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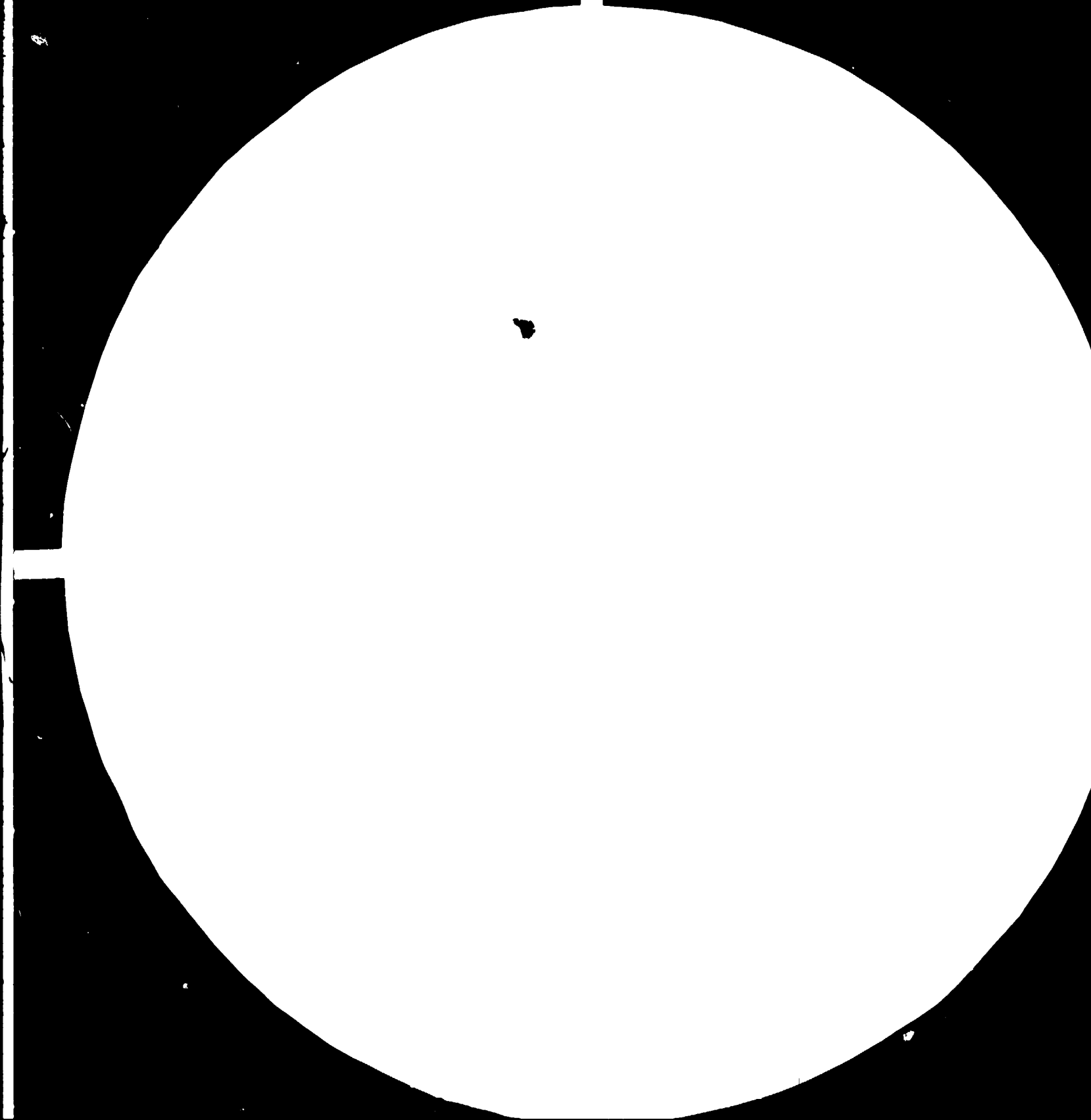
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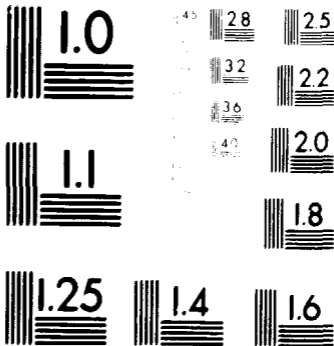
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14189

STUDY

ON ENERGY-RELATED TECHNOLOGIES

AND

THE PRODUCTION OF ENERGY-RELATED EQUIPMENT

1984

1985

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1) INTRODUCTION

Taking into account the rising energy requirements of developing countries the acquisition of technology by developing countries to find, produce, process, transport, market and utilize the required energy gets increasingly important and urgent.

Many developing countries in co-operation with the World Bank, international agencies and organizations of the UN-System have decided to undertake great efforts to enter into arrangements for technology transfer or build up their own technology competence also in the field of energy and some developing countries have already undertaken active measures to implement the legal framework, strategies, policies, priorities and research and development in the field of energy and a few of them have already succeeded in developing their own technical competence for the manufacture of energy-related equipment.

Special attention has to be given to accelerate on a broad basis this development of transfer of technology with the aim of establishing local production of energy-related equipment in developing countries in order to reduce dependency on foreign countries and to strengthen industry at home.

Therefore, the Industrial Development Board of UNIDO approved the conveying of the Second Consultation on the Capital Goods Industry with special emphasis on energy-related technology and equipment in 1985.

In view of the above, ideas and suggestions and recommendations given in this paper might become an input for the Consultation in 1985.

2) SUMMARY

- 2.1) Energy- one of the most important factors of life- is the basis of man's ability and capacity to work. The development of any activity in a community or country is dependent upon the availability of energy in the form, at the location and in the amounts needed. Therefore, the sources, production and consumption of energy in developing countries are described in this report in chapter 3.
- 2.2) A classification of developing countries was established using these energy data only (chapter 4). This classification may serve the purpose of developing strategies not only for a single country but for groups of countries with a similar energy background for the development of programs for the manufacture of energy-related equipment.
- 2.3) Most of the known energy technologies are applied in the developing countries. These energy technologies are described in chapter 5 with a break-down into the main equipment components. Therefore, the spectrum of energy-related equipment used in developing countries for finding, producing, processing, transporting, marketing and utilizing the energy needed was compiled in this chapter and in chapter 6 and is shown in Annexes A,B and C. An analytical summary describes the degree of complexity and difficulty to produce, market and operate energy-related equipment.
- 2.4) The main producers of energy-related equipment also mentioned in chapter 5 and 6 and are given in combination with the equipment list of Annexes A,B and C. These listings serve the purpose for identifying producers of equipment needed in a development country. A co-operation with these producers for the transfer of know-how and/or as a co-venturer might be envisaged, if a country decides to embark into the manufacture of such equipment.

- 2.5) Implications and problems and difficulties in the production of energy-related equipment were identified and are described in chapter 6 and 7.
- 2.6) Phases and activities for entering into production of energy-related equipment in developing countries are proposed.
- 2.7) Conclusions and recommendations had been derived and are given in chapter
- 2.8) Suggested areas for discussion at the Consultation on the production of energy-related equipment in developing countries had been worked out and are explained in chapter 10.

3) SOURCES OF ENERGY IN DEVELOPING COUNTRIES

The availability of energy is the basis of any development of a country.

The amount of the available energy used is proportional to the speed of development of a country and

the type of the available energy has a direct impact on the kind of industry activities using this energy or transforming this energy into the form needed by different end-users.

Any consideration of a production of energy-related equipment in a country will take into account the type and amounts of energy available in the country for which a manufacturer plans to produce energy-related equipment.

Therefore, a survey of the sources of energy in developing countries is fundamental for any recommendation or decision in the area of planning production of energy-related equipment.

The most important source of energy for a country is the utilization of its own energy resources.

The following survey of energy resources, production and consumption of energy in developing countries serves the purpose mentioned above.

It should be noted that figures used in this paper should give an idea about the order of magnitude of energies involved rather than claiming any authority in the correctness of methods or definitions applied for arriving at those figures.

Those figures, naturally, will change with time passing but the knowledge thereon and possible consequences which could be derived therefrom should be a valuable input for future production of energy-related equipment.

CRUDE OIL

World proven crude oil reserves are estimated with about 685 billion barrels or 4,2 billion terajoules.

In addition, to the proven crude oil reserves there exists a high probability for new discoveries of crude oil which might add up to the present reserves, in a modest way.

Then, the efforts undertaken to improve enhanced oil recovery methods, finally would result in an increase of crude oil reserves.

Above all, the oil price and the increase of the oil price is a vital parameter for additional crude oil reserves as a price increase would give an incentive

- a) to continue with exploration and
- b) to develop and produce economically marginal fields and
- c) to invest into enhanced oil recovery projects and
- d) to invest into unconventional heavy oil projects such as exploitation of oil shales and tarsands.

Many developing countries have proven crude oil reserves and several have a production exceeding their own domestic demand enabling them to export crude oil.

As the usage of crude oil is very flexible, and the production and processing technology and the transport and distribution systems are well established many developing countries are importing, processing, storing, distributing and utilizing crude oil and its products in many ways.

Tables CO₁ to CO₃ illustrate the distribution of crude oil reserves, production and consumption which latter amounts to about 22 billion barrels or 0,13 billion tetrajoules.

ENHANCED OIL RECOVERY (EOR)

As a consequence of supply disruptions and threats for disruptions of supply efforts were undertaken for developing processes which could increase the recovery rates from petroleum deposits - called enhanced oil recovery - thus increasing the petroleum reserves in existing oil fields. The technology developed, up to now, include thermal processes (steam, air or oxygen for underground combustion, hot water), carbon dioxide or other gases, and the use of chemicals, including solvents.

The best enhanced oil recovery method depends on the reservoir and rock properties, petroleum viscosity and other conditions. Water flooding and steam flooding and gas injection are reportedly best suited for obtaining an increased petroleum recovery.

The number of enhanced oil recovery projects increases rapidly whereby investments of more than 500 million US \$ are planned. Conservative estimates of the additional reserves producible by enhanced oil recovery processes range from 5 to 10% of the remaining oil in place in the world, that means 200 to 400 billion barrels of oil in addition to existing reserves.

TABLE C01

ENERGY RESERVES AND PRODUCTION AND CONSUMPTION
CRUDE OIL

AREA	Reserves Mio bbls	1980 Production Mio bbls	1980 Consumption Mio bbls
ASIA (except Japan+USSR)	422,000	8,700	2,200
MIDDLE AND SOUTH AMERICA	79,000	2,000	1,300
EASTERN EUROPE plus USSR	66,000	4,380	3,960
AFRICA	59,000	2,200	382
NORTH AMERICA	33,000	3,950	6,280
WESTERN EUROPE	23,000	830	4,570
JAPAN + AUSTRALIA NEW ZEALAND	2,600	140	2,300
TOTAL (rounded)	685,000	22,200	21,000

Source:

- (1) The Energy Transition in Developing Countries
- (2) Petro Atlas
- (3) International Petroleum Encyclopedia
- (4) Arab Oil & Gas Directory 1983
- (5) Energy Balances 1977 - 1980, U.N. 1983

TABLE CO2

ENERGY RESERVES AND PRODUCTION AND CONSUMPTION
CRUDE OIL

MIDDLE AND SOUTH AMERICA

Country	Reserves Mio bbls	1980 Production Mio bbls	1980 Consumption Mio bbls
MEXICO	48,300	707	334
VENEZUELA	21,500	790	120
ARGENTINIEN	2,600	170	194
BRAZIL	1,800	63	363
ECUADOR	1,400	75	26
PERU	800	66	44
CHILE	800	11	30
TRINIDAD AND TOBAGO	600	75	24
COLOMBIA	500	43	55
BOLIVIA	200	ε	9
GUATEMALA	50	0,6	10
BARBADOS	1	0,3	1,4
BELIZE	-		
COSTA RICA	-		6
DOMINICAN REPUBLIC	-		13
EL SALVADOR	-		5
FRENCH GUYANA	-		
HAITI	-		2
HONDURAS	-		3
JAMAICA	-		15
NICARAGUA	-		4
PANAMA	-		13
PARAGUAY	-		2
PUERTO RICO	-		
URUGUAY	-		13
BAHAMAS	-		
MARTINIQUE	-		
NETHERLANDS			
ANTILLES	-		
VIRGIN ISLANDS	-		
TOTAL (rounded)	79,000	2,000	1,300

Source: (1) The Energy Transition in Developing Countries
(2) Petro Atlas
(3) International Petroleum Encyclopedia
(4) Arab Oil & Gas Directory 1983
(5) Energy Balances 1977 - 1980, U.N. 1983

TABLE CO3

ENERGY RESERVES AND PRODUCTION AND CONSUMPTIONCRUDE OILAFRICA

Country	Reserves Mio bbls	1980 Production Mio bbls	1980 Consumption Mio bbls
LIBYA	22,600	670	50
NIGERIA	16,750	718	57
ALGERIA	9,440	356	48
EGYPT	3,325	207	84
TUNESIA	1,800	40	17
ANGOLA	1,635	52	7
CONGO P.R.	1,550	22	3
CAMEROON	530	20	4
GABON	460	61	9
SUDAN	400		8
ZAIRE	139	7	7
IVORY COAST	111	1	8
GHANA	5	1	7
BENIN	-		1
BOTSWANA	-		
BURUNDI	-		0,2
CENTRAL AFRICAN REP.	-		
CHAD	-		
ETHIOPIA	-		3
KENYA	-		15
MADAGASCAR	-	-	
MALAWI	-		1
MALI	-		
MAURITIUS	-		
MOROCCO	-		3
MOZAMBIQUE	-		5
NIGER	-		1
RWANDA	-		0,4
SENEGAL	-		10
SEYCHELLES	-		
SIERRA LEONE	-		3
SOMALIA	-		2
SOUTHERN AFRICA	-	-	
TANZANIA	-		5
UGANDA	-	-	13
ZAMBIA	-	-	6
ZIMBABWE	-	-	4
LIBERIA	-	-	
TOGO	-	-	
TOTAL (rounded)	58,745	2,200	382

Source:

- (1) The Energy Transition in Developing Countries
- (2) Petro Atlas
- (3) International Petroleum Encyclopedia
- (4) Arab Oil & Gas Directory 1983
- (5) Energy Balances 1977 - 1980, U.N. 1983

TABLE CO4

ENERGY RESERVES AND PRODUCTION AND CONSUMPTIONCRUDE OILASIA

Country	Reserves Mio bbls	1980 Production Mio bbls	1980 Consumption Mio bbls
SAUDI ARABIA	168,000	3,515	173
KUWAIT	68,000	504	16
IRAN	55,000	506	170
IRAQ	41,000	920	68
U.A.E.	32,000	620	28
CHINA	19,500	736	614
INDIA	9,600	550	207
INDONESIA	9,500	575	148
NEUTRAL ZONE	6,000	197	
QATAR	3,600	172	9
MALAYSIA	3,300	98	30
OMAN	2,300	103	3
SYRIA	1,900	60	2
BRUNEI	1,700	84	
BAHRAIN	200	17	2
PAKISTAN	200	3	32
TURKEY	100	16	108
THAILAND	100	1	78
BURMA	30	11	14
PHILIPPINES	20	3	77
LEBANON	-	-	39
NORTH YEMEN	-	-	
SOUTH YEMEN	-	-	
JORDAN	-	-	13
BANGLADESH	-	-	10
GUAM	-	-	
KOREA REP. OF	-	-	186
NEPAL	-	-	1
SINGAPORE	-	-	99
HONG KONG	-	-	45
SRI LANKA	-	-	
MACAO	-	-	
PAPA NEW GUINEA	-	-	4
VIETNAM	-	-	
TOTAL (rounded)	422,000	8,690	2,214

Source: (1) The Energy Transition in Developing Countries
(2) Petro Atlas
(3) International Petroleum Encyclopedia
(4) Arab Oil & Gas Directory 1983
(5) Energy Balances 1977 - 1980, U.N. 1983

N A T U R A L G A S

World proved natural gas reserves are estimated with about 72 billions toe.

There is still a high probability for the existence of huge additional amounts of natural gas which might be discovered by exploration.

But the huge investment needed for the development, production, processing, eventual liquefaction, transportation and distribution causes a high consumer price which is quite often incompetent to crude oil and its products.

Therefore, the yearly production and consumption is modest compared with the huge amounts of reserves and consists of about 1,4 billions toe.

The international trade of natural gas involves about 135 million toe, which is approximately 10 % of world gas production, only, 85 % being delivered through pipe lines and 15 % delivered as LNG (Source: Petroleum Economist).

In cases where the production site is not too far away from the consumer market investment for liquefaction might be avoidable and transportation costs could be minimized, leading to economically feasible gas projects.

In such cases, natural gas could be an attractive alternate source of energy also for producer countries in developing a local home market.

Many developing countries have natural gas reserves and considerable production and consumption, as shown in table NG 1, due to the fact that domestic natural gas is cheaper than all crude oil products which might be imported. Natural gas

is used as heating fuel, for energy conversion purposes, especially for conversion into electrical energy, as the necessary technology is well established.

It must be emphasized that the pricing of natural gas is the key factor for any increase of its utilization and in consequence for the establishment of the manufacture of energy-related equipment.

As long as natural gas is flared in substantial amounts the pricing of natural gas should be reconsidered. Gas production and its domestic utilization can also positively influence the development of the industrial sector of a producer country or an importing country as natural gas could be the raw material for the production of fertilizers, urea and methanol of which the latter in turn might then become an alternate energy resource.

For developing countries without domestic production, gas could be imported via pipe lines or as liquified natural gas (LNG) if the enduser price would be competitive with petroleum products or coal. Such projects are in the planning stage and might become feasible in cases of strong cooperation of many countries -- f.e. the Nigerian/Western Europe Natural Gas Pipeline Project -- . LNG-projects are more difficult to materialize what regards to technology as well as to the economics. It is generally expected that the future demand for natural gas will increase to about 2,5 billions m^3 in 1985 and to about 4 billions m^3 in the year 2.000.

The present reserves of natural gas, the yearly production rate and the expectations for a consumption of natural gas of 4 billions m^3 per year in 2.000 are a valid basis for the creation of an industry for the manufacture of energy-related equipment in the gas and electricity sector.

TABLE NG 1

ENERGY RESERVES AND PRODUCTION AND CONSUMPTIONNATURAL GAS

Area	Reserves (Mio toe)	1980 Production (Mio toe)	1980 Consumption (Mio toe)
ASIA (except Japan and USSR)	22,681	106	44
MIDDLE AND SOUTH AMERICA	4,611	52	50
EASTERN EUROPE and USSR	28,798	445	422
AFRICA	4,730	30	22
NORTH AMERICA	6,873	557	559
WESTERN EUROPE	3,855	173	188
JAPAN and AUSTRALIA and NEW ZEALAND	904	11	35
TOTAL (rounded)	72,452	1,374	1,320

Source:

- (1) The Energy Transition in Developing Countries
- (2) Petro Atlas
- (3) International Petroleum Encyclopedia
- (4) Arab Oil & Gas Directory 1983
- (5) Energy Balances 1977 - 1980, U.N. 1983

TABLE NG 2

ENERGY RESERVES AND PRODUCTION AND CONSUMPTIONNATURAL GASMIDDLE AND SOUTH AMERICA

Country	Reserves (Mio toe)	1980 Production (thousand toe)	1980 Consumption (thousand toe)
MEXICO	1,874	25,000	22,300
VENEZUELA	1,336	10,000	10,000
ARGENTINA	623	7,000	8,887
BRAZIL	58	-	1,000
ECUADOR	101	70	70
PERU	30	1,000	1,000
CHILE	62	1,500	1,500
TRINIDAD AND TOBAGO	272	2,500	2,500
COLOMBIA	113	2,700	2,700
BOLIVIA	141	2,000	113
GUATEMALA	1		
BARBADOS			
BELIZE			
COSTA RICA			
DOMINICAN REPUBLIC			
EL SALVADOR			
FRENCH GUYANA			
HAITI			
HONDURAS			
JAMAICA			
NICARAGUA			
PANAMA			
PARAGUAY			
PUERTO RICO			
URUGUAY			
BAHAMAS			
MARTINIQUE			
NETHERLANDS ANTILLES			
VIRGIN ISLANDS			
TOTAL	4,611	51,770	50,070

Source: (1) The Energy Transition in Developing Countries
(2) Petro Atlas
(3) International Petroleum Encyclopedia
(4) Arab Oil & Gas Directory 1983
(5) Energy Balances 1977 - 1980, U.N. 1983

TABLE NG 3

ENERGY RESERVES AND PRODUCTION AND CONSUMPTIONNATURAL GASAFRICA

Country	Reserves (Mio toe)	1980 Production (thousand toe)	1980 Consumption (thousand toe)
LIBYA	588	16,000	15,000
NIGERIA	801	1,000	1,000
ALGERIA	2,749	10,000	3,500
EGYPT	177	2,000	2,000
TUNESIA	106	400	400
ANGOLA	36	77	77
CONGO P.R.	67	20	20
CAMEROON	110	2	-
GABON	12	130	130
SUDAN	-	-	-
ZAIRE	1	3	3
IVORY COAST	75	-	-
GHANA	-	-	-
BENIN	-	-	-
BOTSWANA	-	-	-
BURUNDI	-	-	-
CENTRAL AFRICAN REP.	-	-	-
CHAD	-	-	-
ETHIOPIA	-	-	-
KENYA	-	-	-
MADAGASCAR	-	-	-
MALAWI	-	-	-
MAURITIUS	-	-	-
MOROCCO	3	60	60
MOZAMBIQUE	-	-	-
NIGER	-	-	-
RWANDA	-	-	-
SENEGAL	-	-	-
SEYCHELLES	-	-	-
SIERRA LEONE	-	-	-
SOMALIA	-	-	-
SOUTHERN AFRICA	-	-	-
TANZANIA	5	2	-
UGANDA	-	-	-
ZAMBIA	-	-	-
ZIMBABWE	-	-	-
LIBERIA	-	-	-
TOGO	-	-	-
TOTAL (rounded)	4,730	29,694	22,190

Source: (1) The Energy Transition in Developing Countries
(2) Petro Atlas
(3) International Petroleum Encyclopedia
(4) Arab Oil & Gas Directory 1983
(5) Energy Balances 1977 - 1980, U.N. 1983

TABLE NG 4

ENERGY RESERVES AND PRODUCTION AND CONSUMPTIONNATURAL GASASIA

Country	Reserves (Mio toe)	1980 Production (thousand toe)	1980 Consumption (thousand toe)
SAUDI ARABIA	2,718	45,684	1,238
KUWAIT	761	5,495	5,495
IRAN	11,925	7,000	6,700
IRAQ	712	1,000	1,000
U.A.E.	513	37	26
CHINA	736	13,000	13,000
INDIA	358	14,000	1,000
INDONESIA	731	7,000	4,600
NEUTRAL ZONE	119	-	-
QATAR	1,847	5,483	4,010
MALAYSIA	840	1,000	1,000
OMAN	62	-	-
SYRIA	37	-	-
BRUNEI	180	-	-
BAHRAIN	222	12	8
PAKISTAN	458	5,000	5,000
TURKEY	13	85	85
THAILAND	272	4	4
BURMA	4	-	-
PHILIPPINES	0,4	-	-
LEBANON	-	-	-
NORTH YEMEN	-	-	-
SOUTH YEMEN	-	-	-
JORDAN	-	-	-
BANGLADESH	173	1,164	1,164
GUAM	-	-	-
KOREA REP. OF	-	-	-
SINGAPORE	-	-	-
HONG KONG	-	-	-
SRI LANKA	-	-	-
MACAO	-	-	-
PAPUA NEW GUINEA	-	-	-
VIETNAM	-	-	-
TOTAL (rounded)	22,681	105,964	44,330

Source: (1) The Energy Transition in Developing Countries
(2) Petro Atlas
(3) International Petroleum Encyclopedia
(4) Arab Oil & Gas Directory 1983
(5) Energy Balances 1977 - 1980, U.N. 1983

C O A L
AND LIGNITE

Developing countries have significant coal reserves and production.

In recent years there has been an above average increase of economically recoverable reserves due to increased energy prices and additional exploration.

Coal might develop to an energy option for developing countries as the huge reserves in developing countries would be sufficient to cover consumption for more than 100 years.

Published estimates of coal reserves (Table C 1) show that developing countries have approximately 30 % of world's reserves, while their share of world production is about 20 % and their share of world coal consumption is about 16 % (Table C1 to C4).

The general trend for the utilization of coal should be considered when decisions about energy and production of energy-related equipment have to be taken:

- There is a continuing growth in the demand for coal to be used for steam generation in electric power plant and in industry;
- A continuation of a price advantage for steam coal over petroleum products;
- Interest and readiness of coal importing countries to participate in coal mining activities in producer countries.

With the growing importance of coal as an energy alternative -- especially as the demand of coal for steel production is stable -- there exists also a sound basis for the production of related equipment.

ENERGY RESERVES AND PRODUCTION AND CONSUMPTIONCOAL

Area	Reserves economically recoverable (Mio toe)	1980 Production Solid Fuels (Mio toe)	1980 Consumption Solid Fuels (Mio toe)
ASIA (except Japan, USSR)	136,000	548	375
MIDDLE AND SOUTH AMERICA	14,000	14	15
EASTERN EUROPE AND USSR	147,000	1,374	1,351 ^{x)}
AFRICA	43,000	120	91
NORTH AMERICA	187,000	790	616
WESTERN EUROPE	82,000	457	400
JAPAN AND AUSTRALIA AND NEW ZEALAND	28,000	121	144
TOTAL (rounded)	637,000	3,424	2,992

Source: - World Energy Outlook, IEA, 1982

- Energy Transition in Developing Countries, World Bank, 1983

- 1982-1983 World Coal Industry Report

x) Author's estimate

TABLE C2

ENERGY RESERVES AND PRODUCTION AND CONSUMPTIONCOALMIDDLE AND SOUTH AMERICA

Country	Reserves (Mio toe)	Production Solid Fuels (Mio toe) 1980	Consumption Solid Fuels (Mio toe) 1980
MEXICO	875	4.83	3.90
VENEZUELA	978	0.09	0.26
ARGENTINA	290	0.41	0.80
BRAZIL	8,098	3.23	5.80
ECUADOR			-
PERU	105	0.10	0.15
CHILE	162	1.01	1.20
TRINIDAD AND TOBAGO			-
COLOMBIA	3,000	4.44	3.10
BOLIVIA			-
GUATEMALA			-
BARBADOS			-
BELIZE			-
COSTA RICA			-
DOMINICAN REPUBLIC			-
EL SALVADOR			-
FRENCH GUYANA			-
HAITI			-
HONDURAS			-
JAMAICA			-
NICARAGUA			-
PANAMA			-
PARAGUAY			-
PUERTO RICO			-
URUGUAY			0.01
BAHAMAS			-
MARTINIQUE			-
NETHERLANDS ANTILLES			-
VIRGIN ISLANDS			-
TOTAL (rounded)	13,508	14.11	15.22

Source: - World Energy Outlook, IEA, 1982
 - Energy Transition in Developing Countries, World Bank 1983
 - 1982-1983 World Coal Industry Report

TABLE C3

ENERGY RESERVES AND PRODUCTION AND CONSUMPTIONCOALAFRICA

Country	Reserves (Mio toe)	Production Solid Fuels (Mio toe) 1980	Consumption Solid Fuels (Mio toe) 1980
LIBYA			
NIGERIA	90	0.20	0.20
ALGERIA		0.01	0.15
EGYPT			1.00
TUNESIA			-
ANGOLA			-
CONGO P.R.			-
CAMEROON			-
GABON			-
SUDAN			-
ZAIRE		0.10	0.18
IVORY COAST			-
GHANA			0.01
BENIN			-
BOTSWANA			-
BURUNDI		0.01	0.01
CENTRAL AFRICAN REP.			
CHAD			
ETHIOPIA			-
KENYA			0.04
MADAGASCAR			-
MALAWI			0.03
MAURITIUS			-
MOROCCO		0.70	0.54
MOZAMBIQUE	80	0.41	0.17
NIGER			-
RWANDA			-
SENEGAL			-
SEYCHELLES			-
SIERRA LEONE			-
SOMALIA			
SOUTHERN AFRICA	43,000	115.00	86.50
TANZANIA			0.01
UGANDA			-
ZAMBIA	5	0.50	0.37
ZIMBABWE		3.23	2.14
LIBERIA			
TOGO			
TOTAL (rounded)	43,175	120.16	91.35

Source: - World Energy Outlook, IEA, 1982
- Energy Transition in Developing Countries, World Bank, 1983
- 1982-1983 World Coal Industry Report

TABLE C4

ENERGY RESERVES AND PRODUCTION AND CONSUMPTIONCOALASIA

Country	Reserves (Mio toe)	Production Solid Fuels (Mio toe) 1980	Consumption Solid Fuels (Mio toe) 1980
SAUDI ARABIA			-
KUWAIT			-
IRAN	193	0.91	0.60
IRAQ			-
U.A.E.			-
CHINA	99,000	446.28	301.00
INDIA	33,700	78.37	53.70
INDONESIA	1,430	0.29	0.20
NEUTRAL ZONE			-
QATAR			-
MALAYSIA			0.04
OMAN			-
SYRIA			-
BRUNEI			-
BAHRAIN			-
PAKISTAN		0.62	0.60
TURKEY	793	8.37	5.00
THAILAND		0.31	0.34
BURMA			-
PHILIPPINES		0.20	0.14
LEBANON			-
NORTH YEMEN			-
SOUTH YEMEN			-
JORDAN			-
BANGLADESH	519		0.12
GUAM			-
KOREA REP. OF	386	12.60	13.20
SINGAPORE			-
HONG KONG			0.01
SRI LANKA			0.01
MACAO			-
PAPUA NEW GUINEA			-
VIETNAM			-
TOTAL (rounded)	136,021	547.95	374.96

Source: - World Energy Outlook, IEA, 1982
 - Energy Transition in Developing Countries, World Bank, 1983
 - 1982-1983 World Coal Industry Report

COAL CONVERSION

- Coal gasification

Conversion of coal to low Btu gas for use in industry is well established.

But, up to now a wide spread utilisation of coal for the production of synthetic natural gas (SNG) could not be developed due to commercial and environmental considerations.

- Coal liquefaction

The technology for the production of synthetic fuels from coal is well established. But costs of synthetic fuels through coal liquefaction might be in the order of magnitude of 60 to 80 \$ per barrel. These fuel oils would therefore become an alternative to petroleum products in developing countries only, if the supply of petroleum products is not possible for any reason, and economics allow this expensive energy.

- Coal combustion

New technologies had been developed for the economical combustion of coal for power generation. The combustion technique had been improved through fluidised bed combustion being also used for steam power generation even on a smaller scale.

After an economic solution of sulphur removal this energy resource could develop into an interesting energy alternative.

OTHER FOSSIL ENERGY RESOURCES

Tar sands and heavy oils and shale oil

Huge amounts of this type of energy resources were discovered, also in developing countries.

Their production requires new technologies in mining and/ or heat application and in addition, quite often in the removal of impurities, such as minerals and metal compounds.

Extraction technology for shale oil is not yet established, satisfactorily.

With the recent improvement of the energy supply situation research and developemt budgets for the establishment of economical technology for the production of these energy reserves were cut. Thus, these fossil energy resources might become an alternate energy resource to crude oil after the year 2000 subject not only to the development of a commercial technology for production, but also to the satisfactory solution of the environmental hazards involved.

HYDRO ENERGY

Hydro energy reserves (potential) are small compared with crude oil, natural gas or coal reserves. But for developing countries these energy reserves could develop into a significant supply basis of energy. Therefore, there is a growing interest for hydro energy as a clean and renewable form of energy.

Hydro energy reserves increased during the past up to 1500 to 2000 Mio KW in developing countries due to increasing energy prices.

About 50% of world's hydro energy reserves are situated in developing countries as given in tables HE1 to HE4. Thus, developing countries have the potential to generate up to 10 billion KWh/year, equivalent to 50 Mio barrels oil per day.

Most of the developing countries with hydro energy reserves are planning to develop part of these resources in the near future as hydro energy became competitive with electricity from thermal power plants or from large diesel units.

Hydropower, therefore, might become as important as petroleum for developing countries, especially as it could be assumed that demand for electricity will increase, continuously.

Technology for development of hydro power is well established, capital expenditure for such development is high, but in comparison with the costs of other forms of energy, the unit cost of electrical energy converted from hydro energy (including operating costs) make hydro power development most attractive.

In view of the enormous demand in electrical energy and the high potential of hydro energy in developing countries, the high growth rate of consumption (above 6 per cent per year) governments of developing countries could give high priority to the assessment of the hydro energy potential, and the planning of developing these resources on a national and/or regional level.

MINI - HYDRO POWER (under 1 megawatts)

Many conditions - environmental, political, financial, low water capacity - could prevent the construction of a conventionally sized hydro power plant.

Therefore, it might be assumed that up to 10 percent of world's hydro energy reserves could be utilized through the development of mini-hydro power projects.

The technology for mini-hydro power plants is well established and thousands of plants have been installed, world wide.

Economics are critical but quite often electricity from mini- hydro power plants is competitive to thermoelectricity, is easier acceptable by developing countries for a faster solution of a local and limited energy supply requirement whereby financial constraints and long construction times and opposition on environmental grounds might be minimized.

An other advantage of the implementation of mini-hydro power projects is the much easier transfer or development of the technology in this field. As the capital needed for mini hydro power projects is rather small urgent local demand could be satisfied much faster than by means of conventional hydro power projects.

Speeding up electrification, especially in villages and rural areas could have a tremendous effect on many aspects in view of increases and economics of rural productions as harvesting, drying, and cooling of products could be improved, thus giving rise to establishing also a higher standard of living of rural populations. India, China, Latin America have implemented already a huge amount of mini hydro power projects.

TABLE HE1

ENERGY RESERVES AND PRODUCTION AND CONSUMPTION
HYDRO ELECTRICITY

Area	Reserves (Potential) Megawatts	Production GWh	Consumption GWh
MIDDLE AND SOUTH AMERIKA	558,000	220	220
ASIA	669,000	152	152
AFRICA	297,000	41	41
TOTAL (rounded)	1524,000	413	413

Source: Energy Transition in Developing Countries, World Bank 1983

TABLE HE2

ENERGY RESERVES AND PRODUCTION AND CONSUMPTION
HYDRO ELECTRICITY

MIDDLE AND SOUTH AMERICA

Country	Hydro Potential (Megawatts)	Production (GWh)	Consumption (GWh)
ARGENTINA	40,000	15.00	15.00
BOLIVIA	18,000	1.09	1.09
BRAZIL	213,140	124.00	124.00
CHILE	18,772	6.68	6.68
COLOMBIA	94,358	14.40	14.40
COSTA RICA	9,071	2.18	2.18
DOMINICAN REP.	1,900	0.06	0.06
ECUADOR	22,733	1.00	1.00
EL SALVADOR	1,377	1.36	1.36
GUATEMALA	5,426	0.29	0.29
HAITI	152	0.24	0.24
HONDURAS	2,800	1.00	1.00
JAMAICA	100	0.12	0.12
MEXICO	25,250	26.00	26.00
NICARAGUA	4,106	0.48	0.48
PANAMA	3,031	0.80	0.80
PARAGUAY	10,965	1.00	1.00
PERU	60,000	7.00	7.00
TRINIDAD AND TOBAGO	-	-	-
URUGUAY	2,248	2.00	2.00
VENEZUELA	25,000	15.00	15.00
TOTAL (rounded)	558,429	219.70	219.70

Source: Energy Transition in Developing Countries, World Bank 1983

TABLE HE3

ENERGY RESERVES AND PRODUCTION AND CONSUMPTION
HYDRO ELECTRICITY

AFRICA

Country	Hydro Potential (Megawatts)	Production (GWh)	Consumption (GWh)
ALGERIA	287	0.40	0.40
ANGOLA	23,000	1.49	1.49
BENIN	500	0.09	0.09
BURUNDI	800	0.04	0.04
CAMEROON	23,000	1.35	1.35
CONGO P.R.	11,000	0.08	0.08
EGYPT	2,660	9.00	9.00
ETHIOPIA	12,000	0.42	0.42
GABON	18,000	-	-
GHANA	2,000	4.60	4.60
IVORY COAST	3,000	1.00	1.00
KENYA	6,000	1.00	1.00
LIBYA			
MALAWI	900	0.34	0.34
MOROCCO	15,000	2.00	2.00
MOZAMBIQUE	15,000	0.72	0.72
NIGER	235	0.08	0.08
NIGERIA	12,400	2.00	2.00
RWANDA	600	0.19	0.19
SENEGAL	500		
SIERRA LEONE	1,300	0.01	0.01
SOMALIA	50		
SUDAN	2,700	0.60	0.60
TANZANIA	9,500	0.80	0.80
TUNISIA	65		
UGANDA	1,200	0.40	0.40
ZAIRE	120,000	4.00	4.00
ZAMBIA	12,000	6.40	6.40
ZIMBABWE	3,800	4.00	4.00
TOTAL (rounded)	297,497	41.01	41.01

Source: Energy Transition in Developing Countries, World Bank 1983

TABLE HE4

ENERGY RESERVES AND PRODUCTION AND CONSUMPTION
HYDRO ELECTRICITY

ASIA AND PACIFIC

Country	Hydro Potential (Megawatts)	Production (GWh)	Consumption (GWh)
BANGLADESH	800	0.60	0.60
CHINA	378,532	58.00	58.00
HONG KONG			
INDIA	100,000	52.00	52.00
INDONESIA	32,000	3.00	3.00
IRAN		3.00	3.00
IRAQ		1.00	1.00
MALAYSIA	25,800	1.00	1.00
NEPAL	18,250	0.20	0.20
PAKISTAN	19,600	10.00	10.00
PAPUA NEW GUINEA	29,000	0.40	0.40
PHILIPPINES	10,048	6.00	6.00
SINGAPORE			
SRI LANKA	2,500	1.50	1.50
THAILAND	20,148	2.00	2.00
TURKEY	32,000	13.00	13.00
TOTAL (rounded)	668,678	151.70	151.70

Source: Energy Transition in Developing Countries, World Bank 1983

TABLE ELG 1

ELECTRICITY GENERATION
CAPACITY INSTALLED
(thousand Megawatts)

AREA	TOTAL	PRIMARY ENERGY			SECONDARY ENERGY			
		Hydro	Geo Thermal	Nuclear	Steam	Gas Turbine	Combined Cycle	Diesel
MIDDLE AND SOUTH AMERICA	87.9	49.9	0.2	0.4	23.7	7.9	1.0	4.8
ASIA	138.0	41.2	0.4	1.0	65.2	3.2	-	27.0
AFRICA	22.3	12.6	-	-	5.3	2.9	-	1.5
TOTAL (rounded)	248.2	103.7	0,6	1.4	94.2	14.0	1.0	33.3

Source: Energy Transition in Developing Countries, World Bank 1983

ELECTRICITY GENERATION
CAPACITY INSTALLED
(MEGAWATTS)

MIDDLE AND SOUTH AMERICA

COUNTRY	TOTAL	PRIMARY ENERGY			SECONDARY ENERGY			
		Hydro	Geo Thermal	Nuclear	Steam	Gas Turbine	Combined Cycle	Diesel
ARGENTINA	11,290	4,533	-	357	4,096	1,536	-	768
BOLIVIA	500	287	-	-	-	128	85	-
BRAZIL	31,735	27,267	-	-	2,994	-	-	1,474
CHILE	2,941	1,471	-	-	1,103	176	-	191
COLOMBIA	4,282	2,908	-	-	412	866	-	96
COSTA RICA	645	456	-	-	11	-	-	178
DOMINICAN REP.	1,067	172	-	-	573	295	-	27
ECUADOR	1,183	225	-	-	-	-	-	958
EL SALVADOR	501	271	95	-	67	68	-	-
GUATEMALA	447	103	-	-	176	134	-	34
HAITI	135	44	-	-	-	-	-	91
HONDURAS	213	122	-	-	-	91	-	-
JAMAICA	680	21	-	-	659	-	-	-
MEXICO	17,761	6,491	150	-	8,674	1,557	889	-
NICARAGUA	366	103	-	-	229	34	-	-
PANAMA	753	297	-	-	264	14	-	178
PARAGUAY	272	194	-	-	78	-	-	-
PERU	3,116	1,863	-	-	852	401	-	-
TRINIDAD AND TOBAGO	662	-	-	-	-	-	-	662
URUGUAY	819	371	-	-	417	31	-	-
VENEZUELA	8,548	2,680	-	-	3,110	2,582	-	176
TOTAL (rounded)	87,916	49,879	245	357	23,715	7,913	974	4,833

Source: Energy Transition in Developing Countries, World Bank 1983

TABLE ELG 3

ELECTRICITY GENERATIONCAPACITY INSTALLED

(MEGAWATTS)

ASIA AND PACIFIC

COUNTRY	TOTAL	PRIMARY ENERGY			SECONDARY ENERGY			Diesel
		Hydro	Geo Thermal	Nuclear	Steam	Gas Turbine	Combined Cycle	
BANGLADESH	832	80	-	-	429	286	-	37
CHINA	65,869	20,318	-	-	34,164	-	-	11,387
HONG KONG	3,227	-	-	-	-	-	-	3,227
INDIA	33,007	11,794	-	860	17,911	-	-	2,442
INDONESIA	5,548	748	-	-	1,680	2,016	-	1,104
IRAN	5,300	850	-	-	-	-	-	4,450
IRAQ	1,700	84	-	-	-	-	-	1,616
MALAYSIA	2,695	642	-	-	1,499	123	-	431
NEPAL	86	52	-	-	9	-	-	25
PAKISTAN	3,632	1,847	-	137	1,088	560	-	-
PAPUA NEW GUINEA	329	99	-	-	-	-	-	230
PHILIPPINES	4,477	947	443	-	3,087	-	-	-
SINGAPORE	1,900	-	-	-	-	-	-	1,900
SRI LANKA	399	313	-	-	61	-	-	25
THAILAND	3,871	1,270	-	-	2,315	208	-	78
TURKEY	5,119	2,131	-	-	2,988	-	-	-
TOTAL (rounded)	137,991	41,175	443	997	65,231	3,193	-	26,952

Source: Energy Transition in Developing Countries, World Bank 1983

TABLE ELG 4

ELECTRICITY GENERATION
CAPACITY INSTALLED
(MEGAWATTS)

AFRICA

COUNTRY	TOTAL	PRIMARY ENERGY			SECONDARY ENERGY			
		Hydro	Geo Thermal	Nuclear	Steam	Gas Turbine	Combined Cycle	Diesel
ALGERIA	1,988	287	-	-	1,106	595	-	-
ANGOLA	708	553	-	-	-	-	-	155
BENIN	17	-	-	-	-	-	-	17
BURUNDI	9	0.3	-	-	-	-	-	8.7
CAMEROON	358	263	-	-	-	-	-	95
CONGO P.R.	118	90	-	-	-	-	-	28
EGYPT	3,915	1,645	-	-	1,680	590	-	-
ETHIOPIA	237	216	-	-	6	-	-	15
GABON	239	137	-	-	-	-	-	102
GHANA	876	792	-	-	-	-	-	84
IVORY COAST	882	614	-	-	214	11	-	43
KENYA	527	336	-	-	124	34	-	33
LIBYA	-	-	-	-	-	-	-	-
MALAWI	131	101	-	-	-	20	-	10
MOROCCO	1,396	613	-	-	627	133	-	23
MOZAMBIQUE	2,508	2,258	-	-	-	-	-	250
NIGER	47	-	-	-	-	-	-	47
NIGERIA	2,301	760	-	-	586	940	-	15
RWANDA	22	12	-	-	-	-	-	11
SENEGAL	196	-	-	-	155	-	-	41
SIERRA LEONE	98	2	-	-	-	-	-	96
SOMALIA	90	-	-	-	-	-	-	90
SUDAN	290	155	-	-	49	15	-	71
TANZANIA	370	243	-	-	-	15	-	112
TUNISIA	911	29	-	-	353	503	-	26
UGANDA	154	150	-	-	-	-	-	4
ZAIRE	1,144	1,077	-	-	-	-	-	67
ZAMBIA	1,730	1,641	-	-	-	-	-	89
ZIMBABWE	1,051	633	-	-	418	-	-	-
TOTAL (rounded)	22,314	12,607	-	-	5,318	2,856	-	1,533

Source: Energy Transition in Developing Countries, World Bank 1983

OTHER ENERGY RESOURCES

Geothermal power

Geothermal energy - the natural internal heat of the earth - might be utilized in rare cases where it is extracted as a heated fluid, often hot water or steam or steam and water from formations in depths of a few hundred to a few thousand meters below earth's surface. Steam could be used to drive steam - turbines to generate electricity. Hot water could be used for space heating, hot water supply and process heat also.

Only few geothermal resources were discovered in developing countries up to now and listed in tables ELG 1 to ELG 4.

Again, with increasing energy prices this source of energy is becoming more interesting.

Exploration and production projects are planned in El Salvador, Indonesia, Kenya, Mexico, Nicaragua, Philippines and Turkey. The potential of geothermal power in developing countries might be in the order of magnitude of 30,000 to 300,000 megawatts.

NUCLEAR POWER

A major source of energy is that of atomic nuclei.

Two types of processes are involved, the fission process of heavy atomic isotopes of Uranium and Thorium, and the fusion process of light atomic isotopes of hydrogen into the heavier Helium.

The technology of the fission process is well established using either the rare Uranium - 235 isotope in power reactors or the common Uranium - 238 isotope in thorium breeder reactors. While Uranium - 235 represents only 0,7% of the naturally occurring Uranium - 238 - and needs a sophisticated extraction technique for its isolation - its depletion would take place, relatively quick. With the breeder process the total uranium reserves could be utilized and be converted into electrical energy, making uranium a remarkable source of energy, for today and for the future, comparable to coal, crude oil and natural gas.

On the other hand, the fusion of hydrogen into helium is a source of energy of enormous amounts, a reaction occurring continuously in the sun creating its radiation energy.

Despite great efforts in several countries the technology of this process could not yet be established in a controlled manner - but in principle, its potential might be recognized observing the energy release of an explosion of hydrogen bomb which is based upon the same fusion reaction. Should the technology of the fusion process be established in a satisfactory manner the raw material could be deuterium, a heavy hydrogen isotope which occurs in water, enriched in sea water in the relation of 1 deuterium to 6,700 hydrogens. The potential of this future energy source might be imagined in as far as one liter of sea water contains approximately, 1.0×10^{22} atoms deuterium which could upon fusion release about 8×10^9 joules of heat energy equivalent to the heat of combustion of 1.3 barrels of crude oil. The fusion of the deuterium content of 33 km^3 of sea water would be equivalent to the heat content of world's total initial fossil energy resources.

While research for the fusion type reactor is taking place in some developed countries - very few developing countries have developed the nuclear power sector, too, based upon the fission type reactors. But, less than 2 percent of electricity in developing countries is based upon nuclear power with an installed capacity of about 3 giga watts in Argentine, Brazil, India, Republic of Korea and Pakistan.

Mexico, Philippines, Iran and Irak have units under construction while Egypt, Thailand and Turkey are planning to construct nuclear power plants in the near future.

Thus, in 1990 about 15 developing countries might have nuclear power capacity of about 100,000 mW.

Nuclear power plants are an energy alternative for countries without natural energy resources in case that their energy demand is big enough to justify an economical feasible reactor size. (MINIMUM : 600 MW). For economical reasons, nuclear power plants must be operated close to their capacity. In addition, it is a prerequisite that only countries with capabilities to ensure good plant availability and a safe management of the reactor and the fuel cycle should implement nuclear power projects. At least 200 well trained and reliable people per reactor unit must always be available throughout the life time of the reactor. Disposal of the burnt reactor fuel-highly radioactive and dangerous - must also be managed in a responsible way.

METHANOL

This alcohol is a type of secondary energy usually derived from natural gas. As the technology for production of methanol is well proven its production is becoming attractive for energy and chemical feedstock supply with the advantage over natural gas that it can be transported as a liquid over long distances without increased investment into transportation systems usually needed for the transportation of natural gas.

Methanol can also be produced from naphtha, residual oil, from wood or other biomass.

In cases where the feedstock for any process is cheap enough methanol can be produced, economically.

World consumption stands now at about 12 million tons of methanol, about 50% being used for the production of formaldehyde but it is a realistic assumption that consumption of methanol could increase at an annual rate of 6 to 10%. In addition, the technology for the conversion of methanol to gasoline is already proven, the economics of this process have to be improved.

The potential and flexibility of methanol utilization - chemical feedstock, alternative to fuel oils, extender of diesel oil and gasoline, conversion to gasoline - makes methanol a valuable future basis of energy.

GASOHOL

Gasohol is a solution of one part ethanol in nine parts of gasoline, a mixture which can be used in most automobiles instead of gasoline, only - adjustment of carburetor, replacement of pump diaphragms and engine gaskets might become necessary, the engine performance will decrease to a minor extent. Thus, ethanol could replace 10% of the gasoline needed in a country, if blended with gasoline.

It is even possible to use ethanol instead of gasoline, as had been shown especially in USA and Brazil.

But, calculation of the energy balance proves that for each gallon of ethanol produced out of corn it is necessary to use 0,29 gallons of gasoline for farming (seeding, fertilizing, tilling, harvesting, drying). Ethanol production facilities need about 0,4 to 0,6 gallons of gasoline as process energy (mostly for distillation).

In total, production of one gallon ethanol requires about 0,69 to 0,89 gallons gasoline equivalent. As the energy content of ethanol is about 80% of the energy content of gasoline a stand-alone production of ethanol cannot create an economic alternative to gasoline.

Only in countries with surplus of production of sugar or starch containing materials and cheap biomass as fuel for the distillation process ethanol might be produced economically, or in processes where ethanol is a by-product.

Thus, it might be concluded that ethanol and gasohol will not play a significant role for energy supply in the future, except in some locations with special favourable conditions.

SOLAR ENERGY

In the search for new energy resources, attention has been paid to examine the possibilities of utilization of the energy potential of the sun. Some applications - such as heating and cooling of buildings and water, generating small amounts of electricity, drying agricultural or animal products, and salt production by evaporation of seawater or brines - appear to be feasible and are already used worldwide, in small amounts.

From the technological standpoint, many other solar energy applications are possible - including electricity generation, food refrigeration, cooking, production of potable water from sea water.

But the economics of these technologies have to be improved in order to enable the utilization of solar energy on a larger scale. A careful analysis of the economics must always be carried out before any decision for application of the following systems can be made:

Agricultural uses of solar energy

Simple processes are available for immediate application using locally available materials, labour and expertise. The technology is proven for drying various crops (grain, fruit, lumber and other products), employing both direct exposure to sun or hot air heated by sun and passed over the material to be dried.

Research has to be done to improve the economics of these processes.

Solar energy for the production of hot - water

is already applied in many installations all over the world, especially for domestic hot-water supply. Since this technology produces hot-water economically, its application will increase, especially when energy prices will increase.

Residential heating by solar energy

can be applied quite often in an economical way except in situations where excess and cheap heat energy could be made available. Usually, hot-air systems are used which might be implemented with locally available materials, labour and expertise.

The production of salt by evaporation of sea water or brines by solar energy

The technology for that process is well established since ancient times. Thus, this technology is a current and direct use of solar energy and is immediately available for use of salt-production out of sea water or brines in a sufficient hot and dry climate.

The described applications could be implemented by developing countries, immediately.

Electricity generation by Solar Energy

With regard to large scale generation of electrical power using solar energy there are many approaches in research and development using the Stirling, the Rankine and other cycles and thermoelectric systems.

Solar energy conversion through photovoltaic devices

Direct conversion of solar energy radiation into electricity can be done with photovoltaic devices, the so-called solar cells. Capacities of such available devices are between 1 watt up to tens of KW.

These systems are for use in remote areas, only, as the costs for such systems make the utilisation of a direct conversion of solar energy into electricity uneconomic, for the time being. But, it can be expected that within 10 years solar energy might become an energy alternative on a remarkable scale.

BIOLOGICAL ENERGY

Solar energy, converted to chemical energy by photosynthesis is stored in all organic materials produced by biological processes. These organic materials constitute a huge energy potential which might be utilized after harvesting. Materials like wood, herbaceous plants, crops, residues from agricultural and forest products, manure, fresh water and sea water plants are collectively termed biomass. Biomass was the main energy source for mankind since ever and still is in many developing countries, up to now.

As this type of energy will continue to be the main energy supply for many developing countries, technology must be developed to improve the efficiency of equipment used in order to produce and harvest biomass and to reduce energy losses of conversion processes and at the same time to slow down or avoid the deforestation which is taking place in many countries.

It is estimated that about 300 Mio tons oil equivalents per year of fuel wood and about 200 Mio tons oil equivalent per year of other vegetable material like straw, husks, bagasse, animal affal and others are used as energy source base, today. Sugar containing biomass could be converted into alcohol, while cellulose containing biomass could be converted by combustion into steam and/or electricity. Manure, wheat straw or ocean kelp could be converted by anaerobic digestion into methane gas.

Thus, production of equipment for an economic utilization of biomass would improve the energy situation also of the developing countries, on a short, medium and long term basis.

Systems for the production, harvest and conversion of biomass to an appropriate form of energy could become a remarkable energy sector in the economy of a developing country.

WIND ENERGY

The utilization of wind energy is established since earliest times - to move ships or to pump water for domestic livestock or for irrigation purposes, to grind corn or wheat, to cut wood or to generate electricity.

A variety of wind mills is available, even commercially, for pumping water, or compressing air or generating electricity with a capacity of 7,5 to 15 KW.

In addition, a few wind mill designs are available for manufacture at village level utilizing locally available materials.

The low energy density of wind energy is accompanied by high investment which quite often makes the operations of wind power plants uneconomic. From the technological point of view large scale wind power plants must have very sophisticated properties -

- high operationality

- automatic commissioning

- automatic control

- generator behaviour in congruence with electrical grid conditions to enable delivery into a grid system.

Economics then are based upon savings of fuel costs of the fuels replaced by wind power and these savings of fuel costs have to be compared with capital and operating costs of wind power plants.

A large wind power plant prototype on the North Sea coast with a capacity of 5,000 KW might become economic if specific investment costs could be reduced and fuel costs would continue to increase.

With technological and economic improvements this energy resource will play a limited role at limited locations and could be helpful in rural areas of developing countries where continuous wind with at least 16 kmph can be utilized.

HEAT PUMP

is the thermodynamic counterpart of the heat engine. It can save primary energy in considerable quantities, especially in cold countries in a stand-alone mode or as an add-on device for existing heating systems. Penetration of the commercial sector will increase with stable and increasing energy prices.

Heat pump applications exist in the industrial sector and more often in the residential sector, as the heat pump can meet both heating and cooling purposes.

In practice, the choice of a heat pump system will depend on the structure of power supply, heat demand, general conditions of the area of application, type of primary energy, capital costs, energy prices and other factors. A co-generation plant is only economically feasible where large heat requirements exist such as in big cities or industries. In applications with smaller energy amounts involved or wherever power is generated far away from the consumer then heat pump applications are quite often an economic solution for energy savings, using the electrically driven or heat driven heat pump. In a heat power area usually the heat driven heat pump is more economic than the electric driven heat pump. In particular, heat driven heat pumps are attractive in combination with a gas network as the basis of heat energy.

In such cases, combustion motor driven compressor machines or adsorption heat pumps are applied. In water power or nuclear generating countries, heat pumps have special advantages wherever heating at low or moderate temperatures is required.

Of course, there are still great possibilities for improvements in the efficiency of the available equipment. But as it is expected that heat pump applications will increase rapidly during the coming years savings equivalent to 1 million tons of oil per year for 2 to 3 million heat pump units could be reached within 5 years.

STIRLING ENGINES

Special emphasis is given to the Stirling engine as this engine allows the utilization and transformation of heat energy of any source into motion energy.

In the Stirling engine work is performed by the expansion of gas at high temperature whereby heat is supplied from outside through a wall. With the separation of the combustion chamber from the work performing gas, an engine was created in which almost all combustible fuels could be utilized. This engine operates on alcohols, various gasolines, diesel fuels, lubricating oils, olive and salad oil, propane, butane and natural gas. In addition, the Stirling engine allows combustion to take place in a way that air pollution is some orders of magnitude less than that of internal combustion engines.

The importance of this energy converting engine might be underlined in as far as any heat source at a sufficiently high temperature could be used - even radioisotopes, nuclear reactor heat, heat storage, solar heat, heat from combustion of coal or wood - for the production of motion energy provided that a suitable heat transport system could be established as an intermediate for the heat transfer of the heat of combustion on to the working gas in the Stirling engine.

After technological improvements - especially in the cooling system - the Stirling engine could provide motion energy for developing countries with no supply of petroleum products.

HEAT RECOVERY

In most processes where energy generation or energy conversion is involved, heat is generated, too.

Either hot gases or air on one hand or hot liquids on the other hand are produced and emitted giving rise to a loss of energy. With increasing energy prices a considerable effort was made to invest into heat recovery systems.

Direct and indirect heat recovering projects had been developed in industrial and residential applications.

Direct applications use heat pumps, heat exchange, co-generation systems, for the production of steam and its utilization, f.e. generation of electricity, or for preheating purposes in a recycling mode, for district heating.

Quite often indirect applications take advantage of excess heat, f.e. to produce warm air through heat exchange for the heating of green houses for food production or to produce warm water for improved fish production.

Heat recovery projects can be undertaken in developing countries, immediately, as the technology for such projects is well established and available and financial requirements, usually, are comparably low and would result in remarkable energy savings.

4- CLASSIFICATION OF DEVELOPING COUNTRIES

Many attempts have been made already, to classify developing countries for various purposes and considerations. In the field of developing strategies for managing the requirements of developing countries for establishing or increasing their possibilities for production of energy-related equipment it is necessary to make a classification which is energy-related and simple and easily adjustable.

As one important result of the analysis of the energy situation of the developing countries as lined out in the previous chapters of this report an energy-related classification may be derived. For that purpose the turnover of energy - namely the sum of energy production and energy consumption - was taken as the classifying element.

Undoubtedly, this element is energy-related, it is simple and can be adjusted, on a continuous basis. In addition, the energy turnover is a possible measuring unit for the stage of development of a country and it was deliberately avoided to calculate the per capita energy turnover. Per capita calculations are made mainly for comparison reasons and to demonstrate the overall development stage of a country.

But, the energy turnover of a country is

- a direct measure of the size of a possible market,
- it is proportional to the energy-related technology and equipment available in a country,
- it reflects quite often the presence or capacity of energy experience, know-how and accessible transfer of technology,
- it reflects to some extent the industrialization stage of a country,
- it is proportional to the financial power and therefore likelihood for the implementation of production of energy-related equipment as countries with a large energy turnover quite often could initiate and participate in the financing of such projects.

Thus, a classification was derived consisting of 4 groups of developing countries for each region - America, Africa and Asia with Far East - (FIG.CLASS 1) whereby

in GROUP A

countries with an energy turnover (total primary energy produced and consumed in tons of oil equivalents including crude oil, natural gas, coal, hydro, nuclear and geothermal energy) of more than 40 million tons oil equivalent per year are shown,

four countries of Middle and South America,

three countries of Africa and

seven countries of Asia and Far East;

These countries have a strong experience in many forms of energy, they have bought many technologies, they have many educational and research institutions, repair and maintenance facilities, production facilities for energy-related equipment, very experienced manpower, financial potential.

in GROUP B

countries with an energy turnover of more than 10 million tons oil equivalent per year are shown,

five countries of Middle East and South America,

four countries of Africa and

eight countries of Asia and Far East;

These countries have a fair to good background in energy technology, having educational and research institutions, repair and maintenance facilities, some production facilities for energy-related equipment, experienced man power, some financial capabilities.

in GROUP C

countries with an energy turnover of more than 1 million tons oil equivalent per year are shown,

eleven countries of Middle and South America,

eleven countries of Africa and

four countries of Asia and Far East;

These countries have a rather low background in energy technology, educational and research institutions are by far insufficient, almost no repair and maintenance facilities, no evidence of production facilities for energy-related equipment, no experienced manpower, little financial capabilities.

in GROUP D

countries with an energy turnover of less than 1 million tons oil equivalent per year are shown,

nine countries of Middle East and South America,

twenty-nine countries of Africa and

twelve countries of Asia and Far East.

These countries have no background in energy technology, no research, no repair or maintenance facilities, no production facilities for energy-related equipment, no experienced manpower, no financial capabilities.

CLASSIFICATION OF DEVELOPING COUNTRIES
ENERGY RELATED BY REGION

	1 AMERICA	2 AFRICA	3 ASIA AND FAR EAST
GROUP A	Mexico Venezuela Brazil Argentina	Algeria, Egypt Nigeria	China, India, Iraq Iran, Indonesia Korea, Turkey
GROUP B	Columbia, Peru Trinidad & Tobago Ecuador Chile	Tunesia, Zimbabwe Gabon, Angola	Malaysia, Thailand Philippines, Singapore Hongkong, Taiwan Pakistan, Syria
GROUP C	Bolivia, Uruguay Haiti, Panama Dominican Rep. Costa Rica Guatemala Jamaica, Paraguay Honduras, Nicaragua	Morocco, Zambia Zaire, Ghana Cameroon, Congo Rep. Ivory Coast, Kenya Mozambique Tanzania, Sudan	Bangladesh Burma Sri Lanka Vietnam
GROUP D	Bahamas Barbados Grenada Guyana Belize Puerto Rico Martinique Netherlands Antilles Virgin Islands	Ethiopia, Benin Malawi, Niger Rwanda, Sierra Leone Somalia, Uganda Burundi, Central Afr. Rep. Chad, Comoros Equatorial Guinea Gambia, Guinea Guinea Bissau, Lesotho, Mali Madagascar Mauritius, Senegal Togo, Upper Volta Botswana, Liberia Sao Tome & Principe Swaziland, Seychelles Mauritania	Papua New Guinea Nepal Jordan, Libanon, Cyprus Yemen A.R., Yemen P.D.R. Lao P.D.R. Maldives, Fiji Solomon Islands Western Samoa

GROUP A: Consumption plus production of energy > 40 Mio toe/y

GROUP B: Consumption plus production of energy > 10 Mio toe/y

GROUP C: Consumption plus production of energy > 1 Mio toe/y

GROUP D: Consumption plus production of energy < 1 Mio tbe/y

5) MAIN ENERGY TECHNOLOGIES (KNOW HOW)

The final use of any kind of energy is the last step out of a chain of necessary activities for finding, producing, converting and transporting the energy to be used.

All these activities are based on mostly sophisticated and complex technology with regard to the operations and also with regard to the manufacture of equipment related to the following operations and activities:

- 1 - Exploration -- consisting of all activities needed for finding energy resources
- 2 - Production -- consisting of all activities needed for the extraction and refinement of energy resources
- 3 - Conversion -- consisting of all operations needed to transform available energy into a form suitable for final consumption
- 4 - Transport/Transmission, consisting of all activities needed to move energy in its different forms from the location of extraction to locations of conversion or processing and finally to locations of consumers.

The technologies serving the purpose of the above activities are well established and applied, worldwide.

But, developing countries with plans of implementations of projects for the production of energy-related equipment have to consider all implications described, and have to be aware of possible problems and difficulties.

The following sections serve the purpose giving a survey of the technologies and equipment involved, the degree of difficulty for market entry and the degree of complexity of the technology for the operating of producing facilities. Main suppliers and/or manufacturers of the equipment mentioned are given in the technology sections of the most important energy sources, but in the annexes additional suppliers/manufacturers are enlisted under the equipment-name, item by item.

MAIN TECHNOLOGIES IN THE OIL AND GAS SECTOR

- Exploration

- Geology is the most important know-how factor followed by
- Geophysics which apply special technologies for
magnetic surveys
gravimetric surveys and
seismic surveys.

These operations serve the purpose of determining subsurface structures which might contain oil or gas.

The equipment used consists mainly of measuring and recording apparatus and computerized plotting equipment. The main know-how involved is the computer software for a suitable conversion of the signals measured and recorded into a suitable seismogram which should show reliable pictures of the subsurface formations.

- Drilling activities

follow the geophysical and geological technology for interpretation, production and use of drilling equipment, such as on - and offshore rigs, pipes, mud and drilling bits and well completion is involved as well as the know-how for the drilling operations. Logging of the properties of the formations of the wells drilled is usually applied.

- Production

technologies for the following operations must be made available:

- Reservoir engineering
- drilling of production wells

- completion of wells drilled
- field equipment as separation units, compressors, turbines, pipes, pumps, valves, measuring and controlling apparatus, etc.
- enhanced oil/gas recovery
- storage in tanks

- Conversion

Technology for refineries -- construction and operations including

distillation
hydrodesulphurization
reforming
cracking
bitumen production
lubricants production
gas separation

and technology for power plants and liquefaction of natural gas is applied. Each of these units consists of a huge number of special equipment shown in the equipment section of this paper, including diesel engines and generators for production of electricity.

- Transport

Technology for tankers and pipelines, rail road trucks and road trucks for petroleum products is applied.

The technology for rail road and road trucks is readily accessible for developing countries.

MAIN TECHNOLOGIES IN THE COAL SECTOR

- exploration

Geology know-how and drilling is applied.

- production and transportation

Mining technology and technology for the manufacture of mining equipment especially and conveyers and extracting equipment is used. In transportation easily accessible technology for rail road trucks and road trucks is applied.

Technology for conveyors and slurry pipelines has to be taken into account.

Different geological conditions occurring in coal mines influence strongly the manner of development and production (mining) of coal. In principal, the following three methods are applied.

1 - Underground or Deep Mining Technology

The variables determining the engineering of mining equipment are

seam height, bottom quality, roof quality, methane liberation, hardness of seam, depth of seam and water.

In addition, pillar sizes, opening width

cut depths, percent recovery and roof support techniques

affect also the mining equipment to be produced,

In conventional deep mining

specialized machines are utilized in a sequential manner to perform the different operations -- drilling, undercutting, blasting, loading, haulage.

A crew of 12 to 14 workers may operate a complete set of mining machines, called a face unit. Thus, the mining face is undercut with a coal cutter - similar to a large chain saw, mounted on rubber-tired vehicles - to facilitate blasting by providing space for expansion and allowing gravity assistance in breakage. The ground coal brought out by the cutting teeth

is removed from the face which is then ready for the blast-hole drill. Blast-hole drilling in coal is done with electrically driven auger drills. The holes are loaded with various types of explosives. A ramp-type loader loads the shuttle-cars -- long, low, rubber-tired vehicles. After loading of the coal a roof-bolting machine provides support for the roof from which coal has been removed -- to avoid caving. Such a mining unit may produce about 1500 tons of coal per shift.

In continuous mining

the drilling and cutting machines and blasting are not used, and the basic coal loader is combined with high-speed power driven wheels or chains, that tear the coal from the face, mechanically. Several continuous miners are in use, from which the ripper machine is the best known. It applies up to four cutting wheels studded with cutting teeth. All continuous miners are crawler-mounted and have ramp-type loaders built onto them. Other types have double, triple or quadruple auger heads combined with chain cutters, the borers.

Unlike the conventional units, continuous miners usually stay in one working place throughout a shift to maximize production.

As a continuous miner digs and loads continuously it must be connected to a continuous transporting medium, such as conveyor belts.

In all underground mining systems artificial ventilation is required to permit safe operation conditions and avoid explosions of emitted gas. Numerous shafts and faces provide the necessary volumes of air. In many mines huge amounts of water must be removed using pumps.

2 - Surface Mining Technology, Strip Mining

Where the coal seam lies close to the surface, it is more economical to remove the overburden of earth and rock that covers the coal seam. For this job, power shovels, draglines or wheel excavators are used. The shovel excavates a furrow and casts the overburden parallel to the cut. Draglines sit on the bank above the coal seam and remove the overburden from the seam. Bucket-wheel machines excavate the material from above the coal seam. It then flows in a continuous stream to the conveyor system. When the seam has been exposed, the coal is loaded by smaller power shovels into trucks and then hauled to preparation plants or loading bins. Gigantic machines have been developed making strip mining an efficient method for coal production.

3 - Augering

For coal seams which continue under rising land, too thick for economical strip mining and where underground deep mining cannot burrow further to the surface because of the shallow and more treacherous roof conditions, augering, a relatively new method, is used. The auger miner twists huge drills like carpenter's bits into a hillside coal seam, drawing out the coal to a conveyor which loads the coal onto a truck. Section by section, the drills bore into the hillside.

Augering might recover only 40 - 60 % of the coal seam.

Dual-headed and multi-headed augers are manufactured up to a diameter of 2,44 metres.

Auger recovery gives additional tonnage, minimal costs for equipment and labor, and allows coal production from coal seams where other methods cannot be applied.

Coal treatment and transportation

If needed coal is treated after mining to produce coal of desired and defined quality.

A number of washing devices are used for cleaning coal -- usually flotation equipment is applied, separating the heavier foreign material from the coal. Excess water is removed mechanically or thermally.

Crushers, grinders and sieves are used to produce coal of a desired particle size.

The cleaned and dried coal is transported to the market by railroad, ships or by conveyor systems. More recently, a new transportation concept has been developed where coal slurry pipe lines have proved, in some cases, to be more economical than building railroads.

- Main technologies in coal conversion

In view of the huge coal reserves the conversion of coal into other forms of energy besides heat production is an important energy alternative.

Coal conversion produces solid, liquid and gaseous products.

The processes involved change the chemical character of coal which has a relatively low hydrogen content. Conversion processes require the addition of hydrogen to the carbon content of the coal which is achieved either by pyrolyses or by hydrogenation. Conventional methods involve gasification and liquefaction processes using specialized facilities. In addition, in situ-processes are applied underground, in recent developments.

