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Office for the Caribbean

PRELIMINARY DRAFT INVENTORY OF MINERALS IN CDCC COUNTRIES

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LIST OF EXPLANATORY NOTES TO SYMBOLS AND ABBREVIATIONS

oz	-	ounce
cu.yd	-	cubic yard
dwt	-	pennyweight
ft.	-	foot/ft.
tons	-	long tons (2,340 lbs)
lb(s)	-	pounds (avoirdupois)
MT	-	metric ton
m	-	metre
km	-	kilometre
LDT	-	long dry ton
m	-	million (10^6)
...	-	not available
-	-	negligible or non-existent
g	-	gramme
e	-	estimate
p	-	preliminary
neg	-	negligible
E	-	ECLA estimate
mfrs	-	manufactures
SITC (R)	-	Standard International Trade Classification (Revised)
UNDP	-	United Nations Development Programme
CDCC	-	Caribbean Development and Co-operation Committee
IBA	-	International Bauxite Association
ALCOA	-	Aluminium Company of America

JAMALCAN	-	Jamaica Alcan Aluminium Ltd.
ALPART	-	Alumina Partners of Jamaica Ltd.
SURALCO	-	Suriname Aluminium Company
JAMALCO	-	Jamaica Aluminium Company
DEMBA	-	Demerara Bauxite Company
BIDCO	-	The Bauxite Industry Development Company Ltd.
GUYBAU	-	Guyana Bauxite Company Ltd.
BERMINE	-	The Berbice Mining Enterprise Ltd.
COMECON	-	Council for Mutual Economic Assistance

INTRODUCTION

The countries constituting the Caribbean Development and Cooperation Committee (CDCC) are still basically producers of primary goods (agricultural and mineral commodities). While land is still relatively abundant in the area as a whole, the volume of mineral resources (so far as is known) is relatively scarce, with a few exceptions, notably crude petroleum (severely limited presently to four countries), bauxite (more widely distributed) and a few less important minerals including the construction minerals. Economic development efforts would of necessity have to focus largely on utilizing indigenous resources to best advantage. It is in this context that the First Session of the CDCC stressed the importance of a "better knowledge of indigenous raw materials, with a view to their industrial utilization".[1/]

The purpose of this document is essentially in partial fulfilment of a specific directive that emphasis of the Work Programme in Natural Resources should be on mining.[2/] A necessary first step in the task assigned the Secretariat is to comprehend the nature and quantum of these resources, their location, possibilities of further discoveries etc. Considerably more detailed data, including information on existing and planned initiatives of governments and organizations are of course required in order to complete even this preliminary stage.

Unfortunately, work in this area cannot proceed as rapidly as desired since resources available to the Secretariat for this sub-project are limited. The Secretariat has been assembling data and establishing contacts in countries and among national and international agencies. Data utilized in preparing this Draft Report have been collected over a period of more than two years from the documentation resources of the CDCC library, from resources of other libraries and from data provided to Secretariat staff during field

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1/ Report of the Caribbean Development and Cooperation Committee, Havana, Cuba, 31 October - 4 November, 1975 (E/CEPAL/1010.

2/ Report of the Second Session of the Caribbean Development and Cooperation Committee, Santo Domingo, Dominican Republic, 16-22 March, 1977.

visits (missions). Questionnaires have been left with appropriate government departments in several countries but responses to these have been very limited. The gaps in the data will be easily observed by officials and others familiar with the subject in the various countries.

The main part of the document is an "Inventory" which consists of a number of tables showing a range of mineral resources[3/] data by country including occurrences, location, estimated reserves, etc. It will be observed that this kind of data relating to most minerals are lacking for many CDCC countries.

Data on production, extraction, quarrying, etc. of crude minerals are also shown in the Annex. An obvious deficiency of these tables is the fact that the data are not current, most relating to 1975 and earlier - as early as 1968 in two cases. It will be observed too that data are not available for some countries and that one or only a few country names appear under some minerals. Value of import and export data for certain broad categories of minerals are given for some countries. It was not possible to secure these data at a more meaningful level of detail.

An Annex titled Background Notes constitutes the minor section of the paper. The largest part of this Annex deals with bauxite, copper and ferronickel. Aside from the construction minerals (earth and stone) and salt, most of the other minerals appear to be limited to one country so far as available data indicate. It is hoped to expand the Annex in the final version of the paper.

The above discussion made clear that a considerable amount of data were not available. Requests for additional data to fill the gaps are being sent out and it is hoped to revise the report in the light of comments and observations and the availability of more data during the early part of the fourth quarter of 1980.

3/ Hydrocarbon resources are excluded. These were covered in document E/CEPAL/CDCC/65 dated 28 May 1980.

THE INVENTORY TABLES

COUNTRY: ANTIGUA

TABLE I

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
LIMESTONE	North-east of line joining Wetherell Point and Willoughby Bay. Bounded in the south by a broken scarpment	...	...	...	Most of limestone produced is used locally
CLAY	Underlying limestone region	Bellevue St. Claire	...	...	Used in pottery industry. Production data in Table VII of Annex
OTHER MINERALS	...	...	...	...	No data is available to date on other mineral activities in Antigua

Source: No. 18 of List of References

TABLE II

COUNTRY: BAHAMAS

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
ARAGONITE	Found in association with coralline limestone, of which the islands comprise mainly	Sandy Cay, some 50 miles off the Florida Coast	...	...	During 1970, an agreement for the exploitation of this deposit was made between the Government and a commercial interest, to cover a period of 20 years. Production data given in Table VII
SOLAR SALT	...	Inagua	...	...	Produced by Morton Bahamas Ltd., in Inagua, one of the world's largest solar salt complexes
SAND + GRAVEL	...	...	...	...	Production data given in Table VII of Annex
OTHER MINERALS	...	...	...	...	Data on the presence and economic feasibility of other minerals are unavailable

Source: No. 18 of List of References

COUNTRY: BARBADOS

TABLE III

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
LIMESTONE	Eighty percent of surface area comprises coral limestone, through which water percolates easily to extensive underlying clay beds	St. Andrew District	...	...	Limestone is used for a variety of purposes ranging from coral building blocks to agricultural lime. Surplus is exported (see Table VI of Annex)
SANDSTONE, CLAYS AND MARLS	Found in a north-east extension of the surface limestone, and also in the underlying areas	St. Andrew District	...	...	Used mainly in the pottery industry. Some is exported (see Table VI of Annex)
METALLIC MINERALS	...	...	...	...	Data on presence and economic potential of these minerals are not available

Source: No. 18 of List of References

TABLE IV

COUNTRY: BELIZE

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
TIN	Traces of widespread occurrence found as cassiterite, associated with granite	Mountain Pine Ridge: Prevassion Creek and Little Vaqueros Creek	4 1/2 oz/ton to 6 oz/ton gravel (1 ton = 3/4 cu.yd)	...	London Tin Corporation carried out explorations in 1952. No success.
GOLD	Sporadic alluvial occurrences	Eastern Branch (Macal) of Belize River and several small creeks draining southern parts of Maya Mountains.			
		Only deposits of economic interest found in tributaries of Ceibo Grande River	2 dwts/cu yd to 7 dwts/cu yd gravel	...	
GYPSUM	Thin beds	Near Cays along Belize and Mopan Rivers	-		
		Scattered crystals among coastal clays and sands. No deposits of commercial value.		...	
DOLOMITE	Abundant	Principal deposits: Punta Gorda	Est. 300 - 400 ft		Both areas quarried for road metal
		St. Margaret Creek	200 ft	400 - 500 ft	
BARYTES	Abundant, associated with zone of quartz containing 21.74% to 21.78% Magnesia	First Creek. Best deposits in 2 veins 5 ft and 10 ft thick	-	Extending for distance 800 ft. - 1,000 ft. Depth unknown.	Prospecting carried out in 1951, 1954 and 1955.

TABLE IV (continued)

COUNTRY: BELIZE

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
LIMESTONE	Abundant. Very pure and almost completed soluble in dilute hydro-chloric acid. Usually contain little or no magnesia	Over 60% of country underlain by limestone	Inestimable		Quarrying being done at Rockville and near Stann Creek. Crushed aggregate used in road building.
CLAY	Abundant	Coastal pine ridge areas	No estimate made	...	Few tests carried out.
CORAL	"Pipeshank" - fragments of coral with greyish mud	Shallow water close to cays.	No estimate made	...	Tests made since 1940. Used extensively for reclaiming mangrove swamp around Belize City. In crude state, possesses no hardening properties and valueless as building material unless treated with lime and dried. Treated pipeshank mixed with Portland cement gives product suitable for building purposes.
BUILDING MATERIALS (SANDSTONE, SLATE)	Flagstone: sandstone	Toledo Series, Macal Series (Maya Mountains)	No estimate made	...	
	slate	Maya Series (Soldier Creek and Silver Creek)	No estimate made	...	
	abundant and readily available				

TABLE IV (continued)

COUNTRY: BELIZE

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
SILICA	Abundant	(1) 5-mile quartz reef forming crest of quartz ridge at Source of Rio Grande (2) Alluvial quartzite sands in vicinity of Stann Creek and Punta Gorda	No estimate made of quality or quantity	...	

Source: See No. 1 of List of References.

COUNTRY: CUBA

TABLE V

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POSSIBLE	
IRON ORE	Found in combination with nickel	Sierra de Nipe	3.5×10^9 MT (total) (1965)		Reserves are immense, but problems of extraction and purification due to contamination of nickel, cobalt, alumina and chrome.
CHROMIUM	...	Moa-Baracoa area	2.0×10^5 tons (total)		Ore deposits vary in size from small knots to bodies containing extensive deposits of the ore. This ore contains iron and oxygen.
MANGANESE	...	Mines exist in area south of Bayamo in the Charco Redondo area	...		Problems with manganese mining stem from the low-grade nature of the ore, its location in small pockets, high transportation costs and a shortage of concentration facilities.
COPPER	...	Pinar del Río Province (Matahambre mines)	...		
NICKEL	...	Oriente Province	19×10^6 tons (1972)		Deposits have an assay of 1.5%-1.7%, and are also an important source of iron, chromium, cobalt and manganese. Reserves of nickel are among the largest in the world. Extraction of metal is an expensive and involved operation, due to contamination with other metals.

