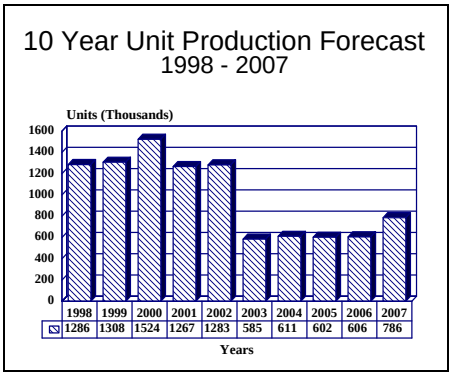
Landmines (International) - Archived 3/99

Outlook

- Production of landmines in the international sector continues despite ongoing efforts to control production
- International controls will most likely be limited to control of exports; no outright ban anticipated
- Some organizations and firms in the international sector are expected to benefit from attempts at international control



Orientation

Description. Ground-deployed anti-personnel, area denial and anti-armor landmines.

Sponsor. The development of the landmines covered in this report is funded and conducted by the respective governments' ministries of defense and/or privately by individual contractors.

Contractors

SPECIAL NOTE

As a result of the international efforts to control anti-personnel landmines, some of the firms and organizations listed below and covered in the main text of this report are no longer manufacturing anti-personnel and (in some cases) anti-armor landmines. However, due to the tremendous numbers of these landmines already existing, they are still listed. A review of each nations' standing regarding the international controls should be conducted in relation to this listing.

Argentina Ministry of Defense, Direccion Generale de Fabricaciones Militares, Buenos Aires, Argentina; Britanite Industrias Quimicas Limitada, Quatro Barras, Parana, Brazil; Chile Ministry of Defense, Fabricaciones Militares, Santiago, Chile; Daewoo Corporation, Seoul, Republic of Korea; Democratic People's Republic of Korea Ministry of Defense, Pyongyang, Democratic People's Republic of Korea; Denel Limited, Hennopsmeer, Republic of South Africa; Explosives Industry Limited, Zichron Jacob, Israel; Heliopolis Company for Chemical Industries, Heliopolis, Egypt; Hsing Hua Company, Taipei, Republic of China; India Ministry of Defence, Indian Ordnance Factories, Kanpur, India; Iran Ministry of Defense, Defense Industries Organization, Ammunition Group, Teheran, Iran; Iraq Ministry of Industry and Military Production, Baghdad, Iraq; Ishikawa Seisakusho, Yokahama, Japan; Kaha Company for Chemical Industries, Cairo, Egypt; Japan Defense Agency, Defense Facilities Administration Agency, Tokyo, Minato-Ku, Tokyo, Japan; Korea Explosives Company Limited, Chung Ku, Seoul, Republic of Korea; Maasara Company for Engineering Industries, Cairo, Egypt; Metalnor Sociedad Anonima, Division Defensa, Santiago, Chile; Myanmar Ministry of Defense, State Munitions Factory, Rangoon, Myanmar; Pakistan Ministry of Defense, Pakistan Ordnance Factories, Rawalpindi, Pakistan; People's Republic of China Ministry of Ordnance Industry, Beijing, People's Republic of China; Quimica Tupan Sociedade Anonima, Rio de Janeiro, Brazil; SIMA-CEFAR,

Callao, Peru; Singapore Technology Corporation/ Chartered Industries of Singapore Proprietary Limited, Jurong Town, Singapore; SNC Industrial Technologies Incorporated, Le Gardeur, Quebec, Canada; TAAS Israel Industries, Ramat Hasharon, Israel; Vietnam Ministry of National Defense, State Factories, Hanoi, Vietnam.

A number of other sources for anti-tank and anti-personnel landmines exist in the international sector. Some of these sources are national, as exemplified by Cuba, Democratic People's Republic of Korea, Mexico, Namibia and Zimbabwe. The Democratic People's Republic of Korea is stated by a variety of sources as manufacturing several different anti-tank and anti-personnel landmines, both of indigenous and non-indigenous designs. Libya, Vietnam, Ethiopia, Laos, Afghanistan and Cambodia are among the other national sources that fall into this grouping; this listing is probably not complete. Another major source for landmines is the various dissident groups operating an many areas of the international market. In this grouping one finds factions such as the Polisario Front, various factions related to the Palestinian Liberation Organization, the Tupac Amaru, various factions related to the Kurdish liberation movement, UNITA, the Liberation Tigers of Tamil Eelam, the Khmer Rouge, the Sendero Luminosa, and the Moro National Liberation Front; this list is not all inclusive but does list the organizations that are generally known to have manufactured various types of landmines in the past.

Licensees. A number of the landmines in this report are manufactured under license from firms or nations outside the scope of this report; there is also some cross-licensing by the firms within this report. The specifics of any license production effort are detailed in the pertinent section.

Status. Development through production. Current development is centered on the design of reduced signature mines, more advanced fuzing and enhanced anti-disturb devices.

Total Produced. Since 1980 inclusive and through January 1, 1997, 22.065 million anti-tank and 143.303 million anti-personnel landmines of all types had been manufactured by the organizations and firms covered in this report.

Application. To maim and kill personnel; to immobilize armored vehicles

Price Range. In equivalent 1998 United States dollars, the mines covered in this report range in price from $2.07 for quantity purchases of the Type 72 to $1,662 for the ATR-5.

SPECIAL NOTE

As a result of the growing move to ban or at least limit the production and international trade in anti-personnel landmines, this market is presently in a state of confusion. Some nations have banned or are examining the possibility of banning the manufacture outright while others are studying the possibility of limiting the manufacture to certain types. Still others are examining the placing of severe export restrictions on landmines. Also being examined by several nations is the employment of various technological devices which would limit the active lifetimes of mines or ease in their detection following self-deactivation following a prescribed period of activity. Another avenue of technology being examined is where the mine would somehow be made to be easier to locate following self-deactivation which would follow a prescribed period of activity after deployment.

