MINISTÈRE DE LA DÉFENSE

C01

MENACES APPORTEES PAR LA PROLIFERATION DES MISSILES DANS LES NOUVELLES PUISSANCES MILITAIRES

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(Juin 1995)

Dosssier n° 135/95

DGA

DIRECTION DE LA RECHERCHE ET DE LA TECHNOLOGIE

CENTRE DE DOCUMENTATION DE L'ARMEMENT

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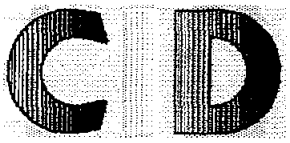
COLLEGE INTERARMEES



DE DEFENSE

ETUDES PARTICULIERES A OPTION

Cycle 1994 - 1995

MENACES APPORTEES par la PROLIFERATION des MISSILES dans les NOUVELLES PUISSANCES MILITAIRES

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MENACES APPORTEES par la PROLIFERATION des MISSILES dans

LES NOUVELLES PUISSANCES MILITAIRES

Remarque:

Le LCL EFRAT n'a pas traité la partie consacrée à Israël et sa présence dans ce groupe de travail ne cautionne pas les données concernant ce pays.

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INTRODUCTION

La prolifération des missiles balistiques dans le Tiers Monde a été mise en évidence lors du conflit du Golfe pendant lequel la menace représentée par les **Scud** irakiens a joué un rôle important. Les informations récentes font état de 25 pays ayant déjà acquis, ou sur le point d'acquérir, la technologie des missiles balistiques, soit par une production locale, soit plus simplement par l'achat de missiles à l'étranger. La plus forte concentration de ces pays "proliférants" se trouve au Moyen Orient. Ainsi la question se pose de savoir ***quelle est la menace apportée par la prolifération des missiles dans les nouvelles puissances militaires.***

Sans s'y appesantir, il est néanmoins nécessaire de répondre à la question : pourquoi cette volonté de posséder des missiles balistiques. Il est incontestable que les missiles ne sont pas un moyen efficace de délivrer des armes explosives conventionnelles, si ce n'est que leur pouvoir de pénétration est supérieur à celui des avions. En revanche, leur impact psychologique est sans commune mesure au regard de leur efficacité. Cet aspect a, au demeurant, bien été ressenti lors de la guerre du Golfe. Les missiles ont donc un rôle politique important à jouer et sont, en outre, un élément de prestige et un symbole de réussite technologique non négligeables.

Il paraît important de souligner que la plupart des pays qui marquent un effort dans le développement ou l'achat de missiles ont, de façon concomitante, une politique de développement des armes "non conventionnelles". Cet aspect, qui n'est pas à proprement parler le thème central de la présente étude ne doit pas pour autant être perdu de vue.

Enfin, il ne faut pas oublier non plus l'aspect symbolique que revêt la détention des missiles et qui explique que les proliférants ne se considèrent pas comme tels et justifient leurs efforts par la volonté de rejoindre le club fermé des pays déjà détenteurs. C'est la notion même de prolifération qui est à remettre en cause car elle n'est vraiment admise comme une évidence que par les "membres du club".

La présente étude se limite aux pays réunissants les trois facteurs suivants :

- nouvelles puissances militaires
- ayant une politique de développement ou d'acquisition des missiles
- situés dans des zones "chaudes" (à risque) de la planète.

Il a paru néanmoins important d'opérer, avant tout, un recensement global des missiles qui permet d'identifier les acheteurs, producteurs, vendeurs, détenteurs de missiles ou de technologies afférentes. De même il est indispensable, afin d'avoir une idée claire des situations, de faire un bref rappel du cadre juridique que s'est donné la communauté internationale pour lutter contre la prolifération des missiles et, surtout des armes de destruction massive susceptibles d'être délivrées par ces vecteurs. Enfin, un aperçu des technologies émergentes afférentes à ce domaine paraît également s'imposer.

Un avertissement s'impose avant de développer d'avantage cette étude. Les références proviennent toutes de la documentation ouverte et la plupart des documents utilisés sont d'origine américaine. Le point de vue exposé est donc souvent celui des Américains.

Arme de dissuasion par excellence , le missile à tête soit nucléaire, soit chimique ou bactériologique est l'héritier direct du V2 allemand. Doté d'une précision toute relative, sa menace d'emploi par un pays, ayant accédé à sa technologie, fait peser sur ses voisins une pression inacceptable sur les populations civiles, les sites industriels ou militaires .

La guerre du Golfe a montré de façon claire que des missiles à tête classiques pouvaient être envoyés de façon indistincte sur un non belligérant (Israël), sur des bases militaires d'une coalition (Dahran) ou sur les objectifs civils saoudiens avec un fort potentiel de réussite. Fonctionnant par la terreur, de telles armes mobilisent pour les contrer un effectif et des moyens hors de proportion avec leur réel effet de destruction.

Equipés de têtes chimiques, voire de déchets radioactifs, ces missiles changent les données de la terreur et augmentent le volume des moyens mis en oeuvre pour les contrer.

Avec une tête équipée d'un explosif nucléaire, des pays du tiers-monde, qui auraient accédé à cette technologie par recherche nationale ou par achat auprès du "grand bazar asiatique", modifieraient l'équilibre précaire de notre monde. La stabilité de régions clé du monde est ainsi remise en cause et elle doit devenir l'un des objectif majeur qui détermine nos efforts militaires. Ceci doit nous amener à repenser notre système de dissuasion et nos efforts de protection.

Depuis 1973, les missiles balistiques ont été utilisés à cinq reprises lors d'opérations "régionales". Si la notion de dissuasion s'applique difficilement dans un tel contexte, ces armes ont la possibilité de dynamiser l'évolution politique des guerres. Si l'échange massif des mégatonnes hérités de la guerre froide devient moins probable, quelques têtes nucléaires au mains d'Etats "renégats" de nations agressives ou de terroristes peuvent contrer une réponse occidentale conventionnelle lors de futures crises régionales, et nous dissuader de projeter une force militaire pour protéger nos intérêts.

La réponse possible passe par le contrôle des armements, la réduction des stocks, la contre prolifération et le développement de moyens anti-balistiques.

Cette étude est présentée selon le plan suivant :

- **1** La prolifération et la lutte contre celle-ci.

- **2** Etude des points chauds du monde dans le domaine de la prolifération balistique.

I/ LA PROLIFERATION

La prolifération, qu'elle soit nucléaire, chimique ou balistique, est un phénomène complexe qui met en jeu des mécanismes de plus en plus sophistiqués liés à la diffusion de technologies, laquelle est soumise à des volontés politiques et commerciales difficiles à concilier. C'est un phénomène qui touche directement à la sécurité des états, impliquant la recherche de consensus pour être efficace au niveau mondial, et dont la perception est fondamentalement différente suivant que l'on se place du coté des états fournisseurs ou de celui des acheteurs.

Une première partie a pour objectif de cerner tout d'abord quelles sont les sources de prolifération sur le plan technologique dans les domaines nucléaire, bactériologique et chimique et enfin balistique, puis d'étudier dans un deuxième temps l'évolution des concepts de prolifération des origines à nos jours, lesquels n'ont fait que croître en volume et en complexité.

La deuxième partie est consacrée aux mécanismes existants de lutte contre la prolifération à travers l'étude des barrières institutionnelles qui regroupent :

* **les différents traités, protocoles et conventions.**
* **les groupes de contrôle multilatéraux.**
* **Les différents organismes et leurs moyens d'action.**

Dans une troisième partie sont analysées les insuffisances actuelles et les moyens d'y remédier. Les défauts des mécanismes existants ont en effet des origines liées soit à l'évolution géopolitique, soit à celle des savoir-faire, des technologies et de leur mode de transfert, soit enfin aux mécanismes eux-mêmes. Les événements des derniers mois (Corée du Nord, attentat de Tokyo, trafics en ex-URSS) démontrent qu'il est indispensable de faire évoluer les concepts de non prolifération et de réfléchir à celui de contre prolifération lorsque tous les moyens pacifiques se révèlent insuffisants. Compte tenu de l'émergence de " nouveaux fournisseurs ", il semble vraiment urgent de relever ce défi.

1 De quelle prolifération s'agit-il?

Il s'agit d'étudier sous les aspects techniques, historiques et politiques le problème de la prolifération des technologies dans les domaines nucléaire, bactériologique, chimique et balistique.

1.1 Les sources de prolifération sur le plan technologique.

1.1.1 Sources de prolifération nucléaire

Par définition on considère que la prolifération nucléaire consiste en l'obtention des moyens de tous ordres par un **E**tat **N**on **D**oté d'**A**rmes **N**ucléaires (ENDAN) pour accéder à l'arme nucléaire et devenir ainsi potentiellement un EDAN.

1.1.1.1 Les domaines de la prolifération

Les domaines essentiels qui constituent des sources de prolifération nucléaire sont: le transfert des connaissances, des technologies, et des matières nucléaires(U235 ou PU 239). Concernant les technologies, on appelle " duales " celles qui contribuent à la prolifération du nucléaire tout en étant utilisées dans des domaines relevant du nucléaire civil ou extérieurs au nucléaire.

* **Le transfert des connaissances** comprend aussi bien la communication et la publication des recherches, que la formation des scientifiques des ENDAN dans le système universitaire des EDAN, le plus souvent sous couvert d'acquis des techniques relevant du nucléaire civil ou l'émigration des cerveaux.

* **Le transfert des technologies** recouvre aussi bien celui des procédés de fabrication que des matières et de l'environnement indispensables à la réalisation des armes. L'exemple récent de l'importation par l'Irak d'éléments provenant de pays divers pour réaliser une usine d'enrichissement de l'uranium démontre la difficulté de contrôler efficacement la diffusion des technologies dans un système d'économie de marché à l'échelle mondiale.

* **Le transfert des matières nucléaires** concerne aussi bien l'U238 (combustible de base des centrales à eau légère qu'il est possible d'enrichir jusqu'à la qualité militaire avec des usines d'enrichissement de la chaîne nucléaire civile), que le Plutonium ou l'Uranium enrichi (U235).En particulier les combustibles irradiés, issus des centrales, constituent une source potentielle importante de Plutonium à usage militaire après retraitement.

1.1.1.2 Les points clés de détournement du nucléaire civil à des fins proliférantes:

Ils sont au nombre de **3** :

* Les réacteurs de recherche qui ont permis à des états comme l'Inde ou Israël d'accéder au nucléaire militaire.

* Les usines d'enrichissement de l'U238 en U235 (à ce titre le procédé d'enrichissement par laser, relativement simple à dissimuler, est beaucoup plus " proliférant " que les procédés d'ultracentrifugation ou de diffusion gazeuse).

* Les usines de retraitement des combustibles irradiés.

1.1.1.3 Les verrous technologiques qui limitent la prolifération nucléaire

On peut considérer que si l'arme à fission est accessible assez facilement, il n'est possible de parvenir à l'arme thermonucléaire que par le biais d'essais nucléaires atmosphériques par nature indiscrets et d'un environnement technologique dans de nombreux domaines connexes qui reste du ressort de nations industriellement très avancées.

D'autre part la difficulté de produire des matières fissiles à usage militaire constitue un sérieux frein à la production d'un nombre significatif d'armes pour des pays du Tiers Monde.

1.1.2 Sources de prolifération bactériologique et chimique

1.1.2.1 Les domaines de la prolifération

* **Le transfert des connaissances**

En dehors du concept des armes binaires (2 composants inertes dont la réunion produit le composant chimique requis) relativement difficile à réaliser, la fabrication d'armes chimiques est le fruit de recherches " duales "par essence puisqu'une installation chimique civile peut parfaitement être détournée à des fins militaires.

* **Le transfert des technologies**

Les domaines de prolifération technologiques vont donc des usines complètes aux systèmes et appareils de sécurité, de réfrigération, de détection des gaz toxiques, des échangeurs de chaleur aux appareils de distillation surtout si l'ensemble de ces matériels est fait de matériaux anti-corrosifs.

* **Le transfert des produits chimiques proliférants**

Il existe à l'heure actuelle une liste d'une cinquantaine de produits dont la vente à des pays tiers est soumise à un contrôle très strict, voire à une interdiction pure et simple par les pays membres du Groupe d'Australie (Cf. §2.2.2).

1.1.2.2 Les points clés de détournement du chimique civil à des fins proliférantes

Toutes les activités de recherche ou de production chimiques à des fins agricoles, pharmaceutiques ou autres peuvent faire l'objet de détournement; cependant la production massive de munitions chimiques est difficile à dissimuler (Cf. l'exemple de la Libye).

1.1.2.3 Les verrous technologiques qui limitent la prolifération

Ils sont quasiment inexistants, le seul véritable obstacle résidant dans la fabrication de munitions stables aussi bien dans le temps (corrosion, étanchéité...), que dans l'environnement (la tête chimique d'un missile balistique, lors de la rentrée dans l'atmosphère, est soumise à une température qui risque fortement de dénaturer la charge en l'absence d'une protection thermique complexe à réaliser.)

1.2.3 Sources de prolifération balistique

On entend par *prolifération balistique* envers des Etats Non Dotés d'Armes Balistiques la vente ou le transfert de capacités permettant la réalisation de systèmes balistiques capables d'emport de charges militaires de plus de 500 Kg (poids jugé minimum d'une charge nucléaire) à plus de 300 Km.

1.1.3.1 Les domaines de la prolifération

* **Le transfert des connaissances**

Il concerne essentiellement les domaines de la combustion et de la détonique, ainsi que ceux de la mécanique des fluides et des échanges de chaleur pour tout ce qui touche à la propulsion et à la rentrée dans l'atmosphère.

* **Le transfert des technologies**

A l'heure actuelle une trentaine de nations ont eu accès à une grande variété d'engins balistiques de portée courte ou intermédiaire, provenant essentiellement des deux grands. Il en résulte une profusion de copies rustiques qui sont à la portée de nombreux pays même s'ils ne possèdent pas d'industrie aérospatiale en propre. Cependant la réalisation de systèmes précis et fiables requiert un environnement industriel complexe et multiple, que même la vente de systèmes d'armes aériens élaborés ne permet pas de détourner facilement.

Les technologies les plus proliférantes ont trait :

* A la propulsion
* A la miniaturisation des moyens de calcul et de stockage informatique.
* A la métallurgie et à la mécanique de précision nécessaires aux moyens de guidage, de contrôle et aux ogives.

1.1.3.2 Les verrous technologiques qui limitent la prolifération

* Le niveau scientifique et technologique à atteindre dans de nombreuses disciplines.
* La nécessité de développer des propergols solides pour assurer une propulsion d'une fiabilité raisonnable sur le plan militaire qui suppose une longue expérience théorique et pratique des poudres et explosifs.
* La difficulté d'obtenir des systèmes de guidage précis

Il en résulte que les progrès sont difficiles et lents pour des pays qui ne sont pas industriellement avancés sauf s'il y a transfert massif de technologies dans un ensemble de domaines stratégiques traditionnellement couverts par le secret militaire (contrairement au nucléaire civil). A ce titre les pays du " seuil balistique" sont essentiellement ceux ayant développé une industrie aéronautique ou spatiale, la seule menace de prolifération dans des pays du tiers monde relevant de la copie de systèmes anciens peu précis et de faible portée.

1.2 Des origines à nos jours étude de l'évolution des concepts concernant la prolifération: croissance du problème en volume et en complexité.

1.2.1 Concernant la prolifération nucléaire

Dès août 1945 le Président TRUMANN déclarait: " les USA doivent se constituer en gardien de la nouvelle force afin d'empêcher son emploi néfaste et afin de la diriger pour le bien de l'humanité ". Toute la politique nucléaire US depuis cette date en découle et n'a eu de cesse d'empêcher d'autres pays d'accéder à l'arme et à défaut de maintenir la primauté des USA dans le domaine nucléaire. D'autre part des considérations économiques ont souvent conduit l'administration américaine à osciller entre laxisme et application du principe fort énoncé ci-dessus, à tel point qu'il n'est possible de constater une harmonisation concrète et efficace des politiques nucléaires des EDAN qu'après la guerre du Golfe, chacun ayant appliqué le même type de politique " flexible " pendant plusieurs décennies.

Période	Concept	Date	Faits marquants
1945	Le plan BARUCH-LILIENTHAL * Développement énergie nucléaire sous contrôle Autorité Internationale propriétaire toute activité nucléaire potentiellement dangereuse * Fin production d'armes nucléaires * Destruction ensuite toutes armes nucléaires existantes * Autorité Internationale aurait pouvoir d'appliquer aux contrevenants châtiment exemplaire	1945	Rejet plan BARUCH par l'URSS qui n'admet pas le monopole nucléaire des USA
1ère: 1946 à 1953	La loi MCMAHON ou la politique du secret Interdiction du transfert hors des USA de : * toutes connaissances nucléaires * toutes technologies utilisables dans armes nucléaires * toutes matières fissiles (U238 et 235, PU)	1947 1952	Explosion de la première bombe nucléaire soviétique Explosion de la première bombe nucléaire britannique => échec de la politique du secret US

Période	Concept	Date	Faits marquants
2ème: 1953 à 1974	" Atoms for peace " (1953) Période du " laisser faire " (stratégie duale): Distinction entre: - développement atome civil pour tous autorisé mais contrôlé pour éviter tout détournement à des fins militaires - développement atome militaire interdit * Transfert de connaissances nucléaires libres pour domaine civil * Fourniture matières fissiles par US à des fins civiles aux ENDAN contrôlés	1957 1960 1963 1967 1968	Création de l'AIEA (pleinement opérationnelle en 1963) et de l'EURATOM en Europe Explosion de la première bombe nucléaire française Traité de Moscou interdiction essais atmosphère Traité Tlatelolco: dénucléarisation Amérique du Sud et Traité dénucléarisation espace Signature du TNP => période d'une politique permissive qui se termine avec l'explosion indienne en 1974 (pays non signataire du TNP), démontrant la dualité civilo-militaire de l'atome
3ème: 1974 à 1980	" Groupe de Londres " * Accord entre les pays fournisseurs pour un renforcement mécanismes existants sur le contrôle des exportations nucléaires vers les ENDAN 1976 USA: la politique CARTER Notion de garanties nucléaires généralisées Refus des surgénérateurs et du retraitement des combustibles irradiés (non au Plutonium) Renégociation des contrats en cours avec pays refusant le NPA	1975 1978 1979	 NPA: Non Prolifération Act (USA) =>refus des autres pays fournisseurs: USA prennent conscience que le monde de l'énergie nucléaire est devenu multipolaire Accident de Three Miles Island
4ème: 1980 à 1990	USA :REAGAN ou la politique des exceptions au NPA Fin du gel du retraitement et des surgénérateurs Approche politique (convaincre les ENDAN) au lieu de l'approche technologique dure du NPA Approche pluridimensionnelle de la prolifération incluant balistique et chimique	1986 1987	Accident de TCHERNOBYL MTCR

Période	Concept	Date	Faits marquants
5ème: après 1990	La lutte contre de nouvelles formes de prolifération * Assurer les démantèlements des têtes nucléaires prévus par les accords START (financement CEI). * Eviter la fuite des cerveaux nucléaires ex-URSS * Surveiller le devenir de l'armement nucléaire de l'ex-URSS (" vente illicite " d'armes nucléaires) Coordonner l'approche pluridimensionnelle de la prolifération (nucléaire, balistique, chimique...) entre les 27 membres du Groupe de Londres et essayer de l'étendre aux " nouveaux fournisseurs "	1991 1991 1994 1995	Eclatement de l'URSS : apparition de 5 puissances nucléaires au lieu d'une. Protocole de Lisbonne Découverte du programm nucléaire Irakien Le cas de la Corée du Nord La renégociation du TNP

1.2.2 Concernant la prolifération bactériologique et chimique (B § C)

Période	Concept	Date	Faits marquants
1915 à 1925	Arme chimique est utilisée au combat * Recherche, production, stockage libre * Utilisation massive de 1916 à 1918 par les belligérants		Plusieurs millions de morts ou de blessés graves dus à l'arme chimique pendant la 1ère GM
1925 à 1972	Prohibition d'emploi des armes B & C * Production et possession non concernées * Usage en riposte toléré	1925 1969 1972	Protocole de Genève Renonciation unilatérale des USA à l'arme bactériologique Convention sur l'interdiction des Armes Bactériologiques ou à Toxines (CABT)
1972 à 1992	Interdiction de la production et de la détention des armes B * Recherche non interdite * Aucune mesure de contrôle ou de vérification	1984 1984	Création du Groupe Australien (22 pays) Emploi massif par l'Irak de moyens chimiques contre l'Iran puis en 1988 contre les Kurdes
Après 1992	Interdiction totale de l'arme C * Mise au point, fabrication et stockage d'armes C * Destruction stocks et moyens production existants * Déclaration des moyens existants * Vérifications soudaines ou de routine	1992 1995	CAC : Convention sur les Armes Chimiques Attentat dans le métro de Tokyo

1.2.3 Concernant la prolifération balistique

Période	Concept	Date	Faits marquants
1945 à 1957	La révolution des missiles Développer des armes guidées (non pilotées) pour porter la destruction chez l'adversaire	1944 1957	* V1: le premier missile de croisière * V2 : le premier missile balistique * Spoutnik
1957 à 1982	Prolifération des missiles et conquête spatiale * Les missiles balistiques: pivot de la dissuasion nucléaire * Les satellites :outils indispensables, mais sources de prolifération balistique	1967 >70 1982	Mise en place dans de nombreux pays de missiles à faible et moyenne portée Traité sur la dénucléarisation de l'espace Miniaturisation électronique et informatique => précision guidage et communications Lancement du programme IDS
Après 1982	Protection contre les missiles balistiques * Protection contre les attaques surprises (IDS) * Lutte contre la dissémination dans le Tiers monde	1987 1991	RCTM SCUD contre PATRIOT pendant la Guerre du Golfe

2 Quels sont les mécanismes existants?

Les mécanismes de contrôle de la prolifération technologique seront examinés suivant la définition des normes, l'exécution des règles et les processus de vérification. Leur portée, leurs qualités ainsi que leurs limites seront mises en valeur.

2.1 Les barrières institutionnelles.

2.1.1 Concernant la prolifération nucléaire.

2.1.1.1. A l'échelle planétaire.

*** Le traité de Moscou (1963).**

Les signataires, à compter du 10 octobre 1983, s'interdirent d'effectuer toute explosion expérimentale ou autre d'une arme nucléaire dans l'atmosphère, dans l'espace extra - atmosphérique ou dans l'eau ainsi que dans tout milieu où la chute de déchets radioactifs dépasse les limites territoriales de l'état qui procède à l'explosion.

Depuis 1976, les essais doivent être limités à une puissance dégagée équivalente à 150 kt de T.N.T. et doivent faire l'objet d'échanges d'informations.

119 pays y adhèrent dont les Etats-Unis et la Grande-Bretagne. La Chine, la France et l'Inde n'ont pas signé le document. Cependant, la Chine et la France se conforment à ses dispositions depuis respectivement 1981 et 1974 après de nombreux tirs en atmosphère.

*** Le traité sur l'utilisation de l'espace et l'extra-atmosphère.(1967).**

Ce traité régit les activités des états en matière d'exploration et d'utilisation de l'espace et des corps célestes. Il interdit que l'espace et l'extra-atmosphère soient le lieu d'expériences car ils sont l'apanage de l'humanité. Il défend aux parties signataires de lancer des armes nucléaires mais il ne fait pas référence aux réacteurs à atomiques, ni aux armes classiques.

*** Le traité de non-prolifération nucléaire (1968).**

A partir de la fin de la deuxième guerre mondiale, la course à l'arme nucléaire conduisit les Etats-Unis à proposer la limitation de sa prolifération. Très tôt, les autres nations y virent un monopole que les Etats-Unis voulaient se réserver. l'URSS la Grande-Bretagne, la France et la Chine n'adhérèrent pas aux propositions américaines. Ces pays se dotèrent à leur tour et dans cet ordre de l'arme nucléaire.