TABLE V (Cont'd)

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POSSIBLE	
COBALT	...	Moa Bay	...	...	This metal is recovered as the sulphide during the extraction of nickel
OTHER METALS	...	...	...	...	Zinc, silver, gold have been produced on a very small scale, in association with the mining of other metals. Tungsten and Antimony are known to exist, but deposits appear too small to provide a basis for production on a significant scale.
LIMESTONES	A range of low-grade to high-grade marble	Isle of Pines Oriente Province to a small extent	Inexhaustable		Cuba's limestones are of good quality, with an inexhaustable supply of clays with the exception of high-grade refractory types of bauxite The combination of clays and limestones has made Cuba virtually self-sufficient in basic building materials
OTHER NON-METALS	...	...	...	...	Gypsum deposits are found in Matanza, Camagüey and Oriente Province Coral sand rich in calcium carbonate is abundant along the coast Sulphur, Barite and magnesite are also known to exist.

Source: No.18 in List of References

TABLE VI

COUNTRY: DOMINICA

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
PUMICE	Found in layers up to 200 ft. in depth and well distributed particles from fine dust to boulders. Of volcanic origin of a cellular glassy structure	Rockaway, Canefield, both in the parish of St. Paul	...	...	Has a number of commercial uses including its incorporation in concrete structures where its lightweight and thermal insulation properties are most valuable; As a finely ground pozzolanic additive for use in hydraulic cement; as soil-conditioner. Pioneer status was granted to the Dominica Mining Co. Ltd., in 1964 in relation to the mining and processing of pumice and pumiceous material. Production data given in Table VII of Annex.
SAND AND GRAVEL	...	...	...	...	Production data given in Table VII of Annex. Other data unavailable
OTHER MINERALS	...	...	...	...	Volcanic nature of island would suggest some metallic mineral occurrence. However data with respect to this is unavailable

Source: No. 18 of List of References

TABLE VII

COUNTRY: DOMINICAN REPUBLIC

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
MANGANESE	Positive indications in several areas	North-East of Padre Las Casas, and South-East of Hato Mayor	...	...	Contains 48% manganese and 1.1% silica. There exists an area on the Nagua zone, 10km long and 50m wide where the manganese deposits are found occuring with magnetite, ilmenite, epidite, zircon and topaz. At the mouth of the Río Yagru del norte is found 100km^2 of this ore.
MOLYBDENUM	Positive indication	Zone of Ma rigal	Quartz deposit	1m thick	Extent, reserves and quality are not known. Contains calcite deposits.
COPPER	Rock formation here is exclusively from the Duarte formation, which is heavily faulted	Mata Grande	...	...	i) Zones from 5 - 8m. thick of copper oxides, with a copper content of 0.5%. Better veins contain as much as 1 to 3% copper. Drillings to evaluate the potential of the region have not been effected.
	Associated with the faults of the Loma Búcaro	San Francisco	...	...	ii) Copper deposits in this region were exploited on a small scale at the beginning of the century. Reserves and assay of copper are not known.
	Rocks are from the Upper Cretaceous period corresponding to the Tireo Formation and the mineral appears to be in contact with the different intrusive bodies of the Cordilleras.	Cordilliera Central	...	...	iii) This area, under concession to a foreign company, covers the: Mata Grande area, Carmen, Pinar Bonito The deposits are associated with veins of quartz, chalcopyrite and pyrites. However studies already done, cannot define the metallic bodies or reserves. In this district copper deposits of an assay of 2.8 and 12% copper have been located.
	Positive indication from the volcanic rocks of the Tireo formation associated with small intrusives, perforated with quartz	Las Cañitas	...	...	iv) 23 inidcations of copper have been found here in the Tres Piezas, Larkesita and Las Ayunias zones. The minerology is chalcopyrite, gold malacite, azunite.

TABLE VII (Cont'd)

COUNTRY: DOMINICAN REPUBLIC

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
COPPER (cont'd)					At the request of the Government, geophysical and geochemical studies are being carried out here in order to make an initial evaluation of the mineralization of the area.
NICKEL	Associated with ultrabasic rocks of the Middle to Upper Cretaceous Period. Occurs also in high zones where moderately faulted.	Pueblo Viejo	67 x 10^6 tons (short (1975)	25x10^6 tons (short) (1975)	Assay of 1% to 2% Nickel containing 16% to 20% Fe_2O_3, (Co, Cr, to a lesser extent)... Reserves are expected to increase with additional exploration activities.
			25 x 10^6MT (1976)	21.1x10^6MT	i) Being explored by a local company. The upper oxidized level of this deposit, was joined by the volcanic sedimentation of the Los Ranchos Formation.
					Oxide here contains silver (25.1g/MT) and Gold (4.06%) and sulphur.
		Cacaos	(25.3x10^6MT) (oxides) 10.6 x 10^6MT (sulphides)		With more exhaustive exploration zones of greater richness can be found.
	South East of Hatillo	Loma La Mina	Est. (6.0 x 10^6)MT		Ten borings done here, but still insufficient. More need to be done.
			(104 x 10^3 MT) sulphides		Given the geology, it may be possible to find more reserves below Hatillo faults. Investment needed to verify composition.
ALLUVIAL GOLD		Bulla Miches	...	...	Possibility here limited. Explored on a small scale for quite some time. Found dispersed in an intensive area north of the Cordillera Oriental and in Lake Redona. This could be source of the deposits of Upper Cretaceous Period.

TABLE VII (Cont'd)

COUNTRY: DOMINICAN REPUBLIC

MINERAL RESOURCES DATA (continued)

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
IRON	Associated with diorites	North and South of Hatillo	10×10^6 MT (probable) 43×10^6 (possible)		Found as magnetite veins (90%) haematite (10%) 700×10^3 MT extracted to date (1978) Reserves appear to be small.

Source: See No. 8 on List of References

COUNTRY: GRENADA

TABLE VIII

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
SAND AND GRAVEL	...	...	...	...	Production data given in Table VII of Annex indicates its existence
LIMESTONE	Occurs in few outcrops, with changes in both land and sea levels	...	...	...	Most of this material is used locally. Production figures given in Table VII of Annex
OTHER MINERALS	Most of island is of comparatively recent volcanic origin, overlaying sedimentary shales of an earlier geological period	...	...	...	Outcrops of shale appear at numerous points on the island, the largest being at Lavera. The volcanic nature of the island would suggest the presence of other materials whose data are not known or unavailable

Source: No. 18 of List of References

TABLE IX

COUNTRY: GUYANA

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	PROVEN RESOURCES	REMARKS
GOLD	Mainly alluvial and eluvial deposits	Widespread, concentrating in the following areas: Potaro, Mazaruni and North West. Few occurrences are known in the south.	...	High density of gold. Present development of deep-seated deposits. Investigations at Honey Camp (Kaburi-Issano-Karanang Division) showed the presence of gold in significant amounts. Further work to be carried out at surface and depth to ascertain grades more reliably and to determine the most suitable mining methods.
DIAMONDS	Spatially associated with the Pakaraima Mountain block of flat-lying sandstones and conglomerates in west of country.	Concentrated in Potaro, Middle Mazuruni, Cuyuni and Rupununi areas	...	Work being done on diamond and gold reserves by a Foreign Company in the Mazaruni Basin during 1975.
MANGANESE	Main occurrences are in an East-West belt, 10 miles wide and 40 - 50 miles long in the North-West district.	North West District	318×10^3 tons (Matthew Ridge) 825×10^3 tons (Piapiani)	First noted in 1903, production started in 1959. Mining discontinued in 1967/68. Reserves at Matthew Ridge have assay of 37% Mn, while those in Piapiani area have 42.5% Mn content. The rocks are deeply weathered, and the manganese ore comprises various oxides and silicates including SiO_2 and Al_2O_3.
MOLYBDENUM	Limited deposits of molybdentite in Potaro district	(a) Eagle Mountain	25 - 40 million tons at 0.1% Mo plus, to depth of 600 ft.	Does not warrant expense of further drilling. Gold is associated with molybdenite and abortive attempts at hardrock gold mining are widespread in this area.
		(b) Dickman's Hill	-	No significant mineralization.

TABLE IX (Cont'd)

COUNTRY: GUYANA

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
LATERITE (FERRUGINOUS, ALUMINOUS)	Iron ore potential. Found in mountains where they extend over several hundred square miles.	Concentrated in the region of the West Pakaraima Mountains, and in association with bauxite deposits.	...	several million tons material (hypothetical)	Processing depends on availability of cheap energy. Some laterite is quarried and used in bauxite processing, and apart from its use as a road metal, no other use is made of it. Laterites have the potential of producing both iron and aluminium, but adequate technology on an economically viable scale is as yet lacking.
COPPER	Disseminated chalcopyrite, and small amounts of native copper in gold workings, associated with high grade metamorphic rock.	Greote Creek - Aremu - Peter's Mine Division and Haimaralli areas, in northern half of country.	...	18×10^6 tons	Isolated samples have assayed up to 20% copper, while reserves have an assay of 0.26% Cu, and a greater amount of lower grade material.
CHROMITE	Disseminated mineralization	Coral Stone Creek	...	...	Low and sub-economic grade
KYANITE	Limited deposits	Near Upper Supenaam River	0.40 tons/cu yd to 0.41 tons/cu yd	...	Economically interesting amounts
KAOLIN	Extensive deposits associated with bauxite belt.	In the Linden-Ituni area, the bauxite overlies the kaolin.	7 million tons	300 million tons	Work carried out in the Ituni area at two locations between 1972 and 1973. Guyana has plans for exploiting a small but high quality 3×10^6 tons kaolin deposit at Ituni. Plans are underway for setting up a 140,000 ton/annum kaolin processing plant. Analysis of raw material compare favourably with English China Clay and Georgia Kaolin.

TABLE IX (Cont'd)

COUNTRY: GUYANA

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
AGATE	Consisting mainly of banded and "fire" varieties	Rupununi - Best values obtained at Bonne Milee near Sunnyside on the Ireng River, 31 miles north of Lethem	0.85 lb/ton Should yield about 373,000 lbs.	...	
GRAPHITE	Limited	Popekai on the Cuyuni River, about 52 miles north-west of Bartica	...	...	Unlikely that occurrence is of economic value.
SAND	Abundant	Over 5,000 sq miles, north-east section of country, covered by deposits of brown and white sand, 200 ft. thick	Inestimable	...	The white sand is suitable for glass manufacture. Preliminary examinations and clearing of a site for the construction of a glass factory is underway.
BUILDING STONE	Bedrock consists partly of granite and to some extent gabbro	Concentrated around Bartica within 25 miles of the Essequibo and Mazaruni Rivers	125 million tons	...	
TUNGSTEN	Metal occurs in scheelite	Two areas in the country	...	...	Associated with gold mineralization in both cases. Random samples assayed high grades of the metal, however occurrences appear too small to be commercially exploitable.
RADIOACTIVE MINERALS	Haphazard distribution of Monazite Minor Euxenite	South Rupununi Savannahs Kanuku Mountains	...	...	Other uranium-bearing radioactive minerals have been reported in the Bartica Assemblage type rocks. The most promising area appears to be in the Roraima Formation.