As of early 1998, the status of the non United States and European nations regarding the control of landmines is as follows; it is worthy of note that, since the United Nations has endorsed controls on anti-personnel landmines, all member nations have agreed to such controls in a de jure manner. However, as is the norm in international politics, the reality is somewhat different. In mid-1996, the United Nations Landmine Review Conference held in Geneva, Switzerland failed to ban outright the production, use and export of anti-personnel landmines although the members decided that anti-personnel landmines should eventually be manufactured so as to be easily detectable and/or self-deactivating. The next meeting of the Landmine Review Conference is scheduled for 2001. However, in a turnaround probably induced by international pressure, in December of 1996 the United Nations Committee on Disarmament and International Security voted 141-0 (with ten abstentions) in favor of a resolution to "pursue vigorously" a legally binding international agreement to ban the development, production, stockpiling, export and use of anti-personnel landmines. However, Canada has long sought to speed up the process even further and, shortly before the United Nations Committee on Disarmament and International Security resolution, proposed an international meeting in Ottawa for December of 1997. A preliminary conference was held in October of 1996 during which 71 nations supported a total ban on anti-personnel landmines. The Canadian effort was supported by the Fourth International Conference of Non-Governmental Organizations which held its meeting in February of 1997 in Maputo, Mozambique. In September of 1997, Norway jumped on the bandwagon by hosting a conference aimed at the banning of production, use and export of anti-personnel landmines with the agreed upon document available for

signature in Ottawa. While the Ottawa conference was duly held, the United States by and large decided to bypass this process, instead favoring the development and implementation of international controls through the United Nations. A total of 123 nations signed the Ottawa Treaty.

Despite this growing effort to control anti-personnel landmines, Belarus, Cuba, Democratic People's Republic of Korea, Israel, Pakistan, People's Republic of China, Republic of Korea, Russian Federation, Syria and Turkey abstained from voting support for the United Nations resolution. These nations did not sign the Ottawa Treaty.

Regarding the non United States and European nations' status on international controls on landmines, the following is accurate as of early 1998.

Afghanistan - Did not sign the Ottawa Treaty.

Algeria - Signed the Ottawa Treaty.

Angola - Still involved in civil strife, Angola long made no official announcement regarding its policy on landmines of any type. However, in 1993, both the Angola Government and the opposition UNITA forces have stated that they will abide by a request from the international community that they destroy their stocks of anti-personnel landmines. Angola signed the Ottawa Treaty.

Antigua and Barbuda - Signed the Ottawa Treaty.

Argentina - In 1995, Argentina enacted a moratorium on the sale, export or any other transfer of anti-personnel landmines. For a long period, this nation opposed limitations on the export of any type of landmine. However, by the mid-nineties, Argentina changed its position, signing in October of 1995 the United Nations' 1980 Convention on Conventional Weapons, which governs the use of anti-personnel landmines. Argentina now supports the strengthening of the anti-personnel landmine provisions of the convention and signed the Ottawa Treaty.

Armenia - Did not sign the Ottawa Treaty.

Australia - Supports a ban on anti-personnel landmines without a self-destruct mechanism. In April of 1996, the new Australian government enacted a ban on the development, manufacture, stockpiling, use and export of anti-personnel landmines. The Australian Defence Forces was ordered to suspend the operational use of anti-personnel landmines with the existing stocks to be used for training and research into their detection and neutralization. Signed the Ottawa Treaty.

Azerbaijan - Did not sign the Ottawa Treaty.

Bahamas - Signed the Ottawa Treaty.

Bahrain - Signed the Ottawa Treaty.

Bangladesh - Did not sign the Ottawa Treaty.

Barbados - Signed the Ottawa Treaty.

Belize - Did not sign the Ottawa Treaty but supports a worldwide ban on anti-personnel mines.

Benin - Signed the Ottawa Treaty.

Bhutan - Did not sign the Ottawa Treaty.

Bolivia - Signed the Ottawa Treaty.

Botswana - Signed the Ottawa Treaty.

Brazil - Opposed limitations on the export of anti-personnel landmines but changed its position when it signed the Ottawa Treaty.

Brunei Darussalam - Signed the Ottawa Treaty.

Burkina Faso - Signed the Ottawa Treaty.

Burundi - Signed the Ottawa Treaty.

Cambodia - Has enacted a moratorium on the export of anti-personnel landmines. Advocates a comprehensive worldwide ban on the production, use and export of anti-personnel landmines. Signed the Ottawa Treaty.

Cameroon - Signed the Ottawa Treaty.

Canada - Has enacted a moratorium on the export of anti-personnel landmines. Supports a total worldwide ban on the production, use and export of anti-personnel landmines. In January of 1996, Canada announced a unilateral moratorium on the production, export or other transfer as well as the operational use of anti-personnel landmines. Shortly thereafter, Canada announced that it would destroy 60,000 units of its 90,000 unit inventory of anti-personnel landmines. The official announcement stated that the remaining 30,000 anti-personnel landmines would be destroyed when a legally binding global ban in implemented. Hosted the December 1997 meeting to ban anti-personnel landmines and was the first nation to sign the Ottawa Treaty.

Cape Verde - Signed the Ottawa Treaty.

Central African Republic - Did not sign the Ottawa Treaty.

Chad - Did not sign the Ottawa Treaty.

Chile - Had opposed limitations on the export of anti-personnel landmines but signed the Ottawa Treaty.

Colombia - Advocates a total worldwide ban on the production, use and export of anti-personnel landmines. Signed the Ottawa Treaty.

Comoros - Did not sign the Ottawa Treaty.

Congo - Did not sign the Ottawa Treaty.

Cook Islands - Signed the Ottawa Treaty.

Costa Rica - Signed the Ottawa Treaty.

Cote d'Ivoire - Signed the Ottawa Treaty.

Cuba - Opposes limitations on the export of any type of landmine. Cuba also opposes proposed verification procedures or enforcement measures related to the manufacture and export of anti-personnel landmines. As noted above, Cuba did not sign the December, 1996 United Nations' resolution for increased legally binding control over anti-personnel landmines and did not sign the Ottawa Treaty.

Democratic People's Republic of Korea - Opposes any limitations on the use or export of anti-personnel landmines. As noted above, this nation did not sign the December, 1996 United Nations' resolution for increased legally binding control over anti-personnel landmines. Did not sign the Ottawa Treaty.

Democratic Republic of Congo - Did not sign the Ottawa Treaty.

Djibouti - Signed the Ottawa Treaty.

Dominica - Signed the Ottawa Treaty.

