

# THE MINERAL INDUSTRY OF LIBERIA

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The Republic of Liberia is a small West African State with an area slightly larger than Tennessee and a population of less than 3.5 million. In 2004, the country was recovering from a 14-year-long period of civil war and political instability that brought the political system and economic sector of the country to a standstill, claimed the lives of 150,000 people, and forced 850,000 people to seek refuge in neighboring countries. The gross domestic product (GDP) based on purchasing power parity for 2004 was estimated to be \$2.9 billion with an estimated real growth rate of 21.8% compared with 5.8% in 2003. The GDP per capita was estimated to be \$900. The inflation rate was estimated to be 15% in 2003, the latest available year in this time series (U.S. Central Intelligence Agency, 2005§<sup>1</sup>).

By early 2005, more than a third of the total population of Liberia lived in and around the capital Monrovia where unemployment was estimated to be at 85%. There was no running water or electricity in the capital. On August 18, 2003, a Comprehensive Peace Agreement was signed in Accra, Ghana, by the main warring factions: Liberians United for Reconciliation and Democracy (LURD), the Movement for Democracy in Liberia (Model), and the existing Government of Liberia, which was formerly led by the exiled Charles Taylor. The Agreement declared an immediate end to the war and established a National Transitional Government of Liberia (NTGL) whose primary responsibility was to implement the peace treaty and to prepare for national elections in October 2005; the elected government was to assume power in January 2006. On September 19, 2003, the United Nations Security Council (UNSC) adopted resolution 1509 (2003) that established the United Nations Mission in Liberia (UNMIL). The UNMIL mandate called for a peacekeeping force of up to 15,000 United Nations (UN) military personnel and empowered UNMIL for an initial period of 12 months; the UNSC renewed the UNMIL mandate on September 19, 2004, for an additional year. UNMIL has taken the lead in an international effort to implement the Liberian cease-fire agreement, assist in the maintenance of law and order throughout Liberia, and help restore the country's political and economic self-sufficiency (United Nations, 2004b§). The fifth progress report of the UN Secretary-General on the UNMIL was issued in December 2004 (United Nations, 2004a§).

Also in December, the UN adopted Resolution 1579, which renewed the sanctions on arms acquisition, timber sales, and official Government travel for an additional 12 months (subject to a review after 6 months); the ban on the sale of rough diamond was renewed for 6 months (to be reviewed after 3 months). Resolution 1579 also reestablished the UN Panel of Experts on Liberia until June 21, 2005, to investigate and report back to the UNSC on the implementation of the sanctions and on any violations (United Nations, 2004e§). The

UN Panel of Experts submitted interim and final reports of its findings in September and December 2004, which, among other items, noted that the NTGL still “lacked the functional capacity to control illegal diamond mining” (United Nations, 2004c§, d§). Illegally extracted “conflict” diamond and timber had helped fund the prolonged civil war and thus were a key focus of the sanctions. Efforts by the NTGL, with assistance from the international donor community, to establish “security, transparency and accountability” in the diamond and timber sectors was a prerequisite for the lifting of sanctions against the export of these commodities.

In November 2002, about 50 countries that produce, trade, and process diamond became signatories to the Kimberley Process Certification System (KPCS) aimed at establishing a system of certificates of origin to control the global trade in diamond. The treaty resulted from international concern over the growing evidence of illegally mined and exported diamond revenues being used to support civil conflicts in Angola, Sierra Leone, and elsewhere (Kimberley Process Secretariat, 2004§). The NTGL was encouraged by the UNSC to establish a Certificate of Country of Origin regime that is transparent, effective, and internationally verifiable for the trade in rough diamond, with a view to joining the Kimberley Process Certification Scheme. The NTGL requested that a Kimberley Process Review Team visit Liberia in February 2005 to assess the NTGL's ability to comply with the requirements of the KPCS.

Liberia was a producer of cement, diamond, and gold and, historically, was a major iron ore producer. To help enforce UN sanctions on diamond exports, the Ministry of Lands, Mines and Energy banned all diamond mining as of January 2005, although exploration was still permitted.