Coal Gasification

Conversion of coal requires steam as hydrogen source and air as oxygen source for the heat production by burning coal, yielding three combustible gases: Hydrogen, carbon monoxide and methane. The produced gas has a low heating value as it contains besides the mentioned combustible gases also carbon dioxide, hydrogen sulfide, water and nitrogen. The types and properties of the produced gases are controlled by the methods and design of introducing hydrogen, oxygen and heat to the system. There exist many alternatives for reactor types, coal bed configurations and operating conditions, e.g. temperatures and pressures.

As reactor types are three categories of vessels in general use based upon different chemical reactions:

gasifiers employing reactions of coal and water at elevated temperatures to produce gases,
hydrogasifiers in which coal and hydrogen are reacted under pressure and
devolatilizers decompose the large coal molecules through reaction with hydrogen.

Besides the reactor technology for the chemistry involved special attention must be given to the promotion of reaction efficiency which is strongly influenced by reactor bed configuration. Fixed bed systems use a grate to support coal through which steam or hydrogen can be passed. Caking coal, usually, cannot be gasified with fixed-bed reactors.

The fluidized-bed systems employ finely sized coal which is continuously agitated by gas flowing through the coal particles thus producing a lifting with a fluid-like effect.

Entrained systems also use finely sized coal which is trans-

ported in steam or oxygen to the reactor.

Most of the gases produced in the described ways must be purified and/or upgraded prior to transportation. More recently, underground coal gasification processes have been developed: Coal is burnt in place using steam and/or air blown into the coal seam to produce a combustible gas which can be produced through bore holes in connection with the coal seam. The gathered gas in turn could be used for power generation or for production of fuel oil or chemicals.

Coal liquefaction

The production of liquids from coal is chemically similar to the gasification processes; either hydrogen must be added to the coal or carbon must be removed, whereby the carbon to hydrogen ration is changed to produce the liquid hydrocarbons, wanted. The main difference to gasification processes is the use of more severe reaction conditions or the use of catalysts.

Four major processes might be used: hydrogenation, pyrolysis, catalytic conversion and solvent refining.

In the hydrogenation process hydrogen is introduced as a gas or as a hydrogen-rich solvent to form hydrocarbons with coal.

In the pyrolysis process heat is applied in the absence of oxygen to decompose the coal into liquid hydrocarbons, gases and char. In the catalytic conversion process coal is converted into liquid hydrocarbons in two steps. First, coal is partly oxidized to produce carbon monoxide and hydrogen, the synthesis gas. This gas is then passed over a catalyst at the corresponding temperature and pressure, to form liquid hydrocarbons.

A fair knowledge of the influence of the process parameters, type of catalyst, temperature and pressure is needed as they determine the amounts and types of products, produced.

In solvent refining processes coal undergoes a pyrolysis reaction in presence of a solvent. Under reaction conditions, coal dissolves in the solvent and reacts with the hydrogen present to form liquid hydrocarbons. Then, the formed solution is separated from solids by filtration, and the solvent recovered by distillation. The remaining solid consists of dissolved coal, newly formed, light oil and other fuel oils. By an additional hydrogenation step mainly liquid products may be produced.

MAIN TECHNOLOGIES IN THE NUCLEAR POWER SECTOR

- exploration

Geology and drilling technology including rigs and bits is applied;

- production and transportation

Technology must be available for:

- mining
- ore concentration
- enrichment
- separation
- fuel fabrication
- reprocessing
- storage

Ore transportation by truck for production purposes, transportation by truck of fuel assemblies in special lead containers to the nuclear power plants, and after conversion transmission lines for electricity is applied.

In mining all mining methods: -- underground and surface mining -- are applied due to occurrence of many various types of mines of uranium/thorium ores. The mined ores are milled and the uranium/thorium compound extracted by bicarbonate solutions or sulfuric acid. The Uranium oxide is precipitated and the resulting concentrated natural uranium compound, called yellow cake, is converted into uranium hexafluoride. This is the starting material for a sophisticated enrichment process for the uranium isotope U_{235} which is the most important and reactive part for the fabrication of nuclear fuels. Fuel assemblies are finally transported to the nuclear power plants. Used fuel rods are recycled and reprocessed to save the active uranium which is added into the enrichment process of the uranium hexafluoride produced out of the natural uranium compounds.

Used and waste fission products must be stored safely whereby sophisticated technology is applied.

- conversion

Technology for nuclear power plants, for their construction and for their operations is needed.

Nuclear Power Plants

In principle, nuclear power plants are thermal power plants producing and using vapour for the production of electricity.

The vapour is produced with the heat energy set free by the nuclear fission reaction of the nuclear fuel, uranium - 235, in the nuclear reactors. Three technologies are dominant on the market: light water plants, heavy water plants and fast breeders. Nuclear power plants consist, in general, of the following components:

a nuclear reactor built with special steel and welding technique, resisting 155 bars pressure and more than 300°C and gamma and neutron rays. A sophisticated command system moves and removes the nuclear fuel, thus controlling the nuclear reactions and the heat to be produced;

steam generators of huge sizes use heat produced in the reactor through a heat exchange system where a few thousand tubes of special alloy are involved.

Primary pumps enforce the water circulation under high pressure from the reactor to the steam generators and back.

Turbines and alternators

To use considerable amounts of heat produced in the reactor special steam turbines are needed to handle the huge steam volumes under the prevailing conditions of speed, pressure and temperature. Sophisticated know-how for construction and fabrication of the rotor is applied whereby the necessary great dimensions pose many problems for forging and welding processes and also for the precise manipulations and movements of the heavy units. Alternators used in the nuclear power industry had to be developed in a new conceptual way as the speeds of the huge rotors are much lower than the classical ones. Again, a very specialised technology of the fabrication processes is essential where also metallurgical and mechanical problems must be mastered.

MAIN TECHNOLOGIES IN THE THERMAL AND HYDRO POWER SECTOR

- in exploration

Geology and Hydrology is applied in search for suitable hydro resources

- in production

Basis for electricity production in the hydropower sector is the technology for dam construction.

- in conversion

For both sectors, hydro and thermal (based on all types of fuel oils, gas, coal, other combustible materials), the technology for construction and operation of the following equipment is applied:

cyclones,

high pressure tubings,

boilers,

condensators,

pipes (high pressure, low pressure, for water and steam)

turbo pumps,

turbines driven by water or steam or gas

generators including turbo generators

fittings

transformers

switchgears

other electrical equipment

In a hydro power plant the kinetic energy of streaming water f.e. of a cataract - is transformed into mechanical energy of rotation using various types of turbines. Mostly used are

the Pelton turbines for strong heads (more than 150 m)

the Francis turbines for medium heads (5 to 150 m),

the Kaplan turbines (2 to 25 m).

In a thermal power plant either heat energy - resulting from combustion of coal or other solids, fuel oil or gas - is used for the production of steam, its kinetic energy often is converted into mechanical energy of rotation through steam turbines. Or gas turbines are used through internal combustion of gas like a combustion motor for the formation of mechanical energy of rotation. The mechanical energy then is converted into electrical energy through AC-generators.

More recently special attention is paid world wide to the development of small hydro power plants consisting of a barrage, a feeding raceway, a grate, one or more turbines, a generator and other electric equipment.

Application range of small hydro power plants runs from 1 to 200 m head and 50 to 400 KW, vertical or horizontal shaft and various kinds of turbines such as Francis spiral turbines and tube-type turbines. In small hydro power plants it is possible to use either synchronous or asynchronous generators depending on the characteristics of the plant. Quite often brushless synchronous generators with internal mounted AC exciters are used.

in transportation

Technology for transmission lines, substations, converters, transformers, rectifiers, inductors is applied.

MAIN TECHNOLOGIES IN THE SOLAR AND BIOGAS SECTOR

- in conversion

Special technology is applied in manufacture of conversion equipment for solar power plants - as collectors, photo-voltaic cells, electrical equipment and biogas plants including thermal power generation equipment based upon combustion of biogas.

- in transport

Transmission technology will be required wherever conversion on large scale could be established in a commercially feasible way.

6) IDENTIFICATION OF MAIN MANPOWER, TECHNOLOGICAL, INFRA-
STRUCTURAL, FINANCIAL AND ECONOMIC IMPLICATIONS FOR PRO-
DUCING ENERGY-RELATED EQUIPMENT IN DEVELOPING COUNTRIES

6.1. - Availability of energy sources

A basic implication for the development of a production of energy-related equipment is a continuous availability of the energy to which the equipment to be produced is related.

An assessment of the available energies should therefore be made by developing countries on a routine basis. Special emphasis must be given to the indigenous energy resources of developing countries including the renewable energies even then when the technology for the utilization of the latter is not yet available to developing countries.

A preliminary survey of energy resources in developing countries has been prepared in this paper to illustrate that the availability implication poses no problem for a great number of developing countries. But each country must undertake all possible measures to explore for and increase its indigenous energy reserve.

6.2. - Availability of skilled manpower.

The production of energy-related equipment requires the availability of skilled manpower of all levels and for all technologies applied or under consideration. In the following, the requirements for qualification of manpower for the main energy technologies are described:

6.2.1. Requirements for qualification of manpower in the oil and gas sector.

. In exploration

senior geophysicists and senior geologists specially trained, most geologists holding master degrees or Ph.D. degrees, electrical and electronical engineers as well as information engineers are needed.

. In drilling

well trained and experienced personnel is required as failures may lead to loss of equipment, or loss of hydrocarbons or health hazards may occur. A drilling crew usually consists of

driller who is the crew supervisor
tool pushers
rough necks
derrick men

whereby maintenance personnel is also needed, e.g.

welding personnel,
mechanicians and
electricians.

The training of personnel is achieved in training centers using simulation techniques or at site, with the contractor company receiving the drilling contract.

The technologies applied offshore for the construction and manufacture of jack-up rigs, semisubmersible rigs and drillships are applied, combinations of shipbuilding and of concrete structures building and bridge building. Despite the fact, that a few developing countries have already entered this market the usual way of taking advantage of these rigs is either to buy them, in case that the exploration/exploitation drilling programs are available for a few years, or these rigs

are rented at market conditions. For that purpose it is possible to operate the rigs with an own personnel. Needless to mention, that drilling and maintenance and a kind of ship operating personnel including telecommunication, medical, security, catering and helicopter personnel must be especially trained to receive experience over a couple of years in offshore environment and operations.

In production

having discovered and appraised petroleum reserves by drilling, production wells are drilled and completed with the equipment needed to receive the produced petroleum. In cases where the petroleum reservoir contains enough energy the petroleum will flow freely to the surface facilities, in other cases, crude oil might be pumped or secondary or enhanced oil recovery methods are applied.

Personnel needed for these technologies are reservoir engineers, geologists, geophysicists and petroleum engineers.

For the maintenance of pumps, pipes, instrumentation, motors, power generation equipment, mechanical, electrical, electronical engineers and technicians are needed with special training in oil and gas field practice.

For the construction of heavy equipment such as drilling and production platforms construction engineers with special experience in metallurgy are needed, as well as ship construction engineers.

For the manufacture of the mentioned heavy equipment special mechanical and hydraulic machinery is applied. In addition, a big amount of personnel up to several hundred labourers, such as welders, crane operators and welding quality inspectors might be engaged for

building a 10,000 tons platform within one year.

For the supplementary equipment, such as derricks, cat heads, transmissions, pipes, drill bits, well heads, blow-out preventers, remote control systems, risers and other, manpower well trained in metallurgy, precision mechanics, hydraulics and remote control electronics are needed.

In gas production, in gas transportation and liquefaction special equipment is used such as: pipeline systems, turbo compressers, turbines, heat exchangers. The personnel needed consists of engineers for civil engineering, boiler works, metallurgy, industrial mechanics, electricity, planning, implementation and administration.

In the manufacture of the corresponding equipment qualified welders, mechanics, electricians and machine operators are required.

6.2.2. Requirements for qualifications of manpower in the coal sector.

For engineering and manufacture of equipment there are various methods for mining and treatment of coal.

The level of mechanisation is a function of the size of investment due to the economics of the coal production. Quite often the economics are strongly influenced by environmental and hygienic conditions, security and properties of a coal mine.

The technologies applied are more developed in the developed countries especially therefore as the social impact enforces the mechanization and automation. A second reason is the necessity for an increased productivity to compensate the higher costs of labour.

In consequence, there are two possibilities for the engineering and manufacture of equipment for coal production; first equipment for low cost labour and second highly mechanized equipment. In both cases it is a prerequisite to have qualified personnel under disposition, such as mechanical and electrical engineers,

technicians and
specially trained labourers.

Their basic knowledge is made available through technical training. The needed specialisation might be received through experience, only, with the engineering company or through work in the mines.

• For Exploitation

The qualifications corresponding to mining and treatment of coal are very specific and are generally built up within the operating company or in special training centres.

- . The exploitation crews are formed on site in the different mining sections
in the beginning with training courses, which
make the personnel acquainted with the mining
environment

and later training in the mines or
mining schools.
- . The maintenance personnel must be educated and trained
in mechanics and electricity.
- . In addition, in surface mining,
machine operators and
maintenance personnel for machines are required.
- . Supplementary personnel
is also needed for different disciplines, e.g.
mining engineers
civil engineers
geologists
chemists
environmentalists
health personnel
security personnel
supervisors
foremen.

This personnel, too, has to receive a training specific to the environment and the work in the coal mines.

- . For Gasification:

The basic technology for the construction of gasification reactors is similar to the construction of boilers keeping in mind the high temperatures and the reactivity of the produced gases which necessitates a special resistant steel.

Operating personnel must be trained in the control of the different reaction parameters and the measures to be taken when the parameters tend to go out of control.

• For Liquefaction

While many companies are involved in research and development projects for coal liquefaction the technology used on industrial level is KELLOG's FISCHER-TROPSCH process. Thus, a development country deciding to enter into a coal liquefaction project need operating personnel for running the process equipment, maintenance personnel -- mechanics and electricians -- both categories of personnel to be trained by KELLOG.

In addition, research and development engineers could then enter into projects for improvement of the process to get higher yields at lower cost per unit.

6.2.3. Requirements for qualification of manpower in the nuclear energy sector:

The technologies described in previous chapters show the high level of the qualification requested for the personnel in the construction and manufacture of equipment for the nuclear industry. One of the most important prerequisites for that purpose is the education and training of researchers and scientists in all disciplines of nuclear sciences and technologies. Specialized know-how needed in this sector can be gained on the basis of an agreement of cooperation with a licence holder and/or manufacturer. In addition, researchers and scientists in nuclear sciences and technology must be able to work at the limits of the knowledge of mankind to successfully increase and improve that knowledge. The above has to be seen for many specialized disciplines, such as:

nuclear chemistry,
nuclear physics,
specialized metallurgy,
specialized mechanics
specialized electricity,
civil engineering,
automation,
informatics,
control and security.

6.2.4. Requirements for the qualification of manpower in the thermal and hydropower sector:

The realisation of projects of this magnitude requires to split the activities into several phases:

personnel for the preliminary project
 in which the choice and description of
 the type and capacity of the manufacture
 is made and the basic requirements are
 outlined in regard of all activities in-
 volved (equipment, civil engineering, ser-
 vices, etc.);

personnel for the final engineering project
 in which the execution of the project is
 described in all details including all
 elements of functioning and costs, man
 power for operations and maintenance,
 and time schedule of execution of the
 project;

personnel for daily operations and maintenance.

The first phase requires engineers with great expe-
 rience in the design of optimal configurations of
 equipment taking into account the local environment
 and conditions, and the second phase needs engineer-
 ing specialists of the different disciplines in-
 volved and the third phase requires the manpower
 for the every day operations.

Thermal power stations

first phase: heat technology engineers,
 mechanical engineers,
 electrical engineers,
 automation engineers;

second phase: specialized engineers in combustion,
 heat exchangers, piping, pumps, automa-
 tion, design engineers, draftsmen, etc.

third phase: supervisory and control personnel,
 and reporting and maintenance (electric-
 al, electronical, mechanical) personnel.

Nowadays, controlling and reporting functions are automated, thus only a few well trained personnel is needed to supervise the functioning of all instruments and equipment.

Steam and gas and hydraulic turbines:

Great attention must be given to the conception and realisation of turbines, the most critical and most difficult part in these projects. Continuous efforts and engineering personnel are required in research of metallurgy, aerodynamic, hydraulic, thermodynamics, vibration mechanics, non-destructive control.

In the manufacturing processes qualified personnel must be made available for

forging, melting processes, precision work shops, heavy duty assembling lines, specialized quality control.

6.2.5 Requirements for qualification of manpower
in the mini-hydropower section

For the design and engineering phase the following specialists are needed:

hydraulic engineers,
mechanical engineers,
electrical engineers and
civil engineers
draftsmen

During the operational phase well trained maintenance technicians (mechanical, electrical), supervising and administration personnel is required.

6.2.6 Requirements for qualification of manpower in the
solar energy and biogas, biological and alcohol sector

In simple applications such as combustion of vegetable material the traditional methods are applied. But some mechanical engineering could significantly improve the design of combustion chambers to increase the possibilities of utilizing different input materials and to increase the yields of combustion heat, thus minimizing and saving input materials. This latter improvement, using better technology available with mechanical engineers, could especially help solving the problem of deforestation.

In all other cases going beyond the simple combustion applications, not only

mechanical engineers but also
chemical and biochemical engineers
agronomical and biological engineers
thermodynamical engineers
electrical engineers

are needed for the conception and design of suitable energy projects using vegetable waste materials for gasification processes or for the conversion into ethanol or into biogas.

For the engineering phase, mechanical and electrical engineers, and during the manufacturing phase, skilled labor is necessary to produce equipment commonly used, such as reactors, gauches, tubings, heat exchangers, pumps and instrumentation.

The solar energy projects utilizing the heat content of solar radiation need for smaller local applications only mechanical and electrical engineers with some experience in that field to apply the most suitable heat absorption and heat exchange system at a given location.

6.3 - Availability of technology

Countries contemplating to enter into the field of production of energy-related equipment usually have to build up an appropriate capacity at least in the technology involved. To understand the full impact of the complexity and difficulties to be mastered the main technologies described in the previous chapters are subdivided/unpacked below. Suitable contractual arrangements within an overall contractual framework for energy projects or the procurement of industrial goods and services constitute one possible way for the transfer of technology needed. The second route is the establishment of a local technology capacity through research and development activities. But it has to be noted that there exists a wide technological gap between the equipment producing company and the equipment receiving country as there exists a fast development of automation in the equipment industry based on the results of the development of electronics. To narrow this technology gap a developing country has to undertake major and concerted efforts especially in the field of research and development activities. This task is very difficult but there are already a few developing countries which successfully have established a competitive technology in the field of electronics such as Hong Kong and Singapore and production of energy-related equipment such as India, Brazil, Mexico, Korea.

6.3.1 Requirements in
CRUDE OIL AND GAS TECHNOLOGIES

BASICS AND PRODUCERS

Despite the fact that research is continuing the technologies used in the crude oil and natural gas industry are well established. But the manufacture of corresponding equipment, mostly very sophisticated, complicated and difficult, is divided into the manufacture of the many different equipment components. The very specialized producers of these equipment components are reluctant for any transfer of technology.

For exploration and production of oil and gas the following main equipment components are required through renting, purchasing or manufacturing:

Drilling equipment consisting of

- a power plant - internal combustion engines driven by gasoline or diesel or gas, with 300 to 3,000 bhp -
- a hoisting machinery
for raising, lowering and rotating the drill pipe and casing
- a rotating machinery
for rotating the drill pipe
- a drill column
with sections of drill pipes connected with tool joints
- drilling bits
of varying sizes, shape, type of metal, number of blades, quite often studded with diamonds
- a mud circulation system
with mud pumps, mud tanks, vibrating screens and
- blowout preventers - telecontrolled hydraulic valve system.

Well completion equipment

in case that a commercial discovery was made.

It consists of

casings - strings of tubing

a christmas tree - an assembly of valves and fittings

above a master valve at the casing head

used if no mechanical lifting system must
be installed.

a bottom-hole casing setting

Production equipment

consists of the components of well completions and in addition quite often mechanical pumps are used for oil e.g. reciprocating plungers in cylinders at the lower end of the tubing are used. Power is transmitted to the plungers by a string of solid sucker rods, operated by a motor-driven excentric at the wellhead.

A pipe line system - pipes, pumps, heaters, corrosion protection -

carries the crude oil or gas to the point of delivery or refinery.

The manufacture of equipment for the oil and gas sector are based upon heavy mechanical and metallurgical workshops with very specialized and sophisticated know-how.

For drill bits special alloys and their metallurgical treatment and industrial diamonds are needed, requirements which can be met by a few producers, only,
f.e.

BAKER INTERNATIONAL

CHRISTENSEN

DRESSER

HUGHES TOOLS

SMITHS INTERNATIONAL

US STEEL CORPORATION

For drilling pipes special steel is needed, which must be worked and thermically treated to receive steel pipes of very high strength; quality pipes are available, for example, with

KAWASAKI STEEL CORP.
SMITH INTERNATIONAL
US STEEL CORPORATION
VEW

Tubings needed are readily available with many steel producers in developed and developing countries.

Other specialized drilling equipment, such as blow out preventers, risers, connections, various types of joints, drilling jars, subs, collars, stabilizers, etc. need also specialization in mechanical workshops such as:

BAKER SERVICE TOOLS
CAMERON IRON WORKS
CHRISTENSEN DIAMOND PRODUCT
HYDRIL
NATIONAL SUPPLY
REGAN
SHAFFER
SMITH INTERNATIONAL INC.
VETCO

Manufacture of drilling equipment in developing countries is established f.e. in India, (Bharat Heavy Electricals Ltd), Korea, Brasil, Mexico.

Derricks, drawworks, rotarys, swivels are also parts of the drilling equipment and produced by mechanical workshops capable of heavy construction works, with high precision and welding and thermal treatment facilities.

On-shore, the described equipment components are assembled into a drilling rig, on location.

Off-shore, these equipments are built up on a rig structure either to be used on fixed jack-up platforms for water depths usually not exceeding 300 feet, or to be used on floating semi-submersible platforms, for water depths up to 2.000 feet, or to be used on drill ships with dynamic positioning, for variable depths, especially deepwater.

For processing, an entire industrial sector of engineering, manufacture, construction and operations and maintenance must be developed step by step towards the aim of mastering technology, at least to some extent.

Refineries serve the purpose of processing or refining of crude oils to convert them into petroleum products such as fuels and lubricants. Refineries, quite often differing from each other, consist of many different processing units; the technology of the processes and of the processing units is well established.

In general, at least the following processes and units must be taken into consideration if crude oil processing is planned in a country:

The crude still - a distillation unit - which separates crude oil into the main primary petroleum products. Its most important equipment components are feeder pumps, heaters and furnaces, a fractionating tower, condensers, pipes, separators, pneumatic and electronic instrumentation.

The hydro-desulfurizer - a desulfurization unit - removes sulfur from petroleum products by heating them in the presence of hydrogen. Its components are feeder pumps, hydrogen compressors, a reactor, reparators, pipes, instrumentation.

The catalytic cracking unit converts high-boiling hydrocarbons (non-gasolines) into lower-boiling gasoline compounds. It consists f.e. of a gasoil feeder pump, a reactor tower in which fluidized catalysts are used for the reactants, gasoil and steam fed through steam turbines; in the regenerator chamber the used catalyst is freed from

coke deposits by combustion with air provided by air blowers, fractionators, pipes, gauges, measuring and control instruments. Outflowing hot air is used for the production of steam and electricity using heat exchangers, steam turbines and generators.

License holders for catalytic cracking processes are, f.e. ESSO, KELLOG, UOP, SHELL, MOBIL, HOUDRI and others.

The catalytic reforming unit is used for upgrading low-

octane virgin or heavy naphthas into high-octane gasolines for motor or aviation fuel blending or for production of aromatic compounds. It consists of naphtha feeder pumps, heating chambers, reactors containing the catalyst, high pressure separators, a products stabilizer column, pipes, gauges measuring and control instruments. Special attention must be paid to the fact that the reactions take place at elevated temperatures and pressures whereby hydrogen gas is produced, too. License holders are ATLANTIC, HOUDRI, UNIVERSAL OIL PRODUCTS CO., MOBIL, ESSO and others.

The Isomerization unit produces isomers out of straight chain

paraffins using aluminium chloride as catalyst at elevated temperatures and pressures, whereby low-octane hydrocarbons are converted into high-octane compounds for gasoline blending. The isomers could also be used as feedstock for alkylation. Isomerization units consist of feeder pumps for n-butane, n-pentane or n-hexane, a reactor where the catalyst and hydrochloric acid are injected, separators, strip and fractionating columns,

pipes and instrumentation. Licence holders are Atlas Processing, Universal Oil Products Co., KELLOG, Phillips Petroleum, SHELL and others.

The alkylation unit combines iso-butane with olefines of catalytic cracker output to form high-octane isomeric gasolines in the presence of catalysts, such as sulfuric acid or hydrofluoric acid.

It consists of gas feeder pumps, mixing vessels, reactors, separator, a deisobutanizer and depropanizer columns, pipes and instrumentation.

Licence holders are KELLOG, Phillips Petroleum, UOP and others.

LICENSES/TRANSFER OF TECHNOLOGY

Most of the equipment in the sector of petroleum technology is protected by patents and special, unpublished know-how.

A basic prerequisite for the manufacture of above equipment is the existence of workshops with the highest technological level in the fields of metallurgy, electronics and telecontrol. Labourers and engineers must be trained, at least, in the maintenance and operating activities and also at the production sites before entering into the manufacture of above-mentioned equipment. Licenses or transfer of technology might be obtained very seldom. The best route is the cooperation with oil companies approaching governments of developing countries and applying for exploration or production or processing licenses. In the agreements for the licenses quite often the oil companies agree to the obligation to train people of the developing countries in the fields of maintenance and operations. With this pre-experience a developing country might be in the technological position either to enter into negotiations for receiving a license or to develop its own technology for the manufacture of above-mentioned equipment.

6.3.2. REQUIREMENTS IN COAL TECHNOLOGIES

BASICS:The Production of mining equipment is based upon heavy and medium mechanics and classical techniques -- but in huge dimensions -- for forming and assembling, e.g.

forges,
foundries,
welding shops,
metallurgical workshops are used.

As the hydraulics are an important means for the transmission and application of power for the mining processes a good mastery of hydraulic technologies and power transmission is needed.

PRODUCERS IN COAL MINING

Quite often the technology owners are companies in USA, Westgermany or UK. There are companies capable of offering a complete mining package with all equipment needed, but others are specialized in a single equipment, alone.

There are also many developing countries which have built up a sufficient capacity in the technology of coal mining, but the successful manufacturers of mining equipment are still in developed countries as customers aim to buy safe and reliable equipment with 20 and more years references, e.g.

EICKHOFF (FRG)
ANDERSON (USA)
JEFFREY (USA)
WESTFALIA (FRG)

MARION POWER (USA)
SALZGITTER (FRG)
SAGEM (FRG)
FRIDRICH (FRG)

The main manufacturers of equipment for drilling,
advance heading and support are:

VOEST ALPINE (A)
INGERSOLL RAND (USA)
ATLAS COPCO (USA)
DOWTY (UK)
TAMPLA (S)
MONTABERT (F)

Transportation and treatment equipment is manu-
factured f.e. by

SCHAEFFER (FRG)
MANNESMANN DEMAG (FRG)
LONG AIRDOX (USA)
MAN (FRG)
INTEGRATED HANDLING (UK)
MITSUBISHI (J)
PROGO INVEST (DDR)

The main producers of surface mining equipment
are:

CATERPILLAR (USA)
WABCO (USA)
KOMATSU (J)
KUBOTA (J)
BUCKAU-WALTHER (FRG)

PRODUCERS IN COAL CONVERSION

From the description given in chapter 5, it is apparent that processes for coal gasification and liquefaction are complex. A moderate number of approaches are available, having advantages and disadvantages. Knowledge and experience of the processes involved are limited. Therefore, additional research and development has to be undertaken to increase the know-how of these processes.

Main technology holder for gasification processes are LURGI, KOPPERS, WINKLER and TEXACO.

But ongoing research show the high interest of companies and institutions to utilize the huge potential of coal reserves for the production of a cleaner form of energy. For that purpose KELLOG is using the FISCHER-TROPSCH synthesis for the liquefaction of coal on industrial level.

LICENSES/TRANSFER OF TECHNOLOGY

Producer companies try to protect the development of new equipment with patents. Therefore, countries without sufficient own capacity of technology have the following possibilities of access and transfer of know-how:

As a prerequisite, the availability of the personnel described in chapter 6.2 must be secured, and also the technical means corresponding to the heavy mechanical operations, to heavy workshops, to the handling and thermal treatment of the equipment to be produced.

In cooperation with the manufacturer/supplier the technology needed might be adopted in various steps:

purchase of licence by a local manufacturer under the usual conditions: The transferer of technology is responsible for the delivery of construction plans

and the know-how needed for the implementation of the processes of the fabrication of the equipment and the training or the secondment of qualified personnel.

In exchange, the transferer of technology (the lesser of the licence) receives

the right to limit the market of the receiver of the licence and

to supply the valuable parts of the equipment to be produced and

will receive a remuneration consisting of a contract of technical assistance with the local government or governmental company, or the local mining company and

a supply contract for parts of equipment or a set of additional equipment and

a licence fee as a function of the amount of equipment produced, which is usually in the order of magnitude of 3 to 5% of the turn-over.

6.3.3. REQUIREMENTS IN THE NUCLEAR, THERMAL AND
HYDRO POWER TECHNOLOGIES

Differing in the source of energy and in the relating technology there are many units of equipment and many equipment components with the same basic technology applied, especially after conversion of the primary energy - nuclear, thermal or hydro - into electricity.

Production of equipment in the nuclear power sector requires facilities for the manufacture of special and heavy components such as reactor, steam generators, primary pumps, turbine electric generators.

The manufacture of reactors requires the most advanced technology in metallurgy to process the extraordinary metal quality needed to counter-balance the high risks - f.e. pressures, temperature, gamma and neutron radiation - and it is also required to have specialized welding shops, forging facilities for pieces of large dimensions such as bottom flanges, reactor blanket, moulding of bottoms; further is required to have thermal treatment facilities and workshops with facilities for vertical and horizontal movements, and sophisticated electronics for the production of control systems for fuel control and control of pressures, temperatures, leakages and automation of all dangerous processes and handlings.

The most important part in the manufacture of a steam generator with a weight of a few hundred tons is the heat exchanger which consists of 3000 to 4000 tubes of a special alloy of high quality with precise dimensions and to be welded in a special way.

Primary pumps having a capacity for water circulation of about 20,000 m³ per hour, and driven by asynchronous motors with vertical axis having a capacity of about 6,000 KW are to be made available.

Steam turbines for the light water reactor have low pressure rotors of 200 to 300 t weight and dimensions making their manufacture extremely difficult in view of the mechanical and metallurgical production processes.

Special facilities are also required for the manufacture of the heavy rotors and stators of the electric generators. The conception, the movement, the forging and the realisation are technologically mastered by a few companies only, with special know-how and work shops needed for metallurgical, chemical, civil engineering, mechanical, hydraulical, electrical, electronic, automation, informatics, control and security systems work to be performed.

PRODUCERS and SUPPLIERS

of

reactors and steam generators are AEE, AMN, ASEA, BABCOCK and WILCOX, CBI NUCLEAR, CHICAGO BRIDGE IRON, COMBUSTION ENGINEERING, FRAMATOME, KWU, LARSON AND TOUBRO, MITSUBISHI

cf

primary pumps are BRYON JACKSON, INGERSOLL RAND CO, JEUMONT SCHNEIDER, PACIFIC PUMPS

of

electrical generators are ALSTHOM, BHARAT ELECTRICALS LTD; ELECTRICAL EQUIPMENT CO, GENERAL ELECTRIC, HITACHI, KWU, MITSUBISHI, WESTINGHOUSE.

Technology and production of equipment in the field of nuclear power is dominated by WESTINGHOUSE and GENERAL ELECTRIC, in addition AEE is leading the market in the eastern bloc countries.

The technology is almost self-protecting as the high standard research and development and the considerable capital involved prevent any transfer of technology without an agreement with the above mentioned companies. Political and commercial conditions govern any transfer of technology in this field.

In the thermal power technology it is necessary for a country wishing to enter into production activities to prepare facilities for the manufacture of the main principle components - a generator of high pressure steam or gases, steam or gas turbines, turbo pumps, electrical generators and transformers.

Depending upon the kind of combustible material available different technologies for the generation of steam or high pressure gases are available, but all of them have in common the conversion of heat energy into mechanical and then into electrical energy.

In case that the production of electricity is based upon coal for heat generation the following equipment is required:

coal stockage, steam generator, condensor, turbo-feeder pumps, high pressure tubings, dust separator, fittings, steam turbine and electrical generator.

The most important know-how needed is that for the manufacture of the steam-generator, the steam turbine and the electrical generator, while the rest of the equipment components mentioned is easily accessible.

The steam generator - designed either for the combustion of coal dust or of lignite or of liquid fuel oils or of natural gas - consists of a combustion chamber in combination with a system of heat exchangers. Manufacture of this equipment is only possible through licensing from most experienced companies - such as

COMBUSTION ENGINEERING OR
BABCOCK AND WILCOX OR
FOSTER WHEELER

or from companies holding already licenses of one of the above mentioned companies - e.g. JOHN THOMSON, MITSUBISHI, STEIN, Deutsche BABCOCK, HITACHI, I.H.I.

The steam turbine is the widely used equipment for the conversion of heat energy into mechanical or electrical energy. Thus, it can be used in industry wherever steam is produced as a result of combustion of fuel oil, or coal, or gas, or any other combustible material or as a result of nuclear reactions.

The usual way of entering the market as a manufacturer of steam turbines is to apply for a licence by way of cooperation with companies such as

GENERAL ELECTRIC, WESTINGHOUSE, BROWN BOVERI, SIEMENS, AEG, PARSONS, SKODA, RATEAU.

Gasturbines consisting of a compressor, combustion chambers and a turbine are working at high temperatures which causes the utilization of special nickel alloys for manufacture in foundries and forges. Know-how is needed in the fields of special metallurgy, aerodynamics, mechanics, thermal and thermodynamical theories and practice, but also in the workshops in regard of high precision in all phases of production and in the handling and assembly of heavy equipment components.

There too, manufacture of gas turbines might only be based upon cooperation with specialized companies such as

GENERAL ELECTRIC, WESTINGHOUSE, BROWN BOVERI, SULZER, SIEMENS, AEG, STAL LAVAL, NUOVO PIGNONE, ALSTHOM, JOHN BROWN, THOMASSON, HITACHI, FIAT, MITSUBISHI, CREUSOT LOIRE, WORTHINGTON, TOSHIBA AND OTHERS.

- . In the hydro power sector the main equipment is the hydro turbine. Its manufacture requires special knowledge in hydraulics, hydrodynamics, in metallurgy and mechanics applied in traditional facilities qualified for heavy copper smith work and heavy mechanical work in forges, in foundries and in the workshops.

In cooperation with producers/patent holders licences for the manufacture of hydro turbines might be obtained.

Main producers are

ALLIS CHALMER, VOIGT, SULZER, NEYPRIC, RIVA, KMW, BOWING, LMZ.

- . In the mini hydropower sector the manufacture of various equipment components - mini turbines, control units - pose no particular problem for many developing countries having developed mechanical, electrical and electronic know-how in their countries. Most of the companies producing hydro turbines are also interested to use their expertise for the implementation of mini hydro power projects, wherever it is requested. In addition, SIEMENS, LEROY-SOMER, VOEST-KLEINRAT have already developed a new expertise in this sector.

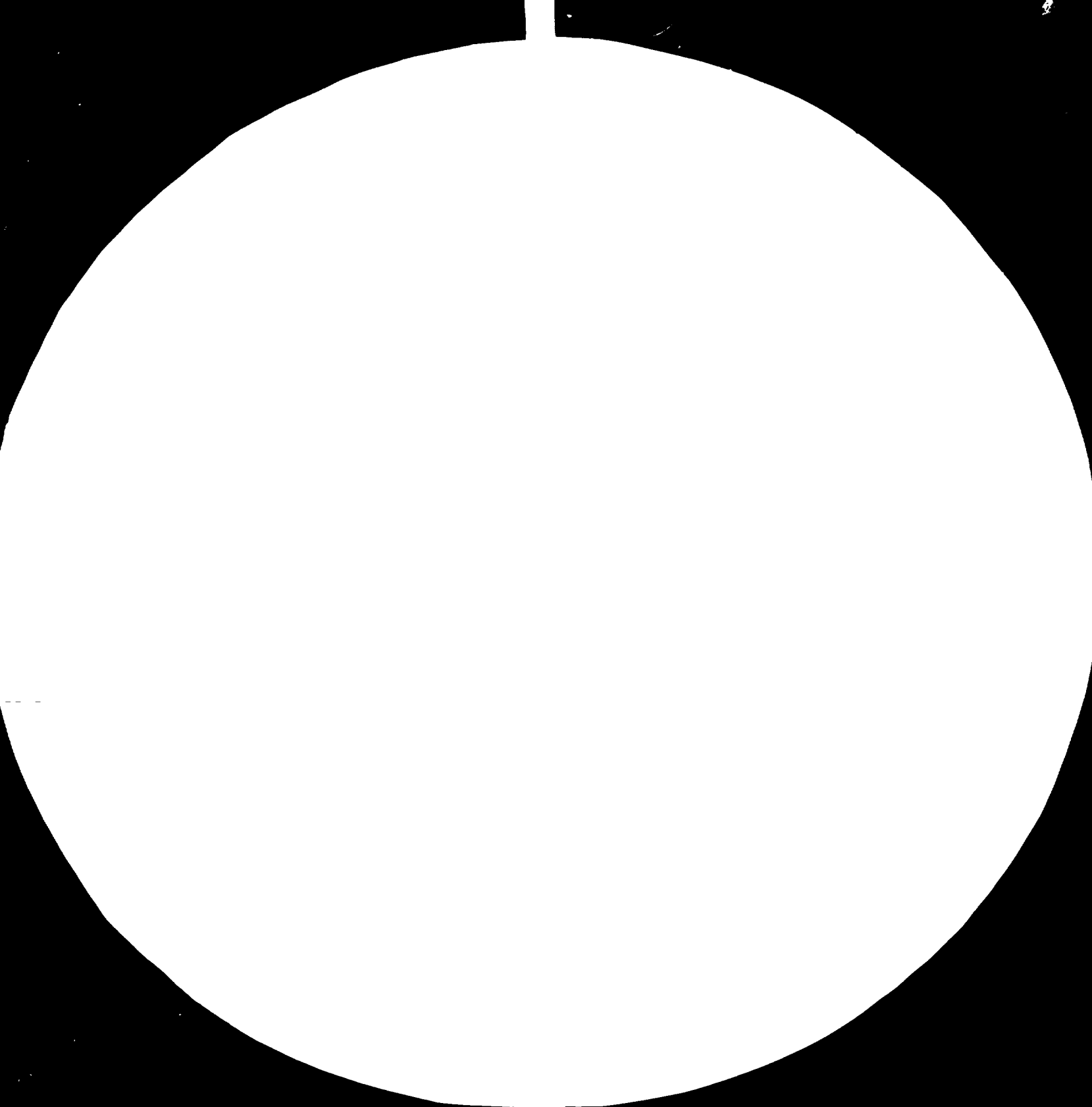
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NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

6.3.4 REQUIREMENTS IN THE TECHNOLOGY OF
GEOTHERMAL ENERGY

Provided that the hot water or steam of a geothermal project is already produced - either naturally or by production wells drilled - the utilization of the hot media is achieved through a system of heat exchangers, condensators, circulation pumps, heat pumps. Manufacture of these equipment components pose no particular problem from the standpoint of transfer of technology, except the equipment made of special titan-alloys needed to prevent corrosion caused by the high salinity of most of the geothermal waters.

6.3.5 REQUIREMENTS IN THE TECHNOLOGIES OF OTHER
RENEWABLE ENERGIES

Equipment needed for the combustion of biological materials - wood, straw and others - consists of a combustion chamber with a suitable burner and a heat exchanger and pumps. These components might be manufactured without special expertise except the know how needed to successfully run mechanical workshops.

Equipment needed for the gasification of biological materials - wood, straw of wheat, rice and others - consists of a press for briquetting of the raw materials, as gasifier (where the raw material is partially burnt in the presence of air), air blowers, a gas washer, and heat exchanger. The utilization of the gas produced is achieved by conversion into heat and electricity, as described in previous chapters. The manufacture of the equipment for the gasification of biomass can be achieved in mechanical workshops.

For the biogas sector the manufacture of the equipment needed - the digester where the anaerobic conversion of organic waste material takes place and the gas collector where the gas produced is collected and tubings - could easily be achieved even with very primitive means. Pits could be used as digestors and sheet steel for the manufacture of gas collecting tanks of various sizes. The equipment needed for the utilization of the gas produced - the biogas - is described in previous chapters

The equipment for the production of ethanol out of biological material containing sugar or starch or cellulose consists of a desintegrator, a washing unit, a fermenter, a distillation column and tubings.

The manufacture of these components made out of stainless steel or copper could be achieved in specialized workshops without technological problems.

The manufacture of equipment for the utilisation of solar energy is rather simple in case of the conversion of sun radiation into heat by means of flat collectors. These collectors are built as flat boxes with bottoms made of black coated sheet steel and covered with two glass sheets.

Heat exchangers and pumps are auxiliary equipments to be produced to utilize the heat formed in the collectors and thus being transferable as hot water or steam.

The manufacture of photovoltaic collectors is complex and is based upon the availability of purest silicium in special cristalline forms or upon availability of gallium arsenide or cadmium sulfide. But as this technology is not yet developed for commercial applications the manufacture of this equipment is of research interest only, for the time being.

6.4)- Infrastructural implications

The establishment of production of energy-related equipment needs the existence of a sound infrastructure . Here also UNIDO has undertaken a basic analysis and listed the techno-economic factors of relevance without them, a successful production project cannot be achieved. It includes the command of casting of iron, steel, non-ferrous metals (especially copper and aluminium), forging, stamping and cold stamping, stress relief, heat treatment, coatings, tool manufacture, maintenance, moulding, dieing, manufacture of jigs, templates, boiler making services, boiler plating, manufacture of gears, gear-cutting, normal and high-precision machinery.

Infrastructure is not limited to techno-economic factors, schools, other educational institutions, training facilities, consultant engineering and financial services should be readily available to facilitate the continuation of production projects.

6.5)- Financial and economic implications

Besides big countries with a corresponding big market a developing country wishing to produce energy-related equipment has to undertake that project on a magnitude level which is economically interesting. The local market quite often would justify only a small production making the project non-profitable. Again, a cooperation on a regional, in some cases on an international basis could increase the market, sufficiently. Economically based contractual arrangements had been established in South and Middle America, in North- and Westafrica and in Asia, to open the markets on a regular basis.

Having engineered economically feasible projects for the production of energy-related equipment the financing of these projects must be secured. The size of investment required varies with the type and size of the projects, but in total, billions of US-dollars are involved and therefore developing countries have to find and allocate financial resources from their own domestic savings from which other projects of high priority have to be financed, too.

Latest at this stage, the national policy and priorities for energy-related programs will have their full impact. In some cases, the developing country might receive soft loans from the World bank or other international institutions with the requirement of repayment out of the profits of the project.

In other cases, agreements might be made on a government to government basis for export credit lines arranged through a group of banking institutions - a typical approach applied by cooperating countries.

Export financing agencies are established in all industrialised countries interested to finance economically feasible projects subject to sound engineering practices, to experienced management and operatorship, in a politically stable environment to minimize the risk elements in the projects.

Crucial to the implementation of projects for the production of energy-related equipment is undoubtedly the cost of the financing of these projects. Special attention must be paid to export-financing conditions quite often tying the receiving country to the financing country from which equipment and services must be purchased.

It could also be of interest for a developing country - especially then, when the development of the energy sector of a developing country should be accelerated - to join forces with an industrialized country or with a supplier company in establishing a joint venture company with the aim of producing energy-related equipment. In joint ventures with supplies it might be possible to secure the transfer of technology, the financing, the management and the operatorship of a project and in turn giving away a great part of the profit of the project.

But as the production of energy-related equipment might save foreign currencies and as it makes a developing country less dependent from foreign countries and as it reduces unemployment, well designed and well negotiated joint venture contracts help improve the economical situation in a developing country.

7) ASSESSMENT OF PROBLEMS AND DIFFICULTIES WHICH EXIST OR
MIGHT BE ENCOUNTERED IN THE PRODUCTION OF ENERGY-RELATED
EQUIPMENT

7.1) Manpower Constraints

There exist many possibilities for the production of energy-related equipment as there are several forms of energy available which involve many different activities each of them performed with the help of a large variety of energy-related equipment.

Production of equipment for exploration, production of energy reserves, conversion, transportation and utilization requires skilled manpower of many levels - mechanics, electricians, engineers for design and operations, managers and scientists for carrying out research and development activities.

Most developing countries rely on foreign personnel from developed countries to run the technical operations or to manage the production company.

Reason for such manpower constraints is the lack of educational and training institutions or facilities in developing countries, and quite often lack or limited financial means to finance the education or training of local personnel or to finance research and development projects. This constraint is made worse by the fact that it takes many years, possibly 5 to 15 years, to build up skilled manpower.

7.2) Technology Constraints

A few developing countries could develop their own technological capacity in the area of production of energy-related equipment, but for most developing countries the transfer of technology did not take place at all, or very slowly due to the reluctance of technology holders to transfer their know-how in the manufacture of energy-related equipment to developing countries or due to the lack of skilled manpower of the developing countries.

Usually, transfer of technology arrangements concentrate on the mastering of the production operation technology, only. Thus, quite often not even repair of equipment used in the energy sector can be done nor the production of spare parts of the equipment used in developing countries.

The degree of complexity of the technology is proportional to the difficulties involved for the production of energy-related equipment.

UNIDO has prepared a method of analyzing the complexity of the technological structure of the production of Capital Goods. This analyzing method allows to make an estimate of the difficulties which might arise, also during the implementation of a project of production of energy-related equipment.

But even then, when a developing country has succeeded in a proper transfer of technology the problem is not solved for ever.

Due to the necessity for improving the efficiency of existing energy-related equipment or due to the strong competition the producer companies have intensified their efforts for developing and creating new technologies.

These activities cause continuous changes in technology which have to be considered and cannot be mastered without national research and development activities, in the long term.

7.3) Infrastructure Constraints

Production of energy-related equipment is based upon a well established and integrated industrial infrastructure including the production of intermediate products such as iron, steel, copper, aluminium, glass and their subsequent processing through metal cutting, casting, smelting, and also including electrical and electronics workshops.

Only a few developing countries have developed their own iron and steel or copper or aluminium production, glass industry is more often found.

These infrastructure constraints lead to the necessity of import of the intermediate products but require additional skilled manpower to process the intermediate products making the manpower problem more complicated.

7.4) Financial and Economic Constraints

Large investment capital is needed for the development of the energy sector of developing countries what implies the import of energy-related equipment with a value exceeding 10 billion US \$ per year. Because of financial constraints - governments of developing countries often cannot afford to allocate sufficient capital in foreign currencies for necessary energy projects or they set other priorities to satisfy urgent requirements (import of energy, food, implementation of agricultural projects, defense projects) - many development countries are not in the position to implement all energy projects needed.

In such a situation it is very difficult for the governments of developing countries to decide to invest into the production of energy-related equipment as the capital needed for such projects has to be shifted away from other vital sectors.

On the other hand the market size of a developing country often is too small to render economically feasible projects for the production of energy-related equipment.

7.5) Legal and Fiscal Constraints

Potential investors - international companies or international institutions - showing interest in projects of production of energy-related equipment usually investigate in the risks involved for their possible investment. A lack of a proper legal framework for the protection of foreign investment, a lack of provisions for the free transfer of dividends, a lack of incentives (subsidies, tax-holidays, duty -free import of machinery for the production of energy-related equipment) might discourage a prospective investor.

8 - PHASES AND ACTIVITIES FOR ENTERING INTO
PRODUCTION OF ENERGY RELATED EQUIPMENT
IN DEVELOPING COUNTRIES

As a result of the analysis made in chapters 5,6 and 7 a summary of energy-related equipment used in the different energy routes, the degree of difficulty for market entry and the degree of complexity of technology for operating of producing facilities is shown in the following table.

ENERGY TECHNOLOGIES

Degree of difficulty for market entry and
degree of complexity of technology for
operating of producing facilities

<i>Technologies</i>	Degree of difficulty for market entry	Degree of complexity of technology for operating of producing facilities
<i>Oil and gas</i>		
Geology	Difficult	Low
Seismics	Difficult	Low
<i>Drilling onshore:</i>		
Rig	Difficult	Low
Bit	Difficult	Low
Mud	Easy	Low
Pipes	Medium	Low
Logging	Very difficult	Very high
Completion	Medium	Low
<i>Drilling offshore:</i>		
Rig	Very difficult	High
Bit	Difficult	Low
Mud	Easy	Low
Pipes	Medium	Low
Logging	Very difficult	Very high
Completion	Difficult	High
Reservoir engineering	Very difficult	Very high
Separation units, compressors, miscellaneous	Medium	Medium
<i>Refinery:</i>		
Distillation	Medium	Low
Hydrodesulfurization	Medium	Low
Reforming	Difficult	Medium
Cracking	Difficult	Medium
Bitumen	Medium	Low
Lubricants	Very difficult	High
<i>Liquefied natural gas plant:</i>		
Separation	Medium	Low
Liquefaction	Very difficult	High
<i>Coal</i>		
Geology	Difficult	Low
Mining engineering	Depends on conditions	Low
Mining equipment {		
Conveyors	Medium	Easy
Extracting equipment	Difficult	Easy to medium
<i>Thermal and hydraulic power</i>		
Boilers	Difficult	Low
Pipes {		
High pressure	Difficult	Low
Low pressure	Medium	Low
Turbines {		
Water	Medium	Low
Steam	Difficult	Medium
Generators	Difficult	Medium
Turbo generators	Very difficult	Medium
Gas turbines	Very difficult	Medium
Transformers	Depends on voltage	Low
Switchgear	Medium to difficult	Low
<i>Nuclear energy</i>		
Geology	Difficult	Low
Mining	Depends on conditions	Low
Enrichment	Very difficult	Very high
Fuel fabrication	Very difficult	Very high
Reprocessing	Very difficult	Very high
Storage	Very difficult	Very high
<i>Solar energy</i>		
Tracking collectors	Difficult	Low
Non tracking collectors	Medium	Low
Solar pumps	Medium	Low
Photovoltaic cells	Medium	Low
Biogas plant	Medium	Low

Having appraised the complexity and difficulties involved in the production of energy-related equipment a general approach was sought for the developing countries for an entry into this market. In this connection, the classification described in chapter 4 is used with a description of the phases and activities necessary for qualifying for the market entry and finally, mastering the technologies involved.

An attempt is also made to indicate an entry point to a distinct phase or level of possible activities for groups of developing countries in relation to their energy exposure as described in previous chapters.

ENERGY-RELATED EQUIPMENT IN DEVELOPING COUNTRIES

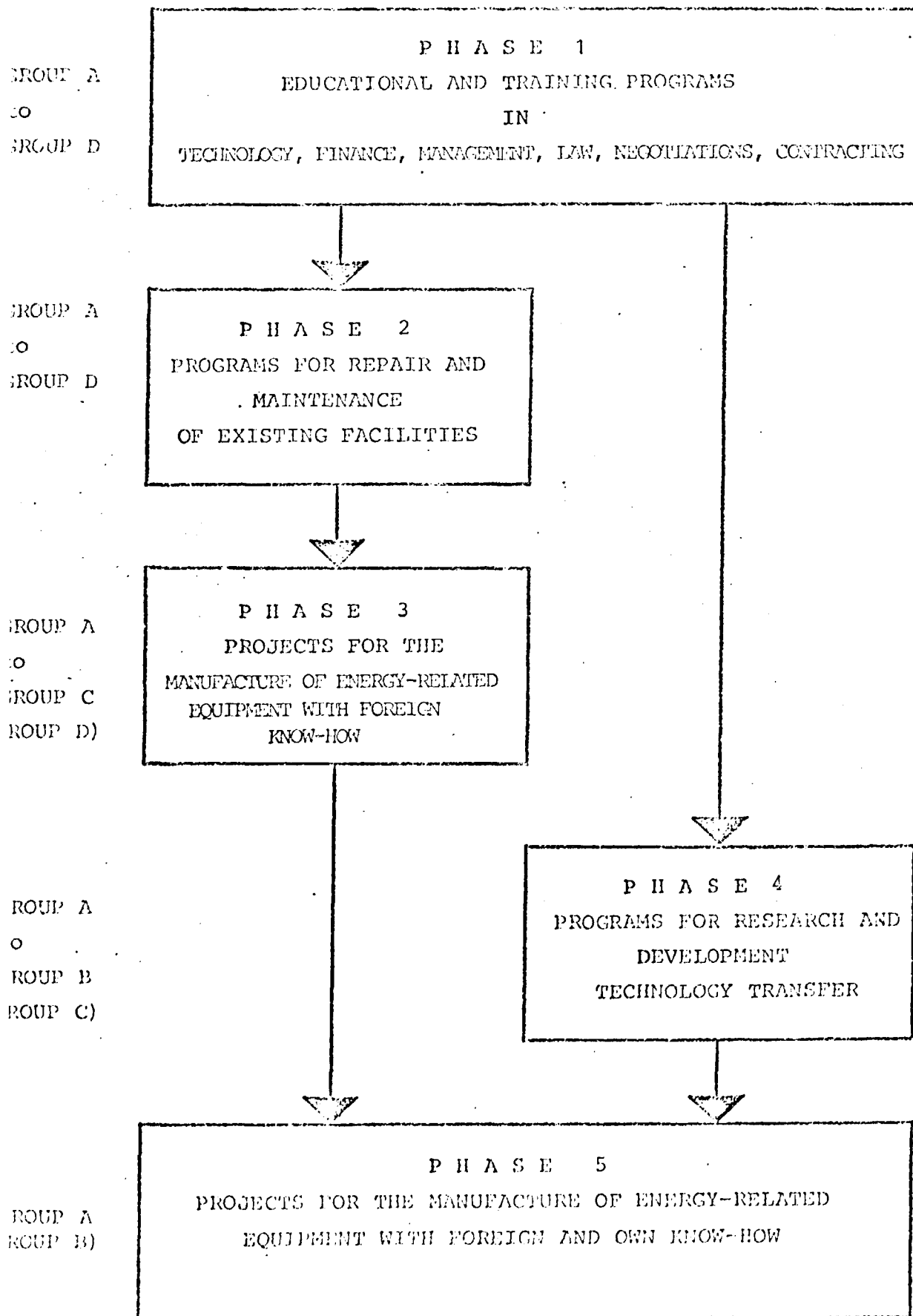


FIG: CLASS 2

In phase 1

which could start immediately, educational programs in energy technology, financing of energy projects, management of energy projects during construction and operations, law and regulations regarding import and export of energy-related equipment, negotiations and contracting might be executed.

All countries are immediately eligible for phase 1 programs. Minimum duration of this phase for a development country could be 5 to 10 years with no time limitation for continuous education and training to maintain a reservoir of educated man-power for current and future energy projects.

In phase 2

which could also start immediately, programs for on-the-job-training on repair and maintenance of existing energy-related facilities might be carried out. All countries with existing facilities for production, transport, conversion, utilization of energy are eligible for repair and maintenance programs of phase 2.

In phase 3

which should begin after execution of programs of phase 1 and 2, projects for the manufacture of energy-related equipment might be undertaken based solely on foreign technology and foreign assistance. Countries of group A, B and C are eligible, in rare cases manufacturing projects could also be created in group D countries whenever the opportunity arises in regional development programs of international organisations. Projects for the manufacture of energy-related equipment with foreign know-how could start sooner in cases where phase 1 and 2 programs are already under execution and the foreign supplier and project manager contractually agrees that the desired transfer of technology will be done at a later stage, whenever the development country is prepared to master the technology to be transferred.

In phase 4

programs for research and development in the fields of energy-related technology could be executed. This includes also the assessment of energy with imported or rented or locally produced equipment, as described in previous chapters. This phase might be entered into by all countries, especially group A and B countries, eventually group C countries, in rare cases group D countries, having built up a sufficiently great cadre of educated and well trained manpower through the programs of phase 1 and phase 2.

In phase 5

projects for the manufacture of energy-related equipment could be carried out whereby not only foreign technology but also own technology might be used. Group A countries, eventually group B countries, should be in the position to create and implement projects for the manufacture of energy-related equipment.

9 - GENERAL POLICY AND STRATEGIES FRAME WORK

Developing countries differ very much in their energy policies but they quite often have similar objectives such as

- increase per capita income
- reduce unemployment
- reduce dependency on foreign countries
- reduce export of hard currencies
- speed up industrialization

To achieve these objectives the following energy policies/strategies could be applied whereby the different groups of countries might differ in their approach.

Group A and B-Countries

- minimize import of energy
- increase energy production
- maximize efficiency of energy utilization to save energy
- export energy
- minimize import of energy-related equipment through substitution by domestic production
- minimize import of energy-related services (repair and maintenance)
- assess energy reserves potential through exploration, appraisal

Group C and D-Countries

- import energy to keep development going on
- save energy by maximal efficiency of energy utilization
- avoid deforestation
- assess energy reserves potential through exploration and appraisal
- minimize import of energy-related services
- develop renewable energy projects

As these policies/strategies will undoubtedly help achieving the objectives mentioned all actions taken to enter the manufacture of energy-related equipment- which is either used for production or conversion or utilization of energy- is also in line with the policies/ strategies and objectives described above.

Priorities for the production of energy-related equipment depend upon the energy available in a country and the technological capacity developed. Thus, if crude oil is available in a country (or neighboring countries) and know-how for the production of oil-related equipment is built up in a sufficient way one or more component(s) with the best impact on the objectives of a country could be chosen.

If more than one choices of energy-related projects exist the project with the highest rate of return should be implemented with the idea to finance the other energy-related projects with the profits of the first.

In any case, production of equipment related to electricity should always be implemented when economics show a sufficient rate of return as most of the other forms of energy finally are converted into electric power.

10. - SUGGESTED AREAS FOR DISCUSSION
AT THE CONSULTATION ON THE PRODUCTION OF ENERGY-RELATED
EQUIPMENT IN DEVELOPING COUNTRIES

As economic growth of all countries is strongly correlated to the growth of energy consumption special attention should be given to the opportunities and necessities of acquiring and developing the technologies related to the energy available including the technology for maintaining and manufacture of the equipment related to the energy available.

Therefore, the inter-relationship between the various energy resources available, their national endowments and technology and equipment related to these energy resources should be taken into consideration.

1. - Potential of production of energy-related equipment in developing countries with energy resources considering:
 - 1.1 the various types and amounts of energy originating in developing countries given in chapter 3 (energy reserves, energy production),
 - 1.2 the various types and amounts of energy used in developing countries given in chapter 3 (energy consumption)
 - 1.3 the various types and amounts of energy available but being transformed into forms of energy finally used in development countries
 - 1.4 the market size for energy-related equipment (import statistics) and its growth pattern of a developing country or a group of co-operating developing countries as classified in chapter 4 - thus a close co-operation of enough developing countries of a region could create a market large enough to establish an economic production of energy-related equipment,
 - 1.5 the infrastructural prerequisites for such production such as availability of skilled man power and intermediate input material

- 1.6 the planning/developing stage as described in chapter 4 and the activities to be undertaken until eligibility is achieved.
 - 1.7 the weak readiness of suppliers to transfer their technologies wholly or partly to the developing countries.
 - 1.8 the financial requirements and the preparations needed to get the resources for financing the production of energy-related equipment.
- 2 - Potential of production of energy-related equipment in developing countries without energy resources considering
- 2.2 the various types and amounts of energy used in developing countries given in chapter 3 (energy consumption)
 - 2.3 the various types and amounts of energy available but being transformed into forms of energy finally used in development countries
 - 2.4 the market size for energy-related equipment (import statistics) and its growth pattern of a developing country or a group of co-operating developing countries as classified in chapter 4 - thus a close co-operation of enough developing countries of a region could create a market large enough to establish an economic production of energy-related equipment,
 - 2.5 the infrastructural prerequisites for such production such as availability of skilled man power and intermediate input material
 - 2.6 the planning/developing stage as described in chapter 4 and the activities to be undertaken until eligibility is achieved.
 - 2.7 the weak readiness of suppliers to transfer their technologies wholly or partly to the developing countries.
 - 2.8 the financial requirements and the preparations needed to get the resources for financing the production of energy-related equipment.

- 3 - The possibilities of establishing groups of co-operating countries in different regions considering
 - 3.1 appropriate sharing of production of parts or whole of equipment and
 - 3.2 fair sharing of neighbouring markets
 - 3.3 the necessity of including in the groups to be created members of all classes as described in chapter 4, ensuring a simultaneous development of countries of the region in a special field

- 4 - The necessity of organizing training centers with sufficient capacity within a region of co-operating countries (with common language) and in developed countries co-operating with the regional group of developing countries (working language is important) where a practical on-the-job-training should be arranged, too.

Special emphasis must be given to the effectiveness of the training as the trainees would later become the operating work force responsible for the functioning of the production of the equipment.

The training center is expected to entertain programs including engineering, maintenance, repair, production of spare parts, managerial, financial, accounting, contractual a.o. courses.

5. - The different ways and means for getting the capital needed to finance the establishment of a production of energy-related equipment.

Countries or a group of countries where energy export is included might receive the needed capital much easier, even for large amounts of capital, either through export-credits or directly from governments interested in a specific project.

Countries without any export could receive the capital needed through the UN-System or bilaterally, through governments willing to assist in the progress of the development of developing countries.

- 6 - Establishment of an authority for the acquisition of
 licences
 know how
 production rights

This authority might either become a partner to the group of developing countries of a region or must have the right to utilize the acquired know-how in the undertakings for production of energy-related equipment.

- 7 - The need to concentrate efforts and speed up action by selecting a special sector of energy-related equipment, the production of which should be established in developing countries, as soon as possible, subject to the condition that such a decision must not be revoked due to a change of the energy policy of a country.

This need could be satisfied under the above condition, only with the establishment of a production of electrical equipment.

As electricity is one of the most convenient and one of the cleanest forms of energy a great part of the energy consumption of any country might be identified as electrical energy. As this fact will not change in the foreseeable future any decision for establishing a production of electrical equipment would serve the purpose of industrial development of developing countries.

With the agreement on the production of electrical equipment, immediate action could be taken as described in the chapters 8 and 9.

- 8 - The possibilities and necessities for the manufacture of energy-related equipment in the sector of new and renewable energy such as mini-hydro electric power, biogas, in special cases solar energy or energy from biomass with the aim of solving local rural or residential energy demand problems.

9 - PRIORITIES

During the consultation on the production of energy-related equipment in developing countries the following areas should be discussed with priority:

- the potential of production of energy-related equipment compared with the market size and growth ratio of developing countries on a national and regional basis.
- The infrastructural prerequisites for such production
- exchange of experience on the readiness of foreign producers for a transfer of technology
- the financial requirements for related projects

- the time needed for the implementation of related projects with and without the assistance of the supplier/producer.

- ways and means for achieving training of manpower of developing countries with producer companies or in a cooperation with production projects of other developing countries.

11. - CONCLUSIONS AND RECOMMENDATIONS

- 1 - Developing countries own considerable amounts of oil and natural gas reserves and production. Technology of oil and gas exploration, production, processing and transportation is not monopolized. Oil products and gas, quite often, are transformed into electricity. Many national Oil Companies of development countries have, at least, partly mastered the technology involved for operating purposes, a few like India and Brazil are also producers of equipment. Entry into the market by new producers is very difficult.

- 2 - Developing countries own also huge amounts of coal reserves and have a remarkable coal production. Coal, too, is often transformed into electricity using thermal power stations. Coal technology is not monopolized and available from various technology owners. Entry into the coal equipment market for a new-comer is not difficult but requires good infrastructure (steel, railway).

- 3 - Hydro and thermal power is produced in many developing countries. Geothermal energy is used for space heating or is transformed into electricity. The technology involved is not difficult to operate but the technology for the production of heavy electrical equipment is concentrated within a few transnational companies who control the market and prices. Nevertheless, some developing countries have made arrangements with the International Power Companies and have become producers, even of heavy, electrical power equipment. Few developing countries have also entered the nuclear power operating sector.

- 4 - Solar energy, biological energy and wind energy is available in almost all developing countries. These technologies are still in development, opening the opportunity for developing countries to participate in the research and development activities in which almost all international oil companies are engaged, too.

Market entry would not be a problem, but the unit costs of these renewable energies are not competitive.

- 5 - The technology for the production of methanol is rather complex, not easily available but the methanol is not competitive, for the time being.

- 6 - The technology for the production of gasohol and ethanol is rather simple and also for the production of the equipment.
To enter into the market would not be a problem for countries where very cheap waste material could be used as a raw material for the production of ethanol.

- 7 - The technology for the production of heat pumps and heat recovery is not complex, and available. Market entry into domestic markets would be no problem.

- 8 - The technology for the production of Stirling engines is still in development, thus allowing advanced developing countries to engage in research and developing work.
As the Stirling engine might utilize the heat energy of the transformation of any form of energy, efforts will continue to complete research and development for this engine.

- 9 - Production of energy-related equipment imply a set of prerequisites which can be achieved only with full and concerted efforts of developing countries:
 - . discovery, development and production of energy reserves,
 - . availability of skilled manpower in all levels as labour, technicians, engineering, management, finance, contracting, accounting etc.,
 - . availability of appropriate technology
 - . a basic infrastructure including availability for steel, copper, aluminium, cement, glass etc. and processing capabilities, transportation capabilities.

- . training facilities
 - . financial resources
- 10 - As all the afore-mentioned prerequisites must be fulfilled the lack of either one would give rise to difficulties which could prevent the implementation of a project, needed.
 - 11 - To overcome or to minimize these difficulties it is recommended
 - 12 - to assist developing countries in their efforts to explore, develop and produce energy reserves, UNIDO, World Bank, developed countries (using these development funds), joint ventures
 - 13 - To advise developing countries in setting up general policy issues and concepts for the energy sector UNIDO consultation identifying the infrastructure sectors to be set up to provide the basic conditions for the manufacture of energy-related equipment
 - 14 - to assist developing countries in establishing plans and projects for the development of a manufacture of energy-related equipment based on long term energy and technological needs of these countries from where the maximum benefit for the developing countries could be derived,
 - 15 - to include in any development program of the energy sector also the development of the educational, the training, the industrial and technological, the financial, the managerial, the contractual, the fiscal, the legal basis, in a concerted effort,
 - 16 - to assess the energy-related activities of developing countries including the existing energy law and regulations, the national energy policy, existing energy corporations, manufacturers of energy-related equipment and existing contractual arrangements with producers of energy-related equipment,
 - 17 - to assess the infrastructural environment related to the manufacture of planned energy-related equipment,

18 - to assist developing countries in formulating and implementing programs to build up a national technology capacity including all levels, i.e.

- labour: set up training programs for
increasing mechanical and electrical and
electronical know-how
operating energy installations,
maintenance of energy installations

- engineering: set up training programs at home and
abroad, for
design and construction of production
facilities of energy-related equipment

- accountancy: set up training programs for
cost accountancy in the manufacture of
planned energy-related equipment

- laws and
regulations to assist developing countries to review
and eventually to revise or to supplement
existing laws and regulations in regards
to energy and manufacture of energy-related
equipment, thus implementing the necessary
incentive programs for improving economics
and speeding up the appropriate activities

- contracting to arrange seminars on the structure of
contracts for the procurement or manufacture
of energy-related equipment including but not
limited to arrangements for training,
maintenance, spare parts and technology transfer

finance to arrange seminars on the different financing systems of projects for the procurement or manufacture of energy-related equipment

management: to arrange courses for improving special skills in

planning

negotiating

purchasing

manufacturing

energy-related equipment

research and development

to promote research and development activities in energy-related technology and equipment

(including technology and equipment for new and renewable energies)

to establish research institutions at least for regions of co-operating developing countries

19 - to advise developing countries in regard of the preparations necessary to make full use of the contractual provisions - eventually existing in their contracts with suppliers or contractors - for training, education or transfer of technology.

20 - to create and to promote and to strengthen the co-operation among developing countries and with developed countries, as the progress of development could be accelerated if efforts are made in co-operation at the national level through concerted activities of governmental and private institutions and at the regional level through co-operation of neighbouring development countries and at the international level through co-operation of national energy institutions and international governmental or private corporations

and

as a single development country usually cannot produce, economically, energy-related equipment for its own domestic market,

in this co-operation several countries share the manufacture of equipment and also share the markets;

several countries might produce different parts of the wanted equipment, eventually purchase from abroad some other parts which are too difficult to be produced in their countries and

each co-operating country might then-after an exchange of the parts produced - assemble its own equipment.

21 - to promote the formation of regional working groups taking into consideration the classification described in chapter 4 with the aim of

assessing

- a - energy resources in the countries of the working group
- b - existing industrial activities with special attention to the energy sector

coordinating programs for

- a - educational, training and research activities in the region, including the establishment of appropriate educational, training and research centers
- b - programs for technology transfer
- c - activities for the establishment of service companies for the maintenance of energy-related equipment
- d - activities for the establishment of a manufacture of energy-related equipment for the production, conversion and utilization of energies available in the region

formulating and deciding on priorities

- a - for the development of specific energies available in the region and
- b - for the development of programs and projects in the field of energy-related equipment suitable for the energies available in the region.

22 - PRIORITIES

It is recommended to apply the following priorities:

- Developing countries very urgently need the education and training of project managers. Therefore, before an investment decision is to be made for the establishment of a production of energy-related equipment project managers of developing countries have to undergo a training program sponsored by the supplier company or using a UNDP OR WORLD BANK or bilateral aid fund for that purpose.
- Training centers should be established by development countries on a regional basis to train all manpower involved or to be involved in energy projects - the fastest way to build up technological knowledge and skills needed, at least for repair and maintenance.
- Developing countries should be encouraged to plan and work on the assessment of energy resources in their countries also on a national and regional basis. Funds in addition to WORLD BANK funds should be made available for that purpose.
- Feasibility studies for the production of equipment related to the energies produced or available in a development country and for electrical equipment should be made by UNIDO.