Face à cet échec, les Etats-Unis lancèrent le programme *atom for peace* basé sur l'idée d'une coopération internationale en faveur du développement pacifique de l'énergie nucléaire. Dans un élan de bonne volonté les nations s'entendront pour créer en 1956 l'agence internationale de l'énergie atomique (A.I.E.A.) afin de promouvoir le développement de l'atome à des fins pacifiques et de contrôler les écarts vers son emploi militaire.

Au début des années 1960, la communauté internationale reconnaissait la légitimité du développement de l'utilisation de l'énergie atomique. Des accords de transfert de technologie virent le jour. En 1968, à l'instigation des cinq pays ayant le statut déclaré de puissance nucléaire, nombre de pays signèrent le traité de non-prolifération nucléaire qui entra en vigueur en 1970. Il avait pour objet de prévenir la dissémination des armes nucléaires tout en promouvant le développement de l'utilisation pacifique de l'énergie nucléaire.

La crise pétrolière de 1970 et l'explosion de la bombe atomique indienne en 1974 relancèrent les débats sur la nécessité de maîtriser le développement de l'emploi de l'énergie nucléaire, face au risque d'une prolifération incontrôlée. Les intenses efforts de l'A.I.E.A. échouèrent et la décennie 1970 se termina par l'apparition de pays supplémentaires sur le seuil de l'équipement nucléaire : Afrique du Sud, Argentine, Brésil, Irak, Israël et Pakistan.

Aujourd'hui, le traité est quasi universel. 171 pays sur 184 l'ont signé. L'Algérie, l'Argentine, la Biélorussie, le Kazakhstan et l'Ukraine sont parmi les derniers adhérents.

Dans le domaine de la non-prolifération des armes nucléaires, il s'agit du seul texte donnant une assise juridique aux vérifications. Mais, le traité parlant bien dans ses dispositions internes, d'états parties et non des états en tant que tels, le respect des obligations contractées au sein du TNP relève des états qui sont liés conventionnellement et non d'une norme du droit international.

Le TNP est examiné tous les cinq ans en vue de sa reconduction. La cinquième conférence a lieu en 1995, à New-York.

La surveillance des activité nucléaires s'effectue à travers le système des garanties. L'A.I.E.A. est chargée des vérifications.

Le traité est discriminatoire puisqu'il ne réserve pas le même sort aux états parties signataires selon qu'ils sont dotés ou non de l'arme nucléaire. L'Inde a toujours dénoncé cette caractéristique du TNP qu'elle n'a pas signé. Le Pakistan, lui, n'adhère pas au traité en raison de l'attitude indienne.

Malgré les défauts du TNP, il existe un consensus sur le fait qu'il a contribué à créer des normes qui soient partout acceptées, et qu'il a, quand même, influencé le comportement des états qui, à l'origine, s'étaient opposés à son adhésion. Inversement, l'Irak s'est empressé de le signer dès 1969 sans en respecter les dispositions dans la décennie 1980.

.Principales dispositions du traité de non-prolifération nucléaire.

	Etats dotés d'armes nucléaires	**Etats non dotés d'armes nucléaires**
Permissions	Déployer en territoire allié des armes nucléaires (Art. II)	
Obligations positives	Utiliser pacifiquement l'atome et promouvoir ce droit inaliénable (Art IV). Poursuivre de bonne foi des négociations pour favoriser la cessation de la course aux armements, le désarmement nucléaire et le désarmement général et complet (Art. VI). Se retirer du traité avec un préavis de trois mois [Art. X(1)]. Conclure des accords régionaux de dénucléarisation (Art. VII)	
		Soumettre à des garanties toutes les activités nucléaires pacifiques exercées sur leur territoire ou sous leur juridiction [Art. III(1)]

	Etats dotés d'armes nucléaires	Etats non dotés d'armes nucléaires
Restrictions		Obtenir des avantages des explosions nucléaires conformément à un ou à des accords internationaux, mais sous réserve de la conclusion d'un traité à ce sujet.
Interdictions	Ne transférer à quiconque, ni directement, ni indirectement, des armes nucléaires (Art. I)	Ne pas accepter, ni fabriquer, ni chercher à acquérir des armes nucléaires (Art. II)

*** Le traité *seabed* (1971).**

En vigueur depuis février 1971, le traité *seabed* interdit l'implantation d'armement nucléaire sur les fonds marins au-delà de 12 miles nautiques des côtes nationales. 96 pays y adhèrent. La France ne l'a pas signé.

2.1.1.2. A l'échelle régionale.

*** Le traité de l'Antarctique (1959).**

Entré en vigueur en juin 1961, le traité de l'Antarctique interdit sur ce continent toute mesure de caractère militaire, notamment les essais d'armes de toutes sortes, ainsi que les explosions nucléaires. Il défend aux pays signataires d'éliminer des déchets radioactifs au sud du soixantième parallèle.

On observera qu'en 1991, il a été adopté un moratoire de 50 ans sur toutes les activités de prospection et d'exploitation minières.

*** Le traité de Tlatelolco (1967).**

En 1967 fut signé à Tlatelolco (Mexique) un traité relatif à l'établissement d'un contrôle d'une zone franche d'armements nucléaires : l'Amérique latine (excepté Cuba et le Guyane), les Antilles et les territoires insulaires proches. Le Royaume-Uni a signé le traité en raison de sa souveraineté sur les îles malouines.

Dans les années qui ont suivi la signature du traité, le Brésil a défendu son droit de tester des bombes nucléaires à des fins pacifiques notamment pour détourner les cours d'eau mais n'est jamais passé aux actes. L'Argentine a ratifié le traité seulement en 1994.

Le document interdit la fabrication, la production ou l'acquisition d'armes nucléaires. Il invite les pays non latino-américains à laisser la zone libre d'armes nucléaires. Il crée l'agence pour la prohibition des armes nucléaires en Amérique latine : l'O.P.A.N.A.L. qui supervise l'ensemble des activités nucléaires pacifiques des pays membres. Les signataires doivent accepter les garanties de l'A.I.E.A. pour tout projet de nature nucléaire qu'ils pourraient entreprendre.

*** Le traité de Rarotonga (1985).**

De même nature que celui de Tlatelolco, le traité de Rarotonga (une des îles Cook associée à la Nouvelle-Zélande) signé en 1985 à l'instigation de l'Australie et de la Nouvelle-Zélande et entré en vigueur en décembre 1986 interdit toute activité nucléaire dans les pays d'Asie du sud-est et le sud de l'océan Pacifique.

Selon les termes de ce traité, les états signataires s'interdisent la détention de tout dispositif explosif capable de libérer de l'énergie nucléaire, même à des fins pacifiques. De même, ils cherchent à interdire tout essai dans la zone et tout transit d'armes nucléaires.

Un protocole additionnel invite les Etats-Unis, la France et la Grande-Bretagne, qui ont des intérêts dans la région, au respect du traité. Ces pays ont précisé qu'ils n'envisageaient pas de le signer.

2.1.2 Concernant la prolifération bactériologique et chimique.

*** Le protocole de Genève (1925).**

Les armes bactériologiques et chimiques sont déjà anciennes. En 1915, les allemands utilisèrent le chlore puis l'ypérite. Depuis, plusieurs pays ont utilisé les armes chimiques : le Japon en Chine (1936-1937), l'Egypte au Yémen, les Etats-Unis au Vietnam, la Libye au Tchad, l'U.R.S.S. en Afghanistan et l'Irak lors du conflit Irak - Iran.

Le protocole de Genève vise surtout le droit de la guerre puisqu'il s'agit d'un texte prohibant l'usage en premier des armes chimiques. Il n'interdit ni la production, ni la possession, ni l'accumulation de ce type d'arme. Par ailleurs, tous les grands états signataires se sont réservés un droit de riposte ou de représailles.

Depuis la signature du protocole de Genève, les problèmes des armes bactériologiques et chimiques ont toujours été liés. En 1971, au sein de la conférence du comité du désarmement de Genève, on dissocia les deux problèmes, les soviétiques et les pays de l'est acceptant pour la première fois de séparer des questions relatives aux armes biologiques ou à toxines de celles concernant les armes chimiques.

*** La Convention sur les Armes Bactériologiques ou à Toxines (1972).**

Le 10 avril 1972 fut signée la convention sur l'interdiction de la mise au point, de la fabrication, du stockage et de l'emploi des armes bactériologiques ou à toxines et sur leur destruction.

Le texte présente une grave lacune : l'absence de définition des armes bactériologiques ou à toxines. Son article IX enjoint les parties signataires à poursuivre dans un esprit de bonne volonté des négociations afin de parvenir, à une date rapprochée, à un accord sur l'interdiction globale et générale des armes chimiques.

Depuis, trois conférences d'examen ont déjà eu lieu.

*** La Convention sur les Armes Chimiques (1992).**

La convention sur l'interdiction de la mise au point, de la fabrication, du stockage et de l'emploi des armes chimiques et sur leur destruction a été signée en 1993 par plus de 130 pays. Elle est entrée en vigueur le 13 janvier 1995. La France l'a ratifiée le lendemain. Les pays musulmans du Proche - Orient, ne possédant pas l'arme nucléaire face à Israël qui la détient potentiellement, n'ont pas voulu se priver d'armes de destruction massives et n'ont pas signé le texte.

Cette convention qui vient d'être parachevée à Genève constitue de loin l'instrument multilatéral de désarmement le plus développé de tous ceux conclus depuis 1945, par son exhaustivité et sa portée universelle.

Un effort est fait sur la définition des produits qui font l'objet d'une surveillance internationale ainsi d'ailleurs que sur les quantités permises à des fins de protection qui ne doivent pas être supérieures à une tonne, au cours d'une même année civile. On distingue les produits :

- à risque considérable : Sarin, Soman, Tabun, VX, moutardes sulfurées et azotées, lewisites, ...;

- à risque important;

- pouvant constituer un risque.

Tous les états sont considérés égaux. Ils doivent tout déclarer et s'engager à détruire en moins de 10 ans les armes en leur possession et les installations de fabrication dont ils disposent. Enfin, ils ont l'obligation de se soumettre à des vérifications routinières ou inopinées. Celles-ci sont très détaillées pour éviter les détournements technologiques et s'intègrent dans un système d'inspection plus investigateur que celui du domaine nucléaire.

Néanmoins, des difficultés apparaissent :

- les limitations induites dans les transferts technologiques civils (colorants, pharmacie, produits composites, ...) au profit des pays sous-développés;
- l'absence d'évocation du domaine bactériologique dont les contours deviennent de plus en plus flous;
- le faible délai consacré à la destruction compte tenu des stocks de certains pays (Etats-Unis : 30 000 t, Russie : environ 60 000 t);
- l'absence d'aide technologique et financière pour débarrasser la planète de la menace chimique.

Principales dispositions de la Convention sur les Armes Bactériologiques ou à Toxine et de la Convention sur les Armes Chimiques.

	C.A.B.T.	C.A.C.
Permissions	Recherches à des fins prophylactiques ou de protection contre les armes bactériologiques ou à toxine	Fins industrielles, agricoles, de recherche, médicales, pharmaceutiques, ou autres fins pacifiques. Fins de protection. Fins militaires sans rapport avec l'emploi d'armes chimiques et qui ne sont pas tributaires de l'emploi des propriétés toxiques de produits chimiques considérés comme moyen de guerre. Fins de maintien de l'ordre public y compris de lutte anti-émeute sur le plan intérieur. Pendant la période de destruction des armes chimiques et des installations de fabrication d'armes chimiques, jouir d'une sécurité non diminuée.
Obligations positives	Prendre toutes les mesures nécessaires sur le plan interne pour répondre à ses engagements	Dans les trente jours suivant l'entrée en vigueur de la C.A.C., fournir une déclaration relativement aux : - armes chimiques; - installations de fabrication; - autres installations (laboratoires, ...); - agents de lutte anti-émeute; - installations et produits chimiques pertinents en ce qui a trait aux fins non interdites par la C.A.C.. Soumettre à vérification toutes les armes, installations et destructions. Soumettre à une surveillance les produits chimiques, les précurseurs et les installations qui les produisent. Détruire les armes chimiques et les installations. S'il a des doutes sur le respect de la convention, un état peut réclamer une inspection chez un autre état

	C.A.B.T.	C.A.C.
Restrictions		Prendre des mesures pour respecter les installations sensibles et empêcher la divulgation d'informations confidentielles. Un état peut refuser l'inspection par mise en demeure et proposer d'autres arrangements pour démontrer son respect de la convention.
Interdictions	Interdiction de mise au point, de fabrication, de stockage, d'acquisition ou de conservation d'agents ou d'armes, y compris l'équipement et les vecteurs à des fins hostiles ou dans des conflits armés. Ne pas transférer à quiconque ces armes, vecteurs ou moyens de fabrication.	Ne pas mettre au point, fabriquer, acquérir, stocker ou conserver des armes ou les transférer à quiconque, ni directement, ni indirectement. Ne pas employer d'arme ou se livrer à des préparatifs militaires pour leur emploi. Ne pas aider, encourager ou inciter quiconque à entreprendre des activités interdites. Ne pas employer d'agent anti-émeute en tant que moyens de guerre Ne pas émettre de réserve quant à la convention

2.2 Les groupes de contrôle multilatéraux.

2.2.1 Concernant la prolifération nucléaire.

* Le COCOM (1950).

En 1950, l'O.T.A.N., sauf l'Islande, mit sur pied le *coordinating committee* pour empêcher les transferts vers l'est des technologies dites stratégiques. Depuis la chute du mur de Berlin et dès juin 1990, l'Occident décidait de revoir sa politique en supprimant une multitude de contrôles sur des biens désormais devenus accessibles à l'étranger et de concentrer tous ses efforts sur une liste de produits majeurs : la *core list*, où il entendait conserver ses avantages et ses contrôles pour des motifs de sécurité nationale, de non-prolifération nucléaire ou encore pour des motifs de politique étrangère. Les principaux bénéficiaires de l'assouplissement des règles du COCOM furent : la Hongrie, la Pologne, la république Tchèque et la Slovaquie qui sont traités maintenant comme la Chine.

Le COCOM fut le premier groupe à caractère international à avoir, dans un effort concerté, réuni quelques pays pour contrôler l'importante technologie du tritium (isotope de l'hydrogène et combustible nucléaire, ce qui lui confère un rôle significatif dans les explosions).

Aujourd'hui, le COCOM. est moribond.

*** Le groupe de Londres (1977).**

A la suite de la première explosion atomique indienne, qui eu lieu en 1974, mais aussi en raison du premier choc pétrolier, les puissances nucléaires déclarées décidèrent de renforcer les contrôles de la prolifération nucléaire en créant le club de Londres. En 1977, 25 pays créèrent un groupe de fournisseurs nucléaires chargés non seulement de rédiger des directives et des listes de produits faisant l'objet d'une surveillance particulière mais aussi de s'assurer que les pays clients se placent sous le contrôle de l'A.I.E.A.. L'Autriche et l'Argentine sont les derniers adhérents.

Les directives émises renforcent les mécanismes existants et reprennent en partie les règles établies par l'A.I.E.A., notamment sur les matières nucléaires brutes et les produits fissiles spéciaux, mais elles spécifient que d'autres éléments entrent aussi en ligne de compte, à savoir le deutérium et l'eau lourde qui ne sont pas à proprement parler des matières nucléaires. Les garanties sont étendues au domaine de la technologie qui recouvre les techniques d'enrichissement, les techniques de retraitement des combustibles ainsi que les installations de fabrication d'eau lourde.

Le groupe de Londres s'est réuni une deuxième fois en 1991 pour élargir et moderniser la réglementation en cours des pays fournisseurs, notamment en ce qui concerne les produits à double usage civilo-militaire (lithium, tritium, zirconium qui sert à gainer les barres d'uranium enrichi, ...). En 1992, à Varsovie, la décision fut prise de contrôler 60 biens technologiques classés en 8 rubriques.

Les limites d'action du groupe relèvent de l'ignorance initiale des produits à usage dual et de l'absence de mécanismes de contrôle et de sanctions.

2.2.2 Concernant la prolifération bactériologique et chimique.

*** Le groupe d'Australie (1984).**

Créé en 1984 à la suite de la guerre Irak - Iran dans laquelle les armes chimiques furent utilisées et à l'initiative du groupe des sept, le groupe d'Australie est un forum rassemblant 22 pays occidentaux qui repose sur les même principes de fonctionnement que le groupe de Londres. Il a rédigé un code de bonne conduite des pays exportateurs dans le domaine chimique. Les pays impliqués se refusent ainsi de vendre les composants et la technologie sensibles de ces armes. La liste noire (*core list*) des produits chimiques à contrôler comprend 50 noms qui ne peuvent être exportés sans l'obtention d'une licence validée par le gouvernement du pays exportateur.

Le groupe s'est réuni pour la première fois en 1985 afin d'échanger des informations sur l'efficacité des méthodes de lutte contre la prolifération des armes chimiques et pour essayer d'harmoniser ces différentes méthodes.

2.2.3 Concernant la prolifération balistique

*** Le Régime de Contrôle de la Technologie des Missiles (1987).**

Un seul groupe travaille sur le retardement de la prolifération des missiles et avions non pilotés capables de délivrer des armes de destruction massive. : celui du régime de contrôle de la technologie des missiles (RCTM) dont l'initiative revient aux Etats-Unis dès 1982.

Officiellement créé par le groupe des sept le 16 avril 1987, il vise à élaborer un code de conduite sur l'exportation de la technologie des missiles de portée supérieure à 300 km (distance moyenne entre deux capitales) et capables de transporter une charge utile de 500 kg (poids minimal d'une tête nucléaire). Il compte 27 membres. Le régime n'a pas de statut, il se fonde sur le consentement mutuel et son principe de fonctionnement est identique à celui du groupe d'Australie. Les gouvernements s'engagent à mettre en œuvre les directives du RCTM à travers leur propre système de législation.

Tous les états participant à ce groupe maintiennent une liste d'équipements et de données techniques qui doivent faire l'objet de contrôle en matière d'exportation. La liste est modifiée périodiquement. Elle comprend, entre autres :

- **catégorie I** : les systèmes de fusées complets, les véhicules aériens sans pilote et les équipements chargés de les produire ;
- **catégorie II** : les mélanges de propergols solides, les moteurs, les équipements de navigation, l'informatique embarquée, de simulation ou d'optimisation, les technologies duales, ...

Tous les transferts sont considérés cas par cas mais la décision d'exporter reste à la seule et souveraine discrétion des gouvernements eux-mêmes. Chaque pays s'engage à ne pas vendre de systèmes d'arme complets ou de composantes appartenant à la catégorie I et à signaler les commandes qu'il a refusées pour que les autres pays signataires en fassent de même (l'obligation est morale). Par ailleurs, chaque état cherche à promouvoir une règle de modération commune.

Enfin, le groupe surveille et partage les renseignements glanés, par tous les moyens disponibles, sur les intentions et les capacités balistiques des pays à risques. Lorsqu'une prolifération est détectée, elle est communiquée au groupe. On estime que cela a permis d'arrêter le programme Condor 2 dans lequel l'Argentine et l'Egypte étaient impliqués.

Le régime est très imparfait :

- bien des états détenteurs d'une technologie développée et suffisante pour présenter un risque à l'exportation comme la Chine et la Russie ne sont pas signataires. D'ailleurs, la Chine considère le RCTM comme un instrument occidental de pression;
- de nombreuses technologies sont duales. Par exemple le RCTM n'entrave pas les programmes civils de conquête spatiale. Or, des vecteurs civils peuvent être utilisés à des fins militaires (les fusées-sondes de l'Argentine, du Brésil et du Pakistan; le lanceur américain Scout de l'Inde);
- certains états du tiers monde, clients potentiel, s'estiment lésés à cause des restrictions opérées sur les technologies duales;
- les moyens de contrôle et de coercition n'existent pas. Tout repose sur une confiance réciproque des parties.

2.3 Les différents organismes à vocation universelle et leurs moyens d'action(procédures).

2.3.1 Concernant la prolifération nucléaire.

* L'Agence Internationale de l'Energie Atomique (1957).

Emanation de l'O.N.U., l'A.I.E.A. a été créée en 1957 c'est-à-dire bien avant la naissance du TNP dont elle est maintenant indissociable. Son siège social est à Vienne. Son objectif est de promouvoir l'application pacifique de l'énergie nucléaire et de développer son contrôle. L'A.I.E.A. a donc deux missions antagonistes.

Pour pouvoir déceler tout détournement des activités civiles à des fins militaires, l'A.I.E.A. vérifie le respect de garanties auxquelles doivent se soumettre les états signataires du TNP. A partir des renseignements descriptifs sur leurs installations que lui fournissent les parties, elle travaille avec des normes qui évoluent en fonction des progrès techniques. Par exemple, elle surveille les quantités de matière nécessaires pour fabriquer un premier dispositif explosif. Son objectif affiché est d'arriver à une probabilité de détection de 95%. Ce qui paraît difficile à réaliser car d'une part l'agence n'est pas en mesure d'effectuer des contrôles suffisamment fréquents et rigoureux et d'autre part les technologies duales favorisent la dissémination et la discrétion de l'enrichissement (techniques au laser). De surcroît, les matières issues du démantèlement des armes ne sont pas soumises à des garanties. Depuis 1992, le conseil de l'A.I.E.A. exige des renseignements descriptifs préliminaires à toute construction ou modification d'installation. et non immédiatement antérieurs à l'introduction de matières fissiles. De cette façon, l'agence peut optimiser sa surveillance.

Les cinq puissances nucléaires sont exemptées du contrôle de l'A.I.E.A.. Quatre états ont refusé le système des garanties généralisées de l'agence : l'Afrique du Sud, l'Argentine, le Brésil et l'Inde.

Les statuts de l'A.I.E.A. prévoient trois types d'inspection des sites déclarés :

- l'inspection *ad hoc* vérifie les renseignements du rapport initial;
- l'inspection régulière s'assure de la conformité de la réalité et de la comptabilité;
- l'inspection spéciale déclenchée lorsque l'information communiquée diffère de l'information recueillie. A ce titre, l'A.I.E.A. a la possibilité de demander l'accès à des sites non déclarés. Cette attribution a été mise en vigueur à la suite de la guerre du golfe Persique et mise en oeuvre pour la Corée du Nord.

Les procédures de recours relèvent de la saisine du Conseil de Sécurité de l'O.N.U. (Cf. la résolution 255 du Conseil de Sécurité).

L'agence est composée d'un organe exécutif : le conseil des gouverneurs composé de 35 membres renouvelables tous les 2 ans par la conférence générale des 155 états membres, sauf les 13 membres permanents représentant les états les plus avancés dans le domaine nucléaire (dont la France). Le conseil est complété par un secrétariat permanent.

Le budget annuel consacré au contrôle s'élève à 60 millions de francs et entretient 200 inspecteurs et 300 experts. Il n'a pas augmenté depuis 8 ans.

L'A.I.E.A. se heurte à de multiples difficultés :

- si les états parties sont soumis aux garanties, les états non parties ne sont liés que par le contrôle de leurs importations. Cette distinction entre la technologie importée et la technologie nationale a ainsi profité à l'Inde et au Pakistan qui ont pu, à partir de matériaux civils importés, mener à bien leurs propres cycles de combustible militaire. En 1990, les états fournisseurs convinrent que tout transfert exige des garanties intégrales, en particulier, un accord de l'état destinataire avec l'A.I.E.A.. La contrainte ne s'applique cependant pas aux contrats et accords déjà existants. L'efficacité des garanties intégrales repose sur la responsabilité des états fournisseurs face à leurs intérêts commerciaux;
- l'agence n'a pas de service de renseignement et doit recourir aux services nationaux plus ou moins zélés ;
- le contrôle se limite aux sites déclarés. L'AIEA est incapable de résoudre le problème des installations non déclarées à l'origine de la prolifération.
- le TNP est ambigu et semble autoriser un état suspect à refuser une inspection spéciale ;
- le système de garantie et les contrôles sont des montages politiques ,techniques et administratifs très élaborés qui n'ont pas empêché certains états d'être au seuil nucléaire ;
- l'agence ne joue qu'un rôle de contrôleur *a posteriori* et vérifie la comptabilité (étalonnage des appareils de mesure et mesures indépendantes);
- aucun système de rétorsion efficace n'existe ;
- le Conseil de Sécurité de l'O.N.U. n'apporte à l'agence qu'un appui théorique ne prenant pas la forme d'une résolution. Des sanctions économiques venant des parties du TNP seraient plus dissuasives.