## Legislation and Government Regulations

On November 17, 2004, the Government enacted a new Chapter 40 of the New Minerals and Mining Law, Part I, Section 23, of the Liberian Code of Laws Revised (2000). Chapter 40 provides for controls on the export, import, and transit of rough diamond and puts in place the legal framework for Liberia to participate in the KPCS. The New Mining Law of 2000, which is administered by the Ministry of Lands, Mines and Energy, has a clearly defined exploration and licensing system, as follows:

- Exploration Licenses—These licenses are issued to exploration and mining companies for 3 years and are renewable for an additional 3 years, during which time artisanal miners may continue to work on the land under their individual licenses. After each 3-year period, one-half of the exploration claim must be relinquished.
- Class A Mining Licenses—Under a Class A license, concessions are limited to 1,000 square kilometers (km<sup>2</sup>) and are open to foreign ownership. Concessions are valid for up to 25 years and are renewable for consecutive additional terms of up

<sup>1</sup>References that include a section mark (§) are found in the Internet References Cited section.

to 25 years each upon a showing of proven reserves. Class A license holders are required to enter into a Mineral Development Agreement with the Government and to pay land rent, taxes, and royalties. Mineral Development Agreements are subject to review every 5 years to take into consideration “substantial changes in circumstances.” Royalties for diamond range from 3% to 10% of the appraised value, with periodic reviews by the Ministry of Lands, Mines and Energy to reassess the royalty rate. Royalties are paid directly to the Ministry of Finance.

- **Class B Mining Licenses**—Under a Class B license, concessions are granted for an initial term of 5 years, and are renewable for consecutive periods of up to 5 years more. Mechanized “industrial” mining operations (backhoe excavators, suction pumps, etc.) are permissible under this license. Foreign ownership is allowed.

- **Class C Mining Licenses**—Issuances of Class C licenses have been the key regulatory control mechanism over artisanal mining. Concessions are granted for a 1-year period, and all expire on December 31st of each year. A license fee of \$350 per claim is required. Only Liberian nationals are eligible for Class C licenses. Class C claim areas are limited to 25 acres and are restricted to semimechanized artisanal mining—generally a “shovel and digger” operation. Several Class C licenses may be combined to apply for a Class B license. The Government placed a moratorium on artisanal mining in January 2005 and announced that no Class C licenses would be issued during 2005.

## Commodity Review

### Metals

**Gold.**—AmLib United Minerals, Inc. of the United States was actively exploring for gold on a 1,300 km<sup>2</sup> license area that included the Cestos, Kle-Kle, and Zwedru properties in Bong, Grand, and River Cess Counties. During 2004, AmLib applied for a Mineral Development Agreement on its Kokoyo property in Bong County in the central part of the country, where it planned to conduct a pre-feasibility study during 2005. The company was privately held and details of its work were not publicly available (AmLib United Minerals, Inc., 2004§).

Resources, Inc. of the United Kingdom held a Mineral Development Agreement that covered a 1,000-km<sup>2</sup> concession in the Bea Mountains in western Liberia, where diamond-drilling, geochemical, and geologic exploration has been carried out on the Gondoja, King George Larjor (KGL), and Weaju gold properties; the company had identified four other gold prospects at Benjeh, Butler Hill, Ndablama, and Sosa Camp. The KGL property is on the site of major artisanal alluvial workings, and exploration has identified primary gold mineralization in sheared ultramafic komatiitic schists within the regional Archean greenstone belt. Mano River Resources has estimated the indicated resource at KGL to be 1.1 million metric tons (Mt) at a grade of 5.23 grams per metric ton (g/t) gold and the inferred resource to be 2.2 Mt at a grade of 5.1 g/t gold. Mano River Resources was awaiting the delivery of three diamond drills by February 2005 to continue exploration along the 70-

kilometer (km)-long shear zone within its concession. Mano River Resources also had active gold and diamond exploration projects in neighboring Guinea and Sierra Leone (Mano River Resources, Inc. 2005a§, c§).

In April 2004, Diamond Fields International Ltd. acquired the 1,300-km<sup>2</sup> Cestos gold concession, which is located in River Cess and Sinoe Counties near the Cestos shear zone. On August 12, 2004, Diamond Fields signed an option agreement with Liberian-owned Ducor Minerals Inc., which entitled Diamond Fields to earn an interest in Ducor’s legal rights under two Mineral Exploration Agreements between Ducor and the Government of Liberia. The Gbapolu (Grand Cape) diamond concession and the Grand Gedeh gold properties cover a combined area of more than 1,800 km<sup>2</sup>. The option agreement allowed for Diamond Fields to earn a 70% interest in Ducor in return for 1 million shares of Diamond Fields stock, provided Diamond Fields spends \$2 million on exploration over the next 4 years. Soil and stream sediment sampling for gold was continuing into 2005 on the Grand Gedeh property (Diamond Fields International Ltd., 2004§, 2005b§).