ENERGY-RELATED EQUIPMENT USED IN DEVELOPING
COUNTRIES AND ITS MAIN PRODUCERS AND SUPPLIERS

ABSORBERS - Shock, Drilling
Daichi Jitsugyo Co Ltd
Fuller & Kinnaird Assoc.Ltd
Hagge Tool Co
Jasco Services

ABSORPTION UNITS

EE & A
C-E Natco Int'l Ltd

ACIDISING EQUIPMENT (see Remedial & Stabilisation Equipment)

ACTUATORS - Valve

Apaco
Asiatic Tool Co
Automatic Accessories
Avelon Inc
Cameron Iron Works
Eres, PT
Fisher Controls Pte Ltd
Flow Measurement & Control Div.
IME Corp
INC Petroleum Equip SEA Pte Ltd
Fomboro Group
Gray Service Co/Gray Tool Co
Heres Trading Co Ltd
Raystone Valve
Lietz-Zalusta Capital Inc
Kestonlian
Kufco Sdn Bhd
Nipco Pipework SpA
W-F-M

ADSORPTION UNITS

Avery-Laurence Group
C-E Natco Int'l Ltd

AGITATORS, CONDITIONERS AND MIXERS

AMF Incorporated
APV Mitchem (Dryers), Ltd
Atlas Copco AB
Bateman Ltd, Edward L
Carr Oliver Inc
Edwards & Jones Ltd
Fives Cail Babcock
Gaugher Co, The
GEC Mechanical Handling Ltd
Gruender Crusner & Pulverizer Co.
Hazen Research International Inc.
Hunslet Mining Machinery Co., Ltd.
Ishikawajima-Harima Heavy Industries
Johnson Progress Ltd
Joy International S A
Joy Manufacturing Co
Joy Manufacturing Co., Denver Equipment Div.
Joy Manufacturing Co. (U.K.), Ltd., Denver Equipment Div.
KHD Industriemagen AG, Humboldt WEDAG
Kawasaki Heavy Industries Ltd.
Koblen Boring Machine Co
Krupp GmbH, Fried. Krupp Industrie Und Stahlbau
Lincoln St. Louis
McDowell Warman Engineering Co
McNally Bharat Engineering Co Ltd
Minemet Industrie
Mining Development (UK) Ltd
Molydev

Philadelphia Gear Corp.
Rauma-Repola Oy, Pori Div.
Rexnord Inc.
Saia International
Saia Minco
Simon-Warman Ltd
Warman Equipment (International) Ltd
WEMCO Div. Envirotech Corp.

AIR CREWING VEHICLES

Ransselec Industries Pte Ltd

AIR CONDITIONING PLANT & EQUIPMENT - Industrial

AAF Intl Sa/AAF Pte Ltd
Atlantic, Gulf & Pacific Co
Carrier Intl Corp.
East Asiatic Co Ltd
Eres, PT
Felzar Pte Ltd
General Electric Co
Heres Trading Co Ltd
ITT Far East & Pacific Inc
Trane SA
York Intl Corp

AIR CONDITIONING PLANT & EQUIPMENT Marine

Alliance
East Asiatic Co Ltd
Wilson Walton Intl
York Intl Corp

AIR LINE LUBRICATORS

Atlas Copco AB
Bonier Bros & Co Ltd
Dresser Industries Inc
Fintmann-Werke GmbH
Furukawa Hock Drill Sales Co Ltd
Gardner Denver International, International Div
Ishikawajima-Harima Heavy Industries
Keene Corp
Lincoln St. Louis
Moss (Pty) Ltd, George
N L Rucker Products
SIG Schweizerische Industrie-Gesellschaft
Vereingte Edelstahlwerke AG

AIRCRAFT

See Also Exploration Services

1 Fixed Wing 2 Helicopter

Kawasaki Heavy Industries Ltd, 2
Rockwell International Corp, 1,2

ATAPHS Drilling (also see Controls Drilling)

Daichi Jitsugyo Co Ltd
Hydril Co
Imco Services
James Gauntt Pte Ltd
Lampara Holdings Group
Martin Decker Co

ALUMINIUM AND ALUMINIUM PRODUCTS

Carl Bauer & Co
Metalex
United States Trading Co Pte Ltd

AMALGAMATORS

Joy Manufacturing Co. (U.K.), Ltd.
Denver Equipment Div.

ANALYZERS

1 Air 2 Ash 3 Coal Gases (Methane)
4 On Stream 5 Neutron Activation 6
Particle Size 7 Sulphur, Coal 8 SO₂
9 Vapor

Avergesellschaft, Sub MSA Europe
3 4 6 8
Australian Mineral Development
Lab 2 4
Beckman Instruments, Inc. 1
Du Pont de Nemours & Co. Inc., E.
1 1 3 8
Fisher Scientific Co. 6, 7
Jonsson-Progress Ltd. 2
Joy Mfg. Co., Western Precipitation
Div. 6
KHD Industrienlagen AG, Humboldt
WEDAG 2 6
Kopex, Export-Import 1, 2, 3, 7, 8
Leeds & Northrup Co. 4, 6, 8
Locker Industries, Ltd. 6
Mine Safety Appliances Co. 1, 3, 6, 8
Mine Safety Appliances Co. Ltd.,
AHL MSA Europe 3
Oldham France SA 1, 3
Outokumpu Oy, Technical Export
Div. 4, 5
Outokumpu Oy, Technical Export
Div. 4, 5
Philips Gloeilampen Fabrieken, N.V.
Science & Industry Div. 1, 4, 5, 7, 8
Scintrex Ltd. 7
Sieger Ltd., J. & S. 3
Simon-Warman Ltd. 6
Texas Nuclear Corp., Div. Ramsey
Engineering Co. 2, 5
Varian Associates, Instrument Div.
1
Warman Equipment (International)
Ltd. 6
Westinghouse Electric Corp. 1, 8
Zeiss, Carl 6

ANODES (see Cathodic Protection)

ASBESTOS & ASBESTOS PRODUCTS
(see Gaskets or Insulation)

ASSAY EQUIPMENT

See Also Laboratory Equipment and
Supplies

1 Analytical X-Ray Equipment

KHD Industrienlagen AG, Humboldt
WEDAG 1
Philips Gloeilampen Fabrieken, N.V.
Science & Industry Div. 1
Zeiss, Carl 1

AUGERS

1 Alluvial 2 Coal, Accessories 3 Coal, Complete

Acker Drill Co. 1
Calweid, Div. Smith International
Inc. 1
Fox Manufacturing Co., Div. Placer
Exploration Ltd. 1, 2, 3
Furukawa Rock Drill Sales Co. Ltd.
2, 3
Jeffrey Mining Machine Co., Div.
Dresser Industries Inc. 3
Koken Boring Machine Co. 1
Long-Airdox Co., Div. Marmon
Group Inc. 3
Mobile Drilling 1
Moss (Pty) Ltd., George 1, 2, 3
Murphy Group, The 3
Pocian 1
Salem Tool Co. The 2, 3
Spencer & Sons Ltd., Matthias 2
VR/Wesson, Div. of Fansteel 2

BAGS AND ACCESSORIES

1 Bag Filling Machines 2 Blasting, Tamping 3 Explosive Carrying Bags 4 Filler Bags 5 Ore and Concentrate Bags 6 Sample Bags

AMF Incorporated 4
American Can Co. 1
Batemans Ltd., Edward L. 4
Bemis Co., Inc. 1, 2, 3, 4, 5
Donaldson Co., Inc. 4
EIMCO, Div. Envirotech Corp. 4
Howe Richardson Scale Co. 1
Jonsson-Progress Ltd. 4
Keene Corp. 4
Krupp GmbH, Fried. Krupp
Industrie-Und Stahlbau 4
Mitsubishi Metal Corp. 1
National Filter Media Corp. 4
National Mine Service Co. 2
P & S Filtration Ltd., Div. Scapa
Group Ltd. 4
Pneumatische Transport AB 1, 2, 3
Prapronvest 1
Standard Filterbau, Dr. E. Andreas
GmbH & Co. 4
Svedala-Abra AB 1
Wheelabrator-Frye, Inc., Air
Pollution Control Div. 4

BAPRELS Core
American Colloid Corp
Apsco
Borneo Oil Tool Co
Christensen Diamond Products Pte
Far East Carbon Sdn Bhd
Morris Corp
III, Hycalog
Technotrade Intl Pte Ltd
United Oilfield Rentals Pte Ltd
Warmco Service & Supply

BASKETS Boots/Fishing/Junk
Borneo Oil Tool
Greaves Cotton & Co Ltd
Tri State Oil Tool SA

BATTERIES AND ACCESSORIES

See Also Lump, Miner

1 Automotive and Light Plant 2 Chargers 3 Locomotive 4 Mine Vehicle

Becorit (GB) Ltd. 3, 4
Brown, Boveri & Co. Ltd. 1, 2, 3
CEAG Dominit AG 2
Compagnie Electro Mecanique, Sub
Brown, Boveri & Co. 1, 2, 3
Gould Inc. 2, 3, 4
Ingersoll-Rand Co. 4
Kershy Mfg. Co. 2, 4
Marathon Manufacturing Co. 2
Mine Safety Appliances Co. 2
National Mine Service Co. 3
Oldham & Son Ltd. 1, 2, 3, 4
Oldham France SA
Shinko Electric Co. Ltd. 3
SIG Schweizerische Industrie-
Gesellschaft Construction &
Mining Mach. 3
Union Caride Corp. 1, 3, 4
Unroyal Inc. 1
Vereinigte Osterreichische Alpine
Montan-Eisen- & Stahlwerke 4
Westinghouse Electric Corp. 2, 3, 4
Yokohama Hubber Co. Ltd. 1

BEARINGS

1 Ball 2 Needle 3 Pillow Blocks 4 Roller 5 Sieve

ABEX Corp. 1, 2, 3, 4, 5
Dresser Industries Inc. 3, 4
Dresser Industries Inc., Power
Transmission Div. 3
Eaton Corp. 3
Federal Mogul Corp., International
Distribution Div. 1, 2, 3, 4
FMC Corp. Bearing Div. 1, 3, 4, 5
GEC Machines Ltd. 5
Ingersoll-Rand Co. 1, 2, 3, 4
Keene Corp. 1, 2, 4
NI Industries Inc. 5
Reliance Electric Co., Dodge Div. 3
Timken Co., The 3, 4
Torrington Co., The 2, 3, 4
Torrington Co. Ltd., The 1, 2, 3, 4
U.S. Steel Corp. 1, 3
Westinghouse Electric Corp. 5

BEARINGS & BEARING PRODUCTS

American Intl Industries
MTN Bearing
Paramount Trade & Engrg, PT
Ua Withya Equip Co Ltd
United Engineers
United Motor Works
Whyte & Co

BELTS AND BELTING

See Also Conveyor Equipment, Fasteners
And Spacers, Belt Suits, Equipment

1 Cable, Belt 2 Chain Link and Metal
3 Dewatering 4 Engineering
Systems 5 Flameproof 6 Flat Belts 7
Hot Materials Belting 8 Leather
Belting 9 Polyvinylchloride 10
Profiled Belts 11 Rubber Belting 12
Steel Cord 13 Synthetic Fibers 14
V Belts 15 Vulcanizing Equipment

ABFA Corp 2
Astromo Div Neytzer 3
American Bitrite Rubber Co. Inc
Boston Industrial Products 5,6,7,
11

Angus & Co Ltd George Belting
Products Div 6,8,11,13,14
BTR Belting Ltd 1,3,5,6,7,9,10,11,
12,13

Babcock & Wilcox Ltd 1
Babson & Thrall Inc 8
Banco Chemical Industries Ltd,
International Div 1,6,7,11,12,
14,15

Bridgestone Tire Co Ltd 5,7,11,
12,13

Brown Boveri & Co Ltd 4
Buckner Wolf Maschinenfabrik AG 4
Cable Belt Conveyors Inc 1,4,5
Chemimpex Hungarian Trading
Co 7,9,11,14

Cloutier Gummifabrik AG 5,6,7,9,
10,11,12,13

Compagnie Electro Mecanique, Sub
Brown, Boveri & Co 4

Continental Gummi-Werke AG 5,6,
7,9,10,11,12,14,15

Den Norske Remfabrik A/S 5,6,7,
8,10,11,15

Dresser Industries Inc, Industrial
Equipment Div 4

Eaton Corp 6,10,12
Fenner & Co Ltd, J H 6,9,11,13,
14

Flexible Steel Lacing Co 14

Flekwoll Corp 3,4,6,7,10,11,12

Gates do Brasil SA 6,7,11,14

Gates Rubber International 11,13,
14

Gates Rubber of Canada Ltd 14

Gates Rubber of Mexico S.A. de
Cv 6,7,15

Goodall Rubber Co 11,14

BF Goodrich International 4,6,7,9,
11,12,14

Goodyear International Corp 5,6,7,
11,12,14

Greengate Industrial Polymers, Ltd
2,11

IBAG Internat Baumaschinenfabrik
AG 1,2,3,4,5,6,9,10,11,12

Johnson-Progress Ltd 4

Korea Export-Import 1,2,3,4,5,6,
7,8,9,10,11,12,13,14,15

Krupp GmbH Fried Krupp
Industrie Und Stahlbau 4

Long Ardox Co Div Marmon
Group Inc 4,9

Mitsubishi Belting, Ltd 6,7,11,14,
15

Mountain State Engineers 4

National Filter Media Corp 11

National Mine Service Co 5,9

Niker 1

Nihs GmbH Forderband-
Ausrustung 15

O & K Orenstein & Koppel AG
Werk Ennigerloh 2

Reliance Electric Co, Dodge Div 14

Reinold Inc 1,2

Rost & Co Balatroswerke, H 5,6,
10,11

Roxon Cy 4

RUD Kettenfabrik Rieger & Dietz 2

Scandura Ltd 5,9

Shaw Armax Ltd 15

TBA Industrial Products, Ltd,
Belting Div 5,6,9,11,14

Tokai Rubber Industries, Ltd 5,7,
11,12,15

Trelleborgs Gummitfabriks Ab 5,6,
7,10,11,14

Uniroval Inc 6,7,11,14

Uniroval International Inc 1,4,8,9,
11,12,13,14

US Steel Corp 2

Wagener & Co 15

Yokohama Rubber Co Ltd 1,4,11

BELTS Derrick Safety

Aqua-Terra Group

Central Industrial Suppliers

Marine & Onshore Trading Co

KSA SEAALIA Pte Ltd

Sea Supply

BELTS Transmission

Ansbach Marine Supplies

Bayliss Intl Pty Ltd, J

Dunlop Singapore Sdn Bhd

Gales Export Corp

Goodyear Singapore Pte Ltd

Quan Teck Hardware Pte Ltd

Guthrie Engineering

Mid Continent Supply Eastern
Hemisphere Co

BIG HOLE BORING MACHINE AND BITS

1 Boring Machines, Horizontal
Tunnel Borers 2 Boring Machines,
Raise 3 Boring Machines, Blind Hole
Raise 4 Coal 5 Drill Cutters 6 Drill
Pipe and Stems 7 Pilot Hole Bits 8
Reaming Bits 9 Shaft Borers

AEC Inc (Alpine Equipment Corp)
1,9

Acker Drill Co 7

Atlas Copco Ab 1,5,7,8

Babcock & Wilcox Ltd 1,2,3,4,5,6,
7,8,9

Calweld Div Smith International
Inc 3,9

Deilmann Haniel GmbH 9

Demag AG ABT
Bergwerksmaschinen 1,2,4,5,7,8

Demag verdichter &
Drucklufttechnik GmbH 1,2,4,5,
7,8

Dosco Overseas Eng Ltd 1

Dresser Industries Inc 1,2,3,4,5,6,
7,8,9

Dresser Industries, Inc Mining
Services & Equip Div 5,6

Draco Industrial Div Smith
International Inc 6

Drill Systems Inc 6

Eickhoff Maschinbk-U Eisengessereier
1

Euro-Drill Equipment (UK) Ltd 6,7

Fagersta Secoroc AB 7,8

Frontier-Kemper Constructors 2,9

Geomenco 9

Goodman Equipment Corp 1

Hoie Openers Inc 8

Hughes Tool Co 2,3,7,8

Ingersoll Rand Co 2

Ishikawajima Harima Heavy
Industries 1,2,3,5,6,9

Jarva Inc 1,5

Jeffrey Mining Machine Co, Div
Dresser Industries Inc 2

Kennametal Inc 1,2

Koken Boring Machine Co 1,2,3,4,
5,6,7,8,9

Krupp GmbH Fried Krupp
Industrie Und Stahlbau 3

Krupp GmbH Fried Krupp Widia
Fabrik 7,8

Machinexport V/O 1,7

Moss (Pty) Ltd, George 4,5,6,7,8

National Mine Service Co 1,4

Padley & Venables 7,8

Reedpath Corp J S 1,2

Reed Tool Co, Drilling Equipment
Div 5,7,8,9

Robbins Co The 1,2,3,8,9

Salzgitter Maschinen AG 3

Smith International, Inc 1,2,3,4,5,
6

Soding & Halbach, J C 1,4,5,6,7

Spencer & Sons Ltd, Matthias 5

Oy Tampella AB Tamrock Div 2

Thymerk Thyssen (Great Britain)
Group 1,4

Thyssen (Great Britain) Ltd 1,4

Underground Mining Machinery,
Ltd 1

VR Western, Div of Fansteel 8

Varel Mig Co 7,8

Vereinigte Osterreichische Alpine
Montan Eisen & Stahlwerke 1,9

VOEST-Alpine 1

Westalia Lunen 1

Wimet Ltd 4

Wirth & Co KG, Alfred 1,2,4,5,6,8

BINS, CHUTES, HOPPERS AND ACCESSORIES

See Also Feeders

1 Bins and Chutes 2 Coal Storage 3
Coal Underground, Self Charging 4

Gates, Lips, Etc. 5 Indicators 6 Level
Indicators, Controllers 7 Lining 8

Vibrators

AEG Teletunken B

Alutery 1

American Mine Door 1,8

Appareis Dragon 1,6

Babcock & Wilcox Ltd 8

Bateman Ltd, Edward L 2,6,8

Bethlehem Steel Corp 1

BICC Ltd 5

Bindicator Co 5,6

Blaw Knox Equipment, Inc 1

Bormag-Rapid Ltd 8

Buckau-Wolf Maschinenfabrik AG 1,
2

Card Corp 1.4
 Coors Porcelain Co 7
 Dillon & Co Inc W C 5.6
 Dragon SA, Appareils 1.6
 Dresser Industries Inc, Industrial
 Equipment Div 1.4.5
 Engineered Equipment Co 7
 Eriez Magnetics Ltd 8
 Fives Cail Babcock 1.2
 Flottmann-Werke GmbH 8
 FMC Corp, Material Handling
 Equip Div 5.6.8
 Fox Manufacturing Co, Div Placer
 Exploration Ltd 1.2.3.4
 Fuller Co 4.5.6
 GEC Mechanical Handling Ltd 1.2.
 8
 BF Goodrich International 7
 Grantham Electrical Engineering
 Ltd 8
 Heath & Sherwood Co 1
 Holz Rubber Co 7
 IBAAG Internati Baumaschinenfabrik
 AG 1.2.4.5.6.7.8
 IFF GmbH & Co KG 8
 Ishikawajima Harima Heavy
 Industries 1.2.4.7
 Johnson Progress Ltd 1.2
 KHD Industriemagazin AG, Humboldt
 WEDAG 8
 Kone Corp 1.2.3.4.8
 Kopex Export-Import 1.2.3.4.5.6.
 7.8
 Locker Industries, Ltd 4.8
 Long-Airdux Co, Div Marmon
 Group Inc 2
 Machinexport V/O 8
 Mapco Ltd 8
 Martin-Decker Co 5.6
 Martin Engineering Co 6.8
 McNally Bharat Engineering Co
 Ltd 1.2
 McNally Pittsburg Mfg Corp 2
 Moss (Pty) Ltd, George 1.7
 Mountain State Engineers 1
 National Tank & Pipe Co 1
 Nilos GmbH Förderband-
 Ausrüstung 7
 Noratom Norcontrol As 6
 O & K Ureinsteil & Koppel AG,
 Werk Ennigerloh 1
 Oil Energy Systems Ltd 8
 Osborn (South Africa) Ltd., Samuel
 1.8
 Philips Gloeilampen Fabrieken, N.V.
 Science & Industry Div 5.6
 Pohlig Heckel-Bleichert Ver.
 Maschin AG 2
 Praksa Seismos GmbH 8
 Production Equipment Ltd 1
 Kauma-Repolo Oy, Lokomo Div. 1.8
 Reaunisation Equipments Industriels
 1.2.3
 Redler Conveyors Ltd 1.2
 Rexnord Inc, Vibrating Equipment
 Div 8
 Rhino Sales Corp 8
 Roxon Oy 1.8
 SSP Construction Equipment 8
 Scaw Metals Ltd 7
 Schenck AG, Carl 8
 Schmelzbasaltwerk Kalenborn 7
 Shinko Electric Co, Ltd 8
 SIEMAG Transpian GmbH 1.3.4
 Siemens AG 6
 Stephens-Adamson Mfg Co 6
 Svedala-Abra AB 1.6
 Teismith Div Barber-Greene Co 4
 Texas Nuclear Corp, Div Ramsey
 Engineering Co 6

Thyssen (Great Britain) Ltd 2
 Trelleborgs Gummifabriks Ab 1.7
 Tyler Inc, W S 4
 Underground Mining Machinery,
 Ltd 1.2
 U.S. Steel Corp 1.2
 Vereinigte Edelstahlwerke AG 8
 Vibranetics Inc 1.8
 Warman Equipment (International)
 Ltd 1.2.4
 Wennberg AB, C J 8
 Wesernutte AG, Eisenwerk 1.2
 Westinghouse Brake & Signal Co
 Ltd, Signal & Mining Div 1.4
 Wilkinson Process Linatex Rubber
 Co Ltd 7

BITS

See Also Steel, Diamond Bit Resetting
Services

**1 Auger Bits 2 Big Hole Bits 3 Churn
 Drill Bits 4 Coal Bits, General 5 Coal
 Cutting Machine 6 Diamond Bits 7
 Percussion Bits 8 Reaming Bits 9
 Rotary Bits 10 Tungsten Carbide**

Acker Drill Co 6.7.8.9.10
 Airam Ab Oy, Kometa Works 7.8.
 10
 Anderson Mavor Ltd 5.10
 Atlas Copco AB 1.2.6.7.8.9.10
 Bellows Heavy Engineering Ltd 7.8
 Boart (UK) Ltd 6.7.8.10
 Bonier Bros & Co Ltd 2.6.9
 Brunner & Lay 7.10
 Christensen Diamond Products 6.8.
 10
 Dalby Tool Co 7
 Demag AG, ABT
 Bergwerksmaschinen 8.9.10
 Demag Verdichter &
 Drucklufttechnik GmbH 8.9.10
 Dresser Industries Inc 2.6.9.10
 Dresser Industries Inc, Mining
 Services & Equip, Div 7.9.10
 Drill Systems Inc 7.8
 English Drilling Equipment Co Ltd
 10
 Euro Drill Equipment (UK) Ltd 7
 Fagersta Secoroc AB 2.8.9.10
 Fox Manufacturing Co, Div Placer
 Exploration Ltd 1.4.5.9.10
 Furukawa Rock Drill Sales Co Ltd
 1.7.8.9.10
 GTE Products Corp 1.10
 General Electric Co, Carbonyl
 Mining Products Sect 1.4.5.10
 Haulax Tool Co Ltd 7.9
 Hole Openers Inc 2.8
 Hughes Tool Co 2.7.9.10
 Ingersoll-Rand Co 9
 Joy International S A 5.6.7
 Joy Mfg Co 7.10
 Kay Rock Bit Co 7.8.9.10
 Kerinmetal Inc 1.2.4.7.10
 Koken Boring Machine Co 1.2.6.7.
 8.9.10
 Kopex Export-Import 7.8.9.10
 Krupp GmbH, Fried Krupp Widia
 Fabrik 1.2.3.4.7.8.9.10
 Long-Airdux Co, Div Marmon
 Group Inc 1.4.9
 Longyear Co 6.9
 Metallwerk Plansee AG & Co KG
 10

Mindrill Ltd 6.10
 Mitsubishi Metal Corp 1.2.4.7.8.
 10
 Mitsubishi Steel Mfg Co. Ltd 3
 Mobile Drilling 1.4.6.8.9.10
 Moss (Pty.) Ltd. George 1.2.4.7.8.
 9.10
 National Mine Service Co 4
 Osborn (South Africa) Ltd. Samuel
 18
 Padley & Venables 4.5.7.8.9.10
 Reed Tool Co. Drilling Equipment
 Div 2.8.9.10
 Sandvik Canadian Ltd. Wear Parts
 Div 10
 Smith Tool Co. Div Smith
 International Inc 9
 Soding & Haibach J. C. 2.4.8.9
 Sprague & Henwood Int'l Corp 6.9.
 10
 Sumitomo Electric Industries, Ltd.
 Sintered Alloy Div 2.7.8.10
 TRW Mission Mfg Co 7.9
 Turkin Co. The 7.10
 U.S. Steel Corp 1.6.9
 VR Wessco Div of Fansteel 1.4.5.
 10
 Van Moppes & Sons. L. M. Diamond
 Tools Ltd 6.8.10
 Varel Mfg Co 2.3.4.6.8.9
 Vereinigte Edelstahlwerke AG 7.10
 Victor Products (Walsend) Ltd 4.9.
 10
 Westral Equipment 4.6.10
 Westfalia Lunen 4.5
 Wimet Ltd 1.4.7.8.9.10
 Wirth & Co AG. Alfred 1.2.8.9.10

BITS Core, Geological or Soils Testing
 Christensen Diamond Products Pte Ltd
 Far East Carbon
 Makati Machinery & Equip Co
 Technotrade Intl Pte Ltd

BITS Core, Oilwell
 American Coldset Corp
 Apisco
 Asia Industries Inc
 Burneo Oil Tool Co
 Christensen Diamond Products Pte Ltd
 Daiichi Jitsuyo Co Ltd
 Drexel Oilfield Services
 Greaves Cotton & Co Ltd
 Morris Corp
 NL Hycalog
 Panah Tiara
 Panah Tiara PT
 Petrocon Swire
 Swire Petrocon
 Wamaco Service & Supply

BITS Drill, Oilwell
 American Coldset Corp
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 Debon & Co Pty Ltd
 Dresser Minerals Group
 Drexel Oilfield Services
 Fuller & Kinnaird Assoc Ltd
 Grant Corp SA
 Grant Oil Tool
 Greaves Cotton & Co Ltd
 Greenland Engrs & Tractors Co Ltd
 Harjes Tool Co
 Lampara

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 Morris Corp
 NL Hycalog
 Panah Tiara
 Panah Tiara PT
 Petrocon Swire
 Swire Petrocon
 Wamaco Service & Supply

Marexco Ltd
Mid Continent Supply Eastern Hemisphere Co

Morris Corp
NL Hycalog
Oiltools Intl Group
Panah Tiara
Panah Tiara PT
Petrocon Swire
Reel Tool Co Intl
Shusta & Shamber
Sil Smith Tool
SMF International
Swire Petrocon
Telnite Singapore Pte Ltd
Tractors India Ltd
Varel Mfg Co
Wamaco Service & Supply

BITS Geophysical or Mining
Atlas Copco Group
Christensen Diamond Products Pte
Drilquip Supply Pte Ltd
Far East Carbon
Gaekwar Enterprise
Geoservicos PT
Greaves Cotton & Co Ltd
Harjill Group
Makati Machinery & Equip Co
Mission Mfg Co
Morris Corp
SMF International
Technotrade Intl Pte Ltd
Varel Mfg Co

BLASTING SUPPLIES

See Also Bags
1 Accessories (Other Than Below) 2
Ammonium Nitrate 3 Blast Hole
Liners 4 Blasting Machines 5 Cap
Testers 6 Detonating Fuses 7
Electric Caps 8 Explosives 9
Explosives, Underwater 10
Metalized Slurry Explosives 11
Mixer Loader ANFO 12 Permitted
13 Pneumatic 14 Pump Truck
Loading Service 15 Safety Fuses 16
Slurry Explosives 17 Slurry Pumps

APL, Apisco & Produits Chimiques SA 2
Challenge Cook Bros. Inc 17
Chrysler International 10
C.P.M.S. Co. Ltd., Thyssen (Great Britain) Group 1.12
Dow Chemical Co. The, Functional Prods. & Sys Dept 8
Du Pont de Nemours & Co Inc. E 1.12.4.6.7.8.9.10.11.12.14.15.16.17
France Explosifs, Tour Gamma D 1.6.7.8.9.10.11.16.17
France Loader 11.17
IRECO Chemicals Co 2.6.7.8.9.10.14.15.16.17
Ishikawajima-Harima Heavy Industries 4
KHD Industriemagen AG, Humboldt WEDAG 17
Mopex Export-Import 8.12.17
Long Arden Co. Div Marmon Group Inc 13
Martin Engineering Co 13
Mitsubishi Metal Corp 11

Morgardshammer AB 17
Nitro Nobel
Nobel Explosives Co. Ltd. 1.2.4.5.6.7.8.9.11.12.15.16
Norsk Hydro Sales Corp 2
Pickrose & Co. Ltd., Member Marmon Group Inc 4
Pneumatisk Transport AB 1.2.3.4.5.11.13.14.17
Schaffler & Co 4.5.7
Thyssen (Great Britain) Ltd. 1.12
U.S. Steel Corp 6.8
Viking Explosives & Supply Inc. 14.16
Walsag Chemie Sythen GmbH 4.6.8.9.12.15

BLENDED MACHINES

Air Products & Chemicals Inc
Babcock-Moore Ltd
Babcock & Wilcox Ltd
Boxmag Rapid Ltd
Buckau Wolf Maschinenfabrik AG
Deinag Lauchhammer Masch & Stahlbau GmbH
Fives Cail Babcock
Furukawa Mining Co. Ltd., Machinery Sales Div
Grundlach Marine Co. T J
International Handling BV
Ishikawajima-Harima Heavy Industries

Keene Corp
Krupp GmbH, Fried. Krupp Industrie-Und Stahlbau
McDowell-Wellman Engineering Co.
Philadelphia Gear Corp.
Pohlig-Heckel-Bleichert Ver. Maschin. AG
Polysius Werke
Realisation Equipments Industriels
Strachan & Henshaw, Ltd.
Sturtevant Mill Co
Warman Equipment (International) Ltd
Weserhutte AG, Eisenwerk

BLOCK - HOOKS
Continental Esaco Co
Daiichi Jitsuyo Co Ltd
Gardner - Denver Co
John Yu & Co
Lampara Holdings Group
Mahindra & Mahindra Ltd
Mid Continent Supply Eastern Hemisphere Co

Morris Corp
National Supply Co
Satterthwaite & Co Ltd AM
Telec Electronics & Machinery Ltd
USS Oilwell Supply Co Intl Inc

BLOCKS - Brake
Central Industrial Suppliers Ltd
Sea Supply

BLOCKS - Crown
Continental-Esaco Co
Daiichi Jitsuyo Co Ltd
John Yu & Co
Lampara Holdings Group
Mahindra & Mahindra Ltd
Morris Corp
National Supply Co
Satterthwaite & Co Ltd
Telec Electronics & Machinery Ltd
USS Oilwell Supply

BLOCKS AND SHEAVES

See Also Conveyor Equipment

ABEX Corp.
Card Corp.
Connellsville Corp.
Deilmann-Haniel GmbH
Demag Verdichter &
Drucklufttechnik GmbH
Dresser Industries Inc.
Gates Hubber of Canada Ltd.
Joy Mfg. Co.
Kone Corp.
Lifts Unlimited
Olin Energy Systems Ltd.
Pickrose & Co. Ltd., Member
Marmon Group Inc.
Reliance Electric Co., Dodge Div.
Sauerman Bros Inc.
U.S. Steel Corp.
VR-Wesson, Div. of Fansteel

BLOCKS Snatch or Tong

Aqua Terra Group
Sea Supply

BLOCKS Travelling

(see Suppliers under Block-Books)

BLOCK PREVENTERS

Apco

Asia Industries Inc.
Camden Iron Works
Daichi Jitsuyo Co Ltd.
Laya Tarangga, PT.
Drexel Oilfield Services
Hydril Co.
Larsen & Toubro Ltd.
Meron Associates
Mid Continent Supply Eastern
Hemisphere Co.
NL Rig Equipment
Shusta & Shaber
Tutelar Oil Services Co Ltd.
Vetco Singapore Pte Ltd

BOILERS

1 Steam 2 Waste Heat

Ahstrom Oy, A. Varkaus
Engineering Works 2
Allens of Tipton Ltd. 1
Del Monigo S.P.A. 1, 2
Dosco Overseas Eng. Ltd. 1
Fives-Cail Babcock 1, 2
Ishikawajima-Harima Heavy
Industries 1, 2
Kawasaki Heavy Industries Ltd.,
Construction Machinery Div. 1, 2
Kawasaki Heavy Industries, Ltd.,
Machine Sales Div. 1, 2
Mitsubishi Metal Corp. 2
NEI Thompson Cochran Ltd.
Carntyne Works 1, 2
Newell Dunford Eng. Ltd. 2
Stein Industrie 1, 2
Westinghouse Electric Corp. 2

BOILERS Steam (also see Generators - Steam)

Babcock & Wilcox
Combustion Engineering Inc.
Engineering Equip. Inc.
George Fent Group
Guthrie Engineering
Harrison Lister Engrg. Ltd.
Mechanical & Comb. Engrg. Co.
Peterson, Sizons & Co.
Trane SA
United Engineering

BOLTS, ROCK

1 Accessories 2 Anchoring Resins 3
Expansion Type 4 Grouted Type 5
Plastic 6 Tensioners 7 Wedge Type
8 Wooden

Bethlehem Steel Corp. 2, 3
Celtine Seltix Ltd. 1, 2, 8
Cementation Mining Ltd. 2
CF&I Steel Corp. 3, 5
Du Pont de Nemours & Co. Inc., E.
1, 1, 2
General Electric Co., Carbonyl
Mining Products Sect. 1, 2, 4
Klockner Becnort GmbH 2, 3, 4
Kupex Export-Import 1, 2, 7
Mine Expert 2, 3
Miner Mine Expert 1, 2, 3
Nanda Millar Co. 1, 2, 3, 4, 7, 8
Nilos GmbH, Förderband-
Ausrüstung 2, 3
Nobel Explosives Co. Ltd. 2
Pneumatisk Transport AB 4

Reynold Inc., Specialty Chemicals
Div. 2, 4

Titan Mfg. Co. 1, 2, 3, 4, 7
Torque Tension Ltd. 1, 2, 3, 4, 6, 7, 8
U.S. Steel Corp. 3

BOOKS (see Publications - Technical)

BOWLS Casing

Tri State Oil Tool SA

BRAKES

1 Air Set 2 Spring Set

Aeroquip Corp. 2
Dings Co., Magnetic Group 2
Eaton Corp. 1, 2
Elektromag 2
GEC Machines Ltd. 2
GEC Mechanical Handling Ltd. 2
Huwod Irwin Co. 1, 2
Knorr Bremse GmbH 1, 2
Newell Dunford Eng. Ltd. 1
Rockwell International Corp. 1
Thyssen, Thyssen (Great Britain)
Group 2
Westinghouse Brake & Signal Co.
Ltd., Signal & Mining Div. 1
Wichita Clutch Co., Inc. 1, 2

BRAKE LINING

ABEX Corp.
BF Goodrich International
Hepburn Ltd., John T.
Huwod Irwin Co.
Knorr Bremse GmbH
Rockwell International Corp.
Uniroyal International Inc.

BRAKE SHOES

ABEX Corp
Card Corp
Hawood Irwin Co
Knorr Bremse GmbH
National Mine Service Co
Rockwell International Corp

BREAKERS

1 Coal, Rotary 2 Coal, Lump 3 Concrete

Anderson Mavor Ltd 2
Atlas Copco AB 3
Barrows Heavy Engineering Ltd 1
Batemans Ltd, Edward L 1,2,3
Baylor Bros & Co Ltd
Buckau Wolf Maschinenfabrik AG 1
Columbia Steel Casting Co., Inc. 3
Compar Construction & Mining Ltd 3
Consolidated Pneumatic Tool Co., Ltd 3
Dresser Industries Inc 3
FMC Corp, Mining Equipment Div
Fries Car Babcock 1
Fox Manufacturing Co., Div Placer Exploration Ltd 1,2
Furukawa Mining Co Ltd., Machinery Sales Div 3
Furukawa Rock Drill Sales Co Ltd 2,3
GEC Mechanical Handling Ltd 1,2
Gardner-Denver International, International Div 3
Gründler Crusher & Pulverizer Co. 1,2
Gulick Dobson, Ltd 2,3
Hammermills, Inc., Sub Pettibone Corp 2
HAZEMAG Dr E. Andreas GmbH & Co 2
Hewitt Robins 2
Hoyl & Patterson, Inc 1
Hawood Irwin Co 1,2
Ingersoll Rand Co 3
Ishikawajima-Harima Heavy Industries 1,2
Joy International S A
KHD Industriemlagen AG, Humboldt WEDAG 1
Kent Air Tool 2
Klockner-Becorit GmbH 2
Kopex Export Import 1,2
Koppers Co., Inc., Hardinge Oper. 1,2
Long-Airdox Co., Div Marmon Group Inc 1,2
McNally Bharat Engineering Co. Ltd 1,2
McNally Pittsburg Mfg. Corp 1,2
Mining Supplies Ltd 2
National Mine Service Co 2
Paxley & Venables 3
Pennsylvania Crusher Corp 1,2
Paxon Oy 3
SiG Schweizerische Industrie-Gesellschaft 3
Stephanoise DE Constr Mécaniques Soc. 1
U.M.M Ltd 1
Vereinigte Edelmetallwerke AG 3
Vickers Australia Ltd., Ruwolt Div. 1,2
Westfalia-Löwen 1,2

BRUSHES, ELECTRICAL

See Electrical Equipment

BUCKETS AND TEETH

1 Clamshell 2 Dragline 3 Dredge 4 Front End Loader 5 Grapples 6 Shovel 7 Slusher 8 Slusher, Collapsible 9 Teeth

ABEX Corp 3,6
Animann Maschinenbau GmbH 4
Balderson Inc 4
Blaw Knox Equipment, Inc 1,5,9
Bofors AB Steel Div 1,2,4,6,9
Bucyrus Erie Co 2,6,9
Calweid Div, Smith International Inc 9
Card Corp 7
Case Co., J I International Div 4
Caterpillar Tractor Co 4,9
Clark International Marketing S A 1,2,3,4,5,6,9
Columbia Steel Casting Co., Inc. 2,6,9
Deere & Co 4
Dresser Industries Inc, Marion Power Shovel Div 2,6
Engineered Equipment Co 9
ESCO Corp 1,2,3,4,5,6,9
Fiat Allis Corp., Construction Machinery Inc 4
France Loader 4
Furukawa Mining Co Ltd., Machinery Sales Div 9
Hensley Industries, Inc 9
Ishikawajima-Harima Heavy Industries 1,2,3,4,5,6
Krupp GmbH, Fried. Krupp Widia Fabrik 9
Liebherr Hydraulikbagger GmbH 1,6
Machinoexport V/O 1,2,4,6,9
Marathon Letourneau Co., Longview Div 4
Marathon Manufacturing Co. 4
McGinnes Mfg. Co 1
Mitsubishi Steel Mfg. Co. Ltd 1,2,3,6,9
Owen Bucket Co. 1,3,5,9
Page Engineering Company 2,9
Rauri-Repora Oy, Lokomo Div. 1,6,9
Realisation Equipments Industriels 4
Sandvik Canadian Ltd., Wear Parts Div 3,6,9
Scaw Metals Ltd 6,9
Vickers Australia Ltd., Ruwolt Div 2,6,9

BUG DUSTERS

Joy Mfg Co.

BUILDINGS (Portable (also see Modules)

Delta Industries Pte Ltd
Elder Singapore Ltd
Galax Marine Pte Ltd
Harscoatic Group
Hell Camp Ltd
Intveld Intl
Jarco Services Ltd
Prodet Pte Ltd
Techno Transfer Pte Ltd
Transerve

BUILDINGS, PREFABRICATED

1 Portable Industrial Buildings

Alutery 1
Keene Corp 1
Marinon Manufacturing Co. 1
Olympic Prefabricators, Inc
Porta Kamp Mfg Co Inc
Thyssen (Great Britain) Ltd
Woodrow International Ltd., Taylor 1

BURNERS, Crude Oil (also see Testers)

Baker Oil Tools Group
Daichi Jitsugyo Co Ltd
Oils Enrgy Corp

BURNERS, Industrial

Ace Equipment Pte Ltd
Cofastion Engineering Ind
Enes, PT
Henes Trading Co
Mechanical & Comb Enrgy Co
Trane SA

BURNERS; OIL, GAS, AND COAL

Allis-Chalmers, Cement & Mining Systems Div
Del Monego S P A
Ishikawajima-Harima Heavy Industries
KHD Industriemlagen AG, Humboldt WEDAG
Osborn (South Africa) Ltd., Samuel Peabody International Corp
Stein Industrie

CABLE AND CONDUIT, ELECTRICAL AND ACCESSORIES

See Also Rope, Wire, Trams, Aerial

1 Couplers, Electric 2 Electrical Cable and Conduit 3 Fault Locators 4 Hangers 5 Heaters 6 Splicing Equipment 7 Trailing Cable, Underground and Surface Mining Machines 8 Vulcanizing

Adaliet-PLM, Div of Scott & Fetzer 1,6
AEG-Telefunken 8
American Mine Door 6,8
Anaconda Co., The Wire & Cable Div 2,7
Anderson Mavor Ltd 1
ASEA Inc, Mining & Industrial Transport 1,2
Ballagh & Thrall Inc 2
Beckman Instruments Inc 3
BiCC Ltd 1,2,3,4,6,7,8
Brown, Boveri & Co., Ltd 1,2,7

Communication & Control Eng Co
 Ltd 2
 Compagnie Electro Mecanique. Sub
 Brown, Boveri & Co 1, 2, 7
 Crystal Lite Wire 1, 2, 3, 4, 5, 6, 7, 8
 Cyprus Wire & Cable Co 2, 7
 Gleason Reel Corp 7
 Jones & Laughlin Steel Corp
 Joy Mfg. Co 1, 8
 KHD Industriemagn AG. Humboldt
 WEDAG 5
 Machinexport V. O 7
 McGraw Edison Power Systems Div
 3
 Moss (Pty) Ltd. George 1, 3
 Perard Engineering Ltd 2
 Phelps Dodge International Corp 7
 Rockwell International Corp 2
 Siemens AG 1, 2, 4, 5, 6
 SILEC. Signalisation Industrielle Div
 1, 2
 U.S. Steel Corp 2, 7
 Victor Products (Walisend) Ltd. 1
 Wallacetown Eng. Co Ltd 1

CABLES Communication

BICC
 EB Communications
 Ericsson Telephone Corp
 Erindo Utama PT
 Galaxie Specialities Pte Ltd
 Guthrie Engineering
 IIT Far East & Pacific Inc
 Kabelmetal Indonesia PT
 Lim Kim Hai Electric Co
 Malayan Cables Bhd
 Singapore Technical Services Pte Ltd

CABLES Electric Power

BBC Brown Boveri Group
 BICC
 EB Communications
 Engineering Equipment Inc.
 Equipment Trades Ltd
 Ericsson Telephone Corp
 Erindo Utama PT
 Galaxie Specialities Pte Ltd
 General Electric Co UK
 Guthrie Engineering
 Harrison-Lister Engrg Ltd
 IIT Far East & Pacific Inc
 Kabelmetal Indonesia PT
 Kentjana Indonesia PT
 Kentjana Sakti Indonesia PT
 Lim Kim Hai Electric Co
 Malayan Cables Bhd
 Material Trading
 Tanco Cutler-Hammer Pte Ltd
 Tasin Electric Co Pte Ltd
 United Engineers
 Udny Pyrocables Pvt Ltd

CABLES Oilwell Electric Logging

James Gauntt Pte Ltd

CABLES Pipe Tracing

(also see Heat Tracing Equipment Pipeline)

BICC
 Malayan Cables Bhd

CABLES Welding

(also see Welding Equipment & Supplies)

BICC
 Bornes Co Pte Ltd
 Malayan Cables Bhd
 Progress Trailing Agencies
 Stoddy Asean

**CAMP BUILDINGS,
PREFABRICATED**

M A N

CAMPS Portable (see Buildings Portable)

CARS, CONCRETE TRANSIT

Card Corp
 Ishikawajima-Harima Heavy
 Industries
 Normet S. A

CARS, HOT SLAG OR METAL

Blaw Knox Equipment, Inc
 Card Corp
 Faun-Werke Nurnberg
 Fives Cail Babcock
 Gutehoffnungshutte Sterkrade AG
 Huwood Irwin Co
 Ishikawajima-Harima Heavy
 Industries
 Machinexport V/O
 Pohlig-Heckel-Bleichert Ver
 Maschin AG
 Vecor Heavy Engineering Ltd

CARS, MINE

1 Air Dump 2 Bottom Dump 3
 Personnel Moving 4 Sanitary 5 Side
 Dump

Ageve AB Gavle Vagnverkstad 2, 5
 Aliens of Tipton Ltd 3, 5
 ASEA Inc. Mining & Industrial
 Transport 2
 Bethlehem Steel Corp 2
 Blaw Knox Equipment, Inc
 Calweid Div. Smith International
 Inc. 2, 3, 5
 Card Corp 1, 2, 3, 4, 5
 FMC Corp. Mining Equipment Div
 3
 Fiat-Allis SpA
 Fox Manufacturing Co. Div Placer
 Exploration Ltd 1, 2, 3
 Greenbal Ltd 3
 Gutehoffnungshutte Sterkrade AG
 1, 2, 3, 4, 5
 Hagglund & Soner AB. Trucks &
 Mining Machinery Div. 1
 Hudson (Raletrux) Ltd. Robert 1, 2,
 5
 Huwood Irwin Co. 2, 3, 5
 Ingersoll Rand Co. 3
 Komatsu Ltd 2
 Kopex Export Import
 McNally Pittsburg Mfg. Corp. 5
 Mine Expert 3
 Minex Mine Expert 3
 Moss (Pty) Ltd. George 1, 2, 3, 5
 National Mine Service Co. 3
 Normet S. A. 2, 3
 Orion vhtyma Oy NORMET
 Paccar International, Inc. 2
 Persona sparteknik AB 3, 5
 Pneumatische Transport AB 3
 Secmat S. A. Service Publicitaire
 Sneeppridge Equipment Ltd. 3
 Underground Mining Machinery,
 Ltd. 3
 U.S. Steel Corp
 Vecor Heavy Engineering Ltd

CARS, RAILROAD

Barlows Heavy Engineering Ltd
Beimnem Steel Corp
Haglund & Soner AB, Trucks &
Mining Machinery Div
Kawasaki Heavy Industries, Ltd.
Machine Sales Div
Krupp GmbH Fried Krupp
Industrie-Und Stahlbau
M A N
McDowell Wellman Engineering Co
O & K Orenstein & Koppel AG
Persona Spartechnik AB
Vickers Australia Ltd. Ruwolt Div.

CAR CLEANERS

Mining Development (UK) Ltd
(Mindy)
SIEMAG Transplan GmbH

CAR DUMPERS

1 Mine 2 Railroad

Aliens of Tipton Ltd. 1
Atlas Copco AB 2
Card Corp. 1
Chrysler International
Connellsville Corp. 1
Faun-Werke Nurnberg 1
Fives-Cail Babcock 1,2
Gutehoffnungshutte Sterkrade AG
1
Heyl & Patterson, Inc. 1,2
Hitachi Ltd
Hudson (Raiertrax) Ltd. Robert 1
Huwod-irwin Co. 1
Ishikawajima-Harima Heavy
Industries 2
Jenkins of Retford Ltd. Mbr
Babcock & Wilcox Ltd. Gp. 1
Krupp GmbH Fried Krupp
Industrie-Und Stahlbau 2
McDowell-Wellman Engineering Co.
2
McNally Pittsburg Mig. Corp. 1
Mining Transportation Co. AB.
Kiruna Truck Div.
Mitsubishi Metal Corp. 1
Moss (Pty.) Ltd. George 1
Normet S A 1
Onion-yntyma Oy NORMET 1
Perini International Sp A
Persona Spartechnik AB 2
Production Equipment Ltd. 2
SIEMAG Transplan GmbH 1
Strachan & Henshaw, Ltd. 2

CAR PASSERS

American Mine Door
Card Corp
Chrysler International
SIEMAG Transplan GmbH

CAR RETARDERS

1 Mine 2 Railroad

ABEX Corp. 1,2
Demag AG. ABT
Bergwerksmaschinen 1
Demag Verdichter &
Drucklufttechnik GmbH 1
Gutehoffnungshutte Sterkrade AG
1
Jenkins of Retford Ltd. Mbr.
Babcock & Wilcox Ltd. Gp. 1
McDowell Wellman Engineering Co.
2
McNally Pittsburg Mig. Corp. 2
Production Equipment Ltd. 2
Scaw Metals Ltd. 2
SIEMAG Transplan GmbH 1
Westinghouse Brake & Signal Co.
Ltd. Signal & Mining Div. 1,2

CAR SHAKERS

Aidon Co. The
Allis Chalmers, Crushing &
Screening Div
Hewitt-Robins
Stephens Adamson Mig. Co.
Vibrantics Inc

CAR SPOTTERS

Dresser Industries Inc., Industrial
Equipment Div
Dresser Industries Inc., Power
Transmission Div
FMC Corp. Material Handling
Equip. Div
ISCO Manufacturing Co., Inc
Klochner-Becorit GmbH
McDowell-Wellman Engineering Co.
Midwest Corp., Steel Div
Moss (Pty.) Ltd., George
Production Equipment Ltd
Stephens-Adamson Mig. Co.
Strachan & Henshaw, Ltd
Westinghouse Brake & Signal Co.
Ltd., Signal & Mining Div

CAR WHEELS

See Also Hoisting Units, Off Rail

Allen Group Inc. The
Aliens of Tipton Ltd
Card Corp
Chrysler International
Gutehoffnungshutte Sterkrade AG
Hudson (Raiertrax) Ltd. Robert
Huwod-irwin Co
National Mine Service Co.
Round & Son Inc., David
Scaw Metals Ltd
Stephens-Adamson Mig. Co.
U.S. Steel Corp

CASTING EQUIPMENT: WIREBAR, BILLETS, CAKE, INGOTS

Allis Chalmers, Cement & Mining
Systems Div
Barlows Heavy Engineering Ltd
BICC Ltd
Fives Cail Babcock
Heburn Ltd., John T
Ishikawajima Harima Heavy
Industries
Mitsubishi Metal Corp

CASING Oil & Gas Well
Amon Industries Corp
Aspro
Bakrie & Broo, PT
Besa & Besu
Continental Emeco Co
Daiichi Jitsugyo Co Ltd

CASING Oil & Gas Well continued:

Foster Company, LB
Instalke Pipe Ltd
International Engrg Co Ltd
John Yu & Co
KlochnerSingapore Pte Ltd
Mahindra & Mahindra Ltd
Marbeni Corp
Mid-Continental Supply Eastern
Hemisphere Co
Mitsubishi Corp
Mitsui & Co Ltd
National Supply Co
Nippon Koken KK
Nippon Steel Corp
NL Atlas-Bradford
NL Bystalog
Petroleum Pipe Co
Satherthwaite & Co Ltd
Sulzer Corp
Sulzer Metal Industries Ltd

CATEGORIES

Asiatic Tool Co Ltd
Grant Corp SA
Lampara Holdings Group
Mid-Continental Supply Eastern
Hemisphere Co

CATHODIC PROTECTION PRODUCTS & SYSTEMS

Aarts & Associates Pvt Ltd
Corrosion Technologists Inc
Dinet Group
Eastern Lloyd
Engelhard Industries
Mata & Co Inc
Material Trading
Paychen Corp
Thorsen & Co
Wang Chang Intl
Wilson Walton Intl

CEMENTING EQUIPMENT Oil Well

Apache
Aspro
Arya Offshore Services
Baker Oil Tools Group
Bibojee Services Ltd
BJ Service Intl Inc
Borneo Oil Tool Co
Daiichi Jitsugyo Co Ltd
Dowell Schlumberger
Drexel Oilfield Services
Ex-In Hong Kong Ltd
Fuller & Kinnaird Associates Ltd
Grant Corp SA
Halliburton Ltd
Heng-Ching Corp
Lucey Export Supply
Lynex SEAsia Pte Ltd
Miraksha Associates
Weatherford/Lamb

CENTRALIZERS

Apeco Pte Ltd
 Baker Oil Tools Group
 Bayless Intl Pty Ltd
 Borneo Oil Tool Co
 Brown Oil Tools Inc
 Oiltools Intl Group
 Weatherford/Lamb

CENTRIFUGES

Bateman Ltd. Edward L.
 BICO Inc
 Bird Machine Co Inc
 Centritugal & Mechanical Ind., Inc.
 Dorr Oliver Inc
 Du Pont de Nemours & Co. Inc., E.
 Fisher Scientific Co
 Heyl & Patterson, Inc
 Ingersoll-Rand Co
 Ishikawajima-Harima Heavy
 Industries
 KHD Industriemlagen AG, Humboldt
 WEDAG
 Kopex, Export-Import
 Krauss-Maffei AG
 Krupp GmbH, Fried. Krupp
 Industrie-Und Stahlbau
 McNally Bharat Engineering Co.
 Ltd
 McNally Pittsburg Mfg Corp
 Warman Equipment (International)
 Ltd
 WEMCO, Div. Envirotech Corp.

CHAIN AND ACCESSORIES

1 Chain Tensioners 2 Coal Plow 3
 Conveyor 4 Dragline 5 Mill 6
 Shearer Haulage 7 Tire Chains, Non-
 Skid 8 Tire Chains, Tire Protective

ABEX Corp 3 4 5
 Aumund-Fordererbau GmbH 3
 Becker Fruechte GmbH 3 5
 Bucyrus-Erie Co 4
 Cincinnati Mine Machinery Co 3
 Columbia Steel Casting Co, Inc 4
 Dresser Industries Inc 1, 3
 Dresser Industries Inc., Industrial
 Equipment Div 1, 3
 Dresser Industries Inc., Power
 Transmission Div 1, 2, 3, 4, 5
 Engineered Equipment Co 4
 Erlau AG, Hauptwerk Aalen 7, 8
 ESCO Corp 3 4 5
 Fox Manufacturing Co, Div. Placer
 Exploration Ltd 3
 Furukawa Mining Co Ltd.
 Machinery Sales Div 3
 Huwood Irwin Co 1, 2, 3, 6
 Ishikawajima-Harima Heavy
 Industries 1, 3, 5
 Jeffrey Mining Machine Co., Div.
 Dresser Industries Inc 3, 6
 Jenkins of Retford Ltd. Mbr
 Babcock & Wilcox Ltd. Gp 3
 Kuenkempff Gebrueder 3, 5, 7, 8
 Lifts Unlimited 2, 3, 4
 Mining Supplies Ltd 1, 3
 Mitsubishi Steel Mfg Co., Ltd 1, 2
 O. & K. Lorenstein & Koppel AG,
 Aachen 1, 3
 Parsons Chain Co 2, 3, 6
 Redier Conveyors Ltd 3
 Rexnord Inc 3 4 5
 RUD-Kettenfabrik Rieger & Dietz
 8
 Spencer & Sons Ltd, Matthias 1

Ithiele Kettenfabrik, August 1, 2, 3, 4,
 5, 6, 7

UMM Ltd 1
 Vereinigte Osterreichische Alpine
 Montan Eisen- & Stahlwerke 3
 Westinghouse Electric Corp 3
 Wheway Watson (CM) Ltd 3

CHAINS

Atqua Terra Group
 Sea Supply Pte Ltd

CHAIN HOISTS

Barker, Davies & Co
 Becker Fruechte GmbH
 Demag Formertechnik GmbH
 Dresser Industries Inc
 Dresser Industries Inc., Industrial
 Equipment Div
 Dresser Industries Inc., Industrial
 Products Div
 Eaton Corp
 Gardner Denver International,
 International Div
 Harnischfeger Corp
 Hitachi Ltd
 Ingersoll-Rand Co
 Kone Corp
 Lifts Unlimited
 Nemaus Hebezeuge, J D
 Pohlig Hecker Bleichert Ver.
 Maschinen AG
 Rexnord Inc
 Round & Son Inc., David
 RUD Kettenfabrik Rieger & Dietz

CHAINS Link, Steel High Tensile

Aqua-Terra Group
 Atrecon
 Berjaya Kawat Bhd
 Central Industrial Suppliers
 Ltd Hong
 Marine & Onshore Trading Co
 Mata & Co Inc, BP
 Panda Services Ltd
 Sea Supply

CHAINS Roller

American Int'l Industries
 Aqua-Terra Group
 Asiatic Engineering Pte Ltd
 Bory Warner Int'l Corp
 Marine & Onshore Trading Co
 Mid-Continental Supply Eastern
 Hemisphere Co
 Renold Overseas Ltd
 Rexnord Int'l Inc
 Scott & English Ltd
 Sea Supply
 Sethi Industries
 Tsubakinoto Chain Co

CHARGERS, BATTERY

Allen Group Inc. The
Brown Boveri & Co. Ltd
Compagnie Electro Mecanique. Sub
Brown Boveri & Co
Eaton Corp
Gould Inc
Marathon Manufacturing Co
Mine Safety Appliances Co
Moss (Fy) Ltd. George
Union Electric Co. Ltd
Aluminum Co. of America (Alcoa) 1
Ashland Chemical Co 2
Cargon Corp 1 2
Century Dis Ltd 1
Du Pont de Nemours & Co. Inc. E
1 1 2
General Mills 2
Nobel Explosives Co Ltd 1
Olin Corp 1

CHIMNEYS, SMELTERSTACKS

Ishikawajima-Harima Heavy
Industries
Kawasaki Heavy Industries Ltd.
Machine Sales Div
NEL Thomson Cochran Ltd.
Carnegie Works
Standard Filterbau Dr E Andreas
GmbH & Co
U.S. Steel Corp
VOEST-Alpine

CHOSES

Apsco
Baker Oil Tools Group
Cameron Iron Works
Daichi Jitsugyo Co Ltd
FMC Corp
FMC Petroleum Equip SEA Pte Ltd
Gray Service Co/Gray Tool Co
Otis Engrg Corp

CHRISTMAS TREES

(See Wellhead Assemblies & Components)

CLAMPS Hose (see Fittings)

CLAMPS Pipeline Repair
Aqua Terra Group
BOC SubOcean Services Ltd
Daichi Jitsugyo Co Ltd
Sea Supply

CLAMPS Safety

Sai Company Ltd
Seas Supply
Warmo Service & Supply

CLASSIFIERS

See Also Cyclones

1 Air 2 Hydraulic 3 Mechanical

Allis-Chalmers. Cement & Mining
Systems Div 1 3
Aisthom Div. Neyrtec 2
Amberger Kaolinwerke GmbH.
Equipment Construction Div 2
American Can Co 1
Bateman Ltd. Edward L 1 2 3
Combustion Engineering. Inc. 1
Deister Concentrator Co. Inc. 2
Donaldson Co. Inc. 1 3
Dorr-Oliver Inc 2 3
Fives-Cail Babcock 1 2 3
Furukawa Mining Co. Ltd.
Machinery Sales Div 3
GEC Mechanical Handling Ltd. 3
Gruendler Crusher & Pulverizer Co.
1 3

Head Wrightson & Co. Ltd 3
Heyl & Patterson Inc. 2
Ishikawajima-Harima Heavy
Industries 1 2 3
Joy International S. A. 3
Joy Manufacturing Co 1 3
Joy Manufacturing Co. (U.K.) Ltd.
Denver Equipment Div 1 2 3

KHD Industriemagazin AG. Humboldt
WEDAG 1 2 3

Kawasaki Heavy Industries Ltd.
Construction Machinery Div. 1 3
Kawasaki Heavy Industries. Ltd.
Machine Sales Div 1
Koppers Co. Inc. Hardinge Oper. 1
Larox Oy 1 2
Machinoxport V O 1 2 3
McNally Bharat Engineering Co.
Ltd 1

Mine & Smelter Co. Sub Barber-
Greene Co 3
Neyrtec. Aisthom-Atlantique 2
Nixie 1 2 3

O & K Orenstein & Koppel AG.
Werk Ennigerloh 1
Peabody International Corp 1 2 3
Pegson Ltd 3
Polysius Werke 1
Pragonyest 2 3
Rheax Chemie & Metall GmbH 2
Roxon Oy 1 2
Sala International 3
Saulis & Cie 2
Schenck AG. Carl 3
Simon Warman Ltd 2 3
Standard Filterbau. Dr E Andreas
GmbH & Co 1 3
Startevant Mill Co 1 3
Sveala-Abra AB 2
Warman Equipment (International)
Ltd 2

WEMCO Div. Envirotech Corp 2
Weserhutte AG. Eisenwerk 3
Wilkinson Process Linatex Rubber
Co Ltd 2

CLEANERS

See Also Filters, Scrubbers

1 Air 2 Coal 3 High Pressure

AAF Ltd 1
American Air Filter Co. Inc. 1
Bateman Ltd. Edward L 1
Donaldson Co. Inc. 1
Dresser Industries Inc 3
Joy Mfg Co. Western Precipitation
Div 1

KHD Industriemagazin AG. Humboldt
WEDAG 1 2
Lurgi Gesellschaften 3
Mine Safety Appliances Co 1
Peabody International Corp 1
Schwartz & Dyckerhoff AG.
Ruhrtaier Maschinenfabrik 3
UNIKAT AB
Vereinigte Osterreichische Alpine
Montan Eisen- & Stahlwerke 1
Vickers Australia Ltd. Ruwolt Div 2

CLEANING EQUIPMENT Industrial
(also see Pipeline Equipment or Tank
Cleaning Equipment)

Clemco Intl Sales Co
Diversey
Drillquip Supply Pte Ltd
Inter-Mega
Mechanical & Comb Engrg Co
Mid-Continent Supply Eastern
Hemisphere Co
United Engineers

CLIPS Wire Ropa (see Fittings)

CLUTCHES Industrial
(also see Transmission Products)
Borg-Warner Intl Corp
Dee-Kay Clutches Pvt Ltd
Renold Overseas Ltd
Scott & English Ltd
Sea Supply

CLUTCHES

See Also Friction Material

1 Air Operated 2 Mechanisms

Borg Warner. Rockford Clutch Div.
2
Chrysler International
Eaton Corp. 1
Heppburn Ltd. John T 1 2
Philadelphia Gear Corp 2
Twin Disc. Inc. 1 2
U.S. Steel Corp. 1
Wichita Clutch Co. Inc. 1 2

COAL CUTTERS

1 Arc Wall 2 Disc Shearer 3 Long Wall 4 Plough 5 Short Wall 6 Stable Hole

Anderson Mavor Ltd. 1 2 3 5
Babcock & Wilcox Ltd 3 5
Bateman Ltd. Edward L 3
British Jeffrey Diamond 2 3

Dosco Overseas Eng. Ltd. 3 5 6
Fox Manufacturing Co. Div. Placer
Exploration Ltd. 2 3 4 5
GTE Products Corp. 1 2 3 4 5 6
Huwood-Irwin Co. 2 3 4
Ingersoll-Rand Co. 5
Jeffrey Mining Machine Co. Div.
Dresser Industries Inc. 3 5
Joy International S. A. 5
Joy Mfg Co 1 2 3 5
Klockner-Becorit GmbH 4
Kopex. Export Import 2
Minex Mine Expert 3 5
National Mine Service Co 2 3 4
Stephanose DE Constr
Mechanics. Soc. 5
Thyssenindustrie AG. Umform
Bergbautechnik 2 3
Titanit Bergbau Technik 4
UMM Ltd 4
Underground Mining Machinery.
Ltd 4
Vickers Australia Ltd. Ruwolt Div.
3 4
Westfalia Lunen 1 2 3 4 5 6

COAL PREPARATION PLANTS

1 Conveyor Systems 2 Cyclones 3 Flotation 4 Heavy Media 5 Jigs 6 Tables 7 Washing

AAF Ltd. 2
Allis-Chalmers. Cement & Mining
Systems Div 1
Aisthom. Div. Neyrtec 2 7
American Precision Industries.
Dustex Div 2
Athey Products Corp 1
Barber-Greene Overseas. Overseas
Div 1 7
Bateman Ltd. Edward L. 1 2 3 4 5.
6 7
Bernold AG 1
Berry Co 6
Royer SA 1
Buckau-Wolf Maschinenfabrik AG 1
Cable Belt Conveyors. Inc. 1
Deister Concentrator Co. Inc. 6
Dravo Corp
Dresser Industries Inc. Industrial
Equipment Div. 1 5
Fives-Cail Babcock 1 2 3 4 5 7
Flexowall Corp 1
FMC Corp. Material Handling
Equip Div 1
Fox Manufacturing Co. Div. Placer
Exploration Ltd 1 7
Furukawa Mining Co. Ltd.
Machinery Sales Div 1 2 5
GEC Mechanical Handling Ltd. 1 4.
5 6 7
Geomix 1 3 7
Goodman Equipment Corp. 1
Hazen Research International Inc. 3
Head Wrightson & Co. Ltd. 2 3 4.
5 7
Heyl & Patterson. Inc. 1 2 3 4 7
IBAG Internat. Baumaschinenfabrik
AG 1 2 3 5
International Handling BV 1
Ishikawajima-Harima Heavy
Industries 1 4
Jenkins of Retford Ltd. Mbr.
Babcock & Wilcox Ltd. Gp. 1 2 3.
4 5 7

Johnson-Progress Ltd. 1 2
Joy Manufacturing Co. 3 5 6
Joy Manufacturing Co. Denver
Equipment Div 3 6
Joy Manufacturing Co. (U.K.) Ltd.
Denver Equipment Div. 1 3
KHD Industriemagazin AG. Humboldt
WEDAG 1 2 3 4 5 6 7
Kopex. Export-Import 1 2 3 4 5 6 7
Krebs Engineers 2
Krupp GmbH. Fried. Krupp
Industrie-und Stahlbau 1 2 3 4 7
Long Airdox Co. Div. Marmon
Group Inc 1
McNally Bharat Engineering Co.
Ltd 1 2 3 4 5 7
McNally Pittsburg Mfg. Corp. 1 2 4.
5 7
Mine & Smelter Co. Sub. Barber-
Greene Co 4
Minemet Industrie 3
Mintec International. Div. Barber-
Greene Co 1 7
Mitchell Cotts Projects (Australia)
Pty Ltd 2 3 4
Mountain State Engineers 1 3 4
Mountain State Engineers 2 4 5
Neyrtec. Aisthom-Atlantique 2 7
Oshorn (South Africa) Ltd. Samuel
2 7
Production Equipment Ltd 1
Realisation Equipments Industriels
1
Redler Conveyors Ltd 1
Reynold Inc 1
Rheax Chemie & Metall GmbH 7
Roberts & Schaefer Co
Sala International 2 3 4 6
Sala Minco 1 2 4
Saulis & Cie 7
Schenck AG. Carl 1 3 7
Seltrust Engineering Ltd. 1 2 3 4 5.
6 7
Standard Filterbau. Dr E Andreas
GmbH & Co 1 2
Stearns-Roger. Inc. 1
Stephanose DE Constr
Mechanics. Soc. 1
Thyssen (Great Britain) Ltd. 7
Trelleborgs Gummifabriks AB 1 3
Unroyal International Inc. 1
Vereinigte Osterreichische Alpine
Montan Eisen- & Stahlwerke 1
Vickers Australia Ltd. Ruwolt Div.
2 5
VOEST-Alpine
Warman Equipment (International)
Ltd 1 2 3 4 5 6 7
WEMCO. Div. Envirotech Corp. 2 3.
4 5
Weserhutte Otto Wolff GmbH 1
Witlley Mining Machinery Co. Ltd.
The 6

Production Equipment Ltd 1
Realisation Equipments Industriels
1

Redler Conveyors Ltd 1
Reynold Inc 1
Rheax Chemie & Metall GmbH 7
Roberts & Schaefer Co
Sala International 2 3 4 6
Sala Minco 1 2 4
Saulis & Cie 7
Schenck AG. Carl 1 3 7
Seltrust Engineering Ltd. 1 2 3 4 5.
6 7

Standard Filterbau. Dr E Andreas
GmbH & Co 1 2
Stearns-Roger. Inc. 1
Stephanose DE Constr
Mechanics. Soc. 1
Thyssen (Great Britain) Ltd. 7
Trelleborgs Gummifabriks AB 1 3
Unroyal International Inc. 1
Vereinigte Osterreichische Alpine
Montan Eisen- & Stahlwerke 1
Vickers Australia Ltd. Ruwolt Div.
2 5
VOEST-Alpine
Warman Equipment (International)
Ltd 1 2 3 4 5 6 7
WEMCO. Div. Envirotech Corp. 2 3.
4 5
Weserhutte Otto Wolff GmbH 1
Witlley Mining Machinery Co. Ltd.
The 6

Standard Filterbau. Dr E Andreas
GmbH & Co 1 2
Stearns-Roger. Inc. 1
Stephanose DE Constr
Mechanics. Soc. 1
Thyssen (Great Britain) Ltd. 7
Trelleborgs Gummifabriks AB 1 3
Unroyal International Inc. 1
Vereinigte Osterreichische Alpine
Montan Eisen- & Stahlwerke 1
Vickers Australia Ltd. Ruwolt Div.
2 5
VOEST-Alpine
Warman Equipment (International)
Ltd 1 2 3 4 5 6 7
WEMCO. Div. Envirotech Corp. 2 3.
4 5
Weserhutte Otto Wolff GmbH 1
Witlley Mining Machinery Co. Ltd.
The 6