*** L'EURATOM. (1958).**

En 1959, l'O.C.D.E. (la C.E.E. plus tard) créa en son sein l'EURATOM (*European Atomic Energy Committee*) dans un souci de regrouper les activités nucléaires européennes.

L'agence possédant le monopole des fournitures et de l'exportation des matières fissiles de l'Union Européenne ainsi que celui du contrôle de conformité à l'usage annoncé (les quantités à usage militaire sont exclues de ce contrôle), son système de garanties renforce les normes contenues dans le couple TNP - A.I.E.A..

L'EURATOM. effectue des missions d'inspection qui sont générales et obligatoires à l'inverse de celles de l'A.I.E.A. qui sont limitées et facultatives.

2.3.2 Concernant la prolifération bactériologique et chimique

*** L'organisation pour l'interdiction des armes chimiques (1995).**

Contrairement aux procédures prévues pour le contrôle de l'énergie atomique, le domaine des armes chimiques ne dispose d'aucune organisation établie au préalable, ce qui fait qu'on a accordé une attention considérable à la structure de l'organisation qui sera mandatée pour exercer les activités de vérification ou de respect des engagements souscrits en vertu de la C.A.C..

L'organisation assume une fonction de surveillance :

- vérification internationale systématique;
- surveillance des activités non - interdites par la convention.

Cette fonction gigantesque concerne de 50 000 à 100 000 installations industrielles.

L'organisation assume une fonction d'inspection :

- initiale (vérification des déclarations initiales) ;
- inspection de routine ;
- inspection par mise en demeure d'un état partie.

Les inspections peuvent déboucher sur des sanctions :

- par les états (légitime défense selon l'article 51 de la Charte des Nations Unies);
- par le Conseil de Sécurité (mesures nécessaires pour rétablir la paix et la sécurité internationales selon le chapitre VII de la Charte des Nations Unies).

Sa structure est semblable à celle de l'A.I.E.A. avec une conférence des états signataires de la convention, un conseil exécutif composé de 41 membres élus pour 2 ans sur une base régionale et un secrétariat technique qui dispose d'un inspectorat.

3 Les insuffisances actuelles et les moyens d'y remédier

Au travers d'exemples récents, nous allons chercher à démontrer l'inefficacité partielle des mécanismes existants et tenter de proposer des moyens palliatifs.

3.1 Les insuffisances constatées et leurs origines

3.1.1 Liées à l'évolution géopolitique :

La notion d'évolution géopolitique peut être considérée sous plusieurs aspects: soit une situation conflictuelle qui perdure (type Moyen-Orient), soit une brutale évolution qui en remettant en cause les structures décisionnelles est source d'anarchie ou d'évolutions erratiques (écroulement de l'ex-URSS). les proliférations qui en découlent sont de nature différentes, mais tout aussi dangereuses, et les moyens actuels de lutte contre la prolifération paraissent incapables de contrer ce type de menace.

3.1.1.1 Le Moyen-Orient

Ce qui caractérise le Moyen-Orient, c'est la multiplicité et la complexité des tensions (Israël/arabes, interarabes, débordements de conflits périphériques, instabilités internes). La violence est une donnée de la politique du Moyen-Orient tant sur le plan intérieur que sur le plan extérieur. En l'absence de structures d'alliances stables, les équilibres militaires sont précaires alors que n'existe pas de tradition de dialogue en matière de sécurité ou de contrôle des armements. Mais qu'implique cette tyrannie de l'insécurité sur le plan de la prolifération ?

Si la tentation nucléaire est déjà sensible pour des états dont la survie n'est pas en jeu, l'attrait de la bombe devient irrésistible dans la situation du Proche Orient, pour des motifs de dissuasion ou d'intimidation. L'acquisition des technologies militaires les plus complexes s'impose donc naturellement aux états de la région, et l'émergence d'un équilibre nucléaire stable, à l'instar de celui qui a prévalu entre USA et URSS est extrêmement aléatoire.

Etat qui ne dispose pas de profondeur stratégique et qui a eu des craintes justifiées pour sa survie dès 1948, Israël s'est lancé dans un programme nucléaire dès 1952 et a progressé rapidement grâce à l'aide des USA, de la France et de l'Afrique du Sud. Dès 1953 la France a fourni un réacteur de recherche producteur de plutonium, opérationnel en 1963, et qui a produit sur 20 ans 600 kg de plutonium, (permettant de réaliser environ une centaine de bombes de 20 kt). Le retraitement du plutonium était effectué suivant un procédé et des plans fournis par une société française. Le programme comprenait aussi la construction de vecteurs balistiques (Programme Jéricho, 400 kg de charge utile, 500 à 700 km de portée) et l'acquisition d'une capacité de surveillance spatiale (Offeq 1 et Offeq 2). La force de frappe est déployée dans le Néguev.

Il est donc clair que cet état, qui dispose d'un savoir et d'un savoir-faire incontestable sur tous les plans, a cependant été puissamment aidé financièrement et par des transferts technologiques de pays fournisseurs. Il en résulte que les autres états de la région n'ont eu de cesse de se doter aussi de l'arme nucléaire, en particulier l'Irak et dans une moindre mesure la Syrie et l'Egypte.

Concernant l'Irak, cette nation adhère en 1969 au TNP. Jusqu'en 1974 le programme nucléaire est pacifique avec un petit réacteur de 2 mégawatts, principalement destiné à la production d'isotopes: il n'y a donc pas de danger de prolifération; en 1972 un accord est signé pour placer les installations sous contrôle de l'AIEA. En 1974 Irak s'adresse à la France pour développer son programme nucléaire et souhaite acquérir un réacteur type graphite gaz 500 MW, réacteur connu pour sa capacité de production de plutonium (400 kg par an, une bombe nécessite 6 à 8 kg de Pu). La France refuse, prétextant des difficultés techniques, un autre choix de réacteur est proposé et conduit à la livraison clé en main d'un petit réacteur de 500 kW et d'un réacteur de 40 MW (" Osirak ") fonctionnant à l'uranium enrichi. L'Irak a alors la possibilité de fabriquer des bombes à partir de ce dernier (capacité à produire du PU avec de l'U238 qu'il

possède en quantité abondante dès 1980). L'AIEA exerce pour sa part un contrôle laxiste, et devant l'évolution du programme irakien, Israël décide d'agir en bombardant Osirak en juin 1981. Après 1984, malgré la guerre avec l'Iran, on assiste à une reprise du programme nucléaire, et à partir de 1987 à l'achat de technologies tout azimut auprès de l'ensemble des pays fournisseurs occidentaux et d'Amérique du Sud.

Parallèlement ce pays a développé une infrastructure chimique impressionnante avec plus de 4000 chercheurs recrutés via le Liban. En 1982, après l'échec militaire contre l'Iran, on assiste à la montée en puissance de l'arsenal chimique avec l'aide de firmes allemandes, britanniques et yougoslaves: 3 centres de recherches, 9 centres de production et 2 laboratoires de recherches biologiques, qui sont capables de produire plusieurs milliers de tonnes de produits chimiques allant du lacrymogène à l'ypérite. De plus la possession d'une artillerie d'origine soviétique adaptée a l'emploi de munitions chimiques faisait de l'Irak une super puissance régionale dans ce domaine.

Après la guerre du Golfe Persique, les résolutions 687 et 715 de l'ONU sont votées. La commission spéciale de l'ONU met alors en lumière l'importance de l'effort nucléaire irakien et démontre combien ce pays a été prêt de parvenir à ses fins (une bombe au plus tard en 1995 et un arsenal significatif dix ans plus tard...)

En conclusion la diffusion des armes de destruction massive au Proche - Orient paraît inéluctable à long terme, si l'on considère les faiblesses notables du régime de non prolifération (autant sur le plan nucléaire que sur celui des armes chimiques et des missiles balistiques) face à des régimes déterminés et très sourcilleux concernant leur sécurité et ce, probablement pour longtemps. La guerre du Golfe peut donc être considérée comme une action de contre prolifération, mais l'efficacité du démantèlement permis par les résolutions 687 et 715 n'a aucune chance de résoudre le problème à long terme, une fois l'embargo levé ce qui n'est qu'une question de temps....

3.1.1.2 L'écroulement de l'ex - URSS

L'implosion de L'URSS en 1991 a conduit à trois phénomènes de prolifération: tout d'abord la dissémination de l'arsenal de l'ex-URSS dans 4 nouveaux états (Russie, Ukraine, Kazakhstan, Biélorussie) posant dès facto le problème du contrôle des armes et transformant le " club des 5 " en " club des 8 ", d'autre part celui du démantèlement d'armes tel que prévu dans les accords START (sécurité des matières fissiles récupérées) dans des pays qui n'en ont guère les moyens, et enfin celui de la fuite des cerveaux et de la technologie nucléaire découlant de la " reconversion " dans le secteur civil de l'industrie d'armement ex-soviétique. Il est clair que la résolution de ce problème complexe de dissémination nucléaire (à défaut de prolifération avérée) est considéré comme primordiale par les occidentaux.

Moyennant finance les 4 républiques ont accepté d'honorer les accords START signés par l'URSS dès 1992. En outre, les 3 républiques nucléaires " non russe " ont affirmé souhaiter démanteler leur arsenal nucléaire et devenir ainsi des ENDAN, mais elles utilisent leur arsenal pour exercer un véritable chantage à l'aide économique envers les occidentaux. Enfin ces trois puissances restent méfiantes envers un expansionnisme russe potentiel en cas de

retour au pouvoir des " durs ", ce qui explique leur peu d'empressement à se débarrasser de leur arsenal nucléaire. Les assurances de la Russie sur le fait qu'elle garde le contrôle de toutes les armes nucléaires de l'ex-URSS constituent un sujet d'inquiétude important, .

L'état de déliquescence de l'ensemble de l'ex-URSS tant au plan économique que des structures étatiques est à l'origine d'un commerce dont le contrôle n'est pas totalement sûr, y compris probablement dans le domaine nucléaire ainsi que le montrent plusieurs exemples récents, dont l'existence possible d'un réseau de vente de matières fissiles via la R.F.A. (même s'il semble que son importance ait été exagérée). En outre, les conditions de sécurité entourant le nucléaire dans l'ex-URSS, insuffisantes au regard des normes occidentales, rendent sensible le devenir des matières fissiles issues des démantèlements des armes concernées par les accords START. Mais le plus grave concerne indubitablement la fuite des cerveaux qui peuvent être recrutés sans aucun contrôle par des pays du seuil.

L'implosion de l'URSS est donc à l'origine d'une nouvelle forme de prolifération dans tous les domaines contre laquelle l'ensemble des structures existantes se révèle inadaptée.

3.1.2 Liées à l'évolution des savoir-faire, des technologies et de leur mode de transfert

3.1.2.1 Au niveau des états

L'accès aux armes nucléaire, chimique et balistique découle de tout un environnement technologique, qui comprend aussi bien les usines et les laboratoires que les matières premières, les processus et surtout les " cerveaux ".

Dans un monde ou la circulation de l'information progresse de manière exponentielle, et dans lequel l'accès à la connaissance est considéré comme un facteur clé de développement, il est évident que la dissémination des technologies s'accentue. Si l'on rajoute à cela la notion de technologies " duales " (application possible tant dans le domaine civil que dans celui des proliférations qui nous intéressent) les limites des systèmes prônés par le RCTM et le Groupe d'Australie apparaissent clairement : de quel droit refuser à long terme à certains états des transferts de technologies nécessaires au développement de leur industrie civile ou militaire conventionnelle sous prétexte qu'elles sont " duales " ? L'expérience irakienne démontre le caractère insuffisant de ces mesures face à une attitude politique déterminée. A contrario l'exemple argentin (et l'évolution brésilienne en cours) semble démontrer qu'une prise de conscience politique des risques que font courir une prolifération larvée est beaucoup plus efficace pour amener des états à la raison.

Deux critères clé subsistent cependant : les ressources financières et les capacités intellectuelles (cerveaux). Sachant qu'un des principes de base du TNP est de permettre l'accès libre aux connaissances du nucléaire civil, comment s'étonner que 34% des étudiants ayant obtenu un doctorat de physique, mathématiques ou informatique aux USA en 1990 (10% en 1960), et 49% des ingénieurs (16% en 1960), soient étrangers....!

Enfin, il faut noter qu'existe aujourd'hui un nombre croissant d'états suffisamment avancés technologiquement, à l'instar du Brésil et de l'Argentine, pour être à même de proliférer à long terme : il suffit de temps, d'une volonté politique et d'un concept de formation (ou " d'acquisition ") à l'étranger d'élites intellectuelles.

3.1.2.2 Au niveau de groupes privés

L'attentat commis dans le métro de Tokyo en mars 1995 a démontré, de manière dramatique, que la prolifération chimique pouvait être le fait de groupes privés dans des pays industrialisés, prolifération envers laquelle l'ensemble des mécanismes imaginés pour être appliqués par des états responsables se révèle totalement inadapté. En fait le problème qui est posé concerne la lutte contre une prolifération de type terroriste.

3.1.3 Liées aux mécanismes eux-mêmes (discrimination, absence d'arsenal répressif, modalité des vérifications)

L'absence d'arsenal répressif contre la prolifération nucléaire, lié à un système de contrôle qui repose entièrement sur la bonne volonté des états (déclaration des sites soumis au contrôle de l'AIEA) vient de démontrer, encore récemment, ses limites avec le cas de la Corée du Nord. L'analyse du problème conduit aux constats suivants :

POTENTIEL DES ARMES NUCLEAIRES NORD COREENNES		
INSTALLATION	*MISE EN SERVICE*	*POTENTIEL*
YONGBYON : Réacteur 5 MW	**1986**	PLUTONIUM pour 1 BOMBE par an (**Erreur! Source du renvoi introuvable.**)
YONGBYON : Réacteur 50 MW	**1995?**	PLUTONIUM pour 4 à 6 BOMBES par an
YONGBYON : Petite usine de retraitement	**1990?**	*Inconnu*
YONGBYON : Grosse usine de retraitement	**1996?**	PLUTONIUM pour 10 BOMBES par an
TEACHON : Réacteur de 200 MW	**1996?**	PLUTONIUM pour 16 à 20 BOMBES par an
PYONGYANG : Usine de retraitement	**1975?**	*En expérimentation*

- Depuis début 1992, la Corée du Nord est accusée par les Etats-Unis et plusieurs pays occidentaux d'avoir détourné, à des fins militaires, une partie du plutonium de la centrale de Yongbyon, en violation du traité international de non-prolifération nucléaire (TNP) que ce pays avait signé.

- Des inspecteurs de l'AIEA ont été admis en Corée, mais empêchés de faire leur travail, et ont alors saisi le Conseil de Sécurité.

- Après avoir annoncé le "retrait" de leur pays du TNP, les dirigeants nord-coréens ont décrété la "suspension" de ce retrait. Ils ont ensuite déclaré qu'ils retiraient toutes les barres de combustible de Yongbyon, rendant pratiquement irréalisable toute possibilité de savoir quelle partie du combustible en a été détournée avant 1992.

- Devant l'impuissance du Conseil de Sécurité à traiter le problème due au veto chinois contre toute forme d'intervention, les Etats-Unis ont pris la tête du mouvement international visant à imposer des sanctions à Pyongyang mais ont fini par négocier.

- Le 21 octobre 1994 un accord est intervenu à Genève entre Washington et Pyong Yang sur les points suivants :

  - Gel du programme suspect de la Corée du Nord,
  - Démantèlement de ses réacteurs de la filière graphite-gaz capables de produire de grandes quantités de matière fissile utilisable à des fins militaires,
  - Retraitement du combustible irradié.

Finalement la Corée du Nord s'est engagée à geler son programme nucléaire controversé en échange de la fourniture de 2 réacteurs à eau légère.

Il ressort de cette crise que les USA ont manifestement choisi une voie qui suppose la disparition à moyen terme du pouvoir nord coréen tant les garanties d'exécution de l'accord semblent minimes. Il s'agit donc là d'une approche purement politique qui tranche avec les concepts de type " technologiques " de lutte contre la prolifération jusqu'alors en vigueur, et seul l'avenir démontrera le caractère judicieux ou non de ce choix.

3.2 Les moyens de remédier à ces formes de prolifération

3.2.1 Dans un contexte de non-prolifération

Imaginer que l'on puisse stopper la prolifération technologique est une illusion . Il vaut mieux en maîtriser les causes et les flux en cherchant à :

- désamorcer les conflits régionaux;
- enrayer la prolifération des armes;
- encourager le désarmement;
- développer la coopération internationale en matière d'énergie nucléaire.

3.2.1.1 Extension des accords internationaux.

*** Reconduction du TNP en 1995.**

Le succès de la reconduction risque d'être lié aux résultats de la conférence sur l'interdiction totale et définitive des essais nucléaires que les pays du seuil nucléaire ne manqueront pas de mettre en avant, arguant que les puissances déclarées doivent afficher leur bonne volonté d'arrêter une fois pour toutes leurs essais.

*** Renforcement des directives des groupes de Londres et d'Australie.**

Les pays exportateurs se doivent d'assurer un contrôle strict de leurs transferts au détriment de leurs intérêts commerciaux.

*** Accroissement des capacités d'adaptation du RCTM.**

Par le maintien d'une veille stricte de l'évolution et de l'emploi des différentes technologies, les pays membres doivent évaluer leur potentiel de prolifération. De cette façon, ils adaptent le régime de contrôle au moment. Le passé a démontré l'efficacité d'un tel comportement.

*** Maîtrise des transferts des connaissances.**

Le transfert du savoir est un élément capital dans la maîtrise de la prolifération. On peut difficilement interdire la formation d'ingénieurs et de chercheurs dans les sciences fondamentales. En revanche, les pays exportateurs de technologie peuvent verrouiller l'accès à certaines formations proliférantes. Le problème est épineux car il s'attaque à l'accès à la connaissance de nations qui souhaitent se développer.

*** Incitation des pays récalcitrants à signer et à ratifier les traités ainsi qu'à intégrer les groupes de contrôle multilatéraux.**

En échange de leur nouvelle attitude, les pays qui importent de la technologie exigeront une compensation. Le TNP le prévoit avec l'aide à l'usage civil de l'atome. Malheureusement, rien n'existe dans les domaines bactériologiques et chimiques.

*** Création de nouvelles zones géographiques franches de toutes armes de destruction massive.**

Cela concerne l'Afrique et le Proche - Orient.

3.2.1.2 Encouragement des accords locaux.

*** Incitation des pays militairement nucléarisés à désarmer.**

L'objectif qui apparaît immédiatement est de limiter les motivations qui pourraient porter un état à se doter d'armes nucléaires. De semblables motivations, mis à part celles de prestige ou de mégalomanie, sont en fait très limitées. Elles résultent de tensions historiques dans des zones où certains états sont tentés d'appliquer des principes stratégiques de dissuasion, quand bien même ceux-ci ne présentent qu'une crédibilité limitée. Dans ces zones, il convient de créer les conditions d'une détente par une analyse neutre des possibilités de contrôle aboutissant à un désarmement apaisé. L'exemple de l'Afrique du Sud, qui annonça son renoncement à l'arme atomique sous la présidence de M. De Klerk, est significatif même s'il fut provoqué en partie par la dissolution de l'U.R.S.S., l'accès à l'indépendance de la Namibie et le retrait des troupes cubaines d'Angola.

*** Développement des accords locaux de confiance entre pays dotés d'armes de destruction massive.**

L'existence de l'A.I.E.A. qui joue le rôle, internationalement reconnu comme sérieux, d'un témoin, d'un conseil et d'un arbitre est précieuse. L'exemple vient du couple Argentine - Brésil qui, sans avoir signé le TNP ni même ratifié le traité de Tlatelolco à l'époque des négociations, ont adopté des mesures d'inspections réciproques de la totalité de leurs installations nucléaires.

Cela concerne :

- l'Inde, le Pakistan;
- la Corée du Nord, la Corée du Sud;
- le Proche-Orient.

3.2.1.3 Indépendance et amélioration des techniques de détection et de vérification.

Le problème de la soumission des deux agences A.I.E.A. et O.I.A.C. aux services de renseignement des états signataires demeure. A moins d'un effort financier considérable de la part de ces états pour leur donner un système de détection autonome, la situation va perdurer.

Par ailleurs, l'A.I.E.A. gagnerait à bénéficier des mêmes prérogatives que l'O.I.A.C. en matière de vérifications. Or, il faut bien reconnaître que l'intérêt des vérifications doit se porter sur les installations non déclarées. L'A.I.E.A. doit être assurée de trois réalités :

- l'accès à l'information issue soit des analyses internes de l'agence, soit des services de renseignements, dont l'agence doit pouvoir tirer ses propres conclusions, en toute indépendance ;

- l'accès aux sites non déclarés qui a été reconnu par le conseil des gouverneurs de l'agence ;

- l'appui sans faille du Conseil de Sécurité de l'O.N.U..

3.2.1.4 Sanctions dissuasives.

En matière internationale, il paraît difficile de faire plus que ce que prévoit la Charte des Nations Unies, c'est-à-dire la légitime défense ou le rétablissement de la paix. (Cf. paragraphe 2.3.2). Le rôle du Conseil de Sécurité de l'O.N.U. est essentiel et son comportement traduit la volonté ou l'absence de volonté politique des états qui le composent.

3.2.2 Dans un contexte de contre-prolifération

La contre-prolifération se distingue de la non-prolifération par l'emploi de moyens militaires pour contraindre par la force un proliférant à démanteler son système nucléaire. Cependant, en raison de la nature même des objectifs, les opérations militaires doivent intégrer les dommages collatéraux dus à une dissémination éventuelle de matières fissiles ou toxiques.

3.2.2.1 Exemples d'action de contre-prolifération

La première action de contre-prolifération s'est produite en 1981 lorsque les israéliens détruisirent le réacteur " OSIRAK " mettant un frein notoire à l'expansion du programme nucléaire irakien.

La guerre du Golfe peut être considérée elle aussi comme une action de contre-prolifération, mais cette fois-ci d'envergure, tant la conjugaison de bombardements aériens intenses et du démantèlement du complexe nucléaire imposé par la résolution 687 semblent avoir atteint leur but.

3.2.2.2 Vers un concept de contre-prolifération

L'évolution de la crise nord coréenne a pu faire croire à un moment qu'une action du même type était envisageable par les USA. Mais il n'en reste pas moins que l'aval des nations dans le contexte régional et la recherche d'un consensus au Conseil de Sécurité de l'ONU sont aujourd'hui nécessaires pour mener à bien des actions de contre-prolifération d'envergure. Là encore certains états proliférants semblent moins égaux que d'autres.....On peut donc imaginer deux scénarii possibles :

1) Action unilatérale d'un état en cas d'atteinte directe à ses intérêts vitaux

Ce type d'action sous forme d'un opération " coup de poing " peut faire l'objet d'une attaque aérienne type " Osirak ", ou d'une attaque à base de missiles de croisières embarqués sur un navire ou aéroportés, ou enfin d'une action commando. Par définition ce type d'action doit être limité à un objectif précis afin de bénéficier de l'effet de surprise et minimiser les risques de réactions internationales

2) Action concertée sous égide ONU

Le principe est comparable à celui ayant conduit à la guerre du Golfe. L'objectif est d'être mandaté par la communauté internationale pour une action qui vise à éradiquer complètement le problème, y compris après l'action militaire proprement dite, se terminant par la mise au point d'un système de vérification et de contrôle apte à éviter la résurgence du problème à moyen ou long terme.

La principale difficulté réside dans l'obtention d'un consensus international qui tient compte d'intérêts régionaux pour lesquels le contexte de prolifération est source d'importantes susceptibilités. Force est de constater que la résolution du problème de la Corée du Nord par une action de contre-prolifération menée éventuellement par les USA s'est heurtée à un refus formel de la Chine, voire de la Corée du Sud et du Japon, pour des motifs différents dans un même contexte régional.