Dominican Republic - Signed the Ottawa Treaty.

Ecuador - Signed the Ottawa Treaty.

Egypt - Opposes limitations on the export of anti-personnel landmines. Egypt also opposes proposed verification procedures or enforcement measures related to the manufacture and export of anti-personnel landmines. Egypt did not sign the Ottawa Treaty.

El Salvador - Signed the Ottawa Treaty.

Equatorial Guinea - Did not sign the Ottawa Treaty.

Eritrea - Did not sign the Ottawa Treaty.

Ethiopia - Signed the Ottawa Treaty.

Fiji - Signed the Ottawa Treaty.

Gabon - Signed the Ottawa Treaty.

Gambia - Signed the Ottawa Treaty.

Ghana - Signed the Ottawa Treaty.

Grenada - Signed the Ottawa Treaty.

Guatemala - Signed the Ottawa Treaty.

Guinea - Signed the Ottawa Treaty.

Guinea-Bissau - Signed the Ottawa Treaty.

Guyana - Signed the Ottawa Treaty.

Haiti - Signed the Ottawa Treaty.

Honduras - Signed the Ottawa Treaty.

India - Opposes limitations on the export of any type of landmine. Did not sign the Ottawa Treaty

Indonesia - Signed the Ottawa Treaty.

Iran - Opposes limitations on the export of any type of landmine. Iran also opposes proposed verification procedures or enforcement measures related to the manufacture and export of anti-personnel landmines. Did not sign the Ottawa Treaty.

Iraq - Opposes limitations on the export of any type of landmine. Iran also opposes proposed verification procedures or enforcement measures related to the manufacture and export of anti-personnel landmines. Did not sign the Ottawa Treaty.

Israel - Supports, in a limited way, limitations on the export of anti-personnel landmines. In itself, Israel has enacted a ban on the export of anti-personnel landmines. Israel opposes proposed verification procedures or enforcement measures related to the manufacture and export of anti-personnel landmines. As noted above, Israel did not sign the December, 1996 United Nations' resolution for increased legally binding control over anti-personnel landmines. Israel did not sign the Ottawa Treaty.

Jamaica - Signed the Ottawa Treaty.

Japan - Signed the Ottawa Treaty.

Jordan - Opposes international controls over the international trade in anti-personnel landmines. Jordan did not sign the Ottawa Treaty.

Kazakhstan - Did not sign the Ottawa Treaty.

Kenya - Signed the Ottawa Treaty.

Kiribati - Did not sign the Ottawa Treaty.

Kuwait - Did not sign the Ottawa Treaty.

Kyrgyzstan - Did not sign the Ottawa Treaty.

Laos - In the past, Laos advocated a comprehensive worldwide ban on the production, use and export of anti-personnel landmines but did not sign the Ottawa Treaty.

Lebanon - Did not sign the Ottawa Treaty.

Lesotho - Signed the Ottawa Treaty.

Liberia - Did not sign the Ottawa Treaty.

Libya - Opposes any international controls over the production, international trade or use of anti-personnel landmines. Did not sign the Ottawa Treaty.

Madagascar - Signed the Ottawa Treaty.

Malawi - Signed the Ottawa Treaty.

Malaysia - Advocates a comprehensive worldwide ban on the production, use and export of anti-personnel landmines. Signed the Ottawa Treaty.

Maldives - Did not sign the Ottawa Treaty.

Mali - Signed the Ottawa Treaty.

Marshall Islands - Signed the Ottawa Treaty.

Mauritania - Signed the Ottawa Treaty.

Mauritius - Signed the Ottawa Treaty.

Mexico - This nation had previously opposed limitations on the export of any type of landmine. Mexico also opposed proposed verification procedures or enforcement measures related to the manufacture and export of anti-personnel landmines. However, in 1994 Mexico adopted a positive stance for a comprehensive worldwide ban on the production, use and export of anti-personnel landmines. Signed the Ottawa Treaty.

Micronesia - Did not sign the Ottawa Treaty.

Mongolia - Did not sign the Ottawa Treaty.

Morocco - Did not sign the Ottawa Treaty.

Mozambique - Advocates a comprehensive worldwide ban on the production, use and export of anti-personnel landmines. Signed the Ottawa Treaty.

Myanmar - Did not sign the Ottawa Treaty.

Namibia - Signed the Ottawa Treaty.

Nauru - Did not sign the Ottawa Treaty.

Nepal - Did not sign the Ottawa Treaty.

New Zealand - Advocates a comprehensive worldwide ban on the production, use and export of anti-personnel landmines. Signed the Ottawa Treaty.

Nicaragua - In mid-1995, advocated a comprehensive worldwide ban on the production, use and export of anti-personnel landmines. Signed the Ottawa Treaty.

Niger - Signed the Ottawa Treaty.

Nigeria - Did not sign the Ottawa Treaty.

Oman - Did not sign the Ottawa Treaty.

Pakistan - One of the leading producers of landmines in the international sector, Pakistan opposes limitations on the export of any type of landmine. Pakistan also opposes proposed verification procedures or enforcement measures related to the manufacture and export of anti-personnel landmines. As noted above, Pakistan did not sign the December, 1996 United Nations' resolution for increased legally binding control over anti-personnel landmines and Pakistan did not sign the Ottawa Treaty.

Palau - Did not sign the Ottawa Treaty.

Panama - Signed the Ottawa Treaty.

Paraguay - Signed the Ottawa Treaty.

People's Republic of China - The largest producer in the international sector, this nation opposes limitations on the export of any type of landmine. Also opposes proposals mandating a minimal amount of metallic content in anti-personnel landmines. The People's Republic of China also opposes proposed verification procedures or enforcement measures related to the manufacture and export of anti-personnel landmines. As noted above, this nation did not sign the December, 1996 United Nations' resolution for increased legally binding control over anti-personnel landmines and did not sign the Ottawa Treaty.

Peru - Advocates a comprehensive worldwide ban on the production, use and export of anti-personnel landmines. Signed the Ottawa Treaty.

Philippines - Signed the Ottawa Treaty.

Qatar - Signed the Ottawa Treaty.