TABLE IX (Cont'd)

COUNTRY: GUYANA

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
IRON	Iron-oxide rich rocks of magmatic and possibly sedimentary origin	Northern and Southern Guyana	...	...	The main drawbacks for using this material are the high titanium and phosphorous content. The magnetite - Haematite concentrations of the southern occurrences are of high grade Fe, but deposits are too small and non-persistent at depth.
NICKEL	Lateritic clay overlain by laterite and underlain by ultra-basic rock.	Blue mountains in the North-West district	...	$10\text{-}20 \times 10^6$ tons	Carries approx 1% Nickel.
COLUMBITE - TANTALITE	Derived from complex pegmatite dykes, now almost completely eroded	Mazaruni area	...	...	Alluvial mining of columbite commenced in 1952 and stopped in 1957. Revival of this industry has not been considered.
QUARTZ	Large clear alluvial crystals have been reported in diamond workings	Highest frequency of occurrences, associated with the Pakaraima Mountains block and immediately east of the escarpment.	...	...	Analytical work needs to be done on samples. These crystals are intended for use in optical glass, electronic and other industries.
TALC	Talc and soapstone resources	North-west District	...	6×10^5 MT	The grade appears to be good, the main impurity being magnesite with some antigonite and chlorite.

TABLE IX (Cont'd)

COUNTRY: GUYANA

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
MAGNESITE	Occurs in association with ultra basic rocks. Believed to be a secondary residual product from weathering of the ultrabasics	South Rupununi Savannah	...	...	Resources are too small to consider economic exploitation.
BAUXITE	Deposits found in a north-west south-east belt, 80-40 miles wide and some 180 to 220 miles long	Linden Ituni Kwakwani		Several billion tons (hypothetical)	Laterites are also widely distributed in Guyana. Both aluminous and iron-rich types exist. Some laterite is quarried. Other laterites are found extensively occurring in the west of the country in the Pakaraima Mountains, where they extend for several hundred square miles.

Source: Nos. 1 and 3 of List of References

COUNTRY: HAITI

TABLE X

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
SILVER	...	...	...	...	Some silver ore found. Assay of ore suggests that it is uneconomic
COPPER	...	"Meme" close to Gonaive	...	...	Ore found in this region contains 28 - 30% copper. 200 km of this area was under exploitation until 1972. Other copper deposits found but of uneconomic copper content
BAUXITE	Geology of area comparable with that of deposits found in Jamaica and Dominican Republic	...		5×10^6 MT (1975)	Since 1974 field investigations have been carried out to assess the the bauxite potential. The ore is exported without further conversion to alumina
OTHER MINERALS	...	...	...	...	It is known that Haiti possesses considerable mineral resources, largely undeveloped. Type and quantity data are not known

Source: No.8, 18 of List of References.

TABLE XI

COUNTRY: JAMAICA

MINERAL RESOURCES DATA

MINERAL	OCCURRENCE	RESERVES	REMARKS
A. Economic Resources			
1. Metallic Ores - Bauxite	Red bauxite: mainly in St. Ann and Manchester plateaux and St. Catherine. Yellow bauxite: mainly in St. Elizabeth, North Manchester and Clarendon	Measured 10m LDT Total reserves 2 billion LDT	Six active mining areas exist, and four operating, and one inactive alumina plant.
2. Industrial Minerals i) Sand and Gravel	Major river valleys in central and eastern Jamaica	Limited	Industrial well developed for local use. Shortages of natural sand exist in western Jamaica.
ii) Limestone a) Special Varieties Industrial Lime	Widely distributed in White Limestone areas.	Unlimited	Mainly used in the alumina industry to remove phosphorous. Major potential exists for manufacture of plasters for export and local needs, also for manufacture of metallurgical lime. Possibility for use in manufacture of soda ash, which is used in the production of glass and alumina. Used in terrazzo tile manufacturing.
Whiting	Brown's Town, St. Ann; Lethe, St. James. Good possibility on fringes of bauxite deposits in St. Thomas.	Unlimited Indicated 10×10^6 tons in Brown's Town	Potential in paint, toothpaste and fillers. Pre-investment feasibility study to be started shortly for Brown's Town deposits.
b. Common Varieties - Aggregate	Widely distributed in limestone areas	Unlimited	Industry well developed, supplying material for construction industry. However, specifications and reliability of grades, particularly for high strength aggregate, need to be stressed more.

TABLE XI (Cont'd)

COUNTRY: JAMAICA

MINERAL RESOURCES DATA

	OCCURRENCE	RESERVES	REMARKS
- Grit and Rock Flour		Adequate	Further use needs to be made of this by-product. Bauxite companies, particularly Alpart, have unused stockpile because questions of tax concessions etc. arise. Study of cement - lime block warranted.
- Cement Manufacturing	Limestone and shale areas of eastern and western Jamaica	Adequate	Purity of limestone sometimes makes selection of limestone for cement manufacturing problematic.
- Building Stone	Limestone areas	Unlimited	Costs of cutting and laying stone presently restrict use.
iii) Marble	Serge Island to Hibernia, St. Thomas	Adequate	Industry has operated on too-small scale. However, with 25 years' local experience in the production of cultured marble and terrazo tiles and related products, Potential exists for a large-scale multi-product marble industry for local use and export and also supporting a labour-intensive craft industry.
iv) Gypsum	Bull Bay area, St. Andrew and St. Thomas	Measured 2.7×10^6 tons. Indicated and inferred 18×10^6 tons (70% gypsum)	Present mining practices need to be drastically revised to stop high grading which has seriously depleted reserves. It is proposed that different grades of gypsum should be produced for different uses by blending from different stockpiles. Local use of gypsum and plaster minimal, but potential exists for developing plaster and related local market.

TABLE XI (Cont'd)

COUNTRY: JAMAICA

MINERAL RESOURCES DATA

MINERAL	OCCURRENCE	RESERVES	REMARKS
v) Silica Sand	Black River area, St. Elizabeth	Inferred reserves 1 x 10^6 tons	Present consumption is 9,500 tons per annum for use in the glass-container industry. Upgrading of production by removal of iron materials warranted. Similarly, the use of the fines etc. is necessary.
3. Precious and Semi-precious Stones	Rio Nuevo and neighbouring areas, St. Mary	Adequate	Basis of present semi-precious jewellery industry, e.g. Blue Mountain Gems in Montego Bay, and Gem Cutters Ltd in St. Ann's Bay. There is an excellent export market associated with overseas tourists. This industry needs encouragement because it is labour-intensive, but quality of products must be guaranteed.
B. Possible Resources			
1. Industrial Minerals i) Clays	Frenchman's and elsewhere: Jobs Hill, St. Mary	200 x 10^6 tons	Potential exists for structural ceramics, wall tiles and expanded craft ceramics industry. Hard dickite suitable for polishing for crafts.
ii) Dolomitic Limestone	Port Henderson Hills	At least 150 x 10^6 tons	Further study of this deposit necessary to determine its true usefulness.
3. Fertiliser Minerals i) BAT Phosphates	Limestone caves	80,000 tons	Evaluation of grade and quality of reserves indicate little potential
ii) Guano	Pedro and Morant Cays	30,000 tons	

TABLE XI (Cont'd)

COUNTRY: JAMAICA

MINERAL RESOURCES DATA

MINERAL	OCCURRENCE	RESERVES	REMARKS
C. Speculative Resources			
1. Metallic Ores			
i) Copper	Bellas Gate area, Clarendon etc.	Showings only	Fair prospect, study underway.
ii) Black Sands	Alligator Pond area, St. Elizabeth		On-shore reserves too small for extractive metal industry. Offshore exploration should be examined in the future.
iii) Other Iron Ores	Glade Orchard, Mavis Bank, Blue Mountain area	Inferred 1-3 tons	Further exploration needed; there is also the question of accessibility.
iv) Lead-Zinc	Hope Mine, St. Andrew	124,800 tons indicated	Exploration needed
v) Nickel	Ness Castle, St. Thomas	Showings only	Poor Prospect
vi) Manganese	Marshalls Hall, Portland	Showings only	Exploration needed

Source: Nos. 1 and 2 of List of References.

TABLE X.

COUNTRY: SURINAME

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
GOLD	Associated with the contacts of the Paramaka, Rosebel and Armina rocks	Sara Creek Goldfields	...	...	Gold mining started on a small scale in 1875. Production averaged 30,000 ounces yearly; but has declined in recent years.
PEGMATITE MINERALS					
i) Beryl	Found in a few pegmatites in zonal and non-zonal veins	At Rama on the Suriname River and on Lower Marowyne River	...	...	During 1953-55 about 9 tons were produced from 3000 m^3 of weathered pegmatite.
ii) Amblygonite	Found in a few pegmatites in zonal veins	Jorka Creek	...	...	During 1961-62 about 1700 tons of amblygonite were mined by a foreign company. Presently, mineral rights are owned by a foreign enterprise.
iii) Tantalite	Occurs in zonal pegmatites in association with other minerals.	Near Jorka Creek	...	...	This mineral has also been found in alluvial material, near Patamaka -Tempati area, and in the De Goeje Mountains in South-eastern Suriname.
IRON ORE					
i) Itabirite	Found as enclaves of meta-sediments. These enclaves are surrounded by granite.	Near Tapajé Creek, west of the Paloemeu River	approx. 15-20 x 10^6 tons	...	Iron content of this ore varies between 65-70%. The impurities are very low.
ii) Laterite - Iron Ore	Orignated as a weathering product upon and out of ferruginous rocks of the Paramaka mountains and Old Basic Intrusives	North-east area of Suriname North-western area of Suriname	i) 2 x 10^9 tons ii) 5 x 10^9 tons		Average laterite has a low iron content of 30-35%. Locally this figure is about 50-55%. Because of low iron content and the presence of impurities detrimental to the metallurgical treatment, the development of this resource may probably remain uneconomic for some time.