VOEST-Alpine
Warman Equipment (International)
Ltd 1 2 3 4 5 6 7
WEMCO. Div. Envirotech Corp. 2 3.
4 5
Weserhutte Otto Wolff GmbH 1
Witlley Mining Machinery Co. Ltd.
The 6

COLLARS Drill

Apsco
Zim Mannan Ltd
Christensen Diamond Products Pte Ltd
Jarco Services Ltd
Menon Associates
Mid-Continent Supply Eastern
Hemisphere Co
Miraksha Associates
Morris Corp
NL Hycaloy
Reed Tool Co Intl
Sat Company Ltd
Shusta & Shanber
SII Drillo
SII Drillo

COLLARS Drill Non-Magnetic
Daiichi Jitsuyo Co Ltd
Eastman Whipstock Inc
LOR Intl Pte Ltd
Sll Servco
SMF Intl
Sperry-Sun Intl Inc

COMMUNICATIONS

1 Bell and Buzzer Systems 2 Coal
Face Systems 3 Mine Telephones 4
Radio Systems 5 Shaft Telephones
6 Surface and Underground
Broadcast 7 Television, Industrial 8
Trolley Telephones

Anderson Mavor Ltd 4
Avergesellschaft Sub MSA Europe
3
BCC Ltd 1 2 3 4 5 6 7 8
British Jeffrey Diamond 4
Brown Boveri & Co Ltd 3 4 5
Budayo Telecommunication Co
Ltd 4
Communication & Control Eng Co
Ltd 2 6
Compagnie Electro Mecanique, Sub.
Brown Boveri & Co 3 4 5
Conrac Corp 1 7
Davis & Son Ltd, John 1 2
GTE Products Corp 4 7 8
Geomix 3 5
Hitachi Ltd 5
Jeffrey Mining Machine Co, Div
Dresser Industries Inc 3
Kopex Export-Import 2 3 4 5
Midwest Corp 7
Mine Safety Appliances Co 3 5 8
Montan-Forschung 3 4
National Mine Service Co 2 3 4 5.
8
Oidham France SA 1 2
Philips Gloeilampen Fabrieken, NV,
Science & Industry Div 7
Pylon Boone Inc 1 3
RCA Corp 4 7
Siemens AG 2 3 4 5
SILEC Signalisation Industrielle Div
1 2 3 4 5 7
Westinghouse Brake & Signal Co
Ltd Signal & Mining Div 6
Westinghouse Electric Corp 7

COMMUNICATIONS EQUIPMENT

Antenna Engrg Group
Associated Technical Services
BBC Brown Boveri Group
Clyde Intl Pte Ltd
Debeg Pte Ltd
Decca Survey Group
Dwi Tunggal Djaja CV
Eastern Communications Pte Ltd
EB Communications
Electrospare Systems Inc
Engineering Equip Inc
Equipment Trades Ltd
Eriksen Telephone Corp
Erimo Utara PT
General Electric Co
Guthrie Engineering
Harrisons Lister Engrg Ltd
InternationalAerials
ITT Far East & Pacific Inc

Marconi Intl Marine Co Ltd
Mechanical & Comb Engrg Pte Ltd
Motorola Inc
O'Connor's Group
Orion Systems Sdn Bhd
Radio-Holland BV
Radiosonic Service CV
Redifon Telecommunications Ltd
Rico
SEatech Electronic
Singapore Electronics & Engrg
Singapore Technical Services
Tae Electronics Sdn Bhd
Thaitronics Co Ltd
United Engineers

COMPACTORS

1 Self Propelled 2 Hand Held
Case Co., J I, International Div. 1,
2
Caterpillar Tractor Co. 1
Komatsu Ltd 1
Peabody International Corp 1 2
RAYGO Inc 1
Reynold Inc. 1
SSP Construction Equipment 2
Umi GmbH Maschinenbau 1

COMPASSES - Marine (see Navigational Aids)

COMPENSATORS Motion, Offshore

Asia Industries Inc
Daiichi Jitsuyo Co Ltd
Drexel Oilfield Services
Menon Associates
Mid-Continent Supply Eastern Hemi-
sphere Co
NL Rig Equipment
Vetco Singapore

COMPRESSORS Air

Aartus & Associates Pvt Ltd
Abolitz Marketing
Atkins, Kroll & Co Inc
Atlas Copco Group
Behn Meyer & Co
Cooper Energy Services Intl Inc
Daiichi Jitsuyo Co Ltd
Engtek Pte Ltd
Gardner-Denver Co
Guthrie Engineering
Hamworthy Engineering Ltd
Ingersoll-Rand Group
ITT Far East & Pacific Inc
Mata & Co Inc BP
Mechanical & Comb Engrg Co Pte Ltd
Mid-Continent Supply Eastern
Hemisphere Co
Nuovo Pignone Spa
Oiltools Intl Group
Sulzer East Asia Central Office
Sulzer Representative Offices

COMPRESSORS, AIR, AND ACCESSORIES

1 Portable 2 Stationary 3 Tractor

Allis-Chalmers, Cement & Mining Systems Div 2
Atlas Copco AB 1,2
Compar Construction & Mining Ltd 1,2
Consolidated Pneumatic Tool Co. Ltd 1,2
Demag AG Abt Bergwerksmaschinen 1,2
Demag Verdichter & Drucklufttechnik GmbH 1,2
Dresser Industries Inc 1,2
Dresser Industries, Inc., Industrial Products Div 1,2
Fives-Cail Babcock 1,2
Flottmann-Werke GmbH 1,2
Fuller Co. 2
Gardner-Denver International, International Div 1,2
Gutehoffnungshütte Sterkrade AG 1,2,3
Hitachi Ltd 1,2
Ingersoll-Rand Co. 1,2
Iowa Mold Tooling Co 1
Ishikawajima-Harima Heavy Industries 2
Joy International S. A. 1,2
Joy Mig Co 1,2
Kawasaki Heavy Industries Ltd., Construction Machinery Div 2
Kawasaki Heavy Industries, Ltd., Machine Sales Div 2
Knorr Bremsen GmbH 3
Kornatsu Ltd 1
Long Airdox Co., Div. Marmon Group Inc 2
Moss (Pty) Ltd., George 1,2
Pragoinvest 1,2,3
Scramm, Inc 1,2,3
Oy Tampella AB Tamrock Div 2
Vereingte Edelstahlwerk AG 1
Worthington Compressors, Inc. 1,2

COMPRESSORS Air continued

Sulzer Australia Pty Ltd
Tesinc
United Equipment Services
United Motor Works Group
Worthington-Turbodyne Intl Sales Co

COMPRESSORS Air Portable

Allbest PT
Atlas Copco Group
Gardner-Denver Co
Garuda Power Equip PT
Harqill Group
Ingersoll-Rand Group
Komatsu Singapore Pte Ltd
Stanley Works Sales
Tierra Factors Corp
United Motor Works Group
Worthington-Turbodyne Intl Sales Co

COMPRESSORS & COMPRESSOR SETS Gas

Aartus & Associates Pvt Ltd
Atkins Kroll & Co Inc
Atlas Copco Group
Behn Meyer & Co
Cooper Energy Services Intl Inc
Dresser Machinery Intl Div
Gardner-Denver Co
Guthrie Engineering
Ingersoll-Rand Group
Jardine Matheson

Jensen & Jessen Engrg
Mid-Continent Supply Eastern Hemisphere Co

Nuovo Pignone Spa
Oiltools Intl Group
Sulzer East Asia Central Office
Sulzer Representative Offices
Sulzer Australia Pty Ltd
Tesinc
Worthington-Turbodyne Intl Sales Co
York Intl Corp

COMPUTERS AND DATA PROCESSING EQUIPMENT

1 Equipment 2 Process Control 3 Services

Abib Engenharia S.A. Paulo 3
ASEA Inc Mining & Industrial Transport 2
Australian Mineral Development Lab 2,3
Autometrics 2
Babcock & Wilcox Ltd 1,3
Brown, Boveri & Co. Ltd 1,2,3
Brown, Boveri & Cie AG, Industrial Plants Div 2
Budavay Telecommunication Co Ltd 1
Compagnie Electro Mecanique, Sub. Brown, Boveri & Co 1,2,3
Conrac Corp 1
Foxboro Co 2
Hawker Siddeley Dynamics Engineering Ltd 1,2,3
Hitachi Ltd 1
Honeywell Inc., Process Control Div 2
Howe Richardson Scale Co 2
KHD Industrieanlagen AG, Humboldt WFDAG 1,2,3
Leeds & Northrup Co 1,2,3
Martin-Decker Co 1,2
McPhar Geophysics Ltd 3
Montan Forschung 1
O & K Orenstein & Koppel AG, Werk Ennigerloh 1,2
Outokumpu Oy, Technical Export Div 1,2,3
Outokumpu Oy, Technical Export Div 1,2,3
Philips Gloeilampen Fabrieken, N.V., Science & Industry Div 1,2
Pneumatisk Transport AB 3
RCA Corp 1,3
Rheinbraun-Consulting GmbH 3
Siemens AG 1,2,3
SILEC, Signalisation Industrielle Div 2
Uniroyal Inc 1,3
Westinghouse Brake & Signal Co Ltd, Signal & Mining Div 1,2,3
Westinghouse Electric Corp 2
Zed Instruments Ltd 1

COMPUTERS (see Data Processing Equipment)

CONCENTRATING EQUIPMENT

See Also Crushers, Flotation Machines, Magnetic Equipment, Grinding Equipment, Crushers, Separators

1 Chemical Concentrators 2 Clarification 3 Coal Washing Tables 4 Cones 5 Heavy Media Separation 6 Ion Exchange Equipment 7 Jigs 8 Magnetic Separation 9 Optical 10 Photometric 11 Pneumatic 12 Precipitation 13 Radiometric 14 Spiral Concentrators 15 Tables 16 Water Cyclones, Coal

Abib Engenharia S.A. Paulo 3,4,5,7,10
Allis-Chalmers, Cement & Mining Systems Div 5,8,14
Arluval Dredges Ltd 7
Aisthom, Div. Neyrtec 2,15
Bateman Ltd., Edward L. 1,2,3,4,5,6,7,8,11,12,14,15,16
Berry Co 11,15
Boxmag-Rapid Ltd 8
Carpco 8
Deister Concentrator Co., Inc. 3,15
Dings Co., Magnetic Group 8
Dorr-Oliver Inc 2
Dresser Industries Inc., Industrial Equipment Div 7
EIMCO, Div. Envirotech Corp 2
Eriez Magnetics, Ltd 8
Fives-Cail Babcock 5,7,8,16
FMC Corp., Material Handling Equip Div 15
GEC Mechanical Handling Ltd 3,4,5,7,8,14,15,16
Hazen Research International Inc 16
Head Wrightson & Co. Ltd 5,15
Heath & Sherwood Co 5,8
Heyl & Patterson Inc 2,5,16
Ishikawajima-Harima Heavy Industries 2,12
Jenkins of Retford Ltd, Mor Babcock & Wilcox Ltd Gp 5,7,16
Joy International S.A. 2,4
Joy Manufacturing Co 2,6,7,16
Joy Manufacturing Co., Denver Equipment Div 2,3,13
Joy Manufacturing Co. (UK), Ltd, Denver Equipment Div 5,10
KHD Industrieanlagen AG, Humboldt WFDAG 2,3,5,7,8,9,11,12,14,15,16
Kawasaki Heavy Industries, Ltd., Machine Sales Div 1,2
Kone Corp 8,15
Koppers Export-Import 5,7,8,16
Koppers Co., Inc. Harding Oper 5
Krebs Engineers 16
Krupp GmbH Fried. Krupp Industrie-Und Stahlbau 5,6,8,12
Larox Oy 2,11,16
Lurgi Gesellschaften 8
Machinexport V O 1,7,8,14,15
Matthew Hall Ortech Ltd 3,4,5,6,7,8
McNally Bharat Engineering Co Ltd 5,7,8,16
McNally Pittsburg Mig Corp 5,7,16
Mine & Smelter Co., Sub Barber-Greene Co 15

Mineral Deposits Ltd 4.14
 Mitsubishi Metal Corp 8.15.16
 Mountain State Engineers 1.5.8
 Neyrtec Aisnom-Atlantique 16
 Ohio Magnetics 5.8
 Ore Sorters Africa Pty Ltd 9.10
 13
 Osborn (South Africa) Ltd, Samuel
 16
 RTZ Services Ltd
 Rheas Chemie & Metall GmbH 2
 Roahn Oy 8.15
 Saa International 3.5.8.14.15.16
 Saha Minco 2.3.6.9.10
 Shinko Electric Co. Ltd 8
 Thyssen Thyssen (Great Britain)
 Group 11
 Towa Senkoku Co. Ltd 8
 Tyler Inc. W S 5
 Vickers Australia Ltd, Ruwolt Div. 3
 Warman Equipment (International)
 Ltd 1.2.3.4.5.7.8.14.15.16
 WEMCO Div. Envirotech Corp 5.7.
 14.16
 Withey Mining Machinery Co. Ltd.
 The 15

CONCRETING EQUIPMENT

See Also Cranes

1 Concrete Additives 2 Forms, Underground 3 Mixers 4 Plants 5 Pumps and Placers 6 Sprayers

Acker Drill Co 3.5
 Atlas Coraco AB 3.5
 Bekaert Steel Wire Corp 1
 Bernini AG 6
 Blaw Knox Equipment Inc 2
 Bochumer Eisenhütte Heintzmann
 & Co 2
 Cementation M. Mining Ltd 1.2.5
 Challenge Cook Bros. Inc 1.3.5.6
 Gardner-Denver International,
 International Div 5
 Ishikawajima-Harima Heavy
 Industries 1.3.4.5
 Klienkampff Gebrüder 3
 Machinexport V O 3.4.5.6
 Mining Development (UK) Ltd
 (Mnde.) 3.5.6
 Mitsubishi Metal Corp 4.5
 Normet S. A. 5.6
 Pneumatisk Transport AB 3.4.5.6
 Putzmeister-Werk Maschinenfabrik
 GmbH 3.5.6
 Rexnord Inc 3.5
 Sneebridge Equipment Ltd 5

CONNECTIONS Casing & Tubing (see Couplings)

CONNECTORS Breech Block McEvoy Oilfield Equip

CONNECTORS Pipe Line
 Daiichi Jitsugyo Co Ltd
 Indel-Davis
 McEvoy Oilfield Equip
 Sea Supply

CONNECTORS Pipeline, Subsea BOC SubOcean Services Ltd

CONNECTORS Riser Subsea Apcco

Asia Industries Inc
 BOC SubOcean Services Ltd
 Cameron Iron Works
 Daiichi Jitsugyo Co Ltd
 FMC Corp
 FMC Petroleum Equip SEA Pte Ltd
 McEvoy Oilfield Equip
 Menon Associates
 National Supply Co
 NL Rig Equipment
 Vetco Singapore

CONSTRUCTION EQUIPMENT (also see Cranes or Hoists or Tractors)

Abottin Marketing
 Allbest PT
 Anchor Enrgy Co Pty Ltd
 Atlantic, Gulf & Pacific Co
 Atlas Copco Group
 Borneo Tractors
 Case Co J1
 Caterpillar Far East Ltd
 Clyde Iron
 Connac Pte Ltd
 Dana Engineers Intl
 Diehelm & Co Ltd
 East Asiatic Co
 Ekman & Co
 Engineering Equipment Inc
 Ensel Engineering Services
 Erlanaja PT
 Far East Drilling Consultants & Supp-
 llers Ltd
 Felmar Pte Ltd
 Flat Allis Singapore
 Gardner-Denver Co
 Grove Intl Corp
 Guthrie Engineering
 Hargill Group
 Harnischfeger Intl Corp
 Ingersoll-Rand Group
 International Harvester Export Co
 John Deere Intercontinental Ltd
 Komatsu Singapore Pte Ltd
 Fukati Machinery & Equip Co
 Manila Machinery & Supply Co Inc
 Pamitran MTD
 Paterson, Simons & Co
 Singapore Equipment Services Pte Ltd
 Span Intl Ltd
 Thaitrac Co Ltd
 Tierra Factors Corp
 Tractors Malaysia Bhd

CONSTRUCTION EQUIPMENT, continued:

Tractors Singapore Ltd
 Tractors Utada PT
 Trax International Pte Ltd
 Utank PT
 United Equipment Services
 United Engineers
 United Motor Works Group
 Whyte & Co

CONTAINERS (see Drums)

Continental Gummi-Werke AG 10
 Davy Powergas International Ltd 2.
 4.10.11.12
 Deimann-Haniel GmbH 17
 Demag AG, ABT
 Bergwerksmaschinen 3.4.5.6.7.
 15.17
 Demag Verdichter &
 Drucklufttechnik GmbH 3.4.5.6.
 7.10.11.12.15.17
 DRAYO Corp 2.9.10.11.12.17
 Du Pont de Nemours & Co Inc. E.
 1.1.13.16
 EKONO Consulting Engineers 1.2.
 6.7.8.10.11.12
 Fives-Cail Babcock 2.10.12
 Fox Manufacturing Co., Div. Placer
 Exploration Ltd 10.12.17
 Frontier-Kemper Constructors 12.
 17
 Furukawa Mining Co. Ltd.
 Machinery Sales Div 11
 Garrand Corp., Consulting Engrng
 & Research 2.3.4.11.12.14
 Gates Engineering Co 2.7
 Geomin 2.3.4.5.6.9.10.11.12.15.
 17
 Geominco 2.4.5.6.12.17
 Geophysical Service Inc., Div of
 Texas Instruments Inc 1.2.4.5.
 5.6.9.15
 Golder & Associates Ltd., H Q 4.
 5.6.9.15
 Golder Associates, Inc. 2.4.6.12.15
 Golder Brawner & Associates Ltd.
 4.6.12.15
 Golder, Hoek & Associates Ltd 2.
 3.4.5.6.7.8.9.12.14.15
 Gould & Co., Gordon 1.2.4.11.12
 Hamilton Engineering Associates 2.
 7.8.10
 Hanson Co., R. A., Mining Div 10
 Heinrichs Geoexploration Co 1.2.3.
 4.5.6.7.8
 Hevi & Patterson, Inc 2.10
 HUNTEC (1970) Ltd 14
 Hunting Surveys & Consultants.
 Ltd 2.3.4.5.6.14
 Hunting Surveys & Consultants Inc
 2.3.4.5.6.14
 Hawood Irwin Co 2.10.12
 IBAG Internat. Baumaschinenfabrik
 AG 2.7.8.10.12
 Imperial Smelting Processes Ltd 1.
 2.11
 International Engineering Co., Inc.
 1.2.4.5.6.9.10.12.14.15
 International Handling BV 10
 Jaakko Poyry Engineering Oy 2.7.
 3.10
 Jacobs Engineering Co 2.10.11.
 12
 Joy Manufacturing Co., Denver
 Equipment Div 11
 Kaiser Engineers 1.2.3.4.5.7.8.9.
 10.11.12.13.14.15.16.17
 Kawasaki Heavy Industries Ltd.,
 Construction Machinery Div 1.6.
 7.8.9
 Kawasaki Heavy Industries, Ltd.
 Machine Sales Div 7
 Kone Corp 10
 Kopex Export-Import 4.12.15.16.
 17
 Krupp GmbH, Fried. Krupp
 Industrie und Stahlbau 2.4.7.9.
 10.11.12.14.15

Legend Corp 12
 Lkab International AB 2.3.4.5.11.
 12.15.16.17
 Long Airdox Co., Div. Marmon
 Group Inc 10
 M A N 7.10
 Matthew Hall Ortech Ltd. 2.7.8.9.
 10.11.12.13.14
 McDowell-Wellman Engineering Co.
 2.7.9.10.11.12
 McKee & Co., Arthur G. Western
 Knapp Engineering Div. 2.11.12
 McPhar Geophysics Ltd 5
 Mindrill Ltd 12
 Mine Expert 2.12
 Mineral Deposits Ltd. 2.4.11.12
 Minex Mine-Expert 2.12
 Mintec International, Div. Barber-
 Greene Co. 10.12
 Mitchell Ropeways Ltd 10
 Mitsubishi Metal Corp. 2.3.4.5.7.8.
 10.11.12.15.16.17
 Montan Consulting GmbH 1.2.3.4.
 11.12.16.17
 Montreal Engineering Co Ltd 1.2.5.
 6.7.8.9.10.11.12.13.14.15
 Moss (Pty) Ltd., George 8.10

 Mountain State Engineers 1.2.3.4.
 6.7.8.12.11.12
 Newseco 2.4.7.12
 Oiko Engineering 2.4.6.7.9.10.14.
 15
 Outokumpu Oy, Technical Export
 Div. 2.3.4.5.8.11.12
 Outokumpu Oy, Technical Export
 Div. 2.3.4.5.8.11.12
 Parsons Co., The Ralph M. 1.2.3.4.
 5.6.7.8.9.10.11.12.13.15.16.17
 Parsons, Jordan Co., Div. Ralph M.
 Parsons Co. 1.2.3.4.5.6.7.8.9.
 10.11.12.13.15
 PD-NCB Consultants, Ltd. 1.2.4.6.
 7.10.12.15.16
 Peake, Percy V. 2.12.15.16
 Pincock, Allen & Holt, Inc. 2.4.11.
 12.15
 Polysius Werke 2.3
 Praktische Maschinen GmbH 4.5
 Production Equipment Ltd 10
 Reanor Equipments Industriels
 10
 Redpath Corp. J.S. 2.12.17
 Rheax Chemie & Metall GmbH 12
 Rheinbraun-Consulting GmbH 1.2.
 4.6.10.12.13.15.16.17
 Robertson Research International
 Ltd. 2.3.4.5.6.7.8.11.12.14.15
 Rock Falls Co., Ltd. 2
 Roxon Co. 12
 Sandvik Canadian Ltd., Wear Parts
 Div. 11.12
 Schenck AG Carl 10
 Scintrex Ltd 5
 Seegmiller Associates 4.6.12.15
 Seltrist Engineering Ltd. 1.2.4.5.6.
 8.10.11.12.16.17
 Siemens AG 8
 Simpson Engineering Ltd. 1.7.8.10
 Solremes 1.2.4.6.7.8.9.10.11.
 12.15.17
 Soil Mechanics Ltd. 4.5.15
 South African Mining Co. 2.
 3.4.5.10.11.12.15.16.17
 Stearns Roller Inc. 1.2.7.8.10.11.
 12
 Taim SA 11.10.12
 Tesco 2.3.4.5.6.7.8.10.11.12.13.
 15.16

Thyssen (Great Britain) Ltd. 2.4.7.
 12.17
 Trelleborgs Gummitabriks AB 2.12.
 17
 Transtronic AB 8
 Trelleborgs Gummitabriks AB 10.
 12
 Vickers Australia Ltd., Ruwolt Div.
 9.10.11.12
 VOEST Alpine 1.6.10.11
 Wahler & Associates, W A
 Warman Equipment (International)
 Ltd. 2.11.12
 Weir Co., Paul 2.4.12.17
 Wesermatte AG, Eisenwerk
 2.7.10.12
 Wilson, L. K. (Ken) 4.12
 Wimpey & Co. Ltd., George 2.4
 Zed Instruments Ltd. 8
 Zeni Drilling Co. 6.17

CONTINUOUS MINERS

1 Coal, Permissible 2 Other

AEC, Inc. (Alpine Equipment Corp.)
 1.2
 Anderson Mavor Ltd 1
 Babcock & Wilcox Ltd. 1
 Demag AG, ABT
 Bergwerksmaschinen 2
 Demag verdichter &
 Drucklufttechnik GmbH 2
 Dosco Overseas Eng. Ltd. 1
 Fox Manufacturing Co., Div. Placer
 Exploration Ltd. 1
 Goodman Equipment Corp. 1
 Ingersoll Rand Co. 1.2
 Jeffrey Mining Machine Co., Div.
 Dresser Industries Inc. 1.2
 Joy International S A
 Joy Mfg. Co. 1.2
 Krupp GmbH, Fried. Krupp
 Industrie-Und Stahlbau 1.2
 Lee-Norse Co. 1
 Long Airdox Co., Div. Marmon
 Group Inc 1
 Macmahonexport V O
 National Mine Service Co. 1.2
 VOEST Alpine

CONTROLS

See Also Control Systems

1 Automatic Process 2 Blast Hole Drill Control 3 Density 4 Depth Measuring 5 Electric Motor 6 Electronic 7 Hydraulic 8 Liquid Level 9 Mill 10 Particle Size 11 Ph Meters 12 Pneumatic 13 Pressure 14 Pump 15 Pyrometallurgical 16 Radio 17 Remote 18 Speed 19 Temperature Monitoring 20 Thyristor 21 Ultrasonic 22 Viscosity

ABEX Corp 7 13 14
Alec-Chalmers, Cement & Mining Systems Div 5 9 15
Anderson Mavor Ltd 5 16
ASEA Inc, Mining & Industrial Transport 1 5 6 9 14 17 18 20
Australian Mineral Development Lab 1 3 9
Autometrics 1 10
Babcock & Wilcox Co., Automated Machine Div 4
Babcock & Wilcox Ltd 8 12 17
Bateman Ltd., Edward L. 1 8 9
Beckman Instruments, Inc. 1 6 11, 12 13
Bridicator Co 4 8
Brown, Boveri & Co. Ltd 1 5 6 8, 9 17 18 19 20
Brown, Boveri & Cie AG, Industrial Plants Div 1 5 6 9 17 18 20
Communication & Control Eng. Co. Ltd 1 6 14 17 18 19
Compagnie Electro Mecanique, Sub Brown, Boveri & Co 1 5 6 8 9, 17 18 19 20
Conrad Corp 5 8 13
Davis & Sons Ltd, John 3 4 13
Dillon & Co Inc., W. C. 1 6
Eaton Corp 1 6
Fives-Cail Babcock 3
Fox Manufacturing Co., Div. Placer Exploration Ltd 2
Foxboro Co. 1 3 8, 11, 12, 13, 14, 17 18 19
Furukawa Rock Drill Sales Co. Ltd. 12
GTE Products Corp 5 6
Harnischfeger Corp 5
Hawker Siddeley Dynamics Engineering Ltd 1 17
Hayden Niles Contlow Ltd 7
Hitachi Ltd 3 4 6 9 10, 11, 15
Honeywell Inc., Process Control Div. 1 5 6 8 12 13 18 19
Howe Richardson Scaie Co 1
IBAG Internati Baumaschinenfabrik AG 1 3 5 7 11 12 15 16 17 19
Ishikawajima-Harima Heavy Industries 1 7 9 12 13 14 17 18, 19
Jones & Laughlin Steel Corp 14
Kay-Ray Inc 3 8
Leeds & Northrup Co 1 6 8 9 10, 11 13 15 17 19 21
Lifton Industrial Products, Inc., Louis Allen Div 5 6 14 17
Martin-Decker Co 1 3 6 7 8 13 17
Materials Control Inc 1 8
Montabert 7 12
Moss-Fair Ltd., George 5 6 7 16, 17 18 20
New Yorker Products 7 12 14
National Mine Service Co 1 5 6 7

Noratom-Norcontrol AS 3 8
Onmart Corp., The 3 8
Peabody International Corp 14
Peerless Pump 8 14 18
Philadelphia Gear Corp 18
Philips Gloeilampen Fabrieken N.V. Science & Industry Div 1 6 8 10, 11 19 19
Pyott Boone Inc 6 17 19
Rhino Sales Corp 5
Shinko Electric Co. Ltd 1 5 6 17, 18 20
Siemens AG 1 4 5 6 10 15 16 17, 18
SILÉC, Signalisation Industrielle Div 1 18
Square D Co 5 6 7 8 13 14 16, 17 18 19
Stanco Manufacturing & Sales 17
Texas Nuclear Corp., Div. Ramsey Engineering Co 3 8
Transtronic AB 1 2 4 6 17
U.S. Steel Corp 14
Varian Associates, Instrument Div 8 14 19
Warman Equipment (International) Ltd 8
Westinghouse Brake & Signal Co. Ltd., Signal & Mining Div 12 13, 17
Westinghouse Electric Corp 5 14, 18
Zed Instruments Ltd 6 17
CONTROLS Drilling
Cameron Iron Works
Daiichi Jitsuyo Co Ltd
Dresser Minerals Group
Drexel Oilfield Services
Fuller & Kinnaird Associates Ltd
Geolograph Operations
Greenland Engineers & Tractors Co Ltd
Hydril Co
James Gauntt Pte Ltd
Martin-Decker Co
Mid-Continent Supply Eastern Hemisphere Co
Mirafsha Associates
National Supply Co
CONTROLS Electrical (see Electrical Equipment)

CONTROLS Environmental
(see Oil Spill Prevention/Recovery or Sewage & Effluent Treatment)

CONTROLS Flow (see valves)

CONTROLS Hydraulic
(see Hydraulic & Pneumatic Equipment)

CONTROLS Liquid Level
Alliance (SI) Engrg Co Pte Ltd
Australian American Engrg Corp
Automatic Accessories
Bestobell Group
Feltar Pte Ltd
Fisher Controls Pte Ltd
Foxboro Group
ITT Far East & Pacific Inc
Lietz-Zulueta Capital Inc
Martin-Decker Co
Masonelan
Oiltools Intl Group

CONTROLS Marine
AEG Telefarken
Alliance
Asea Singapore Pte Ltd
Bain Meyer & Co
Drexel Oilfield Services
Foxboro Group
Galaxie Specialities Pte Ltd
George Kent Group
Gould Inc
Harrisons Lister Engrg Ltd
Haven Automation
Honeywell Inc
Honeywell-Sime Darby Pte Ltd
Instrumentation Ltd
ITT Far East & Pacific Inc
James Gauntt Pte Ltd
Lietz-Zulueta Capital Inc
Martin-Decker Co
Masonelan
Mechanical Comb Engrg Co
Nell Company, EJ
Oiltools Intl Group
Tanco Cutler-Hammer
Taylor Instrument
CONTROLS Temperatur, Industrial
Bestobell Group
Colosseum Corp Pte Ltd
Foxboro Group
Haven Automation
Honeywell Inc
Honeywell-Sime Darby
Instrumentation Ltd
Masonelan
Mechanical Comb Engrg Co
Tokico Singapore Pte Ltd
United Tennik UD

CONTROLS Wellhead
(see Wellhead Assemblies & Components)

CONVEYORS AND ELEVATORS

See Also Feeders

1 Belt 2 Bridge 3 Bucket 4 Bunker 5 Chain Conveyors 6 Pan 7 Armored Flexible Conveyors 8 Pneumatic 9 Portable 10 Radial Spreaders 11 Scraper Chain 12 Screw 13 Shaking or Vibrating 14 Stacking 15 Steel Plate

AEC Inc 1 2 5
Aluterv 1
Anderson Mavor Ltd 1 5 6 7 11
Angus & Co Ltd., George, Belting Products Div 1
Appareis Dragon 1 9
Atney Products Corp 1 9 14
Atlas Copco AB 4
Aumund-Fordererbau GmbH 1 2 3, 4 5 6 7 9 11 12 13 14 15
Babcock-Moxey Ltd 1
Babcock & Wilcox Ltd 1
Bando Chemical Industries, Ltd., International Div 1
Barber-Greene Overseas, Overseas Div 1 9 14
Bateman Ltd., Edward L. 7
Boxmag-Rapid, Ltd. 13
Boyer SA 1 9
British Jeffrey Diamond 11
British Ropeway Engineering Co Ltd 1 10
Buckau-Wolf Maschinenfabrik AG 1, 2 3

Cable Belt Conveyors, Inc. 1
Calweid, Div. Smith International Inc. 1 9
Chemolimpex, Hungarian Trading Co. 1
Clouth Gumminwerke AG 1
Combustion Engineering, Inc. 1 3 5
Compagnie Colmant Tournai, S. A. 1
Creusot-Loire 15
Deimann-Haniel GmbH 1 3
Demag AG, Abt Bergwerksmaschinen 5 15
Demag Lauchhammer Masch & Stahlbau GmbH 1
Demag Verdichter & Drucklufttechnik GmbH 4 12
Den Norske Remfabrik A/S 1
Dowty Meco, Ltd 1 5 7 10 11
Dragon SA Appareis 1 9
Dresser Industries Inc 1 3 5 11 12
Dresser Industries Inc, Industrial Equipment Div 1 3 5 6 11 12, 13 14
Dresser Industries Inc., Power Transmission Div 5 11
Eickhoff Maschinenbau U Eisengieserei 1 5 11
Engineering Equipment Co. Div of Auto Weigh Inc 1
Eriez Magnetics, Ltd 13
Esch-Werke AG 1 3 4 9 12
ESCO Corp 3 5
Fenner & Co Ltd., J. H. 1
Fives-Cail Babcock 1 12 15
Fletcher Sutcliffe Wild Ltd 1 4
Flexowal Corp 1 3 6 14
FMC Corp., Material Handling Equip Div 1 3 8 12 13
Fuller Co 5 8
Furukawa Mining Co Ltd, Machinery Sales Div 1 2 3 4 5 6, 9 10 11 12 13 14 15
Gates do Brasil SA 1
Gates Rubber International 1
GEC Mechanical Handling Ltd. 1
General Spice Corp 1
Geomir 1 3 5
Goodall Rubber Co 1
Goodman Equipment Corp 1 13
BF Goodrich International 1
Goodyear International Corp 1
Grantham Electrical Engineering Ltd 13
Gruender Crusher & Pulverizer Co 1 3 9
Gutehoffnungshutte Sterkrade AG 1
Hagglund & Soner AB, Trucks & Mining Machinery Div 4
Hammermills, Inc., Sub Pettibone Corp 1 9 10
Hanson Co., R. A., Mining Div 1 2, 9 10 14
HAZEMAG Dr E Andreas GmbH & Co 6 15
Hazen Research International Inc 1 3 12
Heyl & Patterson, Inc 1 14
Huwood Ltd 1 5
Huwood-Irwin Co 5 6 7 11
IBAG Internati Baumaschinenfabrik AG 1 2 3 4 8 9
Ishikawajima-Harima Heavy Industries 2 3 4 5 6 7 8 10 11, 12 13 14
Jeffrey Mining Machine Co., Div Dresser Industries Inc 5 6
Jenkins of Retford Ltd., Mbr Babcock & Wilcox Ltd Gp 1 3 5, 11

Johnson-Progress Ltd. 1
Joy International S A 9
Joy Mtg Co 1 7
KHD Industriemagazin AG, Humboldt WEDAG 1 2 3 12 13 15
Kawasaki Heavy Industries, Ltd., Machine Sales Div 1 3 8 13
Kennedy van Saun Corp., Sub McNally Pittsburg Mig Co B
Klockner-Becorit GmbH 11
Kone Corp 1 2 3 5 9 12 13 14
Kopex, Export-Import 1 3 4 5 6 7, 11
Krupp GmbH, Fried. Krupp Industrie-Und Stahlbau 1 2 3 4 5, 6 8 10 13 14
Kulenkampff, Gebruder 5
Locker Industries Ltd 13
Long-Airdux Co., Div Marmon Group Inc 1 2 5
Louise GmbH, Maschinenbau 1 4 5, 12
Maschinenbau Louise GmbH 1 3 5, 12
Machinexport V/O 1
Magco Ltd 13
M. A. N. 1
McNally Bharat Engineering Co Ltd 1 5 6 8 10 11 12 13 14
McNally Pittsburg Mig Corp 3 5, 12
Mining Supplies Ltd 1 2 5 6 7 9, 11 14
Mintec International, Div Barber-Greene Co 1 9 14
Mitchell Ropeways Ltd 1 5 9
Mitsubishi Belting Ltd 1
Mitsui Mike Machinery Co Ltd
National Iron Co., Div Pettibone Corp 6 15
National Mine Service Co 1 5 6 7
Newell Dunford Eng. Ltd 3 11 15
Nilos GmbH, Förderband-Ausrüstung 1
O & K Orenstein & Koppel AG, Werk Ennigerloh 1 3 5 6 11 12, 14 15
Osborn (South Africa) Ltd., Samuel 13
Parsons Chain Co 11
Pohlig Hecker-Biechert Ver Maschinen AG 1 3 14
PORTEC Inc., Pioneer Div 1 9 10, 14
Production Equipment Ltd 1 2 3 4, 5 6 9 10 11 14 15
Rauma-Keppola Oy, Lokomo Div 1
Realisation Equipments Industries 1 2 4 9 14
Redier Conveyors Ltd 5
Reiter & Crippa SNC 1 3 15
Reynold Inc., Process Machinery Div 1 9 10 14
Reynold Inc 1 3 5 6 8 9 11 13, 14
Reynold Inc, Vibrating Equipment Div 13
Rost & Co Balatroswerke, H 1
Roxon Oy 1
Rud. Kettentabrik Rieger & Dietz 5
Saia International 1
Saia Minco 1
Schnitzler Maschinen AG 1
Schenck AG, Carl 1 3 6 13 15

Schwartz-Holywell, Ltd 8
 Serpentina Conveyor Corp 1,6,9
 Sheepbridge Equipment Ltd 8
 Simplicity Engineering Co 6
 Standard Filterbau Dr E Andreas
 GmbH & Co 4,8,12
 Stepanoise DE Constr
 Mecaniques, Soc 1,5,6,11
 Stephens-Adamson Mfg Co 1,5,13
 Sturtevant Mill Co 3,12
 Svedala Arora AB 1,3
 Taim SA 1,6
 TAKRAF 1,3,14
 Thiele Kettentabrik, August 5,11,
 15
 Thyssen Thyssen (Great Britain)
 Group 8
 Thyssen Industrie AG, Umform
 Bergbautechnik 5
 Titan Mfg Co 1
 Trelleborgs Gummifabriks AB 1
 UMM Ltd 5
 Underground Mining Machinery,
 Ltd 4
 Unroyal Inc 1
 U.S. Steel Corp 1
 Vereinigte Österreichische Alpine
 Montan Eisen- & Stahlwerke 1,5
 Vöranetics Inc 12,13
 Vickers Australia Ltd, Ruwolt Div.
 1,10
 VÖEST-Alpine 1
 Weserhütte AG, Eisenwerk
 1,9,11,13,14,15
 Westfalia Lünen 1,5,6,7,11
 Yokohama Rubber Co, Ltd 1

CONVEYOR EQUIPMENT

See 4,10,30,31

1 Belts 2 Belt Cleaners and Brushes
 3 Belt Tensioning Equipment 4
 Braking Equipment 5 Buckets 6
 Centrifugal Switches 7 Chain 8 Coal
 Scrapers 9 Extension 10 Drive and
 Tail Pulleys 11 Idlers 12 Pillow
 Blocks and Hangers 13 Scraping
 and Cleaning Device 14 Serpentina
 15 Trippers 16 Tripper Cars and
 Controls

ABEX Corp 5,7
 Alutery 1,3,4
 Anderson Mavor Ltd 3,9,10,11
 Angus & Co Ltd, George Belting
 Products Div 1
 Babcock Moxey Ltd 16
 Bando Chemical Industries, Ltd.,
 international Div 1
 Barber-Greene Overseas, Overseas
 Div 11,15
 Beyer SA 10,11,12
 Bridgestone Tire Co, Ltd 1,2
 BTR Belting Ltd 1,2
 Buckau-Wolf Maschinenfabrik AG 1,
 2,3,5,9,10,11,15,16
 Cincinnati Mine Machinery Co 7
 Columbia Gummwerke AG 1,2
 Compton Engineering Inc 5,10,
 11,15
 Compagnie Colmant Tournai, S A
 10
 Continental Gummi-Werke AG 1,5
 Demag AG, AB
 Bergwerksmaschinen 8,10

Demag Lauchhammer Masch &
 Stahlbau GmbH 1,15,16
 Demag Verdichter &
 Drucklufttechnik GmbH 8,10
 Den Norske Remfabrik A/S 1,2,10
 Dillon & Co Inc, W C 3
 Dosco Overseas Eng Ltd 1,4
 Dowty Meco Ltd 3,11
 Dresser Industries Inc 5,7,10,11,
 12,13,15,16
 Dresser Industries Inc, Industrial
 Equipment Div 2,3,5,7,8,10,11,
 12,13,15
 Dresser Industries Inc, Power
 Transmission Div 7,12
 Eickhoff Maschinenbau-Eisengießerei
 3,10
 Engineering Equipment Co, Div of
 Auto-Weigh Inc 1
 ESCO Corp 5,7
 Fenner & Co Ltd J H 1,2
 Fives Cail Babcock 11
 Fletcher Sutcliffe Wild Ltd 1,3,10,
 11,15
 Flexible Steel Lacing Co 2
 Flexowal Corp 1,14
 FMC Corp, Chain Div 7
 FMC Corp, Material Handling
 Equip Div 10,11
 Fox Manufacturing Co, Div, Placer
 Exploration Ltd 2,3,4,8,9,10,11,
 12,15,16
 Fuller Co 7
 Furukawa Mining Co, Ltd,
 Machinery Sales Div 2,3,5,8,10,
 11,13,15,16
 Gates do Brasil SA 1
 Gates Rubber International 1,13
 Geomon 1,5,7,10,11
 Goodall Rubber Co 1
 Bf Goodrich International 1,3,11
 Goodyear International Corp 1
 Greengate Industrial Polymers, Ltd.
 1,13
 Hammermills, Inc, Sub Pettibone
 Corp 11
 Hanson Co, R A Mining Div 15
 Hayden Nilos Contlow Ltd 2,8
 Holz Rubber Co 10
 Huwood Irwin Co 7
 Huwood Ltd 3,10,11,13
 IBAG Internat Baumaschinenfabrik
 AG 1,2,3,4,5,6,7,8,9,10,11,12,
 13
 IFE GmbH & Co KG 2
 Ingersoll-Rand Co 12
 Ishikawajima-Harima Heavy
 Industries 3,4,5,9,10,11,12
 Jeffrey Mining Machine Co, Div,
 Dresser Industries Inc 7
 Jenkins of Kettford Ltd, Mbr
 Babcock & Wilcox Ltd Gp 15,16
 Johnson-Progress Ltd 1,3
 Joy SA 11
 Joy Mfg Co 3,9,14,15
 Kawasaki Heavy Industries Ltd,
 Construction Machinery Div 1,8
 Kone Corp 10,11
 Kopex Export-Import 1
 Kuepper KG, Artur 11
 Krupp GmbH, Fried, Krupp
 Industrie und Stahlbau 3,5,8,10,
 13,15,16
 Kulenkampf Gebrüder 8
 Lee-Norse Co 1,6
 Long-Airfax Co, Div, Marmon
 Group Inc 1,3,7,10,11,13
 Louise GmbH, Maschinenbau 1
 Maschinenexport V O 1

Martin Engineering Co 2,13
 Materials Control Inc 2,8,13
 McNally Bharat Engineering Co
 Ltd 2,3,10,11,15,16
 Mining Supplies Ltd 7,8,10
 Mintec International, Div, Barber-
 Greene Co 11,15
 Mitchell Ropeways Ltd 11,12
 Mitsubishi Heavy-Industries, Ltd. 1
 Mitsubishi Belting, Ltd 1
 National Mine Service Co 1
 Nilos GmbH, Förderband-
 Ausrüstung 1
 Nippon Conveyor Co, Ltd 2,3,10,
 11,12,13,15,16
 Parsons Chain Co 7
 Philadelphia Gear Corp 10
 Pohlig-Heckel-Bleichert Ver,
 Maschinen AG 15
 Polysius Werke 1,3,5,7
 PORTEC Inc, Pioneer Div 2,3,9,
 10,11,13,15
 Production Equipment Ltd 3,4,10,
 11,13,15
 Rauma-Repola Oy Porri Div 1,3,4,7
 Realisation Equipments Industriels
 3,4,8,10
 Reliance Electric Co, Dodge Div.
 10,11,12
 Rexnord Inc, Process Machinery
 Div 2,3,4,10,11
 Rexnord Inc 1,2,7,10,11
 Rost & Co Balatroswerke, H 1
 Roxon Oy 2,3,4,10
 RUD-Kettentabrik Rieger & Dietz 7
 Sala International 10,11
 Sala Minco 10,11
 Scandura Ltd 1
 Schaefer Brush Mfg Co, Inc 13
 Scholtz AG, Conrad 1
 Schwartz-Holywell, Ltd 13
 Siemens AG 4,6
 SILFC, Signalisation Industrielle Div
 6
 Skega AB 13
 Stepanoise de Constr
 Mecaniques, Soc 3,10
 Stephens-Adamson Mfg Co 2,10,
 11,15
 Sturtevant Mill Co 5
 Taim SA 1,3,5,7,8,10,11,15,16
 TBA Industrial Products, Ltd.,
 Belting Div 1
 TAKRAF 1,5
 Thiele Kettentabrik, August 7,8
 Titan Mfg Co 10,11
 Toka Rubber Industries, Ltd 1
 Torrington Co Ltd The 3,12
 Trelleborgs Gummifabriks AB 1,2,
 13
 Underground Mining Machinery,
 Ltd 7
 Unroyal Inc 1,10
 Unroyal International Inc 1,10
 U.S. Steel Corp 1
 VÖEST-Alpine 1,3
 Weserhütte AG, Eisenwerk
 2,3,10,13,15,16
 Westfalia Lünen 7
 Wilkinson Process Linatex Rubber
 Co, Ltd 13
 Yokohama Rubber Co, Ltd 1

COOLERS

1 Circular 2 Fluidized Bed 3 Rotary 4 Screw 5 Stationary

Ahstrom Oy, A. Varkaus
Engineering Works 2,3
Allis-Chalmers, Cement & Mining
Systems Div. 1,2,3,5
APV-Mitchell (Dryers), Ltd. 2,3
Bateman Ltd., Edward L. 2,3
Combustion Engineering, Inc. 3
Del Monego S P A 2,3
Dresser Industries Inc., Industrial
Equipment Div. 2
Fives-Cail Babcock 1,2,3
Fuller Co. 2,3
GEC Mechanical Handling Ltd. 3
Gould & Co. Gordon 1,3
Head Wrightson & Co., Ltd. 3
Joy Manufacturing Co. (U.K.), Ltd.,
Denver Equipment Div. 4
KHD Industrienlagen AG, Humboldt
WEDAG 2,3
Kawasaki Heavy Industries, Ltd.,
Machine Sales Div. 5
Kennedy Van Saun Corp., Sub.
McNally Pittsburg Mfg. Co. 3
Koppers Co., Inc., Hardinge Oper. 3
Kurimoto Iron Works, Ltd. 2,3
Locker Industries, Ltd. 2
McDowell-Wellman Engineering Co.
1,3
McNally Bharat Engineering Co.
Ltd. 3
Newell Dunford Eng., Ltd. 3
Niro Atomizer, Inc. 2,5
Polysius Werke 2,3
Rexnord Inc. 2
Rexnord Inc., Vibrating Equipment
Div. 2
Schenck AG, Carl 2
Stansteel Corp., Sub. Allis-Chalmers
Corp. 3
Stearns-Roger, Inc. 3

COOLERS, MINE

Dosco Overseas Eng. Ltd.
KHD Industrienlagen AG, Humboldt
WEDAG
Stansteel Corp., Sub. Allis-Chalmers
Corp.

COOLING TOWERS

Head Wrightson & Co., Ltd.
Heat Process Equipment Corp.,
Fberglass Equip. Div. Dart
Ingersoll-Rand Co.
Ishikawajima-Harima Heavy
Industries
Krupp GmbH, Fried. Krupp
Industrie-Und Stahlbau
Union Carbide Corp.
U.S. Steel Corp.
Woodrow International Ltd., Taylor

CORE BARRELS, REGULAR AND WIRE LINE

Atlas Copco AB
Christensen Diamond Products
English Drilling Equipment Co. Ltd.
Euro-Drill Equipment (U.K.) Ltd.
Fox Manufacturing Co., Div. Placer
Exploration Ltd.
Joy International S. A.
Joy Mfg. Co.
Koken Boring Machine Co.
Longyear Co.
Mindrill Ltd.
Mobile Drilling
Moss (Pty) Ltd., George
Sprague & Henwood Intl. Corp.
Wirth & Co. KG, Alfred

CORE BOXES

Allen Group Inc. The
Christensen Diamond Products
Fox Manufacturing Co., Div. Placer
Exploration Ltd.
Moss (Pty) Ltd., George
Sprague & Henwood Intl. Corp.
Warman Equipment (International)
Ltd.

CORING EQUIPMENT (see Barrels or Bits-Core)

COUPLERS, CAR

Allens of Tipton Ltd.
Card Corp.
Commonwealth Steel Co., Ltd.
Gutenhoffnungshutte Sterkrade AG
Hudson (Raletrux) Ltd., Robert
Huwood Irwin Co.
Moss (Pty) Ltd., George

COUPLINGS

See Also Transmissions

1 Clamps 2 Hoes 3 Hydraulic 4 Pipe 5 Shaft or Shaft Flexible

Aeroquip Corp. 1,3,4
Air Products & Chemicals Inc. 2
Alsthom, Div. Neyrtec 3
Atlas Copco AB 1,2
Dixon Valve & Coupling Co. 1,3,5
Dresser Industries Inc. 1,4
Dresser Industries Inc., Power
Transmission Div. 5
Fenner & Co. Ltd. J. H. 5
Fluidrive Engineering Co., Ltd. 3
Furukawa Rock Drill Sales Co. Ltd.
2
Gates do Brasil SA 3
Gates Rubber of Canada Ltd. 1,3
Goodall Rubber Co. 1,3
BFGoodrich International 1,4
Guillick Dobson Ltd. 3,4
Ingersoll-Rand Co. 5
Jones & Laughlin Steel Corp. 4
Lincoln St. Louis 3
Microdot Inc. 1,2
Mitsubishi Steel Mfg. Co., Ltd. 4
Morgardshammer AB 5
Moss (Pty) Ltd., George 4
Phelus Dodge International Corp. 4
Philadelphia Gear Corp. 5
Reliance Electric Co. Dodge Div. 5
Rexnord Inc. 5

Rockwell International Corp 1.4
Secmaster S. A. Service Publicitaire
3

Torrington Co Ltd. The 5
Toyo Rubber Industry Co Ltd. The
Overseas Oper Div 4.5
Twin Disc Inc 3
U.S. Steel Corp 4
Victuac Co of America 4
Westinghouse Brake & Signal Co
Ltd. Signal & Mining Div 4
Wirth & Co KG Alfred 3

COUPLINGS Casing or Tubing, Oil Well
(Also see Connectors)

Apco
Daichi Jitsuyo Co Ltd
Drexel Oilfield Services
Grant Corp SA
Hydril Co
NL Atlas Bradford
Sumitomo Corp

COUPLINGS Chain (see Fittings)

COUPLINGS Hose (see Fittings)

COUPLINGS Mechanical
(see Transmission Products, Mechanical)

COUPLINGS Pipe (see Fittings)

CRANES Onshore

Allbest PT
Atlantic Gulf & Pacific Co
Brady & Co Ltd WA
Case Co JI
Clyde Iron
Dana Engineers Intl
East Asiatic Co Ltd
Ensel Fray Services Ltd
Felmar Pte Ltd
Gerson & Sons Ltd
Grove Intl Corp
Guthrie Engineering
Hargill Group
Harnischfeger Intl Corp
Harrisons Lister Engrg
McAllister & Co Ltd
Mechanical Handling Engrg
National Supply Co
Panitran NVPD
Singapore Equipment Services Pte Ltd
Thaltrac Co Ltd
United Engineers
United Equipment Services
United Motor Works
Whyte & Co

CRANES Marine/Offshore Rig

Allbest PT
Aker Group
Clyde Iron
Drexel Oilfield Services
L&M Prestressing
Mata & Co, Inc
National Supply Co
Nor Mar A.S.
Promet Pte Ltd
Pyramid Derrick Singapore Pte Ltd
Span Intl Ltd
Thoreson & Co

CRANES

1 Bridge 2 Climbing and Tower 3
Crawler Mounted 4 Floating 5
Hydraulic 6 Jib 7 Truck Mounted

Aumund-Fordererbau GmbH 1
Barlows Heavy Engineering Ltd 1
Bedia Maschinenfabrik U
Raparaturwerk 5
Bucyrus-Erie Co 3.5.7
BUMAR 3.5.7
Case Co. J. I. International Div 5.
7
Chance Co. A B 5.7
Clark Equipment Co. Lima Div 3.7
Clark International Marketing S. A.
2.3.4.5.6
Demag AG Abt
Bergwerksmaschinen 1.5.7
Demag Baumaschinen 3.5.7
Demag Fordertechnik GmbH 1
Demag Verdichter &
Drucklufttechnik GmbH 1.5.7
Dresser Industries Inc 1.5.6.7
Dresser Industries Inc., Industrial
Equipment Div 1.6
Dresser Industries, Inc., Industrial
Products Div 1.6
Faun Werke Nurnberg 5
Fives-Cail Babcock 1
FMC Corp., Crane & Excavator Div
2.3.5.6.7
Gardner-Denver International,
International Div 6
Harnischfeger Corp 1.3.5.7
Hedburn Ltd, John T 1.5.6
Heyl & Patterson Inc 1
Hitachi Construction Machine Co.,
Ltd 2.3.5.7
Hitachi Ltd 1.5
Iowa Mold Tooling Co 5.7
Ishikawajima-Harima Heavy
Industries 1.2.3.4.5.6.7

Kawasaki Heavy Industries, Ltd.,
Machine Sales Div 1.3.4.5.6.8.9.
10
Kennedy Van Saun Corp., Sub.
McNally Pittsburg Mfg. Co 3.5.9
Kone Steel Ltd 1.3.4.5.9
Kone Corp 1.3.4.5.6.8.10
Koppers Co., Inc., Hardinge Oper. 4
Krupp GmbH, Fried. Krupp
Industrie-Und Stahlbau 1.3.4.5.6.
9.10
Kurimoto Iron Works, Ltd. 1.3.4.5.
8.10
Machinexport V/O 1.3.4.5.6
Magco Ltd 4.9
McNally Bharat Engineering Co.
Ltd 1.3.4.5.9.10
McNally Pittsburg Mfg. Corp 9
Mintec International, Div. Barber-
Greene Co 3.5.8
Morgardshammer AB 1.3.5.6.7.8.
10
Newell Dunford Eng., Ltd. 1.3.4.5.
6.9
Neytec. Aisthom-Atlantique 3.4.5.
6
Nikex 4.5
O & K Orenstein & Koppel AG,
Werk Ennigerloh 4.6.8.9.10
Osborn (South Africa) Ltd., Samuel
1.3.5.6.7.8.10
Person Ltd 1.3.5.6.10
Pennsylvania Crusher Corp. Sub. 4.
5.9.10

Kawasaki Heavy Industries, Ltd.,
Machine Sales Div 1.3.4.5.6.8.9.
10

Kennedy Van Saun Corp., Sub.
McNally Pittsburg Mfg. Co 3.5.9
Kone Steel Ltd 1.3.4.5.9
Kone Corp 1.3.4.5.6.8.10
Koppers Co., Inc., Hardinge Oper. 4
Krupp GmbH, Fried. Krupp
Industrie-Und Stahlbau 1.3.4.5.6.
9.10

Kurimoto Iron Works, Ltd. 1.3.4.5.
8.10

Machinexport V/O 1.3.4.5.6
Magco Ltd 4.9

McNally Bharat Engineering Co.
Ltd 1.3.4.5.9.10

McNally Pittsburg Mfg. Corp 9
Mintec International, Div. Barber-
Greene Co 3.5.8

Morgardshammer AB 1.3.5.6.7.8.
10

Newell Dunford Eng., Ltd. 1.3.4.5.
6.9

Neytec. Aisthom-Atlantique 3.4.5.
6

Nikex 4.5
O & K Orenstein & Koppel AG,
Werk Ennigerloh 4.6.8.9.10
Osborn (South Africa) Ltd., Samuel
1.3.5.6.7.8.10

PORTEC Inc., Pioneer Div 1.5.6.
8.9.10

Pragoinvest 1.3.4.5
Rauma-Repola Oy, Lokomo Div. 1,
3.4.5.6.8.10

Rauma-Repola Oy, Pori Div. 3.4.5.
10

Reiter & Crippa SNC 1.3.4.5.6.10
Reknord Inc., Process Machinery Div
1.2.3.4.5.6.7.8.10

Reknord Inc. 1.3.4.5.6.8.10
Roxon Oy 1.3.5.6.8.10
Schwartz Holywell Ltd 10
Sheepbridge Equipment Ltd. 1.3.4.
5.6.8.9

Stephanoise de Constr.
Mecaniques. Soc. 4
Sturtevant Mill Co 4.5.9

Svedala-Arbra AB 1.3.4.5.6.8.9.10
Teismitz Div. Barber-Greene Co. 1.
3.5.8.10

Vecor Heavy Engineering Ltd. 1.3.5
Vickers Australia Ltd., Ruwolt Div.
1.2.3.4.5.6.7.8.9

VOEST-Alpine 4.5.6.8.10.11
Weserhutte AG, Eisenwerk
4.5.6.8.9.10

CRUSHER PARTS

(Other Than Primary Crusher
Manufacturers Below)

1 Backing Components 2 Hammers
and Breaker Bars 3 Jaws and Cheek
Plates 4 Mantles and Concaves 5
Replacement Parts

ABEX Corp 3.5
Allis-Chalmers, Crushing &
Screening Div 4.5
Aluterv 3

Babcock & Wilcox Ltd. 2
Beryllium Smelting Co., Ltd. 2.3.4.
5

BICO, Inc 3.5
Brown, Lenox & Co., Ltd. 1.2.3.4.5
Columbia Steel Casting Co., Inc. 1,
2.3.4.5

Commonwealth Steel Co., Ltd. 3.4
Engineered Equipment Co. 2.3.4.5
ESCO Corp 1.2.3.4.5

Fives-Cail Babcock 2.3.4.5
Fuller Co 3
Furukawa Mining Co Ltd,
Machinery Sales Div 2.3.4.5

Holz Rubber Co 1
IBAG Internatl Baumaschinenfabrik
AG 1.2.3.4.5

Kawasaki Heavy Industries, Ltd.,
Machine Sales Div 1.2.3.4.5
Kent Air Tool 1

Krupp GmbH, Fried. Krupp
Industrie-Und Stahlbau 1.2.3.5
Kulenkampff Gebruder 2

Kurimoto Iron Works, Ltd. 2.3.4
Machinexport V/O 3.4.5
McNally Bharat Engineering Co
Ltd 2.3.4.5

Kobe Steel Ltd 2.4.6
Koenig Co 2.3.5.7
Kone Corp 1

Krupp GmbH, Fried. Krupp
Industrie-Und Stahlbau 1.2.3.4.5,
6.7

Kulenkampff Gebruder 7
Liebherr Hydraulikbagger GmbH 5
Lifts Unlimited 1.5.6
Linden-Armak AB 2

Machinexport V/O 1.2.3.5.6.7
M. A. N. 1.4.6

Marathon Manufacturing Co. 4.6
Mitsubishi Heavy-Industries, Ltd. 6
Mohr & Federhall AG 1.4

Moss (Pty.) Ltd., George 5
National Iron Co., Div. Pettibone
Corp 7

Nikex 1
Northwest Engineering Co 3.7
O & K Orenstein & Koppel AG 4.5,
7

Owatonna Tool Co 5
Pettibone Corp 5.7
Pragoinvest 5.6.7

Production Equipment Ltd 7
Ransomes & Rapier Ltd. 3.5
Rauma-Repola Oy, Lokomo Div. 5.7

Pound & Son Inc., David 1.5.6.7
Ruston-Bucyrus, Ltd. 3.5.7
Stanco Manufacturing & Sales 5.6.
7

Taim SA 1
UMM Ltd 5
Vecor Heavy Engineering Ltd. 1

VOEST-Alpine 1
Warman Equipment (International)
Ltd 7
Weserhutte AG, Eisenwerk 3.4.5.6

CRUSHERS

See Also Laboratory Equipment And
Supplies

1 Cone 2 Disc 3 Gyrotary 4 Hammer
and Impact 5 Jaw 6 Mobile 7 Non-
Metallic Backing for Wear Material 8
Portable 9 Roll 10 Stationary

Allis-Chalmers, Cement & Mining
Systems Div. 3.5.6.8

Allis-Chalmers, Crushing &
Screening Div 1.3.4.5.6.7.8.10

Aisthom Div. Neyrtec 1.2.3.4.5.6.
9.10

Aluterv 4.5.9
Appareis Dragon 1.3.4.5.6.7.8.9.
10

Aveling-Barford Ltd 4.5.6.8.9.10
Barber-Greene Overseas, Overseas
Div 3.5.8.10

Bateman Ltd., Edward L. 1.3.5
BICO, Inc 2.3.5.6.8.10

British Jeffrey Diamond 2.4.9
Brown, Lenox & Co., Ltd. 1.3.4.5.6
Buckau-Wolf Maschinenfabrik AG 2,
4.9.10

Columbia Steel Casting Co., Inc. 7
Dresser Industries Inc 4.6.8
Dresser Industries Inc., Industrial
Equipment Div 4.9

Esch Werke AG 1.3.4.5.6.8.9.10
Fives-Cail Babcock 1.3.4.5.6.8.9.
10

Fuller Co 3.5.9
Furukawa Mining Co Ltd,
Machinery Sales Div 5.8.10

GEC Mechanical Handling Ltd. 4.5,
6.9.10
Geormin 1.2.3.4.5.6.9

Grugendier Crusher & Pulverizer Co.
4.5.6.8.9.10
Gundlach Machine Co., T. J. 4.9.10
Hammermills, Inc., Sub. Pettibone
Corp 1.4.5.6.8.9.10

HAZEMAG Dr E Andreas GmbH &
Co 4.6.9.10
Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

Hewitt-Robins 1.4.5.8.9.10

CUTTING EQUIPMENT INDUSTRIAL
(Free Tools or Welding & Cutting Equipment)

CYCLONES

See Also Classifiers

1 Dry 2 Wet

AAE Ltd 1
Abe Enpenharia S.A. Paulo 1.2
Auss Chalmers Cement & Mining Systems Div 2
Aisthoni Div Neytec 2
American Air Filter Co. Inc 1
American Precision Industries, Dustex Div 1
Barber-Greene Overseas, Overseas Div 2
Bateman Ltd Edward L 1.2
Del Monego S P A 1
Dorr-Oliver Inc 2
Fives Cail Babcock 1.2
Fuller Co 1
Furukawa Mining Co Ltd Machinery Sales Div 1.2
Grondier Crusher & Pulverizer Co 1
Hazen Research International Inc 1.2
Heyl & Patterson Inc 2
Howden & Co Ltd James 1
Ishikawajima-Harima Heavy Industries 1.2
Jenkins of Kettord Ltd Mbr Babcock & Wilcox Ltd Gp 2
Joy International S A 3
Joy Mfg Co 1
KHD Industriemagnen AG, Humboldt WEDAG 1.2
Kawasaki Heavy Industries Ltd, Construction Machinery Div 1
Kawasaki Heavy Industries, Ltd, Machine Sales Div 1
Krebs Engineers 2
Krupp GmbH Friedl Krupp Industrie Und Stahlbau 1.2
Kurimoto Iron Works, Ltd 1.2
Larox Oy 1.2
Lurgi Gesel schatten 1.2
Machinexport V O
McNally Bharat Engineering Co Ltd 1.2
McNally Pittsburg Mfg Corp 2
Mineral Deposits Ltd 2
Nirex 1.2
Osborn (South Africa) Ltd, Samuel 2
Peñar Iron Works Inc
Polysius Werke 1
Rauma-Repola Oy Pori Div 3
Krebs Chemie & Metall GmbH 2
Roberts & Schaefer Co 2
Rohm Co 1.2
Sala International 2
Sala Minco 2
Simon Warman Ltd 2
Standard Filterbau, Dr E Andreas GmbH & Co 1.2
Teismann Div Barber-Greene Co 2
Vickers Australia Ltd Ruwolt Div 2
Warman Equipment (International) Ltd 1.2
WEMCO Dr, Envirotech Corp 2
Wilkinson Process Linatex Rubber Co Ltd 2

CYLINDERS AND ACTUATORS

ABEX Corp
Air Products & Chemicals Inc
CRC-Kelley Products, Div Crutcher Resources Corp
Dresser Industries Inc
Heipeds, Ltd
Logan Actuator Co
McDowell-Wellman Engineering Co
Moss (Pty) Ltd, George
Rauma-Repola Oy, Lokomo Div 3
Reinord Inc
Rockwell International Corp
U.S. Steel Corp

DATA PROCESSING EQUIPMENT

Dataprep Group
Hewlett Packard Singapore Pte Ltd

DEGASSERS

Mud
Azim Mannan Ltd
Dresser Minerals Group
Drexel Oilfield Services
Mid-Continent Supply Eastern Hemisphere Co

Sil Drilco

DEGREASERS (see Chemicals Cleaners)

DEHYDRATOR UNITS Oil or Gas

Avery-Laurence Group
BS & B
C-E Natco Intl Ltd
Porta Test Systems Engrg Pte Ltd

DERRICKS (see Rigs)

DESALINATION EQUIPMENT Water

(also see Water Treatment Equipment)
Aartus & Associates Pvl Ltd
Alfa-Laval Group
Avery-Laurence Group
Chemitreat Group
Daiichi Jitsugyo Co Ltd
Drexel Oilfield Services
Weir Pumps Ltd

DESALINATION EQUIPMENT

Du Pont de Nemours & Co Inc, E
Gardner Denver International, International Div
Ishikawajima-Harima Heavy Industries
Kawasaki Heavy Industries, Ltd, Machine Sales Div
Permutite Co, Inc, The

DESALTER UNITS Oil

Avery-Laurence Group
BS & B
C-E Natco Intl Ltd
Porta-Test Systems Engrg Pte Ltd

DESANDERS Mud

Apsco
Aqua Terra Group
Daiichi Jitsugyo Co Ltd
Dobson & Co Pty Ltd
Dresser Minerals Group
Drexel Oilfield Services
Fuller & Kennard Associates Ltd
Grant Oil Tool Co
Mid-Continent Supply Eastern Hemisphere Co
Oiltools Intl Group

DESALTERS Mud

Daiichi Jitsugyo Co Ltd
Dresser Minerals Group
Drexel Oilfield Services
Galaxie Specialities Pte Ltd
Imco Services
Mid-Continent Supply Eastern Hemisphere Co

Milchen Intl Ltd
Oiltools Intl Group

DESULFURATION EQUIPMENT Oil or Gas

Avery-Laurence Group
BS & B
C-E Natco Intl Ltd

DIAMOND BIT RESETTING SERVICE

Acker Drill Co
Atlas Copco AB
Joy International S A
Koken Boring Machine Co
Longyear Co
Machinexport V/O
Mindrill Ltd
Sprague & Henwood Intl Corp
Van Moppes & Sons, L M, Diamond Tools Ltd
Wesdril Equipment

DIAMOND DRILL EQUIPMENT

See Also Bits, Drills, Rock Exploration

Acker Drill Co
Atlas Copco AB
Bakerdrill
Christensen Diamond Products
Davey-Housselle, Drill Rig Div
Dresser Industries Inc
English Drilling Equipment Co Ltd
Euro-Drill Equipment (UK) Ltd
Fox Manufacturing Co., Div Placer Exploration Ltd
Jeffrey Mining Machine Co, Div Dresser Industries Inc
Joy International S A
Joy Mig Co
Koken Boring Machine Co
Longyear Co
Machinexport V/O
Mindrill Ltd
Moss (Pty) Ltd, George
Smith International Inc
Sprague & Henwood Intl Corp
Van Moppes & Sons, L M, Diamond Tools Ltd
Wesdril Equipment
Wirth & Co KG, Alfred

DIAMOND DRILLING

See Exploration Services

DIAMOND SAW BLADES

Christensen Diamond Products
Dresser Industries Inc
Federal Mogul Corp., International Distribution Div
Longyear Co
Mindrill Ltd
Van Moppes & Sons, L M, Diamond Tools Ltd

DIAMONDS, INDUSTRIAL DIPPERS

See Buckets

Du Pont de Nemours & Co. Inc., E.
Longyear Co
Van Moppes & Sons, L M, Diamond Tools Ltd

DIRECTIONAL DRILLING EQUIPMENT

(See Collars Drill, Non Magnetic or Survey Instruments, Directional or Tools, Oilfield, Drilling, Directional)

DESTILLERS (see Desalination Equipment)

DIVING EQUIPMENT

Borneo Co Pte Ltd
Hanseatic Group
Malaysian Oxygen Bhd
Meriton Shipping Agency Pte Ltd
Singapore Oxygen Air Liquide Pte Ltd
Techno Transfer Pte Ltd

DOORS, MINE

American Mine Door
Card Corp
Westinghouse Brake & Signal Co. Ltd, Signal & Mining Div

DRAWWORKS

Continental Emaco Co
Daiichi Jitsugyo Co Ltd
Gardner-Donver Co
John Yu & Co
Mid Continent Supply Eastern Hemisphere Co
National Supply Co
Satterthwaite & Co Ltd
Telec Electronics & Machinery Ltd
USS Oilwell Supply Co Intl Inc

DREDGES AND DREDGE BUCKETS ALLUVIAL

See Also Monitors

1 Clamshell 2 Connected Bucketline
3 Cutterhead (Hydraulic) 4 Dragline
Dredge 5 Suction

Alluvial Dredges Ltd 1,2,3,4,5
Blaw Knox Equipment, Inc 1
Buckau-Wolf Maschinenfabrik AG
Bucyrus-Erie Co 1,4
ESCO Corp 1,3
Gould & Co., Gordon 1
Ishikawajima Harima Heavy Industries 1,2,3,4,5
Kennametal Inc 3
Kobe Steel Ltd 1
Mineral Deposits Ltd 3
Mitsubishi Steel Mfg. Co., Ltd. 3
Mohr & Federhaff AG 1
National Car Rental System, Inc., Mud Cat Div 3
O & K Orenstein & Koppel AG 2,3,5
Simon-Warman Ltd 3,5
Warman Equipment (International) Ltd 3,5
Weserhutte AG, Eisenwerk 1,4