Republic of Korea - Opposes (with some reservations) any international controls on anti-personnel landmines. However, this nation is considering signing the United Nations' 1980 Convention on Conventional Weapons which governs the use of anti-personnel landmines. However, as noted above, this nation did not sign the December, 1996 United Nations' resolution for increased legally binding control over anti-personnel landmines and did not sign the Ottawa Treaty.

Rwanda - Signed the Ottawa Treaty.

Saint Kitts and Nevis - Signed the Ottawa Treaty.

Saint Lucia - Signed the Ottawa Treaty.

Saint Vincent and the Grenadines - Signed the Ottawa Treaty.

Samoa - Signed the Ottawa Treaty.

Sao Tome and Principe - Did not sign the Ottawa Treaty.

Saudi Arabia - Did not sign the Ottawa Treaty.

Senegal - Signed the Ottawa Treaty.

Seychelles - Signed the Ottawa Treaty.

Sierra Leone - Did not sign the Ottawa Treaty.

Republic of China - Did not sign the Ottawa Treaty.

Republic of Singapore - Another leading producer and exporter of landmines in the international sector, Singapore's position on a ban on the production, use and export of anti-personnel landmines has not yet been made clear. However, in mid-1996, the nation introduced several controls on the export of anti-personnel landmines. Specifically, for a two year period beginning on 8 May, Singapore will ban the export of any anti-personnel landmine that is not fitted with a self-destruct or self-neutralizing mechanism.

Solomon Islands - Signed the Ottawa Treaty.

Somalia - Did not sign the Ottawa Treaty.

Republic of South Africa - Enacted a total ban on the export of anti-personnel landmines in March of 1994. Signed the Ottawa Treaty.

Sri Lanka - Did not sign the Ottawa Treaty.

Sudan - Signed the Ottawa Treaty.

Suriname - Signed the Ottawa Treaty.

Swaziland - Signed the Ottawa Treaty.

Syria - Opposes any international controls over the export or use of anti-personnel landmines. As noted above, Syria did not sign the December, 1996 United Nations' resolution for increased legally binding control over anti-personnel landmines. Did not sign the Ottawa Treaty.

Tajikistan - Did not sign the Ottawa Treaty.

Tanzania - Signed the Ottawa Treaty.

Thailand - Signed the Ottawa Treaty.

Togo - Signed the Ottawa Treaty.

Tonga - Did not sign the Ottawa Treaty.

Trinidad and Tobago - Signed the Ottawa Treaty.

Tunisia - Signed the Ottawa Treaty.

Turkmenistan - Signed the Ottawa Treaty.

Uganda - Signed the Ottawa Treaty.

United Arab Emirates - Did not sign the Ottawa Treaty.

Uruguay - Signed the Ottawa Treaty.

Uzbekistan - Did not sign the Ottawa Treaty.

Vanuatu - Signed the Ottawa Treaty.

Venezuela - Signed the Ottawa Treaty.

Vietnam - Did not sign the Ottawa Treaty.

Western Samoa - Did not sign the Ottawa Treaty.

Yemen - Signed the Ottawa Treaty.

Zambia - Signed the Ottawa Treaty.

Zimbabwe - Previously, had not gone on record regarding its position on the international control of anti-personnel landmines. However, in March of 1996, the General Manager of Zimbabwe Defence Industries stated that the country had not engaged in the export of its landmines. Signed the Ottawa Treaty.

Technical Data

ANTI-ARMOR MINES

DESIGNATION	TYPE
Manufacturer - Argentina Ministry of Defense	
FMK-3	Plastic mine; can integrate with FMK-1 anti-personnel mine.
MAA-1	Plastic mine; 150+ kilogram activation.
MAAA-1	Concrete practice mine; fitted with white/red smoke charge.
"Ministry of the Navy"	Metallic mine; 150+ kilogram activation.
Manufacturer - Britanite Industrias Quimicas	
T-AB-1	Plastic mine; 200 kilogram activation.
T-AB-1	Practice mine; incorporates white smoke marker.
Manufacturer - Chartered Industries of Singapore	
STM-1	Plastic mine; 225 to 550 kilogram activation.

DESIGNATION	TYPE
VS-1.6	Scatterable plastic mine; 150 to 220 kilogram activation.
Manufacturer - Chile Ministry of Defense	
MP-APVL 83-F4	Plastic mine; improved M1A1/M4 design.
MAT.84-F5	Plastic mine; side mounted fuze system.
Manufacturer - Daewoo Corporation	
M19	Plastic mine; 136 to 227 kilogram activation.
Manufacturer - Democratic People's Republic of Korea Ministry of Defense	
unknown	Metallic pressure activated mine; 130 - 250 kilogram activation.
unknown	Metallic pressure activated mine; 300 - 700 kilogram activation.
Manufacturer - Denel Limited	
ATR-5	Off-route dual sensor fuzed mine.
Intelligent Horizontal Mine	Off-route single sensor fuzed mine.
Nonmetallic A/T Mine	Plastic mine; 250 to 750 kilogram activation.
Number 8	Plastic mine; 150 to 220 kilogram activation.
Manufacturer - Explosives Industries Limited	
Number 6	Metallic mine; copy of Russian TM.46; 275 kilogram activation.
Manufacturer - Heliopolis Company for Chemical Industries	
SACI	Plastic mine; copy of Italian design.
M/71	Metallic mine; copy of Russian TM.46; 210 kilogram activation.
M/80	Plastic mine; improved Russian design.
Manufacturer - Hsing Hua	
M6A1	Metallic mine; license manufacture of United States design.
Manufacturer - India Ministry of Defence	
1A	Plastic mine; 172 to 244 kilogram activation.
1A Practice	Practice mine; fitted with white smoke marker.
3A	Plastic mine; copy of United Kingdom L9 Bar Mine.
Manufacturer - Iran Ministry of Defense, Defense Industries Organization, Ammunition Group	
unknown	Metallic mine; copy of Chinese Type 72.
unknown	Metallic mine of indigenous design.
Manufacturer - Iraq Ministry of Industry and Military Production	
unknown	Scatterable type metallic mine designed for belly attack.
Manufacturer - Japan Defense Agency	
Type 63	Plastic mine; 181 kilogram activation.
Manufacturer - Korea Explosives Company	
M19	Plastic mine; 136 to 227 kilogram activation.
Manufacturer - Metalnor	
AT Mine (U/I)	Metallic mine; 140 kilogram activation.
M19	Plastic mine; 136 to 227 kilogram activation.
M80	Practice mine that is an inert training version of M19.

