrocarbon resources are vested in the Cabinet of Ministers (ITAR-TASS, 1997; Interfax Oil, Coal & Gas Report, 1997a).

Turkmenistan's President signed a resolution approving a program to produce 6 Mt of oil and gas condensate and 53 billion cubic meters of gas in 1997 (Interfax Oil, Coal & Gas Report, 1997b). According to data from Turkmenistan, about 80% of the territory of the country is viewed as promising from the standpoint of availability of hydrocarbon raw materials. Gas resources are estimated by Turkmenistan to be 21 trillion cubic meters and oil resources 6.9 billion tons (Interfax Oil, Coal &

Gas Report, 1997a).

Several bilateral projects with a total cost of \$400 million are planned to be implemented with foreign cooperation to increase extraction of oil and gas. Out of a total of 6 Mt of oil planned to be extracted in 1997, 5.13 Mt is to be extracted by Turkmennebit (the Turkmenistan State Oil Concern). The rest will be supplied by joint ventures and foreign companies operating in Turkmenistan. Despite new developments, the bulk of Turkmenistan's oil still is to be supplied by the Kotur-Tepe and Barsa-Kelmes fields in the Balkan region in western Turkmenistan (Ashgabat Magallymlar Gazeti, 1997).

The annual output of oil in Turkmenistan is planned to reach 11 Mt to 14 Mt in the near future by adding new oil wells and modernizing obsolete ones with the aid of foreign investment. Large-scale prospecting is underway in the Shatut, Nebitlije, Northern Korpeje oilfields and in the Alatau-Messerian area in western Turkmenistan (Ashgabat Magallymlar Gazeti, 1997).

The strategy for the development of the country's oil production complex during the period up to 2020 was announced in 1994. It reportedly is based on the results of analyses of geologic and geophysical findings, including the results from 3,000 exploratory wells and more than 150,000 kilometers of seismic readings, as well as a performance analysis of almost 2,500 producing wells.

There were two joint ventures (JV) that were in production in the oil sector. They were the Turkmenistan-Argentine Keymir JV, with Argentina's Bridas Corp. This JV is developing the Keimir, Ekpatlaukh, and Chikishlyar oilfields in the southern Caspian Sea region. According to Bridas, which was producing about 15,000 barrels per day (bbl/d) in 1995, there was no reason, except for the lack of an export route, why the joint venture's oil production could not be boosted rapidly to 50,000 bbl/d. In the other JV, the Netherlands-based Larmag Energy Assets is involved in a joint venture to develop the Cheleken oilfield, producing around 8,000 bbl/d. Larmag is hoping to achieve peak production of 85,000 bbl/d (Energy Information Administration, 1997).

Bridas and Larmag have been frustrated by similar problems including periodic suspension of oil export licenses and lack of an export route. Larmag was exporting its output mainly across the Caspian Sea to Iran, where it was trucked to Persian Gulf ports. In addition, limited amounts of oil were transported to the Black Sea via Russia's Volga-Don canal.

Besides Bridas and Larmag, other western firms including Monument Oil of the United Kingdom and Germany's Mannesmann and Siemens reportedly are already involved in oil development projects. Monument Oil in a production-sharing agreement has received the right to explore and develop three oil fields, the Burun, Kyzyl Kum, and Karatepe, in western Turkmenistan. Turkmenistan signed a production sharing agreement with the Malaysian company Petronas to develop the Gubkino, Barinovo and Livanovo fields in the Caspian Sea (Interfax Petroleum Report, 1996). According to a cooperation agreement signed in July, Siemens will ally with Mannesmann to develop the Yuzhniy Kamyshtdzha field in western Turkmenistan near the Caspian Sea with estimated reserves reportedly of 20 million tons of oil. Mannesmann also signed a

contract to produce motor oil and other oils at the Turkmenbashi refinery. At the beginning of 1997, Turkmenistan also signed a production-sharing agreement with Monument Oil and Mobil Oil Corp. to develop oil in the Nebit Dag region in western Turkmenistan and also signed a memorandum of understanding giving these companies exclusive rights to negotiate for the development of oil in a 7,717 square mile area in western Turkmenistan. (Energy Information Administration, 1997).