DRILLING EQUIPMENT Geological/Geophysical/

Atlas Copco Group Soil
Christensen Diamond Products Pte Ltd
Gardner-Donver Co
Geosupply
Greaves Cotton & Co Ltd
Ingersoll-Rand Group
Larsen & Toubro Ltd
Mission Mfg Co
Morris Corp
Seismic Supply
SMF Intl
Technotrade Intl Pte Ltd
Varel Mfg Co

DRILLS (see Bits)

DRILLS, ALLUVIAL

1 Churn 2 Overburden 3
Prospecting 4 Reverse Circulation

Acker Drill Co 2,3,4
Atlas Copco AB 2,3
Becker Drills, Inc 2,4
Bonier Bros & Co. Ltd. 3
Bucyrus-Erie Co 2
Chicago Pneumatic Tool Co., Drill Div 2,3
Drill Systems, Inc. 2,4
English Drilling Equipment Co. Ltd 3
Fox Manufacturing Co., Div Placer Exploration Ltd 3,4
Gardner-Donver International, International Div 2
Hydraulic Drilling Equipment, Ltd 2,3,4
Ingersoll-Rand Co 1,2,3
Koken Boring Machine Co 2,3,4
Machinexport V O 3,4
Mobile Drilling 2,3
Moss (Pty) Ltd., George 2,3,4
Portadrill 2,3,4
Smith International, Inc. 1
Wirth & Co. KG, Alfred 1,2,3,4
Zen Drilling Co 4

DRILLS, EXPLORATION

1 Churn 2 Coal Sampling 3 Diamond
4 Drill Collars 5 Reverse Circulation
6 Reverse Circulation Drill Pipe 7
Truck Mounted Rotary

Acker Drill Co 2,3,4,5,6,7
Atlas Copco AB 3
Becker Drills, Inc 5
Boart (UK) Ltd 3
British Jeffrey Diamond 2
Bucyrus-Erie Co 7
Chicago Pneumatic Tool Co., Drill Div 7
Christensen Diamond Products 3
Dresser Industries Inc 3,7
Drico Industrial Div Smith International Inc 4,6
Drill Systems, Inc 2,5,6,7
Driltech, Inc 7
English Drilling Equipment Co Ltd 3
Euro-Drill Equipment (UK) Ltd 4,6
Fox Manufacturing Co., Div Placer Exploration Ltd 2,3,5,7
Gardner-Donver International, International Div 7
Geotac 2,3,7

Heath & Sherwood Co. 3
 Hitachi Construction Machine Co. Ltd. 5
 Hosfield Manufacturing Co. 1,2
 Hydraulic Drilling Equipment, Ltd. 2,3,4,5
 Ingersoll-Rand Co. 7
 Jeffrey Mining Machine Co., Div. Dresser Industries Inc. 3,7
 Joy Mfg. Co. 3
 Koehring Co. 7
 Koken Boring Machine Co. 2,3,4,5,6,7
 Krupp GmbH Fried. Krupp Industrie-Und Stahlbau 7
 Longyear Co. 3
 Mindril Ltd. 3,4
 Mobile Drilling 2,3,7
 Moss (Pty.) Ltd. George 2,3,4,5,6,7
 Portadrill 5,7
 Schramm Inc. 7
 Smith International, Inc. 1,2,3,5
 Soeding & Haibach, J. C. 1,2,3,5
 UNM Ltd. 5
 Underground Mining Machinery, Ltd. 5
 Wesdri Equipment 3
 Wirth & Co. KG Alfred 1,2,3,4,5

DRILLS, MINING

1 Air Leg 2 Burn Cut 3 Coal 4
 Crawler Mounted 5 Down-The-Hole
 6 Drifters 7 Drill Pipe, Rotary 8
 Gasoline Drills and Hammers 9
 Hydraulic 10 Jet Piercing 11 Long
 Hole 12 Methane Exploration and
 Drainage 13 Rotary, Blast Hole 14

Rotary Percussion 15 Sinkers 16
 Stabilizer, Drill Steel 17 Stoppers 18
 Truck Mounted 19 Vacuum 20
 Wagon

Acker Drill Co. 5,9,12,14,18
 Atlas Copco AB 1,4,5,6,8,9,11,13,
 14,15,17,18,20
 Barlows Heavy Engineering Ltd. 5
 Bort (UK) Ltd. 1,6,9,11,17
 Bonier Bros. & Co. Ltd. 1,4,5,6,7,
 10,11,12,14,16
 British Jeffrey Diamond 12
 Bucyrus-Erie Co. 4,7,13,18
 Chicago Pneumatic Tool Co., Drill
 Div. 3,4,13,14,18
 Christensen Diamond Products 5,9,
 12
 Clark Equipment Co., Construction
 Machinery Div. 1,7,19
 Compar Construction & Mining
 Ltd. 1,2,3,4,5,6,9,13,14,15,17,
 18,20
 Consolidated Pneumatic Tool Co.,
 Ltd. 5,14,20
 Feinmann Haniel GmbH 4,15
 Demag AG ABT
 Bergwerksmaschinen 4,18
 Demag Drucklufttechnik GmbH 1,4,
 5,9,20
 Demag Varrichter &
 Drucklufttechnik GmbH 4,15,16
 Dresser Industries Inc. 1,4,5,6,14,
 15,17
 Dresser Industries Inc., Marion
 Power Shovel Div. 13
 Dresser Industries Inc., Mining
 Services & Equip. Div. 13,14

Drlico Industrial, Div. Smith
 International Inc. 13,16
 Drill Systems Inc. 7,9,18
 Drilmark Ltd. 4,5,6,7,13
 Driltech, Inc. 4,5,7,13,18
 E.M.C.O. (Great Britain) Ltd. 2,3,4,9,
 13,14
 English Drilling Equipment Co. Ltd.
 12,18
 Euro Drill Equipment (UK) Ltd. 5,7
 Flottmann-Werke GmbH 1,14
 Fox Manufacturing Co., Div. Placer
 Exploration Ltd. 3,4,5,7,12,13,14
 Furukawa Rock Drill Sales Co. Ltd.
 1,2,3,4,6,9,11,13,14,15,16,17,
 18,20
 Gardner-Denver International,
 International Div. 1,2,4,6,9,11,
 13,14,15,17,18
 Hailfax Tool Co. Ltd. 5,6,14,18,20
 Hosfield Manufacturing Co. 14
 Hydraulic Drilling Equipment Ltd.
 3,4,5,10,11,12,15
 Ingersoll-Rand Co. 1,2,3,4,5,6,7,
 11,14,15,17,18,20
 Jeffrey Mining Machine Co., Div.
 Dresser Industries Inc. 1,13,14,
 17
 Jones & Laughlin Steel Corp. 13
 Joy International S. A. 1,2,4,5,6,
 10,11,12,13,14,16
 Joy Mfg. Co. 1,3,4,6,7,9,13,14,15,
 17,18
 Koken Boring Machine Co. 7,13,14
 Krupp GmbH Fried. Krupp
 Industrie-Und Stahlbau 9,18
 Linden-Aimark AB 9
 Long-Airdux Co., Div. Marmon
 Group Inc. 3,4,9,11
 Machinexport V.O. 1,2,3,4,5,6,9,
 10,11,13,14,16,20
 Mindril Ltd. 9,13,18
 Mining Development (UK) Ltd.
 (Mindev) 4,9,14,20
 Mitsubishi Steel Mfg. Co., Ltd. 3,4
 Mitsui Shipbuilding & Eng. Co., Ltd.
 4
 Mobile Drilling 5,7,9,18,20
 Montabert 1,2,3,4,6,9,11,13,14,
 17,18
 Moss (Pty.) Ltd., George 7,8,9,13,
 14,13,19
 Portadrill 4,5,7,13,14,18
 Reed Tool Co., Drilling Equipment
 Div. 7,13,14,18
 Robbins Co., The 13
 Ruston Bucyrus, Ltd. 13,14
 Saizgitter Maschinen AG 3,4,9,13,
 14
 Schramm, Inc. 4,5,6,13,14,18
 Secoma 2,3,4,6,9,11,13,14,18,
 19,20
 SIG Schweizerische Industrie-
 Gesellschaft Construction &
 Mining Mach. 1,6,9,11,14,15,17
 Smith International, Inc. 4,14
 Smith Tool Co., Div. Smith
 International Inc. 13
 Spencer & Sons Ltd., Matthias 12,
 13,14
 TRW Mission Mfg. Co. 5,13,14
 Oy Tampella AB, Tamrock Div. 4,6,
 9,11,18,20
 Torque Tension Ltd. 3,4,6,9,13,14,
 18,20
 Toyoko Kogyo Co. Ltd. 1,4,6,15,17,
 20

Vereinigte Edelstahlwerke AG 1,4,
 5,6,9,13,17,20
 Victor Products (Wallsend) Ltd. 3,9,
 11,12,13,14
 Wallacetown Eng. Co. Ltd. 3
 Wesdri Equipment 7,9,11
 Wirth & Co. KG Alfred 3,4,7
 Worthington Compressors, Inc. 4,6,
 14,15
 Zeni Drilling Co. 5

DRILLS, ROCK BIG HOLE

1 Raise Rotary 2 Reamers 3 Shaft
 Sinking Rotary 4 Shot 5 Stabilizers

Barlows Heavy Engineering Ltd. 2
 Calweid, Div. Smith International
 Inc. 1,3,5
 Dresser Industries Inc. 1,2
 Drlico Industrial, Div. Smith
 International Inc. 2,5
 Drilmark Ltd. 4
 Driltech, Inc. 4
 Euro-Drill Equipment (UK) Ltd. 2,5
 Fox Manufacturing Co., Div. Placer
 Exploration Ltd. 3
 Hanson Co., R. A., Mining Div. 3
 Ingersoll-Rand Co. 1,2,3,4
 Jones & Laughlin Steel Corp. 1,2,3,
 4,5
 Joy International S. A. 2,3
 Kennametal Inc. 1
 Koken Boring Machine Co. 1,2,3,5
 Robbins Co., The 1,2,3
 Smith International, Inc. 2,3,4
 Wirth & Co. KG Alfred 1,2,3,5
 Zeni Drilling Co. 2,3,5

DRIVES

See Also Shaft Mounted Drives, Speed
 Changers, Drives, Gears

1 Chain 2 Flatbelt 3 Fluid 4
 Hydraulic 5 Hydrostatic 6 Variable
 Speed 7 V-Belt

ABEX Corp. 3,4,5,6
 ASFA, Inc., Mining & Industrial
 Transport 6
 Bando Chemical Industries, Ltd.,
 International Div. 7
 Becker-Pruefte GmbH 1
 Brown Boveri & Cie AG, Industrial
 Plants Div. 6
 Continental Gumm. Werke AG 7
 Dresser Industries Inc. 1,6
 Dresser Industries Inc., Industrial
 Equipment Div. 1
 Dresser Industries Inc., Power
 Transmission Div. 1,6
 Eaton Corp. 3,4,5,6,7
 Fenner & Co. Ltd., J. H. 1,2,6,7
 Fluidrive Engineering Co., Ltd. 3,4,
 6
 FMC Corp., Drive Div. 3,6
 Gates de Brasil SA 2,6,7
 Gates Rubber International 7
 GEC Mechanical Handling Ltd. 4
 Kawasaki Heavy Industries, Ltd.,
 Machine Sales Div. 4
 Litton Industrial Products, Inc.,
 Louis Allen Div. 1,6,7
 Moss (Pty.) Ltd., George 6
 Peerless Pump 6
 Philadelphia Gear Corp. 6

Praginvest 6
 Reliance Electric Co., Dodge Div. 1,
 7
 Rexnord Inc. 1,2,7
 Secmafer S. A., Service Publicitaire
 5
 Stephanoise DE Constr.
 Mecaniques, Soc. 5
 Twin Disc, Inc. 3,4,6
 Uniroyal Inc. 2,4,6,7
 Warman Equipment (International)
 Ltd. 6
 Wesernuite AG, Eisenwerk 1,2,4,7

DRUMS Steel

Van Leer Containers

DRYERS AND KILNS

See Also Sintering Machines, Coolers

1 Flash 2 Fluid Bed 3 Rotary 4
 Screw 5 Shaft 6 Spray

Ahstrom Oy, A., Varkaus
 Engineering Works 1,2,3
 Allis-Chalmers, Cement & Mining
 Systems Div. 3,5
 Alstom, Div. Neyrtec 3
 APV Mitchell (Dryers), Ltd. 1,2,3,6
 Aveling-Barford Ltd. 3
 Barlows Heavy Engineering Ltd. 3
 Bateman Ltd., Edward L. 1,2,3,4,5
 Berry Co. 2
 Betton Inc. 3
 Combustion Engineering, Inc. 1,2,3
 Del Monago S.P.A. 2,3
 Dorr-Glover Inc. 2
 Esch-Werke AG 3
 Fives-Cail Babcock 3
 Fuller Co. 1,2,3
 Furukawa Mining Co. Ltd.,
 Machinery Sales Div. 1,3
 GEC Mechanical Handling Ltd. 1,3
 Gould & Co., Gordon 1,3
 Gutehoffnungsnutte Sterkrade AG
 3
 HAZEMAG Dr. E. Andreas GmbH &
 Co. 1,5
 Head Wrightson & Co., Ltd. 3,6
 Heyl & Patterson, Inc. 2
 Ishikawajima-Harima Heavy
 Industries 1,2,3
 Joy Manufacturing Co., Denver
 Equipment Div. 4
 Kawasaki Heavy Industries Ltd.,
 Construction Machinery Div. 1,3,
 4
 Kawasaki Heavy Industries, Ltd.,
 Machine Sales Div. 3
 Kennedy Van Buren Corp., Sub.
 McNally Pittsburg Mfg. Co. 3
 KHD Industriemag. AG, Humboldt
 WEDAG 1,2,3,4,5,6
 Kobe Steel Ltd.
 Koppers Co., Inc., Hardinge Oper. 3
 Krupp GmbH Fried. Krupp
 Industrie-Und Stahlbau 3,5
 Kurimoto Iron Works Ltd. 1,2,3,6
 Kvaerner Brug A/S 3
 Laro Oy 3
 Locker Industries Ltd. 2
 McNally Bharat Engineering Co.
 Ltd. 3
 Mine & Smelter Co., Sub. Barber-
 Greene Co. 3
 Mitsubishi Metal Corp. 3,4
 Newell Dunford Eng. Ltd. 3
 Nipex 3,4

Niro Atomizer, Inc. 1,2,6
 Niro Atomizer Ltd. 1,2,6
 O & K Orenstein & Koppel AG,
 Werk Ennigerloh 3,5,6
 Polysius Werke 2,3
 Rauma Repola Oy, Pori Div. 3
 Rexnord Inc. 2
 Stansteel Corp., Sub. Allis-Chalmers
 Corp. 3
 Stearns-Roger, Inc. 3
 U.S. Steel Corp. 3
 Vector Heavy Engineering Ltd. 3
 Vickers Australia Ltd., Ruwot Div. 3
 VOEST-Alpine 4
 Winchester-Western

DUMPERS, MINE CAR

Allens of Tipton Ltd.
 Atlas Copco AB
 Armund-Fordererbau GmbH
 Autoexport
 Barlows Heavy Engineering Ltd.
 CFBK
 Card Corp.
 Conneville Corp.
 Fain Werke Nurnberg
 Fives-Cail Babcock
 Gutehoffnungsnutte Sterkrade AG
 Haglund & Soner AB, Trucks &
 Mining Machinery Div.
 Heyl & Patterson, Inc.
 Hitachi, Ltd.
 Hudson (Raletrux) Ltd., Robert
 Huxwood Irwin Co.
 Kockum Industri AB
 Macminexport V.O.
 McNally Pittsburg Mfg. Corp.
 Moss (Pty.) Ltd., George
 Normet S. A.
 Phram International Sp. A.
 Secmafer S. A., Service Publicitaire
 SIEMAG Transplan GmbH
 Volvo BM AB

DUST COLLECTION EQUIPMENT

1 Bags and Tubes

AAF Ltd. 1
 AEC, Inc. (Alpine Equipment Corp.)
 1
 American Air Filter Co., Inc. 1
 American Precision Industries,
 Dustex Div. 1
 Bateman Ltd., Edward L. 1
 Bernis Co., Inc. 1
 Carborundum Co., The 1
 DCE Vokes Inc., Sub. DCE Vokes
 Group Ltd. 1
 Donaldson Co., Inc. 1
 Drilmark Ltd. 1
 Dust Suppression Ltd. 1
 Fuller Co. 1
 Joy International S. A.
 Joy Mfg. Co., Western Precipitation
 Div. 1
 Kawasaki Heavy Industries Ltd.,
 Construction Machinery Div.
 KHD Industriemag. AG, Humboldt
 WEDAG 1
 Kobe Steel Ltd.
 Krupp GmbH Fried. Krupp
 Industrie-Und Stahlbau 1
 Kurimoto Iron Works, Ltd. 1
 Lurg, Gesellschaften
 Newell Dunford Eng. Ltd. 1

P & S Filtration Ltd. Div Scapa
Group Ltd 1
Peabody International Corp 1
Standard Filterbau Dr E Andreas
GmbH & Co 1
Stanssteel Corp. Sub Allys-Chalmers
Corp 1
Trenborgs Gummitfabriks AB 1
Vöest Alpine
Wheelabrator Frye, Inc. Air
Pollution Control Div 1

DUST SAMPLING EQUIPMENT

Avergesellschaft, Sub MSA Europe
Corporandum Co., The
Donaldson Co. Inc
Drägerwerk AG
Dr. mark Ltd
Johnson Progress Ltd
Joy International S. A
Joy Mfg Co. Western Precipitation
Co.
Krupp GmbH Fried Krupp
Industrie und Stahlbau
Mine Safety Appliances Co
Philips Gloeilampen Fabrieken, N.V.
Science & Industry Div
Standard Filterbau, Dr E Andreas
GmbH & Co

DUST SUPPRESSION EQUIPMENT

AEG, Inc. (Alpine Equipment Corp)
American Air Filter Co., Inc
Atlas Copco AB
Avergesellschaft, Sub MSA Europe
Bateman Ltd, Edward L
Corporandum Co., The
Communication & Control Eng. Co.
Ltd
Donaldson Co. Inc
Dosco Overseas Eng. Ltd
Drilmark Ltd
Dust Suppression Ltd
Hayden Niles Contlow Ltd
Heli Process equipment Corp.,
Fiberglass Equip Div Dart
Joy International S. A
Krupp GmbH Fried Krupp
Industrie und Stahlbau
Newell Control Eng., Ltd
Olin Energy Systems Ltd
Peabody International Corp
Rotneer & Mitchell Ltd
Svega AB
Standard Filterbau Dr E Andreas
GmbH & Co
Thyssen (Great Britain) Ltd
Vereinigte Osterreichische Alpine
Montan Eisen- & Stahlwerke
Victor Products (Waisend) Ltd
Warman Equipment (International)
Ltd

ELECTRICAL ACCESSORIES & SUPPLIES

Aboitiz Marketing
Allicance
Asea Group
Athins, Kroll & Co
BBC Brown Boveri Group
BICC
Borneo Co Pte Ltd
CEAG Group
Certact Pte Ltd
Crompton Greaves Ltd
Cycle & Carriage
Diesel Intl Pte Ltd
Drexel Oilfield Services
Engineering Equipment Inc
Galaxie Specialities Pte Ltd
General Electric Co
General Electric
Guthrie Engineering
Harrisons Lister Engrg Ltd
Harvey Hubbell SEA Pte Ltd
Holland Asia Trading Co Pte Ltd
ITT Far East & Pacific Inc
James Gauntt Pte Ltd
Letiaco IT
Lim Kim Hai Electric Co
Loxley
Malayan Cables Bhd
Mechanical & Comb Engrg Co
Panitran, NVPD
Quantum Electronics
Riychem Corp
Scott & English Ltd
Sin Soon Heat Pte Ltd
Singapore Technical Services Pte Ltd
Square D Company
Tanco Cutler-Hammer
Tasin Electric Co Pte Ltd
Thomas & Betts
Ua Whithya Equipment Co Ltd
United Engineers

ELECTRICAL EQUIPMENT

*See Also Environment Protection
Equipment And Reclamation Services
Equipment And Supplies, Hoisting
Equipment, Communications, Winches,
Cable And Conduit, Trains Equipment
Instruments, Air Control, Recorders*

1 Brushes, Motor & Generator 2
Cable Connectors 3 Cable Splicing
Material 4 Circuit Breakers 5 Diesel-
Electric Generating Plants 6
Explosion Proof Equipment 7
Generator Sets 8 Ground Fault 9
Light Plants 10 Miscellaneous
(Condensers, Resistors,
Potentiometers, Etc.) 11 Motors,
Flameproof 12 Motors, Generators
& Converters 13 Package
Substation 14 Shrinkage Cable
Splices 15 Switches, Enclosed 16
Switches, Explosion Proof 17
Switches, Open Knife 18 Switches,
Proximity 19 Switches and Starters
20 Transformers, Flameproof 21
Turbine Electric Generating Plants
22 Voltage Regulators

AEG Teletanken 1 4 7 11 12 16

AMF Incorporated 4

Adalet-Pim. Div. of Scott & Fetzer 14
Allis-Chalmers. Cement & Mining Systems Div. 5
Anderson Mavor Ltd. 2.4.6.11.15.16.19
ASEA. Inc. Mining & Industrial Transport 1.2.4.5.7.12.13.18.21
Bateman Ltd. Edward L. 5.7.13
BICC Ltd. 2.3.7.15.17.18.19
Bindicator Co. 18
British Jeffrey Diamond 1.4.6.11
Brown Boveri & Co. Ltd. 1.2.3.4.5.6.7.8.9.10.11.12.13.14.15.16.17.18.19.20.21
Brown Boveri & Cie AG. Industrial Plants Div. 4.5.6.7.8.11.12.13.15.16.19.20.21.22
Brown Boveri Corp. 11.12.21
Brush Transformers Ltd. 4.13.20
CEAG-Unionit AG. 6.21
Communication & Control Eng. Co. Ltd. 6
Compagnie Electro Mecanique. Sub Brown Boveri & Co. 1.2.3.4.5.6.7.8.9.10.11.12.13.14.15.16.17.18.19.20.21
Cummins Engine Co. Inc. 5.7
Davis & Son. Ltd. John 9.10.14
Dresser Industries Inc. Power Transmission Div. 6.11
Du Pont de Nemours & Co. Inc. [1.2
Elektim
Elektromag 17
FMC Corp. Mining Equipment Div. 11.12
Fenner & Co. Ltd. J. H. 12
Fives Cail Babcock 21
GEC Machines Ltd. 5.7.11.12
GTE Products Corp. 4.13.19.22
General Motors Overseas Operations. Electro-Motive Products 4
Greenpat Ltd. 11
Harnischleger Corp. 10.11.12
Heinrichs Geop Exploration Co. 9.22
Hitachi Ltd. 1.3.4.7.9.10.11.13.14.15.16
Huwood-Irwin Co. 2
Joy Mfg. Co. 2
Kawasaki Heavy Industries Ltd. Construction Machinery Div. 4.17
Kawasaki Heavy Industries Ltd. Machine Sales Div. 5.7.21
Klopper-Humboldt-Deutz AG. 5
Koehring Co. 7.9
Kohler Co. 5.8
Liton Industrial Products. Inc. Louis Allis Div. 11.12.22
M. A. N. 5.20
Marathon Manufacturing Co. 9
Martin-Decker Co. 18
Materials Control Inc. 6.15.16
McGraw Edison Power Systems Div. 4.13.17.22
Mirreets Blackstone. Ltd. 7
Mitsui Mike Machinery Co. Ltd. Montan Forschung 16
Moss (Pty.) Ltd. George 1.2.5.6.7.9.11.12.13.19
Motoren Werke Mannheim AG. 5
National Mine Service Co. 4.6.8.9
Ohio Magnetics. 7.12
Onan Corp. 9
Over-Lowe Co. 7.9
Phelps Dodge International Corp. 2

Philips Gloehampen Fabrieken. N.V. Science & Industry Div. 6
Pragoinvest 5.9
Round & Son Inc. David 11.12
Shinko Electric Co. Ltd. 1.2.4.5.6.7.10.11.12.13.15.16.17.19.20.21.22
Siemens AG. 1.2.3.4.5.6.7.8.9.10.11.12.13.14.15.16.17.18
SILEC. Signalisation Industrielle Div. 17
Square D Co. 2.3.4.6.8.13.15.16.18.19
Texas Nuclear Corp. Div. Ramsey Engineering Co. 6.15.16
Transtronic AB. 1.8
Union Carbide Corp. 1
Victor Products (Wallisend) Ltd. 2
Wallacetown Eng. Co. Ltd. 4.6.13.15.16.19.20
Warman Equipment (International) Ltd. 5.7.22
Westinghouse Brake & Signal Co. Ltd. Signal & Mining Div. 15.16.18
Westinghouse Electric Corp. 1.4.10.16.18.19.22

ELECTRICAL EQUIPMENT Switchboards
Asca Group
Atkins, Kroll & Co
Automarine
BBC Brown Boveri Group
Contact Pte Ltd
Galaxie Specialities Pte Ltd
General Electric Co
General Electric
Guthrie Engineering
Imperial Electric Co
Singapore Technical Services Pte Ltd
Tanco Cutler-Hammer
Taslin Electric Co Pte Ltd
United Engineers
Vesper Pte Ltd
Watt & Akkermans Pte Ltd

ELECTRICAL EQUIPMENT Switchgear & Controls
Abcrite Marketing
Alliance
Asca Group
Atkins, Kroll & Co
BBC Brown Boveri Group
Contact Pte Ltd
Crompton Groves Ltd
Galaxie Specialities Pte Ltd
General Electric Co
General Electric
Guthrie Engineering
Harrisons Lister Engrg Ltd
Imperial Electric Co Ltd
ITT Far East & Pacific
Larsen & Toubro Ltd
Lim Kim Hai Electric Co Pte Ltd
Loxley
Malayan Cables Bhd
Mid-Continent Supply Eastern Hemisphere Co
Singapore Technical Services
Tanco Cutler-Hammer
Taslin Electric Co Pte Ltd

ELECTRICAL EQUIPMENT Switchgear & Controls (continued)
United Engineers
Vesper Pte Ltd
Watt & Akkermans Pte Ltd

ELECTRICAL EQUIPMENT Transformers
Asca Group
BBC Brown Boveri Group
Contact Pte Ltd
Crompton Groves Ltd
Galaxie Specialities Pte Ltd
General Electric Co
General Electric
Guthrie Engineering
Harrisons Lister Engrg Ltd
Imperial Electric Co Ltd
Industrial Inspection
ITT Far East & Pacific Inc
Loxley
United Engineers
Watt & Akkermans Pte Ltd

EVAPORATORS
Balfour Oil Tool Co
Greaves Cotton & Co Ltd
Mid-Continent Supply Eastern Hemisphere Co
Sai Company Ltd
Tri-State Oil SA

ELEVATORS, MINE & MILL
Abtury
Aumund Fordererbau GmbH
Connellisne Corp
Linden-Amax AB
McNally Bharat Engineering Co Ltd
Newell Dunford Eng. Ltd
Rehabitation Equipments Industries
Reinard Inc

ENGINES Diesel
ARTS & Associates Pvt Ltd
Abcrite Marketing
Aver Group
Atkins, Kroll & Co Inc
Bahn, Mayer & Co
Bofors-Nichab
Capricorn
Caterpillar Far East Ltd
Copper Energy Services Intl Inc
Cummins South Asia Ltd
Dana Engineers Intl
Detroit Diesel Allison Intl
Deutz Far East
Deutz-Bangladesh Ltd
East Asiatic Co
Electro Motive Div
Engyak Pte Ltd
European Technical Services
General Electric Co
Harpill-Weir Engrg Services Pte Ltd
Harrisons Lister Engrg Ltd
Hedemora Diesel SEA
Industrial Inspection Intl Inc
Pertayana Utama Teknik PT
Komatsu Singapore Pte Ltd
N.A.H.GHE
Manila Machinery & Supply Co Inc.
Mata & Co Inc hp
Metro Machinery Co Ltd
Mirreets Blackstone
MU Friedrickshafen
MWM Diesel Far East Pte Ltd
Oiltrolls Intl Group
Palmerston, Simons & Co

Perkins Engines Eastern
 Schottel Far East
 Singapore Equipment Services Pte Ltd
 Stork-Werkspoor Diesel BV
 Sulzer East Asia Central Office
 Sulzer Diesel Service Station
 Sulzer Representative Offices
 Sulzer Australia Pty Ltd
 Tesinc
 Thaltrac Co Ltd
 Tractors Malaysia Bhd
 Tractors Singapore Ltd
 United Engineers
 United Motor Works
 Vosper Pte Ltd
 Watt & McKernan Pte Ltd
 Waukesha Engine Div
 Whyte & Co

ENGINES Dual/Multi-Fuel
 Aertus & Associates Pvt Ltd
 Cooper Energy Services Intl Inc
 Kohler Co
 Oiltools Intl Group
 Tesinc

ENGINES Gas, Natural
 Aertus & Associates Pvt Ltd
 BBC Brown Boveri Group
 Caterpillar Far East Ltd
 Cooper Energy Services Intl Inc
 Dana Engineers Intl
 Dobson & Co Pty Ltd
 Manila Machinery & Supply Co Inc
 Mid-Continent Supply Eastern
 Hemisphere Co

Nuovo Pignone Spa
 Oiltools Intl Group
 Tesinc
 Tractors Malaysia Bhd
 Tractors Singapore Ltd
 Waukesha Engine Div

ENGINES Gasoline
 Dana Engineers Intl
 Kohler Co
 Newton Engrg & Mfg
 United Motor Works
 Waukesha Engine Div

ENGINES Kerosene
 Newton Engrg & Mfg

ENGINES

See 4 - Electrical Equipment

**1 Diesel 2 Diesel, Flameproof 3 Gas
 4 Gasoline 5 Marine Diesel 6 Steam
 7 Turbine, Gas**

Ails Chalmers Cement & Mining
 Systems Div 1
 Balemar Ltd Edward L 1
 Brown Boveri & Co Ltd 3,6,7
 Brown Boveri & Cie AG Industrial
 Plants Div 7
 Caterpillar Tractor Co 1,5
 Chrysler International 1,2,3,4
 Compagnie Electro Mecanique Sub
 Brown Boveri & Co 3,6,7
 Cummins Engine Co, Inc 1,5
 Deere & Co 1,3
 Dresser Industries Inc 1,3,4,5
 Emau Corp of New Mexico 1,2
 Fox Manufacturing Co Div Piacer
 Exploration Ltd 2
 General Motors Detroit Diesel
 Division

General Motors Overseas
 Operations Electro-Motive
 Products 1
 Ingersoll-Rand Co 3
 International Harvester Co 1,3,7
 Ishikawajima-Harima Heavy
 Industries 1,2,5,7
 Kawasaki Heavy Industries Ltd
 Construction Machinery Div 1,4,
 5,6,7
 Kawasaki Heavy Industries Ltd,
 Machine Sales Div 1,4,5,6,7
 Klockner-Humboldt-Deutz AG 1,5,7
 Kohler Co 4
 Komatsu Ltd 1
 Mack Trucks Inc, International Div
 1
 MAN 1,5,6
 Mecanorex Import, Foreign Trade
 Co 1
 Mirrees Blackstone Ltd 1,5
 Mitsubishi Heavy Industries Ltd 3
 Motoren Werke Mannheim AG 1,2,
 3,5
 Osborn (South Africa) Ltd, Samuel
 1,5
 Pragonvest 1,5
 Rolls-Royce Motors Ltd, Diesel
 Engine Div 1,5
 Saab Scania AB, Scandia Div 1,5
 Shinko Electric Co, Ltd 1,2,3,6,7
 Siemens AG 7
 Stewart & Stevenson Services 1,2,
 3,4,5,6,7
 Waukesha Engine Co 1,3,4,5

ENGINE EXHAUST CLEANERS AND CONDITIONERS

Donaldson Co, Inc
 Fox Manufacturing Co, Div Piacer
 Exploration Ltd
 Mining Transportation Co AB
 Kiruna Truck Div
 National Mine Service Co
 Olin Energy Systems Ltd
 UNIMAT AB

ENGINE MONITOR ALARMS

L & M Radiator Inc

ENVIRONMENT PROTECTION EQUIPMENT

See Also Environmental Quality And
Monitoring Services, And Reclamation
Services

**1 Drip Irrigation Systems 2
 Hydraulic Seeders 3 Mulchers and
 Blowers 4 Mulch Binders and
 Tackifiers 5 Seeds and Shrubs for
 Revegetation**

AAF Ltd
 Du Pont de Nemours & Co, Inc, E
 Division
 Furukawa Mining Co, Ltd
 Machinery Sales Div
 Hanson Co, W. A., Mining Div 5
 Ishikawajima Harima Heavy
 Industries 2,3
 Krupp GmbH Fried Krupp
 Industrie und Stahlbau
 Mining Safety Appliances Co, Ltd,
 ABB, NSA Europe

National Mine Service Co
 Pecoff Bros Nursery & Seed Inc 5
 Reinco, Inc 2,3,4
 Saia International
 Superior Fiber Products Co 4
 Warman Equipment (international)
 LTD

ENVIRONMENTAL QUALITY AND MEASURING SERVICES

See Also Environmental Protection Equipment And Reclamation Services

1 Air Quality 2 Biological and Wildlife Baseline Studies 3 Dewatering 4 in-Place Leaching 5 Tailing Dam Design

Abit Engenharia SA Paulo 3,4,5
 Allis Chalmers Cement & Mining Systems Div 3
 Aisthom, Div Neyrtec 3
 American Air Filter Co., Inc 1

Beckman Instruments, Inc 1
 Bird Machine Co, Inc 3
 Du Pont de Nemours & Co, Inc., E. 1,1

EIMCO, Div Envirotech Corp 3
 Furukawa Mining Co, Ltd., Machinery Sales Div 1,2
 Geophysical Service Inc., Div of Texas Instruments Inc 1,2
 Golder & Associates Ltd., H. O. 5
 Heinrichs Geosurveying Co 4,5
 Hunting Surveys & Consultants, Ltd 1,2,3

Hunting Surveys & Consultants Inc 1,2,3

Ishikawajima-Harima Heavy Industries 1,2,5
 Jacobs Engineering Co 1,2,3,4,5
 Kaiser Engineers 1,2,3,4,5
 Larox Oy 3

Locker Industries Ltd 3
 McDowell-Weilman Engineering Co. 1

Mine Safety Appliances Co 1
 Mineral Deposits Ltd 2
 Mountain State Engineers 1,2,4,5
 Neyrtec, Aisthom-Atlantique 3
 Peabody International Corp 3

Philips Gloeilampen Fabrieken, N.V. Science & Industry Div 1,2

Raumia-Kepola Oy Pori Div 3
 Rheinbraun-Consulting GmbH 3

Roxon Oy 3
 Saia International 3

Settrust Engineering Ltd 1,3,4,5
 Soil Mechanics Ltd 3,5

Stearns-Roger, Inc 1,2,3,4,5
 Warman Equipment (international) Ltd 3

Wheelabrator-Frye Inc Air Pollution Control Div 1

ENVIRONMENTAL CONTROLS
 (See Oil Spill Prevention/Recovery or Sewage & Effluent Treatment Equipment)

EXCHANGERS (see Desalination Equipment)

EXCAVATORS

See Also Tractors And Attachments, Drills And Driller Buckets, Loaders, Monitors, Scrapers, Shovels, Shaft Sinking

1 Backhoes 2 Bin and Bunker 3 Bucket Chain 4 Bucket Wheel 5 Cableways, Slackline 6 Cableways, Tautline 7 Draglines, Diesel & Draglines, Electric 9 Draglines, Walking 10 Hydraulic 11 Scrapers, Crawler Drawn 12 Scrapers, Elevating 13 Scrapers, Self-Propelled

Allis Chalmers Cement & Mining Systems Div 1
 American Mast & Derrick 1,2,3,4,5,6,7,8,9,10,11,12,13

Anderson Mavor Ltd 4
 Aumund Forerderbau GmbH 3
 Barber-Greene Overseas, Overseas Div 4

British Ropeway Engineering Co Ltd 5

Buckau-Wolf Maschinenfabrik AG 2,3,4

Bucyrus-Erie Co 1,4,7,8,9,10
 BUMAR 4,11

Case Co., J. I., International Div. 1,10

Caterpillar Tractor Co 1,10,12,13
 Clark Equipment Co., Construction Machinery Div 7,11,12,13

Clark Equipment Co., Lima Div 7
 Clark International Marketing S A 1,10,11

Deere & Co 1,10,11
 Demag AG ABT

Bergerwerksmaschinen 10
 Demag Baumaschinen 1,10

Demag Lauchhammer Masch & Stahlbau GmbH 4
 Demag verdichter &

Drucklufttechnik GmbH 9
 Dresser Industries Inc 3

Dresser Industries Inc, Marion Power Shovel Div 7,8,9

Fial-Allis Corp., Construction Machinery Inc 11,12

FMC Corp., Crane & Excavator Div 1,7,10

Furukawa Mining Co Ltd Machinery Sales Div 1,10

Geomim 5,7,10
 Hanson Co., R. A., Mining Div 4

Harnischfeger Corp 1
 Hitachi Construction Machine Co., Ltd 1,7,10

International Handling BV 4
 International Harvester Co 1,10,12,13

Ishikawajima-Harima Heavy Industries 1,2,4,10

Kawasaki Heavy Industries Ltd., Construction Machinery Div 3

Kawasaki Heavy Industries, Ltd., Machine Sales Div 4,12

Kobe Steel Ltd 1,6
 Koenig Co 7,10,11,12,13

Kone Corp 4
 Krupp GmbH, Fried. Krupp Industrie-Und Stahlbau 4

Leibherr Hydraulikbagger GmbH 1,10

Machinexport V O 1,3,7,8,9,10
 M A N 4

Mintec International, Div Barber-Greene Co 4

Northwest Engineering Co 1,7,10
 O & K Orenstein & Koppel AG 1,3,4,10

Page Engineering Company 9
 Pettibone Corp 1

Production Equipment Ltd 4
 Ransomes & Rapier Ltd 1,7,8,9

Raumia-Kepola Oy Lokomo Div 1,10

Realisation Equipments Industriels 4

Ruston Bucyrus Ltd 1,7,8,9,10
 Sauerman Bros Inc 5

Vector Heavy Engineering Ltd 8
 Voivo dM AB 1

Wesermotte AG, Eisenwerk 4,7,8,10

EXCHANGERS (see Heat Exchangers)

EXPLORATION EQUIPMENT

See Also Drills, Rock

1 Beryllium Detection Equipment 2 Electroligger 3 Electromagnetic 4 Geiger Counters 5 Geochemical Equipment 6 Geophysical Equipment 7 Geothermal 8 Gravity Meters 9 I.P. Equipment 10 Magnetic Recording Tape 11 Magnetometers 12 Magnetometers, Airborne 13 Magnetometers, Portable 14 Resistivity 15 Scintillometers 16 Seismographs 17 Seismographs, Underground 18 Self Potential

Atlas Copco ABEM AB 2,3,4,6,7,8,9,11,12,13,14,15,16

Dresser Industries Inc 6
 Du Pont de Nemours & Co, Inc., E. 1,10

Exploranium Corp of Canada, Div Geometric Services Ltd 2,4,5,6

Geometrics U 1,1,12,13,15,16,17

Geonics, Ltd 3,6,14
 Geophysical Service Inc, Div of Texas Instruments Inc 6,8

Heinrichs Geosurveying Co 2,3,6,7,9,14,18

HUNTEC ("70") Ltd 9,14,16
 Machinexport V O 2,3,6,8,9,11,12,14,15

McPhar Geophysics Ltd 2,3,6,9,10,11,12,13,14,15,18

Mobile Drilling 6
 Moss (Pty.) Ltd, George 5

Ohio Magnetics 3
 Philips Gloeilampen Fabrieken, N.V. Science & Industry Div 5,6

Praxia Seismos GmbH 6,9,11,12,15,18

Suntrex Ltd 3,5,6,7,8,9,11,12,13,14,15,18

EXPLORANTS & RELATED ACCESSORIES

Cathrie Engineering

ICI Explosives

FANS Industrial

Babcock & Wilcox
 Behn, Meyer & Co
 Combustion Engrg Inc
 Enes PT
 Harrison Lister Engrg Ltd
 Benes Trading Co Ltd
 Mats & Co Inc SP
 Mechanical & Comb Engrg Co
 United Engineers

FANS Marine
 Mats & Co Inc SP

FASTENERS AND SPLICERS, BELT

Automatic Pressings, Ltd.
 Clipper Belt Lacer Co
 Clouth Gummiwerke AG
 Den Norske Kjemfabrik A/S
 Fenner & Co Ltd, J H
 Flexible Steel Lacing Co
 BFGoodrich International
 Hayden Niles Conflow Ltd.
 Mitsubishi Belting Ltd
 Niles GmbH, Fordeband-
 Ausrüstung
 Shaw Axcel Ltd
 Wagener & Co

FEEDERS, ORE

**1 Apron 2 Belt 3 Chain 4 Constant
 Weight 5 Disc 6 Feeder Breaker 7
 Grizzly 8 Hopper, Mobile 9 Pan 10
 Reagent 11 Table 12 Vibrating**

Allis Chalmers, Cement & Mining
 Systems Div 7
 Asthorm (Sv. Neyrtec) 1
 Appareis Dragon 1,2,9
 Aumund-Fordebandbau GmbH 1,2,3,
 9,12
 Aveling Barford Ltd 1,7
 Bando Chemical Industries, Ltd.,
 International Div 2
 Barber-Greene Overseas, Overseas
 Div 1,2,7,12
 Bateman Ltd, Edward L. 1,2,3,6,7,
 8,12
 Boxmag-Rapid, Ltd 12
 Boyer SA 2
 Brown Lenox & Co, Ltd 1,3,7,12
 Chapman Ltd, Clarke, International
 Combustion Div 12
 Clarkson Co, The 10
 Columbia Steel Casting Co, Inc 7,9
 Continental Gummi-Werke AG 2
 Deister Machine Co, Inc 7,12
 Dowty Meco Ltd 2,8
 Dragon SA, Appareis 1,2,9
 Dresser Industries Inc 1,2,7,12
 Dresser Industries Inc, Industrial
 Equipment Div 1,2,3,7,9,11,12
 Dresser Industries Inc, Power
 Transmission Div 3
 Engineering Equipment Co, Div of
 Auto Weigh Inc 2,4
 Erez Magnetics Ltd 7,12
 Eschwege AG 1,2,3,6,8,10
 Fuchs Lini-Babcock 1,2,7,12
 Fiedorow Corp 2
 FMC Corp, Material Handling
 Equip Div 7,12
 FMC Corp, Mining Equipment Div
 For Material Handling Co, Div Placer
 & Exploration Ltd 1,2,3,6,7
 Furer 1,2,7,11,12

Furukawa Mining Co Ltd,
 Machinery Sales Div 1,2,3,7,9,12
 Galigner Co, The 2,10
 GEC Mechanical Handling Ltd 1,2,
 7,9,11,12
 Geomin 1,2,3,5,7,8,12
 Grantham Electrical Engineering
 Ltd 7,12
 Gruendler Crusher & Pulverizer Co
 1,2,7,9
 Hammermill, Inc, Sub Pettibone
 Corp 1,2,7,9,12
 HAZEMAG Dr E Andreas GmbH &
 Co 1,9,11
 Hazen Research International Inc 2
 Hewitt-Robins 7,9,12
 IBAG Internati. Baumaschinenfabrik
 AG 1,2,3,5,6,7,10,11
 International Handling BV 7,8,12
 Johnson-Progress Ltd 10
 KMD Industriemaschinen AG, Humboldt
 WEDAG 1,2,3,12
 Kawasaki Heavy Industries Ltd,
 Construction Machinery Div 1,2,
 3,5,6,8,9
 Kawasaki Heavy Industries, Ltd.,
 Machine Sales Div 1,7,11,12
 Kobe Steel Ltd 1,2,8
 Kone Corp 2,3,5,8,11,12
 Koppers Co, Inc, Hardinge Oper
 2,4,5,11
 Krupp GmbH, Fried, Krupp
 Industrie- und Stahnbau 1
 Locker Industries, Ltd 7,12
 Loesche AG 5
 Long Airdox Co, Div Marmon
 Group Inc 6
 Machinexport V O 1,2,3,5,11,12
 Magco Ltd 7,12
 Maschinenbau Louise GmbH 1,2,3,
 4
 McNally Bharat Engineering Co,
 Ltd 1,2,5,7,10,11
 McNally Pittsburg Mfg Corp 1,7
 Mining Supplies Ltd 3
 Mintec International, Div Barber-
 Greene Co 1,7,12
 Mitsubishi Belting, Ltd 2
 Morgardshammer AB 1,3,7,11,12
 Moss (Pty) Ltd, George 7
 National Iron Co, Div Pettibone
 Corp 1,9
 Neyrtec, Asthorm-Atlantique 1,2
 O & K Orenstein & Koppel AG,
 Werk Ennigerion 1,2,9
 Osborn (South Africa) Ltd, Samuel
 1,6,7,12
 PORTEC Inc, Pioneer Div 1,2,6,8,
 9,12
 Production Equipment Ltd 2,9
 Rauma-Repola Oy, Porri Div 2,5,8,9
 Realisation Equipments Industriels
 2,8
 Rexnord Inc 1,2,3,7,9,12
 Rexnord Inc, Process Machinery Div
 1,7
 Rexnord Inc, Vibrating Equipment
 Div 12
 Roxon Oy 2,7,8,11,12
 Saia International 2,10,11
 Saia Minco 9
 Saizgitter Maschinen AG 2
 Scow Metals Ltd 1,9
 Schenck AG, Carl 2,4,12
 Sheepbridge Equipment Ltd 1,7,12
 Shinko Electric Co, Ltd 7,12
 Simplicity Engineering Co 7,9,12
 Stephanoise DE Constr
 Mechaniques, Soc 1,3

Stephens-Adamson Mfg. Co. 1,2,9,
 12
 Svedala-Arbra AB 1,9,11,12
 Teismith, Div Barber-Greene Co. 1,
 2,7,12
 Vibranetics Inc 7,12
 Vickers Australia Ltd, Ruwolt Div
 1,5,6,8,11
 VOEST-Alpine 1
 Warman Equipment (International)
 Ltd 1,7,11
 Wennberg AB, C J 6,12
 Wesermühle AG, Eisenwerk
 1,2,7,8,12
 Westfalia Lünen 3

FILTER MEDIA

AAF Ltd
 AMF Incorporated
 American Air Filter Co., Inc.
 Caigon Corp
 Carborundum Co., The
 Cleveland Wire Cloth & Mfg. Co.,
 The
 EIMCO, Div Envirotech Corp
 BFGoodrich International
 Hen Lenman AG
 Hendrick Mfg Co
 Johnson-Progress Ltd
 Keene Corp
 Kriekenkampff Gebruder
 National Filter Media Corp
 P & S Filtration Ltd, Div Scapa
 Group Ltd
 Saulas & Co
 Standard Filterbau, Dr E Andreas
 GmbH & Co
 Thyssen (Great Britain) Ltd
 Tyler Inc, W S
 Wheelabrator-Frye, Inc, Air
 Pollution Control Div

FILTERS

**1 Air 2 Air, for Internal Combustion
 Engines 3 Belt 4 Concentrate 5
 Frame 6 Fuel 7 Gas 8 Oil 9 Press 10
 Water**

AAF Ltd 1,2
 AMF Incorporated 1,4,5,6,7,8,10
 Allen Group Inc, The 1
 Allis-Chalmers, Cement & Mining
 Systems Div 4
 Alutery 1,2,4
 American Air Filter Co., Inc 1,2
 Baldwin Mfg Co, J A 2,6,7,8
 Bateman Ltd, Edward L. 1,3,4,10
 Belton Inc 4
 Caigon Corp 10
 Carborundum Co., The 1,6,8
 Chapman Ltd, Clarke, International
 Combustion Div 4
 Continental Gummi-Werke AG 3
 Donaldson Co., Inc 1,2
 Dorr-Oliver Inc 3,4,10
 Dresser Industries Inc 2
 Edwards & Jones Ltd 9
 EIMCO, Div Envirotech Corp 4,5,9
 Federal-Mogul Corp, International
 Distribution Div 2
 Fliegler, Inc 1,2,3,4,5,6,7,8,9,
 10
 Gromin 4
 IBAG Internati. Baumaschinenfabrik
 AG 4

Ingersoll-Rand Co. 1
 Johnson-Progress Ltd 3.9
 Joy Manufacturing Co. 4
 Joy Manufacturing Co., Denver
 Equipment Div. 4
 Joy Manufacturing Co. (UK), Ltd.,
 Denver Equipment Div. 4
 KHD Industriemagazin AG, Humboldt
 WFDAG 1.3.10
 Kawasaki Heavy Industries Ltd.,
 Construction Machinery Div. 4
 Keene Corp. 1.4.6.8.10
 Krauss-Maffei AG 3.4.5.9
 Krupp GmbH, Fried. Krupp
 Industrie Und Stahlbau 1
 Larox Oy 4.9.10
 Mack Trucks Inc., International Div.
 1
 Mine Safety Appliances Co. 1.7
 Mitsubishi Metal Corp. 4
 Mitsubishi Steel Mfg. Co., Ltd. 4
 N. L. Rucker Products 1.8
 Neytec, Alstom-Atlantique 8.10
 Peabody International Corp. 1.10
 Permutite Co., Inc., The 10
 Rexnord Inc. 10
 Roxon Oy 4.10
 Sala International 3.4
 Sala Minco 4
 Stanadyne Inc., Hartford Div. 6
 Standard Filterbau, Dr. E. Andreas
 GmbH & Co. 1.2
 Technasexport, V/O 5.6
 Thune-Eureka AS 4
 Vickers Australia Ltd., Ruwolt Div. 4
 VOEST-Alpine 1
 Warman Equipment (International)
 Ltd. 9
 Wheelabrator-Frye, Inc., Air
 Pollution Control Div. 1

FILTERS Air or Gas, Industrial

AAF Intl SA/AAF Pte Ltd
 Bestobell Group
 Chemitreat
 Dynatech Group
 General Diesel Supplies
 Lietz-Zulueta Capital Inc
 Mechanical & Comb Engrg Co
 Mid-Continent Supply Eastern
 Hemisphere Co
 Scott & English Ltd
 Whyte & Co

FILTERS Oil/Liquid

Alliance
 Crompton Greaves Ltd
 Engineering Equip Inc
 Mechanical & Comb Engrg Co
 Mid-Continent Supply Eastern
 Hemisphere Co
 Panda Services Ltd
 Scott & English Ltd

FILTERS Water

(See Water Treatment Equipment)

FIRE BRICKS

See Also Refractories

Dresser Industries Inc
 Union Carbide Corp

FIRE FIGHTING/PROTECTION EQUIPMENT & SYSTEMS

Aker Group
 Angus Fire Armour Ltd
 Aqua-Terra Group
 Autocarline
 BBC Brown Boveri Group
 Bestobell Group
 Chittik & Co Inc
 Chubb Singapore Pte Ltd
 EB Communications
 Engineering Equip Inc
 Ericsson Telephone Corp
 Erindo Utama PT
 Galaxie Specialities Pte Ltd
 Guthrie Engineering
 Hart Engineering
 Haven Automation
 Honeywell-Simo Darby Pte Ltd
 Intermachine PT
 Malaysian Oxygen Bhd
 McAlister & Co Ltd
 Mid-Continent Supply Eastern
 Hemisphere Co
 Milco Sdn Bhd
 MSA SFAisa Pte Ltd
 Noa Group
 Sea Supply
 Singapore Oxygen Air Liquide Pte Ltd
 Taylor Stanley
 United Engineers
 United Ships Service
 Wormald Intl

FITTINGS Chain & Wire Rope

Anchor Engrg Co Pty Ltd
 Aqua Terra Group
 Berjaya Kawat Bhd
 Central Industrial Suppliers Pte Ltd
 Chong & Co YC
 Lam Hong
 Marine & Onshore Trading Co
 Purnell Engineering Pte Ltd
 Progress Trading Agencies
 Sea Supply

FITTINGS Hose, Industrial & Marine

Aelcorp Pvt Ltd
 Aeroquip Corp
 Amibach Marine Supplies
 Aqua Terra Group
 Atlas Steel & Engineering Co
 Central Industrial Suppliers Pte Ltd
 Connell Bros Co Ltd
 Degmak Engrg Corp
 Elite Industrial Corp
 Fluid Power Pte Ltd
 Fluid Systems Sdn Bhd
 GEORGE Kent Group
 Gilbarco Australia Ltd
 Gould Inc
 Guan Teck Hardware Pte Ltd
 Inter-Mega
 Ippito PT
 Jardine Marketing Services
 Mid-Continent Supply Eastern Hemisphere Co
 Pemco Sdn Bhd
 Singapore Valve & Fitting Pte Ltd
 Southern Engineering Pte Ltd
 Treloar & Sons Pty Ltd
 United Engineers
 United Machinery Co Ltd
 Wah Chang IntlWah Yang Sang Intl Trading
 Wallace Ltd DhCl

FITTINGS Pipe (also see Plugs or Unions)

Aqua Terra Group
 Aartus & Associates Pvt Ltd
 Aeroquip Corp
 American Intl Industries
 Asia Enterprises Pte Ltd
 Atlas Steel & Engrg Co
 Carl Bauer & Co
 Central Industrial Suppliers Pte Ltd
 Connel Bros Co Ltd
 Degmak Engineering Corp
 Elite Industrial Corp
 Federal Hardware Engrg Co
 George Kent Group
 Giltarco Australia Ltd
 GKN Intl
 Gould Inc
 Hup Seng Huat Co Pte Ltd
 Imperial Eastman Pty Ltd
 Inter-Mega
 Ippilo PT
 IIT Far East & Pacific
 Jardine Marketing Services
 Kheng Cheong Co
 Kian Hock Hydraulic & Trading
 Marine & Onshore Trading Co
 Mid-Continent Supply Eastern Hemisphere Co
 Mifco Sdn Bhd
 Parker Hannifin Singapore Pte Ltd
 Pemco Sdn Bhd
 Petromar Industries Pte Ltd
 Sea Supply
 Shiva Engrg Works
 Sin Soon Huat Pte Ltd
 Singapore Valve & Fitting Pte Ltd
 Swift Industrial Supply Pte Ltd
 Treloar & Sons Pty Ltd
 United Machinery Co Ltd
 Van Leeuwen Pipe & Tube
 Wallace Ltd, DMCI

FITTINGS Tube

Aqua Terra Group
 Degmak Engrg Corp
 Fluid Power Pte Ltd
 Fluid Systems Sdn Bhd
 Gould Inc
 Haven Automation
 Imperial Eastman Pty
 Jardine Marketing Services
 Marine & Onshore Trading Co
 Parker Hannifin Singapore Pte Ltd
 Pemco Sdn Bhd
 Singapore Valve & Fitting Pte Ltd
 United Engineers

FLANGES

American Intl Industries Pte Ltd
 Aqua Terra Group
 Central Industrial Suppliers Pte Ltd
 Hup Seng Huat Pte Ltd
 IIT Far East & Pacific Inc
 Kheng Cheong Co
 Mid-Continent Supply Eastern Hemisphere Co
 Sea Supply
 Sin Soon Huat Pte Ltd
 Van Leeuwen Pipe & Tube

FLARE SYSTEMS Gas/Liquid

BP Indian Agencies Joint Enterprises Ltd
 BP Singapore Pte Ltd
 Jarco Services Ltd

FLOTATION MACHINES

Allis-Chalmers Cement & Mining Systems Div
 Bateman Ltd, Edward L
 Gaigher Co., The
 Geomir
 Hazen Research International Inc.
 Heyl & Patterson, Inc
 Joy International S A
 Joy Manufacturing Co
 Joy Manufacturing Co, Denver Equipment Div
 Joy Manufacturing Co (U.K.), Ltd., Denver Equipment Div
 KHD Industriemagen AG, Humboldt WEDA
 Koppex Export-Import
 Krupp GmbH, Fried Krupp Industrie- und Stahlbau
 Lurgi Gesellschaften
 Machineryexport V. O
 McNally Bharat Engineering Co. Ltd
 Minemet Industrie
 Mitsubishi Metal Corp
 Nikea
 Outokumpu Oy, Technical Export Div
 Rauma-Repola Oy, Pori Div
 Roxon Oy
 Saia International
 Saia Minco
 Schenck AG, Carl
 Warman Equipment (International) Ltd
 WEMCO, Div Envirotech Corp

FLUIDS BOP

Ultraglide Ltd

FLUIDS Drilling (see Mud - Drilling)

FLUIDS Motion Compensator
 Ultraglide Ltd

FRACTURING EQUIPMENT

(see Remedial & Stimulation Equipment)

FRICITION MATERIAL

ABEX Corp

FUELING SYSTEMS, VEHICLE

Federal Mogul Corp., International Distribution Div
 Ishikawajima Harima Heavy Industries
 Wiggins Connectors Div., Div. Delaval Turbine Inc

GAS LIFT EQUIPMENT

Aspec
 Baker Oil Tools Group
 Camco Inc
 Daiichi Jitsuyo Co Ltd
 Dresser Minerals Group
 Flowtrol
 Otis Engrg Corp

GAS PROCESSING PLANT & EQUIPMENT

Avery-Laurence Group
 BS & B
 C-E Natco Intl Ltd
 Cooper Energy Services Intl Inc
 Masonellian
 Porta Test Systems Engrg Pte Ltd
 Serbawang Engrg
 Sulzer East Asia Central Office
 Testinc

GAS SWEETENING

(See Desulfurization Equipment)

GASKETS, JOINTING & PACKINGS

Anglo-American Corp
Aqua Terra Group
Bestobell Group
Central Industrial Suppliers Pte Ltd
Chong Fung Material Supplier Pte Ltd
Eastern Lloyd
Garlock Inc
Johns Manville Singapore
Klan Hock Hydraulic & Trading
Lietz-Zulueta Capital Inc
Marine & Onshore Trading Co

GASKETS, JOINTINGS & PACKINGS continued

Material Trading
Pan Pacific Industrial Sales Co Inc
Parker Hannifin Singapore Pte Ltd
Pasig Industrial Sales Corp
Petroleum Industries Pte Ltd
Pordajoko PT
Sea Supply
Tat Lee Engrg Pte Ltd
Thoreson & Co

GASKETS Ring, API

Aqua Terra Group
Sea Supply
Tat Lee Engrg Pte Ltd

GAUGES

1 Density 2 Level 3 Moisture 4
Nuclear 5 PSM 6 Radiation 7 SO2
Concentration

Indicator Co 2
Dresser Industries Inc 2
Foxboro Co 1,2,3
Martin-Decker Co 1,2
McPhar Geophysics Ltd 6
Noratom-Norcontrol AS 1,2,3,4
Ohmart Corp The 1,2,3,4,6
Philips Gloeilampen Fabrieken, N.V.
Science & Industry Div 2,6
Reinord Inc 2
Texas Nuclear Corp Div Ramsey
Engineering Co 1,2,3,4,6
Varian Associates Instrument Div
4
Warman Equipment (International)
Co 2

GAUGES Liquid Level

Ace Equipment Pte Ltd
Anglo American Corp
Australian American Engrg Corp
Eagle Process Controls Ltd
Felsar Pte Ltd
ITT Far East & Pacific
Lietz-Zulueta Capital Inc
Masteller
Pordajoko, PT
Smith Engineering
Tokico Singapore Pte Ltd
United Technik, UD

GAUGES H 4 Pressure

Aqua Terra Group
Bayliss Intl Pty Ltd J
Essex Oil Tool Co
Cameron Iron Works
Daiichi Jitsugyo Co Ltd
James Gauntt Pte Ltd
Martin-Decker Co
Mid-Continent Supply Eastern Hemisphere
Co

Miraksha Association
S.A. 3.1.19

GAUGES

Ace Equipment Pte Ltd
Aloyco Intl Enterprises
Aqua Terra Group
Australian American Engrg Corp
Bestobell Group
Colosseum Corp Pte Ltd
George Kent Group
BAKER Automation
Instrumentation Ltd
ITT Far East & Pacific
Lietz-Zulueta Capital Inc
Mechanical & Comb Engrg Co
Oiltools Intl Group
Sea Supply
Shusta & Shamber
Tokico Singapore Pte Ltd
United Technik, UD

GAUGES Temperature, Industrial

Aloyco Intl Enterprises
Bestobell Group
Colosseum Corp Pte Ltd
Djuara Intl Trade Ltd
GEORGE Kent Group
Instrumentation Ltd
Lietz-Zulueta Capital Inc
Mechanical & Comb Engrg Co
Tokico Singapore Pte Ltd
United Technik, UD

GAUGES Thread, API

Tri-State Oil Tool SA

GAUGES Vacuum

ITT Far East & Pacific Inc
Tokico Singapore Pte Ltd

GAUGES & RECORDERS Pressure, Downhole

Apico
Boswell Intl
Daiichi Jitsugyo Co Ltd
Flopetrol
Hewlett Packard Singapore Pte Ltd
Indel-Davis
Lynco SFAisa Pte Ltd
Martin Decker Co
Shusta & Shamber
Sperry Sun Intl Inc

GAUGES & RECORDERS Temperature, Downhole

Boswell Intl
Daiichi Jitsugyo Co Ltd
Indel-Davis
James Gauntt Pte Ltd
Martin-Decker Co
Mid-Continent Supply Eastern
Hemisphere Co
Miraksha Associates

GEARS

See Also Speed Changers, Open Gearing,
Drives, Shaft Mounted Drives

Butyrus Erie Co
Demag AG ABT
Bergwerksmaschinen
Demag Verdichter &
Drucklufttechnik GmbH
Dresser Industries Inc
Dresser Industries Inc, Industrial
Equipment Div
Dresser Industries Inc, Power
Transmission Div
Eaton Corp
Eickhoff Maschinenbau- u. Eisengesserei
Fenner & Co Ltd J H

Ingersoll-Rand Co
Ishikawajima Harima Heavy
Industries
Kawasaki Heavy Industries, Ltd.,
Machine Sales Div
Lilton Industrial Products, Inc.,
Louis Ains Div
McNally Bharat Engineering Co
Ltd
Morgardshammer AB
Philadelphia Gear Corp
Seiki Kogyosha, Ltd (SMK)
Taim SA
U.S. Steel Corp
Wesernutte Otto Wolff GmbH

GENERATION PLANT & EQUIPMENT Electric

Aartus & Associates Pvt Ltd
Abcitz Marketing
Afzet Machinery Stores
Aker Group
Allied Engineering Co Ltd
Angkasa Jaya Teknik PT
Assea Group
Atkins, Kroll & Co
Babcock & Wilcox
BBC Brown Boveri Group
Behn, Meyer & Co
Caterpillar Far East Ltd
Certact
Combustion Engrg Inc
Cooper Energy Services Intl Inc
Cummins South Asia Ltd
D.K.
Detroit Diesel Allison Intl
Deutz Far East

GENERATION PLANT & EQUIPMENT continued

Deutz Bangladesh Ltd
East Asiatic Co
Electro Motive Div
Equipment Trades Ltd
European Technical Services
Galaxie Specialities Pte Ltd
General Electric Co (UK)
General Electric Co (USA)
Harrisons Lister Engrg Ltd
Imperial Electric Co Ltd
ITT Far East & Pacific Inc
Kertajuna Utana Teknik PT
Kohler Co
Komatsu Singapore Pte Ltd
Konyberg
Mata & Co Inc, BP
Mirreles Blackstone
Mid-Continent Supply Eastern
Hemisphere Co
MTU Friedrichshafen
MWM-Diesel Far East Pte Ltd
National Supply Co
Onan Far East Div
Patersons Simons & Co
Perkins Engines Eastern
Rolls Royce Ltd
Salcon Group Scott & English Ltd
Singapore Equipment Services Pte Ltd
Solar Turbines Intl Co
Stork-Workspoor Diesel BV
Sulzer East Asia Central Office
Sulzer Representative Offices
Sulzer Australia Pty Ltd
Terinc
Tractors Malaysia Bhd
Tractors Singapore Ltd
United Engineers
United Technologies
Watt & Akkermans Pte Ltd

Manasba Engine Div
Whyte & Co
Worthington-Turbodyne Intl Sales Co

GENERATORS Steam (also see Boilers)

Asia Industries Inc
Babcock & Wilcox
C-E Natco Intl Ltd
Combustion Engrg Inc
Guthrie Engineering
Oiltools Intl Group
Panah Tiara PT
Petrocon Swire
Swire Petrocon

GEOMETRICAL EQUIPMENT & SUPPLIES

(also see Drilling Equipment, Geological
or Microscopes)
Core Laboratories Intl Ltd
Geosupply

GEOLOGICAL EQUIPMENT & Supplies

(also see Explosives & Related Accessories)
Far East Catlon
Gaekwar Enterprise
Geoservices Far East
Geosupply
Greaves Cotton & Co Ltd
James Gauntt Pte Ltd
Joshi & Co KP
Miraksha Associates
Seismic Supply
Shusta & Shamber
Technotrade Intl Pte Ltd
Tractors India Ltd
Well Seis Intl Ltd

GRADERS, MOTOR

Athey Products Corp
Aveling Barford Ltd
Dresser Industries Inc
Fiat Anis Corp Construction
Machinery Inc
Kawasaki Heavy Industries Ltd.
Construction Machinery Div
Komatsu Ltd
Mrsul Shipbuilding & Eng Co., Ltd
O & K Orenstein & Koppel AG
Rauma-Repola Oy, Lokomo Div.
RAYGO Inc.
Umi GmbH Maschinenbau
Voivo BM AB
WABCO Construction & Mining
Equipment
WABCO Manufacturing SA

GRATING Steel or Aluminium

American Intl Industries
Ansons Industries
Aqua Terra Group
Bernee Co Pte Ltd
Central Industrial Suppliers Pte Ltd
Diesel Intl Pte Ltd
Material Trading
Metrex Pvt Ltd

GRINDING EQUIPMENT

1 Autogenous 2 Ball Mills 3 Ball Mill
Chargers 4 Balls 5 Cage Mills 6
Liner Changing Machines 7 Liners,
Ceramic 8 Liners, Rubber 9 Liners,
Steel 10 Pebble Mills 11 Rod Mills
12 Rod Mill Chargers 13 Rods 14
Roller Mills 15 Tube Mills 16
Vibrating Mills 17 Fasteners,
Grinding Mill Liners

ABEX Corp 9
Aeroflans Mills Ltd 1.2.10.11.14.
15
Air Products & Chemicals Inc 2
Alis Chalmers Cement & Mining
Systems Div 1.2.9.10.11.14.16
Aistrom Div Neyrtec 2.11.14
Appareis Dragon 2.11.15
ARMCO Chie SA 1 4
ARMCO International Div ARMCO
Steel Corp 4.9.13
ARMCO Moly Co. S P A 4
Barrows Heavy Engineering Ltd 1.
2.10.11.15
Bateman Ltd Edward L 1.2.3.4.5
10.11.12.13.15.16
Bernold AG 9
Beryllium Smelting Co. Ltd 4.9
BIGG Inc 2.4.10
Bitors AB Steel Div 2.9.13
CF&I Steel Corp 4.13
Chapman Ltd Clarke International
Combustion Div 1.2.10.14
Columbia Steel Casting Co. Inc 9
Combustion Engineering, Inc 14
Commonwealth Steel Co. Ltd 4.9.
13
Continental Gummi-Werke AG 8
Coors Porcelain Co 4.7
Creusot-Loire 13
Den Norske Remfabrik A/S 8
Dragon SA Appareis 2.11.15
Dyson & Sons Inc Jos.
Dependable Div 17
Edwards & Jones Ltd 2.10
Esch-Werke AG 2.10.11.13.14
Fives Carl Babcock 1.2.3.9.11.12.
13.15
Fuller Co 2.10.11.14.15
Furukawa Mining Co Ltd.
Machinery Sales Div 2.3.4.9.10.
11.12.15
Gaigher Co. The 8
GEC Mechanical Handling Ltd 1.2.
10.11.12.15
Geomin 2.4.11.13
BFGoodrich International 8
Greengate Industrial Polymers, Ltd
8
Gundlach Machine Co. T J 5
Hazen Research International Inc.
2.11
Head Wrightson & Co. Ltd 2.9.10.
11.15
Heath & Sherwood Co 12
Helpeps Ltd 4
IBAQ Internat Baumaschinenfabrik
AG 2.3.4.9.11.12.13