TABLE X... (Cont'd)

COUNTRY: SURINAME

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
COPPER	Occur fairly regular in the Old Basic Intrusive and in the Basic Paramaka	Upper Saramacca River Benzdorp on Lawa River	...	...	Occasionally green oxydic Copper minerals are found at surface of Saramacca River. While metallic copper occurs alluvially on the Lawa River.
RADIOACTIVE MINERALS	Occur in pegmatites of the northern pegmatite belt.	i) Saramacca River near Kwakoegron	...	...	Radioactive monazite and uraniferous opal found here.
		ii) Jai Creek			At this location, huttonite and cheralite in sand samples were recorded.
		iii) Paloemeui River and in the Makroetoe Creek			Certain granite outcrops may be radioactive
		iv) Kabalebo River (Upper)			Phosphuranylite, is a type of Uranium/Thorium bearing monazite in heavy mineral concentrate of water-well samples.
ASBESTOS	Sporadically in the former Afobaka amphibolite quarry	Marowyne River area	...	...	i) Vague find of good grade asbestos.
		Rama River			ii) Erratic blocks of actindite rock near Rama.
TALC	Old Basic Intrusives	West of the Saramacca River	...	...	
		Picqué Hill east of the Sara Creek	...	...	
CRUSHED STONE GRAVEL, SAND AND CLAY	Part of the Basal Complex	Phedra on the Suriname River	...	...	
i) Crushed Stone	Conglomerates and the saussurite gabbro, of the Boschland	Tandee Creek west of the Afobaka	...	...	
ii) Gravel	Occur in lenses within the Upper Coesewijne Sands	Lower Suriname River	...	...	Extraction still being carried out rather primitively.

TABLE XI (Cont'd)

COUNTRY: SURINAME

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
IRON ORE (cont'd)					
iii) Titanium Iron Ore	Occurrence in areas built up by the high metamorphic Adampada - Falawatra rocks	i) Upper Tibiti and Upper Saramacca Rivers. ii) Adampada Creek and Kabalebo River.	...	...	High titanium creates a metallurgical problem, for further development of this resource.
MANGANESE	Associated with meta-sediments of the Paramaka Formation	Maripa Hill deposit, North-east of the former settlement of Dam on the Sara Creek	1×10^6 tons^E		Manganese content - 20 - 30% Mn., though some richer parts occur. The economic significance is decreased by the small reserves and low grade of material (high SiO_2 and/or Fe).
		ii) Eastern shore of the Van Bloomstein Lake	...	...	
DIAMONDS	Occur in alluvial material derived from the Rosebel conglomerate. Quartzitic Rock from the Upper Coppename River area	Near Table Mountain. Upper Coppename River Rosabel - Sabanpasi area	...	...	Since 1880 diamond finds have been reported. These are of gem quality.
CHROMITE	Found as an enclave of ultra-basic schists.	East of Emma Ridge Lawa River	...	...	Assay of 42-52% Cr_2O_3 with 18% Fe. In the River area, chromite-rich black sand from gold dredging near Benzdorp.
CINNABER	Occuring in smaller pieces of weathering clay, probably associated with a small basic plug.	West of Bonidoro on the Marojirne River at the contact of the Paramaka and Rosebel rocks.	...	...	
PLATINUM	Alluvial deposits and associated with basic to ultra basic igneous rock types.	Southern Slopes of the De Goeje Mountains	...	...	Found occuring with gold.
NICKEL/COBALT	Traces in ferruginous laterites. Often the ultra-basic rocks of the Old Basic Intrussions have a slight nickel content	Majorodam Mountains, Dramhoso on the Upper Saramacca River. Also asbolan at Brokopondo.	...	...	Nickel and Cobalt content small.

TABLE XII (Cont'd)

COUNTRY: SURINAME

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
iii) Sands	Found in Upper Coesewijne Series	Near Lelydorp	...	...	
		Lower Suriname River, between Casipora Creek and Berg en Dal Demerara Series	...	...	
iv) Sedimentary Clays	On the Demerara and Coropina Series, with Kaolin deposits belonging to the Onverdacht and Coesewyne Series	Near Paramaribo	...	...	i) Clays here are used for ceramic purposes.
		Moengo and Paranam-Onverdacht areas	...	...	ii) Suitable for ceramic and in the paper-manufacturing industry.

Source: No. 7 of the List of References.

TABLE XIII

COUNTRY: TRINIDAD AND TOBAGO

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
IRON ORE	Three zones of iron mineralization, all of which appear to have lateral continuity of one mile or more	Maracas Area to La Vigie Ridge. Predominant in the Northern Range	...	...	Deposits consist of a relatively small low-grade primary magnetite, which comes in two general forms viz. a coarse-textured crystalline variety, common in outcrops but only rarely seen and dense fine-grained variety rarely seen in outcrops but common as "floats"
GYPSUM	Faulted and slightly displaced segments of a bed of gypsum, 20 feet thick	(1) Area within the Arima-Pilar Fault zone (2) Fault-disturbed contact between black-red-purple phyllites and white limestone of the Laventille series of the Lower Cretaceous period	...	...	Segments have been exposed and quarried at intervals. The material is white and very pure with a few specks of elemental sulphur present
MANGANESE	Ore pellets evenly scattered in the yellow clays which rest on an uneven surface of fresh limestone	Areas of the Aripo caves and north-west of the Oropouche caves	...	...	Estimated that 42×10^6 cu. yds. of pellet-bearing clay is found in these two areas. Average manganese content is 10.6%. However, manganese content of the washed ore is seemingly not over 5% although surface samples go as high as 15.07%

TABLE XIII (Cont'd)

COUNTRY: TRINIDAD AND TOBAGO

MINERAL RESOURCES DATA

MINERAL	INDICATION	OCCURRENCE	RESOURCES		REMARKS
			PROVEN	POTENTIAL	
GRAPHITE	Sporadic deposits of material. There are dark seams within the phyllites of the Northern Range	Northern Range	...	...	Small size of deposits would preclude commercial exploitation
OTHER MINERALS					
PYRITE	Distributed in the phyllites of Northern Range	Northern Range	...	...	
GLAN SAND	Found as part of a large system of terraces built up of detritus produced by river erosion of the Northern Range during Pleistocene Times	Northern Range	...	...	

Source: No.9 in List of References

BACKGROUND NOTES ON SELECTED MINERALS

BAUXITE

Bauxite mining is the most important mining activity in the entire CDCC sub-region, excluding the extraction of petroleum and natural gas. The six countries in the CDCC region where bauxite is mined are Jamaica, Suriname and Guyana, the three largest producers, and the Dominican Republic, Cuba and Haiti with smaller scale production.

Bauxite in Jamaica[1/]

The bauxite/alumina industry in Jamaica, accounts for about 74% of her export earnings, 30% of government's non-loan revenues and 11% of the Gross Domestic Product in recent years. Production of bauxite commenced in 1952 and to date (1978) some 205 x 10^6 tonnes of bauxite have been mined and 66 x 10^6 tonnes of alumina produced.

The bauxite deposits occur as solution cavity infillings within the members of the White Limestone Formation. The depths of these deposits vary from over 100 ft. to only a few inches, but with an average depth of about 20 ft. Deposits under 5 ft. are usually not considered mineable.

The predominant minerals are gibbsite - $Al(OH)_2\ 3H_2O$; boehmite - $Al_2O_3OH_2$; geothite - FeO_2H; haematite - Fe_2O_3; quartz - SiO_2 and kaolinite - $Al_2Si_2\ O_5(OH)_2$. Note that the actual distribution of these minerals depend mainly on the geology of the area and there are regional characteristics in the distribution of the ore.

Jamaica ranked second during 1978 amongst world producers of bauxite. Production reached 11.4 x 10^6 tonnes in that year, (up from 11.2 x 10^6 tonnes in 1977) but was below the 1974 record of 15.3 x 10^6 tonnes. Approximately 5.3 x 10^6 tonnes of bauxite were processed during 1978 with alumina output at 2.1 x 10^6 tonnes. During 1978 plants operated at between 60% and 90% of full capacity. Greater efforts are now being made to utilize plant capacity more fully.

1/ For more details see No.2 of the List of References.

To date there are no aluminium smelting facilities, the main obstacle being the unavailability of an adequate source of power. Consequently, more than half of the bauxite and all the alumina production are exported. Prospects of further rises in the prices of bauxite and alumina will operate to the advantage of Jamaica, and may make the idea of a fully integrated aluminium industry more feasible.

Joint venture projects involving Guyana, Venezuela and Mexico and Trinidad and Tobago were considered recently, whereby Jamaica would ship alumina to the last two countries mentioned, which both have adequate domestic energy resources for the reduction of alumina. However, the projects were postponed during 1978, which is unfortunate, since supplying feed for the Coatzacoalas smelter in Mexico could have resulted in the establishment of a new Jamaican refinery to meet long term sales contracts of 3.0×10^5 tonnes/year of alumina.

Table 1

Ownership of the Bauxite Industry in Jamaica as of end 1978

	Name	Ownership		Capacity ('000 tonnes per year)	
				Bauxite	Alumina
1.	JAMALCAN	Alcan Aluminium Ltd. Government of Jamaica	93% 7%	2,687	1,100
2.	Alumina Partners of Jamaica Ltd. (ALPART)	Ananconda Aluminium Kaiser Aluminium Reynolds Metals	28% 36%	3,117	1,150
3.	JAMALCO	Aluminium Company of America Government of Jamaica	94% 6%	1,270	550
4.	Kaiser Bauxite	Government of Jamaica Kaiser Aluminium	51% 49%	4,200	-
5.	Reynolds Mines Jamaica Ltd.	Government of Jamaica Reynolds Metals	51% 49%	3,100	-
6.	(Revere Alumina)	(Revere Copper and Brass)		(500)	(200)
	Total (excluding Revere)			14,374	2,800

Source: See No.2 of the List of References

In addition to state participation (joint ventures) three government entities have been established since 1974: Jamaica Bauxite Institute, Jamaica Bauxite Mining Ltd., and Alumina Trading Company of Jamaica.

The Government has also decided to share in the expansion of existing capacity and in building a new plant and/or refurbishing existing plants. In September 1978, the Jamaica Government and a foreign company (ALCAN) entered into a joint bauxite-alumina refining enterprise. The rated capacity of the alumina plant is 1.1 million tonnes/year of alumina. The government as part of this agreement, acquired all of ALCAN's mineral land (valued at J$7.5 million) that were not retained for mining and alumina refining.