Conclusion de la 1° Partie

Après plusieurs décennies d'une course aux armements effrénée, les grandes puissances militaires ont changé leur comportement pour s'en remettre à une stratégie minimale leur garantissant suffisamment de sécurité. De plus, l'écroulement du monde soviétique a bouleversé les données géopolitiques et supprimé la chape de plomb de la guerre froide qui pesait sur la planète. Malgré l'incertitude qui en a résulté, il demeure ou il est apparu des équilibres encourageants car, quoi qu'on dise, il existe des dissuasions régionales, qui échappent en partie aux grandes puissances mais qu'elles se doivent d'encourager et de guider.

L'inquiétude qu'elles manifestent vis-à-vis de la prolifération technologique ne doit donc pas se traduire par la seule construction d'une ligne Maginot technico-institutionnelle imparfaite comme on l'a observé mais par le souci complémentaire de diminuer les tensions régionales. La suppression des déséquilibres et la réduction des volontés belliqueuses des nations va dans le sens de la lutte contre la prolifération technologique.

Cependant, il convient de ne pas tomber dans la naïveté. Aujourd'hui, la maîtrise des flux technologiques à vocation militaire passe par une transformation des outils qui existent. En effet, la technologie proliférante évolue de façon inquiétante :

- l'éventail des produits s'élargit et leur dualité civile/militaire s'accentue,
- le nombre de pays fournisseurs s'étend.

Les textes juridiques, les institutions et, les groupes de contrôle doivent s'adapter en associant davantage de pays exportateurs et importateurs. La convention sur les armes chimiques en est un bon exemple. Il est encore trop tôt pour apprécier son efficacité en matière de surveillance, de détection et de vérification; d'autant que la tâche est immense. On peut d'ores et déjà affirmer que l'avancée est intéressante.

Reste le problème des actions coercitives et des sanctions. En matière internationale, l'O.N.U., et plus précisément le Conseil de Sécurité, est apte à prendre des décisions acceptables par tous. De récentes affaires ont démontré l'ambiguïté de son comportement et son impuissance. Seule la sagesse des nations renforcera son action et son efficacité.

III/ LES POINTS CHAUDS DE LA PROLIFERATION BALISTIQUE

1. L'ALGERIE : une volonté d'hégémonie régionale contrariée par des troubles intérieurs

1.1. Situation actuelle.

L'Algérie n'est pas un pays producteur de missiles, cependant elle consent encore aujourd'hui, malgré les troubles intérieurs qui l'agitent, un effort de recherche tant dans le domaine des missiles que dans celui des armes nucléaires. Il apparaît assez clairement que malgré ses difficultés intérieures l'Algérie cherche à affirmer son poids stratégique dans cette partie du monde.

Actuellement, l'Algérie est suspectée de chercher à acquérir des missiles balistiques auprès de la Corée du Nord et de la Chine. En outre, les dirigeants algériens ne cachent pas l'importance que revêt à leurs yeux la maîtrise des armes nucléaires. *"Dans dix ans, deux pays du continent africain seront pris au sérieux par les Etats-Unis, l'Afrique du Sud et l'Algérie qui seront tous deux des puissances nucléaires."* Rappelons que l'Algérie n'est toujours pas signataire du Traité de Non Prolifération. En outre, l'Algérie est soupçonnée de coopération avec l'Irak dans le double but de fournir un abri aux matériels nucléaires et aux scientifiques irakiens et de mener un programme nucléaire commun.

L'Algérie dispose dès à présent de missiles qu'elle a acheté à l'URSS dans les années 80. Elle était alors le 4° client de l'Union Soviétique au Moyen Orient (7% des armes soviétiques vendues dans la région). Les missiles dont elle dispose aujourd'hui sont des **Scud** et des **Frog 7**. Ce sont donc des missiles anciens et peu performants. Ils ont néanmoins démontré sur le théâtre de la guerre du Golfe le poids politique et psychologique qu'ils représentent.

1.2. Economie et politique intérieure.

Les facteurs marquants de l'Algérie de 1995 sont, d'une part la crise politique intérieure très grave due à l'intégrisme musulman et qui a dégénéré en quasi-guerre civile et, d'autre part l'échec patent de l'économie socialiste et planifiée de type soviétique. Les conséquences de ces facteurs sur la capacité de l'Algérie à développer une politique de maîtrise des technologies de pointe ou d'acquérir des missiles à l'étranger sont évidentes.

La dette actuelle de l'Algérie dépasse les 25 milliards de dollars et ne lui permet pas de disposer des devises fortes nécessaires à l'acquisition des armements auprès de pays étrangers. De plus, les soucis de sécurité intérieure sont aujourd'hui la préoccupation première des gouvernants algériens. La mission prioritaire des forces armées est, bien entendu, la lutte contre le terrorisme islamique du FIS et du GIA.

1.3. Menace.

On peut donc évaluer la menace que fait peser l'Algérie sur la paix régionale selon les critères suivants :

- Les missiles dont elle dispose actuellement sont certes rustiques et anciens mais peuvent néanmoins imposer une menace plus psychologique que réellement efficace (cf. : **Scud** irakiens dans le Golfe),

- Compte tenu des graves difficultés du régime, seule une volonté très affirmée de disposer des symboles de la puissance peut justifier une politique d'achat ou de développement de systèmes d'armes complexes et coûteux,

- Cette volonté politique pourrait se trouver renforcée soit par une victoire du camp islamise, soit par une perception trop forte de l'antagonisme Nord Sud.

En résumé, la menace la plus grande serait l'émergence d'un Etat islamique de type iranien, disposant de missiles coréens ou chinois et de l'arme nucléaire.

2 LA LIBYE : Une inquiétante activité tout azimut

2.1. Situation actuelle.

La Libye est un cas particulier, essentiellement en raison de sa politique extérieure qui se traduit par une grande agressivité vis à vis du monde occidental allant jusqu'au terrorisme d'état. Montrée du doigt par les instances internationales, elle fait l'objet d'une surveillance constante et d'une profonde méfiance due à la personnalité du président Khadafi. Cette surveillance s'exerce sur l'achat ou la production éventuelle de missiles balistiques dans la mesure où ils sont les vecteurs privilégiés d'une éventuelle arme de destruction massive. En effet, la Libye est singulièrement inquiétante à ce sujet et la détention d'une arme atomique par ce pays est particulièrement crainte par les occidentaux.

L'activité de la Libye dans le domaine des missiles est très intense, tant par une politique d'importation tous azimuts que par un développement de programmes nationaux, conduits en coopération avec d'autres pays. Les tentatives d'approche par la Libye des pays producteurs de missiles sont nombreuses et variées dans leur forme : proposition de coopération, achat sur étagère, achat discret de technologies et de cerveaux... Actuellement la Libye dispose de **SS 21**, **Scud** et **Scud C** de fabrication soviétique ainsi que de **Al Fatah**, de production locale et supposé non encore complètement opérationnel.

2.2. Economie et politique intérieure.

La situation économique de la Libye est mauvaise, en particulier en raison de la baisse des cours du pétrole. La société, peu développée ne fournit pas les personnels nécessaires à la conduite de programmes d'armements sophistiqués, ce qui explique le recours à la main-d'oeuvre étrangère. Des ingénieurs allemands sont employés en Libye dans le cadre du programme **Al Fatah**. En revanche cette population ne peut manifester d'opposition à Khadafi et peut supporter de gros sacrifices financiers. Le régime manque de transparence, aussi est-il difficile d'évaluer l'effort financier consenti par le pays pour son armement. Néanmoins on l'évalue à plus de 6% du produit intérieur brut, soit environ 1,5 milliards de Dollars US.

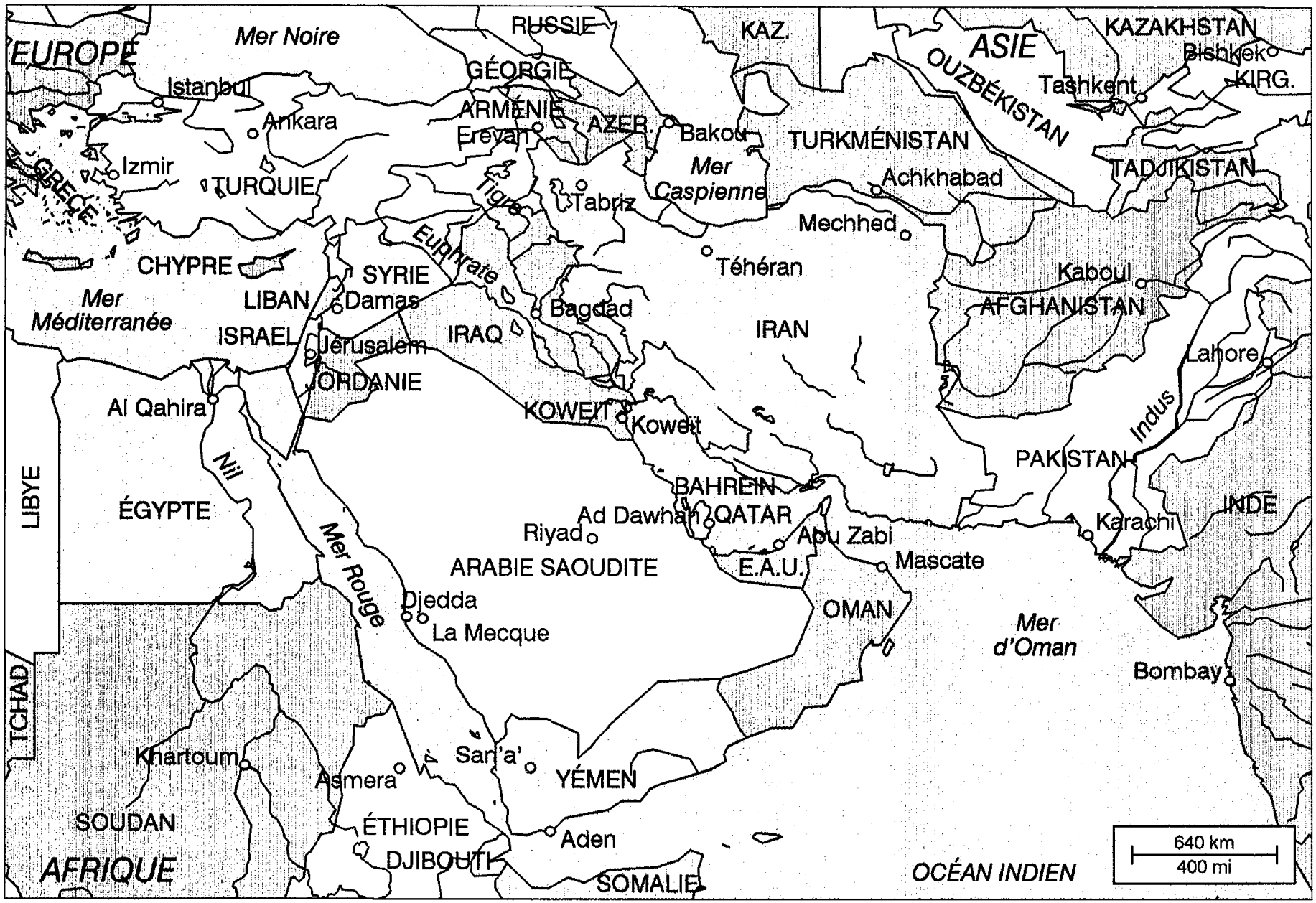
2.3. Capacités.

En ce qui concerne la production, il apparaît que l'effort porte sur le programme **Al Fatah**, missile d'une portée approximative de 500 km, susceptible de transporter tout type de tête militaire. Compte tenu de la volonté de développer simultanément des armes de destruction massive et du manque de moyens humains et financiers, les Libyens font appel à des compétences extérieures, allemandes et russes et à la coopération avec la Corée du Nord, le Brésil, la Chine... En outre, ils proposent une coopération à l'Iran. Le programme d'achat semble quant à lui avoir cessé.

2.4. Menace.

En terme de menace, la Libye est sans conteste un des pays les plus inquiétants du globe. Outre l'attitude menaçante de Khadafi vis à vis des occidentaux, de sa volonté hégémonique dans la région, la solidarité islamique l'amène à coopérer avec l'Iran, autre état terroriste. Il est certain que le développement de missiles va de pair avec la tentative d'acquérir des armes de destruction massive. La possession des uns et des autres pourrait conduire à un terrorisme d'état sur une échelle inconnue jusqu'à ce jour.

Compte tenu des caractéristiques de la Libye qui représente une menace potentielle réelle en cas de détention d'armes de destruction massive pouvant atteindre les pays développés, la surveillance des activités industrielles de Tripoli semble être une nécessité absolue. Heureusement incapable de conduire seule et par ses propres moyens cette ambitieuse politique d'armement, la Libye est pleinement justifiable d'embargo, sur les technologies, et de frappes préventives.


EUROPE
Mer Noire
RUSSIE
KAZ.
ASIE
KAZAKHSTAN
Bishkek
KIRG.
Tashkent
OUZBÉKISTAN
GÉORGIE
Istanbul
Ankara
ARMÉNIE
Erevan
AZER.
Bakou
TURKMÉNISTAN
Achkhabad
TADJIKISTAN
Izmir
TURQUIE
GRÈCE
Mer Caspienne
Tigre
Tabriz
Euphrate
Mechhed
Téhéran
CHYPRE
SYRIE
Damas
LIBAN
Mer Méditerranée
ISRAEL
Jérusalem
IRAQ
Bagdad
IRAN
Kaboul
AFGHANISTAN
Lahore
JORDANIE
Al Qahira
KOWEÏT
Koweït
Indus
PAKISTAN
LIBYE
Nil
BAHREIN
QATAR
Ad Dawhah
ÉGYPTE
Riyad
Abu Zabi
Karachi
INDE
Mer Rouge
ARABIE SAOUDITE
E.A.U.
Mascate
Djedda
La Mecque
OMAN
Mer d'Oman
Bombay
TCHAD
Khartoum
San'a'
Asmera
YÉMEN
SOUDAN
ÉTHIOPIE
Aden
DJIBOUTI
AFRIQUE
SOMALIE
OCÉAN INDIEN
640 km
400 mi

3. L'EGYPTE

3.1 Situation actuelle.

A partir des années 1950, l'Egypte a été la première puissance du tiers monde à s'intéresser aux missiles balistiques. Avec l'aide d'ingénieurs et de scientifiques allemands, ce pays a mis sur pied un programme ambitieux de développement de missile.

Le programme avait pour but de développer et produire 3 missiles balistiques équipés d'une tête militaire de 500 à 800 kg :

Al-Zaphir (Victor) : missile simple étage de 370 km de portée,
Al-Kahir (Conqueror) : missile simple étage de 600 km de portée,
Ar-Ra'id (Pioneer) : missile a deux étages de 1500 km de portée,

Malgré un programme d'investissement considérable de quelques années, de gros problèmes technique ont eu raison de ce programme.
L'Egypte s'est alors tourné vers l'Union Soviétique pour acheter des **Scud** qu'elle a utilisés au cours de la guerre Israélo-Arabe de 1973.

Par la suite, l'Egypte s'est lancé dans un nouveau programme, en coopération avec la Corée du Nord, pour maîtriser la technologie des **Scud** dans le but de développer et améliorer les **Scud B**. L'effort de l'Egypte s'est encore intensifié et un projet tripartite Irak-Argentine-Egypte a vu le jour pour le développement d'un missile de moyenne portée : le **Condor 2.** Ce programme a avorté en 1990 pour des raisons financières et des pressions internationales.

L'Egypte n'a conservé que son programme d'amélioration du **Scud B**, il pourrait bientôt déboucher sur la construction d'un missile équivalent au **Scud B.**

L'Egypte possède des **Scud B** (**SS -1**) et produit des **Scud**. Profitant des connaissances acquises avec les programmes Condor ou **Scud**, l'Egypte s'est associée à la Corée du Nord pour le développement et la production d'un missile d'une portée de 1200 km.
Projet T: Au cours de l'année 1991, l'Egypte a mené des négociations avec la Corée du nord pour l'achat et, également, pour la fabrication de Projet T (**Scud** mod **c** Nord Coréen) avec une exportation possible vers la Syrie, la Libye et l'Arabie saoudite. Ce missile, d'une portée de 450 km pouvant transporter une charge de 985 kg, est entré en service en 1993

3.2 Economie et politique intérieure.

L'économie égyptienne ne peut financer elle même son développement car l'épargne potentielle est exportée (fuite des capitaux) ou redistribuée et consommée (subvention aux produits de première nécessité)

l'Egypte doit donc recourir aux financements extérieurs, d'où son problème d'endettement et sa dépendance vis à vis de pays fournisseurs d'aide civile et militaire : l'URSS puis les Etats-Unis, l'Europe de l'ouest, le Japon, l'Arabie Saoudite et le Koweït. L'ajustement structurel qui visait d'abord à rendre l'Egypte solvable vis à vis de ses créanciers a aussi pour mission de rétablir les mécanismes économiques permettant à l'Egypte d'autofinancer son développement. Du succès de cet "ajustement" dépendra la stabilité politique d'un pays où la contestation islamiste s'alimente du chômage croissant des jeunes et de la dégradation des conditions de vie.

3.3. Capacités

Tant qu'Israël ne signera pas le traité de non-prolifération, l'Egypte ne le fera pas. Il y a quelques rumeurs concernant la fabrication de têtes chimiques et biologiques ce qui n'est pas improbable car l'Egypte a une longue expérience de recherche dans ce domaine. L'Egypte reste absente du domaine des missiles balistiques.

3.4. Menace.

L'Egypte a une industrie de missiles qui existe mais qui dépend beaucoup des pays étrangers. Elle n'a aucune expérience dans le domaine de l'armement nucléaire.

4. L'IRAN

4.1 Situation actuelle.

Depuis 1986, l'industrie de l'armement est devenu le secteur prioritaire de l'économie. L'Iran devient autonome dans un nombre grandissant de secteurs. Près de 300 usines de production d'armement ont vu le jour depuis la guerre Iran - Irak. Les structures de recherches et développement restent cependant peu actives.

La menace des missiles Irakiens durant la guerre Iran - Irak a poussé l'Iran a acquérir ses premiers missiles balistiques en 1985 et a été à l'origine d'un programme ambitieux de fabrication de missiles. L'Iran a, pour la première fois, utilisé des missiles contre des cités irakiennes en 1985 (environ 60 **Scud B** lancés contre Bagdad).

En 1990, l'Iran a réorganisé la production des missiles balistiques en deux composantes distinctes.

une première branche chargée d'assembler les missiles nord-coréens **Scud** Mod **B.**
une seconde branche, en partenariat avec la Chine, a pour but de redessiner et de produire les missiles M Class **SSMs** de 800 à 1000 km de portée.

La Chine et la Corée du Nord sont les deux principaux pays qui ont signé des accords de coopération militaire avec l'Iran. Beaucoup d'armes chinoises transitent par la Corée et sont acheminées par cargo jusqu'à Bandar Abbas

L'Iran a acheté des missiles **Scud** à la Syrie, à la Libye (environ 30 **Scud B** en 1984). La Chine et la Corée du Nord ont exporté 300 missiles **Scud B**. Fin 1993, l'Iran avait plus de 800 **Scud** en stock. Au cours de cette période, un marché a été conclu avec la Corée du Nord prévoyant le financement par l'Iran d'une copie nord-coréenne du **Scud B**. En retour, la Corée du Nord a aidé l'Iran a développer sa propre capacité de production de **Scud B.**
La Corée du Nord a fourni à l'Iran des **Scud C** d'une portée de 600 km.
L'Iran possède des missiles chinois **M-9**. Missile a propergol solide de 600 km de portée transportant une tête de 800 kg (500 kg d'explosif)

Silk-worm :

C'est une version chinoise du **Scud B**. Fin 1993, l'Iran en possédait 200.
Compte tenu de son niveau technologique, la fabrication des missiles balistiques en Iran nécessite des aides extérieures importantes ; l'assistance technique de la Chine et de la Corée du Nord ont été primordiales.
A la fin des années 1980, une usine de fabrication de missiles a été inaugurée. Il s'agit, en fait, d'une ligne d'assemblage du missile nord-coréen variante du **Scud B.**

Scud C :

Peu de renseignements filtrent de l'Iran, on sait cependant que l'Iran travaille avec la Syrie au développement d'une famille de missiles balistiques. Des essais de mise à feu d'un missile balistique de moyenne portée ont eu lieu a la fin de l'année 1991, il s'agit d'une version améliorée du missile **Scud** nord-coréen **(Scud C).**
Par rapport au **Scud B**, les **Scud C** sont plus précis, ils ont une portée double et peuvent transporter une tête militaire trois fois plus puissante.

Nazeat ou Iran-130 :

Propulsé par du propergol solide, le missile Iran-130 a une portée de 130 km, il est mobile par la route et dispose d'une simple tête militaire. Il a connu beaucoup de difficultés de guidage et semble opérationnel depuis 1990. Des versions de 160 et 200 km de portée compléteront la gamme. Le missile de 160 km de portée (Mouchak-160) a été testé au cours de l'été 1988. Ce missile a été développé avec l'aide de la Chine.

Tondar-68 :

C'est un missile d'une portée de 1000 km réalisé en coopération avec la Corée du Nord. D'une portée de 1000 km, le **Tondar-68** est équipé d'une tête de 400 kg. Il n'est pas encore en développement.

No-Dong 1 et 2 :

Depuis le début des années 1992, la Corée du Nord, la Chine et l'Iran coopèrent pour produire un missile balistique capable de transporter une tête militaire de 700 kg. Ce missile sera réellement opérationnel en 1998.

4.2 Economie et politique intérieure.

La guerre de 8 ans avec l'Irak a dévasté l'économie du pays. L'industrie non militaire n'a pas pu se développer et les activités spéculatrices se sont développées au détriment d'autres secteurs. Les cadres qui se sont expatriés à la naissance de la république islamique lui font maintenant cruellement défaut au moment de la reconstruction.

L'Iran possède cependant d'importantes richesses naturelles (pétrole, gisement de minerais) qui lui donnent de grandes possibilités de développement. Si ce pays arrive à maîtriser la démographie et s'il assoupli les règles qui découlent de sa philosophie de l'économie, il devrait être capable de faire face à ses difficultés présentes.

4.3 Capacités.

L'Iran a ratifié le TNP en 1970. En 1974, l'Iran appelée à faire dans la zone du Moyen-Orient, une zone libre d'armes de destruction de masse.

Depuis 1957, l'Iran travaille dans le domaine du nucléaire, officiellement le nucléaire civil. En 1987, l'Iran a signé un accord de coopération dans le domaine nucléaire militaire avec le Pakistan puis, au cours de cette même année, un accord avec l'Argentine pour la fourniture d'uranium enrichi. L'Iran travaille également en collaboration avec la Chine. Il existe deux sites principaux de recherche nucléaire militaire en Iran, l'un est situé près de Ispahan où deux réacteurs chinois sont installés, l'autre est localisé à Bushehr.

L'Iran a acheté entre 3 et 5 armes nucléaires au Kazakhstan ce qui lui a fait gagner 5 ans dans son programme de recherche. Ce pays cherche, aujourd'hui, a embaucher des scientifiques soviétiques. D'ici 5 ans, l'Iran devrait être capable de construire une bombe nucléaire.

Motivations de l'Iran pour se lancer dans le nucléaire :

- la nucléarisation de la région a commencé depuis le début des années 1970, l'Iran veut imposer un certain équilibre entre Israël et le monde islamique,
- la maîtrise du nucléaire confère un prestige et un statut régional de grande puissance,
- les motivations politique et stratégique (dissuasion, intimidation) sont fortes.

4.4 Menace.

L'Iran maîtrise la fabrication de missiles qui sont capables de frapper Israël ou l'Arabie saoudite. Aujourd'hui, 8 sites de lancement de missiles sont implantés sur l'île de Abu Mussa. Si l'Iran n'a pas encore montré de volonté d'hégémonie sur la région, ce pays représente maintenant une menace potentielle importante pour la stabilité de la région.

5 IRAK

5.1 Situation actuelle

Les équipes d'inspecteurs de l'ONU n'ont pas achevé la destruction complète des installations nucléaires. Au moins une usine est actuellement opérationnelle.