**Iron Ore.**—With the increasing world demand for iron ore that has been driven by the rapid growth of the Chinese steel industry, the mining industry was actively seeking new sources of iron ore supply. Many of these potential new sources, such as in Liberia and Guinea, have been known for a long time, but have been either unavailable or marginally economic owing to their low grade or high infrastructure development costs. A 1988 United Nations University study estimated Liberia’s iron ore resources to be between 2 billion and 5 billion metric tons (Yachir, 1988§). Table 3 shows recent Ministry of Lands, Mines and Energy estimates of iron ore resources by deposit. In January 2005, the Ministry of Lands, Mines and Energy announced that four multinational companies had submitted bids to reopen the iron ore mines in the Nimba Mountains. The four companies were BHP Billiton plc, Global Infrastructure Holdings (the holding company for two Indian steel companies, Ispat and Essar), Mittal Steel, and Rio Tinto plc (Africa Online, 2005§).

Iron ore has been mined in Liberia since the early 1950s. The iron ore deposits of Liberia are Archean age iron formations of itabirite type and are associated with metavolcano-sedimentary formations overlying and tightly infolded into the predominantly gneissic basement complex. After the opening of the Buchanan Port in 1963, iron ore production and exports ranged between 12 Mt/yr and 24 Mt/yr during the period 1964 to 1989, which was the last year of any significant production; the iron ore mine at Nimba finally closed in 1991. By the time of closure, most of the high grade (greater than 60% iron content) iron ore at the Nimba Mine, which was operated by American and Swedish interests, had been mined out. There are, however, extensive known resources of lower grade iron ore in northern Liberia, including the deeper ores at Nimba and the nearby Mount Todeh deposit, at Mt. Kitoma, at Wologisi, and in the Putu Mountains. The Nimba-Buchanan railway was built to export the Nimba iron ore and, in addition to iron ore handling facilities at Buchanan, there was a 10-Mt/yr washing plant and a 2-Mt/yr pelletizing plant. In addition to Nimba, iron ore was mined at the National Iron Ore Company Mine near Mano River by the

Liberia Mining Company of the United States in the Bomi Hills and by German and Italian steel interests in the Bong Range. The Liberian Government held minority equity interest in both the Bong and the Nimba Mines. Around 1980, a pelletizing plant was added to the Bong operation to upgrade lower grade ores for export. All these iron ore handling and treatment facilities have been destroyed and would need to be rebuilt to support any future iron ore mining.

### *Industrial Minerals*

**Cement.**—Liberian Cement Corp. operated a cement plant with a capacity of 220,000 metric tons per year (t/yr). Post-war reconstruction efforts will substantially increase the internal demand for cement. The increasing cost of domestically produced cement has led the NTGL to allow imported cement into the market to increase competition (Liberia Analyst Corp., 2005§). Foreign investment was being sought to build additional cement production capacity in the country.

**Diamond.**—Diamond occurs in two principal areas in Liberia—in alluvial terrace gravels in the Gbapa area, which is located about 35 km south of Nimba and Yekeba on the northern border with Guinea, and within a large (approximately 60-km-wide and 120-km-long) area roughly between the Lofa River and the Mano and Morro Rivers along the western border with Sierra Leone. The latter area encompasses the Liberian counties of Gbarpolu, Grand Cape Mount, and Lofa. This region is part of the Mano Craton of West Africa, which is a northeasterly trending geologic structure that generally follows the same trend as the local watersheds, such as the Lofa and Mano Rivers. The Mano Craton contains the principal diamond-bearing rocks, generally of Jurassic Age (130 to 150 million years old), of Guinea, Liberia, and Sierra Leone. The kimberlites in the Weasua area, however, have been dated at 800 million years old.

All diamond production in Liberia comes from artisanal alluvial mining. Between 1960 and 1980, official production and export statistics of Liberia ranged from 300,000 to 900,000 carats per year. During much of this period, however, Liberia was a U.S. dollar currency zone, and it is suspected that the statistical data included diamond from neighboring countries that was taken across the border in search of the harder currency available in Liberia. Liberian production data for the 1980-90 period of 100,000 to 430,000 carats per year is probably more reflective of Liberian domestic artisanal mining productive capacity. Historical diamond export data are shown in table 2. In the few months of 2001 before the sanctions on diamond from Liberia were imposed by UNSC Resolution 1343 (2001), Liberia officially exported 3,781 carats of rough diamond. Since then, no diamond has been exported. UN sanctions and Kimberley Process restrictions have shut down the artisanal mining of diamond. However, under new legislation, once sanctions are lifted, the Government has mandated the formation of artisanal cooperatives similar to those that are in place in Sierra Leone.