In May 1974 the Jamaican Parliament promulgated the Bauxite (Production Levy) Act, which imposed a levy on mined bauxite whether for export or for local processing into alumina.

Bauxite in Suriname

In the year 1922, the first shipment of bauxite was made from Suriname and by 1929 the industry had become the main area of economic activity. The contribution of the mining sector to GDP in Suriname rose from 27.4% in 1963 to 33% in 1970 but the share has since declined. Exports of bauxite, alumina and aluminium dominate export trade.

There are two types of bauxite deposits in Suriname, namely the coastal type bauxite and the plateau type of bauxite. The former is mainly of sedimentary origin and with deposits running in an approximately east-north-east direction nearly parallel to the entire coast line of Suriname. This bauxite deposit is of high quality, that is, low in iron with an alumina content (Al_2O_3) well above 50%.

The plateau type bauxite is of residuary origin, formed out of residuary clay and occurring as small or larger lenses of alumina-rich material. It has a high iron content and is of lower quality than the coastal type bauxite.

The two main areas where plateau type bauxite is found are:

1) The Adampa-Kabalebo area in the north-west, lying within the sphere of the hydropower potential of the Kabalebo, Lucie, Coeroeni and Upper Corantijn Rivers.

2) The area north-east and within the sphere of the Brokopondo hydro-electric project, as well as the hydro-electric potential of the Saramacca, Marowyne, Tapanahony and Lawa Rivers.

Bauxite reserves in Suriname are estimated to amount to between 412 and 490 x 10^6 MT although this figure excludes considerable unexplored resources.

Production of bauxite amounted to approximately 4.9 x 10^6 MT during 1978 continuing a decline from the levels of the early 1970's when production averaged in excess of 6.7 x 10^6 MT.

Three companies are presently involved in the bauxite industry in Suriname, two of which have been established in the country for many years - SURALCO which is a fully owned subsidiary of ALCOA and Billiton Maatschappij NV, part of the Royal Dutch Shell Group. It is noteworthy that the refinery and smelter at Paranam, owned by SURALCO, handles bauxite also from Billiton.

The third company, NV Grassalco is state-owned and is presently opening up unexploited deposits of bauxite in the Bakhuis region of Western Suriname. This bauxite would be refined at a new plant to be located at Apoera on the Corantijn River. This scheme is part of a project, funded by the World Bank, to develop the western parts of the country.

At the beginning of 1958 a document known as the "Brokopondo Agreement" was signed by representatives of Suriname and SURALCO which included the establishment of a completely integrated aluminium industry and an 80 million kWh hydropower generating plant at the Brokopondo Dam. The company agreed in part to spend 10 million guilders in 20 years on a geological survey of a large unexplored area in the eastern part of Suriname.

At present there are 4 alumina plants which have a total rated capacity of 800,000 tons per year. Owing to the world recession, the production of bauxite has declined drastically since 1974; however, this has been offset to a degree by the considerable increase in world market prices. The Suriname government collected its share of the higher prices by agreeing at the end of 1974 with the two mining companies, SURALCO and Billiton, on a new system of taxation: the Levy due to the state is now linked with the selling price of aluminium instead of with the volume of ore extracted. Twenty per cent of the ordinary budget revenue is derived from this source.

Bauxite in Guyana

Bauxite, including alumina, is the principal mineral product of Guyana, accounting for around 15% of GDP and about half the country's export earnings in the last few years. Total production of bauxite in 1978 amounted to nearly 3 million dry long tons and 227,060 dry long tons of alumina. Value of exports of bauxite and alumina during 1978 amounted to about G$330 million.

The commodity is presently mined in three areas. The largest group of mines is situated at Linden on the Demerara River, and the other mines are located at Ituni and Kwakwani.

In one respect bauxite resources of Guyana are of particular significance in that the country is the world's largest producer of calcined bauxite, a pure aluminium ore containing a low proportion of iron and used for refractory purposes.

Bauxite deposits are found within a large arcuate belt, stretching from the vicinity of the Pomeroon River (Essequibo County) to the Corentyne River (Berbice County), covering a distance of 200 miles in length and 15-20 miles in width in a north to south direction.

Locally, bauxite occurs as large dome-shaped deposits resting horizontally on selective areas of the old land surface which subsequently became submerged and preserved by deposits of white sands and clays of later geological eras.

Detailed estimates of bauxite reserves are available mainly for the Berbice and Demerara deposits, with only rough estimates available for the Essequibo deposits. Measured reserves are given as approximately 150×10^6 crude metric tons, however by taking into account large but poorly-explored resources, not readily accessible from the existing mining areas a figure of 1016×10^6 MT is suggested.

Organised mining of bauxite in Guyana began in October 1916, following the granting of certain leases of Crown Colony lands at Christianburg, Wismak and Three Friends, on the Upper Demerara River. The first commercial shipment of crude bauxite (2,069 MT) from Guyana was made by DEMBA[2/] during 1917 from their mine at Three Friends.

2/ Demerara Bauxite Company.

In 1934 another foreign company became interested in the deposits in the Kwakwani area (on the Upper Berbice River). By 1939 a washing plant was installed here, with a transhipment plant at Everton near the mouth of the Berbice River.

There is only one alumina plant in Guyana, to date, which was built by DEMBA (construction beginning in 1956) and commissioned in May 1961 (the long construction period resulting partly from the 1957 recession in the industry). The original installed capacity was given as 300,000 long tons per year but the plant has a rated capacity presently of 350,000 tonnes per year.

At present there are three companies involved in the extraction of bauxite:

BIDCO - The Bauxite Industry Development Company Ltd. which was incorporated in 1976. BIDCO is a state-owned holding company, which, in addition to providing common core services such as marketing and shipping, is responsible for coordination and development, including the diversification of the entire bauxite industry in Guyana.

GUYBAU - Guyana Bauxite Company Ltd., which is a subsidiary of BIDCO was incorporated in June 1971. It is the largest and the better known of the two operating companies and is located in the area of the Demerara deposits. Formerly this company was known as DEMBA.

BERMINE - The Berbice Mining Enterprise Ltd., which was incorporated as a state-owned company in 1975 is located in the area of the Berbice deposits and is the smaller of the two operating companies.

Guyana has ambitious plans for the expansion of the bauxite and alumina industry and a number of initiatives during 1978 was related to these plans. In February 1978, BIDCO announced that it had hopes of increasing production and reducing costs by the installation of a $28 million Lurgi fluidised bed calciner. It is expected that this investment would save 30% in fuel and maintenance costs. In May 1978 the USSR offered to undertake a feasibility study for a new 600,000 tonnes per year alumina refinery.

Guyana, like other developing countries, needs to increase the value added of production from its natural resources. Since Guyana has large reserves of metallurgical grade bauxite and an existing alumina plant, it is hoped to construct smelter facilities for producing primary aluminium as a first step and ultimately to fabricate intermediate and finisned products. Energy sources for this project would come from the Upper Mazaruni Hydropower Scheme which is in the preliminary stages of implementation.

The Linden area was chosen as the location for the smelting facilities because:3/

- alumina facilities are already located there;
- the workforce in the area is accustomed to working and living in an industrial town type atmosphere;
- river conditions would permit transportation of imported input materials and the exportation of metal;
- it facilitates economical location of an electricity sub-station of the Upper Mazaruni, Power Generating facility with respect to the existing national grid system;
- there is ample land available for the aluminium smelter and possible future fabricating facilities;
- there are no major agricultural activities of the sort that may be affected by possible fluoride emissions from the aluminium smelter.

Bauxite in the Dominican Republic

Early geological work on bauxite was done in the Dominican Republic during the 1940's. In 1952, mine construction activities commenced and one company started exporting bauxite in 1959. A pre-feasibility study for an alumina plant was done by a foreign company in 1967. As a result of the general paucity of information on the potential bauxite deposits, another study was proposed to evaluate additional potential of bauxite in the Dominican Republic.

3/ No.19 of List of References.

Bauxite is of some importance in the Dominican Republic but the industry is not as vital as in the case of Guyana, Jamaica or Suriname. Production of bauxite reached a level of nearly 1120 x 10^3 metric tons in 1974 but declined between then and 1979. Volume of exports followed the same trend but export receipts have been increasing since 1977 owing to favourable market conditions. During 1975 government receipts from bauxite amounted to US$11.00 per ton compared with US$3.00 in 1973. The agreement with the multinational enterprise was due for renegotiation in 1976 but the outcome is not yet known.

Bauxite deposits are found in the Padernales zone, where the geology is comparable with that of the deposits found in Jamaica and Haiti and in the flanks, south-east of the Sierra de Bahoruco. Elevation of deposits of white to red bauxite varies from 400m to 1,350m. These are related to the deposits of the Plaisance region whose thickness ranges from 600 to 700 metres.

Grey deposits of bauxite are found in the north-west region and are suspected to be the product of chemical erosion of the limestone which resulted in a laterite bed of aluminium oxide, of low quality.

The chemical composition of the bauxite in the Dominican Republic, on the average, is as follows:

50.0 %	Al_2O_3	2-3%	TiO_2
2-10%	SiO_2	Loss by decomposition - 28%	
16-20%	Fe_2O_3		

Most of the deposits are found in elongated and circular cavities. The mineral consists fundamentally of two ore types, viz, gibbsite $Al_2O_3 \cdot 3(H_2O)$ with a proportion of 65.4% Al_2O_3 and 36.4% H_2O and Boehmite Al_2O_3 H_2O with 85% Al_2O_3 and 15% H_2O. The monohydrate has the most predominant occurrence.

All of the proven reserves are under concession to the Aluminium Company of America (ALCOA). Apparently conservative estimates at the beginning of 1977 (see Table 1 at the end of thise section) put the figure for "measured reserves" at 17 x 10^6 MT. Probable reserves, not yet quantified, are believed to exist in the region Charco de la Paloma, an area north of the

area under concession to ALCOA. Also in the eastern region of Samaná, there appears to be small deposits of bauxite. One source[4/] states that total reserves are of the order of 60 x 10^6 MT.