DESIGNATION	**TYPE**
Manufacturer - Pakistan Ministry of Defense	
P2 Mark 3	Plastic mine; square assembly around P3 Mark 1 mine.
P3 Mark 1	Plastic mine; integral anti-personnel mine.
Manufacturer - People's Republic of China Ministry of Ordnance Industry	
Number 4	Metallic mine; weighs 5.17 kilograms; 136 - 226 kilogram activation.
Type 72	Metallic mine; weighs 8.13 kilograms; 300 - 700 kilogram activation.
Type 72	Plastic mine; weighs 6.5 kilograms; 300 - 800 kilogram activation.
unknown	Metallic mine; weighs 5.43 kilograms; 200 kilogram activation.
Manufacturer - Quimica Tupan	
AC NM AE T1	Plastic mine; 60 to 140 kilogram activation.
Manufacturer - TAAS Israel Industries	
Number 25	Metallic mine; 15 to 16 kilogram activation.
Number 26	Metallic mine; 79 to 120 kilogram activation.

ANTI-PERSONNEL MINES

Again, we wish to note that, due to the ongoing international control efforts, in some cases, many of the below listed anti-personnel mines are no longer being manufactured.

Manufacturer - Argentina Ministry of Defense	
FMK-1	Plastic blast type mine; initiator for FMK-3 anti-armor mine.
MAPG	Metallic blast type mine; tripwire or pressure activated.
MAPPG	Metallic bounding blast type mine; tripwire or pressure activated.
MAPI	Practice mine with integral signal; tripwire or pressure activated.
Manufacturer - Britanite Industrias Quimicas	
T-AB-1	Plastic blast type mine; pressure (18 kilogram) activation.
T-AB-1	Practice mine with smoke marker.
Manufacturer - Chartered Industries of Singapore	
VS-50	Scatterable plastic blast mine; 8 to 15 kilogram pressure activation.
VS-69	Bounding type plastic bounding mine; tripwire or pressure activated.
Manufacturer - Chile Ministry of Defense	
M18	Directional, plastic ballistic projectile mine; unlicensed Claymore.
MAPP 78-F2	Blast type plastic mine; pressure activated.
MAPT 78-F2	Blast type plastic mine; tripwire activated.
Manufacturer - Daewoo Corporation	
K440	Directional, plastic ballistic projectile type mine; close copy of M18A1.
Manufacturer - Democratic People's Republic of Korea Ministry of Defense	
unknown	Directional blast/fragmentation type mine command or tripwire activated.
unknown	Bounding type blast type mine; tripwire activated.
Manufacturer - Denel Limited	
Ambush Mine	Directional, metallic ballistic projectile mine; tripwire or remote activation.
Mine A/P HE	Plastic blast type mine; 3 to 7 kilogram pressure activation.
Mine A/P HE (P)	Practice mine fitted with smoke marker.
Mine, Jumping	Plastic bounding type blast mine, tripwire activated.

DESIGNATION	TYPE
Mini-MS 803	Directional, plastic blast/fragmentation mine; self or tripwire activated.
Non Metallic A/P Mine	Plastic mine; pressure (5 to 11 kilogram) activation.
Number 2	Directional, plastic ballistic projectile mine; copy of M18 Claymore.
Manufacturer - Explosives Industries	
Number 4	Plastic blast/fragmentation mine; eight kilogram pressure activation.
Manufacturer - Heliopolis Company for Chemical Industries	
M18A1	Directional, plastic ballistic projectile mine; command or tripwire activated.
T/78	Plastic blast/fragmentation mine; tripwire activated.
Manufacturer - Hsing Hua	
M2A4	Metallic blast bounding mine; tripwire or pressure activated.
M18A1	Directional, plastic ballistic projectile mine; multiple activation options.
Manufacturer - India Ministry of Defence	
AP NM M-14	Plastic blast type mine; 9-16 kilogram pressure activation.
AP M-16	Metallic bounding type mine; pressure or tripwire activated.
Manufacturer - Ishikawa Seisakusho	
FFV 013	Plastic directional ballistic projectile mine; command activated.
Manufacturer - Kaha Company for Chemical Industries	
AP Jumping Mine	Bounding type plastic fragmentation/blast mine; tripwire activated.
Manufacturer - Korea Explosives	
M18A1	Directional, plastic ballistic projectile mine; command or tripwire activated.
Manufacturer - Maasara Company for Engineering Industries	
A/P Plastic Mine	Plastic blast type; pressure activated.
A/P Directional Mine	Plastic directional ballistic projectile mine based on the M18A1 Claymore.
A/P Jumping Mine	Metallic bounding type blast/fragmentation mine; tripwire activated.
Manufacturer - Metalnor	
AP Mine	Metallic blast/fragmentation mine; five kilogram pressure activation.
AP Mine II	Plastic blast/fragmentation mine; 10-14 kilogram pressure activation.
Directional AP Mine	Plastic directional ballistic projectile mine; modified copy of M18A1.
M18A1	Directional, plastic ballistic projectile mine; command or tripwire activated.
Manufacturer - Myanmar Ministry of Defense	
unknown	Metallic blast/fragmentation mine; pressure activated.
unknown	Bounding type plastic blast mine; tripwire activated.
Manufacturer - Pakistan Ministry of Defense	
AP Mine	Plastic blast type mine, also used as detonator for anti-armor mine.
Bounding AP Mine	Bounding type blast/fragmentation mine, pressure or tripwire activated.
P4 Mark 2	Blast type mine, pressure or tripwire activated.
P5 Mark 1	Directional, plastic ballistic projectile mine; copy of M18A1 Claymore.
Manufacturer - People's Republic of China Ministry of Ordnance Industry	
Type 69	Bounding type blast/fragmentation mine; pressure or tripwire activated.