Ishikawajima-Harima Heavy Industries 2,3
Joy International S A 2
Joy Manufacturing Co. 2,11
Joy Manufacturing Co., Denver Equipment Div 2,11
Joy Manufacturing Co. (U.K.), Ltd., Denver Equipment Div 2,11
KHD Industriellen AG, Humboldt WEDAG 1 2 10 11,14,15,16
KAWASAKI Heavy Industries Ltd., Construction Machinery Div 2,9, 11,13,14,15
KAWASAKI Heavy Industries, Ltd., Machine Sales Div 2,4,11,13,15, 16
Kennedy Van Saun Corp., Sub McNally Pittsburg Mfg. Co 2,11
Kobe Steel Ltd 1,2,3,4,8,9,10,11, 12,13,14
Kone Corp
Koppers Co., Inc., Hardinge Oper 1,2,6,9,10,11,15
Krupp GmbH, Fried, Krupp Industrie- u. Stahlbau 1,2,11, 14,15
Kulenkampff & Bebruder 4,9
Kurimoto Iron Works, Ltd. 2,3,5,9, 10,11,12,14
Kvaerner Brug A/S 1,2,10,11
Loesch KG 1,14
Machineseport V.O 2,4,11,13,14, 15,16
McNally Bharat Engineering Co Ltd 2,9,10,11,15
Mine & Smelter Co., Sub. Barber-Greene Co 2,10,11
Mintec International Div. Barber-Greene Co 2,10,11
Mitsubishi Steel Mfg Co., Ltd. 11, 13
Morgardshammer AB 1,2,10,11, 12
Newell Ounford Eng., Ltd. 1,2,11, 15
Neyrtec, Aisthom Atlantique 14
Nixes 2,3,11
O & K Greenstein & Koppel AG, Werk Ennigerloh 2,15
Osporn (South Africa) Ltd., Samuel 1,2,3,4,9,10,11,12,15
Outokumpu Oy, Technical Export Div 2,10,11
Polysius Werke 2,10,11,14
Rauma-Repolä Oy, Pori Div. 1,2,10, 11
Reiter & Crippa SNC 10,11,12,14
Reynold Inc. Process Machinery Div 1,2,9,10,11
Reynold Inc 2,3,10,11,12
Sala International 1,2,10,11,15
Saw Metals Ltd 4,9
Svega AB 8
Stedmon Foundry & Machine, a Waan United Co. 5
Svevia Arbra AB 2,11,16
Trelleborgs Gummitfabriks AB 8
U.S. Steel Corp. 11
Vecor Heavy Engineering Ltd. 1,2, 9,10,11,14
Vickers Australia Ltd, Ruwolt Div 1,2,3,4,8,9,10,11,12,13
VOEST Alpine 2,3,8,9,11,12,13,14
Warman Equipment (International) Ltd 8,9
Wilkinson Process Linatex Rubber Co Ltd 10

GROUTING, GUNITING, SHOTCRETING

See Also Concreting Equipment
1 Equipment 2 Plants 3 Reagents 4 Services

Atlas Copco AB 1
Bernold AG 1
Cementation Mining Ltd. 3,4
Chemgrout 1,2,3
Drill Systems, Inc. 2
Gardner-Denver International, International Div. 1
Hoken Boring Machine Co. 1,2
Mining Development (UK) Ltd (Mindev) 1
Normet S A 1
Pneumatisk Transport AB 1,2
Reynold Inc. Specialty Chemicals Div 3
Robertson Research International Ltd. 3
Rock Falls Co., Ltd. 4
Soil Mechanics Ltd 4
Thyssen (Great Britain) Ltd 3
Zeni Drilling Co. 4
GUNS Mud
Aqua Terra Group
Continental-Emeco Co
Daiichi Jitsugyo Co Ltd
Drexel Oilfield Services
Inter-Mega
Mid-Continent Supply Eastern Hemisphere Co
Sea Supply

HAMMERS, AIR POWERED, ROCK BREAKING AND DEMOLITION

Atlas Copco AB
Consolidated Pneumatic Tool Co., Ltd
Demag Verdichter & Drucklufttechnik GmbH
Dresser Industries Inc. Mining Services & Equip. Div
Euro-Drill Equipment (U.K.) Ltd
Flottmann Werke GmbH
Furukawa Rock Drill Sales Co. Ltd
Gardner Denver International, International Div
Hauhinco Maschinenfabrik
Joy Mfg Co
Kent Air Tool Co
Krupp GmbH, Fried, Krupp Industrie- und Stahlbau Montabaur
Rammmer Oy
Schramm Inc
SIG Schweizerische Industrie-Gesellschaft

HANGERS Liner

Apache
Apcco
Borneo Oil Tool Co
Brown Oil Tools Inc
Daiichi Jitsugyo Co Ltd
Ex-In Hong Kong Ltd
Lines SEAsia Pte Ltd

HARDFACING/HARD TRIM

Apache
Stoody Asean
Tri-State Oil Tool SA
Whyte & Co

HARDWARE (also see Tools)

Alliance
American Intl Industries
Amsbach Enterprises
Amsbach Marine Supplies

HARDWARE (also see Tools) continued:

Al Hana Raja Teknik PT
Aqua Terra Group
Asia Enterprises
Asiatic Drift
Bulstead Trading
Carl Bauer & Co
Central Industrial Suppliers Pte Ltd
Chiang & Co YV
Connell Bros Co Ltd
Cycle & Carriage
East Asiatic Co
Federal Hardware Engrg Co
Guan Tech Hardware Pte Ltd
Guthrie Engineering
Hart Engineering
Bernard & Co
Hup Song Huat Co Pte Ltd
Inter-Mega
Intermachine PT
Jensen & Jensen
Kheng Cheong
Lee Hong
Marine & Onshore Trading Co
McAlister & Co Ltd
Metalex
Oiltrend Supply Co
Parweld Engrg
Pernas-Side Darby Sdn Bhd
Petro Marine Industries Pte Ltd
Petro Marine Holdings Group
Progress Trading Agencies
Regfield Intl Pte Ltd
Reynolds Co Inc Wash
Ridge Tool Co
Rig-Marine Supplies
Scott & English Ltd
Sea Supply
Sin Eoon Huat Pte
Soon Ahk Hardware
Supra Enterprise
Swift Industrial Supply Pte Ltd
Thoresen & Co
Unitor Ships Service
Wan Joo Seng Intl Trading
Whyte & Co

HEADFRAMES

Country this Company Cataloging This Product

1 Concrete 2 Safety Catchgear 3 Steel 4 Timber

Barker, Davies & Co 2
Cementation Mining Ltd 3
Deimann-Haniel GmbH 3
Demag AG, ART
Bergwerksmaschinen 3
Demag Verdichter & Drucklufttechnik GmbH 3
Eysen & Babcock 3
Fox Manufacturing Co., Div. Placer Exploration Ltd 1,3
Guttenbergsmutte Sterkrade AG 1,2,3
Head Wrightson & Co. Ltd 2,3
Ishikawajima-Harima Heavy Industries 3
SIFMAG Transbau GmbH 1,3
Thyssen (Great Britain) Ltd 3

HEADING MACHINES

1 Dnting 2 Impact Rippers 3 Profile

AEC Inc (Alpine Equipment Corp) 1 2 3

Anderson Mavor Ltd 3
Deimann Manier GmbH 1 2
Demag AG ABT

Bergwerksmaschinen 3
Dosco Overseas Eng Ltd 1 3
Eckhoff Maschinbau-Eisengieserei 3

E-MCO (Great Britain) Ltd 1
Gulick Dobson Ltd 2
Machinoexport 1 2 3
Mitsui Mike Machinery Co Ltd
Parard Engineering Ltd 1 2
Salzgitter Maschinen AG 1 2 3
Thyssen Thyssen (Great Britain) Group 3
Thyssen (Great Britain) Ltd 3
Vereinigte Osterreichische Alpine Montan Eisen- & Stahlwerke 3
Westalia Lunen 1 3

HEAT EXCHANGERS

AMF Incorporated
Anstrom Oy A Varkaus Engineering Works
Air Products & Chemicals Inc
American Air Filter Co. Inc
Baleman Ltd Edward L
Carborundum Co The
Du Pont CE Nemours & Co. Inc. E

Fives Cail Babcock
G & W Energy Products Group
Gutehoffnungshutte Sterkrade AG
Head Wraggison & Co. Ltd
Heli Process Equipment Corp.
Fiberglass Equip Div Dart
Ishikawajima Harima Heavy Industries
Joy Manufacturing Co (U.K.) Ltd.
Denver Equipment Div
KHD Industriemagen AG Humboldt WEGAG

Kawasaki Heavy Industries Ltd.
Constructor Machinery Div
Kawasaki Heavy Industries Ltd.
Machine Sales Div
Krupp GmbH Fried Krupp Industrie-Und Stahlbau
Kuma-Recola Oy. Porri Div
Scaw Metals Ltd
Siemens AG
Union Carbide Corp
Varan Associates Instrument Div
VOEST-Alpine

HEAT EXCHANGERS

Alfa-Laval Group
Applied Engineering Ptd Ltd
Avery-Laurence Group
Behn Meyer & Co
Bell Bryant Ltd
Bestobell Group
C-E Natco Intl Ltd
Chemtec Pte Ltd
Cooling Systems & Flexibles Pte Ltd
CTCI Corp
Engineers India Ltd
Guthrie Engineering

Industrial Engineering Ltd

Larsen & Toubro Ltd
Lunans Overseas Corp
Nurvo Piquine Spa
Srabawang Engrg
Sunlit Engrg
Trane SA

HEAT TRACING EQUIPMENT Pipeline (also see Cables - Pipe Tracing)
Raychem Corp

HEATERS

1 Air 2 Internal Combustion Engine Coolant 3 Mine. Ventilation Systems 4 Space

Ahstrom Oy. A. Varkaus Engineering Works 1
Allens of Tipton Ltd 4
American Air Filter Co. Inc 1 4
Del Monego S P A 1
Fox Manufacturing Co. Div. Piacer Exploration Ltd 3
Ishikawajima Harima Heavy Industries 1 4
Kawasaki Heavy Industries. Ltd.
Machine Sales Div 1
L & M Radiator Inc 2
Square D Co 1 4
Westinghouse Electric Corp 4

HEATERS Liquid, Industrial/Marine Alliance

HEATERS Oil
Avery Laurence Group
BS & B Pte Ltd
C-E Natco Intl Ltd
Mid-Continent Supply Eastern Hemisphere Co
Porta Test Systems Engrg Pte Ltd

HEATERS Tank
Chemtec Pte Ltd

HOISTS & HOISTING EQUIPMENT (also see Winches)

Anchor Engrg Co Pty Ltd
Aqua Terra Group
Clyde Iron
Gardner-Denver Co
Harrisons Lister Engrg Ltd
Irgersoll-Rand Group
John Chen Engrg Service
McAlister & Co Ltd
Mechanical Handling Engrg
Mid-Continent Supply Eastern Hemisphere Co
Panda Services Ltd
Span Intl Ltd
Tierra Factors Corp

HOIST CONTROLS AND SAFETY EQUIPMENT

ASEA Inc Mining & Industrial Transport
Avergesellschaft. Sub MSA Europe
Brown Boveri & Cie AG Industrial Plants Div
Connellsville Corp
Dillon & Co Inc W C
Dresser Industries Inc
Fox Manufacturing Co. Div Piacer Exploration Ltd
Friedmann & Wolf GmbH
GEC Mechanical Handling Ltd
Ishikawajima Harima Heavy Industries

Lifts Unlimited

Lintott Engineering Ltd
Logan Actuator Co
Martin-Decker Co
Mine Safety Appliances Co
Oldham & Son Ltd
Rexnord Inc
Round & Son Inc. David
Siemens AG
Square D Co
Westinghouse Brake & Signal Co. Ltd. Signal & Mining Div.

HOISTING EQUIPMENT (WINDERS)

See Also Reels, Wire, Chain Hoists

1 Automatic Skip Loading Devices 2 Controls & Safety Equipment 3 Drum Hoists 4 Drum Regrooving 5 Friction Hoists (Koepe) 6 Portable Hoists 7 Scraper Hoists (Slushers) Portable 8 Scraper Hoists (Slushers) Stationary 9 Shaft Sinking Hoists 10 Skips and Cages 11 Skip and Cage Suspension Equipment

Allens of Tipton Ltd 10
AEC Inc (Alpine Equipment Corp) 1 3 5 6 9
AEG-Teletunken 1 2 3 5 6 9
ASFA Inc Mining & Industrial Transport 1 2 3 5 6 9 10 11
Atlas Copco AB 2 3 6
Barker, Davies & Co 11
Barrows Heavy Engineering Ltd 3, 5 9 10 11
Brown Boveri & Co. Ltd 2
Brown, Boveri & Cie AG. Industrial Plants Div 2
Calweid, Div Smith International Inc 6
Card Corp 1 10 11
Compagnie Electro Mecanique. Sub Brown Boveri & Co 2
Connellsville Corp 1 2 3 5 9 10 11
Deimann Manier GmbH 3 5 6 9
Demag AG ABT
Bergwerksmaschinen 1 2 3 4 5 6 7 8 9 10 11
Demag Fordertechnik GmbH 3
Demag Drucklufttechnik GmbH 1 2 3 4 5 6 7 8 9 10 11
Dillon & Co Inc W C 2
Dresser Industries Inc 3 6
Eaton Corp 6
EIMCO (Great Britain) Ltd 7
Fives Cail Babcock 1 3 10
Fox Manufacturing Co. Div Piacer Exploration Ltd 1 2 3 5 7 8 10 11
Frontier Kemper Constructors 9
GFE Products Corp 2
Gardner-Denver International. International Div 3 6 7 8 9
GEC Mechanical Handling Ltd 2 3 5 9 10
Gutehoffnungshutte Sterkrade AG 1 3 4 5 6 8 10 11
Harnischfeger Corp 2 3
Hawker Siddeley Dynamics Engineering Ltd 1 2
Hepturn Ltd Jones 3 4 5 9
Hudson (Kaiser) Ltd Robert 10
Ishikawajima Harima Heavy Industries 2 3

Jenkins of Hettford Ltd. Mbr
Babcock & Wilcox Ltd Gp. 10
Joy International S.A. 6,7,8
Joy Mfg. Co. 3,7,8
Kone Corp. 3
Kope. Export-Import 1,2,3,5,6,9.
10,11

Lebus International Engineers, Inc.
3,4

Lifts Unlimited 3,6

Linden-Aimak AB 9

Lintott Engineering Ltd. 2

Logan Actuator Co. 2

Machinexport 1,2,3,4,5,6,7,8,9.

10,11

Martin Decker Co. 2

McDowell-Wellman Engineering Co.

10

Mitsui Mike Machinery Co. Ltd

Moss (Pty) Ltd., George 10

Nanda Millar Co. 11

Nehaus Hebezeuge J.D. 6

Newell Dunford Eng., Ltd. 3

Nikex 3,10

O & K Orenstein & Koppel AG 3,5.

10

Parsoris Chain Co. 11

Pickrose & Co., Ltd., Member

Marmon Group Inc. 3,6,7,8,9

Polihp Heckel-Bleichert Ver.

Maschin. AG 1,3,5,10

Reliance Hope Attachment Co. Ltd

11

Reynold Inc. 1,2,3,5,10,11

Reynold Inc. Process Machinery Div

1,2,3,5

Round & Son Inc., David 3

Sala Minco 1,10

Salzgitter Maschinen AG 3,5

S.A.M.I.A. 3,6,7,8

SIEMAG Transplan GmbH 1,3,5,9.

10,11

Siemens AG 2

SILEC. Signalisation Industrielle Div 2

Thyssen, Thyssen (Great Britain)

Group 3,9

Thyssen (Great Britain) Ltd. 10

UMM Ltd 6

Underground Mining Machinery,

Ltd 6

Vecor Heavy Engineering Ltd. 3,5,9

Vereinigte Osterreichische Alpine

Montan Eisen- & Stahlwerke 3,9.

10,11

Westalia Lunen 3,5

Westinghouse Brake & Signal Co.

Ltd., Signal & Mining Div. 1,2,10

HOLE LOGGING SYSTEMS

Eastman International Co. GmbH

Heinrichs Geoprospection Co.

McPhar Geographics Ltd

HOSE

1 Concrete Pumping 2 Drill Hose 3
High Pressure, Hydraulic 4 Oil and
Gasoline 5 Suction

Aerquip Corp. 3,4,5

American Bitrite Rubber Co., Inc.

Boston Industrial Products 2,3,4.

5

AMI Corp. 3

Bridgestone Tire Co. Ltd. 3,4,5

BTR Beijing Ltd. 1,2,3,4,5

Cementation Mining Ltd. 1

Chemolimpex Hungarian Trading

Co. 1,2,3,4,5

Clouth Gummiwerke AG 1,4,5

Continental Gummi-Werke AG 1,2.

3,4,5

Den Norske Remfabrik A/S 1,4,5

Fenner & Co. Ltd., J.H. 3

Furukawa Rock Drill Sales Co. Ltd.

2

Gates do Brasil SA 1,2,3,4,5

Gates Rubber International 1,2,3,4.

5

Gates Rubber of Canada Ltd. 1,2,3.

4,5

General Rubber Co. 5

Goodall Rubber Co. 1,2,3,4,5

BF Goodrich International 1,2,3,4,5

Goodyear International Corp. 1,2,3.

4,5

Greengate Industrial Polymers, Ltd.

1,2,3,4,5

Hayden Nilos Conflow Ltd. 2,3

Ingersoll Rand Co. 2

Koken Boring Machine Co. 2,3,5

Lincoln St. Louis 1,3,4

Toyo Rubber Industry Co. Ltd., The.

Overseas Oper. Div. 5

Trelleborgs Gummifabriks AB 1,2.

3,4,5

Uniroyal Inc. 2,3,4,5

Uniroyal International Inc. 2,3,4,5

HOSE FITTINGS, CLAMPS, COUPLINGS

Aerquip Corp.

Atlas Copco AB

Ballagh & Thrall, Inc.

Den Norske Remfabrik A/S

Dixon Valve & Coupling Co.

Europower Hydraulics Ltd.

Fenner & Co. Ltd., J.H.

Furukawa Rock Drill Sales Co. Ltd.

Gates do Brasil SA

Gates Rubber International

Gates Rubber of Canada Ltd.

Goodall Rubber Co.

BF Goodrich International

Gullick Dobson, Ltd.

Hayden Nilos Conflow Ltd.

Lincoln St. Louis

Microdot Inc.

Secmafer S.A., Service Publicitaire

Trelleborgs Gummifabriks AB

Uniroyal International Inc.

Varian Associates, Instrument Div.

HOSE Industrial
Aelcorp Pvt Ltd
Aeroquip Corp
Aqua-Terra Group
Borneo Co Pte Ltd
Bridgestone Singapore Pte Ltd
Central Industrial Suppliers Pte Ltd
Deyzak Engrg Corp
Dunlop Singapore Sdn Bhd
Federal Hardware Engrg Co
Fluid Power Pte Ltd
Fluid Systems Sdn Bhd
Gates Export Corp
Goodyear Singapore Pte Ltd
Gould Inc
Guan Teck Hardware Pte Ltd
Guthrie Engineering
Haglund & Associates
Imperial Eastman Pty Ltd

HOSE Industrial continued
Inphill Marketing Inc
Indian Commercial Co Pvt Ltd
Intermachine PT
Klan Hock Hydraulic & Trading
Lietz-Zulueta Capital Inc
Marine & Onshore Trading Co
Mid-Continent Supply Eastern Hemisphere Co
Ong Pte Ltd PL
Pasig Industrial Sales Corp
Rig Marine Supplies
Sea Supply
Singapore Valve & Fitting Pte
Southern Engrg Pte Ltd
TI Flexible Tubes Ltd
Tierra Factors Corp
United Engineers
Wah Joo Seng Intl Trading
Wilcox & Co

HOSE Marine (see Hose - Suction & Discharge, Oil)

HOSE Mud/Rotary/Vibrator
Aqua Terra Group
Bayliss Intl Pty Ltd
Coflexip & Services Asia
Dunlop Ltd Oil & Marine Div
Gates Export Corp
Goodyear Singapore Pte Ltd
Grand Corp SA
Haglund & Associates
Indian Commercial Co PVT Ltd
Lietz-Zulueta Capital Inc
Mid-Continent Supply Eastern Hemisphere Co

Oiltools Intl Group
Sea Supply
Tirupati Intl
Uniroyal Intl Oil & Marine Div

HOSE SBM Floating &/or Submarine
Coflexip & Services Asia
Dunlop Ltd Oil & Marine Div
Goodyear Singapore Pte Ltd
Oiltools Intl Group
Panda Services Ltd
Uniroyal Intl Oil & Marine Div

HOSE Suction & Discharge, Oil
Amsbach Marine Supplies
Borneo Co Pte Ltd
Bridgestone Singapore Pte Ltd
Dunlop Ltd Oil & Marine Div
Gates Export Co
Goodyear Singapore
Guan Teck Hardware Pte Ltd
Lietz-Zulueta Capital Inc
Oiltools Intl Group
Ong Pte Ltd
Pasig Industrial Sales Corp
Pence Sdn Bhd
Sea Supply
Uniroyal Intl Oil & Marine Div
Wah Joo Seng Intl Trading
Wilcox & Co

HYDRAULIC POWER PACKS

ABEX Corp
AMI Corp
Anderson Mavor Ltd
Dowty Mining Equipment, Ltd.
Fenner & Co Ltd, J H
Fletcher Sutcliffe Wild Ltd
Guilck Dobson, Ltd
Hauhinco Maschinentabrik
Helipeds, Ltd
Kent Air Tool Co
Klockner Becorit GmbH
Lincoln St Louis
Logan Actuator Co
Minex Mine Expert
N L Rucker Products
Olin Energy Systems Ltd.
Owatonna Tool Co
Reinord Inc
Schwartz-Holywell, Ltd
Secmatex S A Service Publicitaire
Victor Products (Wallsend) Ltd.
Westaria Lunen
Westinghouse Electric Corp

HYDRAULIC SEEDERS, MULCHERS AND BLOWERS

See Environment Protection Equipment
Renco, Inc

HYDRAULIC & PNEUMATIC EQUIPMENT

COMPONENTS & CONCEPTS
Chong Fung Material Supplier
Degmag Engrg Corp
Fluid Power Pte Ltd
Fluid Systems Sdn Bhd
Galaxie Specialities Pte Ltd
Gould Inc
Holland-Asia Trading Co Pte Ltd
Imperial Eastman Pty Ltd
Klan Hock Hydraulic & Trading
Masonellan
Mechanical & Comb Engrg Co
Paratran NYD
Parker Hannifin Singapore Pte Ltd
Singapore Valve & Fitting Pte Ltd
Sperry Vickers Group
Ua Wilhysa Equipment Co Ltd
United Engineers

HYDROCARBON RECOVERY UNITS

Avery Lawrence Group
BS & H Pte Ltd
C-E Balco Intl Ltd
Felmar Pte Ltd
Porta-Treat Systems Engrg Pte Ltd
Sulzer East Asia Central Office

INCINERATORS

American Can Co
Del Monego SpA
Dorr-Oliver Inc
EIMCO Div Envirotech Corp
Fives-Cail Babcock
Fuller Co
Isnikawaajima-Harima Heavy
Industries
Kawasaki Heavy Industries Ltd.
Construction Machinery Div.
Kawasaki Heavy Industries, Ltd.
Machine Sales Div
Peabody International Corp

INDICATORS

(see Controls or Gauges or Recorders)

INJECTION PACKAGES Water

Aker Group

INJECTORS Chemical

(also see Pumps - Chemical Injector)
Avery-Laurence Group

INSPECTION EQUIPMENT (see Testing Equipment)

INSTRUMENTS (see specific Product Headings)

INSTRUMENTS Electrical & Electronic Test)

Associated Technical Services
BBC Brown Boveri Group
Felmur Pte Ltd
General Electric Co
General Electric
Mechanical & Comb Engrg Co
O'Connor's Group
Singapore Technical Services

INSULATION MATERIALS Accoustical

AAF Intl SA/AAF Pte Ltd
Bestsell Group
Johns-Manville Singapore Pte Ltd
Mechanical & Comb Engrg Co

INSULATION MATERIALS Thermal

Bayer
Bestsell Group
Cisco Engrg Co Ltd
Inspection & Certification
Intveid Intl
Johns-Manville Singapore
Mitco Sdn Bhd
Paramount Trade & Engrg PT
Pipeline Engrg- Pte Ltd
Mah Chang Intl

JACYS Hydraulic

Anchor Engrg Co Pty Ltd
Aqua-Terra Group
Pernas-Size Derby Sdn Bhd
JACYS Rig Offshore
National Supply Co

JAPS Accelerator

Tri-State Oil Tool SA

JAPS Buffer

Apasco
Jarco Services Ltd
Spotco
Tri-State Oil Tools SA

JAPS Drilling

Asia Industries Inc
Borneo Oil Tool Co
Christensen Diamond Products Pte Ltd
CVC Inc

Eastman Whipstock Inc

Jarco Services Ltd
Morris Corp
Oiltools Intl Group
Parah Tiara
Parah Tiara PT
Petrocon Swire
Spotco
Swire Petrocon
Tri-State Oil Tool SA

JAPE Hydraulic/Hydro Mechanical

Apasco
Jarco Services Ltd
Spotco
Tri-State Oil Tool SA

JAPE Fishing

Jarco Services Ltd
Spotco

JOINTINGS

(see Gaskets, Jointings & Packings)

JOINTS Ball, Pipeline

Aeroquip Corp
Apasco
FMC Corp

JOINTS Expansion, Pipeline

Bestobell Group

JOINTS Pup

LOR Intl Pte Ltd
SMF Intl

JOINTS Safety, Drilling or Safety, Washover

Apasco
Borneo Oil Tool Co
NL Hycalog
SMF Intl
Tri-State Oil Tool SA

JOINTS Swivel

Aboltiz Marketing
Aeroquip Corp
Apasco
Aqua-Terra Group
Atlas Steel & Engrg Co
Borneo Oil Tool Co
Continental Enasco Co
Calichi Jitsugyo Co Ltd
FMC Corp
George Kent Group
Sea Supply

JOINTS Tool

Azim Hannan Ltd
Daichi Jitsugyo Co Ltd
Drilling Equipment Supply Co Inc
Fuller & Kinnaird Associates Ltd
Grant Corp SA
Hughes Tool Co
Mid-Continent Supply Eastern Hemisphere Co
Oiltools Intl Group
Reel Tool Intl Ltd
Sal Company Ltd
SilDrilco
SMF Intl

JUMBOS AND BOOM ASSEMBLIES

Atlas Copco AB
Bohler Bros & Co Ltd.
Dasco Overseas Eng Ltd
EIMCO (Great Britain) Ltd.
France Leader
Furukawa Mining Co Ltd.
Machinery Sales Div
Furukawa Rock Drill Sales Co Ltd
Gardner Denver International,
International Div
Hanson Co, R A Mining Div
Ingersoll Rand Co
Joy International S A
Joy Mig Co
Linden Almak AB
Machinexport
Mining Development (UK) Ltd.
(Mindev)
Montabert
Rammer Oy
Secoma
SIG Schweizerische Industrie-
Gesellschaft
Oy Tamceila AB, Tamrock Div
Thymerk Thyssen (Great Britain)
Group
Torque Tension Ltd
Vereingte Edelstahlwerke AG

KELLYS

A-1 Bit & Tool Co Pte Ltd
Azim Hannan Ltd
Jarco Services Ltd
Lucey Export Supply
Shusta & Shamber
SMF Intl

KILNS

See Drives And Atlas, Coolers,
Pneumaturgical Equipment

LABORATORIES AND ASSAYERS

1 Assay Equipment 2 Coal Analysis
Laboratories 3 Magnetic Separators
4 Mineral Research 5 Ore Sampling

6 Ore Testing Services 7 Rock
Sectioning and Polishing Services 8
Rock and Soil Testing (Engineering
Properties) 9 X-Ray Analyzers, on
Stream 10 X-Ray Analyzers,
Portable

Aerolabs Mills Ltd 5
Atlas Chalmers Cement & Mining
Systems Div 4.5 6
Appareils Dragon 5
Australian Mineral Development
Lab 2.4 6
BICO Inc 1
Boxmag-Rapid Ltd 3.6
Carpco 3
Fives-Cail Babcock 2.3.5.6
Geomon 2.4.5.6.7.8.9.10
Golder Hoek & Associates Ltd 8
Hazen Research International Inc.
2.4.5.6
Heath & Sherwood Co 5.6
Hunting Surveys & Consultants,
Ltd 1.5.6
Hunting Surveys & Consultants Inc
1.4.5

Jones Ferro Magnetics Inc 3
 Joy International S A 3 4
 Joy Manufacturing Co 6
 Joy Manufacturing Co. Denver
 Equipment Div 5
 Joy Manufacturing Co. (U.K.). Ltd.
 Denver Equipment Div 5
 KHD Industriemagazin AG Humboldt
 WEDAG 1 3 4 5 6 7 9
 Kaser Engineers 4 5 6
 L-Field Research of Canada Ltd.
 4 5 6 7
 Log Tech Ltd 7
 Matthew Hall Ortech Ltd 4 6
 McPhar Geophysics Ltd 4 6
 Mine & Smelter Co. Sub Barber-
 Greene Co 1
 Minemet Industrie 5
 Mineral Deposits Ltd 4 6
 Montan Consulting GmbH 1 2 4 5,
 6 7 8 9
 Mountain State Engineers 2 4 5 6
 Outokumpu Oy Technical Export
 Div 5 6 7 9
 Philips Gloeilampen Fabrieken N.V.
 Science & Industry Div 1 4 5 9
 Polybus Werke 4
 Rigaku Denki Co. Ltd 7 8
 Robertson Research International
 Ltd 1 2 3 4 5 7
 Sala International 3 4 5 6
 Sala Minco 3 4 5
 Seegmiller Associates R
 Seitrust Engineering Ltd 4 5 6
 Shinjo Electric Co. Ltd 3
 Sol-Mechanics Ltd 7 8
 Texas Nuclear Corp., Div Ramsey
 Engineering Co 9 10
 Warman Equipment (International)
 Ltd 2 3 4 5 6
 Zeiss Carl 9

LABORATORY EQUIPMENT AND SUPPLIES

See Also: Reagents And Chemicals

1 Atomic Absorption
 Spectrophotometers 2 Balances 3
 Crushers 4 Dryers 5 Grinders 6
 Laboratory and Testing Machines 7
 Microscopes 8 Mineral Pilot Plant 9
 Miscellaneous Laboratory Supplies
 10 Spectrophotometers 11
 Spectroscopy, Analytical

A-Products & Chemicals Inc 5
 Ans Chemers Cement & Mining
 Systems Div 3 5 6 8
 Astrom Div Neyrtec 3 5
 APV Mitchell (Dryers) Ltd 4
 Beckman Instruments Inc 1 6 9,
 10
 BICO Inc 3 5 6 9
 Boxmag Rapid Ltd 6
 Clarkson Co The 6
 Deister Concentrator Co. Inc 5
 De Monago S P A 8
 Dixon & Co Inc W C 6
 Du Pont de Nemours & Co Inc, E
 6
 Esch Werke AG 3
 Fisher Scientific Co 1 2 3 5 9 10
 Galigne Co The 6
 Gison Screen Co 6

Gruendler Crusher & Pulverizer Co
 3 5
 HAZEMAG Dr E Andreas GmbH &
 Co 3 4
 Hazen Research International Inc
 6 8
 Heath & Sherwood Co 3 5 6 9
 Hitachi Ltd 1 7 9
 Hunting Surveys & Consultants Inc
 9 10
 IBAG Internat Baumaschinenfabrik
 AG 3
 Joy International S A 3 5 6
 Joy Manufacturing Co 6
 Joy Manufacturing Co. Denver
 Equipment Div 6 8
 Joy Manufacturing Co. (U.K.). Ltd.
 Denver Equipment Div 3
 KHD Industriemagazin AG, Humboldt
 WEDAG 3 4 5 6 8
 Kawasaki Heavy Industries, Ltd.,
 Machine Sales Div 3 4
 Machineexport V O 3
 Mine & Smelter Co. Sub Barber-
 Greene Co 3
 Minemet Industrie 3
 Mineral Deposits Ltd 6
 Morgardshammer AB 3 5
 Mountain State Engineers 8
 Ohmart Corp., The 6
 Philips Gloeilampen Fabrieken, N.V.
 Science & Industry Div 1 7, 10, 11
 Sala International 3 5 6 8 9
 Sala Minco 3 6 8
 Sauias & Cie 6
 Sturtevant Mill Co 3 5 8
 Texas Nuclear Corp., Div Ramsey
 Engineering Co 6
 Tyler Inc W S 2 6 9
 Vickers Australia Ltd, Ruwolt Div, 3
 Warman Equipment (International)
 Ltd 8
 Wild Heerbrugg Ltd 7
 Zeiss Carl 1 7 10

LABORATORY EQUIPMENT

(Also see Microscopes Geological
 or Test Equipment Petroleum)
 American Optical Co Pte Ltd
 Bausch & Lomb
 Jardin Parrish
 Jabsen & Jessen
 Mechanical & Comb Engrg Co
 Shiro

LAMPS, MINER

1 Cap Lamps 2 Hand Lamps 3 Oil
Safety Lamps

CEAG Dominit AG
 GTE Products Corp
 Kober Export-Import
 Mine Safety Appliances Co
 National Mine Service Co
 Oldham Batteries Ltd

LASER GUIDES FOR TUNNELING

Davis & Son Ltd, John
 Kern & Co Ltd
 National Mine Service Co
 Siemens AG
 Zed Instruments Ltd

LIGHT PLANTS

See Electrical Equipment

LIGHTING

See Also Electrical Equipment

1 Compressed Air Lamps 2
Flameproof 3 Lighting Fixtures
Outdoor 4 Lighting Systems 5 Mobil
Open Pit Lighting Systems 6
Underground Systems

Atlas Copco AB 1
Avergesellschaft, Sub MSA Europe
4 6

CEAG Liomint AG 1,2,3
Friedmann & Wolf GmbH 1,2,4,6
GTE Products Corp 3,4
Huswood Irwin Co 4
Keene Corp 3
Linden-Animak AB 4
Mine Safety Appliances Co 4
National Mine Service Co 1,2,3,6
Over-Lowe Co 4,5
Phoenix Products Co 3,4,5,6
Siemens AG 1,2,3,4

Sun Enterprises Inc., Div Sun
Enterprises Inc 3,5,6
Victor Products (Walised) Ltd 2,3,
4

Westinghouse Electric Corp 3,4
Zip-Up Inc 3

LIGHTING EQUIPMENT & FITTINGS

Explosion-proof
BBC Brown Boveri Group
CEAG Group
Cortact
Fuller & Kinnaird Associates Ltd
General Electric
Ideal Electric Singapore Pte Ltd
James Gault Pte Ltd
Lim Kim Hal Electric Co
Malayan Cables Bhd
Scott & English Ltd
Spotco
Tamco Cutler-Hammer
Tasin Electric Co Pte Ltd
Zenit Lite Buoy Co Ltd

LININGS Brake Industrial
Sea Supply

LNG PLANT (see Gas Processing
Plant & Equipment)

LOADERS, FRONT END AND OVERHEAD, AND FORK LIFT

See Also Tractors And Attachments, Self-
Loading Transport, Train Loader Systems

1 Belt 2 Crawler 3 Forced Feed 4
Fork Lift 5 Gathering Arm 6 Rail
(Mucking Machines) 7 Rubber-Tired
8 Side Dumping 9 Stage 10 Swing
Shovel 11 Telescoping

AEC, Inc. (Alpine Equipment Corp)
2,5,8

Atlas Chalmers, Cement & Mining
Systems Div 4

Anderson Mayer Ltd 5
Atley Products Corp 1,3

Atlas Copco AB 6,7
Aveling-Barford Ltd 2,7

Bando Chemical Industries, Ltd
International Div 1

British Jiffrey, Diamond 7

Buckau-Wolf Maschinenfabrik AG 1
BOMAB 7

Case Co., J. I., International Div 2,
4

Caterpillar Tractor Co. 2,4,7,8
Clark Equipment Co., Fargo Div 7
Clark International Marketing S A
4,7,8,9

Continental Gummi-Werke AG 1
Dart Truck Co 7
Deimann-Haniel GmbH 2,8,11
Demag Lauchhammer Masch &
Stanibau GmbH 1
Dowty Meco Ltd 1
Eaton Corp 4,7

EMCO (Great Britain) Ltd 2,6,7,8
Eimac Corp of New Mexico 7,8
Fiat-Allis Corp., Construction
Machinery Inc 2,7
France Loader 4,7,8

Furukawa Mining Co. Ltd.
Machinery Sales Div 2,7,10
General Motors, Terex Div 2,7
Goodman Equipment Corp 2,3,5
Gutenofnungshutte Sterkrade AG
7,8

Hagglund & Soner AB, Trucks &
Mining Machinery Div 2,5,6,7
Hanson Co., R. A., Mining Div 1,2,
7

Hitachi Construction Machine Co.,
Ltd 2,10

International Harvester Co 2,7,8
Jeffrey Mining Machine Co., Div
Dresser Industries Inc 5

Joy International S A 5,7
Kawasaki Heavy Industries Ltd.,
Construction Machinery Div 7,9

Kawasaki Heavy Industries, Ltd.,
Machine Sales Div 7

Kobe Steel Ltd 7
Koenring Co 2,4
Komatsu Ltd 2,4,7,8,10

Machinoexport V O 2,6,10,11
Marathon Letourneau Co., Longview
Div 4,7

Matroc Ltd 4,7
McDowell Wellman Engineering Co
Mining Development (UK) Ltd
(Mindev) 2,8

Mitsubishi Belting, Ltd 1
Mitsui Shipbuilding & Eng. Co. Ltd
2,6,7,8

Muir-Hill Ltd 7
O & K Orenstein & Koppel AG 4,7
Paccar International, Inc 7

Pettibone Corp 4
Plymouth Locomotive Works Inc 4,
7

RAYGO Inc 7
Realisation Equipments Industriels
1,7,11

Salzgitter Maschiner AG 2,8
Schopli Maschinenbau GmbH 7
Schwartz-Hoylewell, Ltd 2

Shinko Electric Co., Ltd 4
SIG Schweizerische Industrie-
Gesellschaft 4

Stanco Manufacturing & Sales 11
Trelleborgs Gummifabriks AB 7
Unit Rig & Equipment Co 4

Vickers Australia Ltd., Ruwoll Div.
4,7

Volvo BM AB 7
Wagner Mining Equipment Co. 7
Weserhutte AG, Eisenwerk 1
Westfalia Lunen 8,11

LOADING ARMS

Abottis Marketing
Atlas Steel & Engrg Co
Connell Bros Co Ltd
Continental-Emco Co
Daitchi Jitsuijyo Co Ltd
Elito Industrial Corp
FMC Corp
George Kent Group
Gillbarco Australia Ltd
Indian Commercial Co Pvt Ltd
Ippilo, PT
Treloar & Sons Pty Ltd
United Machinery Co Ltd
Wallace Ltd DM:1

LOCOMOTIVES

1 Battery 2 Compressed Air 3
Diesel 4 Diesel Electric 5 Diesel-
Hydraulic 6 Flame Proof 7 Radio
Remote Controlled 8 Trolley 9
Tunnel

AEG-Telefunken 1,6,7,8
Ageve AB Gavle Vagnverkstad 1,5,
6,8,9

ASEA, Inc. Mining & Industrial
Transport 1,7,8,9

Babcock & Wilcox Ltd 8
Becort (GB) Ltd 3
Bedia Maschinenfabrik U
Kaparaturwerk 3,6

Berry Co 1,3,6,8,9
Brown Boveri & Co. Ltd 1,4,7
Brown Boveri & Cie AG Industrial
Plants Div 4

Chapman Ltd, Clarke International
Combustion Div 1,3,5,6,7,8,9

Compagnie Electro Mecanique, Sub
Brown Boveri & Co 1,4,7
Dresser Industries Inc 1,3,5,8

Fox Manufacturing Co, Div Piacer
Exploration Ltd 1,3,4,5,6
Ganzmagag

General Motors Overseas
Operations Electro-Motive
Products 4

Goodman Equipment Corp 1,4,5,
8,9

Greenhal Ltd 1,6,7,8,9
Hudswell, Clarke & Co. Ltd 1,3,4,
5,6

Hunslet Ltd 1,3,4,5,7
Hunslet Mining Machinery Co. Ltd
1,3,5,6

ISCO Manufacturing Co, Inc 3,7
Jeffrey Mining Machine Co, Div
Dresser Industries Inc 1,8

Kawasaki Heavy Industries Ltd.,
Construction Machinery Div 3,4,
5,6,7

Kawasaki Heavy Industries, Ltd.,
Machine Sales Div 3,4,5
Krauss-Maffei, AG 3,4,5,6,7,8

Krupp GmbH Fried Krupp
Industrie-Und Stahlbau 3,4
Lee-Norse Co 7

Mecanoexportimport, Foreign Trade
Co 3,4
Moss (Pty) Ltd, George 1,3,4,5,6,
7,8,9

National Mine Service Co 1,3,4,6,
7,8,9
Nippon Yusokai Co Ltd
O & K Orenstein & Koppel AG 3,4,
5

Persona Spartechnik AB 3.5.7.8.9
 Plymouth Locomotive Works Inc. 1.
 3.4.5.6.7.8.9
 Prapovest 4
 Schwartz & Dickerhoff AG
 Kuhnrauer Maschinenfabrik 3.5.6.9
 Secmatel S. A. Service Publicitaire
 5
 Shinko Electric Co. Ltd 1.8
 Siemens AG 7
 SIG Schweizerische Industrie-
 Gesellschaft 1.9
 SILEC, Signalisation Industrielle Div
 7
 Stephanose de Constr
 Mecaniques. Soc 5.6
 LMM Ltd 5
 Westfalia Lünen 3.5.6.7
 Westinghouse Electric Corp 1
 Wingrove & Rogers Ltd 1.8.9

LOGGING EQUIPMENT & INSTRUMENTS
 (also see Gauges & Recorders or
 Survey Instruments)

Asia Industries Inc
 Baker Oil Tools Group
 Borneo Oil Tool Co
 Daiichi Jitsugyo Co Ltd
 Dresser Minerals Group
 Electrospace Systems Inc
 Halliburton Ltd
 Imco Services
 James Gauntt Pte Ltd
 Martin-Decker Co
 Miraksha Associates
 NL Barold
 NL Rig Equipment
 Shusta & Shamber
 Sperry Sun Intl Inc
 Well Seis Intl Ltd
LONGWALL MINERS

1 Duote Drum 2 Plow 3 Shear 4
 Single Drum

Anderson Major Ltd 1.3.4
 British Jeffrey Diamond 1.3.4
 Eckhoff Maschinen- u. Eisengiesserei
 1.3.4
 Fox Manufacturing Co. Div Placer
 Exploration Ltd 1.2.3.4
 Greenwood Iron Co 1.2.3.4
 Joy Mfg Co 1.3
 Klockner Bécort GmbH 2
 Kopek Export-Import 1.2.3.4
 Mine-Expert 1.3.4
 Mine-Import 1.3.4
 Mining Supplies Ltd 1
 Mitsui Mine Machinery Co. Ltd
 National Mine Service Co. 1.2.3.4
 LMM Ltd 2
 Underground Mining Machinery
 Ltd 4
 Wickers Australia Ltd. Ruwolt Div
 1.3
 Westfalia Lünen 1.2.3.4

LONGWALL SUPPORTS

1 Chock 2 Shield 3 Chock/Sheild

AEC Inc (Alpine Equipment Corp)
 1.2.3
 Barlows Heavy Engineering Ltd 2
 Dowty Mining Equipment, Ltd 1.2.
 3
 Fletcher Sutcliffe Wild Ltd 1.2.3
 Fox Manufacturing Co. Div Placer
 Exploration Ltd 2
 Guilick Gibson Ltd 1.2.3
 Gutenhoffnungshutte Sterkrade AG
 2
 Greenwood Iron Co 1.2.3
 Joy Mfg Co 1.2
 Klockner Bécort GmbH 1.2.3
 Kopek Export-Import 1.2.3
 Mine-Expert 1.2.3
 National Mine Service Co. 1.2.3
 Thyssen Industrie AG Umform-
 Technik 1.2.3
 Westfalia Lünen 1.2.3

LUBRICATION EQUIPMENT Industrial
 Adolitz Marketing
 Aqua-Terra Group
 Central Industrial Suppliers Pte Ltd
 George Kent Group
 Hagglund & Associates
 Herman & Co E
 MacNaught Pty Ltd
 Marine & Onshore Trading Co
 Sea Supply
 United Motor Works

**LUBRICATING EQUIPMENT
 SERVICE CENTERS**

Eaton Corp
 Lincoln St. Louis
 SIG Schweizerische Industrie-
 Gesellschaft
 Wiggins Connectors Div. Div
 Delaval Turbine Inc

LUBRICATING SYSTEM

Aeromac Corp
 Fox Manufacturing Co. Div Placer
 Exploration Ltd
 Iowa Mold Tooling Co
 (Shikadama-Harima) Heavy
 Industries
 Kulenkampff Gebrüder
 SIG Schweizerische Industrie-
 Gesellschaft
 Wiggins Connectors Div. Div
 Delaval Turbine Inc

MACHINE TOOLS & SUPPLIES

Ambach Enterprises
 Beco Engineering Co Ltd
 Boswell Intl
 Carl Bauer & Co
 East Asiatic & Co
 Engineering Equipment Inc
 Esab AB
 Harrison's Lister Engrg Ltd
 Scott & English Ltd

MAGNETIC EQUIPMENT

1 Brakes, Clutches 2 Couplings for
 Grinding Mills 3 Fishing Tools,
 Magnetic for Drill Holes 4 Head
 Pulleys and Suspension Magnets 5
 Lifting 6 Road Sweepers 7
 Separators

Allis Chalmers Cement & Mining
 Systems Div 7
 Boxmag-Rapid Ltd 1.2.3.4.5.6.7
 Dings Co. Magnetic Group 1.4.5.6.
 7
 Eaton Corp 1
 Elektromag 1
 Eriez Magnetics Ltd 4.5.6.7
 Fives-Cail Babcock 4.7
 GEC Machines Ltd 1.5.7
 GTE Products Corp 1
 Heath & Sherwood Co. 7
 Jones Ferro Magnetics Inc 7
 KHD Industriemagen AG. Humboldt
 WEDAG 7
 Kone Corp 7
 Krupp GmbH Fried. Krupp
 Industrie und Stanbau 7
 Lurgi Gesellschaften 7
 Machinexport V/O 7
 Mitsubishi Metal Corp. 7
 Mitsubishi Steel Mfg. Co. Ltd 5.6.
 7
 Moss (Pty) Ltd. George 1.5
 Ohio Magnetics 4.6.7
 Roxon Oy 7
 Sula International 7
 Sala Mico 7
 Shinko Electric Co. Ltd 1.5.7
 Siemens AG 1
 Square D Co 1.5
 Stearns Magnetics, Inc 3.4.5.6.7
 Thune-Eureka AS 7
 Towa Senkou Co. Ltd 7
 Warman Equipment (International)
 Ltd 7

MAGNETOMETERS
 James Gauntt Pte Ltd

MARINE EQUIPMENT, PRODUCTS & SUPPLIES
 (also see Controls or Diving Equipment or
 Navigation Aids or Propulsion Units - Marine)

ARG Telefunken
 Aker Group
 Alfa-Laval Group
 Alliance
 Ambach Marine Supplies
 Asea Group
 Atrason
 Behn Meyer & Co
 Berg-Warner Intl Corp
 Borneo Co Pte Ltd
 Cycle & Carriage
 Daiichi Jitsugyo Co Ltd
 Drexel Oilfield Services
 East Asiatic Co Ltd
 Ekman & Co
 Engelhard Industries
 Engtek Pte Ltd
 Goodyear Singapore Pte Ltd
 Guan Teck Hardware Pte Ltd
 Harrison's Lister Engrg Ltd
 Holland-Asia Trading Co Pte Ltd
 Honeywell Inc
 James Gauntt Pte Ltd
 Mata & Co Inc BP

National Supply Co
 Navire Cargo Gear SEA Asia Pte Ltd
 Panda Services Ltd
 Promet Group
 Schottel Far East
 Scott & English
 Selmer

MARINE EQUIPMENT, PRODUCTS & SUPPLIES

Singapore Oxygen Air Liquide Pte Ltd
 Typhoon & Co
 Uniroyal Intl Oil & Marine Div
 United Motor Works
 Visper Pty Ltd
 Wah Chang Intl
 Watercraft Schat Viking Pte Ltd
 Watt & Akkermans Pte Ltd
 Whyte & Co
 World-Wide Offshore Services Pte Ltd

MASTS see Rigs

MECHANICAL PICKS

Furukawa Mining Co. Ltd.
 Machinery Sales Div
 Krupp GmbH Fried. Krupp
 Industrie und Stanbau
 Le-Norse Co.

METAL DETECTORS

1 Conductive 2 Magnetic 3 Methane
 Detectors
 Avergeseellschaft, Sub MSA Europe
 3
 Dings Co. Magnetic Group 2
 Fives-Cail Babcock 1.2
 IBAG Internat Baumaschinenfabrik
 AG 2
 McPhar Geographics Ltd 1.2
 Ohio Magnetics 2
 Outokumpu Oy, Technical Export
 Div 1
 Stearns Magnetics, Inc. 1

METERS AND GAUGES

1 Density 2 Flow
 AMF Incorporated 2
 Aerodup Corp 2
 Agar Instrumentation Inc. 1.2
 Dresser Industries Inc 2
 Fives-Cail Babcock 1
 Foxboro Co 1.2
 Friesseke Hoepfner GmbH 1
 Hayden Nios Conflow Ltd 2
 Honeywell Inc., Process Control Div.
 2
 Jones & Laughlin Steel Corp 1.2
 Kay Ray Inc 1.2
 LaMotte Chemical Products Co.
 Martin-Decker Co 1.2
 Neyretic, Aristhom-Atlantique 2
 Noratom-Norcontrol AS 1
 Ohmart Corp. The 1.2
 Texas Nuclear Corp. Div Ramsey
 Engineering Co 1.2

METEOROLOGICAL INSTRUMENTS

Djwara Intl Trade Ltd
 Singapore Electronic & Engrg
METEPE Flow, Liquid or Gas
 Australian American Engrg Corp
 Bechtel Group
 Boswell Intl
 Brady & Co Ltd NH
 Colossus Corp Pte Ltd
 Flow Measurement & Control Div/Geosci
 Foxboro Group
 George Kent Group
 Hagglund & Associates
 Haven Automation
 JTC Far East & Pacific Inc
 Lietz-Zulbeta Capital Inc
 Mechanical & Co Engrg Co
 Mid-Continental Supply Eastern
 Hemisphere Co
 Oiltools Intl Group
 Sri Timor Oilfield Supplies & Equip Sdn
 Tokio Singapore Pte Ltd
 Wilcox & Co

MICROSCOPES Geological
 American Optical Co Pte Ltd
 Bausch & Lomb
 Striko

MILLS

A-1 Bit & Tool Co
 A-Z Intl SA
 Borneo Oil Tool Co
 Tri-State Oil Tool SA
MILLS Section
 A-1 Bit & Tool Co
 A-2 Intl SA
 Fuller & Finnard Associates Ltd
 Grant Oil Tool Co
 Tri-State Oil Tool SA

MINE CARS

See Cars, Mine

MINERS

See Conveyors, Miners

MIXERS Industrial or Chemical
 Bell Bryant Ltd
 Whyte & Co

MIXERS Mud (see Mud Systems & Equipment)

MODULES Platform/Rig
 Aker Group
 Atlantic, Gulf & Pacific Co
 Avery Laurance Group
 Bethlehem Singapore Pte Ltd
 C-E Hatco Intl Ltd
 Dodsall Pvt Ltd
 Elder Singapore
 Far East-Levingston Shipbuilding Ltd
 Hongkong United Dockyards Ltd
 Malaysia Shipyard & Engrg Sdn Bhd
 Nippon Steel Corp
 Penang Shipbuilding Corp Sdn Bhd
 Promet Pte Ltd
 Serhawang Engrg
 ThyssenHardenUnion AG
 UIE-Promet Pte Ltd

MONITORS (HYDRAULIC)

English Clays Lovering Pochin &
Co Ltd
SEMAG Transplan GmbH

MONORAILS

Klockner Becton GmbH
Koper, Export-Import
LMS Unlimited
Minea Mine-Expert
Scharf GmbH, Maschinenfabrik
Schwartz & Dyckernott AG,
Ruhrthaler Maschinenfabrik

MOORING SYSTEMS Offshore

Avery-Laurence Group
Bethlehem Singapore Pte Ltd.
Isodoco
Serbiawang Engrg
Single Buoy Moorings Inc
Span Intl

MOTORS

See Two Engines, Electrical Equipment,
Locomotives

1 Air 2 Gear 3 Hydraulic

ABEX Corp 1 2 3
AMI Corp 3
Atlas Copco AB 1
Behler Bros & Co Ltd 1 2
Conrac Corp 2
Demag AG ABT
Bergwerksmaschinen 1 2
Demag Verdichter &
Orbitaltechnik GmbH 1 2
Dresser Industries Inc 1 2
Dresser Industries Inc, Power
Transmission Div 2
Eaton Corp 2 3
EMCO (Great Britain) Ltd 1
FMC Corp Drive Div 2
Furukawa Rock Drill Sales Co. Ltd.
Gardner Denver International,
International Div 1
Heath & Sherwood Co 2
Hitachi Construction Machine Co.,
Ltd 3
Hitachi Ltd 2
Ingersoll Rand Co 1
Joy International S A 1
Kawasaki Heavy Industries Ltd.,
Construction Machinery Div. 3
Linden-Amak AB 1
Lifton Industrial Products, Inc.,
Louis Arms Div 2
Mitsui Make Machinery Co. Ltd.
N L Rucker Products 3
Philadelphia Gear Corp 2
Pickrose & Co., Ltd., Member
Marmen group Inc 1
SAMIA 1
Secmater S A, Service Publicitaire
3
Westinghouse Electric Corp 2

MOTORS Electric

Aboltis Marketing
Ace Equipment Pte Ltd
Alliance
Asea Group
Atkins, Kroll & Co
BBC Brown Boveri Group
Capricorn
Certact Pte Ltd
Crompton Grooves Ltd
Galaxie Specialities Pte Ltd
General Electric Co
General Electric
Guthrie Engineering
Harrison Lister Engrg Ltd
Imperial Electric Co
Industrial Inspection
Kelly & Lewis/Mather & Platt
Mechanical & Comb Engrg Co
Mid-Continent Supply Eastern
Hemisphere Co
Panda Services Ltd
United Engineers
Watt & Akkermans Pte Ltd

MOTORS Outboard

(also see Propulsion Units Marine)
Borneo Company
United Motor Works

MUD Drilling (also see Additives Mud)

Alfal Machinery Stores
Amipura Minerals & Chemicals Pvt Ltd
Arya Offshore Services
Asian Mineral Products
Bibojee Services Ltd
Brinadd Intl Co
BW Mud Group
Cebo Far East Pte
Croda Tex-Asia
Daichi Jitsugyo Co Ltd
Dresser Minerals Group
Drexel Oilfield Services
Falcon Minerals Inc
Fuller & Kinnaird Associates Ltd
Heng-Ching Corp
Imco Services
Lone Star
Milchem Intl Ltd
Mud Engineering Co Sdn Bhd
NL Barold
Telnite Singapore Pte Ltd
Tiffin's Barytes, Asbestos & Paints Ltd
Tirupati Intl
Universal Minerals & Chemicals Co

MUD SYSTEMS & EQUIPMENT

Aqua-Terra Group
BJ Service Intl Inc
Borneo Oil Tool Co
BW Mud Group
Cebo Far East Pte Ltd
Croda Tex-Asia
Daichi Jitsugyo Co Ltd
Dresser Minerals Group
Drexel Oilfield Services
Falcon Minerals Inc
Fuller & Kinnaird Associates
Grant Corp SA
Imco Services
James Gaunt Pte Ltd
Martin-Decker Co
Mid-Continent Supply Eastern
Hemisphere Co
Milchem Intl Ltd
Morris Corp

Mud Engineering Co Sdn Bhd
NE Baroid
NL Rig Equipment
Oiltools Intl Group
Plenty Group Ltd

NAVIGATIONAL AIDS Compasses, Marine
Associated Technical Services
Engtek Pte Ltd
Mata & Co Inc BP
Motwalla & Co EJ
Radio Holland BV
Rico

NAVIGATIONAL AIDS Positioning & Survey
Equipment

Associated Technical Services
Daya Mitra Silpa PT
Decca Survey Group
Dwi Tunggal Djaja, CV
Eastern Communications Pte Ltd
Electrospace Systems Inc
Geomex Surveys
Greaves Cotton & Co Ltd
Honeywell Inc
International Aeradio
ITT Far East & Pacific
James Gauntt Pte Ltd
Kalatec Seatronics
Komaritim PT
Laser Electronics Pty Ltd
Marconi Intl Marine Co Ltd
Marconi Space & Defence Systems Ltd
Mars Electronics & Engrg Sdn Bhd
Mata & Co Inc BP
Mushko & Co Ltd
O'Connor's Group
Progress Engineering Pte Ltd
Radio-Holland BV
Radiosonic Service, CV
Radifon Telecommunications Ltd
Rico
SEATEch Electronics
Seaview Intl Corp
Singapore Electronic & Engrg
Singapore Technical Services
Sunshine Co Ltd
Tac Electronics Sdn Bhd
Thaitronic Co Ltd
Tideland Signal Corp
United Engineers
Watercraft Schat Viking Pte Ltd
Zeni Lite Buoy Ltd

NAVIGATIONAL AIDS Sextants
Mata & Co Inc EP
Motwalla & Co, EJ

OCEANOGRAPHIC EQUIPMENT

1 Accessories 2 Bottom Profiling
Equipment 3 Depth Sounders 4
Diving Equipment 5 Drills,
Underwater Sampling 6 Engineering
7 Magnetometers, Marine 8 Search
Sonar 9 Ships 10 Sparking
Equipment

Acker Drill Co 5
Atlas Copco ABEM AB 7
Geometrics 7
BFGoodrich International 8
Gutenhoffnungshutte Sterkrade AG
9

MUNTEC (1707) Ltd 1,2,6
Ishikawajima Harima Heavy
Industries 5,6,9
Kawasaki Heavy Industries Ltd,
Construction Machinery Div. 4,8
Kawasaki Heavy Industries, Ltd.,
Machine Sales Div 9
Koken Boring Machine Co. 5
Mine Safety Appliances Co 1
O & K Gresten & Kopper AG 9
Peabody International Corp 3
Robertson Research International
Ltd 1
Smith International, Inc 5

OCEANOGRAPHIC INSTRUMENTS
(also see Navigational Aids)

Atracron
Daya Mitra Silpa, PT
Decca Survey Group
Geomex Surveys
Greaves Cotton & Co
Harrisons Lister Engrg Ltd
James Gauntt Pte Ltd
Kalatec Seatronics
Komaritim, PT
Marconi Space & Defense Systems Ltd
Mars Electronics & Engrg Sdn Bhd
Mushko (Co Ltd
Radio Holland BV
Seaview Intl Corp
Soisalc Supply

OCEANOGRAPHIC INSTRUMENTS
(also see Navigational Aids)

continued
Singapore Electronic & Engrg
Singapore Technical Services
Sunshine Co Ltd

OIL SPILL PREVENTION/
RECOVERY EQUIPMENT

Bethlehem Singapore Pte Ltd
Borneo Co Pte Ltd
Bridgestone Singapore Pte Ltd
Dunlop Ltd, Oil & Marine Div
Felmar Pte Ltd
Goodyear Singapore Pte Ltd
Guthrie Engineering
Oiltools Intl Group
Paterson, Simons & Co
Uniroyal Intl Oil & Marine Div
Wilson Walton Intl

OPENERS - Hole

A-1 Bit & Tool Co Ltd
Indian Drilling & Mining Co Pvt Ltd
Fuller & Kinnaird Associates Ltd
Grant Oil Tool Co
Greaves Cotton & Co Ltd
LOR Intl Pte Ltd
Morris Corp
Shusta & Shamber
Sll Smith Tool
SMF Intl
Tractors India Ltd
Tri-State Oil Tool SA
Varel Mfg Co
Wamco Service & Supply (HK)Ltd

OPERATORS (see ACTUATORS-Valve)

OVERSHOTS

Borneo Oil Tool Co
Tri-State Oil Tool SA

PACKERS

Apache Sdn Bhd
Apaco Ptd Ltd
Baker Oil Tools (Packers Div)
Borneo Oil Tool Co
Brown Oil Tools Inc
Camco Inc
Christensen Diamond Products Pte Ltd
Dalichi Jitsugyo Co Ltd
Dowell Schlumberger Intl Inc
Dresser Minerals Group
Drexel Oilfield Services
Em-Im Hong Kong Ltd
Halliburton Ltd
Lynes SEAsia Pte Ltd
Miraksha Associates
Morris Corp
Otis Engineering Corp
Weatherford/Lamb Group

PATCHES - Casing

Apsco Ptd Ltd
Borneo Oil Tool Co
Brown Oil Tools Inc
Tri-State Oil Tool SA

**PELLETIZERS, MODULIZERS &
BRIQUETTING MACHINES**

1 Disc 2 Drum 3 Grate 4 Roll Press

Allis Chalmers, Cement & Mining
Systems Div. 1 2 3 4
Barrows Heavy Engineering Ltd. 2
Buckau Wolf Maschinentabrik AG 2
Esch-Werke AG 2
Fives Cail Babcock 1 2 3
GEC Mechanical Handling Ltd. 1 2
KHD Industriellen AG, Humboldt
WFDAG 4
Kawasaki Heavy Industries Ltd.,
Construction Machinery Div. 4
Kawasaki Heavy Industries, Ltd.,
Machine Sales Div. 4
Kennedy Van Sain Corp. Sub. J.
McNary Pittsburg Mfg. Co. 1 2
Kobe Steel Ltd. 1 2 3
Krupp GmbH & Co. KG 4
Krupp GmbH, Fried. Krupp
Industrie und Stanbau 3 4
Kumamoto Iron Works Ltd. 1 2
Lerg. Gesellschafren 1 3
McDowell Weisman Engineering Co.
1 2 3
McNary Bharat Engineering Co.
Ltd. 2
Newell Duntford Eng. Ltd. 1 2
Polysius Werke 1 3
Saia International 1 2
Simpson Maschinen AG
VOEST-Alpine 1 2 3 4

PERFORATORS

Borneo Oil Tool Co

PERSONNEL CARRIERS

**1 Battery Powered 2 Chair Lifts 3
Diesel Powered 4 Man-Riding Belt
Conveyors**

APCO 2
Beconit (GB) Ltd. 1 2
Berry Co. 3
British Jeffrey Diamond 3
Dowty Mecc Ltd. 4
Eickhoff Mashintok-U Eisengesserei
4
FMC Corp., Mining Equipment Div.
1
Fenner & Co. Ltd., J. H. 4
France Loader 3
Goodman Equipment Corp. 1
Hunslet Mining Machinery Co., Ltd.
3
Huwod-irwin Co. 1
Joy International S. A. 2
Kloockner Beconit GmbH 2 3
Long-Airfax Co., Div. Marmon
Group Inc. 1
Mitchell Ropeways Ltd. 2
Moss (Pty) Ltd. George 1 3
Normet S. A. 3
Rapiet Tramway Co. 2
Stephanose de Constr.
Mecaniques Soc. 3
Titan Mfg. Co. 1
UMM Ltd. 3
Westfalia Lunen 1 2 3

PHOTOGRAMMETRIC INSTRUMENTATION

Bausch & Lomb Ltd

PHOTOPRINTING EQUIPMENT & SUPPLIES

Petro-Mineral Reproductions Ltd
Petroleum Reproductions Co
S.E.A. Reprographics Singapore
Ptd Ltd

PIGS - Pipeline

(also see PIPELINE EQUIPMENT
& SUPPLIES)

Adji Kerta Raya, PT
Alonso Trading & Engrg Serv. Inc
Boswell Intl Ltd
Felmar Pte Ltd
George Kent Group
Inspection & Mktg Services Ltd
Jansa Sdn Bhd
Wijaya Pura, PT
Wilcox & Co Ltd

PILE DRIVING EQUIPMENT

Atlas Copco AB
Bucyrus Erie Co
FMC Corp., Crane & Excavator Div
Hitachi Construction Machine Co.,
Ltd
Ingersoll-Rand Co
Isnikawaima-Harima Heavy
Industries
SIG Schweizerische Industrie-
Gesellschaft
Wesernutte AG, Eisenwerk

PIPE - Drill

Amon Industries Corp
Continental-Emsco Co
Grant Corp SA
Instube Pipe Ltd
International Engineering Co Ltd
International Oil & Refining
Intra Oil Sdn Bhd
John Yu & Co
Kawasaki Steel Corp
Kloockner Singapore Pte Ltd
Mahindra & Mahindra Ltd
Marubeni Corp
Mid Continent Supply
Eastern Hemisphere Co
National Supply Co
Nippon Kokan KK
Nippon Steel Corp
Petroleum Pipe Co
Satterthwaite & Co Ltd
Sil Drilco
Sumitomo Corp
Sumitomo Metal Industries Ltd

PIPE - Drill, Heavy Wall

Azin Mannan Ltd
Grant Corp SA
Shasta & Shamber
Sil Drilco
SMF Intl

PIPE AND FITTINGS

See Also Couplings

1 Aluminum 2 Cast 3 Coatings 4
Copper, Brass & Bronze 5
Fiberglass Reinforced 6 Plastic 7
Plastic Lined, Steel 8 Rubber 9
Rubber Lined 10 Stainless Steel 11
Steel 12 Steel, Spiral Welded
Valves; See also Valves 13 Wood

AMF Incorporated 3
Aerquip Corp. 1,2,11
Aluminum Co. of America (Alcoa) 1
Bairagh & Thrall, Inc. 12
Bethlehem Steel Corp 11
BiCC Ltd 4,6
Brooks Mig. Inc. Frank 13
Clouth Gumminwerke AG 8,9
Creusot-Loire 11
Den Norske Remfabrik A/S 8
Dow Chemical Co. The, Functional
Prods & Sys Dept 6,7
Dresser Industries Inc
Du Pont de Nemours & Co. Inc. E
1,6
G & W Energy Products Group 1,4,
10,11
General Rubber Co. 8
Goodall Rubber Co. 6,8,9
BFGoodrich International 6,7,8,9
Greengate Industrial Polymers, Ltd.
8
Gullick Dobson, Ltd
Heat Process Equipment Corp.,
Fiberglass Equip Div Dart 5,6
Jones & Laughlin Steel Corp 6,10,
11
Murimoto Iron Works, Ltd. 2,5
Lincoln St. Louis 4,10,11
Mannesmannrohrren-Werke AG 7,
10,11,12
Microdot Inc 6
National Tank & Pipe Co 13
Navior Pipe Co. 9,10,12
Owens Corning Fiberglas Corp.,
Non-Corrosive Products Gp 5,6
Peabody International Corp 7
Pneipros Dooge International Corp. 2,
4
Sandvik Canadian Ltd., Wear Parts
Div 10,11,12
Scaw Metals Ltd. 2,10,11
Schwartz-hoywell, Ltd 11
Schmeitzbasaltwerke Kalenborn 2,6,
7,8,9
Secmater S. A., Service Publicitaire
4
Simon-Warman Ltd 7
Skega AB 8,9
Toyo Rubber Industry Co. Ltd., The,
Overseas Oper Div 8
Trelleborgs Gummitfabriks Ab 5,6,
8,9
U.S. Steel Corp. 1,3,6,7,10,11
Victaulic Co of America 1,2,6,10,
11
VOEST-Alpine 11
Warman Equipment (International)
Ltd. 2

PIPE - Line, API

Aizal Machinery Stores
American Intl Industries
Amon Industries Corp
Asia Enterprises Ltd
Baxrie & Bros,PT
Central Industrial Suppliers Pte Ltd
Continental - Erso Co
Foster Company, LB
Goes Intl Petroleum Services Pte Ltd
Hup Seng Huat Co Pte Ltd
Instube Pipe Ltd
International Engineering Co Ltd
International Oil & Refining
John Yu & Co
Kawasaki Steel Corp
Kheng Cheong
Klueckner Singapore Pte Ltd
Krahatau Hoogovens Intl Pipe
Industries Ltd
Mahindra & Mahindra Ltd
Marubeni Corp
Material Trading
Mid-Continent Supply Eastern
Hemisphere Co
Mitsubishi Corp
Mitsui & Co Ltd
National Supply Co
Nippon Yokan KK
Petrocar Industries Pte Ltd
Pent-A Mousson SA
Satterthwaite & Co Ltd,AM
Sin Soon Huat Pte Ltd
Soon Alk Hardware
Sumitomo Corp
Sumitomo Metal Industries Ltd
Swift Industrial Supply Pte Ltd
Tubemakers of Australia Ltd
Van Leeuwen Pipe & Tube Pte Ltd

PIPE - Line, Flexible, Subsea Coflex & Services Asia

PIPE -Wash or Washover

Borneo Oil Tool Co
Grant Corp SA
Tri-State Oil Tool SA

PIPE HANDLING SYSTEMS (See also SLIPS or TONGS)

Apsco (Asia)Pte Ltd
BJ Service Intl Inc
Brown Oil Tools Inc
Alichl Jitsubyo Co Ltd
Fuller & Kinnaird Associates Ltd
Grant Corp SA
Lucey Export SupplyLtd
Morris Corp
NorMar A.S.
Varco Intl Inc
Weatherford/Lamb

PIPELINE COATINGS & WRAPPINGS

Adji Kerta Raya, PT
Amelco Engrg Inc
Hanseatic Group
Inspection & Marketing Services Ltd
Janas Sdn Bhd
Johns-Manville Singapore Ltd
Lone Star Ltd
Trans-Eastern Intl Ltd

PIPELINE CONTROLS

Automatic Accessories
Flow Measurement & Control Div/
Geosource
Masonellian Pte Ltd
Oiltools Intl Group

PIPELINE EQUIPMENT & SUPPLIES (also see PIGS or HEAT TRACING EQ)

Adji Kerta Raya,PT
Alonso Trading & Engrg Services I
Amelco Engrg Inc
Apsco Ptd Ltd
Asiatic Tool Co Ltd
Basu & Basu
Bestobell Group
BOC SubOcean Services Ltd
Drexel Oilfield Services
Felmar Ptd Ltd
George Kent Group
Greaves Cotton & Co Ltd
Inspection & Marketing Services L
Intermachine,PT
ITT Far East & Pacific, Inc
Janas Sdn Bhd
Japan Steel Works Ltd
Lekom Maras,PT
Lietz-Zulueta Capital Inc
Lone Star Ltd
Mid-Continent Supply Eastern Hcmi
phere Co
Sri Timor Oilfield Supplies &
Equip Sdn Bhd
Trans-Eastern Intl Ltd
Wijaya Pura,PT
Wilcox & Co Ltd