Bauxite in Haiti[5/]

The bauxite industry is relatively less important to Haiti than to most other CDCC bauxite producing countries. As of the beginning of 1977 recoverable reserves stood at some 5 million metric tons, extraction of bauxite for that year was just over 0.6 million metric tons. Exports of course provide valuable foreign exchange receipts which amounted to about US$17 million in 1977. Royalty payments during the early 1970's were fixed at US$0.50 per ton of bauxite exported. During 1976 a new contract was signed by the government and the producing company whereby payments to the government would more closely reflect the actual price of aluminium. Income to government is now approximately US$15.00 per ton.

In 1950 the first mineral (bauxite) agreement was concluded, having terms which included an initial investment, valued at $10 million and a production capacity of 350,000 tonnes per year. In the 1960's the company increased its productive capacity to 750,000 tonnes per year.

In 1963 the Government introduced new rules in the agreement requiring renegotiations of the financial arrangements every three years and the rehabilitation of the mined-out land.

The only well-established bauxite mine in Haiti is owned by Reynold's Haitian Mines S.A. located in the southern peninsula area.

The Government has established an institution called "The National Institute of Mineral Resources" which deals with all the activities related to the Mining Sector. Haiti is also a member of the International Bauxite Association (IBA) and as such has benefited by being able to secure large payments from the producers.

4/ See No.8 of the List of References.

5/ Data are not available on the geological aspects nor on prospects for future discoveries.

Since 1974 new field investigations have been conducted by a number of foreign mining interests. However, available data suggest little promise of additional economic occurrences of bauxite. The paucity of data concerning the bauxite industry in Haiti makes the full assessment of its potential difficult.

TABLE 2

RECOVERABLE BAUXITE RESERVES (on dry bone basis)
AND RECOVERABLE EQUIVALENT AS AT JANUARY 1977

(Mill. tonnes)

Country	Recoverable Reserves			Alumina Equivalent		
	Measured	Possible	Total	Measured	Possible	Total
CUBA						
DOMINICAN REPUBLIC	17	...	(17)	7	...	(7)
GUYANA	678	1142	1820	339	509	848
HAITI	5	...	(5)	2	...	(2)
JAMAICA	2134	...	(2134)	918	...	(918)
SURINAME	227	185	412	118	96	214

Source: No.6 of List of References.

COPPER

Copper in the Dominican Republic[6/]

There exist in the Dominican Republic five different areas in which copper deposits are located. Three of these are considered as economically significant.

(1) The Mata Grande deposits are located on the northern flanks of the Cordillera Central and to the south of the San José de las Matas, where variable zones of five to eight metres of copper oxide exist with a copper content of 0.5%. There are other veins one metre thick with a copper content ranging from 1-3%. The extent of reserves of this deposit are not known.

(2) The Cordillera Central, has been an area under concession by MITSUBISHI. This concession for exploration included the areas Mata Grande, Cañitas, Carmen, Pinar Bonito. The rocks in these areas belong to the Upper Cretaceous period and the mineralization appears close to the contacts of the different intrusive bodies of the Cordillera. Copper content of these deposits range from 2.8% to 11.2% copper.

(3) To the north-east of Jarabacoa, there is a vein of copper ore, whose reserves are unknown. However, the copper content is 8.9%, with 1.29% zinc, 2.07 g/MT of gold and 53.8% silver. The real economic potential of this deposit needs to be assessed, although preliminary exploration suggested that reserves were approximately 1×10^6 MT.

(4) To the north of San Cristobal and near to Río Nigua, are some copper deposits which were exploited on a small scale at the beginning of this century. The copper content and the reserves of these deposits are also not known.

(5) In the Las Cañitas area, geochemical and geophysical studies were done, in order to make a superficial evaluation of the extent of mineralization in the area. It was concluded that these deposits had no economic significance.

6/ See No.8 on the List of References.

The U.N. Statistical Yearbook show small quantities of production of copper in the Dominican Republic up to 1970. There is apparently intention to fully exploit the copper resources once the international market conditions permit. It may be noted here that copper prices increased significantly during 1979.

Copper in Haiti[7/]

In 1950 a foreign company obtained a concession from the Haitian Government for copper exploitation, covering 200 km in the area called "Meme" close to Gonaive. From 1960 to 1972, the date on which the mine was closed, approximately 30,000 tonnes of copper concentrate (28-30% Cu) were exported. It was then apparent that exploitation of copper resources of an assay of 1.4% Cu was very uneconomic.

The foreign owned company had remitted to the Haitian government a mineral zone of approximately 70 sq km, with the most up-to-date geochemical characteristics of the area. Extent of mineralization has been estimated, and it has been suggested that a pre-feasibility phase be initiated with bilateral aid from the German government. In 1976, the Haitian government signed two mineral agreements granting exploitation rights to foreign companies. The companies have done studies on the geochemical nature of their concession and field work has commenced.

Copper in Cuba

Copper is the nation's second most important metal in terms of production value. Copper ore is extracted from mines located in the Pinar del Río area, while other deposits are known to exist near Cumanayagua, Fomento and Sanchi Spíritus in the Sierra Maestra, and also in the Zapata Peninsula. Extraction of these deposits dates back over 400 years. Associated with the copper deposits are traces of lead, zinc, gold, silver and sulphur.

7/ See No.16 of List of References.

TABLE 3

COPPER ORE PRODUCTION 1970-1977

('000 MT - Cu Content)

Year	Cuba	Dom.Rep.	Haiti
1970	0.4	0.4	4.8
1971	...	-	6.6
1972	1.8	-	-
1973	2.1	-	-
1974	2.9	-	-
1975	2.8	-	-
1976	2.9	-	-
1977	6.0	-	-
1978	...	...	...
1979	...	...	...

Source: No.16 of List of References for 1970-1977.

NICKEL

Cuba and the Dominican Republic are the two producers of nickeliferous laterite minerals in the CDCC region.

Nickel in Cuba

Cuba's total nickel reserves (among the largest in the world) amounted to about 19 million tons (1972 estimate) of contained metal in ore whose average grade ranges from 0.8% to 1.4%. The deposits which are situated in the Oriente province in the eastern part of the island, contain on the average between 1.5% to 1.7% nickel. These deposits are also an important source of iron, chromium, cobalt and manganese.

Nickel was not exploited in Cuba until 1943 when the Nicaro Nickel Company commenced operations. Production during the 1960's averaged 15,000 MT per year of nickel oxide. Overall nickel production capacity expanded in 1969 by the opening of a new extraction plant at Moa Bay in northern Oriente province. Commercial production of nickel sulphide began in 1962.

Cuba was the world's fifth largest nickel producer in 1976,[8/] with production of 37,000 MT of nickel ore accounting for slightly less than 5% of the world's output in that year.

During that year current productive capacity of the Rene Ramos Latour Complex at Nicaro and the Pedro Soto Alba complex at Moa in the Oriente province was fully utilized. Half of the mineral is produced at Nicaro as granular oxide and nickel oxide sinter. Output from Moa is in the form of nickel oxide plus cobalt sulphur. Mine feed to these operations is at a rate of 4.0 million tonnes/year.

Despite a prolonged period of depressed earnings and surplus inventories experienced by the world nickel industry, Cuba formulated expansion plans during 1978 which were intended to almost triple nickel production by 1985. Cuba's ability to finance this contra-cyclical investment stems from the security of long-term nickel sales contracts at favourable prices with COMECON trading partners.

8/ Op. cit.

The first phase of the expansion plans commenced in 1979 and included rebuilding and modernization of the Nicaro and Moa plants, to reach a productive capacity of about 46,500 tonnes of nickel content by 1980.

The second phase of the expansion plans, includes the construction of two new nickel plants, each of which would be capable of producing 30,000 tonne/year. The first plant is under construction at Punta Gorda, east of Moa, and should be operative by 1981. The second plant is to be constructed at Las Camariocas, with foreign assistance and is scheduled to come on stream in 1983. On completion of this second phase Cuba's production capacity will have increased to 107,000 tonne/year of nickel concentrates.

The third and final phase of the expansion plans, requires the construction of a fifth concentrator and smelter, which will take the productivity capacity of nickel to 150,000 tonne/year by 1990.

(In March of 1978 an economic and technical cooperation meeting held in Havana recommended that development of Cuban mineral resources be accelerated during the next decade, by diversifying the mining base from nickel to include copper, lead, zinc and phosphate rock).

Nickel in the Dominican Republic

In the Dominican Republic the sole company exploiting this resource, Falconbridge Dominicana (FALCONDO), has reported that proven nickel reserves are 52 x 10^6 MT containing 1.58% nickel, and probable reserves 21 x 10^6 MT.[9/] These reserves are found in the Bonao Zone which extends from Sierra Prieta to La Vega and accounts for only 30% of the area under study. It has been estimated that the reserves can feed the mine for the next 60 years. Additional reserves are thought to exist in Loma Miranda, Loma Pinar, Sucio, Loma Monte.

9/ See No.8 of List of References.

Commercial operations of nickel commenced in 1972, however production of nickel was held to one-third of plant capacity due to the continuing weakness in the world nickel market and excessive producer and consumer inventories. In 1978 FALCONDO operated at designed capacity. It is expected that this mine, when in full operation, will contribute more than $60 million annually to the gross foreign exchange revenue of the country.

TABLE 4

PRODUCTION OF NICKEL IN CDCC COUNTRIES

('000 MT - Ni Content)

Year	Cuba	Dominican Republic
1968	37.3	-
1969	35.4	-
1972	36.8	14.5
1975	37.3	26.9
1976	37.1	24.4
1977	37.0	24.9
1978	...	...
1979	...	...

Source: No.16 of List of References

GOLD

Gold is known to be produced in three CDCC member countries, the Dominican Republic, Guyana and Suriname. Gold output data for recent years are given below in Table

Gold in Suriname

In Suriname the occurrence of gold is associated with the contacts of the Paramaka, Rosebel and Armina rocks. However gold is produced mostly from alluvial deposits.

Gold mining started in Suriname on a small scale around 1875. Production reached a maximum around 1910 with an average yearly output of 30,000 ozs. Since then production had declined drastically.

Gold in Guyana

Gold recovery in Guyana[10/] is exclusively from alluvial and eluvial deposits, and is now on an upward trend (following a long downward slump) resulting from the escalation of gold prices in the last few years. Several million ounces of gold have been produced from Guyana's gold fields but by international standards, Guyana is a small gold producer exporting approximately half of her annual gold production. Much of the production resulted from the efforts of thousands of miners (pork-knockers) with their gold pans and hundreds of sluices. In some areas, practically every crack has been tested, between 1890 and 1935. In a few instances, dredging was undertaken but with one exception, such operations were short-lived.