DESIGNATION	**TYPE**
Unknown	Bounding type blast/fragmentation mine; pressure or tripwire activated.
Unknown	Metallic anti-personnel blast/fragmentation mine; tripwire activated.
PMD-6	Wooden blast type mine; pressure activated.
Manufacturer - Quimica Tupan	
Min AP NM AE T1	Plastic blast type mine; pressure activated.
Manufacturer - CIMA-CEFAR	
MGP-30	Plastic blast type mine; 15 kilogram pressure activated.
Manufacturer - SNC Industrial Technologies	
C3A1 Elsie	Plastic anti-personnel mine; 7.25-13.6 kilogram pressure activation.
C3A2 Elsie	Plastic anti-personnel mine; 7.25-13.6 kilogram pressure activation.
C4A1 Elsie	Practice anti-personnel mine with blue smoke marker.
Manufacturer - TAAS Israel Industries	
Mark 4	Wooden blast type mine; pressure activated.
Number 10	Plastic blast type mine; pressure (15-35 kilogram) activation.
Number 12	Metal bounding blast/fragmentation type mine; tripwire activated.
Number 12A1	Metal bounding blast/fragmentation type mine; tripwire activated.
Manufacturer - Vietnam Ministry of National Defense	
Apple Mine	Metallic blast/fragmentation type mine; pressure or tripwire activated.
unknown	Wooded box blast type mine; pressure activated.
unknown	Metallic blast/fragmentation mine; pressure activated.

Variants/Upgrades

This is generally not applicable to this market segment. When new, enhanced or otherwise modified landmines are offered on the market, in order to have the greatest degree of product differentiation, these mines are usually given new designations.

Program Review

Background. Landmines fall into two groups: anti-armor (often, if improperly called anti-tank) landmines and anti-personnel landmines. Anti-armor landmines are designed to stop armored vehicles so that they can be destroyed by direct fire; a fundamental principle of laying minefields is that they should always be covered by fire. Anti-armor minefields are also used to "channel" or direct enemy armor into friendly fields of fire. Anti-personnel landmines are usually designed to maim rather than kill. There are some exceptions - anti-personnel mines designed to be used in ambushes are made as lethal as possible, for obvious reasons.

AFRICA

Republic of South Africa - Denel Limited: In an early nineties reorganization, ARMSCOR, the state-owned umbrella firm transferred its manufacturing operation to a newly created umbrella firm called Denel Limited. Denel oversees the manufacture of several anti-armor and anti-personnel landmines. The Naschem firm manufactures the Number 8 anti-armor landmine which is a well designed plastic mine with a simple pressure fuze and integral safety lever. The firm has also manufactured the Shrapnel Mine Number 2, which is a copy of the United States M18A1 Claymore. The firm's Ambush Mine is similar but larger and much more

powerful and suited for attacks of light vehicles. Naschem has also manufactured the High Explosive Anti-personnel landmine which is a simple plastic mine with a single impulse fuze; the firm's Non-Metallic Anti-Personnel Mine is similar but, due to its composition, even harder to detect. Naschem's latest entrant is the Intelligent Horizontal Mine, an off-route mine using an infrared detection system and claimed by the contractor to be able to defeat modern tanks. SOMCHEM's ATR-5 is another off-route mine based on the FT-5 man-portable anti-armor weapon. The FT-5 weapon is fitted with a fire control unit and support legs. An advanced design acoustic/infrared sensor system identifies and tracks the target and fires the munition at the proper time. Both the Intelligent Horizontal Mine and ATR-5 are now available for production orders. The other landmines are in service with South African armed forces; some evidence indicates that, in the past, South African mines may have been sold to Iran and/or Iraq.

ASIA

Democratic People's Republic of Korea - Democratic People's Republic of Korea Ministry of Defense - Other than for the types listed above, little is known of this nation's manufacture of landmines. Research does indicate that mines from the Democratic People's Republic of Korea have turned up in Southeast Asia, Southwest Asia and several nations in sub-Saharan Africa. This is one of the nations that does not presently accept any international controls on anti-personnel landmines.

India - India Ministry of Defence: One of the larger manufacturers in the international sector, the state-owned Indian Ordnance Factories manufactures one anti-armor and two anti-personnel landmines. The 1A Anti-armor mine is an all plastic mine with a simple pressure fuze and is of Indian design. The two anti-personnel landmines (which are still offered) are copies of the United States M14 non-metallic and M16 bounding landmines. All these landmines are in service with the Indian armed forces; no export of Indian landmines has been reported.

Japan - Japan Defense Agency: Only one Japanese developed and produced landmine has been identified by our research, the Type 63 anti-armor mine. This mine has a simple pressure fuze and is in service with the Japanese Ground Self-Defence Force.

Ishikawa Seisakusho: Following the 1989 procurement of an evaluation lot (worth SEK 30 million) of the FFV 013 area defense landmine from Bofors of Sweden, in September of 1990 the Japanese Defense Agency announced that the mine had been selected for license production in Japan. The Ishikawa Seisakusho firm was selected for this and production began in 1991.

Myanmar - Myanmar Ministry of Defense: Other than the fact that this nation manufactures the two anti-personnel landmines described above, nothing else is known of Myanmar's production or export of landmines.

Republic of Korea - Korea Explosives Company: The Korean Explosives Company Limited produces the United States M19 anti-armor and M18A1 Claymore anti-personnel landmines under license. Both mines are in service with the South Korean armed forces. A few of these landmines have been exported to an unidentified South American nation.

Daewoo Corporation: As far as the research indicates, this firm is involved in the manufacture of one anti-armor landmine, the M19, which is manufactured under license from the United States. Also manufactured is a close copy of the M18A1 Claymore, the K440.

Pakistan - Pakistan Ministry of Defense: Another major player that has so far not accepted international controls on anti-personnel landmines, the state owned Pakistan Ordnance Factories manufacture a non-metallic anti-armor landmine and a range of anti-personnel landmines, including a copy of the M18A1 Claymore and a rather crude but effective bounding type landmine. This bounding mine uses a black powder charge to propel an ARGES 69 hand grenade to head height, where it is detonated. All the landmines are of a simple and seemingly indigenous design and are in service with the Pakistan armed forces; a small amount of export has also taken place.

People's Republic of China - Ministry of Ordnance Industry. This nation has long been the largest manufacturer of landmines in the international sector and, more recently, in the world. Widely distributed throughout the lesser developed nations, landmines from the People's Republic of China are rugged, simple designs, some of them being copies of Russian pattern mines. This nation is seen in the international anti-mine community as being the greatest hindrance to international control efforts. Presently, four anti-personnel and four anti-armor landmines are offered on the open market, marketed through China North Industries Corporation. Iran has been a major recipient of Chinese landmines.