According to the November 2004 UN Panel of Experts report on Liberia, a large Class B alluvial diamond mine that employed 150 workers and was owned by Jungle Waters was operating in the Gbapa-Nimba County area. Following a cave-in that cost

the lives of several diggers in November 2004, the mine was closed by the Ministry of Lands, Mines and Energy. The UN Panel of Experts also reported seeing evidence of 16 medium-scale alluvial mines chiefly between the Lofa Bridge and Wesua (United Nations, 2004d§).

The ban on new mining licenses and on diamond prospecting has limited the work of the two main international exploration companies in Liberia, Mano River Resources and Diamond Fields. Some exploration work, however, was allowed to continue under terms of the Mineral Development Agreements. Diamond Fields held a 100% interest in the Nimba concession and an option agreement with Ducor on Ducor's Gbapolu concession in Grand Cape County. In March 2005, Diamond Fields announced that recent loam and stream sediment sampling had identified five priority kimberlitic targets within the Grand Cape concession (Diamond Fields International Ltd., 2005a§).

Mano River Resources holds a 25-year Mineral Development Agreement for 200 km<sup>2</sup> on the Kpo Range area of the Bea Mountains in Grand Cape County. Under a joint-venture agreement with the Trans Hex Group of South Africa, the companies had discovered a number of kimberlites with a focus on the Mano Godua and Mabong and Yambessi Valleys sites. Mano River Resources reported that "Trans Hex can earn a 50% interest in the Kpo license by investing US\$2.1 million in a two-phase 3-year program. Thereafter, Mano River Resources can maintain its contributing interest at 50% or offer Trans Hex the opportunity to increase its equity to 69% by funding feasibility and construction" (Mano River Resources, Inc., 2005b§). As of January 2005, Mano River Resources had discovered five kimberlite pipes in the Weasua area of the Kpo license. Three of these pipes were confirmed by test work at Lakefield laboratory in Toronto as diamondiferous and two were estimated to have substantial surface areas of approximately 4 hectares. In addition, numerous high interest indicator mineral anomalies in the Weasua area remained unresolved, which indicated that additional pipes may remain to be discovered in the cluster (Mano River Resources, Inc., 2005b§). Mano River Resources assisted the Ministry of Lands, Mines and Energy by establishing a heavy-mineral sample preparation lab at the Liberian Geological Survey offices in Monrovia.

American Mining Associates (an American-owned company) also held an exploration license for diamond north of Lofa Bridge in Grand Cape County.

### *Mineral Fuels*

In 2003 (the last year for which data were available) Liberia did not produce or refine petroleum and was dependent upon imports for its petroleum requirements. Imports of petroleum products amounted to about \$25 million, or 17% of total imports (International Monetary Fund, 2004§, p. 26).

### *Infrastructure*

Liberia had more than 10,600 km of highways, of which 657 km was paved. Neglect, however, and damage during the civil war has left many roads difficult to travel on. Reconstruction

efforts have focused on the routes between the main cities and on those needed to repatriate refugees. Liberia has four main ports, at Buchanan, Greenville, Harper, and Monrovia. The Ports of Buchanan, Greenville, and Harper are used primarily for the logging trade, while Buchanan was traditionally used for rubber and iron ore exports. Water depth at the harbor at Buchanan limits the size of ships that can berth. Dredging would likely be needed to accommodate large world-class iron ore carriers should the Liberian iron ore industry be revitalized.

Liberia had a total of 490 km of rail that runs from Monrovia to the closed iron ore mine at Bong, and from the Port of Buchanan to Yekepa and the former Nimba iron ore mine. The Bong line (145 km, narrow gauge) had been restored, partially to accommodate the export of scrap iron from the old Bong iron ore plants. Plans to rebuild the Buchanan-Yekepa line (345 km, standard gauge) would be enhanced by the potential opening of iron ore mines in northern Liberia and at Mifergui in Guinea. The Buchanan line would be the natural and most likely the cheapest export route for the high-grade iron ore deposits at Mifergui. Consideration was also being given to building a new and considerably longer railway from Mifergui to Conakry that would stay entirely within Guinea. Lack of regional cooperation and long periods of political instability have made it difficult to optimize regional infrastructure projects (OT Africa Line, 2005§; U.S. Central Intelligence Agency, 2005§).

## Outlook

With the signing of the Peace Agreement in 2003 and with assistance from the UN and the international donor community, 2004 saw the beginning of the long process of rebuilding the Liberian economy, for which mining development is poised to play a large part. Rehabilitation of the iron ore sector and the potential for developing the country's diamond and gold resources hold the promise for the creation of employment and foreign exchange export earnings. The ability of Liberia to reestablish self-governance following the October 2005 elections and to create a stable and transparent investment climate will determine the rate at which the required direct foreign investment in mineral development will flow into the country.