Gold is found mainly in areas located in the northern half of the country; only a few occurrences are known in the south. It is noteworthy that hard rock of gold mining has met no success in Guyana, principally because there was only one serious effort to establish a hard rock mine. In this case, the cost of mining escalated because of the lack of facilities for treating the pyritic concentrates locally, and thus, these had to be sent abroad for processing.

10/ See No.3 of List of References.

Suction dredging in the rivers and larger creeks, has revolutionized small mining operations and in those areas which were incompletely worked before, successful work is presently being done.

The future of underground gold mining will rest on the development of deep-seated deposits, especially those in which both gold and base metals can be extracted together. The Geological Surveys and Mines Department, in 1976 had been considering the development of some small alluvial prospects and a few hard rock ores. However, information on this development to date is unavailable.

Gold in the Dominican Republic

Gold deposits in the Dominican Republic are found mainly in the Pueblo Viejo area, located in the eastern flanks of the Cordillera Central. The Pueblo Viejo deposit was formed by the erosion of volcanic rock deposits of the Los Ranchos Formation.

Proven resources of the oxide of the Pueblo Viejo deposit as of May 1976 was 25×10^6 MT, with an assay of 4.06 grammes of gold and 25.1 grammes of silver per metric tonne of ore. Under this deposit are located sulphite deposits containing gold and silver associated with zinc and copper. The metal content of this deposit is as follows: 3.57 grammes gold and 26.1 grammes of silver per metric tonne with 1.4% zinc and 0.143% copper. However, to date, many problems are associated with the metallurgical processing of this deposit, whose proven reserves are 21×10^6 metric tonnes.

Other gold deposits of less significance are found in Monte Negro and Mejita Este.

Alluvial gold has been found in Bulla, Monción and Miches and exploited on a small scale. Reserves of these deposits are not known.

In 1973 the Pueblo Viejo gold/silver mine was constructed with an estimated capacity of 8,000 ton/day ore which served to elevate the Dominican Republic to rank amongst the ten largest gold producers in the world.

TABLE 5

PRODUCTION OF GOLD IN CDCC COUNTRIES

(kilograms)

Year	Guyana	Suriname	Dominican Republic
1965	65	195	-
1969	65	74	-
1970	138	36	-
1975	562	4	6, 065
1976	525	1	12, 877
1977	370	...	10, 824
1978	...	...	...
1979	...	...	...

Source: No.16 of List of References.

DIAMONDS

So far as is known, Guyana is the only CDCC country with commercial scale production of diamonds. Alluvial diamonds were discovered in Guyana during 1887. These diamonds are found distributed within and peripheral to the extensive plateaux of the Pakaraima Mountain block of flat lying sandstones and conglomerates in the west of the country. Over 3 million metric carats have been recovered from alluvial deposits. Peak production was attained in the 1920's; the most outstanding year was 1923 when 214,474 carats were recovered. Since then annual production decreased steadily to less than 30,000 carats during the period 1946-1958 and in 1978 was only 17,000 carats.

Most of the diamonds won in the years prior to 1959 were recovered from alluvial deposits within a belt extending for 18 miles from the foot of the Pakaraima Mountains. Since 1959 activity has shifted to within the Pakaraima Mountains with most of the production coming from the deposits in the beds of the upper reaches of the Mazaruni, Cuyuni, Potaro and Ireng rivers and their tributaries.

The several thousand carats of diamonds discovered annually are all worked by hand methods or suction dredging. In some cases both gold and diamonds are recovered together. The future of the diamond industry in Guyana is encouraging but there is need for more efficient prospecting and orderly exploitation of the available resources.

SALT

Common salt, that is, Sodium Chloride (NaCl) is found in some CDCC countries. Available data are given in the table below.

TABLE 6

SALT PRODUCTION IN SELECTED CDCC COUNTRIES

('000 MT)

Year	Bahamas	Cuba	Dominican Republic
1970	621	89	37
1971	1,213	103	39
1972	807	102	31
1973	1,121	124	30
1974	1,027	138	40
1975	1,232	157	37
1976	1,491	150	40
1977	1,871	...	30

Source: No.16 of List of References.

All domestic salt production in Cuba is carried out by solar evaporation of sea water. Rock salt outcrops exist, but have not been found in sufficiently large quantities or in suitable locations to make significant commercial exploitation possible.

Salt deposits in the Dominican Republic are found occurring in Las Salinas and Barahona. The strata of salt are vertical and their purity vary between 90-95% sodium chloride. To the north of these deposits salt is found associated with potassium and magnesium. Reserves, (possible and probable) of this deposit are of the order of 243 x 10^6 short tons.

Judging from production data in the table above, the Bahamas would appear to be the largest producer and exporter of salt in this sub-region. However, data on location, extent of reserves, how much are in the form of deposits, extent of solar evaporation etc. are unavailable.

Apparently salt is produced in St. Kitts. Salt exports appear in officially published export statistics up to the late 1960's but no data are available subsequently.

TABLE 7

PRODUCTION AND EXPORT OF BAUXITE AND REFINED PRODUCTS

	PRODUCTION FOR SELECTED YEARS ('000 MT)			EXPORT ('000 MT)		
	Bauxite[1/]	Alumina	Aluminum	Bauxite	Alumina	Aluminum
			CUBA			
1971	...	...	...	...	...	...
1973	...	...	...	...	...	...
1975	...	...	...	...	...	...
1977	...	...	...	...	...	...
			DOMINICAN REPUBLIC			
1970	1,086	-	-	1,311.2	-	-
1973	1,145	-	-	1,410.7	-	-
1975	772	-	-	909.9	-	-
1976	621	-	-	528.7	-	-
1977	576	-	-	...	-	-
			GUYANA			
1970	4,418	317	-	...	...	-
1973	3,622	238	-	...	...	-
1975	3,830	299	-	2,196	325	-
1977	3,223	260	-	1,600	263	-
1978	3,260.5[E]	230	-	1,601	247	-

TABLE 7 (Cont'd)

PRODUCTION AND EXPORT OF BAUXITE AND REFINED PRODUCTS

	PRODUCTION FOR SELECTED YEARS ('000 MT)			EXPORT ('000 MT)		
	Bauxite[1/]	Alumina	Aluminum	Bauxite	Alumina	Aluminum
			HAITI			
1970	673	...	-	...	...	-
1973	779	...	-	...	...	-
1975	523	...	-	...	...	-
1976	739	...	-	...	...	-
1977	701	...	-	...	...	-
			JAMAICA			
1971	12,345	1,847	-	7,590	1,783	-
1973	13,276	2,466	-	7,389	2,316	-
1975	10,981	2,223	-	5,483	2,375	-
1977	11,240	2,015	-	6,355	2,034	-
1978	11,547	2,107	-	6,448	2,140	-
			SURINAM			
1971	6,718	1,069	55	3,476	1,149	47
1973	6,976	1,346	54	3,666	1,209	54
1975	4,749	1,130	35	2,324	1,090	26
1976	4,587	1,163	46	1,976	1,060	46
1977[E]	4,856	1,215	50	2,172	1,097	59

1/ Crude Ore.

Source: 4, 8, 16 of List of Reference and data supplied CEPAL

TABLE 8

PRODUCTION OF SELECTED CRUDE MINERALS, 1977

COMMODITY/COUNTRY	UNITS	PRODUCTION
SAND and GRAVEL		
Antigua	000 MT	23 (1973)
Bahamas		...
Barbados		...
Belize	"	334[e] (1975)
Cuba:		...
Dominica:		
Sand	"	2 (1975)
Gravel, crushed	"	23 (1975)
Dominican Republic	MT	80 (1975)
Grenada		...
Guyana		...
Haiti	000 m^3	20[e]
Jamaica:		
Glass sand (Silica)	000 MT	28.4
Other sand and gravel	000 m^3	3823
Montserrat	000 m^3	14 (1975)
Netherland Antilles		...
St. Kitts, Nevis, Anguilla		...
St. Lucia		...
St. Vincent	000 MT	13 (1975)
Suriname:		
Sand	000 MT	203 (1975)
Gravel	000 m^3	25 (1975)
Trinidad and Tobago:		
Pitch Sand	000 m^3	33 (1975)
Other sand and gravel	"	312 (1975)
SILVER		
Haiti	MT	1

TABLE 8 (Cont'd)

PRODUCTION OF SELECTED CRUDE MINERALS, 1977

COMMODITY/COUNTRY	UNITS	PRODUCTION
ASPHALT, NATURAL		
Trinidad	000 MT	44
CLAYS		
Guyana:		
Kaolin	...	...
Other	...	...
Haiti	000 MT	43 (1974)
Jamaica 1/	"	140e (1975)
Trinidad:		
Argillite	000 m^3	198 (1975)
Other	"	74 (1975)
Suriname	MT	3500e (1973)
Other countries	...	...
CHROMIUM, ORE (Cr_2O_3 content)		
Cuba	000 MT	10
COPPER ORE (Cu content)		
Cuba	MT	6000p
Dominican Republic	MT	450 (1974)
Haiti	MT	1400 (1972/73)
DIAMONDS		
Guyana:		
Gems	000 carats	12e (1975)
Industrial	000 carats	8e (1975)
GYPSUM		
Jamaica	000 MT	214
LIME		
Dominican Republic	MT	...
Jamaica (industrial)	000 MT	144
Antigua		...
Barbados		...
Cuba		...
Netherland Antilles		...