L'Irak cherche de nouveau à acquérir une capacité nucléaire. On estime a environ 7000 le nombre de scientifiques qui travaillent dans ce domaine. Mais même avec des aides importantes de puissances étrangères, l'Irak ne pourra pas reconstruire son industrie d'armes nucléaires avant 1997.

Accords commerciaux.

Avant la crise du Golfe, 207 traités commerciaux ont été signés pour la construction des missiles :

- 18 avec les USA (guidage de missile, propergols)
- avec l'Allemagne (propergol solide, gyroscopes, turbo pompes, enrichissement d'uranium)
- avec la France (moteur)

Les activités de l'Irak prouvent à quel point le contrôle international, en matière de technologie, est perméable face à des entreprises qui se montrent résolues à contourner des lois d'exportation

Partant d'un inventaire modeste soit 26 **Frog 7** et une douzaine de lanceurs **Scud** au début des années 1980, Bagdad a entrepris un programme d'équipement remarquable. Durant la décennie, une structure industrielle sera mise sur pied au côté de Messoul et à l'Ouest de Bagdad. L'entreprise irakienne sera largement animée par l'assistance de pays tels que l'Union Soviétique , les Etats-Unis, la Chine, la Corée du Nord, l'Allemagne de l'Ouest, l'Egypte, le Brésil et l'Argentine.

Scud B

L'Irak a tiré son premier **Scud B** sur l'Iran en 1982. Dans les quatre derniers mois de la guerre Iran - Irak, 70 **Scud B** et 150 missiles **Al Hussein** ont été tirés.

Les **Scud** ont hérités des techniques mises au point par les allemands au cours de la deuxième guerre mondiale. Le **Scud B** constitue un progrès considérable par rapport au **Scud A** qui est entré en service en 1955, il conserve néanmoins un système de guidage très rudimentaire

L'Irak a acheté une partie de ses **Scud** directement à l'URSS (1500 à 2000 **Scud B**), les autres venant de pays comme la Libye ou la Corée du Nord. L'Irak a également produit ce missile sous licence. Fin 1990, entre 400 et 1000 **Scud B** étaient stockés en Irak.

Al Hussein

Le **Al Hussein** est entièrement construit par l'Irak. Par rapport au **Scud B**, sa tête militaire a été réduite et la capacité de ses réservoirs augmentée. ce qui lui permet de doubler sa portée mais avec une charge militaire réduite.

Ce missile a été développé pour atteindre Téhéran situé à 500 km des frontières de l'Irak. Il a été testé en août 1987 avec une charge de 500 Kg sur une trajectoire de 650 km et a été utilisé au cours de la guerre Iran - Irak.

Dans le conflit du Golfe, 81 missiles **Al Hussein** ont été tirés contre l'Arabie Saoudite (41), Israël(38), Bahrayn(1) et le Qatar (1) à des distances variant entre 400 et 500 km. 5 missiles se sont détruits en cours de vol, 10 ont été détruits par les alliés.

Al Abbas

C'est une version améliorée du **Scud B**. Sa portée est de 900 km mais sa charge a été réduite. Les premiers essais ont eu lieu en Avril 1988

Aucun **Al Abbas** n'a été utilisé pendant la guerre du Golfe, on n'en connaît pas le nombre.

Al Hijara

Développé en 1990 pour attaquer Israël, ce missile a été développé à partir du **Condor 2**, fruit de la collaboration entre l'Argentine et l'Egypte, et du **Scud**. Il aurait une portée de 2000 km.

Al Aabed (Tammouz)

Le **Al Aabed** est le dérivé militaire du lanceur spatial Tammouz. Il ne délivre qu'une seule tête, sa précision n'est pas connue mais sa portée est de 2300 km..

C'est un missile à trois étages. La technologie des moteurs provient en grande partie des missiles **Scud**. Le premier étage a été testé le 5 Décembre 1989

5.2 capacités

Dans les années 1980, l'Irak a fortement investi dans la construction de dépôts souterrains, beaucoup n'ont pas été localisés. De 100 à 200 missiles **Al Hussein** auraient échappé aux destructions imposées par l'ONU.

Autres développements.

Il existait des plans de développement d'un missile **Badr 2000** d'une portée de 1200 km.

Le développement de **Condor 2**, d'une portée 800 à 1000 km, mené en coopération avec l'Egypte et l'Argentine a été abandonné à la suite d'intenses pressions américaines.

5.3 Analyse économique et politique intérieure.

Il faudra 40 ans de négociation, de crises et de conflits pour progresser de l'indépendance nominale par rapport aux britanniques à une liberté politique réelle dont la révolution du 14 Juillet 1958 fut le signal sinon l'accomplissement.

La découverte relativement récente d'importants gisements, de pétrole et de souffre notamment ont attiré sur l'Irak l'attention des nations industrielles qui ont eu parfois tendance à réduire ce pays à l'expression d'un pur et simple espace économique

La conscience de ce qu'il fut amène l'Irak à s'engager dans une véritable reconquête de soi dont les phases pour confuses qu'elles paraissent ne doit pas faire perdre de vue la lumière directrice

5.4 Menace

Ce pays travaille depuis les années 1970 dans ce domaine, une vingtaine d'essais ont été effectués pour développer une tête militaire adaptable à un missile. Au moment de la guerre du Golfe, on estime entre 12 et 18 mois le temps qui aurait été nécessaire pour détenir un engin nucléaire probablement encore primitif mais certainement utilisable. Sans la guerre du Golfe, l'Irak était assuré, malgré les lenteurs et les difficultés de son programme d'obtenir l'arme nucléaire en 5 à 10 ans.

Si les sanctions de l'ONU sont levées, l'Irak ne retrouvera pas ses capacités militaires conventionnelles d'avant la guerre du Golfe avant 3 à 5 ans et ses capacités de construire l'armes nucléaires avant 5 à 7 ans. Ce pays a néanmoins préservé des centaines de missiles **Scud** et est déjà en mesure de menacer ses voisins. L'Irak peut remettre sur pied son industrie de construction de missiles mais, pour cela, il a besoin d'une aide étrangère.

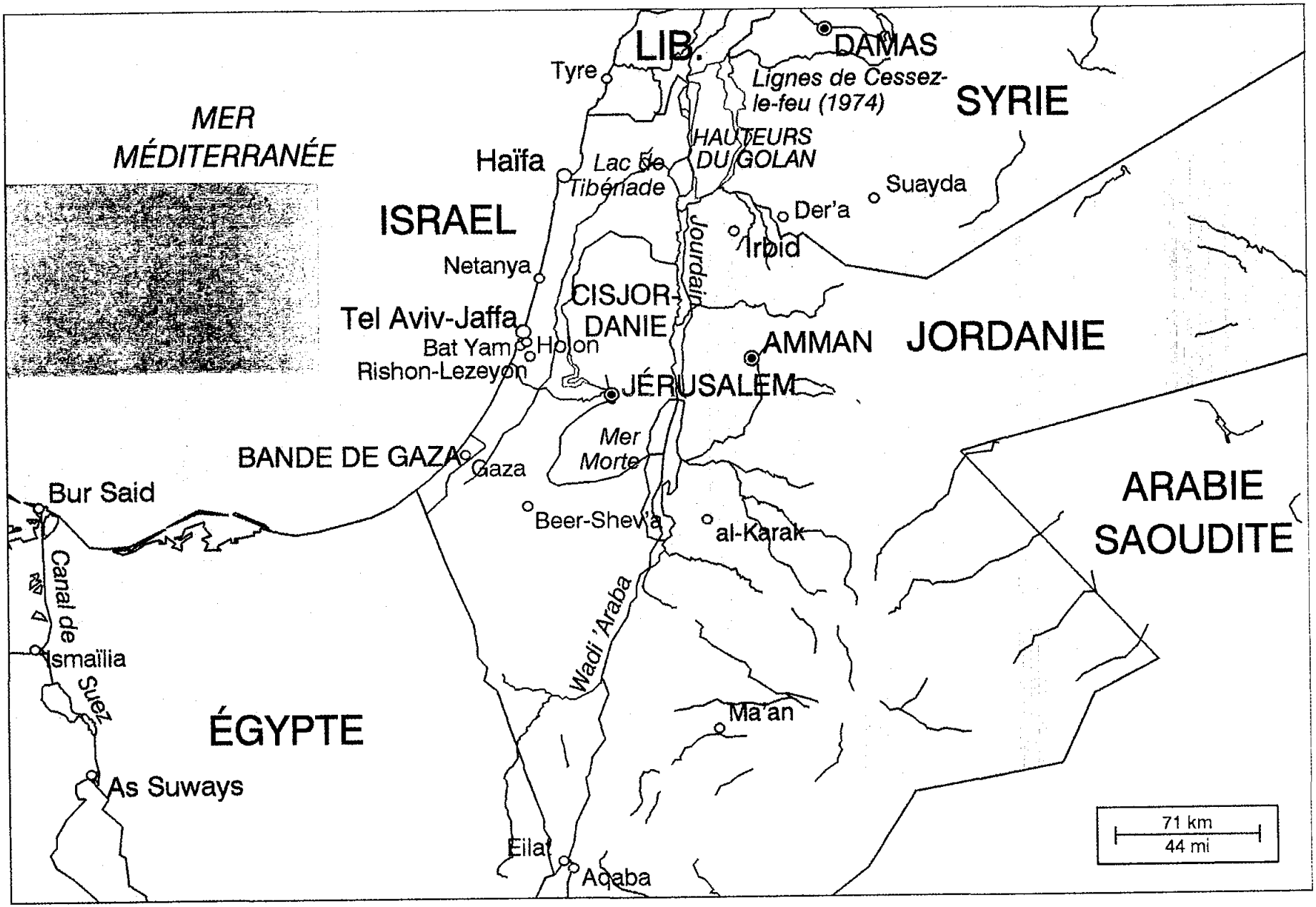
Le développement de missiles balistiques va continuer et la menace future ne sera pas restreinte uniquement aux missiles du type **Al Hussein** dont la technologie date des années 1950.

La construction de missiles balistiques va continuer, et les menaces futures ne seront pas uniquement dues au missiles **Al Hussein** qui ne sont que des **Scud B** modifiés.

Les américains ont récemment découvert des efforts secrets par l'Irak de poursuivre ses efforts de recherche. Dès que les sanctions de l'ONU seront levées, l'Irak recommencera son programme de développement.

La situation présente du régime baasiste, vaincu mais résolument accroché au pouvoir, laisse entendre que l'orientation fondamentale des politiques de Bagdad restera la même et que les ambitions nucléaires irakiennes demeureront vivaces.

En effet, si les missiles et les installations nucléaires irakiens ont été détruits, les connaissances et l'expérience acquises par les milliers de scientifiques et de techniciens irakiens demeureront un potentiel que les inspections de l'ONU ne pourront éliminer. Au terme de la guerre du Koweït, l'ombre de la nucléarisation continue donc a peser sur la région.


LIB.
DAMAS
Tyre
Lignes de Cessez-le-feu (1974)
SYRIE
MER MÉDITERRANÉE
Haïfa
Lac de Tibériade
HAUTEURS DU GOLAN
Suayda
ISRAEL
Der'a
Irbid
Jourdain
Netanya
CISJOR-DANIE
Tel Aviv-Jaffa
Bat Yam
Holon
Rishon-Lezeyon
AMMAN
JORDANIE
JÉRUSALEM
Mer Morte
BANDE DE GAZA
Gaza
Bur Said
ARABIE SAOUDITE
Beer-Shev'a
al-Karak
Canal de Suez
Wadi 'Araba
Ismaïlia
Ma'an
ÉGYPTE
As Suways
Eilat
Aqaba
71 km
44 mi

6. ISRAEL

6.1 Situation actuelle.

La production indépendante de missile nécessite une avance technologique, scientifique et des infrastructures capables de développer et de construire les éléments qui composent un missile. Seul un état au Moyen-Orient a la capacité de faire des systèmes balistiques, il s'agit d'Israël.

Israël a la capacité de construire un missile balistique d'une portée de plus de 4000 km capable de transporter une charge d'environ une tonne

Les équipements militaires les plus importants d'Israël sont fabriqués dans ce pays. Israël a le programme de missile balistique le plus avancé au Proche-Orient. En effet, ce pays a la capacité de production la plus importante en dehors de l'ex Union Soviétique, des USA, de la France et de la Chine. Israël a exporté des systèmes missiles et de la technologie à plusieurs nations dont Taiwan et l'Afrique du Sud. Jusqu'à présent, peu de choses ont été officiellement confirmées par les autorités. Le gouvernement israélien n'a jamais reconnu posséder un missile balistique produit par le pays.

Les efforts d'Israël dans ce domaine remontent à une trentaine d'années. Ils ont été menés au début en coopération avec la France. Après les ruptures des ventes d'armes entre la France et Israël à la fin des années 1960, Israël a pris l'effort de production à son compte.

Israël a développé plusieurs générations de missiles, connus sous le nom de **Jéricho I**, **Jéricho II** et **Jéricho II B** avec respectivement des portées de 450, 800 et 1500 km. En septembre 1988, Israël a lancé une fusée à trois étages avec son premier satellite **Ofek** qui est resté en orbite trois mois. Israël a lancé **Ofek 2** en avril 1990 d'un lanceur mobile. Selon un expert, si la fusée **Shavit** était utilisée comme missile balistique, elle pourrait délivrer 775 kg à 4000 km. On pense qu'Israël développe actuellement un missile mobile ayant une telle portée.

Les missiles.

Jéricho I

Ce missile à un étage d'une portée d'environ 500 kilomètres déployé à partir de lanceurs mobiles est opérationnel depuis 1973. Il utilise du propergol solide et transporte une simple tête conventionnelle ou non. Il est proche du missile **Pershing** en taille et performances.

Jéricho II

C'est un missile à deux étages capable de transporter une charge de 500 à 1000 kg sur une distance de 900 km à 1450 km. Il est opérationnel depuis 1975.

Le **Shavit** qui a été utilisé comme lanceur du premier satellite est une application du **Jéricho II** qui pourrait porter une charge de 500 à 1000 kg à 3500 kilomètres.

Jéricho II B

Ce missile à deux étages est une amélioration du **Jéricho II**. Il fonctionne avec du propergol solide. Il a une portée de 1600 km à 2400 km et est très précis.

Si les portées de ces missiles ne sont pas bien connues, en revanche il est certain que ces missiles peuvent délivrer des charges non conventionnelles.

Un missile en cours de développement a été testé pour des raisons de politique extérieure en coopération avec l'Afrique du Sud en 1990. Il y a eu des spéculations concernant ces essais, Israël aurait fourni de la technologie de missile et en échange, l'Afrique du Sud aurait fourni de l'uranium enrichi. Israël l'a toujours démenti.

6.2 Economie et politique intérieure.

Les ressources en matière première sont pour ainsi dire inexistantes. Israël doit importer tout le pétrole dont il a besoin. L'économie israélienne n'est pas une économie socialiste au sens où l'état est propriétaire des industries les plus vitales pour l'économie mais elle n'est pas capitaliste au sens classique du terme. Les usines les plus importantes se répartissent entre trois grands groupes :

1. le secteur contrôlé par l'état.
2. le secteur contrôlé par le Histadrout (centrale syndicale israélienne).
3. le secteur privé.

Le drame palestinien, en particulier depuis que la Cisjordanie est occupée (1967), est irréductible à toute catégorie de conflits connus. On peut le ramener à une relation entre occupant et occupés, même si cette occupation n'a rien de commun avec les formes d'occupation que l'Europe a connue. Il s'agit d'abord d'un concept juridique.

6.3. Capacités.

Israël continue de refuser de souscrire au Traité de Non Prolifération et d'envisager un quelconque désarmement dans ce domaine. Israël a développé une tête nucléaire, un essai a eu lieu au large de l'Afrique du Sud. Selon les Etats-Unis, Israël détiendrait une centaine d'armes nucléaires. Ce pays a été deux fois en alerte totale nucléaire durant la guerre Iran-Irak de même que pendant la guerre du Golfe.

6.4 Menace.

Bien que ce pays soit très discret sur ce sujet, Israël est une puissance nucléaire dotée d'un arsenal conséquent. Israël a démontré sa volonté de défense vis à vis de ses voisins, il a déjà mis plusieurs fois en alerte ses moyens nucléaires. La politique d'Israël en matière d'armement nucléaire maintient une certaine stabilité dans la région tout en faisant peser des risques importants de dérapages incontrôlés.

7. LA SYRIE : nouvelle puissance nucléaire ?

7.1. Situation actuelle.

La Syrie coopère avec l'Iran et manifeste sa volonté de produire des missiles balistiques. En 1991 elle y a consacré 200 millions de dollars et utilise de la technologie venant de la Corée du Nord et de la Chine.

La Syrie produit des missiles type **Scud C** dont elle détient aujourd'hui une vingtaine d'exemplaires. On estime que la production sera opérationnelle en 1996.

La Syrie a signé avec l'Iran un accord de coopération stratégique, visant à développer et diffuser des armes nucléaires en commun.

La Syrie dispose actuellement d'un arsenal non négligeable, acquis à l'étranger. On y retrouve les missiles habituellement exportés par l'ex-URSS et la Chine : **Scud, Scud B, Scud C, SS-21, M- 9, M-11**

7.2. Economie et politique intérieure.

Le but de la politique extérieure syrienne est de parvenir à la parité avec Israël sur les plans stratégique et militaire. Cela pose des problèmes majeurs au point de vue économique. La dette nationale de la Syrie est, en effet de l'ordre de 14 à 15 milliards de dollars US.

La minorité alaouite (10 % de la population syrienne) détient la totalité du pouvoir et contrôle tous les postes importants du pays, y compris dans l'armée qui est favorable au pouvoir.

7.3. Capacité.

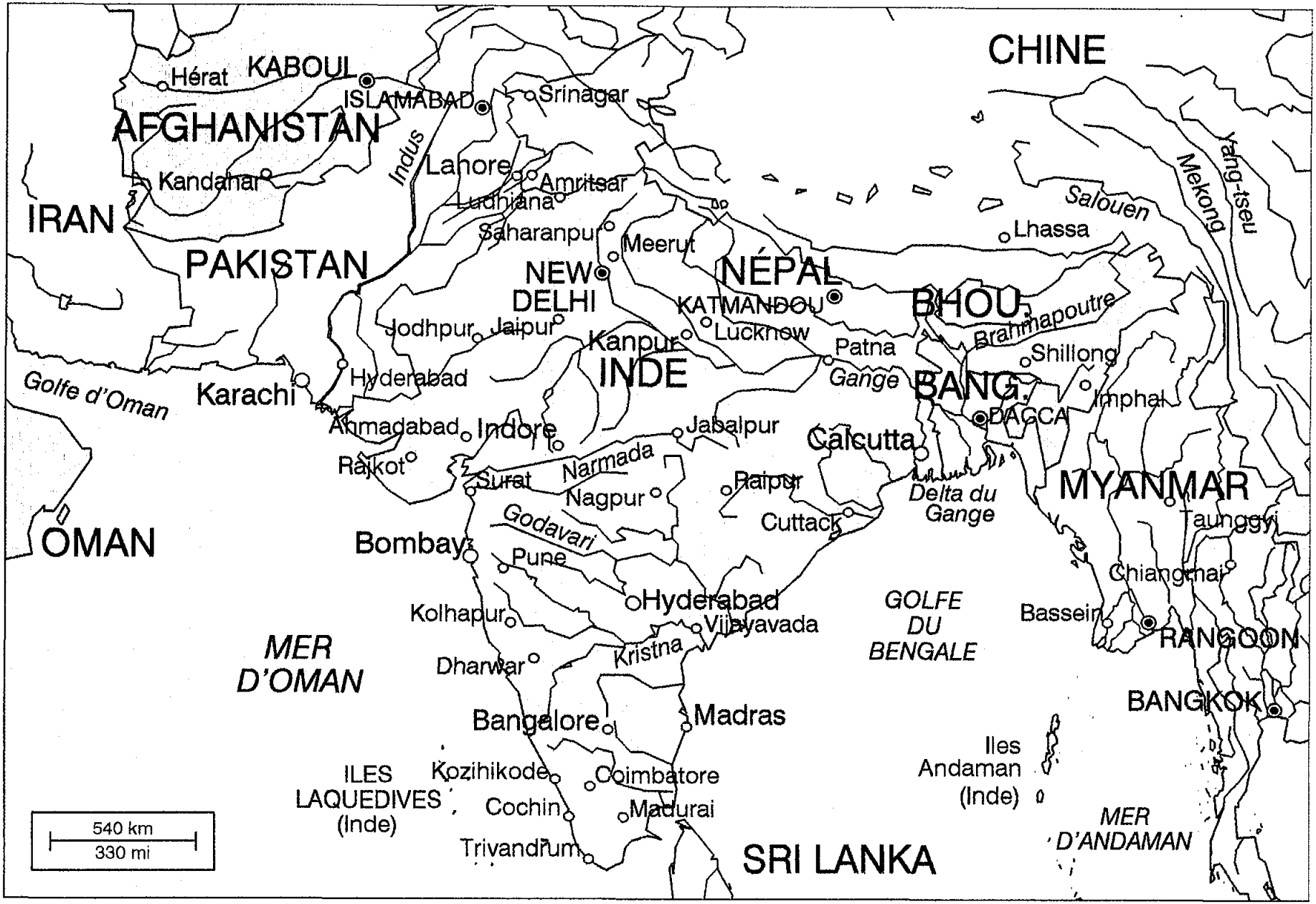
Les technologies venant de l'extérieur avec l'aide des scientifiques d'ex-URSS peuvent fournir une bonne base pour fabriquer des missiles et permettent de mener des recherches en ce domaine.

7.4. Menace.

Le Président de la Syrie pense que la paix avec Israël n'est possible que s'il obtient la parité stratégique. Pour cela la Syrie est prête à tout, même au risque d'endommager l'économie nationale.

44% du budget est consacré à la défense, soit 3 milliards de dollars US.

La tension qui prévaut avec Israël et les efforts consentis par la Syrie à la conquête de la supériorité stratégique militaire dans la région joint au manque de volonté de résoudre les problèmes pacifiquement par la voie des négociations est un facteur de guerre dans la région. Les missiles détenus par la Syrie pourraient alors être mis en oeuvre.


CHINE
Hérat
KABOUL
ISLAMABAD
Srinagar
AFGHANISTAN
Indus
Lahore
Amritsar
Ludhiana
Kandahar
IRAN
Saharanpur
Meerut
Salouen
Mekong
Yang-tseu
Lhassa
PAKISTAN
NEW
DELHI
NÉPAL
KATMANDOU
BHOU
Brahmapoutre
Jodhpur
Jaipur
Kanpur
Lucknow
Patna
Shillong
Golfe d'Oman
Karachi
Hyderabad
INDE
Gange
BANG.
Imphal
DACCA
Ahmadabad
Indore
Jabalpur
Calcutta
Rajkot
Surat
Narmada
Raipur
Delta du Gange
MYANMAR
Nagpur
Cuttack
Taunggyi
OMAN
Godavari
Bombay
Pune
Chiangmai
Hyderabad
GOLFE DU BENGALE
Bassein
Kolhapur
Vijayavada
RANGOON
MER D'OMAN
Kristna
Dharwar
BANGKOK
Bangalore
Madras
Iles Andaman (Inde)
ILES LAQUEDIVES (Inde)
Kozihikode
Coimbatore
Cochin
Madurai
MER D'ANDAMAN
Trivandrum
SRI LANKA
540 km
330 mi

8. L'INDE : une volonté d'hégémonie régionale et une certaine inquiétude vis à vis de son voisin Pakistanais

8.1. Situation actuelle.

L'Inde est un pays dont l'activité industrielle et technologique est atypique. Disposant d'un vivier important de chercheurs et d'ingénieurs de haut niveau et d'une main d'oeuvre industrieuse et bon marché, l'Inde souffre cruellement du manque de techniciens. Néanmoins, l'Inde consent un effort financier important, motivé, entre autre par la menace représentée par le voisin pakistanais et une volonté affichée d'hégémonie régionale. C'est pourquoi, l'Inde est un pays producteur de missiles. Elle est en outre une puissance nucléaire.