PLATFORMS, AERIAL, TRUCK MOUNTED

BUMAR
Chance Co. A B
Chrysler International
Ishikawajima-Maruma Heavy Industries
Moss (Pty) Ltd. George
Normet S. A.
Stanco Manufacturing & Sales

PLUGS - Bull (also see FITTINGS)

Central Industrial Suppliers Ptd Ltd
Sea Supply Ptd Ltd

PIPGS - Stripping

Tri-State Oil Tool SA

PNEUMATIC CONCRETE PLACING MACHINES

BUMAR
Compair Construction & Mining Ltd

PNEUMATIC TOOLS

See Tools, Air Driven

PNEUMATICS

(see HYDRAULIC & PNEUMATIC EQUIPM. COMPONENTS & CONTROLS)

POLLUTION CONTROL

(see OIL SPILL PREVENTION/RECOVERY or SEWAGE & EFFLUENT TREATMENT EQUIPMENT)

PORTABLE CAMPS

(see BUILDINGS-Portable)

POSITIONING EQUIPMENT

(see NAVIGATIONAL AIDS or SURVEYING EQUIPMENT)

PRECIPITATORS, ELECTROSTATIC

AAF Ltd
Bateman Ltd. Edward L
Dresser Industries Inc
Heald Wrightson & Co. Ltd
Heat Process Equipment Corp.
Fiberglass Equip Div Dart
Ishikawajima-Maruma Heavy Industries
Joy International S. A.
Joy Mfg Co
Joy Mfg Co Western Precipitation Div
KHD Industriemagazin AG. Humboldt WEDAG
Kawasaki Heavy Industries Ltd. Construction Machinery Div
Krupp GmbH. Fried. Krupp Industrie-Und Stahlbau
Lurgi Gesellschaften
Peabody International Corp
Wheelabrator-Frye Inc. Air Pollution Control Div

PRESSURE VESSELS

Applied Engineering Ptd Ltd
Avery-Laurence Group
Babcock & Wilcox
CBI Overseas Inc
C-I Natco Intl Ltd
Combustion Engineering Inc
CTCI Corp
Dodsall Pvt Ltd
Industrial Engrg Ltd
Japan Steel Works Ltd
Larsen & Toubro Ltd
Nuovo Pignone Spa
Porta-Test Systems Engrg Ptd Ltd
Progress Engineering Ptd Ltd
Sembawang Engrg Ltd
Singapore Takada Industries Ptd Ltd
Sunlit Engrg Ltd
Tian San Co

PRODUCTION MODULES

(See MODULES-Platform/Rig)

PROPULSION UNITS-Marine

(also see ENGINES-Diesel or MOTORS-Outboard)

Boswell Intl Ltd
Harrisons Lister Engrg Ltd
Schottel Far East Ltd
United Motor Works
Whyte & Co

PROPS

1 Friction Caps 2 Hydraulic 3 Mechanical 4 Rapid Yield 5 Self Advancing

AEC Inc (Alpine Equipment Corp.) 1,2,3,4,5

Barrows Heavy Engineering Ltd 4

Bateman Ltd. Edward L 4

Beccorit (GB) Ltd 3,4

Bochumer Eisen-Und Huettenwerk & Co 2

Fletcher Sutcliffe Wild Ltd 4

Gullick Dobson Ltd 2,4,5

Gutehoffnungshutte Sterkrade AG 2,5

Huwood-Irwin Co 1,2,5

Ishikawajima-Maruma Heavy Industries 2,3,5

Joy Mfg Co 5

Kloppner-Beccorit GmbH 2,4

Kopex Export-Import 1,2,3,4,5

Mine-Expert 2,5

Miner Mine-Expert 1,2,3,4,5

National Mine Service Co. 2,4,5

Nixex 4

Salzgitter Maschinen AG 2,5

Thyssen Industrie AG. Umform

Bergbautechnik 1,2,3,4,5

Titan Mfg Co 2

vereinigete Oesterreichische Alpine Montan Eisen- & Stahlwerke 2,3,5

VOEST-Alpine 2,4

Westfalen Lunen 5

Casings, Drill, Pipe & Tubing

Apsco (Asia) Pte Ltd
Atracon Pte Ltd
Azim Mannan Ltd
Bayliss Intl Pty Ltd
Central Industrial Suppliers Pte Ltd
Grant Corp SA
Hydrill Co
Miraksha Associates
Sea Supply Pte Ltd
Sil Crilco
Weatherford/Lamb

PROTECTORS-Thread

Sil Crilco
Weatherford/Lamb

PULLEYS

See Also Magnetic Equipment

Boyer SA
Dresser Industries Inc
Dresser Industries Inc., Industrial Equipment Div
FMC Corp., Material Handling Equip Div
Fox Manufacturing Co., Div. Placer Exploration Ltd
Hoiz Rubber Co
Ishikawajima-Harima Heavy Industries
Jenkins of Retford Ltd., Mbr Babcock & Wilcox Ltd Gp
Machinexport V/O
Olin Energy Systems Ltd
Production Equipment Ltd.
Rexnord Inc
Stearns Magnetics, Inc
Titan Mfg Co
Uniroyal Inc
U.S. Steel Corp
Weserhutte AG, Eisenwerk

PULP DISTRIBUTORS

Deister Concentrator Co., Inc.
Health & Snerwood Co
Ishikawajima Harima Heavy Industries
Joy Manufacturing Co., Denver Equipment Div
Sala Minco
Simon-Warman Ltd

PULVERIZERS

See Also Laboratory Supplies, Crushers

Air Products & Chemicals Inc
BICO, Inc
Dresser Industries Inc
Gründler Crusher & Pulverizer Co.
HAZEMAG Dr E. Andreas GmbH & Co
Hewitt Robins
Ishikawajima Harima Heavy Industries
KHD Industrienlagen AG, Humboldt WEDAG
Newell Duntford Eng., Ltd
Rexnord Inc
Stein Industrie
Sturtevant Mill Co
Vecor Heavy Engineering Ltd

PUMPS

1 Acid 2 Air Driven 3 Blast Hole Dewatering 4 Centrifugal 5 Ceramic Lined 6 Concrete 7 Diaphragm 8 Dredge 9 High Pressure 10 Metering 11 Mine and Deep Well 12 Oil, Hydraulic 13 Packingless 14 Piston 15 Plastic Lined 16 Plunger 17 Rubber Lined 18 Sand and Slime 19 Solids Handling 20 Submersible, Electric 21 Sump 22 Vacuum 23 Vertical

AMF Incorporated 1.7.10.14.16
ABEX Corp. 1.4.8.9.10.12.13.14.18.19
Acker Drill Co 9.17
Allis-Chalmers, Cement & Mining Systems Div. 17.19.21.23
Aisthom, Div. Neyrtec 4.21
Aluterv 4
AMI Corp 11
Appieton & Howard, Ltd. 1.2.4.12.14.17.18.20.22
Atlas Copco AB 2.4.7.21
Aveling-Barford Ltd. 4.6
Barrett, Haentjens & Co.
Bateman Ltd., Edward L. 1.4.7.17
Bernoldi AG 6
Betton Inc 7
Boher Bros. & Co. Ltd. 2.18
BUMAR 6
Caigon Corp 7.10.14
Carborundum Co., The 4.23
Challenge-Cook Bros., Inc. 6.19
Chapman Ltd., Clarke, International Combustion Div. 16.20.22
Christensen Diamond Products 14
Compair Construction & Mining Ltd. 4.21
Consolidated Pneumatic Tool Co., Ltd. 21
Dorr Oliver Inc. 1.4.7.10.15.17.18.19.23

Dow Chemical Co., The, Functional Prods & Sys Dept. 3.12
Dresser Industries Inc. 2.4.5.9.16.21.22.23
Dresser Industries Inc., Industrial Equipment Div. 22
Dresser Industries, Inc., Industrial Products Div. 21
English Clays Lovering Pochin & Co Ltd 19
English Drilling Equipment Co. Ltd. 11
Fisher Scientific Co. 1.22
Fives-Cail Babcock 22
Flygt AB 4.11.20.21
Frank Loader 4.7.20.23
Fuhr Co 4.19.22
Furukawa Mining Co. Ltd., Machinery Sales Div. 1.2.4.8.9.17.18.19.21.23
Galigner Co., The 4.17.18.19.21.23

Gardner Denver International, International Div. 2.4.5.6.7.8.9.10.11.13.14.15.16.17.20.21.22.23
GEC Mechanical Handling Ltd. 4.8.12.17.18.19.21.23
Gecmin 4.11.22
Grinders AB 1.3.4.11.19.20.21
Gulick Dobson Ltd 10.11
Haugenco Maschinenfabrik 2.9.12

Hayden Niles Contflow Ltd. 12
Hazen Research International Inc. 7
Hitachi Ltd. 3.7.17.19.20
Huiwood-Irwin Co. 9.12.14
Ingersoll-Rand Co. 1.2.4.9.11.16.17.19.21.22.23
Johnson-Progress Ltd. 7.9.16
Jones & Laughlin Steel Corp. 4.16.21.22
Joy International S.A. 3.14.19
Joy Manufacturing Co. 17.18.21.23
Joy Manufacturing Co., Denver Equipment Div. 4.6.16.17.18.19.20
Joy Manufacturing Co. (UK), Ltd., Denver Equipment Div. 4.6.11.13.15.16.17.21
KHD Industrienlagen AG, Humboldt WEDAG 4.8.9.16.17.18.19.20.21.22
Kawasaki Heavy Industries Ltd., Construction Machinery Div. 10
Kawasaki Heavy Industries Ltd., Machine Sales Div. 12
Koken Boring Machine Co. 2.7.9.14
Kone Corp. 11.18
Lawrence Pumps Inc. 1.4.5.9.18.19.23
Lincoln St. Louis 2.9.10.12.14.16
Linden-Alimak AB 20
M A N 4.10.17

McNally Pittsburg Mfg. Corp. 4
Mindrill Ltd. 2.9.14.21
Minex Mine Expert 11
Mining Development (UK) Ltd. (Mindev) 6.7.21
Mitsubishi Metal Corp. 1.9.11.14.18.19
Morgardshammer AB 4.17.19.23
N.L. Rucker Products 12.14
Nagle Pumps, Inc. 1.2.4.13.17.18.19.21.23
Neyrtec, Aisthom-Atlantique 22
O & K Orenstein & Koppel AG 8.12
Olin Energy Systems Ltd. 2.9.12
Owatonna Tool Co. 12
Peabody International Corp. 1.4.7.8.9.11.14.16.18.19.20.21.23
Peerless Pump 3.4.11.20.21.23
Pegson, Ltd. 4.7.9.10.11.16.19.20
Pettibone Corp. 8.18
Pleuger Unterwasserpumpen GmbH 18
Prosser Industries, Div. Purex Corp. 1.3.11.20.21
Pumpex AB 20.21
Putzmeister-Werk Maschinenfabrik GmbH 6.9.14.18.19
Ransomes & Rapier Ltd. 6
Rexnord Inc. 14
Ritz Pumpenfabrik KG 4.9.11.20.23
Rupp Co., The Warren 1.2.3.7.12.13.18
Sala International 4.5.13.15.17.18.19.21.23
Sala Minco 4.5.13.15.16.17.19.21
Scaw Metals Ltd. 1.4.8.18.21.22
Schwartz & Dyckerhoff AG, Ruppenthaler Maschinenfabrik 9.14.16
Schwartz Morwell Ltd. 13.19
Slemmer S.A. 9.12
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Siemens AG 20

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Sala Minco 4.5.13.15.16.17.19.21
Scaw Metals Ltd. 1.4.8.18.21.22
Schwartz & Dyckerhoff AG, Ruppenthaler Maschinenfabrik 9.14.16
Schwartz Morwell Ltd. 13.19
Slemmer S.A. 9.12
Siemens AG 20

Simon-Warman Ltd 1,4,8,13,15.
 17,18,19,20,21,23
 Stanco Manufacturing & Sales 10.
 19
 Standard Filterbau, Dr E Andreas
 GmbH & Co 4
 Technasexport, V-O 1,3,4,5,6,7.
 8,9,11,12,13,14,15,16,17,19.
 20
 TRW Mission Mfg Co 4
 Union Carbide Corp 1
 Vaisan International Corp 1,2,6,7.
 9,11,18,19
 Varian Associates, Instrument Div
 22
 Vereinigte Eisenstahtwerke AG 21
 Vereinigte Osterreichische Alpine
 Montan Eisen- & Stahtwerke 11
 Vickers Australia Ltd, Ruwolf Div
 3,9
 Viking Explosives & Supply Inc 3
 VCES, Alpine 9
 Warman Equipment (International)
 Ltd 1,3,4,8,9,11,17,18,19,20.
 21,23
 WEMCO, Div Envirotech Corp. 4.
 11,19,20,21,23
 Westinghouse Electric Corp 4
 Witley & Sons Inc A R 1,4,5,13.
 15,17,18,19,21,23
 Wilkinson Process Linatex Rubber
 Co Ltd 4,7,17,18,23
 Willson Products Div, Div ESB Inc.
 2
 Wirth & Co KG, Alfred 8,12,14,21

PUMP PARTS -Fluid End

Bayliss Intl Pty Ltd
 Drilling Equip Supply Co
 Grant Corp SA
 John Yu & Co
 Joshi & Co,
 Mahindra & Mahindra Ltd
 Mid-Continent Supply Eastern
 Hemisphere Co
 Mission Mfg Co
 Morris Corp
 National Supply Co
 Oiltools Intl Group
 Reed Tool Co Intl Ltd
 Satterthwaite & Co Ltd
 SMP Intl
 Telec Electronics & Machinery Ltd
 USS Oilwell Supply Co Intl Inc.

PUMPS - Centrifugal

Aboitiz Marketing
 Alliance Engrg Co Pte Ltd
 ApSCO (Asia)Pte Ltd
 Borg-Warner Intl Corp
 Central Industrial Suppliers Pte Ltd
 Dresser Machinery Intl Div
 Environ Sdn Bhd
 Fuller & Kinnaird Associates Ltd
 Galactic Specialities Pte Ltd
 George Kent Group
 Goulds Pumps Inc
 Guthrie Engineering
 Hagglund & Associates Ltd
 Hargill Weir Engrg Services
 Harrison's Lister Engrg Ltd
 Ingersoll-Rand Group
 ITT Far East & Pacific Inc

Kelly & Lewis/Mather & Platt
 Makati Machinery & Equipm Co Inc
 Manila Machinery & Supply Co Inc
 Mark Controls Corp
 Mechanical & Corp Engrg Co
 Menon Associates
 Mid-Continent Supply Eastern
 Hemisphere Co

Mission Mfg Co
 Nuovo Pignone SpA
 Oiltools Intl Group
 Peerless Pump Intl
 Scott & English Group
 Sulzer East Asia Central Office
 Sulzer Representative Offices
 Sulzer Australia Pty Ltd
 Sunlit Engrg Pte Ltd
 Tractors Malaysia Bhd
 Tractors Singapore Ltd
 United Engineers
 Weir Pumps Ltd
 Wilcox & Co Ltd
 Worthington Pump Pte Ltd

PUMPS - Chemical Injector/Feed

ApSCO (Asia)Pte Ltd
 Australian American Engrg Corp
 Chemitreat Group
 Diversy Pte Ltd
 Lietz-Zulueta Capital Inc
 Oiltools Intl Group
 Salcon Group
 Scott & English Group
 Wilcox & Co Ltd

PUMPS - Duplex

Continental-Emsco Co
 Dalichi Jitsugyo Co
 Gardner-Denver
 John Yu & Co
 Mahindra & Mahindra Ltd
 Morris Corp
 National Supply Co
 Satterthwaite & Co Ltd
 Telec Electronics & Machinery Ltd
 USS Oilwell Supply Co Intl Inc

PUMPS-Mud

Continental-Emsco Co
 Dalichi Jitsugyo Co Ltd
 Gardner-Denver Co
 John Yu & Co
 Mahindra & Mahindra Ltd
 Mid-Continent Supply Eastern
 Hemisphere Co

Morris Corp
National Supply Co
Satterthwaite & Co Ltd
Telec Electronics & Machinery Ltd
USS Oilwell Supply Co Intl Inc

PUMPS-Plunger

Aartus & Associates Pvt Ltd
Cooper Energy Services Intl Inc
Gardner-Denver Co
John Yu & Co
Mahindra & Mahindra Ltd
Morris Corp
National Supply Co
Satterthwaite & Co Ltd
Telec Electronics & Machinery Ltd
Tesinc
USS Oilwell Supply Co Intl Inc

PUMPS-Production, Oil Well

Apso (Asia) Pte Ltd
Axelson Inc
Borg-Warner Intl Corp
Continental-Emsco Co
Dalichi Jitsugyo Co Ltd
Dobson & Co Pty Ltd
Gardner Denver Co
John Yu & Co
Kobe, Inc
Mahindra & Mahindra Ltd
Menon Associates
Morris Corp
National Supply Co
Reda Pump Pte Ltd
Satterthwaite & Co Ltd
Telec Electronics & Machinery Ltd
USS Oilwell Supply Co Intl Inc
Weir Pumps Ltd

PUMPS - Quintuplex

Aartus & Associates Pvt Ltd
Cooper Energy Services Intl Inc
John Yu & Co
Mahindra & Mahindra Ltd
Morris Corp
National Supply Co
Satterthwaite & Co Ltd
Telec Electronics & Machinery Ltd
Tesinc
USS Oilwell Supply Co Intl Inc

PUMPS-Slurry

Aartus & Associates Pvt Ltd
Cooper Energy Services Intl Inc
Hargill-Weir Engrg Services
Kelly & Lewis/Mather & Platt
Menon Associates
Mid-Continent Supply Eastern Hemisphere Co
Scott & English Group

Tesinc

Weir Pumps Ltd Worthington Pump Pte Ltd
Worthington Pump (Asia) Pte Ltd

PUMPS - Slush
(see PUMPS-Mud)

PUMPS - Submersible/Subsurface, Oil Well

Apsco (Asia) Pte Ltd
Axelson Inc
Borg-Warner Intl Corp
Continental-Emsco Co
Dalichi Jitsubyo
Dresser Minerals Group
John Yu & Co
Kobe, Inc
Mahindra & Mahindra Ltd
Mid-Continent Supply Eastern Hemisphere Co
Morris Corp
National Supply Co
Reda Pump Co Pte Ltd
Satterthwaite & Co Ltd
Telec Electronics & Machinery Ltd
USS Oilwell Supply Co Intl Ltd

PUMPS - Sump (Oil, Water, Sewage, Sludge)

George Kent Group
Guthrie Engineering
Hamworthy Engrg Ltd
Kelly & Lewis/Mather & Platt
Weir Pump Ltd
Wilcox & Co Ltd

PUMPS - Triplex

Aartus & Associates Pvt Ltd
Continental-Emsco Co
Cooper Energy Services Intl Inc
Dalichi Jitsugyo Co Ltd
Gardner-Denver Co
John Yu & Co
Kobe, Inc
Mahindra & Mahindra Ltd
Morris Corp
National Supply Co
Satterthwaite & Co Ltd
Telec Electronics & Machinery Ltd
Tesinc
USS Oilwell Supply Co Intl Inc

PUMPS - Vacuum

Behn Meyer & Co Sdn Bhd
Oiltools Intl Group

PYROMETALLURGICAL EQUIPMENT

*See Also Lubricatory Equipment And
Supplies, Sintering Machines, Drives And
Aids*

1 Calciners 2 Converters 3 Cyclone
Furnaces 4 Distillation, Retorts 5
Electric Furnaces: Arc, Induction 6
Fluid Beds 7 Flash Furnaces 8
Ladies 9 Magnetizing Roasting Kiln
10 Melting Furnaces, Arc 11
Multiple Hearth Furnaces 12
Reverberatory Furnaces 13 Rotary
Furnaces 14 Shaft Furnaces 15
Smelting Furnaces

Allis-Chalmers, Cement & Mining
Systems Div 13

Bateman Ltd, Edward L 6,9

BCO, Inc 4,15

Brown-Boveri Corp 5

Combustion Engineering, Inc 1

Dei Monago S P A 1,6,11,13

Dorr-Diver Inc 1,6

EMCO Div, Envirotech Corp. 1,6,

11,13

Fives-Cail Babcock 1,2,8,13

Fuller Co 1,2,6,7

Furukawa Mining Co Ltd.,

Machinery Sales Div 5,7,15

GEC Mechanical Handling Ltd. 1

Gould & Co, Gordon I 1,13

Hazen Research International Inc. 6

Imperial Smelting Processes Ltd

14,15

Ishikawajima-Harima Heavy

Industries 2,3,4,5,6,7,10,11,13,

14,15

Johnson-Progress Ltd 11

KHD Industriemagazin AG, Humboldt

WEDAG 1,2,3,6,7,9,10,11,12,

13,14,15

Kennedy Van Saun Corp, Sub

McNally Pittsburg Mfg. Co 1

Lurgi-Gesellschaften 2,6,9,11,13,

15

McCowell-Wellman Engineering Co

1

McNally Bharat Engineering Co

Ltd 1

Mine & Smelter Co, Sub Barber-

Greene Co 11

Mitsubishi Metal Corp 1,2,10,12,

15

Outokumpu Oy, Technical Export

Div 2,7

Polysius Werke 1

Raumis-Repoia Oy, Pori Div. 1,2,6

Shinko Electric Co, Ltd 5

Stansteel Corp, Sub Allis-Chalmers

Corp 1

VOEST-Alpine 2

RADIATORS, ENGINE COOLING

L & M Radiator Inc

RADIO SYSTEMS

See Communications

RAIL HAULAGE SYSTEMS

ASEA, Inc, Mining & Industrial

Transport

Card Corp

Fox Manufacturing Co, Div Placer

Exploration Ltd

Haglund & Soner AB, Trucks &

Mining Machinery Div

Huwood Irwin Co

McCowell-Wellman Engineering Co

Moss (Pty) Ltd, George

National Mine Service Co

Pickrose & Co, Ltd, Member

Marmion Group Inc

Production Equipment Ltd

Seitrust Engineering Ltd

Westinghouse Brake & Signal Co,

Ltd, Signal & Mining Div

RAIL, MINE

See Track And Accessories

RAISE CLIMBER AND EQUIPMENT

Linden-Alimak AB

RAISE DRILLING, BIG HOLE EQUIPMENT

*See Big Hole Boring Machines And Bits
Reagents, See Chemicals*

RECLAIMERS, STOCKPILE

1 Coal 2 Metal (Ore)

Babcock-Moxey Ltd 1,2

Barber-Greene Overseas, Overseas

Div 1,2

British Ropeway Engineering Co,

Ltd 1,2

Buckau-Wolf Maschinenfabrik AG 1,

2

Demag Fordertechnik GmbH

Demag Lauchhammer Masch &

Stahbau GmbH 1,2

DRAVO Corp 1,2

Dresser Industries Inc, Industrial

Equipment Div 1,2

Fives-Cail Babcock 1,2

Fox Manufacturing Co, Div Placer

Exploration Ltd 1,2

Furukawa Mining Co Ltd.,

Machinery Sales Div 1,2

Heyl & Patterson, Inc 1,2

Hitachi Ltd

International Handling BV 1,2

Ishikawajima-Harima Heavy

Industries 1,2

Kone Corp 1,2

Krupp GmbH, Fried, Krupp

Industrie-und Stahbau 1,2

M A N 1,2

McCowell-Wellman Engineering Co

1,2

Mintec International, Div Barber-

Greene Co 1,2

O & K Dreistein & Kopp AG 1,2

Pohlig Haeckel Bleichert Ver

Maschin AG 1,2

Production Equipment Ltd 1,2

Reclamation Equipments Industriels

1,2

Roxon Oy 2

Saizgitter Maschinen AG 1,2

Sauerman Bros Inc 1,2

Stephens-Adams Mfg. Co. 1,2

Strachan & Henshaw, Ltd. 1,2

Taim S A 1,2

Vickers Australia Ltd, Ruwolt Div

1,2

Weserhutte Otto Wolff GmbH 1,2

PROTECTION EQUIPMENT

1 Tailing 2 Dump 3 Mine

Australian Mineral Development

Lab 1,2,3

Geophysical Service Inc, Div of

Texas Instruments Inc 3

Jacobs Engineering Co 2,3

Kaiser Engineers 1,2,3

Krupp GmbH, Fried, Krupp

Industrie-und Stahbau 2

Mineral Deposits Ltd 1

Mitsubishi Metal Corp 1,3

Montreal Engineering Co Ltd 1,2,3

Pecott Bros, Nursery & Seed Inc 1

Rheinbraun Consulting GmbH 1,2,3

RECORDERS

1 Electrical 2 Electronic 3
Mechanical 4 Pneumatic 5 Vibration

Atlas Copco ABEM AB 5

Babcock & Wilcox Ltd 2,4

Beckman Instruments, Inc 1,2,4

Davis & Son, Ltd, John 1,2

Foxboro Co 1,2,3,4

Hawker Siddeley Dynamics

Engineering Ltd 2

Hitachi Ltd 4

Honeywell Inc., Process Control Div.

2,4

Logan Actuator Co 3

Martin-Decker Co 1,3,4

McPhar Geographics Ltd 1,2

Ohmart Corp, The 2

Peabody International Corp 3

Philips Gloeilampen Fabrieken, N V,

Science & Industry Div 2,5

RCA Corp 2

Zed Instruments Ltd 2

RECORDERS - Industrial

(see CONTROLS or GAUGES & RECORDERS)

RECORDERS - Pressure, Downhole

(see GAUGES & RECORDERS)

RECORDERS - Temperature, Downhole

(see GAUGES & RECORDERS)

RECORDING MATERIALS - Magnetic

Indel-Davis Pte Ltd

REDUCERS, SPEED

See Also Speed Changers

ASEA, Inc., Mining & Industrial Transport
Demag AG. ABT
Bergwerksmaschinen
McNally Bharat Engineering Co. Ltd. 4 18.19.23
Demag Verdichter & Trucklufttechnik GmbH
Dresser Industries Inc
Dresser Industries Inc., Industrial Equipment Div
Dresser Industries Inc., Power Transmission Div
Eaton Corp
Eickhoff Mashinfk U Eisengiesserei
FMC Corp., Drive Div
Huwood-Irwin Co
Ingersoll-Rand Co
Litton Industrial Products, Inc., Louis Allis Div
M A N
Sala Minco
Seiki Kogyosho Ltd (SKK)
Siemans & Co. Constr. Meccaniques, Soc
Weserhutte AG. Eisenwerk
Westinghouse Electric Corp

REFINERY EQUIPMENT

1 Anode Handling Equipment 2
Cathode and Anode Scrap Washers
3 Starting Sheet Machines
KHD Industriellenagen AG. Humboldt WEDAG 1.2
Mitsubishi Metal Corp 1,2,3
Wennberg Ab. C. J. 1,2,3

REFRACTORIES

Carborundum Co., The
Coors Porcelain Co
Dresser Industries Inc
NL Industries Inc

REFRACTORY PRODUCTS

American Intl Industries
Bestobell Group
Lietz-Zulueta Capital Inc
Paramount Trade & Engrg PT
Wal: Chang Intl

REFRIGERATION PLANT & EQUIPMENT- Industrial

Atlantic, Gulf & Pacific Co
Avery-Laurence Group
Carrier Intl Corp
Felmar Pte Ltd
Gould Inc
Mid-Continent Supply Eastern Hemisphere Co

Trane SA
York Intl Corp

REFRIGERATION PLANT & EQUIPMENT- Marine

Alliance Engrg Co Pte Ltd
East Asiatic Co
York Intl Corp

REGULATORS (see CONTROLS)

REMEDIAL & STIMULATION EQUIPMENT- Oil Well

Apsco (Asia) Pte Ltd
Baker Oil Tools Group
BJ Service Intl Inc
Brown Oil Tools Inc
Dalichi Jitsugyo Co Ltd
Dowell Schlumberger Intl Inc
Dresser Minerals Group
Fuller & Kinnaird Associates Ltd
Grant Corp SA
Halliburton Ltd
Lucey Export Supply Ltd
Morris Corp

REPULPING SYSTEMS

Fives Cail Babcock
Ishikawajima Harima Heavy Industries

RESPIRATORS

See Safety Equipment

RIGS - Drilling, Onshore, Oil Well

Asia Industries Inc
Continental-Emeco Co
Dalichi Jitsugyo Co Ltd
Drexel Oilfield Services
Gardner-Denver Co
John Yu & Co
Larpera Holdings Group
Mahindra & Mahindra Ltd
Mid-Continental Supply Eastern Hemisphere Co
Miraksha Associates
Morris Corp
National Supply Co
Oiltools Intl Group
Pyramid Derrick Singapore Ltd
Satterthwaite & Co Ltd
Telec Electronics & Machinery Ltd
Tractors India Ltd
USS Oilwell Supply Co Intl Inc

RIGS - Survey, Geological/Geophysical

Atlas Copco Group
Drilquip Supply Pte Ltd
Drexel Oilfield Services
Far East Carbon Sdn Bhd
Gaekwar Enterprise
Gardner-Denver Co
Geoservices PT
Indian Drilling & Mining Co Pvt Ltd
Ingersoll-Rand Group
Lochta Services Pte Ltd
Menon Associates
Mid-Continental Supply Eastern Hemisphere Co
Oiltools Intl Group
Pyramid Derrick Singapore Ltd
Seismic Supply Pty Ltd
Technorade Intl Pte Ltd
Tractors India Ltd

RIGS - Workover
(Also see WORKOVER UNITS)
Asia Industries Inc
Drexel Oilfield Services
Lampira Holdings Group
Mahindra & Mahindra Ltd
Mid-Continental Supply Eastern Hemisphere Co

Morris Corp
Oiltools Intl Group
Pyramid Derrick Singapore

RISERS - Subsea

Apsco Pte Ltd
Asia Industries Inc
Cameron Iron Works Pte Ltd
Coflexip & Services Pte Ltd
Fuller & Kinnaird Ass.Ltd
National Supply Co
NL Rig Equipment
Vetco Singapore Ltd

ROADHEADERS

AEC Inc (Alpine Equipment Corp.)
Anderson Mavor Ltd
Baker Pruehle GmbH
Dusco Overseas Eng. Ltd
Fox Manufacturing Co. Div. Placer
Extraction Ltd
Kissl Mine Machinery Co Ltd
Tosmark Thyssen (Great Britain) Group
Thyssen (Great Britain) Ltd
Westfalia Luner

ROASTING FURNACES

See Drives And Axes, Pyrometallurgical Equipment, Sintering Machines

ROCK DUSTING EQUIPMENT

See Blows, Rock

American Mine Door
Avergesellschaft, Sub MSA Europe
Furukawa Rock Drill Sales Co Ltd
Mine Safety Appliances Co
Schwartz-Holywell Ltd
Standard Fiterbau Dr E Andreas GmbH & Co

ROCK MECHANICS INSTRUMENTS

Seegmiller Associates

ROCK PICK, MINING

AEC Inc (Alpine Equipment Corp.)
Consolidated Pneumatic Tool Co., Ltd
Furukawa Rock Drill Sales Co. Ltd
Heath & Sherwood Co
Pablex & Venables
SIG Schweizerische Industrie-Gesellschaft
Westfalia Luner

ROD MILLS

See Grinding Equipment

RODS

See Grinding Equipment, Welding Equipment

ROLLS, ROLLERS

See Crushers, Conveyors

ROOF BOLT DRILLING MACHINES

EIMCO (Great Britain) Ltd
FMC Corp. Mining Equipment Div.
France Loader
Furukawa Rock Drill Sales Co. Ltd
Gardner-Denver International, International Div
Joy Mfg. Co
Lee-Norse Co
Long-Airtox Co., Div. Marmon Group Inc
Mine Expert
Minex Mine-Expert
Montabert
Salzgitter Maschinen AG
Secoma
SIG Schweizerische Industrie-Gesellschaft
Oy Tampella AB, Tamrock Div
Titan Mfg. Co
Torque Tension Ltd
Vereinigte Edeltahlwerke AG
Vereinigte Osterreichische Alpine Montan Eisen- & Stahlwerke
Victor Products (Waltsend) Ltd.
Wirth & Co KG, Alfreid

ROOF SUPPORT

See Also Bolts, Rock, Props, Struts

1 Chain Link Fabric Lagging 2
Liners, Steel 3 Power Operated
Systems 4 Sets, Steel 5 Sets, Steel,
Yieldable

Bethlehem Steel Corp 4 5
Bochumer Eisennutze Heintzmann & Co 1 2 3 4 5
Deilmann-Haniel GmbH 2
Dusco Overseas Eng. Ltd 4 5
Dow, Mining Equipment Ltd 3 5
Gulick-Dobson Ltd 3
Gutenothnungnutte Sternrade AG 3
Hayden Nilos Contlow Ltd 5
Huwod-Irwin Co 3
Keene Corp 2 4 5
Klochner-Becorit GmbH 3
Minex Mine-Expert 3
Mitsui Mine Machinery Co Ltd
Schwartz-Holywell Ltd 1 4 5
Thyssen-Industrie AG, Umform-
Bergbau-Technik 1 3 5
Titan Mfg. Co. 2 4 5
Vereinigte Osterreichische Alpine
Montan Eisen- & Stahlwerke
Westfalia Luner 2 3 5

ROPE GUIDE EQUIPMENT

Barker, Davies & Co
Connellisville Corp
Deilmann-Haniel GmbH
Demag AG, ABT
Bergwerksmaschinen
Ishikawajima-Harima Heavy
Industries
Lifts Unlimited
Reliance Rope Attachment Co. Ltd.

ROPE, WIRE

1 Accessories 2 Locked Coil Ropes
3 Lubricants 4 Rope Testing
Devices 5 Spooling/Grooved Drums
6 Wire Ropes

ARMCO International Div. ARMCO
Steel Corp 6
Barker, Davies & Co 1
Bethlehem Steel Corp 1 6
British Ropes Ltd 1 2 6

Broderick & Bascom Rope Co. 6
Century Oils Ltd 3
Dillon & Co Inc, W. C. 1 4
Frontier-Kemper Constructors 6
Jones & Laughlin Steel Corp 6
Kuenkampff, Gebrueder 6
Lebus International Engineers, Inc.
5
Lifts Unlimited 1 2 6
Macwhyle Wire Rope Co. 1 3 6
Pheips (Dodge International Corp. 6
Reliance Rope Attachment Co. Ltd.
1
Sauerman Bros Inc 1
Spencer & Sons Ltd, Matthias 1
SSP Construction Equipment 1
U.S. Steel Corp. 2 5 6

ROPE - Natural or Synthetic

Bridon Group
Eastern Lloyd Pte Ltd
Lam Hong Pto Ltd

ROPE - Wire

Aker Group
Amon Industries Corp
Anglo-American Corp
Atracon Pte Ltd
Bayliss Intl Pty Ltd
Berjaya Kawat Bhd
Bridon Group
Carl Bauer & Co
Crompton Greaves Ltd
Drexel Oilfield Services
Eastern Lloyd Pte Ltd
Fuller & Kinnaird Ass.Ltd
International Engrg Co Ltd
John Yu & Co
Lam Hong Pte Ltd
Mahindra & Mahindra Ltd
Material Trading
Mid-Continental Supply
Eastern Hemisphere Co
National Supply Co
Neil Company, EJ
Pododjojo, PT
Satterthwaite & Co Ltd
United Engineers
USHA Martin Black Ltd
Whyte & Co Sdn Bhd
World-Wide Offshore Services
Pte Ltd

ROTARY TABLES (see TABLES-Rotary)

RUBBERS - Drillpipe

Drexel Oilfield Services
Miraksha Associates
RUBBER LINING

1 Chutes 2 Flotation Equipment 3
Grinding Mills 4 Pumps 5 Screens 6
Skips 7 Truck Bodies

Allen Group Inc, The 1 7
Clouth Gumminwerke AG 1 2 3 4,
5 6
Continental Gummi-Werke AG 1
Gates do Brasil SA 1 3 4 5 6 7
Gates Rubber International 1 5
BFGoodrich International 1 2 3 4 5,
6 7
Goodyear International Corp. 1
Hein Lehman AG 5
Holz Rubber Co. 1 4 5
Ingersoll-Rand Co 4
Joy Mfg. Co 4
Minemet Industrie 2
Nilos GmbH, Förderband-
Ausrüstung 1 5
Schmelzbasaltwerke Kalenborn 1 2,
5
Skega AB 1 2 3 4 5 6 7
Tip Top Stahigruber 3
Trelleborgs Gummitfabriks AB 1 2,
3 4 5 6 7
Unroyal Inc 1
Vickers Australia Ltd, Ruwolt Div
1 2 3
Warman Equipment (International)
Ltd 1 2 3 4 5
Wilkinson Process Linatex Rubber
Co Ltd 1 5

RUBBER PRODUCTS

See Belts, Hoses, Conveyor Equipment,
Grinding Equipment, Safety Equipment,
Screens, Tires

RUST PREVENTIVES

Air Products & Chemicals Inc
Ballagh & Thrall Inc
Century Oils Ltd
Du Pont de Nemours & Co. Inc., E
Miller Corp, Harry

SAFETY EQUIPMENT

1 Air Sampling Equipment 2 Alarms
and Warning Systems 3 Apparel 4
Audio Dosimeters 5 Boots and
Shoes 6 Cryogenic "Clean Air"
Breathers 7 Fire Detection 8 Fire
Fighting 9 First Aid Supplies 10
Floodlight, Compressed Air 11
Foam-Making Machines 12 Gas
Detection Equipment 13 Gas Masks
14 Goggles and Glasses 15 Harness
16 Hats 17 Hearing Protectors 18
Hydraulic Rescue Kits 19 Mine Hoist
Control 20 Non-Sparking Tools 21
Respirators 22 Rock Dusting
Equipment 23 Self-Contained
Oxygen

Air Products & Chemicals Inc. 14
American Mine Door 22
American Optical Corp.,
International Div 3 14 16 17 21
Anderson Mavor Ltd 2
ASEA Inc, Mining & Industrial
Transport 19
Avergesellschaft, Sub MSA Europe
1 2 3 4 8 9 11 12 13 14 15 16,
17 21 22 23
Beckman Instruments Inc 1
Becorit (GB) Ltd 11
BICC Ltd 1 2 7
Brown, Boveri & Cie AG, Industrial
Plants Div 19
Cnapman Ltd, Clarke, International
Combustion Div 2
Connellisville Corp 19
Conrac Corp 7
Davis & Son, Ltd, John 1
Den Norske Kjemfabrik A/S 22
Dillon & Co Inc, W. C. 2 19
Dragerwerk AG 1 7 8 11 12 19 21
Du Pont de Nemours & Co. Inc., E
1 1 4 12
Engineering Equipment Co. Div of
Auto-Weigh Inc 12 21
Exel Oy 17
Faun-Werke Nurnberg 8
Godwin & Warren Engineering Ltd
19
Goodall Rubber Co 2 5 8 9 14 16
BFGoodrich International 3 16
Hayden Nilos Contlow Ltd. 8
Huwod-Irwin Co 3
Ingersoll-Rand Co 7 22
Ishikawajima-Harima Heavy
Industries 2
Kawasaki Heavy Industries Ltd,
Construction Machinery Div 6 7
Lintott Engineering Ltd 19
Logan Actuator Co 19
Martin Decker Co 2
Mine Safety Appliances Co 1 2 3,
4 7 8 9 11 12 13 14 15 16 17,
18 21 22
Mine Safety Appliances Co Ltd,
Afric MSA Europe 2 3 7 12 14,
16 17 21 22
Montan-Forschung 1
Motoren Werke Mannheim AG 8
National Mine Service Co 1 2 7 8,
9 11 12 13 14 16 17 20 21 22,
23
Olonam France SA 1 11
Philips Gloeilampen Fabrieken, N.V.,
Science & Industry Div 12
Pyott-Boone Inc 2 7 8 12
Rock Tools Inc 20
Roxon Oy 21
Safety Weld Inc 3 5 9 13 14 16,
17 21
Sala Minco 15
Schubert Werk GmbH & Co KG
16
Schwartz-Holywell Ltd 22
Sieger Ltd 2 & 5 12
SILFC, Signalisation Industrielle Div
2 12
Titan Mfg. Co 22
Transonic Ad 10
Trelleborgs Gummitfabriks AB 13
21
Union Carbide Corp 14
Unroyal Inc 3 5 8 16
Westinghouse Brake & Signal Co
Ltd, Signal & Mining Div 2 19
Westinghouse Electric Corp 2
Wilson Products Div, ESB Inc
3 13 14 16 17 21

SAFETY PRODUCTS & EQUIPMENT

-Industrial

(also see FIRE FIGHTING & PROTECTION)

Aelcorp Pvt Ltd
All Indotrade, PT
American Optical Co Pte Ltd
Angus Fire Armour Ltd
Applied Equipment Ltd
Aqua-Terra Group
BBC Brown Boveri Group
Bestobell Group
Boswell Intl
Central Industrial Suppliers Pte Ltd
Commonwealth Industrial Gases Ltd
Electro Build
Galaxie Specialities Pte Ltd
Guthrie Engineering
Hongkong Oxygen & Acetylene Co Ltd
Malaysian Oxygen Bhd
Marine & Onshore Trading Co
Mechanical & Comb Engrg Co
MSA SEAsia Pte Ltd
National Industrial Gases Corp
Noa Group
Pan Pacific Industrial Sales Co Inc
Pipeline Engrg Pte Ltd
Rig-Marine Supplies Ltd
Sea Supply Pte Ltd
Singapore Oxygen Air Liquide Pte Ltd
Taylor Stanley Pte Ltd
Thai Industrial Gases Ltd
Unitor Ships Service

SAWS, POWER

See Also Tools, Air Driven

1 Chain Saws 2 Powered Hand Saws

Allis Chalmers Cement & Mining
Systems Div. 1
Consolidated Pneumatic Tool Co.,
Ltd. 1
Sandvik Canadian Ltd., Wear Parts
Div. 12

SAMPLERS

Allis Chalmers, Cement & Mining
Systems Div.
Apparatus Dragon
Atlas Copco AB
Averpessellschaft, Sub MSA Europe
Belton Inc
Gilson Screen Co
Heath & Sherwood Co
Johnson Progress Ltd
Joy Manufacturing Co
Joy Manufacturing Co., Denver
Equipment Div.
Joy Manufacturing Co. (UK), Ltd.,
Denver Equipment Div.
Kopex Export-Import
Machinesport V. O.
McNally Bharat Engineering Co
Ltd.
Minemet Industrie
Mineral Deposits Ltd
Mitsubishi Metal Corp
National Mine Service Co
Outokumpu Oy, Technical Export
Div.
Sala International
Sala Mine
Warman Equipment (International)
Ltd.
Wesernutte AG, Eisenwerk

SCALES

**1 Automatic in Motion Weighing and
Belt 2 Crane 3 Electronic 4
Laboratory 5 Nuclear 6 Portable
Weighbridge 7 Truck and Railroad 8
Vehicle on-Board Load Indicators**

ASEA Inc., Mining & Industrial
Transport 1,2,3
Cary Instruments Ltd. 1,2,4,6,7
Dillon & Co Inc., W.C. 1,2,3,6,8
Engineering Equipment Co. Div of
Auto Weigh Inc. 1,3
Fisher Scientific Co. 4
Gilson Screen Co. 4
Häminco Maschinenfabrik 3,6,7
Howe Richardson Scale Co. 3,6,7
Kay-Ray Inc. 5
Martin Decker Co. 2,3,4,6,7,8
Maschinenbau Louise GmbH 1
Merrick Scale Mfg. Co. 1,3
Mitsubishi Steel Mfg. Co. Ltd. 2,4,
5
Norstom Norcontrol AS 5
Ohmart Corp., The 1,3,4,5
Philips Gloeilampen Fabrieken, N.V.
Science & Industry Div. 1,2,3,7,8
Reardon Inc. 1
Schneck AG, Carl 1,2,3,7
Seymours AG 1,2
Soudate Ltd. 2,3,6,7
Westinghouse Brake & Signal Co.
Ltd., Signal & Mining Div. 1

SCALING EQUIPMENT

Getman Corp
Mecanique Specialisee, la
Roch Tools, Inc.
Secoma

SCRAPERS

See Also Excavators, Tractors and
Attachments

Clark International Marketing S. A.
Deere & Co
Demag AG, ABT
Bergwerksmaschinen
Demag verdichter &
Drucklufttechnik GmbH
Fiat Allis Corp., Construction
Machinery Inc
General Motors, Terex Div
Komatsu Ltd
Krupp GmbH, Fried. Krupp
Industrie und Stahlbau
Sandvik Canadian Ltd., Wear Parts
Div.
Sauerman Bros Inc
Scaw Metals Ltd.
WABCO Construction & Mining
Equipment
WABCO Manufacturing SA

SCRAPERS - Casing

Borneo Oil Tool Co
Daiichi Jitsugyo Co
Dobson & Co Pty Ltd
Fuller & Kinnaird Associates Ltd
Grant Oil Tool Co
Morris Corp
Tri-State Oil Tool SA

SCRAPERS - Pipeline
(See FIGS or PIPELINE EQUIPMENT SUPPLIES)

SCREENS - Oil & Gas Well

Apsco Pte Ltd
B & B Oil Tools Intl
Drexel Oilfield Services
Geosupply PT
Johnson Screen Div
Lynes SEA Ia Pte Ltd
Seismic Supply Pty Ltd
Surescreen Mfg Co Pty Ltd

SCREENS, GRIZZLIES AND ACCESSORIES

1 Bar Screens 2 Cloth, Woven 3 Enclosed 4 Heated 5 Perforated Metal 6 Polyurethane 7 Resonance 8 Revolving Screens 9 Roller 10 Rubber and/or Rubber Covered Screens 11 Shaking and Vibrating Screens 12 Spray Nozzles 13 Stationary Screens and Grizzlies 14 Wire, Woven

AMF Incorporated 14
Allis-Chalmers, Cement & Mining Systems Div 8 9 13
Allis-Chalmers, Crushing & Screening Div 1 3 4 5 8 10 11 12 13
Appareis Dragon 1 3 4 8 10 11 13
Athey Products Corp 2 11
Aveling-Barford Ltd 1 2 3 8
Babcock & Wilcox Ltd 1 2 11 14
Bateman Ltd, Edward L 1 2 3 6 10 11 12 13 14
Bavaria Maschinenfabrik GmbH & Co 5 8 11 12 13 14
BICO Inc 11
Bibby Zimmer Engineering Co 1 8 11 13
Boxmag-Rapid Ltd 11
Brown, Lenox & Co Ltd 1 5 11 13 14
Buckau-Wolff Maschinenfabrik AG 4 9
Card Corp 8
Cleveland Wire Cloth & Mfg. Co., The 2 14
Connellsville Corp 11
Deister Concentrator Co, Inc 11 12
Deister Machine Co, Inc 3 4 11
Derrick Mfg Corp 3 11
Dorr Oliver Inc 1 13
Dresser Industries Inc., Industrial Equipment Div 1 8 11
Eriez Magnetics Ltd 11
Esch-Werke AG 1 8 10 12
Fives Cail Babcock 4 7 8 11 13
FMC Corp, Material Handling Equip Div 1 11 13
Fox Manufacturing Co., Div Placer Exploration Ltd 1

Fuller Co 13
Furukawa Mining Co Ltd., Machinery Sales Div 1 2 3 5 11 12 13 14
Gates Rubber International 10
GEC Mechanical Handling Ltd 1 2 3 4 8 11
Grantnam Electrical Engineering Ltd 3 4 5 10 11 13 14
Greening Ltd, N 1 2 5 7 8 13 14
Gruendler Crusher & Pulverizer Co 3 4 8 11 13
Hammermills Inc., Sub Pettibone Corp 8 11 13
Hein Lehman AG 1 2 6 7 10 14
Hendrick Mfg Co 5 6 10
Hewitt-Robins 3 4 11 13
Holz Rubber Co 10
IBAG Internati Baumaschinenfabrik AG 1 2 3 5 6 7 8 9 10 11 12 13
IFE GmbH & Co KG 7 11 13
International Handling BV 1 2 3 4 5 11 13
Jenkins of Retford Ltd, Mbr Babcock & Wilcox Ltd Gp 11
KHD Industriemagazin AG, Humboldt WEDA G 1 4 7 11 13
Kawasaki Heavy Industries Ltd., Construction Machinery Div 1 6 8 9 10 12
Kawasaki Heavy Industries Ltd, Machine Sales Div 1 11 13
Kobe Steel Ltd 1 3 8 10
Kone Corp 1 3 5 6 7 8 9 10 11 13
Krebs Engineers 11
Krupp GmbH, Fried Krupp Industrie- und Stahlbau 1 5 11 13
Kulenkampff Gebruder 1 2 10 14
Kurimoto Iron Works Ltd 1 7 8 11 12 13
Locker Industries Ltd 3 4 7 11
Machinexport V O
Magco Ltd 1 11
McNally Bharat Engineering Co Ltd 1 11 13
McNally Pittsburg Mfg. Corp 5 11 13
Mineral Deposits Ltd 6 12
Mintec International, Div Barber-Greene Co 11
Morgardshammer AB 11
Moss (Pty) Ltd, George 13
National Filter Media Corp 2
Nikel 10
Nilos GmbH, Forderhand-Ausrustung 6 10
Osborn (South Africa) Ltd, Samuel 1 2 3 5 6 10 11 12 13 14
PORTEC Inc., Pioneer Div 5 8 11 12 13
Production Equipment Ltd 1 2 3 4 5 11 14
Rauma-Repola Oy Lokomo Div 3 11 13
Rauma-Repola Oy Pori Div 1 5 8 10 12
Reiter & Crippa SNC 1 11 12 13
Reynold Inc 1 2 11 13 14
Reynold Inc, Process Machinery Div 11 13

Reynold Inc., Vibrating Equipment Div 11
Roxon Oy 1 2 3 10 11 13
Saulas & Cie 2
Scandura Ltd 6
Schenck AG, Carl 7 10 11 13
Sheepbridge Equipment Ltd 1 11
Simplicity Engineering Co 1 2 3 4 11
Sturtevant Mill Co 11
Svedala Arbra AB 1 2 3 5 7 10 11
Teismith, Div Barber-Greene Co 11
Towa Senkoki Co, Ltd 5
Tremborgs Gummifabriks AB 3 6 10
Tyler Inc, W S 1 2 3 4 6 10 11 14
Underground Mining Machinery, Ltd 10
Universal Oil Products, Jonsson Div 1 2 6 11 13 14
Vibranelic Inc 1 11
Vickers Australia Ltd, Ruwolt Div 10 12
Victaulic Co of America 12
VIOEST Alpine 1 2 7 8
Warman Equipment (International) Ltd 8 13
WEMCO Div, Envirotech Corp 13
Weserhutte AG, Eisenwerk 1 2 6 8 9 10 11 13 14
Wilkinson Process Linatex Rubber Co Ltd 10

SCRUBBERS

See also Testators and Conditioners, Engine Exhaust Conditioners
1 Bag Houses 2 Gas, Air 3 Mineral Washing 4 Paddle Mill
AAF Ltd 1 2
Anstrom Oy, A Yarkaus Engineering Works 1
American Air Filter Co., Inc 1 2
American Precision Industries, Distex Div 1
Appareis Dragon 3
Bateman Ltd, Edward L 1 2 3 4
Bavaria Maschinenfabrik GmbH & Co 3
Carborundum Co, The 2
Donaldson Co, Inc 1 2
Dust Suppression Ltd 2
Fsch-Werke AG 2
Fuller Co 2
Furukawa Mining Co Ltd., Machinery Sales Div 2 3
GEC Mechanical Handling Ltd 3 4
Head Wrightson & Co, Ltd 1 2
Hell Process Equipment Corp., Fiberglass Equip Div Dart 2
Howden & Co Ltd, James 2
Hudswell, Clarke & Co, Ltd 2
Hunslet Ltd 1
IBAG Internati Baumaschinenfabrik AG 2
Joy International S A 1
Joy Manufacturing Co 1 2
Joy Manufacturing Co., Western Precipitation Div 1 2
Joy Manufacturing Co. (U.K.), Ltd., Denver Equipment Div 2
Kobe Steel Ltd 2
Knoppers Co, Inc, Hardinge Oper 3
Kurimoto Iron Works Ltd 3
Mineral Deposits Ltd 3

Neyrtec, Alstom-Atlantique 3
Niro Atomizer, Inc. 2
Osborn (South Africa) Ltd., Samuel
3

Peabody International Corp 2
Reynold inc 2
Standard Filterbau, Dr E Andreas
GmbH & Co 1 2
Stansteel Corp., Sub. Allis Chalmers
Corp. 1
UNIKAT AB 1
Union Carbide Corp 2
Vickers Australia Ltd., Pwafit Div. 2
Warman Equipment (International)
Ltd 3 4

SEALANTS - Tank Farm

Resource Consultants Pte Ltd

SEALS - Mechanical

Ace Equipment Pte Ltd
Borg-Warner Intl Corp
Chong Fung Material Supplier
Garlock Inc
Pasig Industrial Sales Corp

SEALS & SEALANTS

(also see COMPOUNDS or GASKETS or
HARDWARE)

Aqua-Terra Group
Chimico Pte Ltd
Lone Star Pte Ltd
Marine & Onshore Trading Co
Pernas-Sime Darby Sdn Bhd
Sea Supply Pte Ltd
Tat Lee Engrg Pte Ltd

SECONDARY RECOVERY EQUIPMENT

(also see REMEDIAL & STIMULATION EQUIP-
MENT)

Apsco Pte Ltd
Baker Oil Tools Group
Brown Oil Tools Inc
Carco Inc

SELF-LOADING TRANSPORT

1 Autoloader 2 Front End Loader 3
Scoop

Allis Chalmers (Cement & Mining
Systems Div. 2

Appareils Dragon 1
Atlas Copco AB 1 2
Caterpillar Tractor Co. 2
Eaton Corp. 2
EMCO (Great Britain) Ltd. 2
Eimac Corp. of New Mexico 2 3
France Loader 3
Gutenofnungshutte Sterkrade AG
1 2 3
Huwod-irwin Co. 3
Joy International S. A. 2
Joy Mig. Co. 2
Marathon L'etourneau Co., Longview
Div. 2
Marathon Manufacturing Co. 2
Perusyntha Oy, Auran
Rautateollisuus 2
Realisation Equipments Industriels
1 2
Schopf Maschinenbau GmbH 2 3
Walker Mining Equipment Co. 2 3

SEPARATORS

See also Magnetic Equipment, Classifiers,
Concentrators

1 Air 2 Electrostatic 3 Gravity 4
Optical

AAF Ltd 1 2
Air Products & Chemicals Inc. 1
Allis Chalmers, Cement & Mining
Systems Div. 3
American Can Co. 1
Baleman Ltd., Edward L. 1 2 3
Bavaria Maschinenfabrik GmbH &
Co. 3
Berry Co. 1 3
Boxmag-Rapid Ltd. 2
Carco 2
Combustion Engineering, Inc. 1
Dresser Concentrator Co., Inc. 3
Dresser Industries Inc. 1 2 3 4
EMCO Div. Envirotech Corp. 3
Fives-Cail Babcock 1 3
Fuller Co. 1
GEC Mechanical Handling Ltd. 3
Gruendler Crusher & Pulverizer Co.
1
Heil Process Equipment Corp.,
Fiberglass equip Div. Dart 3
Ingerson-Rand Co. 1
KHD Industriemagen AG, Humboldt
WEAG 1 2 3
Kawasaki Heavy Industries Ltd.,
Construction Machinery Div. 1
Kawasaki Heavy Industries, Ltd.,
Machine Sales Div. 1
Kobe Steel Ltd. 1
Kone Corp. 2
Kurimoto Iron Works, Ltd. 1 3
Lozan Actuator Co. 1
McNally Bharat Engineering Co.
Ltd. 1
Mineral Deposits Ltd. 2 3
O & K Orenstein & Koppel AG,
Werk Ennigerloh 1
Ore Sorters Africa Pty Ltd. 4
Polysius Werke 1
Reynold Inc. 3
Rheax Chemie & Metall GmbH 3
Roxon Oy 1
Sala International 2
Sala Minco 2
Saulis & Co. 3
Standard Filterbau, Dr E Andreas
GmbH & Co. 1 3
Sturtevant Mill Co. 1
Warman Equipment (International)
Ltd. 3
Willley Mining Machinery Co. Ltd.,
The 3

SEPARATORS - Gas Oil & Water

Aker Group
Applied Engineering Pte Ltd
Avery-Laurence Group
BS & B Pte Ltd
C-E Natco Intl Ltd
Porta-Test Systems Engrg Pte Ltd
Progress Engineering Pte Ltd
Sembawang Engrg Ltd

SERVICE STATION EQUIPMENT

Atlas Steel & Engrg Co
Connell Bros Co Ltd
Dresser Wayne, Petroleum Equip.Div
Elite Industrial Corp
Engineering Equip Inc
George Kent Group
Gilbarco Australia Ltd
Ippilo,PT
Treloar & Sons Pty Ltd
United Machinery Co Ltd
Wallace Ltd

SETS, STEEL

See Steel

SEWAGE DISPOSAL

1 Surface 2 Underground

Allis-Chalmers, Cement & Mining
Systems Div. 1
Bateman Ltd., Edward L. 1
Dresser Industries Inc., Industrial
Equipment Div. 1
EIMCO, Div. Envirotech Corp. 1,2
Kaiser Engineers 1
Peabody International Corp. 1,2
Warman Equipment (International)
Ltd. 1,2

**SEWAGE & EFFLUENT TREATMENT PLANT
& EQUIPMENT**

Alliance Engrg Co Pte Ltd
Environ Sdn Bhd
Felmar Pte Ltd
Hamworthy Engrg Ltd
Hargill-Weir Engrg Services
Mata & Co Inc,BP
Salcon Group
Transerve
United Engineers
Weir Pumps Ltd
Will on Walton Intl

SHOCKLES (see FITTINGS)

SHAFT-MOUNTED DRIVES

See Also Drives, Gears, Open Gearing

ASEA Inc. Mining & Industrial
Transport
Brown, Boveri & Cie AG, Industrial
Plants Div
Demag AG, ABT
Bergwerksmaschinen
Demag verdichter &
Drucklufttechnik GmbH
Dresser Industries Inc. Industrial
Equipment Div
Dresser Industries Inc., Power
Transmission Div
Eaton Corp
Fenner & Co Ltd, J. H.
Fluidrive Engineering Co., Ltd
FMA, Corp. Drive Div
Kawasaki Heavy Industries Ltd.,
Machine Sales Div
Morganshammer AB
Philadelphia Gear Corp
Reliance Electric Co. Dodge Div
Sai Mine
Westnulle AG, Eisenwerk

SHAFT SINKING

1 Cages 2 Contractors 3 Equipment
4 Jumbos 5 Muckers 6 Rope
Balance Suspension Equipment 7
Skips and Buckets 8 Steel Forms

AEC Inc. (Alpine Equipment Corp.)
3
Barker, Davies & Co. 6
Barlows Heavy Engineering Ltd. 7
Bernold AG 8
Calweid Div. Smith International
Inc. 4
Card Corp. 1,3,6,7
Cementation Mining Ltd. 2,3,5,6,7
8
Connellsville Corp. 1,6,7
Diekmann Manie' GmbH 2,3,7,8
Demag AG, ABT
Bergwerksmaschinen 6,7
Demag verdichter &
Drucklufttechnik GmbH 6,7
EIMCO (Great Britain) Ltd. 5
Fives-Cail Babcock 1,6,7
Fox Manufacturing Co., Div. Piacer
Exploration Ltd. 1,7,8
Frostner-Kempfer Constructors 2
Furukawa Rock Drill Sales Co. Ltd
4
Gardner-Denver International,
International Div. 3,4,7
Gutehoffnungshutte Sternkrade AG
1,6,7,8
Ingersoll-Rand Co. 4
Kopeks, Export-Import 1,2,3,6,7
Linden-Amiak AB 3,4,5
Mitsui Mine Machinery Co. Ltd
Moss (Pty.) Ltd. George 1,7,8
Parsons Chain Co. 6
Reopatt. Corp. 1,5,2
Reliance Kope Attachment Co. Ltd
6
Robbins Co. The 3
Thyssen (Great Britain) Ltd. 1,2
VOLST-Alpine 1,3,7,8
Westhalla Lohne 3
Zem Drilling Co. 2

**SHAKERS (see MUD SYSTEMS
AND EQUIPMENT)**

**SHARPENERS AND GRINDERS,
ROCK BIT AND STEEL**

Atlas Copco AB
Boart (UK) Ltd
Furukawa Rock Drill Sales Co. Ltd.
Grinder AB
Krupp GmbH, Fried, Krupp Widia
Fabrik
Mindrill Ltd
Mine Expert
Secoma

SHEAVES

See Blocks and Sheaves

SHIP LOADING AND UNLOADING

Appareils Dragon
ASEA Inc. Mining & Industrial
Transport
Aumund Forerderbau GmbH
British Hopway Engineering Co
Ltd
Demag AG, ABT
Bergwerksmaschinen
Demag Fordertechnik GmbH
Demag Lauchhammer Masch &
Staubau GmbH
Demag verdichter &
Drucklufttechnik GmbH
Fives-Cail Babcock
Fuller Co
Furukawa Mining Co. Ltd.,
Machinery Sales Div
Heyl & Patterson, Inc.
Kone Corp
Krupp GmbH, Fried, Krupp
Industrie-Und Staibau
M. A. N.
McDowell-Weiman Engineering Co
Mitsui Mine Machinery Co. Ltd
O & K Orenstein & Koppel AG
Production Equipment Ltd
Reparation Equipments Industriels
Sagzitter Maschinen AG
Westnulle AG, Eisenwerk

SHOES - Casing/Float/Guide

Apache Sdn Bhd
Apsco
Baker Oil Tools Group
Ex-1n Hong Kong Ltd
Halliburton Ltd

SHOES - Potary

Tri-State Oil Tool SA

SHOES - Washover

Tri-State Oil Tool SA

SHORTWALL MINERS

AEC Inc. (Alpine Equipment Corp.)
Anderson Mayer Ltd
Dobco Overseas Eng. Ltd
Joy Mfg. Co
Lee Morse Co
Machinexport
Mines Mine Expert
Mitsui Mine Machinery Co. Ltd
Westhalla Lohne

SHOVELS, POWER

1 Diesel 2 Electric 3 Hydraulic 4
Parts & Attachments for Above 5
Trailing Cable Reels 6 Wrist-Action
Buckets

ASEA Corp. 4
Babbcock & Wilcox Ltd. 1,2
Bucyrus Erie Co. 1,2,4,5
Caterpillar Tractor Co. 3
Dresser Industries Inc. Marion
Power Shovel Div. 1,2,3,4
Eaton Corp. 4
FMA Corp. Crane & Excavator Div.

Furukawa Mining Co. Ltd
Machinery Sales Div 3
Gutenhoffnungshutte Sterkrade AG

Harnischfeger Corp 1 2 3
Hitachi Construction Machine Co.
Ltd 1 3

Kawasaki Heavy Industries Ltd
Machine Sales Div 3 4
Kobe Steel Ltd 1 2 3
Kochring Co 3

Komatsu Ltd 1
Mitsui Power Shovel Co. Inc.
Mitsubishi Heavy Industries Ltd 1
Mitsubishi Steel Mfg Co. Ltd 3 4

Northwest Engineering Co 1 3
O & K Orenstein & Koppel AG 3
Ruster-Busyros Ltd 1 2 3
Schwarz-Holywell Ltd 3

Weserhutte Otto Wolff GmbH 1 2 4
Westfalia Lünen 2

SHUTTLE CARS

See Also Underground Haulage Units Off
Track

Babcock & Wilcox Ltd
FMC Corp Mining Equipment Div
Fox Manufacturing Co. Div. Placer
Exploration Ltd

Goodman Equipment Corp
Gutenhoffnungshutte Sterkrade AG
Haglund & Soner AB Trucks &
Mining Machinery Div

Joy International S. A.
Joy Mfg. Co.
Moss (Pty.) Ltd. George
National Mine Service Co

SILENCERS, MUFFLER

AAF Ltd
American Air Filter Co. Inc.
Becor (GB) Ltd
Donaldson Co. Inc.
Primo Sales Corp

S.G. Schweizerische Industrie-
Gesellschaft
Standard Filterbau Dr E Andreas
GmbH & Co

Thyssen (Great Britain) Ltd

SINKERS

See Drills, Rock Blast Hole

SINTERING MACHINES

See Also Pyrometallurgical Equipment,
Driers And Kilns, Pelletizers

Esch-Werke AG
Gutenhoffnungshutte Sterkrade AG
Head Wrightson & Co. Ltd
HMD Industriemagazin AG, Humboldt
WEGAG

Kawasaki Heavy Industries Ltd,
Machine Sales Div
Krupp GmbH Fried Krupp
Industrie und Stahlbau

Lurgi Gesellschaften
Machinery Export V. Co.
M. Decker, Werhman Engineering Co
P. H. S. Werke
V. E. S. A. B. one

SKIPS

See Hauling Equipment

SLACKLINES

See Excavators

SLEEVES -Hose(see FITTINGS)

A-1 Bit & Tool Co Ltd
Aqua-Terra Group
Borneo Oil Tool Co
Inter-Mega

Lucey Export Supply Ltd
Mid-Continent Supply Eastern
Hemisphere Co

Mission Mfg Co
Oiltools Intl Group
Tri-State Oil Tool SA
Varco Intl Inc

SLINGS

See Rope, Wire

SLUSHERS

See Excavators, Hauling Equipment,
Scrapers

SMELTING & REFINING EQUIPMENT

See Pyrometallurgical Equipment

SNOW REMOVERS

See Tractors And Attachments

SPEARS - Casing, Drill Collar or Packer Retriever (also see TOOLS, OILFIELD-Fishing)

A-1 Bit & Tool Co Ltd
Tri-State Oil Tool SA

SPECTROMETERS

Du Pont de Nemours & Co. Inc. I.

Geometrics
Hitachi Ltd
McPhar Geographics Ltd
Philips Groenlandse Fabrieken N.V.

Science & Industry Div
Varian Associates, Instrument Div
Zeiss Carl

SPEED CHANGERS, INCREASERS AND/OR REDUCERS

ASEA Inc. Mining & Industrial
Transport

Borg Warner, Rockford Clutch Div
Dresser Industries Inc., Industrial
Equipment Div

Dresser Industries Inc., Power
Transmission Div
Eaton Corp

Eickhoff Maschinenbau-Eisenwerkerei
Fenner & Co. Ltd. J. H.
Ingersoll Rand Co.
Litton Industrial Products, Inc.

Louis Allis Div
Mitsui Mike Machinery Co. Ltd
Philadelphia Gear Corp

Reliance Electric Co., Dodge Div
Taim SA
Warman Equipment (International)
Ltd.