Singapore - Chartered Industries of Singapore: This famous firm has developed two anti-armor and two anti-personnel landmines. The VS-1.6 anti-armor landmine looks somewhat similar to some of the Italian Technovar mines, while the STM-1 anti-armor

landmine is of indigenous design. Both landmines use simple pressure fuzes, but can be fitted with anti-lift devices. The two anti-personnel landmines are copies of the Italian Valsella VS-50 and Valsella Valmara 69 bounding landmine. The status of these landmines is not known, although probably only the STM-1 is in service in Singapore.

Republic of China - Hsing Hua: The Hsing Hua Company manufactures United States pattern landmines for domestic and moderate export requirements. These include the M6A1 anti-armor landmine and the M2A4 anti-personnel bounding type landmine.

Vietnam - Vietnam Ministry of National Defense: Vietnam, known for its innovative, if primitive, mine technology has recently introduced a new anti-personnel landmine. The spherically shaped Apple Mine is based on the body of old BLU-24 submunitions which were widely dispensed during the Vietnam War. The Apple Mine is rather crude in manufacture but apparently effective in operation. It can be either tripwire or pressure activated. Other Vietnamese anti-personnel landmines include a wooded box mine that is pressure activated and a metallic pressure plate landmine based on Russian technology.

AUSTRALIA-NEW ZEALAND

Australia - Australian Defence Industries: While this government-owned organization has manufactured several different landmines in the past, production has been dormant for some time. In light of the recent decisions regarding anti-personnel mines in Australia, it is doubtful if this type will ever again be manufactured.

MIDDLE EAST

Egypt - Heliopolis Company for Chemical Industries: Heliopolis Company for Chemical Industries makes three anti-armor landmines and one anti-personnel landmine. The M/71 Anti-armor landmine is a copy of the Russian TM.46. The M/80 seems to have been designed to be mechanically laid and is probably of Egyptian design. The firm also makes a copy of the Italian SACI plastic landmine, which has no known designation. The T/78 anti-personnel landmine is a small boobytrap mine detonated either by a tripwire or some form of pull action. All these landmines are in service with the Egyptian armed forces as well as Sudan and a number of other Middle Eastern countries.

Kaha Company for Chemical Industries: This firm manufactures a low technology bounding type anti-personnel landmine with a lethal radius of approximately 15 meters (16.4 yards). This landmine has been in large scale production and has been exported to Jordan and Sudan.

Maasara Company for Engineering Industries: This firm manufactures three different anti-personnel landmines, none of which is remarkable. The A/P Plastic Mine is based on the Israeli Number 4 landmine while the A/P Directional Mine, a plastic directional ballistic projectile landmine, is based on the M18A1 Claymore. These landmines, plus the A/P Jumping Mine, have been mainly manufactured for the domestic requirement, although some export to Sudan and one other unidentified nation has taken place.

Iraq - Iraq Ministry of Industry and Military Production: In the late eighties, Iraq introduced a new scatterable anti-armor landmine which has subsequently been integrated for deployment from the LRSV M-87 multiple launch rocket system. Each 26.2 centimeter rocket dispenses 30 of these landmines, the designation of which is still unknown. Following their dispensing, four curved vanes are deployed to provide aerodynamic stabilization. These landmines are designed to attack the belly armor of tanks. This system was developed in conjunction with Yugoslavia (Serbia-Montenegro). In addition to receiving large scale shipments of landmines from the former Soviet Union, Iraq has also been a heavy importer of anti-personnel landmines from the Valsella firm in Italy. Following the devastation of the Second Gulf War, Iraq, which accepts no international controls for anti-personnel landmines, has been strenuously trying to rebuild its entire military manufacturing infrastructure.

Iran - Iran Ministry of Defense, Defense Industries Organization, Ammunition Group: It is only in the past three years that some minimal information has surfaced regarding this nation's extensive rearmament effort. Included in this effort are two anti-armor landmines. One type, a metallic landmine, is a copy of Chinese Type 72 while the other is also a metallic mine but of indigenous design. Iran has imported large quantities of both anti-armor and anti-personnel landmines from the People's Republic of China.

Israel - TAAS Israel Industries: This firm manufactures two anti-armor and three anti-personnel landmines. The Number 25 anti-armor landmine has a friction fuze while the Number 26 has a pressure fuze. The Number 10 anti-personnel landmine has a simple pressure fuze; the Number 12 is a tripwire-operated bounding type blast landmine. The Mark 4 is a pressure activated wooden box mine containing 150 grams (5.29 ounces) of high explosive. Research indicates that these landmines are in service with the Israeli Army as well as Argentina, Ecuador, El Salvador, Guatemala, Mexico, Nigeria and Zaire.

Explosives Industry Limited: This firm produces the Number 6 anti-armor landmine (a copy of the Soviet

TM.46) and the Number 4 anti-personnel landmine. Both mines are of a simple design with simple pressure operated fuzes and are in service with the Israeli and Argentinean armies, as well as some other countries' armies.

NORTH AMERICA

Canada - SNC Industrial Technologies: Formerly known as Canadian Arsenals Limited, this firm manufactured the Canadian-designed Elsie anti-personnel landmine, which is in service (but due to be destroyed) with the British and Canadian Armies. This groundburst type landmine has a simple pressure fuze and is one of the better designs on the market. The practice version can be reused at least five times.

SOUTH AMERICA

Argentina - Argentina Ministry of Defense: Landmine production in Argentina is controlled by Direccion Generale de Fabricaciones Militares, which produces three types of anti-armor and (previously) four types of anti-personnel landmines. All these landmines are of a modern design, very similar to some United States designs. Fuzes are a simple pressure or pressure/pull type. All these landmines are in service with the Argentinean Army and Marine Corps. In addition, a minimal amount of export has taken place; one of the identified nations is Uruguay.

Brazil - Quimica Tupan: Quimica Tupan, the pyrotechnics and grenade manufacturer for Brazilian and export requirements, has manufactured two types of landmines on an as-needed basis. One mine is an anti-armor type and the other (no longer offered) is an anti-personnel type. Both landmines are of a simple, non-metallic design, with simple pressure fuzes. They are in service with the Brazilian Army and Marine Corps and are believed to have been procured by at least one Middle Eastern country, possibly Libya.