Les missiles développés par l'industrie indienne sont le **Prithvi** et l'**Agni**, dont les portées respectives sont 250 et 2000 km. Ces deux types de missiles répondent à des ambitions différentes. Les missiles **Prithvi** correspondent à des **Scud**, tout du moins en matière d'emploi. En revanche les missiles **Agni** sont des vecteurs adaptés à l'emport de têtes nucléaires. Ce potentiel technologique n'est pas destiné à l'exportation mais bien à dissuader "l'ennemi héréditaire" voisin, le Pakistan.

8.2. Economie et politique intérieure.

Le fait marquant de l'Inde d'aujourd'hui réside dans sa volonté, compte tenu de son importance démographique et de la taille du pays d'être la puissance de référence dans la zone. Cependant, si le décollage économique de ces trente dernières années a été impressionnant, il n'en demeure pas moins que la société indienne s'est, pour l'instant, montrée incapable de créer cette "classe moyenne" de l'industrie que sont les techniciens. Après avoir longtemps misé sur un splendide isolement économique, l'Inde s'ouvre au reste du monde. Société complexe et contrastée dans laquelle cohabitent technologie de pointe et rigidités sociales d'un autre temps, l'Inde n'a toujours pas achevé la révolution des mentalités qui doit en faire une société vraiment moderne. Elle dispose cependant des moyens économiques et des cerveaux nécessaires à la conduite des programmes d'armement de haute technologie. Elle en a, en outre, la volonté.

L'Inde consacre de l'ordre de 3 à 4% de son produit intérieur brut à sa défense, ce qui représente environ 10 dollars US par habitant. Cet effort montre une volonté réelle mais non disproportionnée. L'étude des cinq dernières années montre une relative baisse de l'effort financier consacré à la défense. En effet l'augmentation du budget de l'armement a été de l'ordre de 7% qu'il faut comparer avec la moyenne de 10% d'inflation dans la même période. En valeur absolue, l'investissement militaire est donc en baisse.

8.3. Capacité.

Les programmes de missiles dont dispose l'Inde sont entièrement nationaux et ne font que peu appel aux aides extérieures. En effet, l'Inde dispose des chercheurs dont elle a besoin dans ce domaine. Cependant il faut noter que l'**Agni** est un dérivé de l'**ASLV**, programme spatial civil pour lequel l'Inde a disposé de l'aide de pays européens, dont l'Allemagne par exemple.

8.4. Menace.

La puissance de l'Inde apparaît non négligeable, et ce d'autant plus qu'elle dispose de l'arme nucléaire. Rappelons qu'elle a refusé jusqu'à présent de signer le Traité de Non Prolifération qu'elle considère comme un "numerus clausus" non justifié au "club des puissants". Farouchement indépendante, initiatrice du mouvement des pays non alignés, humiliée par sa défaite contre la Chine et inquiète de l'agressivité, réelle ou supposée du Pakistan, l'Inde se préoccupe de sa défense et y consacre les moyens. La menace que cette région fait peser sur la paix du monde est importante mais non imputable à l'Inde seule. Une guerre indo-pakistanaise reste toujours à craindre et pourrait dégénérer en conflit nucléaire.

Les grands traits de cette brève analyse nous font apparaître un pays contrasté, aux difficultés intérieures certaines et aux relations de voisinage exécrables, disposant des moyens de mener une guerre moderne pouvant aller jusqu'à l'utilisation des armes de destruction massive. La seule garantie de paix dans cette région est l'amélioration des relations indo-pakistanaises et l'appel à la raison des dirigeants de ces pays.

9. LE PAKISTAN : une course à l'armement dirigée contre le "diabolique" voisin indien

9.1. Situation actuelle.

Le Pakistan est, à l'instar de son voisin et "ennemi" l'Inde, une puissance militaire émergeante et non négligeable. Tout comme son voisin, le Pakistan dispose d'une industrie et de chercheurs capables de mettre au point et de produire des missiles. La même volonté l'habitant, il consacre à cette tâche des moyens financiers importants et complète ses insuffisances industrielles par l'importation.

Le Pakistan dispose aujourd'hui de deux types de missiles, les **Haft**, de fabrication nationale et dont il existe trois versions portant de 80 à 600 km pour la dernière, et les **CSS-7**, de fabrication chinoise, d'une portée de 300 km. Notons que ces vecteurs, tant les **CSS-7** que les **Haft 2** et **3** peuvent emporter une tête nucléaire. Les missiles fabriqués par le Pakistan ne sont pas, pour l'instant, exportés mais uniquement en service dans l'armée pakistanaise.

9.2. Economie et politique intérieure.

Le Pakistan, né dans la douleur de la séparation des musulmans de l'Inde a connu dans son histoire des périodes tragiques qui ont fortement marqué sa société. C'est un pays monolithique où l'Islam est le ciment de la société et a conduit récemment à des engagements en matière de politique extérieure (aide aux rebelles d'Afghanistan, par exemple). Le régime autoritaire militaire a été remplacé par une démocratie où la place faite aux musulmans reste prépondérante malgré la présence à la tête du gouvernement d'une femme. La place de l'armée reste également très importante. La situation de l'économie pakistanaise est à peine acceptable et le niveau de vie n'y est pas plus élevé qu'en Inde. Il y a là aussi un manque de techniciens qui n'est pas sans conséquences sur la capacité de produire des missiles balistiques.

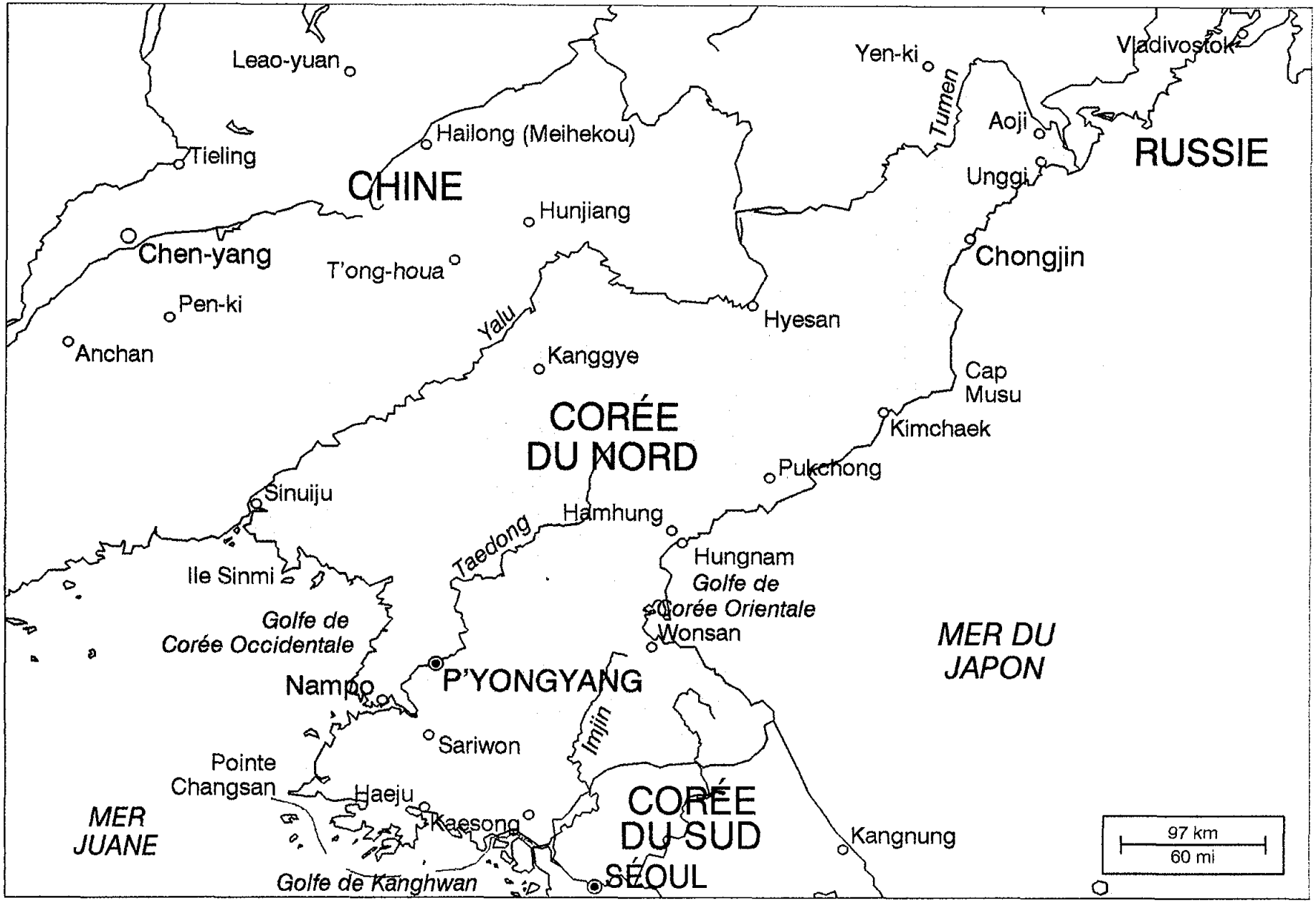
Le pourcentage du produit national brut consacré à la défense est très important, entre 7 et 8%, soit environ 25 dollars US par habitant. Notons que 45% du budget de la défense est consacré à l'armée de terre laquelle joue un rôle majeur dans la société. Cependant, et de façon parallèle à l'Inde, le budget de la défense décroît en valeur absolue depuis les cinq dernières années.

9.3. Menace.

La menace que représente le Pakistan est évidemment liée à ses relations vers son puissant voisin. Celles-ci sont mauvaises et fondées sur la méfiance réciproque. Puissance nucléaire, ce qui semble d'ailleurs être la motivation prioritaire à l'achat et à la fabrication de missiles balistiques, le Pakistan dispose d'une force de dissuasion tournée vers l'Inde. Il existe néanmoins une autre menace qui tient à la caractéristique religieuse du régime d'Islamabad. En effet, au nom d'une solidarité islamique, on peut craindre une participation active du Pakistan à l'ar-

mement de pays musulmans dans les zones les plus chaudes de la planète. Ce danger est d'autant plus grand que la stabilité du régime n'est pas assurée et qu'un coup d'état fondamentaliste est toujours possible.

Le Pakistan est donc une puissance militaire musulmane et potentiellement islamique dont les préoccupations actuelles sont limitées à sa vieille haine de l'Inde mais qui pourrait évoluer dans d'autres directions moins prévisibles. Dans l'immédiat, il est nécessaire que le Pakistan stabilise son jeune régime démocratique et améliore ses relations avec l'Inde. Un conflit indo-pakistanais, par les armements qui y seraient mis en oeuvre et les répercussions qu'il aurait sur le monde musulman est un danger important que les grandes puissances doivent prendre en compte.


Leao-yuan
Yen-ki
Vladivostok
Tumen
Aoji
Hailong (Meihekou)
Tieling
CHINE
RUSSIE
Unggi
Hunjiang
Chen-yang
Chongjin
T'ong-houa
Pen-ki
Yalu
Hyesan
Anchan
Kanggye
Cap
Musu
CORÉE
DU NORD
Kimchaek
Pukchong
Sinuiju
Hamhung
Taedong
Hungnam
Ile Sinmi
Golfe de
Corée Orientale
Golfe de
Corée Occidentale
Wonsan
MER DU
JAPON
Nampo
P'YONGYANG
Imjin
Sariwon
Pointe
Changsan
Haeju
CORÉE
DU SUD
MER
JUANE
Kaesong
Kangnung
SÉOUL
Golfe de Kanghwan
97 km
60 mi

10. LA COREE DU NORD : la prolifération du Tiers Monde

10.1. Situation actuelle.

En 1992 la Corée du Nord a été soupçonnée d'avoir la capacité nucléaire par l'Agence Internationale d'Energie Atomique". Selon "Jane's Intelligence review", l'objectif de son programme nucléaire a été, et sera la production d'armes nucléaires.

La Corée du Nord a déroulé depuis 1980 le programme de développement des missiles balistiques, en ayant assez de plutonium pour un arsenal de système d'armes nucléaires. Récemment, la Corée du Nord a produit des missiles balistiques de plus de 1000 km : **No-Dong, Scud B, C, D**.

Les missiles dont dispose aujourd'hui la Corée du Nord sont : **DF-61 R-17E, Scud B, Scud C, No-Dong 1 et 2, Tae-Po-Dong, SSN2**

10.2. Economie et politique intérieure.

La Corée du Nord a une grande volonté d'avoir les moyens de dissuasion contre la Corée du Sud et les Etats-Unis afin de faciliter et mettre en oeuvre sa politique extérieure. Cette volonté l'amène à développer l'arme nucléaire.

Depuis 1980 la situation économique a commencé à s'aggraver. Le gouvernement ne peut pas soutenir les dépenses d'armement. Cette situation économique pose des problèmes dans le domaine des développements des armes nucléaires et des missiles balistiques.

Le régime de la Corée du Nord n'est pas démocratique. C'est un système politique instable et fragile.

10.3. Capacité.

En 1992 la Corée du Nord a été reconnue comme ayant la capacité nucléaire. A présent la Corée possède trois types de réacteurs nucléaires et elle construit le quatrième. A la fin des années 1990, la Corée aura la capacité de fabriquer 200 kg de plutonium par an.

La Corée a des centres de recherches nucléaires, des mines d'uranium, et dispose de programmes d'installation des réacteurs nucléaires.

La Corée a la capacité et la technologie pour fournir et délivrer des armes chimiques et biologiques, et elle fait un grand effort d'exportation de ses missiles vers le Tiers Monde, en particulier vers l'Iran, la Libye et la Syrie.

Le budget de la défense de la Corée du Nord est de 1,7 milliards de dollars US, soit 6% du Produit National Brut (1994). Il était de 2,14 milliards de dollars en 1992.

10.4. Menace.

La Corée du Nord peut causer des dommages très importants à la Corée du Sud grâce à ses armes balistiques.

La tension de cette région trouve son origine dans l'affrontement des deux blocs pendant la guerre froide. Elle n'est donc plus actuelle et cessera lorsque le communisme aura cessé d'exister dans cette région.

Le problème politique entre les deux Corée est défini par la volonté de réunifier les deux Corée sous un gouvernement nord-coréen.

Le conflit entre la Corée du Nord et la Corée du Sud a été pendant longtemps le plus grand danger en Asie de l'Est et représente encore un des risques majeurs pour la sécurité du monde entier.

Les moyens dont dispose la Corée du Nord sont loin d'être équivalents à ceux de la Corée du Sud (moyens fournis par les Etats-Unis), elle doit donc adopter une politique du " faible au fort ". C'est un pays faible mais bien soutenu par la Chine.

Les forces armées américaines prépositionnées en Corée du Sud sont un facteur de dissuasion contre une agression venant de la Corée du Nord mais celles-ci peuvent mener une attaque surprise. La condition du succès est d'interdire la mobilisation des forces de l'armée du Sud et la monté en puissance des forces américaines. Pour cela, elle doit utiliser la puissance des missiles balistiques. La Corée du Nord peut dissuader le Japon d'accorder aux forces américaines une base sur le territoire Japonais qu'elle menace par ses missiles.

L'un des buts de la politique de défense nord-coréenne est d'inciter au retrait des forces américaines prépositionnées en Corée du Sud.

La prolifération des missiles venant de la Corée du Nord menace la paix du monde.

Tant que le conflit entre les deux Corée ne sera pas réglé, le risque d'utilisation des missiles dans la zone demeure. De plus, la Corée du Nord continuera de développer et vendre des missiles, pour financer ses projets militaires.

Le dialogue entre les deux Corée ne peut pas être s'établir tant que le problème nucléaire n'est pas résolu.

11. LES PAYS DE L'EX-URSS
INTRODUCTION :

En 1991, lorsque l'Occident assiste au démantèlement de l'URSS, son premier sentiment est le soulagement de voir disparaître la principale source de menace sur la paix dans le monde.

Pourtant, les experts occidentaux font part de leurs inquiétudes devant l'immense arsenal nucléaire désormais partagé entre la Russie et trois autres pays, la Biélorussie, la Kazakhstan et l'Ukraine.

Quelle attitude ces nouvelles puissances nucléaires allaient-elles adopter ? Suivraient-elles la voie du désarmement que l'URSS avait prise, ou au contraire conserveraient-elles cet armement comme garantie de leur indépendance?

A ces interrogations, chaque pays a apporté une réponse, parfois ambiguë d'ailleurs. Mais aujourd'hui, ces états nouvellement indépendants opèrent une réorganisation profonde de leurs institutions et sont en proie à une grave crise économique. Comment ne pas craindre que leurs industries militaires surdimensionnées et moins contrôlées ne cherchent pas à trouver des débouchés vers les pays les plus offrants, et que leurs scientifiques ne soient attirés par les propositions alléchantes d'embauche à l'étranger.

Il y a peu à craindre que ces pays cherchent à s'armer plus encore, leur économie ne leur permet sans doute pas et leur arsenal est suffisant. En revanche, il est possible qu'ils cherchent à brader leurs armes - entre autres leurs missiles - et toute la technologie associée. C'est à ce titre qu'ils peuvent être classés comme états proliférants et les pays occidentaux en proposant très tôt à chacun des compensations financières contre un rapide désarmement et une reconversion de leurs industries d'armement ne s'y sont pas trompés.

L'étude plus approfondie de chacun de ces trois pays nous permettra de faire le point de la situation actuelle et de justifier nos espoirs ou nos craintes pour le futur.

Les informations livrées sont des informations ouvertes et comptent tenu du secret qui entoure encore les problèmes de prolifération des missiles balistiques et du nucléaire dans l'ancienne URSS, un certain nombre de renseignements n'ont pu être obtenus, tels que la personnalité et le devenir des scientifiques spécialistes de ces domaines, le niveau de compétence dans les usines et surtout la capacité à concevoir et à réaliser de telles armes sans concours extérieur.

LETTONIE
Daugava
Daugavpils
Velikie Louki
73 km
46 mi
Siauliai
LITUANIE
RUSSIE
Dvina
Vitebsk
Kaunas
VILNIUS
Vilnya
Smolensk
Dniepr
Orsha
Barysov
MINSK
Mogilev
Hrodna
Niemen
BIÉLORUSSIE
Berezina
Soj
Bialystok
Baranovichi
Bobrouysk
POLOGNE
Homyel'
Dniepr au Boug
Brest
Pinsk
Pripyat
Mozyr'
Dniepr
Tchernigov
Desna
UKRAINE
Chernobyl

11.1 LA BIELORUSSIE

11.1.1. Situation actuelle.

La Biélorussie est en comparaison de l'Ukraine et du Kazakhstan le pays dont l'héritage dans le domaine balistique est le plus faible.

L'inventaire de son industrie d'armement ne fait état d'aucune usine de fabrication ni même d'assemblage de missiles. On peut donc penser raisonnablement qu'elle n'a pas la capacité de produire de telles armes.

En revanche dans le domaine du nucléaire, la Biélorussie possède à Minsk un des centres majeurs de recherche et d'essais nucléaires. Renonçant au nucléaire, la Biélorussie laisse donc inemployés de nombreux spécialistes de ce domaine.

La Biélorussie avait précédemment sur son territoire 25% des missiles mobiles **SS-25** de l'ex-Union Soviétique. Les forces de missiles stratégiques comprenaient deux divisions à huit régiments basées à Mozyr et Lida.

La Biélorussie a entrepris le début de leur rapatriement en Russie pour y être démantelés.

Le premier régiment (9 missiles) stationné à Postavy est retourné en Russie à l'été 1993, les quatre régiments suivants en 1994 en accord avec l'échéancier établi entre les deux ministres de la défense. Le reste devrait faire retour en 1995. A la mi 96, les deux divisions de missiles de Mozyr et de Lida auront totalement cessé d'exister.

La Biélorussie possède encore sur son territoire des missiles tactiques de portée moindre et ne rentrant pas dans la catégorie des missiles faisant l'objet de cette étude. Pour mémoire, on mentionnera simplement 60 **Scud B** ainsi que 40 **SS-21.**

11.1.2 Economie et politique intérieure

Malgré des difficultés économiques importantes, la Biélorussie n'a pas été tentée de vendre ses **SS-25** à l'étranger. Possédant peu d'usines d'armement et aucune dans le domaine balistique, la reconversion de son industrie d'armement ne devrait pas poser de problème et le risque de fuite d'ouvriers ou d'ingénieurs vers l'étranger est minime. Seuls en effet, 3,2% des ouvriers de l'ex-URSS travaillant dans ce secteur sont de nationalité biélorusse.

La Biélorussie se flatte d'être le seul des pays de l'ex-URSS a avoir démantelé son arsenal sans conditions ni chantage et d'avoir réellement adhéré au TNP en temps que pays non nucléaire.

En revanche, sur le plan des compensations financières, la Biélorussie a exprimé son regret que les Etats-Unis aient accordé plus de soutien à "l'obcursionnisme" ukrainien qu'à la coopération biélorusse.

La Biélorussie est tournée résolument vers la Russie et ne connaît pas de troubles intérieurs susceptibles d'entraîner d'emploi de son armement.

11.1.3 Menace

La Biélorussie ne connaît pas actuellement de menaces extérieures qui justifieraient le maintien d'une force de dissuasion. Compte tenu de son attitude dans les instances internationales, il y a peu à craindre de la Biélorussie dans le domaine de la prolifération des missiles.

Elle a, en effet, ratifié le traité START 1 le 4 février 1993 et a officiellement fait savoir son intention de devenir un état non nucléaire. Elle est, par ailleurs, signataire du Traité de Non Prolifération.

Enfin, elle a signé en juillet 1993 avec les Etats-Unis un accord d'assistance pour le transfert de ces armes vers la Russie.

Toutes les garanties de sécurité semblent donc avoir été fournies par la Biélorussie.

Sans faire de prospective hasardeuse, on peut penser que la démarche de la Biélorussie pour se débarrasser de son arsenal de missiles stratégiques est suffisamment bien entamée et volontariste pour que le danger de prolifération soit écarté dans les années qui viennent.

Baranovichi
Bobroïsk
BIÉLORUSSIE
Briansk
RUSSIE
Brest
Pinsk
Pripyat
Homyel'
Mozyr'
Desna
Tchernigov
Voronej
Lublin
Chernobyl
Soumy
Don
POLOGNE
Loutsk
Rovno
KIEV
Dniepr
Kharkov
Jitomir
Lwow
Ternopol
Tcherkassy
Poltava
Ivano-Frankovsk
Vinnitsa
Stanislav
Dniestr
UKRAINE
Krementchoug
Sev. Donets
Louhansk
Kramatorsk
Kamenets-Podolskii
Yuzhnyy Bug
Dniepropetrovsk
Gorlovka
Tchernovtsy
Donetsk
Makeyevka
Krivoï-Rog
Zaporojie
MOLDAVIE
Marioupol
Nikolaïev
Dniepr
Melitopol
Chrisinau
ROUMANIE
Kherson
Odessa
MER D'AZOV
RUSSIE
Kertch
Galati
Sébastopol
Simferopol
Krasnodar
BUCHAREST
Danube
BULGARIE
MER NOIRE
160 km
100 mi

11.2 L'UKRAINE

11.2.1 Situation actuelle.

Parmi les trois pays de l'ex-URSS devenus puissances nucléaires, l'Ukraine est incontestablement la mieux dotée en usines de fabrication de missiles.

Le Yuzhnoye Design Office de Dnepropetrovsk, est le constructeur des missiles **SS-18** et **SS-24** et possède un très grand savoir faire dans le domaine des propulseurs fusée. La production des **SS-24** a débuté en 1984 et bien que les Russes aient annoncé en 1990 que la production s'arrêterait en 1991, l'usine de Yuzhnoye a montré sa détermination à conserver sa maîtrise puisqu'elle propose aujourd'hui de transformer les propulseurs des missiles **SS-24** en lanceurs de charges légères en orbite basse à des fins civiles.

Le Yuzhnoye NPO est par ailleurs le constructeur de la fusée Rocket.

Second constructeur de missiles implanté en Ukraine, l'usine de Pavlograd produit également le missile **SS-24**.