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TABLE 1  
LIBERIA: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

Commodity		2000	2001	2002	2003	2004
Cement, hydraulic	metric tons	71,000	62,897	53,622	25,000 <sup>c</sup>	40,000 <sup>c</sup>
Diamond <sup>c</sup>	carats	170,000	170,000	80,000	40,000	10,000
Gold <sup>c</sup>	kilograms	25	57	42	20	20

<sup>c</sup>Estimated; estimated data are rounded to no more than three significant digits.

<sup>1</sup>Table includes data available through July 10, 2005.

TABLE 2  
LIBERIA: EXPORTS OF ROUGH DIAMOND FROM 1953 TO 2004

Year	Carats	Year	Carats	Year	Carats
1953	1,200	1970	812,000	1987	295,000
1954	19,300	1971	809,000	1988	167,000
1955	170,700	1972	764,000	1989	150,000
1956	718,100	1973	817,000	1990	NA
1957	NA	1974	634,000	1991	NA
1958	NA	1975	405,000	1992	NA
1959	1,114	1976	320,000	1993	NA
1960	942,100	1977	326,000	1994	NA
1961	1,081	1978	328,000	1995	NA
1962	904,700	1979	301,000	1996	NA
1963	747,400	1980	298,000	1997	NA
1964	680,000	1981	314,000	1998	8,047
1965	545,000	1982	403,000	1999	7,482
1966	555,000	1983	323,000	2000	18,300
1967	543,000	1984	240,000	2001	3,781
1968	750,000	1984	240,000	2002	--
1968	750,000	1985	138,000	2003	--
1969	760,000	1986	252,000	2004	--

NA Not available. -- Zero.

Source: Liberia Ministry of Lands, Mines & Energy, 2004

TABLE 3  
LIBERIA: ESTIMATED RESERVES OF IRON ORE IN 2004<sup>1</sup>

Deposit	Location	Duration of prior mining	Company	Type of ore	Reserves (million metric tons)	Ore grade (% Fe)
Mt. Nimba <sup>2</sup>	Yekepa, about 340 kilometers east-northeast of Monrovia	1963-1983	Liberian American-Swedish Minerals Co., Joint Venture Operating Co. (LAMCO)	Hematitic itabirite	417	65-69
Do.	do.	Jan-Mar 1990	Iron Mining Co. of Liberia (LIMINCO)	do.	417	65-69
Mt. Nimba Western Area <sup>3</sup>	do.	1963-1983	Liberian American-Swedish Minerals Co., Joint Venture Operating Co. (LAMCO)	Magnetitic itabirite	NA	52
Do.	do.	Jan-Mar 1990	Iron Mining Co. of Liberia (LIMINCO)	do.	NA	52
Bomi Hills	80 kilometers northwest of Monrovia	1951-1977	Liberian Mining Co. Ltd.	Magnetite	45	68
Mano River	Mano River Hills, near Sierra Leone border	1958-1983	National Iron Ore Co. Ltd.	Limonitic	136	51
Bong Mine	80 kilometers northeast of Monrovia	1965-1990	Bong Mining Co.	Magnetite	290	35-45
Putu Range	Grand Gedeh County, 270 kilometers east-southeast of Monrovia	Undeveloped	do.	Itabirite	455	45
Bea Mountain	Grand Cape Mount County	Undeveloped	Liberian Mining Co. Ltd.	Magnetite, hematite, and goethite	382	35-45
Wologizi Range	Lofa County	Undeveloped	Liberian Iron Ore and Steel Co. Exploration	Hematite	1,000	35-40
Goe Fantro	60 kilometers northeast of Monrovia	Undeveloped	Liberian American-Swedish Minerals Co., Joint Venture Operating Co. (LAMCO)/Iron Mining Co. of Liberia (LIMINCO)	do.	NA	35-40

NA Not available.

<sup>1</sup>Source: Liberian Ministry of Land, Mines & Energy, Liberia: Resource Potential and Investment Opportunities. Presentation to INDABA-Africa Mining Investment Conference, Cape Town, South Africa, February 2005.

<sup>2</sup>Includes Gbahrn Ridge, Mt. Nimba, and Mt. Tokadeh. Much of the high grade ore was mined out by Liberian American-Swedish Minerals Co.

<sup>3</sup>Includes Mount Bele, Mount Kitoma, and Yulleton deposits