In 1996, natural gas was extracted in more than 30 fields. Turkmenistan, with more than 30% of the world's natural gas reserves, ranks fourth in the world, after the United States, Russia, and Canada, in terms of potential yield. Only around 30% of the country's territory has been prospected for natural resources. Turkmenistan sees the potential for increasing output of natural gas to 90 billion cubic meters in the next few years (Delovoy Mir, 1996).

The largest natural gas fields are in the Amu-Dar'ya basin, with half of the country's gas reserves located in the large Dauletabad-Donmez field. In addition to the Amu-Dar'ya basin, Turkmenistan contains large gas reserves in the Murgab basin, particularly the giant Yashlar deposit, which contains an estimated 765 billion cubic meters (Energy Information Administration, 1997). New deposits with a projected output of up to 6.1 billion cubic meters of gas per year are being developed.

Two foreign companies, Bridas of Argentina and Unocal of the United States, were involved in developing Turkmenistan's gas reserves. Bridas stated it intends to increase its investment in the country's oil and gas industry from \$400 million to \$3 billion. Bridas began its involvement in Turkmenistan in 1991, and since that time has mainly focused on developing the Yashlar gas deposit in the southeastern Amudarya basin, as well as the Keimir oil and gasfield in the southwestern part of the country (Energy Information Administration, 1997).

In March 1996, a consortium of Unocal and Saudi Arabia's Delta signed an agreement with Russia's Gazprom to help develop gas reserves in the country, and also to build a nearly 900-mile long, \$3-billion pipeline from Turkmenistan's giant Dauletabad field through Afghanistan, to the Pakistani gasfield of Sui in Baluchistan province, and on to the port city of Karachi. Construction on the Pak-Turkmen Gas Pipeline Project was to start by December 1998. The first delivery of Turkmen gas would be made to Pakistan by the year 2001 (Islamabad PTV Television Network, 1997).

The country's development strategy calls for the retooling of the country's two petroleum refineries (NPZ's). The Turkmenbashi (formerly Krasnovodsk) NPZ was under renovation. In February 1996, Merhav Corporation of Israel announced the signing of a \$500 million deal to upgrade the Turkmenbashi refinery. The project involves constructing a new lubricant oil facility, as well as upgrades to the refinery's catalytic reforming and catalytic cracking units. (Energy Information Administration, 1997).

The development of major oil and gas deposits cannot be conducted without major financial outlays. The program on economic reform states that international cooperation, integration, large-scale joint projects, joint ventures, and the

investments of foreign state and private companies, banks, and international financial institutions will be used widely in the mobilization of the state's resource potential. Some of this has already been accomplished (Delovoy Mir, 1996).

Gas from Turkmenistan is being sent to consumers through the longest pipeline in the world, the "Central Asia-Center" pipeline, running through Uzbekistan, Kazakhstan, and Russia. After Turkmenistan had gained its independence, it encountered the problem of selling its fuel. Whereas it had produced an average of 80 billion cubic meters of gas per year in the last Soviet years and had sent more than 95% of it through a single pipeline to Russia, Ukraine, the Transcaucasus republics, and the countries of Eastern Europe and Western Europe. However, CIS countries, including Armenia, Azerbaijan, Georgia, and Ukraine, had been ordering and getting the fuel without paying for it. Therefore, the Turkmenistan Government had to find alternate ways of sending gas to world markets, but there are no alternatives to the main CIS pipeline other than to build new pipelines.

One possibility is a 90-mile pipeline hookup, currently under construction, with Iran's pipeline grid. The overall viability of the project in 1996 remained questionable, primarily because of the challenge of obtaining international financing because of U.S. political opposition to the pipeline. The United States opposed U.S. companies investing in a project that was perceived as benefiting Iran, although United States law barring investment in Iran's energy sector reportedly did not address pipelines crossing Iranian territory carrying another country's gas (Washington Post, 1997). In July 1997, the United States reportedly was reconsidering its opposition to this pipeline, which would not involve U.S. firms financing construction of the pipeline sector that transverses Iran which will be financed solely by Iran (Washington Post, 1997). The pipeline will initially carry 3 billion cubic meters per year of gas with the amount rising eventually to 30 billion cubic meters per year (Washington Post, 1997).