Il ne fait aucun doute que l'Ukraine avec ses deux usines de production et les nombreux spécialistes qui y travaillent est capable de développer seule une production de missiles balistiques.

L'Ukraine a hérité en 1991 du troisième arsenal nucléaire mondial.

Elle a en sa possession 130 missiles **SS-19** (appellation OTAN "Stiletto") répartis sur les sites de Pervomaysk (40 missiles) et Khmelnitskiy (90 missiles), ainsi que 46 **SS-24** (appellation OTAN "Scalpel") implantés à Pervomaysk.

Le missile **SS-19** a été déployé opérationnellement en 1975. Sa dernière version "Mod 3" est entrée en service en 1979. Il est équipé de 6 têtes nucléaires et a une portée d'environ 10000 km.

Le missile **SS-24** a été déployé dans sa version mobile (Mod 1) en 1987 puis dans sa version en silo (Mod 2) en 1989. L'Ukraine ne possède que la version fixe. Il est équipé de 10 têtes nucléaires.

Après d'intenses négociations avec la Russie et les USA en janvier 1994, l'Ukraine a accepté de renvoyer en Russie 200 des 780 têtes nucléaires des **SS-19** prélevées sur le site de Pervomaysk ainsi que les 460 têtes des 46 **SS-24**. Leur démantèlement était prévu fin 94.

L'attitude de l'Ukraine est tellement ambiguë qu'il est difficile de connaître avec exactitude le reliquat des missiles sur le sol ukrainien à la date d'aujourd'hui.

11.2.2. Economie et politique intérieure

L'Ukraine doit faire face à des difficultés économiques importantes. Il semble que l'actuel président Léonid Koutchma ait plus de succès que son prédécesseur mais au prix de mesures draconiennes.

Ainsi, le budget de la défense de l'Ukraine est passé de 15% du budget de l'état en 1992 à 5% seulement en 1994. Cette politique de diminution budgétaire

est lié à l'écart considérable entre le budget actuel et la capacité économique du pays.

L'Ukraine n'a pas aujourd'hui la capacité d'entretenir son arsenal nucléaire mais utilise en revanche celui-ci comme monnaie d'échange dans toutes les négociations. Elle souhaite en effet obtenir le maximum de compensations financières pour le démantèlement de ses missiles. Elle estime à 2,8 milliards de dollars le coût de celui-ci.

Les élections présidentielles de juillet 1994 ont montré qu'il existait une forte scission politique entre l'Est et l'Ouest de l'Ukraine. L'Est, culturellement et ethniquement russe, souhaite un rapprochement politique et économique avec la Russie, alors que l'Ouest cherche à sortir l'Ukraine de l'orbite russe.
Cette opposition, que l'on retrouve dans l'attitude du parlement ukrainien (Rada), est une gêne considérable dans les négociations menées.

11.2.3. Menace

L'Ukraine a déclaré dès son indépendance sa volonté d'être un état non nucléaire. Elle s'est théoriquement engagée par les accords de Lisbonne du 17 mai 1992 à respecter le traité START1 et à adhérer au Traité de Non Prolifération nucléaire comme état non nucléaire. Mais l'Ukraine a considérablement tardé à remplir ses obligations. Outre les raisons économiques évoquées plus haut, la raison de ce retard tient dans les rapports que l'Ukraine entretient avec la Russie.

Deux différents demeurent en effet très forts depuis l'indépendance de l'Ukraine. Le premier concerne le sort de la flotte de la Mer Noire. Les accords de Massandra de septembre 1993 prévoyaient la cession à la Russie de la totalité de la flotte en contrepartie de l'annulation de la dette énergétique de l'Ukraine à l'égard de la Russie. L'Ukraine a, par la suite, repris ses réclamations antérieures visant à un partage égal de la flotte.

En avril 1994, un accord signé à Moscou prévoit que l'Ukraine conservera 18% des bâtiments de la flotte et vendra le reste de sa part de 50% soit 32% à la Russie. Mais il reste encore un certain nombre de points de désaccord portant notamment sur le statut juridique de la future base et sur le règlement financier.

Le second différent porte sur le sort de la Crimée. La Russie n'a jamais vraiment admis que l'Ukraine devienne indépendante et encore moins qu'elle récupère la péninsule de Crimée. La légitimité juridique des ukrainiens se heurte aux réalités démographiques des russes et aux revendications des Tatars qui peuplaient la Crimée avant leur déportation par Staline. Ni l'Ukraine ni la Russie ne veulent céder sur ce point, risquant ainsi d'envenimer des relations déjà tendues.

Enfin, L'Ukraine a des soucis légitimes de sécurité face à la Russie. Elle souhaite donc obtenir des garanties de la part de Moscou et de l'Occident en échange de sa renonciation à l'arme nucléaire. Les ukrainiens craignent, peut-être, à juste titre, que personne ne vienne à leur secours en cas de problème avec les russes et sont conscients qu'ils existent au yeux du monde en grande partie grâce à leurs armes nucléaires.

L'adhésion récente de l'Ukraine au TNP, en tant qu'état non-nucléaire (5 décembre 1994), est un signe encourageant dans son processus de dénucléarisation. L'unité politique qui semble se faire autour du président Koutchma est probablement une des raisons de ce progrès. Les compensations financières obtenues par l'Ukraine ainsi que les garanties de sécurité offertes par les occidentaux devraient permettre à l'Ukraine de poursuivre dans cette voie. Mais il faut rester très vigilant car un certain nombre de différents entre l'Ukraine et la Russie ne sont pas encore réglés : le sort de la Crimée et le devenir de la flotte de la Mer Noire.

Par ailleurs, l'Ukraine doit faire un nouvel effort pour que des mesures de vérifications efficaces puissent avoir lieu sur son territoire.

RUSSIE
Perm
Kama
Volga
Kazan
Tcheliabinsk
Tobol
Petropavlosk
Omsk
Novossibirsk
Ob
Koustanai
Ichim
Kokchetav
Pavlodar
Rudnyy
Ekibastuz
Aqmola
Irych
Samara
(Kouibychev)
Saratov
Ouralsk
Aktioubinsk
Oural
Semipalatinsk
Temirtaou
Oust-Kamenogorsk
Karaganda
Volgograd
KAZAKHSTAN
Volga
Djezkazgan
MER
D'ARAL
Astrakhan
Atyrau
Lac
Balkhash
Syr Daria
Kzyl-Orda
Taldy-
Kourgan
Ouroumtsi
Shevchenko
MER
CASPIENNE
ALMA-ATA
Djamboul
OUZBÉK.
BISHKEK
TBILISSI
Tchymkent
KIRG.
AZER.
TASHKENT
Amou Daria
BAKOU
TURKMÉN.
CHINE
Douchanbé
TAKJIK.
IRAN
ACHKHABAD
Mechhed
Téhéran
AFGHANISTAN
430 km
270 mi

11.3 LE KAZAKHSTAN

11.3.1. Situation actuelle.

Le Kazakhstan n'a pas hérité d'usines de fabrication de missiles balistiques au moment de son indépendance en 1991. Les missiles balistiques, présents sur son sol, ont été conçus et assemblés en Ukraine et aucune production de ce type d'armement n'a été recensée ces dernières années au Kazakhstan.

Il parait d'autre part exclu que le Kazakhstan cherche à acquérir de nouveaux missiles balistiques mais si les accords avec la Russie pour le maintien de missiles sur le territoire Kazakh sont confirmés, le Kazakhstan pourrait être doté de missiles qui ne tombent pas sous le coup du traité START1.

La seule menace actuellement perceptible concerne donc le devenir des missiles implantés sur le territoire dont le Kazakhstan hésite à se séparer et leur éventuel remplacement.

L'arsenal nucléaire resté sur le sol du Kazakhstan après son indépendance est très conséquent mais est demeuré sous contrôle technique de la CEI..
Le Kazakhstan comptait 104 **SS-18** (appellation OTAN "Satan"), répartis également sur les deux sites de Derzhavinsk et Zhangiz-Tobe, chaque missile étant équipé de 10 têtes nucléaires. Ces missiles implantés dans les anciens silos de **SS-9** modifiés ont été améliorés dans leur version 2 en 1976 puis dans leur version 4 en 1982. Une version mod 5 aurait dû être déployée en 1988 mais il semble que la date ait été repoussée puis le déploiement annulé.

En mars 1994, douze des 104 **SS-18** avaient été transférés en Russie pour y être démantelés. En accord avec START 1, la totalité de ces missiles devrait être démantelée dans les sept ans. Mais le Kazakhstan est en retard sur son échéancier et justifie ce retard par des problèmes économiques.

11.3.2 Economie et politique intérieure

La situation économique du Kazakhstan est un des principaux obstacles au désarmement de l'arsenal nucléaire du Kazakhstan. Le président Nazarbaev a clairement exposé que le Kazakhstan avait besoin d'une aide financière pour démanteler ses missiles.

Il est évident que le Kazakhstan est en position de force. En effet, les pays occidentaux ne souhaitent pas que ses problèmes économiques ne le poussent, soit vers la déstabilisation et le risque d'un emploi de l'arme nucléaire, soit, plus vraisemblablement, vers la vente de ses missiles ou des techniques associées à d'autres nations proliférantes.

Dans cette optique, les pays occidentaux ont proposé des aides financières et techniques en échange de vérification (70 millions de dollars pour le DoD américain). Mais le Kazakhstan souhaite conserver ses lanceurs afin de les utiliser

comme lanceurs de satellites. Rappelons en effet que le Kazakhstan a également hérité du cosmodrome de Baïkonour, principal centre de lancement spatial de l'ex-URSS et qu'il entend bien l'utiliser à son profit même s'il a négocié avec la Russie sa location pour une durée de 20 ans.

Cette reconversion à des fins civiles n'est d'ailleurs pas sans inquiéter les industriels américains qui voient arriver sur le marché des lanceurs de satellites peu coûteux. Bien qu'il y ait eu au début une volonté d'écarter les Kazakhs et les Russes du marché des lanceurs spatiaux commerciaux, l'Occident préfère encourager ce type de reconversion plutôt que de voir les missiles vendus à des pays tels que l'Iran ou l'Inde qui possèdent des programmes d'armes non conventionnelles sophistiquées.

Par ailleurs, le Kazakhstan souhaite récupérer le plutonium et l'uranium issus des têtes nucléaires pour un usage civil dans ses propres centrales. Dans cette intention, il a signé avec l'AIEA un accord en échange d'une vérification sur le respect du TNP signé en 1993.

Enfin la perception par les Kazakhs des dégâts occasionnés par les essais nucléaires menés à Semipalatinsk pourrait, dans une certaine mesure, jouer un rôle dans le processus de dénucléarisation.

11.3.3 Menace

La menace qui pèse sur la sécurité du Kazakhstan est faible et ne paraît pas être une justification du maintien de ses missiles balistiques sur son sol. La seule menace potentielle pourrait venir de la Chine, son voisin du sud.

En revanche, le Kazakhstan perçoit la Russie comme une garantie pour sa sécurité plus que comme un adversaire. Les accords entre Moscou et Alma-Ata d'août 1992 montrent clairement le rapprochement du Kazakhstan vers la Russie avec le maintien d'armes nucléaires sur le sol kazakh et l'utilisation par les Russes des sites de test des missiles.

Le Kazakhstan a signé le TNP en décembre 1993 et est le premier pays de l'ex-Union Soviétique à avoir signé le traité START 1. Même si désormais, le Kazakhstan conditionne la dénucléarisation de son arsenal par une compensation financière et une garantie de sécurité, le processus paraît bien engagé.

Les nations occidentales ont saisi le danger qu'il y avait à laisser le Kazakhstan se dépêtrer seul avec le démantèlement de son arsenal de missiles balistiques. L'aide financière de l'Occident assortie de mesures de vérifications, le rapprochement du Kazakhstan avec la Russie pour sa sécurité sont des signes positifs qui limitent les risques d'une prolifération ou d'une vente d'armes à des pays proliférants.

Seul le retard que prend le Kazakhstan dans le retrait de ses missiles demeure préoccupant.

CONCLUSION

En conclusion de cette étude documentaire, on peut souligner la concordance entre les points chauds de la prolifération balistique et ceux de la prolifération des armes de destruction massive, nucléaires en particulier. Ceci s'explique par le fait que les missilies balistiques n'ont pas une précision finale suffisante pour que leur effet soit significatif. Rapelons, néanmoins, que l'effet psychologique de ces armes n'est pas négligeable, ainsi que l'a démontré l'utilisation par l'Irak de ses missiles Scud contre Israël.

Le souci des grandes puissances détentrices de la technologie nécessaire à la construction des missiles balistiques est, bien évidemment, de limiter l'accès à ces armes. Il faut noter, cependant, que les puissances émergeantes ne raisonnent pas selon les mêmes schémas que les puissances "possédantes". En effet, si pour les unes il s'agit de défendre la paix en limitant l'accès aux missiles, pour les autres il s'agit de démontrer leur poids géostratégique en accédant au statut de puissance balistique. Ces deux logiques ne peuvent que se heurter et les tentatives, tant diplomatiques que techniques visant à empêcher la diffusion des technologies de pointe dans le Tiers Monde, sont perçues de façon négative par les pays qui sont l'objet de ces mesures de défiance.

Les possibilités qui s'offrent aux pays détenteurs de la technologie sont les suivantes :

- contrôle des exportations de matériels et de technologies sensibles,
- négociation de traités visant à obtenir la renonciation à l'obtention de ces technologies et comprenant des compensations.

En ce qui concerne le contrôle des exportations, le verrou technologique le plus sûr aujourd'hui est celui de la maîtrise de la construction des éléments de guidage et navigation (gyroscopes). Ce contrôle est, néanmoins, rendu difficile par la situation particulière des pays de l'ex-URSS. Ces pays sont, en effet, par leur avance technologique membres du "club des détenteurs", alors que leur situation économique les classe presque parmi les pays du Tiers Monde.

Pour ce qui est de la protection de la paix mondiale par les négociations et traités, force est de constater que les résultats sont mitigés. De nombreux pays refusent de se priver de ce qu'ils considèrent comme une manifestation de leur puissance. D'autres, qui sont à la limite du terrorisme, ne méritent aucune confiance.

Le problème de la prolifération est donc loin d'être définitivement réglé, et ce d'autant moins qu'émergent aujourd'hui dans certaines régions du monde des puissances qui ne sont pas des états et disposent des moyens financiers d'acquérir des armes de destruction massive. La prolifération possible des missiles au sein des mafias de la drogue ou du banditisme qui n'a pas été étudiée ici pourrait, d'ici quelques années être à l'ordre du jour.

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ANNEXES

Introduction et Prolifération

L'Algérie

La Libye

L'Egypte

L'Iran

Israël

La Syrie

L'Inde

Le Pakistan

La Corée du Nord

Les pays de l'ex-URSS

La Biélorussie

L'Ukraine

Le Kazakhstan

INTRODUCTION ET PROLIFERATION

Foreword

Introduction

The number of ballistic missile systems entering service continues to rise, and there are many more systems in development with countries around the world. Whilst it is impossible to have an accurate count an estimate can be made, and it is believed that by mid-1993 there were in service the following ballistic missile numbers;

Short range (70 to 500 km) 8800 (18 type)
Intermediate Range; (500 to 5500 km) 2000 (15 types)
Intercontinental Range; (over 5500 km) 650 (17 types)

In addition there are some 11 short range ballistic missile projects in development, five intermediate range and eight intercontinental range. This indicates that whilst the Russian and USA ballistic missile numbers may be coming down over the next 10 years, the present development programmes indicate that the rest of the world numbers will continue to increase.

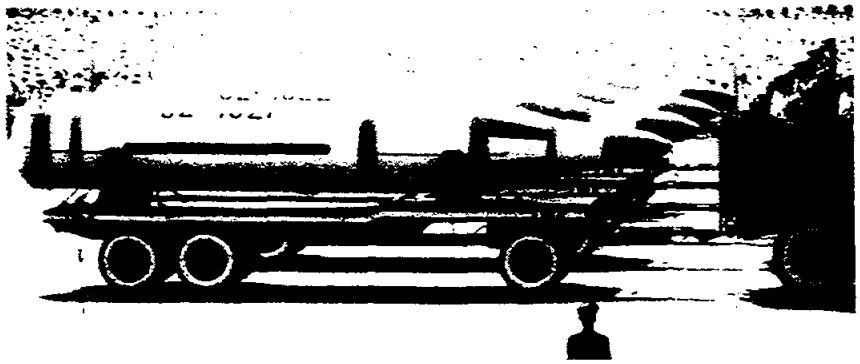
A most significant step was taken with the signing of the START 2 agreement between Russia and the USA in January 1993. This agreement when ratified will reduce the strategic nuclear warheads of both nations from the present levels of around 10 000 each to below 3500 by the year 2003. Unfortunately the ratification of START 2 is conditional on the prior ratification of START 1, signed in July 1991 but still not yet ratified due to the disintegration of the former Soviet Union, and the requirement for Russia, Belarus, Kazakhstan and Ukraine to ratify START 1 individually. The significantly greater reductions agreed upon in START 2 show at last a comprehension of the massive over capacity of nuclear warheads accumulated by the two superpowers between 1960 and 1990. Both Russia and the USA have also agreed unilaterally to withdraw ship- and submarine-launched nuclear cruise missiles from service, and to reduce the numbers of tactical nuclear weapons in service. However, as there are no accurate numbers of tactical nuclear weapons available to Russia or the USA it is not known how many remain, but estimates made in 1991 suggested that there were around 15 000 to 20 000 in Russia and 15 000 in the USA. The result of the planned reductions in both strategic and tactical nuclear warheads will be to place a premium upon the facilities available to dismantle the weapons and safely dispose of the nuclear materials, and the shortage of such facilities will most probably determine the rate at which weapons are taken out of service.

However, whilst the former USSR and the USA are reducing their massive nuclear arsenals, several countries around the world are striving to become nuclear powers. China, France and the UK have declared their nuclear weapons and whilst all three have only limited numbers when compared to Russia and the USA, we really do not know the rate at which the Chinese nuclear weapons numbers have increased over the last 10 years. It is widely regarded that India, Israel, and probably Pakistan have nuclear warheads, and we now know that South Africa had built a small number. Iraq has demonstrated how a determined effort to achieve nuclear status could well have succeeded, and it would appear from the available evidence that Iran and North

TABLE 1

In Service Short and Intermediate Range Ballistic Missiles

Weapon System	Warhead Payload	Max Range	User Countries
Short Range			
SS-21 'Scarab A' (OTR-21)	480 kg	70 km	Belarus, Czech Republic, Hungary, Kazakhstan, Libya, Poland, Russia, Slovakia, Syria, Ukraine, Yeman
SA-2 variant	130 kg	80 km	North Korea
Hatf 1	500 kg	80 km	Pakistan
SS-21 'Scarab B'	480 kg	120 km	Russia
Ching Feng (Green Bee)	400 kg	130 km	Taiwan
MGM-52 Lance	450 kg	130 km	Iran, Israel
Iran 130 (Mushak-120)	190 kg	130 km	Iran
MGM-140 ATACMS	450 kg	135 km	USA
CCS-8 (M-7/8610)	190 kg	150 km	China, Iran, Iraq
Prithvi SS-150	1000 kg	150 km	India
Alacran	500 kg	200 km	Argentina
NHK-1	300 kg	250 km	South Korea
Prithvi SS-250	500 kg	250 km	India
SS-1 'Scud B' (R-17)	985 kg	300 km	Afghanistan, Algeria, Azerbaijan, Belarus, Bulgaria, Czech Republic, Egypt, Georgia, Hungary, Iran, Iraq, Kazakhstan, North Korea, Libya, Poland, Romania,Russia, Slovakia, Syria, Ukraine, UAE, Vietnam, Yeman
'Scud B' variants	985 kg	300 km	North Korea, Iran, Syria
CSS-7 (DF-11/M-11)	500 kg	300 km	China, Iran, Pakistan
Project T	985 kg	450 km	Egypt
Hades	400 kg	480 km	France
Intermediate Range			
SS-23 'Spider'	450 kg	500 km	Bulgaria, Czech Republic, Slovakia
Jericho 1 (YA-1)	500 kg	500 km	Israel
'Scud C' variant	500 kg	550 km	North Korea, Iran, Libya, Syria
CSS-6 (DF-15/M-9)	500 kg	600 km	China, Syria
Al Hussein	500 kg	650 km	Iraq
Jericho 2 (YA-3)	1000 kg	1500 km	Israel
CSS-N-3 (JL-1) (SLBM)	600 kg	1700 km	China
CSS-5 (DF-21)	600 kg	1800 km	China
CSS-2 (DF-3)	2150 kg	2800 km	China, Saudi Arabia
S-3	1000 kg	3000 km	France
SS-N-6 'Serb' (SLBM)	650 kg	3000 km	Russia
M-4 (SLBM)	1000 kg	4000 km	France
A-3TK Polaris (SLBM)	1500 kg	4630 km	UK
UGM-73 Poseidon (SLBM)	2000 kg	4630 km	USA
CSS-3 (DF-4)	2200 kg	4750 km	China



The CSS-5/CSS-N-3 (DF-21/JL-1) Chinese ground- or submarine-launched solid propellant missile with a range of 1700 km

A Pakistan HAFT-1 short range solid propellant missile, believed to have entered service in 1992

TABLE 2

In Development Short and Intermediate Range Ballistic Missiles

Weapon System	Warhead Payload	Max Range	Developing Countries
Short Range			
Hatf 1A	500 kg	100 km	Pakistan
KSR 100	300 kg	100 km	South Korea
Rohini	400 kg	130 km	India
SRBM	500 kg	150 km	Iraq
MB/EE 150	500 kg	150 km	Brazil (terminated)
Mushak 160	190 kg	150 km	Iran
SS-21 'Scarab C'	320 kg	185 km	Russia
Mushak 200	500 kg	200 km	Iran
NHK/A (Hyon Mu)	300 kg	300 km	South Korea
SS 300	450 kg	300 km	Brazil (terminated)
Hatf 2	500 kg	300 km	Pakistan
CSS-7/M-11 variant	500 kg	300 km	Iran
Prithvi SS-350	500 kg	350 km	India
Intermediate Range			
SS-600	500 kg	600 km	Brazil (terminated)
Haft 3	500 kg	600 km	Pakistan
Iran 700 'Scud C'	500 kg	700 km	Iran
Al Abbas	300 kg	900 km	Iraq (terminated)
Condor 2	500 kg	900 km	Argentina (terminated)
Al Fatah	500 kg	950 km	Libya, Iran
Tien Ma (Sky Horse)	500 kg	950 km	Taiwan
Labour-1 (Nodong 1)	1000 kg	1000 km	North Korea, Iran
M 18 (Tondar-68)	400 kg	1000 km	China, Iran
Badr 2000	450 kg	1200 km	Egypt/Iraq (terminated)
Capricornio	500 kg	1300 km	Spain
Labour-2 (Nodong 2)	1000 kg	1500 km	North Korea, Iran
Arniston	1000 kg	1500 km	South Africa (terminated)
DF-25	2000 kg	1700 km	China, Iran
Al Aabed	750 kg	2000 km	Iraq (terminated)
Agni	1000 kg	2500 km	India
S 4	900 kg	3500 km	France (terminated)
M 45 (SLBM)	1000 kg	4000 km	France
ASLV variant (SLV)	500 kg	4000 km	India (capability)
M 3 variant	500 kg	4000 km	Japan (capability)

Korea may be attempting to develop their own capabilities as well. The threat posed by nuclear weapons is relatively well understood, but it seems that biological and chemical weapon threats are less well accepted. Whilst military personnel may be reasonably protected against biological and chemical weapon attacks, it would just not be practicable to protect large civilian populations with special face masks and suits. As a result, a threat of a biological or chemical attack could be devastating to a city as populations would probably panic and attempt to evacuate before any attack. There are many countries of the world with a chemical weapons capability, and even though the Chemical Weapons Convention was signed in January 1993 if the nuclear weapons treaties are anything to go by then this will not on its own inhibit nations from developing chemical weapons or using them in the future. Biological weapons are not as well developed as chemical weapons, and may not be readily available at this point in time, but again the lessons from Iraq need to be remembered as the UN inspectors report that a biological weapons research programme was in place in Iraq and may well have succeeded in five to 10 years time. The net result is that for many nations of the world the traditional threat no longer exists in a clearly defined form, with the result that governments and military planners have to return to assessments of risk as opposed to measurable threats. Risk implies a higher degree of uncertainty, with the result that defence programmes will be subjected to greater discussion while diplomatic and economic alternatives to direct military involvement will be given greater consideration.