TABLE 8 (Cont'd)

PRODUCTION OF SELECTED CRUDE MINERALS, 1977

COMMODITY/COUNTRY	UNITS	PRODUCTION
CEMENT, hydraulic		
Bahamas	000 MT	23
Cuba	"	2656
Dominican Republic	"	582 (1976)
Haiti	"	257
Jamaica	"	205
Suriname	"	45
Trinidad and Tobago	"	218
COBALT		
Cuba	MT	1600 (1975)
MANGANESE		
Cuba	000 MT	27.9 (1968)
Guyana	000 MT	38.4 -"-
PHOSPHATE ROCK, (crude)		
Netherland Antilles	000 MT	82 (1975)
SALT		
Bahamas	000 MT	1871
Cuba	"	150 (1976)
Dominican Republic	"	30
Haiti		...
Netherland Antilles	"	400
St. Kitts, Nevis		...
St. Vincent	"	50 (1975)

TABLE 8 (Cont'd)

PRODUCTION OF SELECTED CRUDE MINERALS, 1977

COMMODITY/COUNTRY	UNITS	PRODUCTION	
STONE			
Antigua (crushed)	000 m^3	45	(1973)
Bahamas:			
Aragonite	000 MT	1232	(1975)
Limestone	"	521	(1975)
Barbados			
Belize:			
Limestone	000 MT	263	(1975)
Marl	"	38	(1975)
Cuba		...	
Dominica			
Pumice and volcanic ash	000 MT	106	(1975)
Dominican Republic			
Limestone	000 MT	148	(1975)
Grenada		...	
Guyana		...	
Haiti			
Limestone, crushed 2/	000 MT	191	(1975)
Jamaica			
Limestone	000 MT	2540	(1975)
Marl	MT	7620	(1975)
Montserrat		...	
Netherland Antilles		...	
St. Kitts, Nevis, Anguilla		...	
St. Lucia		...	
St. Vincent:			
Andesite, crushed	000 MT	6	(1975)
Suriname	"	50e	(1973)
Trinidad and Tobago:			
Diorite	000 m^3	1	(1974)
Limestone	"	425	(1975)
Porcellanite	"	13	(1975)
SULPHUR			
Cuba 3/	000 MT	20	(1976)
Netherlands Antilles 4/	000 MT	94	

2/: Production data refers to Consumption 3/: Production recovered from Pyrites
4/: Production recovered as a by-product in purification of other minerals

Sources: Nos. 10 and 11 of the List of References.

TABLE 9

IMPORTS AND EXPORTS OF SELECTED MINERALS

AND MINERAL PRODUCTS, 1977

(Mill US dollars)

SITC (R) No.	Description	Imports	Exports
	TRINIDAD AND TOBAGO		
27	Crude Fertilizer, Minerals, N.E.S.	6.3	1.4
273	Stone, sand, gravel	0.8	...
274	Sulphur-iron pyrites	0.6	...
28	Ores and metal scrap	0.1	0.3
66	Non-metallic mineral mfrs N.E.S.	22.5	0.8
661	Lime, cement and building materials	4.1	...
662	Clay construction materials	1.6	...
665	Glassware	8.3	...
67	Iron and Steel	69.2	0.1
671-672	Pig iron and iron and steel ingots	1.3	...
68	Non-ferrous metals	7.5	0.2
684	Aluminium	3.8	0.2
	CUBA		
27	Crude Fertilizer, Minerals,	5.6 (1974)	...
28	Ores and metal scrap	...	168.4 (1974)
283	Non ferrous base metallic ores + concentrates	...	168.4 (1974)
66	Non-metallic mineral mfrs N.E.S.	...	...
67	Iron and Steel	162.2 (1974)	...
674	Iron and steel plates, sheets etc.	116.2 (1974)	...
68	Ferrous metals	12.3 (1974)	...
	HAITI		
27	Crude Fertilizer, Minerals, N.E.S.	1.0	...
271	Natural Fertilizers	...	..
276	Other crude minerals	0.7	...
28	Metalliferous ores, scrap	...	17.4
283	Non-ferrous base metallic ores	...	17.3
66	Non-metallic mineral mfrs N.E.S.	3.4	3.2
661	Lime, cement, building materials	0.3	3.2
665	Glassware	1.2	...
67	Iron and Steel	5.9	...
68	Ferrous metals	1.0	...

TABLE 9 (Cont'd)

SITC (R) No.	Description	Imports	Exports
	BAHAMAS		
27	Crude fertilizers and minerals (excl. precious stones)	0.6	13.7
276	Other crude minerals N.E.S.	0.2	12.1
28	Metalliferrous ores, scrap	neg.	0.1
66	Non-metallic mineral mfrs N.E.S..	5.4	1.0
661	Lime, cement and other building materials	1.0	...
663	Clay construction materials	1.2	...
665	Glassware	1.6	...
67	Iron and steel	2.2	2.2
672	Iron and steel ingots	0.5	...
68	Non-ferrous metals	0.6	-
684	Aluminium	0.4	-
	GUYANA		
27	Crude fertilizers and minerals etc.	...	...
Ex 273	Gypsum and limestone	1.1	...
Ex 276	Salt	0.6	...
28	Metalliferrous ores, scrap	...	...
Ex 283	Bauxite and alumina	...	129.9
66	Non-metallic mineral mfrs N.E.S.	...	
Ex 661	Lime and cement	2.0	
Ex 665	Glassware	2.5	...
Ex 667	Diamonds, excl. industrial	...	0.3
67	Iron and steel	...	...
68	Non-ferrous metals	...	...
	JAMAICA		
27	Crude fertilizers and minerals etc.	...	...
273	Gypsum and limestone	...	...
28	Metalliferrous ores, scrap	...	16.1
283	Non-ferrous base metals ore, etc.	...	16.0
66	Non-metal mineral mfrs N.E.S.	9.7	1.6
662	Clay refractory building products	1.3	...
665	Glassware	3.1	...
67	Iron and steel	22.9	4.3
672	Iron and steel primary forms	4.9	...
673	Iron and steel shapes	5.1	...
674	Iron and steel, universal plate, sheet	3.7	3.1
68	Non-ferrous metals	19.9	...
684	Aluminium	6.7	...

TABLE 9 (Cont'd)

SITC (R) No.	Description	Imports	Exports
	BARBADOS		
27	Crude fertilizer, minerals, N.E.S.	...	...
28	Ores and metal scrap	...	0.1
66	Non-metallic mineral mfrs N.E.S.	7.7	...
661	Lime, cement and building materials	2.2	...
665	Glassware	2.6	...
67	Iron and Steel	6.3	...
68	Non-Ferrous metals	2.0	...
684	Aluminium	1.5	...
	DOMINICAN REPUBLIC 1/		
27	Crude fertilizer, minerals,	2.8	1.4
273	Stone, sand and gravel	...	1.3
28	Metalliferrous ores, scrap	...	22.5
283	Non-ferrous base metallic ores etc.	...	22.0 2/
66	Non-metallic mineral mfrs N.E.S.	18.5	...
661	Lime, cement and other building materials	6.9	...
662	Clay construction materials	3.7	...
665	Glassware	4.3	...
67	Iron and steel	30.8	92.0
671	Pig iron and iron and steel ingots	...	91.9
672	Iron and steel, primary forms	3.1	...
68	Non-ferrous metals	8.4	...
684	Aluminium	5.0	...

1/: Exports include re-exports

2/: Mainly bauxite

TABLE 9 (Cont'd)

SITC (R) No.	Description	Imports[1/]	Exports[1/]
	SURINAME		
27	Crude fertilizers and minerals N.E.S.	1.3	
273	Sand, stone and gravel	0.8	
276	Other crude minerals	0.5	
28	Metalliferrous ores and scrap	...	69.8
283	Non-ferrous base metal ores etc.	...	69.8[2/]
66	Non-metallic mineral mfrs N.E.S.	6.7	...
661	Lime, cement and other building materials	1.5	
662	Clay construction materials	0.8	
665	Glassware	1.7	
67	Iron and steel	8.6	
673	Iron and steel shapes	3.1	
674	Iron and steel universal plates etc.	2.4	
68	Non-ferrous metals	1.5	38.2
684	Aluminium	0.6	38.2

1/: Data for 1974

2/: Mainly bauxite

Sources: Nos. 12, 13, 14 and 15 of the List of References.

CHEMICAL TERMS AND SYMBOLS

Elements

Al - Aluminium
Ba - Barium
Be - Beryllium
Ca - Calcium
C - Carbon
Cr - Chromium
Co - Cobalt
Cu - Copper
Au - Gold
Ce - Cerium
H - Hydrogen
Fe - Iron
Pb - Lead
Li - Lithium
Mg - Magnesium
Mn - Manganese
Hg - Mercury
Mo - Molybdenum
Ni - Niobium
N - Nitrogen
O - Oxygen
P - Phosphorous
K - Potassium
Ra - Radium
Si - Silicon
Ag - Silver
S - Sulphur
Na - Sodium
Ta - Tantalum
Sn - Tin
Th - Thorium
Ti - Titanium
U - Uranium
Zn - Zinc
Zr - Zirconium

Azurite	-	Copper Carbonate ore - $CuCO_3Cu(OH)_2$
Agate	-	Semi-precious silica mineral
Antigonite	-	Magnesium Silicate ore - $MgSiO_2(OH)_4$
Ambylgonite	-	Lithium Aluminium Phosphate - $Li(AlF)PO_4$
Barite	-	Barium Sulphate - $BaSO_4$
Beryl	-	Silicate containing Beryllium and Aluminium - $Be_3Al_2(SiO_3)_6$
Boehmite Aluminium Ore	-	AlO.Oh
Chalcopyrite	-	Copper Iron Sulphide Ore - $CuFeS_2$
Cinnabar	-	Mercury Sulphide Ore - HgS
Columbite	-	Iron and Chromium Ore - $FeCr_2O$
Columbite	-	Iron and Columbium Ore - $Fe(CbO_3)_2$
Chromite	-	Ore containing Iron and Chromium - $FeCr_2O_4$
Chlorite	-	Silicate Complex
Dickite	-	Rare form of Kaolinite
Epidite	-	Calcium Silicate containing Aluminium, Iron or Magnesium
Euxenite	-	Brownish-black mineral containing yttrium, columbium, uranium, titanium, erbium and cerium
Gypsum	-	Calcium Sulphate - $CaSO_4$
Haematite	-	Iron Oxide - Fe_2O_3
Ilmenite	-	Iron - Titanium Ore
Kaolinite	-	Group of clay minerals containing hydrous aluminium silicates
Magnesia	-	Magnesium Oxide - MgO
Magnesite	-	Magnesium Carbonate - $MgCO_3$
Magnetite	-	Iron Oxide - Fe_3O_4
Monazite	-	Throium-Uranium-Cerium-Phosphate Ore

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Molybdenite	-	Molybdenium-Sulphur Ore - MoS_2
Malachite	-	Basic Copper Carbonate - $CuCO_3Cu(OH)_2$
Quartz	-	Pure Silica - SiO_2
Scheelite	-	Calcium - Tungsten Oxide - $CaWO_4$
Topaz	-	Aluminium Silicate - $Al_2SiO_4F_2$
Tantalite	-	Iron, Magnesium, Niobium Tantalum Oxide - $(Fe/Mn)(Nb/Ta)_2O_6$
Zircon	-	Silicate containing Zirconium - $ZrSiO_4$