Britanite: This firm, better known in Brazil as an explosives manufacturer, has also manufactured an anti-armor and (no longer) an anti-personnel landmine. The two landmines are both of a basic non-metallic design with simple pressure fuzes. Practice versions are available for both landmines, which are now in production and in service in Brazil.

Chile - Chile Ministry of Defense: The Chile Ministry of Defense manufactures two anti-armor landmines and (up to 1998) one anti-personnel landmine. The MP-APVL 83-F4 is an improved copy of the old United States M1 anti-armor mine with a plastic body and a laminated steel base plate. The MAT.84-F5 is an all-plastic mine. All these landmines, including the anti-personnel landmine, have simple pressure fuzes and are in service with the Chilean Army.

Metalnor SA In the early nineties, the well-known Industrias Cardoen firm was restructured under this new name. The firm presently manufactures one anti-armor and formerly manufactured three anti-personnel landmines. The single anti-armor landmine, possibly designated U/I, was produced mainly for export; in any event, it has more recently been replaced in production by a local version of the United States' M19 anti-armor landmine. Of the three anti-personnel landmines, one is a Claymore look-alike which is fired either by a pull switch or a three minute delay fuze, and the other two are rather simple pressure operated mines. The Metalnor/Cardoen landmines are in service with the Chilean Army and there is some evidence which indicates that a significant number were previously supplied to Iraq and other areas of the Mideast and sub-Saharan Africa.

Peru - CIMA-CEFAR: This government-owned organization has developed a small blast type anti-personnel landmine largely fabricated from plastic. The main distinguishing feature is that the landmine can be filled with two different amounts of main charge - 35 or 80 grams. To date, the only sales have been domestic and no further production is anticipated.

Funding

The funding for the development of the landmines covered in this report is provided and conducted by the respective governments' ministries of defense and/or privately by individual contractors.

Recent Contracts

Not available as contractual information is not released.

Timetable

By the turn of the century, at least two and possibly three new players are expected to make their appearance in the international sector of the landmine market. The main technical innovation, a "totally plastic" landmine, is expected to be available by that time, although efforts to control this technology, especially for the anti-personnel types, are expected to limit production.

Worldwide Distribution

Countries. The distribution of the landmines manufactured by the firms covered in this report is largely confined to those manufacturing countries and other countries in the immediate vicinity. Some exceptions include the Argentinean (Metalnor), Canadian, Chinese, Egyptian, Indian, Pakistani, Singapore and South African designs. However, the efforts to control the proliferation of anti-personnel landmines is expected to increasingly impact the distribution in the future.

Forecast Rationale

As of early 1998, our latest research into the landmine manufacturing programs in the international sector finds that, as with the European firms, the effects of the international control efforts related to anti-personnel landmines are becoming significant. However, since there are several major players in this market that are not accepting the international controls, the effects are different than for the rest of the world. In fact, it is increasingly evident to observers concerned with the landmine problem that several of the organizations and firms covered in this report will benefit in a major way from the control efforts.

A few nations in the international sector (led by Canada - long a minor player in the market) have embraced and are leading the implementation of a worldwide ban on the export of anti-personnel landmines. In addition, since the Ottawa agreement, many others have embraced the control measures. However, several other players, mostly in the international sector, are essentially ignoring the efforts. In fact, aside from the Russian Federation and the United States, both special cases, by far the majority of the nations in the world that are resisting the control efforts are in the international sector. While it is understood that the major producers, such as the People's Republic of China, Pakistan and Israel, are vehement in their resistance, even some non-player nations are staunchly resisting any efforts in the international control of landmines.

Our research indicates that the result of the decisions by the United Nations and much of the rest of the international community to limit the production and export of landmines will mean that the unmet demand will be taken up by several of the organizations in the international sector. This will represent a major shift in the rankings of the manufacturers as well as in the world export trade.

In the coming ten years, both Iran and Iraq are expected to maintain their extensive rearmament plans. In fact, Iran is already fairly well along in its effort, exploiting its own developing manufacturing capability to the greatest degree possible. In addition, Iran is an active customer on the international market. A good portion of this demand can be expected to be provided by the People's Republic of China. Iraq can be expected to jump in as soon as international politics allows. In addition to China, several other Mideast and Southwest Asian nations are expected to account for much of the forecast demand for landmines of all types in the coming ten years. Another vibrant market for landmines in general is expected to be Southeast Asia; despite many nations in the area signing the Ottawa Treaty, portions of sub-Saharan Africa should also continue to be good markets for anti-personnel mines in particular. In Latin America, the overall demand for landmines should be static or even decline a little in the coming ten years, with reductions in demand for anti-personnel types by far leading the way. Overall, the People's Republic of China should continue to be the largest producer of landmines of all types in the world.

Even though the December 1997 Ottawa Treaty has gone a long way toward the international control of anti-personnel landmines, the evidence still indicates that it will still be several years before the growing demand to limit the production and export of anti-personnel landmines has a major impact on the international sector. This is the reason for the higher level of production in this report (especially for anti-personnel landmines) than in the report on the European

players. However, the international efforts to control anti-personnel landmines are eventually expected to take effect on most of the nations in the international sector, the reason for the rather precipitous decline in production after 2002. But in the end, at least three nations can be expected to continue to flaunt these efforts and continue their manufacture.

Live mines are rarely used for practice, and so the forecast for landmine production is based principally on replacement of time-expired mines. Of course, the demands for production for use in conflicts (including by insurgent groups) is almost impossible to forecast with any certainty, but some allowance is made for this, based on historical data.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

		High Confidence Level			Good Confidence Level			Speculative				
Designation	through 97	98	99	00	01	02	03	04	05	06	07	Total 98-07
International production of anti-tank landmines(a)	22,065,000	221	207	232	181	206	177	222	199	205	230	2,080
International production of anti-personnel landmines(a)	143,303,000	1065	1101	1292	1086	1077	408	389	403	401	556	7,778

(a) All numbers except for the through 1997 figure are for units in thousands; the historical production figure is since 1980 inclusive.