SPIDERS - Casing

Mid-Continent Supply Eastern
Hemisphere Co
Tri-State Oil Tool SA

SPINNERS - Kelly

Asiatic Tool Co Ltd

SPOOLS - Drilling

Apsco (Asia) Pte Ltd

SPOOLS - Pipe

Patra Vickers, PT

STABILIZERS - Drill Collar/Pipe

American Coldset Corp
Azim Mannan Ltd
Bayliss Intl Pty Ltd
Christensen Diamond Products Pte Ltd

Dobson & Co Pty Ltd
Drexel Oilfield Services
Fuller & Kinnaird Ass. Ltd
Grant Oil Tool Co

LOR Intl Pte Ltd
Mid-Continent Supply Eastern
Hemisphere Co

Miraksha Associates

Morris Corp
Oiltools Intl Group
Shusta & Shamber

Sil Drilco
Sill Servco
SMF Intl

Tri-State Oil Tool SA

STACKERS AND SPREADERS

1 Coal 2 Metal (Ore)

Atney Products Corp 1 2

Babcock-Moxey 1 1 1 2

Babcock & Wilcox Ltd 1 2

Bateman Ltd, Edward L 1 2

British Ropeway Engineering Co
Ltd 1 2

Buckau-Wolf Maschinenfabrik AG 1,
2

Demag Fordertechnik GmbH

Demag Lauchhammer Masch &
Stahlbau GmbH 1 2

Dresser Industries Inc., Industrial
Equipment Div 1 2

Fives-Cail Babcock 1 2

Fox Manufacturing Co., Div. Placer
Exploration Ltd 1 2

Furukawa Mining Co. Ltd,
Machinery Sales Div 1 2

Hanson Co., R. A. Mining Div 1 2

Heyl & Patterson, Inc 1 2

Hitachi Ltd

International Handling BV 1 2

Kone Corp 1 2

Krupp GmbH Fried Krupp
Industrie und Stahlbau 1 2

Long-Arnox Co., Div. Marmon
Group Inc 1

M. A. N. 1 2

Marathon Manufacturing Co 1 2

McNary Inaral Engineering Co
Ltd 1

McNary Pittsburg Mfg Corp 1

Minter International Div. Barber-
Greene Co 1 2

Mitsui Mike Machinery Co. Ltd
O & K Orenstein & Koppel AG 1 2
Production Equipment Ltd 1 2

Realisation Equipments Industriels
1 2
Salzgitter Maschinen AG 1 2

Siracran & Henshaw Ltd 1 2
Taim SA 1 2
Weserhutte AG Eisenwerk 1 2

STARTERS, COMPRESSED AIR FOR DIESEL ENGINES

Stanadyne Inc., Hartford Div

STARTING SHEETS

1 Blanks 2 Machines

Outokumpu Oy, Technical Export
Div 2

STEEL

See Also Bars

1 Alloy Steel 3 Drill Steel 4 Drill
Steel Couplings 5 Drill Steel,
Integral 6 Drill Steel, Rubber Collars

7 Drill Steel, Sectional 8 Sets,
Support

ARMCO International, Div. ARMCO
Steel Corp 1

Atlas Copco AB 3 4 5
Bernold AG 2 8
Bethlehem Steel Corp 1 2 3

Boart (UK) Ltd 3 4 5 6 7
Bochumer Eisenhutte Heintzmann
& Co 2 8

Bohler Bros & Co Ltd 3 4
Brunner & Lay 3 4 5 7
CF&I Steel Corp 1

Christensen Diamond Products 3
Commonwealth Steel Co., Ltd 1
Creusot Loire 1

Dosco Overseas Eng Ltd 2
Drilco Industrial, Div. Smith
International Inc 3 5

Engineered Equipment Co 1
Fagersta Secoroc AB 3 4 5 7
Furukawa Mining Co. Ltd,
Machinery Sales Div 1

Furukawa Rock Drill Sales Co. Ltd.
3 4 5
General Electric Co., Carbonyl
Mining Products Sect 3 4 5 7

Hayden Niles Conflow Ltd 2
IBAG Internatl Baumaschinenfabrik
AG 8

Ingersoll-Rand Co 3
Jones & Laughlin Steel Corp 1 3

Kay Rock Bit Co 4
Kennametal Inc 3 4
Koken Boring Machine Co 3 4

Long-Arnox Co., Div. Marmon
Group Inc 3
Marathon Lefourneau Co., Longview
Div 1

Mitsubishi Metal Corp 3 4 5 7
Mitsubishi Steel Mfg Co., Ltd. 3
Osborn (South Africa) Ltd., Samuel
1

Pardley & Venables 3 4 5
Rauma Repola Oy, Lokomo Div 1
Reed Tool Co., Drilling Equipment
Div 3 4

Sandvik Canadian Ltd., Wear Parts
Div 1 3

Schwartz-Holywell, Ltd. 2
Spencer & Sons Ltd., Matthias 3
Thyssen Industrie AG, Umform

Bergbautechnik 2 8
Timkin Co., The 1 3
Titan Mfg Co 2 8

Toyo Kogyo Co Ltd 3 5
U.S. Steel Corp 1 3
VR Wesson Div of Fansteel 3 4 5 7

Vereinigte Edelstahlwerke AG 3 4 5
Vereinigte Osterreichische Alpine
Montan Eisen- & Stahlwerke 2
VOEST Alpine 1 2 3

Warman Equipment (International)
Ltd 1

STEEL & STEEL PRODUCTS (also see PIPE)

American Intl Industries
Amon Industrial
Arco Intl

Arco-Marsteel Alloy Corp
Borneo Co Pte Ltd
Carl Bauer & Co

International Engrg Ltd
John Yu & Co
Krakatau Hoogovens Intl

Mahindra & Mahindra Ltd
Nippon Steel Corp
Petromar Industries Pte Ltd

Satterthwaite & Co Ltd
Shinko Shoji Kaisha Ltd
Singapore Steel Pte Ltd

Sumitomo Corp
Swift Industrial Supply Pte Ltd
Unitears Vickers Pte Ltd

STIMULATION EQUIPMENT

(see REMEDIAL & STIMULATION EQUIPMENT)

STOCKPILING AND RECLAMATION SYSTEMS

Atney Products Corp
Babcock & Wilcox Ltd
Barber-Greene Overseas, Overseas
Div

Bateman Ltd, Edward L
Buckau-Wolf Maschinenfabrik AG
Carrag Forgerotechnik GmbH

Demag Lauchhammer Masch &
Stahlbau GmbH
Drilco SA, Appareils

URAVO Corp
Dresser Industries Inc., Industrial
Equipment Div

Fives-Cail Babcock
Furukawa Mining Co. Ltd,
Machinery Sales Div

Hanson Co., R. A. Mining Div
Heyl & Patterson, Inc
IBAG Internatl Baumaschinenfabrik
AG

Jenkins of Bedford Ltd., Mbr
Babcock & Wilcox Ltd Gp
Kaiser Engineers

KNO Industriemagazin AG, Humboldt
WEGAG

Krupp GmbH Fried Krupp
Industrie und Stahlbau

M. A. N.
McNary Pittsburg Mfg Corp
Minter International Div. Barber-
Greene Co

Mitsui Mike Machinery Co. Ltd
Production Equipment Ltd
Realisation Equipments Industriels

Reed Tool Co., Drilling Equipment
Div 3 4
Sandvik Canadian Ltd.
9

Sauerman Bros Inc
Seltrust Engineering Ltd
Vickers Australia Ltd, Ruwolt Div
Warman Equipment (International)
Ltd
Wesernutte AG Eisenwerk
Westinghouse Brake & Signal Co.
Ltd, Signal & Mining Div

STOPERS

See Drills, Rock Blast Hole

STORAGE SYSTEMS - Industrial

Amson Industries

STOWING MACHINES

Pickrose & Co. Ltd, Member
Marmon Group Inc
Schwartz-Horlywell Ltd
Thyssen, Thyssen (Great Britain)
Group

SUBS - Bumper

Apsco (Asia) Ptd Ltd
Borneo Oil Tool Co
Dalichi Jitsugyo Co Ltd
NL Hycalog

SUBS - Rotary

Tri-State Oil Tools SA

SUBS - Shock

Christensen Diamond Products Pte Ltd
Jarco Services Ltd
Morris Corp
Sil Crilco

SULFUR RECOVERY

(see DESULFURIZATION EQUIPMENT)

SURVEY INSTRUMENTS - Directional, Oil Well

Dalichi Jitsugyo Co Ltd
Eastman Whipstock Inc
Sil Dyna-Drill
Sperry-Sun Intl Inc

SURVEY INSTRUMENTS - Temperature, Pressure

(see GAUGES & RECORDERS)

SURVEY INSTRUMENTS-Well Velocity

Well Seis Intl Ltd

SURVEYING EQUIPMENT & SUPPLIES-Land

Laser Electronics Pty Ltd
Motiwalla & Co, EJ
Shriro Ltd

SURVEYING INSTRUMENTS AND EQUIPMENT, MAPPING EQUIPMENT

See also Engineering Supplies and
Drilling Equipment, Exploration
Equipment.

1 Drill Hole Orientation 2 Drill Hole
Television 3 Photogrammetric
Plotters 4 Surveying Instruments,
Drill Hole 5 Theodolites, Gyroscopic

Atlas Copco AB 1-4

Christensen Diamond Products I
Eastman International Co GmbH 1,
2,4

Golder Hoek & Associates Ltd 1,4
Hungarian Optical Works (MOM) 5
HUNTEC (1970) Ltd 4
Kern & Co Ltd 3,4
McPhar Geographics Ltd 4
Seegmiller Associates I
Sperry Sun Well Surveying 1,4
Wild Heerbrugg, Ltd 1,3,4
Zed Instruments Ltd 4
Zeiss Carl 3,4

SWAGES - Casing

Greaves Cotton & Co Ltd

SWITCHBOARDS/GEAR

(see ELECTRICAL EQUIPMENT)

SWIVEL JOINTS (see JOINTS -Swivel)

SWIVELS - Drilling

Continental-Emsco Co
Gardner-Denver Co
John Yu & Co
Mahindra & Mahindra Ltd
Mid-Continent Supply Hemisphere Co
Morris Corp
National Supply Co
Satterthwaite & Co Ltd,
Telex Electronics & Machinery Ltd
USS Oilwell Supply Co Intl Inc
Wamco Service & Supply Ltd

SWIVELS - Loading Arm

Atlas Steel & Engrg Co
Connell Bros Co Ltd
Continental-Emsco Co
Elite Industrial Corp
FMC Corp
George Kent Group
Gilbarco Australia Ltd
Ippilo, PT

(cont.)

Treloar & Sons Pty Ltd
United Machinery Co Ltd
Wallace Ltd, DMCL

SWIVELS - Marine

LOR Intl Pte Ltd
Tri-State Oil Tool SA

SWIVELS - Workover

Tri-State Oil Tool SA

TABLES - Rotary

Continental-Emsco Co
Gardner-Denver Co
John Yu & Co
Mahindra & Mahindra Ltd
Mid Continental Supply Eastern
Hemisphere Co

Morris Corp
National Supply Co
Satterthwaite & Co Ltd
Telex Electronics & Machinery Ltd
USS Oilwell Supply Co Intl Inc

TANK & TERMINAL CONTROLS

Automatic Accessories
Felmar Pte Ltd
Flow Measurement & Control Div
Foxboro Group
George Kent Group
Hagglund & Associates Ltd
Lietz-Zulueta Capital Inc
Masonellan Pte Ltd
Oiltools Intl Group
Panda Services Ltd
Tokico Singapore Pte Ltd

TANK CLEANING EQUIPMENT

Eastern Lloyd Pte Ltd
Gamien Pty Ltd
Rochem Intl Ltd
Wilson Walton Intl

TANKS - Storage, Fixed

Applied Engineering Pte Ltd
Avery-Laurence Group
CBI Overseas Inc
C-E Natco Intl Ltd
CTCI Corp
Djasa Ubersakti, PT
Malaysia Shipyard & Engrg Sdn Bhd
Progress Engineering Pte Ltd
Shinto Industrial Services Pte Ltd
Sunlit Engrg (Pte)Ltd
Tian San Co
Toyo Kanetsu KK

TANKS - Storage, Portable

Avery-Laurence Group
Dunlop Ltd, Oil & Marine Div
Oiltools Intl Group
Progress Engineering Pte Ltd
Pyramid Derrick Singapore Ltd
Regional Oilfield Supply & Services Pte Ltd
Shinto Industrial Services Pte Ltd
Uniroyal Intl Oil & Marine Div
Van Leer Containers

TANKS, COLLAPSIBLE COATED FABRIC, RUBBER

Ballagh & Thrall Inc
Clouth Gumminwerke AG
BFGoodrich International
Uniroyal Inc
Uniroyal International Inc

TANKS, STORAGE

See Also Thickeners and Tanks, Agitation and Conditioners

Air Products & Chemicals Inc
Alstery
Babcock & Wilcox Co, Automated Machine Div
Barlows Heavy Engineering Ltd
BridgeStone Tire Co Ltd
EMCO Div, Envirotech Corp
BFGoodrich International
Hill Process Equipment Corp.
Fiberglass Equip Div, Hart
Johnson Progress Ltd
Kawasaki Heavy Industries Ltd
Machine Sales Div

Krupp GmbH, Fried. Krupp Industrie Und Stahlbau
National Tank & Pipe Co
Owens-Corning Fiberglas Corp.
Non Corrosive Products Gp
Uniroyal International Inc
U.S. Steel Corp
VOEST Alpine
Warman Equipment (International) Ltd

TAPES

(also see HARDWARE)

TAPES - Derrick

Aqua-Terra Group
Boastead Trading Pte Ltd
Inter-Mega
Marine & Onshore Trading Co

TAPES - Gauging, Oil

Aqua-Terra Group
Boastead Trading Pte Ltd
Central Industrial Suppliers Pte Ltd
Inter-Mega
Sea Supply Pte Ltd

TAPS - Box or Tapered

Greaves Cotton & Co Ltd
Tri-State Oil Tool SA

TENSIONEPS - Guideline & Riser

Dalichi Jitsugyo Co Ltd
Hydril Co
NL Rig Equipment
Vetco Singapore Pte Ltd

TESTERS - Formation & Well Production (also see FLARE SYSTEMS - Gas/Liquid)

ApSCO Pte Ltd
Baker Oil Tools Group
Dalichi Jitsugyo Co Ltd
Dowell Schlumberger
Flopetrol
Halliburton Ltd
Lynes SEAsia Pte Ltd
Otis Engineering Corp

TESTING EQUIPMENT- Petroleum

Analyst Supply House Inc
General Scientific Co Sdn Bhd
George Kent Group
Techno Instruments Inc
Zimmerman Scientific Co Ltd

TESTING EQUIPMENT & PRODUCTS -Non Destructive (NDT)

American Optical Co Pte Ltd
Apache Sdn Bhd
BCI Pte Ltd
Dimet Group
Ex-Im Hong Kong Ltd
Industrial Inspection Inc
Pyrene-Ral Metal Treatments Ltd
Singapore Electronic & Engrg Ltd
Singapore Technical Services Ltd

THICKENERS AND TANKS

See Also Conditioners

1 Steel Tanks 2 Thickeners 3 Wood Tanks

Allis Chalmers, Cement & Mining Systems Div 2
Airstrom, Div Neyrtec 2
Alstery 1 2
Barlows Heavy Engineering Ltd 1
Bateman Ltd, Howard 1 2
Brooks Mfg Inc, Frank 3
Dorn-Dyer Inc 2
EMCO Div, Envirotech Corp 2
Fives Cail Babcock 2
Fruhnart Corp 1
Hazen Research International Inc 2
Johnson Progress Ltd 1
Joy International SA 2
Joy Manufacturing Co 1 2 3
Joy Manufacturing Co, Denver Equipment Div 2
Joy Manufacturing Co (UK) Ltd, Denver Equipment Div 1 2 3
KHD Industriellen AG, Humboldt WEDAG 2
Kawasaki Heavy Industries Ltd, Construction Machinery Div 1 2
Kawasaki Heavy Industries Ltd, Machine Sales Div 1
Larox Div 2
McNally Pittsburg Mfg Corp 2
Mitsubishi Metal Corp 1 2
National Tank & Pipe Co 2 3
Niles 1 2
Rayna Pappia Oy, Pori Div 1 2
Rheax Chemie & Metall GmbH 1 2
Roxon Div 1 2
Sala International 2
Sala Minco 2
Sauts & Co 2
Simon Warman Ltd 2
U.S. Steel Corp 1
VOEST Alpine 1
Warman Equipment (International) Ltd 1 2 3

THRUSTERS (see PROPULSION UNIT Marine)

TIES, TRACK

See Tank and Accessories

TIMBER

1 Mine 2 Shaft Guides 3 Timber Framing Machines

Brooks Mfg Inc, Frank 1 2
DeLmann Hammer GmbH 2
Evo Products Co, Inc 1 2
Stearns Roger Inc 3

TIRES AND TUBES, OFF HIGHWAY

BridgeStone Tire Co Ltd
Chemiluxer, Margarian Trading Co
Continental Gummi Werke AG
Firestone International
General Tire International Co
BFGoodrich International
Goodyear International Corp
Toyo Rubber Industry Co Ltd, Tire Overseas Super Div
Trelleborg International AB
Uniroyal
Yokohama Rubber Co Ltd

TIRES, PROTECTION

See Chains and Accessories

TIRE CHANGING EQUIPMENT

Aren Group Inc, The
 Firestone International Co
 BR Goodrich International
 GWA Wheel Truing Co
 The George Gumm Fabrics AB
 Tool Rig & Equipment Co

TIRE RECAPPING EQUIPMENT

BFGoodrich International
 The George Gumm Fabrics AB

**TONGS & TONGS DIES - Casing, Drill
Pipe & Tubing**

Asiatic Tool Co Ltd
 BJ Service Intl Inc
 Borneo Oil Tool Co
 Dalichi Jitsugyo Co Ltd
 Drexel Oilfield Services
 Fuller & Kinnaird Ass.Ltd
 Grant Corp SA
 Interscope Ltd
 Lampera Holdings Group
 Lucey Export Supply Ltd
 Mid-Continental Supply
 Eastern Hemisphere Co
 Morris Corp
 Sea Supply Pte Ltd
 Tri-State Oil Tool SA
 Weatherford/Lamb

TOOLS -Hand (see HARDWARE)

**TOOLS - Hydraulic, Underwater
 Construction**
 Stanley Works Sales

TOOLS - Pneumatic

Aqua-Terra Group
 Atlas Copco Group
 Black & Decker Group
 Central Industrial Suppliers Ptd
 Ltd

Felmar Pte Ltd
 Gardner-Denver Co
 Ingersoll-Rand Group
 Marine & Onshore Trading Co
 Oiltools Intl Group
 Soon Alk Hardware
 Stanley Works Sales
 Tierra Factors Corp
 United Motor Works
 Unitor Ships Service
 Universal Equip & Services
 Pte Ltd

TOOLS - Power, Electric

Aqua-Terra Group
 Black & Decker Group
 Dycle & Carriage Pte Ltd
 Guthrie Engineering
 Ingersoll-Rand Group
 Menara Alam Teknik, PT
 Pernas-Sime Darby Sdn Bhd
 Sea Supply Pte Ltd
 Soon Alk Hardware

**TOOLS, OILFIELD - Drilling
& Completion**

A-1 Bit & Tool Co Ltd
 A-2 Intl SA
 Apsco Pte Ltd
 Asia Industries Inc
 B & B Oil Tools Intl
 Bayliss Intl Pty Ltd
 Borneo Oil Tool Co
 Brown Oil Tools Inc
 Christensen Diamond Products Pte Ltd
 Dalichi Jitsugyo Co Ltd
 Dresser Minerals Group
 Drexel Oilfield Services
 Fuller & Kinnaird Associates Ltd.
 Grant Corp SA
 Grant Oil Tool
 Greaves Cotton & Co Ltd
 Greenland Engrg & Tractors Co Ltd
 Jarco Services Ltd
 Lampera Holdings Group
 LOR Intl Pte Ltd
 Lucey Export Supply Ltd
 Lynes SEAsia Pte Ltd
 Marexco Ltd
 Morris Corp
 Panah Tiara Sdn Bhd
 Panah Tiara PT
 Etrocon Swire Ltd
 Sil Crilco
 Dil Dyna-Drill
 Sil Servo
 Spotco Ltd
 Swire Petrocon Ltd
 Tractors India Ltd
 Tri-State Oil Tool SA
 United Oilfield Rentals Pte Ltd

**TOOLS, OILFIELD - Drilling, Directional
(also see COLLARS - Drill, Non-Magnetic
or SURVEY INSTRUMENTS-Directional)**

Dowell Schlumberger
 Drexel Oilfield Services
 Eastman Whipstock Inc
 Sil Dyna-Drill
 Sperry-Sun Intl Inc

TOOLS, OILFIELD - Fishing

A-2 Intl SA
 Apsco Pte Ltd
 Bayliss Intl Pty Ltd
 Borneo Oil Tool Co
 Brown Oil Tools Inc
 Dalichi Jitsugyo Co Ltd
 Drexel Oilfield Services
 Grant Corp SA
 Jarco Services Ltd
 LOR Intl Pte Ltd
 Lucey Export Supply Ltd
 Mid-Continent Supply Eastern
 Hemisphere Co

Spotco
 Tirupati Intl
 Tri-State Oil Tool SA

**TOOLS, OILFIELD - Rental
(see SERVICE INDEX)**

TOOLS, AIR-DRIVEN PORTABLE

See Also Drills, Rock

Atlas Copco AB
Bonier Bros & Co Ltd
Compair Construction & Mining Ltd
Demag Verdichter & Drucklufttechnik GmbH
Dresser Industries Inc
Flottmann-Werke GmbH
Gardner-Denver International, International Div
BFGoodrich International
Ingersoll Rand Co
Iowa Mold Tooling Co.
Joy Mfg Co
Kent Air Tool Co
Krupp GmbH, Fried, Krupp Industrie-Und Stahlbau
Rhino Sales Corp
S G Schweizerische Industrie-Gesellschaft
Vereinigte Edelstahlwerke AG
Victaulic Co. of America
Worthington Compressors, Inc.

TOOLS

1 Industrial Gun 2 Service Equipment Maintenance

Gardner-Denver International, International Div 1,2
Owatonna Tool Co 2

TRUCK CONVERTERS

See Tractor Conversions

TRACK AND ACCESSORIES

1 Bolts and Spikes 2 Maintenance 3 Rail Bender 4 Rail and Ties, Steel 5 Rerailers and Derailers 6 Switches, Frogs, Crossings, Etc. 7 Switchgear, Flameproof 8 Track Cleaning Machines 9 Track Shifting Machines 10 Turntables

ABEX Corp, 2,6
Aldon Co, 3,5
American Mine Door 8
Bethlehem Steel Corp 1,4,6
Brown, Boveri & Cie AG, Industrial Plants Div 7
Card Corp, 6,10
CF&I Steel Corp, 1,4
Midwest Corp., Steel Div, 1,3,4,5,6
Moss (Pty) Ltd., George 2,3,6,7,10
Owatonna Tool Co, 2
Persona Spartechnik AB 1,2,3,4,5,6,7,9,10
Pettibone Corp, 1,5,6,8
Rexnord Inc., Process Machinery Div 2,8,9
Rexnord Inc., Railway Equipment Div 2,8,9
Torque Tension Ltd, 1,2
U.S. Steel Corp, 1,4
Vickers Australia Ltd., Ruwolt Div, 6
WEST Alpine, 1,4,5

TRACTORS AND ATTACHMENTS

1 Attachments 2 Bulldozer Blades 3 Cabs and Canopies 4 Crawler 5 Cutting Edges & Grader Blades 6 Rippers and Teeth 7 Rubber Tired 8 Snow Removers, Augers & Blowers 9 Tractors 10 Winches, Tractor Mounted

Allis-Chalmers, Cement & Mining Systems Div, 7,9
Athey Products Corp, 8
Aveling-Barford Ltd, 4,7
Babcock & Wilcox Ltd, 7
Balderson Inc, 1,2,5,6
Balors, AB, Steel Div, 1,2,5,6
Bonier Bros & Co Ltd, 3
Bucyrus Blades Inc, 5
BUMAR, 2,4
Case Co., J. I., International Div, 2,4,6,7,9
Caterpillar Tractor Co., 1,2,3,4,6,10
Clark Equipment Co., Construction Machinery Div, 1,2,6,7,9,10
Clark International Marketing S. A., 1,2,6
D.B. Sales Inc, 9
Deere & Co, 1,2,3,8,9
Deimann-Maniel GmbH, 4
Eaton Corp, 7
Elmac Corp of New Mexico, 7
ESCO Corp, 2,5,6
Faun-Werke Nurnberg, 9
Fiat-Allis Corp., Construction Machinery Inc, 1,2,4,5,6,9
Fox Manufacturing Co., Div. Placer Exploration Ltd, 9,10
France Loader, 1,2,7,8,9
General Motors, Terex Div, 4,9
Greenbat Ltd, 9
Hudswell, Clarke & Co., Ltd, 7
Hunslet Ltd, 6,8,9
Hunslet Mining Machinery Co., Ltd, 7
Huwood-Irwin Co, 7
International Harvester Co., 2,3,4,5,6,7,9,10
Kawasaki Heavy Industries Ltd., Construction Machinery Div, 7
Kennametal Inc, 5
Klocker-Humboldt-Deutz AG, 9
Komatsu, Ltd, 1,2,3,4,5,6,7,8,9,10
Liebherr Hydraulikbagger GmbH, 2,6,9
Marathon Letourneau Co., Longview (Div), 7
Mining Development (UK) Ltd (Mindev), 4
Mitsubishi Heavy-Industries, Ltd, 1,2,3,4,6
Mitsubishi Steel Mfg Co., Ltd, 3,4,5
Muir Hill Ltd, 7
Normet S. A., 10
Orion vntyma Oy, NORMET, 10
O & K Griesstein & Koppel AG, 7
Secmaster S. A., Service Publicitaire, 9
Torque Tension Ltd, 4,7
Traktorexport, V O, 2,4,8
Treibborgs GummiFabriks AB, 7
Vickers Australia Ltd., Ruwolt Div, 2,5,6
Volvo BM AB, 7
Wingrove & Rogers Ltd, 9

TRACTORS & EARTHMOVING EQUIPMENT (Also see CONSTRUCTION EQUIPMENT or CRANES)

Abottiz Marketing
Allbest, PT
Alliance Engrg Co Pte Ltd
Borneo Tractors
Case Co,JI
Caterpillar Far East Ltd
East Asiatic Co Ltd
Engineering Equip Inc
Fiat Allis Singapore Inc
Gerson & Sons Ltd
Guthrie Engineering
John Deere Intercontinental Ltd
Komatsu Singapore Pte Ltd
Singapore Equipment Services Pte Ltd

Thaitrac Co Ltd
Tierra Factors Corp
Tractors Malaysia Bhd
Tractors Singapore Ltd
Trans International Pte Ltd
Ukanik, PT
United Engineers
United Motor Works
Whyte & Co Sdn Bhd, J

TRAIN LOADING SYSTEMS

See Also Loaders, Cars

1 Coupled Conveyor Cars 2 Slusher Train 3 Unit Train

Appareis Dragon 1
Atlas Copco AB, 1
Bateman Ltd., Edward L, 3
Card Corp, 2
Demag Lauchhammer Masch & Stahlbau GmbH, 3
Dresser Industries Inc., Industrial Equipment Div, 3
Fletcher Sutcliffe Wild Ltd, 3
Haglund & Soner AB, Trucks & Mining Machinery Div, 1
Heath & Sherwood Co, 3
Jenkins of Kettered Ltd., Mbr Babcock & Wilcox Ltd, Gp 3
McDowell-Wellman Engineering Co, 1,3
McNally Pittsburg Mfg Corp, 3
Production Equipment Ltd, 1
Reaisaition Equipments Industriels, 1
Stearns-Roger Inc, 3
Weserhutte Otto Wolff GmbH, 1,3
Westinghouse Brake & Signal Co., Ltd., Signal & Mining Div, 3

TRAMMERS

See Locomotives

TRAMWAYS, AERIAL

1 Buckets 2 Cable 3 Cable Couplings & Sockets 4 Designers 5 Personnel Moving 6 Tensioning Equipment 7 Towers

Aluterv, 4
APOD, 5
Barrows Heavy Engineering Ltd, 1
British Kopeway Engineering Co, Ltd, 1,2,4,5
Dillon & Co Inc., W. C, 6
Fives Cal Babcock, 2
Interstate Equipment Corp, 1,2,3,4,5,6,7

Mitchell Ropeways Ltd. 1.2.3.4.5.6.

7

Nixx 2

Production Equipment Ltd 2

Reliance Rope Attachment Co Ltd

3

Ribiet Tramway Co. 1.2.3.4.5.6.7

U.S. Steel Corp. 1.2.3.7

TRANSFERS, CAR

Card Corp

Chapman Ltd. Clarke International

Combustion Div

Greenbat Ltd

Haglund & Soner AB. Trucks &

Mining Machinery Div

Krupp GmbH. Fried. Krupp

Industrie-Und Stanbau

VOEST-Alpine

TRANSITS

See Surveying Instruments And Equipment

TRANSMISSIONS AND TORQUE CONVERTERS

Borg Warner. Rockford Clutch Div

Chrysler International

Clark International Marketing S. A.

Elmat Corp of New Mexico

Fenner & Co. Ltd. J. H.

Hitachi Ltd

Kawasaki Heavy Industries Ltd.

Machine Sales Div

Philadelphia Gear Corp

Fraxionves

Reliance Electric Co. Dodge Div

Secmater S. A. Service Publicitaire

Twin Disc, Inc

TRANSMISSION PRODUCTS-Mechanical

(also see BELTS or CHAINS or CLUTCHES)

Alliance Engrg Co Pte Ltd

American Intl Industries

Aqua-Terra Group

Benn Meyer & Co

Borg-Warner Intl Corp

Caterpillar Far East Ltd

Cycle & Carriage Ptd Ltd

Detroit Diesel Allison Intl

Mechanical & Comb Engrg Co

Mid-Continent Supply Eastern

Hemisphere Co

Fenold Overseas Ltd

Reynold Intl Inc

Scott & English Ltd

Tractors Malaysia Bhd

Tractors Singapore Ltd

Tsubakimoto Chain Co

TRANSPORTATION EQUIPMENT

- Tank Trucks, Petroleum

Bharat Industries & Commercial Corp

Hargill Group, Engrg Div

TRANSPORTATION EQUIPMENT

- Tracked Vehicles, All-Terrain

Jurusan Hargill Sdn Bhd

TRANSPORTATION EQUIPMENT-

Bharat Industries & Commercial Corp

Elder Singapore Ltd

Hargill Group, Engrg Div

TRANSPORTATION EQUIPMENT-Trucks

Allbest, PT

Borneo Tractor

Engineering Equip Inc

International Harvester Export Co

Thaitrac Co Ltd

Tierra Factors Corp

Trakindo Utama, PT

Ukanix, PT

TRACTORS - Oil or Gas

Avery-Laurence Group

BS & S Pte Ltd

C-E Natco Intl Ltd

Porta-Test Systems Engrg Pte Ltd

TRIPPERS

See Conveyor Equipment

TROLLEY EQUIPMENT

See Also Locomotives

Dresser Industries Inc

Lee-Norse Co

Round & Son Inc., David

Westhara Lunen

TROMMELS ACCESSORIES

See Screens, Grizzlies, And Accessories

TRUCKS - Forklift

Allbest, PT

Alliance Engrg Co Pte Ltd

Guthrie Engineering

Hargill Group

Komatsu Singapore Pte Ltd

Material Trading

United Motor Works

TRUCKS AND TRAILERS

See Also Haulage Units, Underground
Haulage

1 Accessories 2 Aluminum Bodies 3

Coal Haulers Tractor-Trailer 4

Bottom Dump Tractor Trailer 5

Chassis, Special Application 6

Electric Wheel Drive Truck 7 Hoists,

Dump Body 8 Low Boys, Heavy

Equipment Trailers 9 Lubrication 10

Off Highway 12 On-Highway 13 Self

Loading 14 Steel Bodies 15 Trailers

Atney Products Corp. 3.4.10.14

15

Aveling-Bartford Ltd. 11

Autoexport 7.8.11

Caterpillar Tractor Co. 3.10

Century Ous Ltd. 9

Challenge-Cook Bros., Inc. 2.3.4.

10.12.14.15

Chrysler International 1.2.4.6.7.8.

10.11

Clark International Marketing S. A.

11

DJB Engineering Ltd. 3.5.10

DJB Sales Inc. 5.8.10.12

Dart Truck Co. 2.3.4.5.10.14.15

Euclid Inc. Sub. Daimler-Benz AG

3.4.6.10

Frestone International Co. 1

Ford Overseas Distribution

Operations, Div. Ford Motor Co.

3.11.12

France Loader 10
Fruehauf Corp. 1.2.3.4.7.8.12.14.
15

General Motors, Terex Div. 3.10
Getman Corp 9
Goodbarry Equipment 3
Goodyear International Corp 1
Huwood-Irwin Co. 8
International Harvester Co 11.12
Kockum Industri AB 10
Komatsu Ltd 9
Kress Corp 3
Mack Trucks Inc., International Div.
3.4.5.10.12
Microdot Inc 1
O & K Orenstein & Koppel AG 6
Over-Lowe Co 15
Paccar International, Inc 3.4.10.
12.14

Peabody International Corp 7
Perlin International Sp A 10
Phillip Hagenbuch, Inc 1.10.14
Pneumatik Transport AB 5.9
Rhino Sales Corp 1
Saab Scania AB, Scandia Div 10.12
Secmatier S. A. Service Publicitaire
2.10.12
Unit Rig & Equipment Co 3.5.7
WABCO Construction & Mining
Equipment 3.4.6.10
WABCO Manufacturing SA 7
Wingrove & Rogers Ltd 10

TUBING & FITTINGS, FLEXIBLE

Flexible Ducting Ltd
Goodall Rubber Co
Moss (Pty) Ltd George
Pennsylvania Flexible Metallic
Tubing Co
Thyssen (Great Britain) Ltd

TUBING- Fiberglass

Continental-Emsco Co
Dobson & Co Pty Ltd

TUBING - Industrial

American Intl Industries
Fluid Systems Sdn Bhd
Gould Inc
Mechanical & Comb Engrg Co
Singapore Valve & Fitting Pte Ltd
TI Flexible Tubes Ltd

TUBING - Oil & Gas Well

Amon Industries Corp
Bakrie & Bros, PT
Basu & Basu
Continental-Emsco Co
Foster Company, LB
Grant Corp SA
Instube Pipe Ltd
International Engineering Co Ltd
International Oil & Refining
Intra Oil Sdn Bhd
John Yu & Co
Kawasaki Steel Corp
Kloekner Singapore Pte Ltd
Mahindra & Mahindra Ltd
Mid-Continental Supply Eastern
Hemisphere Co

Mitsubishi Corp
Mitsui & Co Ltd
National Supply Co
Nippon Kokan KK
Nippon Steel Corp

NL Atlas Bradford
Petroleum Pipe Co
Satterthwaite & Co Ltd, AM
Sumitomo Corp
Sumitomo Metal Industries

TUNNEL BORERS

See *Big Hole Boring Machines And Bits*

TUNNELLING SHIELDS

AEC, Inc. (Alpine Equipment Corp)
Frontier-Kemper Constructors
Kawasaki Heavy Industries, Ltd.
Machine Sales Div
Robbins Co., The
Westfalia Lunen

TURBINES- Gas

Aartus & Associates Pvt Ltd
Asea Singapore Pte Ltd
BBC Brown Boveri Group
Behn Meyer & Co
Cooper Energy Services Intl Inc
Detroit Diesel Allison Intl
Dresser Machinery Intl Div
Fuller & Kinnaird Associates
General Electric Co
General Electric Co
Kongsberg Pte Ltd
Lekom Maras, PT
M.A.N.-GIII Pte Ltd
Manila Machinery & Supply Co Inc
MTU Friedrichshafen
Nuovo Pignone SpA
Oiltools Intl Group
Rolls-Royce Ltd
Sal Company Ltd
Salcon Group
Solar Turbines Intl Co

TURBINES - Gas (cont.)

Sulzer East Asia Central Office
Sulzer Representative Offices
Sulzer Australia Pty Ltd
Tesinc
United Engineers
United Technologies
Watt & Akkermans Pte Ltd

TURBINES - Steam

Ace Equipment Ptd Ltd
Angkasa Jaya Tehnik
Asea Singapore Pte Ltd
Atkins, Kroll & Co Inc
BBC Brown Boveri Group
Behn Meyer & Co Sdn Bhd
General Electric Co
General Electric
IAC Pte Ltd
M.A.N. GIII Ptd Ltd
Manila Machinery & Supply Co Inc
Nuovo Pignone SpA
Trane SA
Watt & Akkermans Pte Ltd
Worthington-Turbodyne Intl Sales Co

TURBOCHARGERS, DIESEL ENGINES

Brown-Boveri Corp
Kawasaki Heavy Industries, Ltd.
Machine Sales Div

UNDERCUTTERS

Anderson Mavor Ltd
Joy Mig Co

UNDERGROUND HAULAGE UNITS

See *Also Mine Cars And Locomotives*

1 Track 2 Monorail Off-Track 3
Articulated Or Swivel 4 Bottom
Dump 5 Diesel Power 6 Electric
Power 7 End Dump, Moving Deck 8
End Dump, Moving Ejector Plate 9
End Dump, Tipping Body 10 Rigid
Frame 11 Truck, Conveyor Dumped

ASEA Inc., Mining & Industria
Transport 6
Atney Products Corp 3.4.9
Atlas Copco AB 5.7
Becorit (GB) Ltd 1.2.5
Berry Co 1.5.6
British Jeffrey Diamond 5
Brown Boveri & Co. Ltd 6
Card Corp 1.4.9
Chapman Ltd, Clarke International
Combustion Div 5.6
Compagnie Electro Mecanique, Sub
Browne, Boveri & Co 6
DJB Engineering Ltd 3.9
Dresser Industries Inc 5
Eimac Corp of New Mexico 3.5.8.
9.10
Fox Manufacturing Co, Div Placer
Exploration Ltd 3.5
France Loader 3.5.9
Getman Corp 3.5.9.10
Goodman Equipment Corp 1.5.6
Gutehoffnungshutte Sterkrade AG
4
Haglund & Soner AB Trucks &
Mining Machinery Div 5.7
Hayden Nips Conflow Ltd 2
Huwood-Irwin Co 1.4
Ingersoll Rand Co 1
Joy Mig Co 3
Kloekner-Becorit GmbH 5
Kockum Industri AB 3.9
Lee Norse Co 1.6
Mining Supplies Ltd 2.3
Moss (Pty) Ltd George 1.4.5.6.9.
10
National Mine Service Co 1.5.6
Pickrose & Co., Ltd. Member
Marmon Group Inc 1.2.6.10
Pneumatik Transport AB 3.5.10
Realisation Equipments Industriels
11
Scharf GmbH Maschinenfabrik 2
Schnopf Maschinenbau GmbH 3.5.9
Schwartz-Hoywell Ltd 1.6
Secmatier S. A. Service Publicitaire
11
UMM Ltd 1.2
Wagner Mining Equipment Co 3.5.
6.8.9
Westfalia Lunen 2.5

UNDERREAMERS

A-1 Bit & Tool Co Ltd
 A-2 Intl SA
 Dalichi Jitsugyo Co Ltd
 Fuller & Kinnaird Associates Ltd
 Grant Oil Tool Co
 LOR Intl Pte Ltd
 Miraksha Associates
 Morris Corp
 Sil Servco
 Tri-State Oil Tool SA

VACUUM FILTERS

See Index

VACUUM PUMPS

See Index

VALVES

AREX Corp
 Aerodup Corp
 Air Products & Chemicals Inc.
 Asthom. Div. Neyrtec
 Dezurk Unit General Signal Corp
 Dixon Valve & Coupling Co
 Dresser Industries Inc
 Eaton Corp
 FMC Corp Material Handling
 Equip Div
 Foxboro Co
 Gagner Co. The
 General Rubber Co
 Hayden Nilos Contflow Ltd
 Heilpedz Ltd
 Honeywell Inc Process Control Div
 Jones & Laughlin Steel Corp
 Joy Mfg Co Western Precipitation
 Div
 McKelvey Co. O C
 Kurimoto Iron Works. Ltd
 Larox Oy
 Neyrtec Asthom-Atlantique
 Peabody International Corp
 Rockwell International Corp
 TRW Mission Mfg Co
 Union Carbide Corp
 Victaulic Co of America
 Warman Equipment (International)
 Ltd
 Westfalia Lunen
 Westinghouse Brake & Signal Co
 Ltd Signal & Mining Div
 Wilkinson Process Linatex Rubber
 Co Ltd

VALVES, SLURRY

AMF Incorporated
 Asthom Div Neyrtec
 Alutery
 Bareman Ltd. Edward L
 Clarkson Co. The
 Dezurk Unit General Signal Corp.
 Gagner Co. The
 General Rubber Co
 Kone Corp
 Kurimoto Iron Works. Ltd
 Larox Oy
 McNally Pittsburg Mfg. Corp.
 Mine & Smelter Co. Sub. Barber-
 Greene Co
 Ronon Oy
 Sara Menco
 Simon-Warman Ltd
 Warman Equipment (International)
 Ltd
 Wilkinson Process Linatex Rubber
 Co Ltd

VALVES - Ball

Aloyco Intl Enterprises
 American Intl Industries
 Anglo-American Corp
 Aqua-Terra Group
 Australian American Engrg Corp
 Bestobell Group
 Cameron Iron Works Pte Ltd
 Central Industrial Suppliers Pte Ltd
 Chong Fung Material Supplier
 Cronles Enterprise Corp
 Degmak Engrg Corp
 Drexel Oilfield Services
 Enes, PT
 European Technical Services Pte Ltd
 Fisher Controls Pte Ltd
 Fluid Power Pte Ltd
 Fluid Systems Sdn Bhd
 George Kent Group
 Gould Inc
 Hup Seng Huat Co Pte Ltd
 ITT Far East & Pacific Inc
 Jamesbury Singapore Pte Ltd
 Japan Steel Works Ltd
 Lietz-Eulucta Capital Inc
 Mark Controls Corp
 Masonellan Pte Ltd
 Mid-Continent Supply
 Eastern Hemisphere Co
 Moyes & Groves Ltd
 National Supply Co
 Nuvo Pignone SpA
 Pipeline Supplies of Australia
 Prem Nath Diesels Pvt Ltd
 Rogers & Co Ptd Ltd
 Sea Supply Ptd Ltd
 Shalimar Agencies
 Sherman Corp
 Sin Soon Huat Pte Ltd
 Singapore Valve & Fittings Pte Ltd
 Sperry Vickers Group
 W-K-M Pte Ltd

VALVE - Bellows

Degmak Engrg Corp
 Enes, PT
 Singapore Valve & Fittings Pte Ltd

VALVES - Brass/Bronze

American Intl Industries
 Aqua-Terra Supply Group
 Bestobell Group
 Degmak Engrg Corp
 Flow Measurement & Control Div/
 Geosource
 Gould Inc
 Hagglund & Associates Ltd
 Hart Engrg
 Mid-Continent Supply
 Eastern Hemisphere Co
 Mitco Sdn Bhd
 Rogers & Co Pte Ltd
 Shiva Engrg Works
 Sin Soon Huat Pte Ltd
 Singapore Valve & Fittings Pte Ltd

VALVES - Butterfly

Ace Equipment
Aeroquip Corp
Aloyco Enterprises
American Intl Industries
Apsco Pte Ltd
Aqua-Terra Group
Automatic Accessories
Bestobell Group
Borneo Oil Tool Co
Central Industrial Suppliers Pte Ltd
Chong Fung Material Supplier
Degmak Engrg Corp
Drexel Oilfield Services
Enes, PT
Environ Sdn Bhd

VALVES-Butterfly (cont.)

Fisher Controls Ptd Ltd
FMC Corp
Fouress Engrg Pvt Ltd
Garlock Inc
George Kent Group
Haven Automation Pte Ltd
Henes Trading Co Ltd
Instrumental Ltd
Inter-Mega
ITT Far East & Pacific Inc
Jamesbury Singapore Pte Ltd
Jardine Marketing Services
Joshi & Co KP
Keystone Valve
Larsen & Toubro Ltd
Marine & Onshore Trading Co
Mark Controls Corp
Masonellan Pte Ltd
Mission Mfg Co
Rogers & Co H
Sai Company
Sea Supply Pte Ltd
Sherman Corp
United Teknik, UD

VALVES - Check

Aartus & Associates Pvt Ltd
Aloyco Enterprises
Apsco Ptd Ltd
Australian American Engrg Corp
Degmak Engrg Corp
Enes, PT
Environ Corp
Fouress Engrg Pvt Ltd
Gould Inc
Gray Service Co/Gray Tool Co
Henes Trading Co Ltd
Hup Seng Huat Co Ptd Ltd
ITT Far East & Pacific Inc
Kheng Cheong
Larsen & Toubro Ltd
Lietz-Zulueta Capital Inc
Mark Controls Corp
McEnvoy Oilfield Equip
Mission Mfg Co
National Supply Co
Oiltools Intl Group
Rogers & Co
Sai Company Ltd
Sherman Corp
Shiva Engrg Works
Sin Soon Huat Pte Ltd
Singapore Valve & Fitting Pte Ltd

VALVES - Check, Swing

Aqua-Terra Group
Gray Service Co/Gray Tool Co

VALVES - Check, Water

Environ Sdn Bhd
Gray Service Co/Gray Tool Co
Mission Mfg Co
Moyes & Groves Ltd
Oiltools Intl Group

VALVES - Control

Ace Equipment Pte Ltd
Automatic Accessories
Borneo Oil Tool Co
Chong Fung Material Supplier
Degmark Engrg Corp
Enes, PT
Fisher Controls Pte Ltd
Flow Measurement & Control Div./
Ge source
Foxboro Group
Gould Inc
Hagglund & Associates Ltd
Haven Automation Pte Ltd
Henes Trading Co Ltd
ITT Far East & Pacific Inc
Jamesbury Singapore Pte Ltd
Lietz-Zulueta Capital Inc
Masonellan Pte Ltd
Nuovo Pignone SPA
Oiltools Intl Group
Wilcox & Co Ltd
W-K-M Pte Ltd

VALVES - Dump

Automatic Accessories
Sea Supply Pte Ltd

VALVES - Float

Automatic Accessories
Baker Oil Tools Group
Sea Supply Pte Ltd

VALVES - Gas Lift

Apsco Ptd Ltd
Camco Inc

VALVES - Gate

Aartus & Associates Pvt Ltd
Allied Engineers
Aloyco Intl Enterprises
American Intl Industries
Apsco Pte Ltd
Aqua-Terra Group
Asia Industries Inc
Automatic Accessories
Axelson, Inc
Bermaco Mechanical Engrs
Bestobell Group
Borneo Oil Tool Co
Cameron Iron Works Pte Ltd

Valves - Gate (cont.)

Central Industrial Suppliers Pte Ltd
Dalichi Jitsugyo Co Ltd
Environ Sdn Bhd
Flow Measurement & Control Div/
Geosource

FCM Corp
FMC Petroleum Equip SEA Pte Ltd
Fouress Engrg Pvt Ltd
Gray Service Co/Gray Tool Co
Hagglund & Associates Ltd
Hup Seng Huat Co Pte Ltd
Japan Steel Works Ltd
Khong Cheong
Lietz-Zulueta Capital Inc
Mark Controls Corp
McEnvoy Oilfield Equip
Menon Associates
Moyes & Groves
National Supply Co
NL Rig Equipment
Nuovo Pignone SPA
Panah Tiara Sdn Bhd
Panah Tiara, PT
Petrocon Swire Ltd
Prem Nath Diesels Pvt Ltd
Rogers & Co
Sherman Corp
Shiva Engrg Works
Sin Soon Huat Pte Ltd
Swire Petrocon Ltd
W-K-M- Pte Ltd

VALVES - Globe

Aloyco Intl Enterprises
American Intl Industries
Aqua-Terra Group
Bermaco Mechanical Engrs
Bestobell Group
Chong Fung Material Supplier
Fisher Controls Pte Ltd
Fouress Engrg Pvt Ltd
Hup Seng Huat Co Pte Ltd
Instrumentation Ltd
ITT Far East & Pacific Inc
Jamesbury Singapore Pte Ltd
Kheng Cheong Co Pte Ltd
Mark Controls Corp
Masonellan Pte Ltd
Rogers & Co
Sherman Corp
Sin Soon Huat Pte Ltd

VALVES - Hydraulic or Pneumatic

Australian American Engrg Corp
Automatic Accessories
Chong Fung Material Supplier
Degmak Engrg Corp
Fluid Power Pte Ltd
Fluid Systems Sdn Bhd
Gould Inc.
Holland Asia Trading Co Pte Ltd
Imperial Eastman Pty Ltd
ITT Far East & Pacific Inc
Mechanical & Comb Engrg Co
Pamitran, NVPD
Parker Hannifin Singapore Pte Ltd
Sea Supply Pte Ltd
Sperry Vickers Group
United Engineers

VALVES - Kelly

A-1Bit & Tool Co Ltd
Azim Mannan Ltd
Jarco Services Ltd
Sil Crilco Div

VALVES - LPG

Australian American Engrg Corp
George Kent Group
Kentjana Sakil Indonesia

VALVES - Metering

Degmak Engrg Corp
Singapore Valve & Fitting Pte Ltd

VALVES - Needle

Ace Equipment Pte Ltd
Aqua-Terra Group
Central Industrial Suppliers Pte Ltd
Chong Fung Material Supplier
Degmak Engrg Corp
Gould Inc
Masonellan Pte Ltd
Sea Supply Pte Ltd
Singapore Valve & Fitting Pte Ltd

VALVES - Pig/Sphere Injector & Receiver

Apsco Pte Ltd

VALVES - Plug

American Intl Industries
Apsco Pte Ltd
Aqua Terra Group
Automatic Accessories
Enes, FT
FMC Corp
Gould Inc
Larsen & Toubro Ltd
Masonellan Pte Ltd
Mid-Continental Supply Eastern Hemisphere Co
Mission Mfg Co
Oiltools Intl Group
Sea Supply Pte Ltd
W-K-M Pte Ltd

VALVES - Pneumatic

(see VALVES-Hydraulic or Pneumatic)

VALVES - Relief

Apsco Pte Ltd
Aqua-Terra Group
Australian American Engrg
Automatic Accessories
Axelson Inc
Cameron Iron Works
Degmak Engrg Co
Fisher Controls Pte Ltd
Flow Measurement & Control Div/
Geosource
Fourress Engrg Pvt Ltd
Gould Inc
Instrumentation Ltd
Larsen & Toubro Ltd
Lietz-Zulueta Capital Inc
Mid-Continental Supply Eastern Hemisphere Co
Moyes & Groves Ltd
Oiltools Intl Group
Sai Company Ltd
Singapore Valve & Fitting Pte Ltd

VALVES - Safety

Apsco Pte Ltd
Aqua-Terra Group
Australian American Engrg Corp
Automatic Accessories
Axelson Inc
Bestobell Group
Cameron Iron Works Pte Ltd
Fisher Controls Pte Ltd
Fourress Engrg Pvt Ltd
Gray Service Co/Gray Tool Co
Hydrill Co
Instrumentation Ltd
Lietz-Zulueta Capital Inc
Moyes & Groves Ltd
Nucve Pionone SPA
Oiltools Intl Group
Otis Engineering Corp
Sai Company Ltd

VALVES - Safety, Subsurface

Apsco Pte Ltd
Baker Oil Tools Group
Carco Inc
Flopetrol

VALVES - Solenoid

Bestobell Group
Gould Inc
ITT Far East & Pacific
Lietz-Zulueta Capital Inc
Mechanical & Comb Engrg Co
Parker Hannifin Singapore Pte Ltd
Sperry Vickers Div

VALVES - Subsea

Cameron Iron Works Pte Ltd
FMC Corp
FMC Petroleum Equip. SEA Pte Ltd
Hydril Co
McEnvoy Oilfield Equip.
Vetco Singapore Pte Ltd
W-K-M-Pte Ltd

VALVES - Wellhead (see WELLHEAD ASSEMBLES & COMPONENTS)

VALVE ACTUATORS AND VALVE CONTROLS

ABEX Corp
Dezurik, Unit General Signal Corp.
FMC Corp., Material Handling Equip Div
Foxboro Co
HeliPods, Ltd
Honeywell Inc., Process Control Div
Kawasaki Heavy Industries, Ltd., Machine Sales Div
Philadelphia Gear Corp
Westinghouse Brake & Signal Co. Ltd., Signal & Mining Div.

VEHICLES

1 Difficult Terrain 2 Snowmobiles

Autoexport 1
Chrysler International 1,2
Kawasaki Heavy Industries, Ltd., Machine Sales Div. 2

VENTILATION EQUIPMENT AND BLOWERS

1 Air Locks 2 Anemometers 3 Brattice Cloth 4 Mine Fans and Blowers 5 Ventilation Pipe and Tubing 6 Ventilation Duct Forming Machines

Agar Instrumentation Inc. 2
American Brattice Cloth 3
American Mine Door 1
Becorit (GB) Ltd 3
Berry Co. 4
Cementation Mining Ltd 4
Davidson & Co. Ltd. Sirocco Engineering Works 4
Dowty Mecc Ltd 4,5
Dresser Industries Inc 4,5
Dresser Industries, Inc., Industrial Products Div 4
Fan Line Manufacturing 6
Fox Manufacturing Co., Div. Placer Exploration Ltd 1,4,5
Fuller Co. 4
Gardner-Denver International, International Div 4
Gecmin 4
Gutehollungshutte Sterkrade AG 1
Howden & Co. Ltd. James 4
Jo, International S A 2
Joy Mig. Co. 4
KHD Industrienlagen AG, Humboldt WEDAG 4
Kawasaki Heavy Industries, Ltd., Machine Sales Div 4
Kopex Export Import 1,2,3,4,5
Mine Safety Appliances Co. 2
Mitsui Make Machinery Co. Ltd

Montan-Forschung 2
Moss (Pty.) Ltd., George 4,5
Peabody International Corp 4
Rauma-Repola Oy, Pori Div. 2
Standard Filterbau, Dr E. Andreas GmbH & Co 4,5
Technasheport V/O 2
Thyssen (Great Britain) Ltd 5
Westinghouse Brake & Signal Co. Ltd., Signal & Mining Div 1

VIBRATORS

See Bins, Chutes And Accessories

WASHERS

1 Aggregate 2 Log

Alsthom Div Neyrtec 1
Appareus Dragon 1
Aveling Barford Ltd. 1
Barber-Greene Overseas, Overseas Div 1
Bayaria Maschinenfabrik GmbH & Co. 1,2
Esch-Werke AG 1,2
Furukawa Mining Co. Ltd., Machinery Sales Div 1
GEC Mechanical Handling Ltd. 1,2
Gruendler Crusher & Pulverizer Co. 1,2
IBAG Internatl Baumaschinenfabrik AG 1,2
Joy Manufacturing Co., Denver Equipment Div 1
KHD Industrienlagen AG, Humboldt WEDAG 1,2
Kurimoto Iron Works, Ltd. 1
McNally Bharat Engineering Co. Ltd 1
Minemet Industrie 2
Mintec International, Div. Barber-Greene Co 1
Neyrtec, Alsthom-Atlantique 1
Osborn (South Africa) Ltd., Samuel 2
PORTEC Inc., Pioneer Div 1
Reiter & Crippa SNC 1
Rheax Chemie & Metall GmbH 2
Simon-Warman Ltd 1,2
Tersmith, Div. Barber-Greene Co. 1
Warman Equipment (International) Ltd 1,2
WEMCO Div. Envirotech Corp. 2

WATER TREATMENT EQUIPMENT (also see DESALINATION EQUIPMENT)

Alliance Engrg Co Pte Ltd
Avery-Laurence Group
C-E Natco Intl Ltd
Chemitreat
Engelhard Industries Ptd Ltd
Environ Sdn Bhd
Guthrie Engineering
Mid-Continent Supply Eastern Hemisphere Co
Salcon Group
Transerve
Ua Withya Equip Co Ltd
United Engineers

WATER AND WASTE TREATMENT

Air Products & Chemicals Inc
Allis-Chalmers, Cement & Mining Systems Div
Alsthom Div Neyrtec
Australian Mineral Development Ltd
Batemans Ltd., Edward I.
Caigon Corp
Carborundum Co., The
Dorr Oliver Inc
Dresser Industries Inc., Industrial Equipment Div
Du Pont de Nemours & Co. Inc., E. I.

EIMCO, Div. Envirotech Corp
Fives-Cail Babcock
Furukawa Mining Co. Ltd., Machinery Sales Div
Head Wrightson & Co. Ltd
Heli Process Equipment Corp., Fiberglass Equip Div Dart
Johnson-Progress Ltd
Kaiser Engineers
Keene Corp
Kone Corp
Krupp GmbH Fried. Krupp Industrie-Und Stahlbau
Matthew Hall Orlich Ltd
Montreal Engineering Co Ltd
Mountain State Engineers
Neyrtec, Alsthom-Atlantique
Nixec
Peabody International Corp
Permutite Co. Inc. The
Philips Gloeilampen Fabrieken, N.V., Science & Industry Div
Rexnord Inc
Rheax Chemie & Metall GmbH
Roxon Oy
Sala International
Sala Minco
Schramm, Inc.
Seitrust Engineering Ltd.
Soil Mechanics Ltd.
VOEST Alpine
Warman Equipment (International) Ltd
Wheelabrator-Frye, Inc., Air Pollution Control Div

WEIGHING DEVICES

See Scales

WELDING & CUTTING EQUIPMENT & SUPPLIES

Advani-Oerlikon Ltd
Afzal Machinery Stores
All Indotrade PT
American Intl Industries Pte Ltd
Aneka Gas Industri, PT
Applied Equipment
Aqua-Terra Group
Atkins, Kroll & Co Inc
Atlantic, Gulf & Pacific Co
Borneo Oil Tool Co
Central Industrial Suppliers Pte Ltd
Cleveland Tungsten Pte Ltd
Commonwealth Industrial Gases Ltd
Ekman & Co
Esab AB
GRH Intl

Guthrie Engineering
 Hargill Group
 Harrisons Lister Engrg Ltd
 HechstSingapore Pte Ltd
 Hongkong Oxygen & Acetylene Co Ltd
 Lincoln Electric Co Pty Ltd
 Louis T Leonowens Ltd
 Loyang Industrial Gas Pte Ltd
 Makati Machinery & Equipm.Co Inc.
 Malaysian Oxygen Bhd
 Marine & Onshore Trading Co
 Mata & Co Inc,8P

WELDING & CUTTING EQUIPMENT (cont.)

Mata & Co Inc
 Material Trading Pte Ltd
 Mechanical & Comb Engrg Co
 National Industrial Gases Corp
 Pan Pacific Industrial Sales Co Inc
 Panweld Engrg
 Paramount Trade & Engrg PT
 Perma Group
 Petromar Industries Pte Ltd
 Philtectic Corp
 Poris Jaya Steel, PT
 Rennolds Co Inc
 Rig-Marine Supplies Ltd
 Scott & English Ltd
 Sea Supply Pte Ltd
 Sin Soon Huat Pte Ltd
 Singapore Oxygen Air Liquide Pte Ltd
 Shinko Shoji Kaisha Ltd
 Soon Aik Hardware
 Stoodly Asean Sdn Bhd
 Thai Industrial Gases Ltd
 Thai Welding Supplies Co Ltd
 United Motor Works
 Unitor Ships Service
 Uniweld Products Pte Ltd
 Whyte & Co
 Wilson Walton Intl

WELDING EQUIPMENT, SUPPLIES AND SERVICES

1 Automatic Hard Facing System 2
 Automatic Welding Wire 3 General
 Supplies 4 Hard Facing 5 Machines
 6 Track and Idler Rebuilding 7
 Welding Rod and Electrodes

Air Products & Chemicals Inc. 2,3.
 4,5,7
 Aluminum Co of America (Alcoa) 7
 ARMCO International, Div ARMCO
 Steel Corp 2,7
 Conrac Corp 3
 Duwood-Irwin Co 5
 Kobe Steel Ltd 7
 Krupp GmbH, Fried. Krupp Widia
 Fabrik 4
 Kullenkampff Gebruder B
 Moss (Pty) Ltd, George 4
 Philips Gloeilampen Fabrieken, N.V.,
 Science & Industry Div 1,2,3,4,5,
 7
 Phoenix Products Co 7
 Praegerfest 3,6
 Satek, Weld Inc 3,7
 Stoodly Co 1,2,4,7
 Union Carbide Corp 1,3,5,7
 Westinghouse Electric Corp 5,7

WELLHEAD ASSEMBLIES & COMPONENTS

(also see BLOWOUT PREVENTERS or VALVES)

Allied Engineers
 Apasco Pte Ltd
 Asia Industries Inc
 Cameron Iron Works Pte Ltd
 FMC Corp
 FMC Petroleum Equipment SEA Pte Ltd
 Gray Service Co/Gray Tool Co
 Hydril Co
 Larsen & Toubro Ltd
 Lietz-Zulueta Capital Inc
 Lucey Export Supply Ltd
 Masonellan Pte Ltd
 McEnvoy Oilfield Equip
 Menon Associates
 Mid-Continent Supply Eastern
 Hemisphere Co
 National Supply Co
 NL Rig Equipment
 Panah Tiara Sdn Bhd
 Panah Tiara,PT
 Petrocon Swire Ltd
 Prem Nath Diesels Pvt Ltd
 Shusta & Shamber
 Swire Petrocon Ltd
 Vetco Singapore Pte Ltd
 W-K-M Pte Ltd

WINCHES

See Also Hoisting Equipment

1 Electric 2 Hydraulic 3 Portable

Aeroquip Corp 3
 AMI Corp 2
 Anderson Mavor Ltd. 2
 ASEA, Inc, Mining & Industrial
 Transport 1
 Atlas Copco AB 3
 Bohier Bros & Co. Ltd. 3
 Clark International Marketing S. A.
 2
 Deilmann-Haniel GmbH 1,2,3
 Demag AG, ABT
 Bergwerksmaschinen 1
 Demag Verdichter &
 Drucklufttechnik GmbH 1
 Dresser Industries Inc 1,2,3
 Eaton Corp 1
 EIMCO (Great Britain) Ltd. 2
 Fives-Cail Babcock 1
 Gardner-Denver International,
 International Div 3
 GEC Mechanical Handling Ltd. : 2
 Gullick Dobson Ltd 2
 Hebburn Ltd, John T. 1,2
 Hitachi Construction Machine Co.,
 Ltd 2
 HUNTEC (1770) Ltd 2
 Hydraulic Drilling Equipment, Ltd 2
 Iowa Mold Tooling Co 2
 Joy International S. A. 1
 Kawasaki Heavy Industries, Ltd.,
 Machine Sales Div. 2
 Koper, Export Import 1
 Lifts Unlimited 1,2,3
 Linden-Alimak AB 1,2
 Macchineexport V O
 Marathon Letourneau Co., Longview
 Div 1

YIELDABLE STEEL SETS

See Steel

Marathon Manufacturing Co. 1
Moss (Pty) Ltd., George 2
N L Rucker Products 2
Pickrose & Co., Ltd., Member
Marmon Group Inc. 1,2,3
Round & Son Inc., David 1,3
Scharf GmbH, Maschinentabrik 2
Shinko Electric Co., Ltd. 1
Stanco Manufacturing & Sales 2
Stepnnoise DE Constr.
Mecaniques Soc. 2
Thyssen Thyssen (Great Britain)
Group 1,2,3
Thyssen (Great Britain) Ltd. 2
Vereingte Edelestahtwerke AG 3
Vereingte Osterreichische Alpine
Montan Eisen- & Stahlwerke 1
Westfalia Lunen

WINCHES (also see HOISTS & HOSTING EQUIPMENT)

Aker Group
Anchor Engrg Co Pty Ltd
Atracon Pte Ltd
Clyde Iron
Drexel Oilfield Services
Erlangga,PT
Indonesian Engrs Jatiluhur
Cicofranca,PT
Ingersoll-Rand Group
Mata & Co Inc,BP
Mid-Continent Supply Eastern
Hemisphere Co
Pasig Industrial Sales Corp
Promet Engineering Pte Ltd

WIPERS - Pipe

Drexel Oilfield Services
Miraksha Associates

WIRE

See Cable And Conduit

WIRE CLOTH

See Screens, Grizzlies And Accessories

WIPELINE EQUIPMENT & TOOLS

Asia Industries Inc
Bayliss Intl Pty Ltd
Camco Inc
Flopetrol
Fuller & Kinnaird Associates Ltd
Grant Oil Tool Co
Martin-Decker Co Pte Ltd
Morris Corp
Tri-State Oil Tool SA

WIRE ROPE

See Rope, Wire

WORKOVER UNITS

(also see RIGS-Workover)

Apsco Pte Ltd
Brown Oil Tools Inc
Dresser Minerals Group
Mid-Continent Supply Eastern
Hemisphere Co

WRAP - Pipe

(see PIPELINE COATINGS & WRAPPINGS)

HEAVY POWER EQUIPMENT USED IN DEVELOPING
COUNTRIES AND ITS MAIN PRODUCERS AND SUPPLIERS

BOILERS

Alsthom
Ansaldo
Breda
Clark Champman
Combustian Engineering
Deutsche Babcock and Wilcox
Foster Wheeler
Franco Tosi
Ishikawajima-Harima
Heavy Industries
Kawasaki
M.A.N.
Mitsubishi
Steinmueller
Sulzer

CIRCUIT BREAKERS

Adda
Allis Chalmers Corp.
AEG-Telefunken
Asgen
Asea
Brown Boveri
Compagnie Electro Mecanique
Delle-Alsthom
Garoly
General Electric Co.
ITE Circuit Breakers
Magrini
Merlin Gerin
NEI Reyrolle
Siemens
Sprecher und Schuh
Tecnomasio

TRANSFORMERS

Allis Chalmers Corp.
Alsthom Unelec
Asea
Asgen
Breda
Brown Boveri
Compagnie Electro Mecanique
Elin Union
Ercole Marelli
Ferranti
General Electric Co.
Hitachi
Italtrado
Jermont Schneider
Kawasaki Heavy Industries
Mc Gram Edison
Meidensha Electric Manufacturing Co
Mitsubishi
NEI Bruce Peebles
Tecnomasio
Toshiba
Transformatoren Union
Westinghouse Electric Corp.

TURBINES (GAS)

Alsthom Atlantique
AEG-Telefunken
Brown Boveri
Fiat Auto
General Electric
Hitachi
John Brown Engineering
Kraftwerk Union
Mitsubishi
Nuovo Pignone
Rolls Royce
Stal-Laval
Sulzer
Thomassen-Drijver Verblifa
United Technologies
Westinghouse Electric Corp.

TURBINE-GENERATORS

Allis Chalmers Power System
Alsthom Atlantique
Asgen
Brown Boveri
Ercole Marcelli
Franco Tosi
General Electric
Hitachi
Kraftwerk Union
M.A.N.
Mitsubishi
Passons
Stal-Laval
Tecnomasio
Toshiba
Westinghouse

REACTORS (NUCLEAR)

AECL
Atomenergoexport
CGE
Framatome
General Electric
KWU
Siemens
Westinghouse

DEVELOPING COUNTRIES

PRODUCERS/SUPPLIERS OF ENERGY-RELATED EQUIPMENT

BOILERS

BHEL (INDIA)
SN. METAL (ALGERIA)
CALDERAS SALCOR (ARGENTINA)
FEBO ESTABLE CIMIENTOS (ARGENTINA)

CIRCUIT BREAKERS

SONELGAZ (ALGERIA)
EL NASR (EGYPT)
HYO - SUNG (S.KOREA)
SHINHAN (S.KOREA)
HYUNDI (S.KOREA)

CONDUCTORS

HELWAN (EGYPT)

CABLES

CABLEBOL (BOLIVIA)
PLASMAR (BOLIVIA)
MATRA (BOLIVIA)
SONELEC (ALGERIA)
ENACAB (ALGERIA)
EGYPTIAN ELECTRIC CABLES
HELWAN (EGYPT)
CONDUMEX (MEXICO)
TANZANIA CABLES (TANZANIA)
KEUM-SUNG (S.KOREA)
BHEL (INDIA)

COMPRESSORS

DENYO (INDONESIA)
BHEL (INDIA)
DIACROM (ARGENTINA)

DRILLING EQUIPMENT

INTECO IND. (ARGENTINA)
TSHIKAWAJIMA DO BRAZIL

GENERATORS

AVAN KAICH NEU (INDONESIA)
ELTAB INDONESIA
NEWAGE ENGINEERS (INDONESIA)
METRIKA (INDONESIA)
UNGARAN MULTI ENGINEERS (INDONESIA)
DENYO INDONESIA
MEGATEX (MEXICO)
MANUFACTURERA FAIRBANKS (MEXICO)
KHIC (S.KOREA)
BHEL (INDIA)
CALDERAS SALCOR CAREN (ARBENTINA)

HEAT EXCHANGERS

SN.METAL (ALGERIA)
BHEL (INDIA)
ENGINEERS INDIA
LARSEN & TOUBRO (INDIA)
COMETARSA (ARGENTINA)
PRODISENO (ARGENTINA)
COBRASMA (BRAZIL)

NUCLEAR REACTORS

LARSEN & TOUBRO (INDIA)

PLATFORMS

CEC-EQUIPAMENTOS MARITIMOS (ERA)

PIPING/VESSELS

K.H.I. (INDONESIA)
BAKRI TUBE MAKERS (INDONESIA)
SPINDO (INDONESIA)
ANEKA (INDONESIA)
INASTU (INDONESIA)
BOMA STORK (INDONESIA)
BARATA (INDONESIA)
BHEL (INDIA)
LARSEN & TOUBRO (INDIA)

HIGH VOLTAGE LINES

SONELGAZ (ALGERIA)

MINING EQUIPMENT

SPARTAN (ARGENTINA)

OIL FIELD EQUIPMENT

CAMCO (EGYPT)

PIPELINES

SERMEC (BRAZIL)

POLES

SN.METAL (ALGERIA)

ONAMHYD (ALGERIA)

METALCO (EGYPT)

STEELCO (EGYPT)

EL NASR (EGYPT)

PUMPS

BEW RUMAAK (INDONESIA)

EBARA (INDONESIA)

KARYA MIDUP SENTOSA (INDONESIA)

DWIKA (INDONESIA)

SONACOME (ALGERIA)

BHEL (INDIA)

HIDRO MECANICA (ARGENTINA)

REFINERY EQUIPMENT

INDUSTRAAS METALURGICAS (VENEZUELA) MANUFACTURERA FAIRBANKS (MEXICO)

BECHIR (IRAQ)

SUBSTATIONS

SONELGAZ (ALGERIA)

EL A CHOUR (ALGERIA)

SWITCH GEARS

SWITCH BOARD

SWITCHES

TWINK (INDONESIA)

SONELGAZ (ALGERIA)

EGEMAC (EGYPT)

ARABB (EGYPT)

GENERAL ELECTRIC (MEXICO)

MEGATEX (MEXICO)

INTERRUPTORES (MEXICO)

FEDERAL PACIFIC (MEXICO)

TANELEC (TANZANIA)

HYO_SUNG (S.KOREA)

BHEL (INDIA)

TRANSFORMERS

FATRA (BOLIVIA)

ELECTROMATIC (BOLIVIA)

UNINDO (INDONESIA)

BAMBANG JAYA (INDONESIA)

ASATA UTANA (INDONESIA)

TRAFINDO PERKAJA (INDONESIA)

NORAWA ELECTRIC (INDONESIA)

SINAR ELEKTRONICA (INDONESIA)

SONELEC (ALGERIA)

AZAGA (ALGERIA)

EL NASR (EGYPT)

EGEMAC (EGYPT)

GENERAL ELECTRIC (MEXICO)

MANUFACTURERA FAIRBANKS (MEXICO)

TANELEC (TANZANIA)

MYO-SUNG (S.KOREA)

HYUN-DAI (S.KOREA)

DAE MYUNG (S.KOREA)

BHEL (INDIA)

TURBINES

KHIC (S.KOREA)

BHEL (INDIA)

VALVES

BOMA STORK (INDONESIA)

SUCACO (INDONESIA)

KABELINDO MURNI (INDONESIA)

TERANG KITA (INDONESIA)

BHEL (INDIA)

KHIC (S.KOREA)

SINGAPORE VALVER & FITTINGS
(Singapore)

MEREX (ARGENTINA)

VALVULAS (ARGENTINA)

IBRAVE (BRAZIL)

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