Other natural gas export projects under consideration are two different routes through Afghanistan; a pipeline through China to Japan; and an underseas project across the Caspian Sea. Unocal and Saudi Arabia's Delta Oil have agreed to cooperate with Gazprom to build the \$3.5 billion Turkmenistan-Afghanistan-Pakistan oil and gas pipelines. It also will give Turkmenistan a vital new access route to the world market. However, warring factions in Afghanistan may delay this project. Other proposed alternative pipeline routes include: Turkmenistan-Transcaucasus-Turkey line; Turkmenistan-China-Japan line; and the Turkmenistan-Caspian-Turkey line under the Caspian Sea. The only pipeline currently under construction is the one through Iran.

Turkmenistan in 1996 was a net importer of coal. Plans called for developing the Tuarkyr deposit in the northwestern portion of the country. Iran is assisting with the feasibility study and in the development of the first section of the deposit which contains estimated reserves of almost 25 million tons.

Turkmenistan finally seems poised to realize its great potential as a supplier of natural gas with the resolution of pipeline development issues that will enable Turkmenistan to

get its gas to world markets. This will considerably boost the country's foreign currency earnings. Turkmenistan, however, like other countries that have large earnings from the export of oil or gas, will have to ensure its future through balanced development. The country has a number of important industrial mineral resources which could be used to supply regional and world markets with both raw materials and downstream products. The country will be better able to focus on the development of these resources and mineral products after the issue of gas transport is resolved, which will provide the country with both a more secure economic base and a more favorable investment climate.

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Major Sources of Information

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TABLE 1
TURKMENISTAN REPORTED MINERAL PRODUCTION

(Metric tons)

Commodity	1995	1996
Ammonia nitrate	149,365	137,181
Bischofite	28,266	3,230
Cement	437,300	450,500
Epsomite	1,500	14,250
Ferrous bromide (51% Br)	200	250
Gypsum	216,427	169,577
Iodine, crude	137	255
Lime, dead burned	52,000	47,000
Natural gas	billion cubic meters 32.3	35.2
Petroleum, crude	4,700,000	4,400,000
Salt:		
Rock salt	24,401	24,279
Native	25,251	27,041
Sodium sulfate	22,226	30,820
Sulfur:		
Lump	137	--
Ground	7,913	8,112

Sources: 1996 Minerals Questionnaire completed for the U.S. Geological Survey by the Turkmenistan Ministry of Energetics and Industry: Interfax Statistical Report, 1997; Commonwealth of Independent States: Preliminary 1996 results: Interfax Statistical Report, v. VI, issue 8, February 14-21, p. 14-16. (Available from Interfax America, Denver, Colorado.)

TABLE 2
TURKMENISTAN: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Thousand metric tons unless otherwise specified)

Commodity	Major operating company	Location of main facilities	Annual capacity e/
Ammonia	Maryzaot Association	Mary region	400,000. 1/
Bentonite	Oglany Mine	Oglany region	100,000. 1/
Cement	Byuzmein cement plant	Byuzmein	1,000,000. 1/
Gypsum	IA Turkmenmineral	Mukry, Tagorin deposits	300,000. 1/
Do.	Wastes from Gaourdak sulfur deposit	Gaourdak	400,000. 1/
Iodine and bromine	Cheleken plant	Cheleken region	355 (iodine). 1/ 4,740 (bromine). 1/
	Nebit Dag plant	Vyshka	255 (iodine). 1/ 2,370 (bromine). 1/
Natural gas	Deposits: Achakskoye, Gygyrlinskoye, East and West Shatlykskiye, North and South Naipskiye, Daulatabad-Donmezskoye	Northeastern, eastern southeastern, and southwestern part of country	90 total.
Petroleum:	Deposits:		
Crude	Nebitdag, Cheleken, Kum Dag, Koturtepinskoye, Barsa-Gelmesskoye, Burunskoye, Kuydzhikskoye, Gograndagskoye, Okaremskoye, Kamyshldzhinskoye	Southwestern part of country on Caspian Sea	5,500,000 total.
Refined	Chardzhou refinery Krasnovodsk refinery	Chardzhou Krasnovodsk	6,000,000. 5,000,000.
Sodium sulfate	Karabogaz Sulfate Association	Bekdashh	400,000. 1/
Sulfur	IA Turkmenmineral	Gaourdak deposit	240,000. 1/

e/ Estimated. NA Not available.

1/ Reported figure.