From the perspective of offensive weapons, or the threat, the views over the last two years appear to have placed the ballistic missile threat more clearly into context, following the Iraqi use of Al Hussein missiles in early 1991 against Israel in particular. The initial reaction was to focus on the political nature of the use of the ballistic missiles against Israel, to provoke Israel into retaliation; whilst the 'Scud' missile use in Afghanistan, where in excess of 2000 missiles have been launched since November 1988, went nearly unnoticed by the world. Afghanistan's 'Scud' missiles have been used to attack towns, villages, supply routes and staging areas, with as many as 229 being launched in a single month in July 1989. Whilst the results were significant, the Mojahedin were not defeated by these missile attacks any more than V2 attacks on the UK and Belgium in 1944-45 affected the invasion of Europe by the Allies. Ballistic missiles with high explosive warheads aimed at civilian targets will provoke strong reactions from the people and pressurise democratic governments, but if nuclear, chemical or biological warheads were to be threatened then a far more serious and destabilising effect would result. In contrast however, it is realised that manned aircraft can deliver a greater weight of weapons than ballistic missiles, and cruise missiles have the potential to deliver similar warheads to ballistic missiles but with more accuracy and at considerably less cost. Cruise missiles can be launched from aircraft, ships, submarines or even converted lorries, and their ranges could well match those of ballistic missiles. As a result, the future assessment of risk will have to consider a wide spectrum of threat options including all types of missiles, together with bombs and rockets, that could be delivered from a wide range of platforms threatening most countries around the world.

As far as defences are concerned there has been a growing consensus that there are a range of actions that need to be taken to defend against the proliferating threat from ballistic and cruise missiles. Treaties, prevention of proliferation, halting the production of nuclear, biological and chemical materials, elimination of weapons, the use of counterforce to pre-empt attack, and finally active defence against such missiles are all actions being considered. The truth is that all these actions need to be carried out, for none will be totally successful on their own. It was shown in the 1991 Gulf War just how difficult it is to find and attack mobile ballistic missile launch vehicles, and cruise missile launchers could be even smaller as well as being fitted to ships and submarines. Treaties and agreements have been circumvented, and it is virtually impossible to prevent the spread of

technology to countries that are determined to obtain it. To monitor the facilities capable of developing nuclear, biological or chemical materials in every country will demand a more expensive and obtrusive inspection regime than has yet been available. The result is that more countries are now prepared to accept that it will be necessary to develop active ballistic and cruise missile defence systems, but such systems will be expensive.

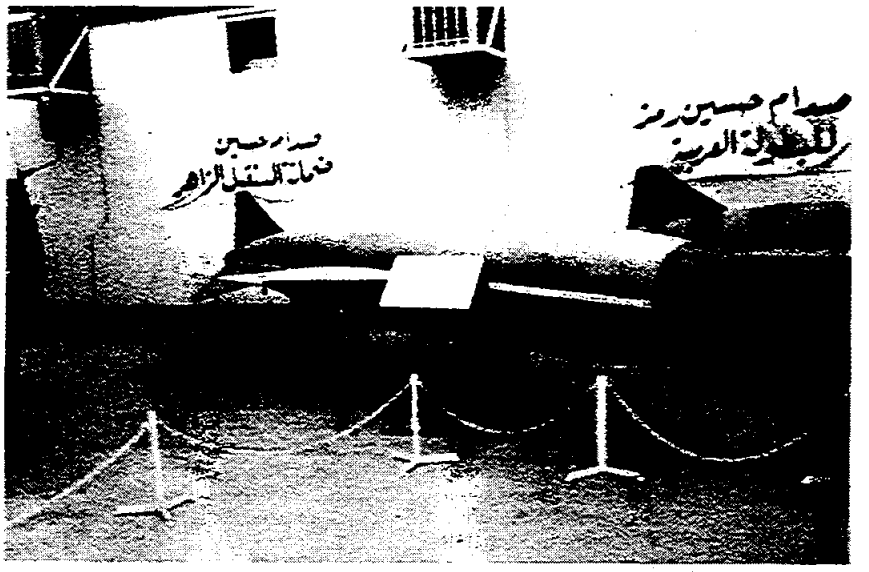
Jane's Strategic Weapons Systems was first published in 1989 and has been aimed specifically at highlighting the changes taking place in the development and proliferation of weapon systems around the world, as well as documenting the improving capabilities to defend against these emerging offensive weapons. The text and tables that follow summarise the details contained within the individual entries of the binder, reflecting in general the trends and changes of the last year.

Emerging Strategic Threats

It is always a problem defining the meaning of 'strategic threats' but in the context used here it means any weapon that can be used to significantly threaten the homeland of any nation. Thus nuclear, chemical or biological warheads, as well as larger but more accurately delivered conventional high explosive warheads, targeted against seats of government, cities, or retaliatory defence assets within each particular country are regarded as strategic threats. Such systems could be delivered onto their targets by a variety of means, including ballistic, cruise, air-to-surface, surface-to-surface missiles, or even by guided or unguided bombs. To put actual figures to strategic threats is more difficult, since the range required to reach any major city or defence facility varies from country to country. However, it is perhaps not appreciated that a range of 1500 km would be adequate to reach any major target in the world, without having to penetrate the borders of that country. It is generally regarded that a warhead weight of about 500 kg would be required to inflict significant damage, and thus the Missile Technology Control Regime (MTCR) adopted the criteria of restricting technology transfers for missile systems with payloads exceeding 500 kg or ranges in excess of 300 km. The MTCR includes ballistic missile and cruise missile technologies, but was revised in 1993 as it was realised that the original 1987 criteria for range and payload did not reflect the fact that both ballistic and cruise missiles can be modified to fly further with a smaller warhead. The revised MTCR guidelines restrict exports of missiles capable of adaptation to deliver any payload over 300 km. As an example, a ballistic missile with a range of 200 km carrying a payload of 800 kg, could be modified to have a range of 300 km carrying a payload of 500 kg or a range of 500 km with a payload of 200 kg.

The spread of ballistic missile technology has been going on since the end of Second World War in 1945, when the German expertise in their V2 rocket programme was divided up between Russia and the USA. Both the Russians and Americans built up their knowledge and experience in missile technologies from the core programmes and expertise of the early German engineers and scientists, and this movement of ideas and knowledge is still taking place. The background of the proliferation of missile technology today is essentially the migration of people with the knowledge and experience, although the publicised cases tend to be of espionage and bribery. Research teams and the necessary support facilities for development programmes are being financed and set up in many countries around the world, with several conducting well structured and integrated programmes relating to the development of a wide ranging set of missile capabilities, including small shoulder-launched anti-tank weapons all the way up to large ballistic missiles. By 1993 there were some 22 nations with either well developed missile capabilities or in the process of developing such capabilities, including the following; Argentina, Brazil, China, Egypt, France, Germany, India, Iran, Iraq, Israel, Italy, Japan, North Korea, Norway, Pakistan, Russia, South Africa, Sweden, Taiwan, Ukraine, UK and USA. Several more countries are near to a capability to develop and build their own missiles, with unconfirmed reports that South Korea, Libya, Spain, and Syria are building up their manufacturing base.

Perhaps the most interesting case study



This extended range variant of the CSSC-2 'Silkworm' was exhibited in Iraq in 1989, with a claimed range of 200 km

TABLE 3

Intercontinental Range Ballistic Missiles, In Service and Development

Weapon System	RVs	Max Range	User Countries
JL-2 (SLBM)	1	8000 km	China (development)
DF-31	1	8000 km	China (development)
CSS-4 (DF-5)	1	11 000 km	China
DF-41	1	12 000 km	China (development)
M 5 (SLBM)	10	11 000 km	France (development)
H1 variant (SLV)	1	12 000 km	Japan (capability)
H2 variant (SLV)	1	15 000 km	Japan (capability)
SS-11 'Sego' (RS-10)	1	13 000 km	Russia
SS-13 'Savage' (RS-12)	1	9400 km	Russia
SS-17 'Spanker' (RS-16)	4	10 000 km	Russia
SS-18 'Satan' (RS-20)	10	11 000 km	Russia, Kazakhstan
SS-19 'Stiletto' (RS-18)	1 or 6	10 000 km	Russia, Ukraine
SS-24 'Scalpel' (RS-22)	10	10 000 km	Russia, Ukraine
SS-25 'Sickle' (RS-12M)	1	10 500 km	Russia, Belarus
SS-X-26	nk	nk	Russia (development)
SS-X-29	1	10 000 km	Russia (development)
SS-N-8 'Sawfly' (SLBM)	1	7800 km	Russia
SS-N-18 'Stingray' (SLBM)	3	6500 km	Russia
SS-N-20 'Sturgeon' (SLBM)	4 or 10	8300	Russia
SS-N-23 'Skiff' (SLBM)	4	8300 km	Russia
SS-NX-26 (SLBM)	nk	nk	Russia (development)
SS-NX-27 (SLBM)	nk	nk	Russia (development)
LGM-30F Minuteman 2	1	12 500 km	USA
LGM-30G Minuteman 3	1 or 3	13 000 km	USA
LGM-118 Peacekeeper MX	10	9600 km	USA
XMGM-134 Small ICBM	1	11 000 km	USA (terminated)
UGM-96 Trident C4 (SLBM)	4 to 8	7400 km	USA
UGM-133 Trident D5 (SLBM)	1 to 8	12 500 km	USA, (UK development)

is that of China, which has been accused of ballistic missile proliferation more times than any other country. From the late 1950s China has been interested in acquiring a ballistic missile capability, and received help and assistance from the former Soviet Union as well as in some small measure from companies in Brazil, France, Germany, Israel, UK and USA over the last 30 years or so. China has now in development or in service a set of ballistic missile programmes with ranges spanning 180 to 12 000 km both land-based and submarine-launched, with currently 13 separate known missile systems. The Chinese in their turn have assisted or are still assisting Iran, North Korea, Libya, Pakistan, Saudi Arabia and Syria with either direct exports of missiles or technical advisors to help set up domestic projects in these other countries. North Korea, having been helped to gain a ballistic missile expertise, has in turn helped Egypt, Iran and Syria. So the proliferation process will continue, with perhaps new countries entering into the race in the next ten years.

The demonstration of the accuracy of cruise missiles, shown to be to within about 10 m after a 1200 km flight, as well as terminal guidance systems on the more modern ballistic missiles resulting in accuracies of 50 m or so, indicates that the dismissal of the possession of such weapons by less well armed countries would be dangerous in the future. If such improved accuracy were to be combined with new warhead technologies, such as submunitions, fuel-air explosive, chemical, biological or even nuclear warheads then the resultant effectiveness should be of concern to all. Such improved weapons would be capable of being accurately targeted against airbases, harbours, troop barracks, amphibious landing areas, military headquarters, large ships, power stations, presidential palaces, whole cities and towns. A small number of weapons could be used to threaten and to hold at risk the vital interests of a large and powerful nation, as well as less well armed neighbours.

From the point of view of comparing cruise missile and ballistic missile proliferation around the world, then the MTCR definition of range limit of 300 km seems to make the best division as this equates to the range of the standard SS-1 'Scud B', the most widely used ballistic missile system. The INF and START definitions allocated minimum ranges of 500 and 600 km respectively to cruise missiles, but these ranges are too long. The 300 km range definition has been used by the Missile Technology Control Regime, which includes export controls on cruise missiles and remotely piloted vehicles. Cruise missiles present a particularly difficult target to defences as they usually fly close to the ground, at around 200 m altitude, at high subsonic speed in the region of M 0.85 or 1000 km per hour, and present a small radar cross-section as well as only a low intensity infra-red signature. Cruise missile technologies have been available for many years and several systems were introduced in the 1960s, however, today only a few such systems remain in service. The ranges of the earlier systems, that were air-, ground- or ship-launched, were around 500 km and the majority were neither accurate nor particulary reliable. A step change occurred in the early 1980s, with the introduction into service of both USA and later Russian cruise missiles with

TABLE 4

Cruise Missile Programmes

Weapon System	Warhead Payload	Max Range	Countries
In service			
AS-4 'Kitchen' (Kh-22)	1000 kg	400 km	Russia, Belarus, Kazakhstan, Ukraine
AS-6 'Kingfish' (KSR-5)	1000 kg	300 km	Russia, Belarus, Ukraine
SS-N-3 'Shaddock/Sepal' (P-5/6/7/35)	1000 kg	450 km	Angola, Bulgaria, Russia Serbia, Syria, Ukraine
BGM-109 Tomahawk	450 kg	450/ 2500 km	USA
SS-N-12 'Sandbox'	1000 kg	550 km	Russia, Ukraine
SS-N-19 'Shipwreck' (P-500)	750 kg	550 km	Russia, Ukraine
AGM-86 ALCM	450 kg	2500 km	USA
SS-N-21 'Sampson'	300 kg	3000 km	Russia
AS-15 'Kent' (Kh-55)	300 kg	3000 km	Russia, Ukraine
AGM-129 ACM	450 kg	3000 km	USA
In Development			
Yakhont/Bastion	nk	300 km	Russia
AGM-131 SRAM 2	265 kg	400 km	USA (terminated)
AGM/MGM-137	450 kg	450 km	USA
CSSC-2 'Silkworm' variant	500 kg	450 km	Iran
Unknown	NK	600 km	China
Unknown	NK	600 km	India
Alfa	400 kg	600 km	Russia
Kh-65SE	410 kg	600 km	Russia
AS-19 'Koala'	nk	3000 km	Russia (terminated)
SS-NX-24 'Scorpion'	nk	4000 km	Russia (terminated)

Programmes from which Cruise Missiles could be developed

Country	Programmes
Argentina	MQ-4
Brazil	SM-70 Barracuda
China	XW-41, YJ-2, CK-1, HY-4, C-101, HY-3
France	ASMP-C, Apache, Exocet, C-22, ANS, Otomat
Germany	AS 34 Kormoran, ANS, MW-1, DWS 24
India	Koral
Iraq	Ababil, FAW 200
Israel	Gabriel 4
Italy	Skyshark, Mirach 150, Otomat
Japan	SSM-1, ASM-2
North Korea	HY-2 (CSSC-2 'Silkworm')
Russia	Kh-31, SS-N-25 (Kh-35), Kh-41, SS-N-22
Sweden	RBS 15, ASOM
Taiwan	Hsiung Feng 2
UK	Sea Eagle, MANTIS
USA	RGM-84 Harpoon, MQM-107, BQM-126, AQM-127, TBA 324, AGM-136 Tacit Rainbow, BQM-145

The SA-10 'Grumble' (S-300) SAM system has been in service since 1980, and is also fitted to surface ships as the SA-N-6. The latest version of this missile has a range of 150 km (Christopher F Foss)

OFFENSIVE WEAPONS TABLES

LAND-BASED BALLISTIC MISSILES

Missile name and designation	Length	Diameter	Launch weight	Payload	Propulsion	Range	Status	In service
Argentina								
Alacran	6.9 m	0.59 m	1750 kg	single HE	solid	150 km	operational	1990
Brazil								
MB/EE-150	12.0 m	0.7 m	4500 kg	single HE	solid	150 km	development	1995
SS-300	8.0 m	0.56 m	2000 kg	single HE	solid	300 km	development	1995
SS-600	11.0 m	1.0 m	7270 kg	single HE	solid	600 km	development	1995
China								
CSS-2 (DF-3)	24.0 m	2.25 m	64 000 kg	single HE/1-3 MT	liquid	2800 km	operational	1969
CSS-3 (DF-4)	28.0 m	2.25 m	82 000 kg	single 2 MT	liquid	4750 km	operational	1978
CSS-4 (DF-5)	32.6 m	3.35 m	183 000 kg	single 1-5 MT	liquid	12 000 km	operational	1980
CSS-5 (DF-21)	10.07 m	1.4 m	14 700 kg	single nuclear 500 kT/HE	solid	1800 km	operational	1987
CSS-6 (DF-15/M9)	10.0 m	1.0 m	6000 kg	single HE	solid	600 km	operational	1991
CSS-7 (DF-11/M-11)	9.75 m	0.8 m	3350 kg	single HE	solid	300 km	operational	1992
CSS-8 (M-7/8610)	10.8 m	0.65 m	2650 kg	single HE	solid	150 km	operational	1992
M-18	n/k	n/k	n/k	single HE	solid	1000 km	development	1996
DF-31	n/k	n/k	n/k	single nuclear	solid	8000 km	development	1996
DF-25	n/k	n/k	n/k	single HE	solid	1700 km	development	2000
DF-41	n/k	n/k	n/k	single nuclear	solid	12000 km	development	1997
France								
Hades	7.5 m	0.53 m	1850 kg	single HE/80 kT	solid	480 km	operational	1992
S-3	13.8 m	1.5 m	25 800 kg	single 1.2 MT	solid	3000 km	operational	1980
M-5 variant	12.0 m	2.3 m	48 000 kg	10 MRV, nuclear	solid	11 000 km	development	2005
India								
Prithvi SS-150	9.0 m	1.1 m	4000 kg	single HE	liquid	150 km	operational	1993
Prithvi SS-250	9.0 m	1.1 m	4000 kg	single HE	liquid	250 km	operational	1993
Agni	21.0 m	1.3 m	14 000 kg	single HE/chemical/nuclear	solid and liquid	2500 km	development	1995
International								
Condor 2	11.0 m	1.0 m	6500 kg	single HE/chemical	solid	900 km	cancelled	—
Iran								
Iran-130 (Mushak 120)	n/k	n/k	n/k	single HE	solid	130 km	operational	1990
'Scud B' variant	11.16 m	0.88 m	6370 kg	single HE/chemical	liquid	300 km	operational	1987
'Scud C' variant	12.0 m	0.88 m	7000 kg	single HE	liquid	550 km	operational	1993
Iraq								
Al Hussein	12.2 m	0.88 m	7000 kg	single HE/chemical	liquid	650 km	operational	1988
Al Abbas	13.75 m	0.88 m	8000 kg	single HE/chemical	liquid	900 km	cancelled	—
SRBM	n/k	n/k	n/k	single HE	solid	150 km	development	1997
Israel								
Jericho 1 (YA-1)	10.0 m	1.0 m	6500 kg	single HE/chemical/nuclear	solid	500 km	operational	1973
Jericho 2 (YA-3)	14.0 m	1.56 m	29000 kg	single HE/nuclear	solid	1500 km	operational	1990
North Korea								
'Scud B' variant	11.16 m	0.88 m	6370 kg	single HE/chemical	liquid	300 km	operational	1986
'Scud C' variant	12.0 m	0.88 m	7000 kg	single HE	liquid	550 km	operational	1992
Labour-1 (Nodong-1)	15.0 m	0.88 m	n/k	single HE	liquid	1000 km	development	1996
Labour-2 (Nodong-2)	n/k	0.88 m	n/k	single HE	liquid	1500 km	development	2000
South Korea								
NHK-1	12.2 m	0.54 m	4900 kg	single HE	solid	250 km	operational	1980
Pakistan								
Hatf 1	6.0 m	0.56 m	1500 kg	single HE/chemical	solid	80 km	operational	1992
Hatf 2	9.75 m	0.56 m	3000 kg	single HE/chemical/nuclear	solid	300 km	development	1995
Hatf 3	10.0 m	1.0 m	6500 kg	single HE/chemical/nuclear	solid	600 km	development	1998
Russia								
FROG-7	9.1 m	0.54 m	2300 kg	single HE/chemical/nuclear	solid	70 km	operational	1965
SS-1B 'Scud A'	10.7 m	0.88 m	4400 kg	single 50 kT	liquid	180 km	operational	1955
SS-1C 'Scud B'	11.16 m	0.88 m	6370 kg	single HE/nuclear/chemical 5-70 kT	liquid	300 km	operational	1965
SS-1D 'Scud C'	11.25 m	0.88 m	6400 kg	single HE	liquid	550 km	n/k	—
SS-1E 'Scud D'	12.29 m	0.88 m	6500 kg	single HE/nuclear/chemical	liquid	300 km	n/k	—
SS-11 'Sego'	19.0 m	2.0 m	50 100 kg	Mod 2, single 1 MT	liquid	13 000 km	operational	1966
SS-13 'Savage'	21.7 m	1.84 m	51 000 kg	single 750 kT	solid	9400 km	operational	1969
SS-17 'Spanker'	23.9 m	2.25 m	71 000 kg	Mod 3, 4 MIRV 200 kT	liquid	10 000 km	operational	1975
SS-18 'Satan'	36.5 m	3.0 m	211 100 kg	Mod 1 single 25 MT	liquid	10 000 km	superseded	1975
				Mod 2, 8-10 MIRV 500 kT		11 000 km	superseded	1976
				Mod 3 single 20 MT		13 000 km	superseded	1977
				Mod 4, 10 MIRV 500 kT		11 000 km	operational	1982
				Mod 5, 10 MIRV 750 kT		n/k	operational	1988
				Mod 6 single 20 MT		13 000 km	development	1992
SS-19 'Stiletto'	27.0 m	2.5 m	105 600 kg	Mod 3, 6 MIRV 500 kT	liquid	10 000 km	operational	1975
SS-21 'Scarab A'	6.4 m	0.65 m	2000 kg	single HE/chemical/nuclear	solid	70 km	operational	1976
SS-21 'Scarab B'	6.42 m	0.65 m	2010 kg	single HE/chemical/nuclear	solid	120 km	operational	1986
SS-24 'Scalpel'	23.8 m	2.4 m	104 500 kg	10 MIRV 300-500 kT	solid	10 000 km	operational	1987
SS-25 'Sickle'	21.5 m	1.8 m	45 100 kg	single 550 kT	solid	10 500 km	operational	1985

Missile name and designation	Length	Diameter	Launch weight	Payload	Propulsion	Range	Status	In service
Taiwan								
Green Bee (Ching Feng)	6.0 m	0.6 m	1500 kg	single HE	liquid	130 km	operational	1983
USA								
MGM-140 ATACMS	3.98 m	0.61 m	1670 kg	single, submunitions	solid	135 km	operational	1991
MGM-52 Lance	6.41 m	0.56 m	1527 kg	single HE/100 kT	liquid	130 km	operational	1972
LGM-30F Minuteman II	18.2 m	1.8 m	31 746 kg	single 1.2 MT	solid	12 500 km	operational	1962
LGM-30G Minuteman III	18.2 m	1.85 m	34 467 kg	3 MIRV 335 kT	solid	13 000 km	operational	1974
LGM-118 Peacekeeper	21.6 m	2.34 m	88 450 kg	10 MIRV 500 kT	solid	9600 km	operational	1986
XMGM-134 SICBM	14.02 m	1.17 m	16 800 kg	single 500 kT	solid	11 000 km	cancelled	–

LAND-BASED SSM AND CRUISE MISSILES

Missile name and designation	Length	Diameter	Launch weight	Payload	Propulsion	Range	Status	In service
China								
CSSC-2 (HY-1)	5.8 m	0.76 m	2300 kg	single HE	liquid	85 km	operational	1974
CSSC-3 (HY-2/C-201)	7.36 m	0.76 m	3000 kg	single HE	liquid	95 km	operational	1978
CSSC-X-5 (C-101)	6.5 m	0.54 m	1850 kg	single HE	ramjet	45 km	development	1995
CSSC-X-6 (HY-3)	9.85 m	0.76 m	3400 kg	single HE	ramjet	130 km	development	1995
CSSC-7 (HY-4)	7.36 m	0.76 m	2000 kg	single HE	turbojet	150 km	operational	1985
CSS-N-4 (YJ-1/C-801)	5.81 m	0.36 m	815 kg	single HE	solid	40 km	operational	1984
CSSC-X-8 (YJ-2/C-802)	6.39 m	0.36 m	715 kg	single HE	turbojet	120 km	development	1994
France								
MM 38	5.21 m	0.35 m	735 kg	single HE	solid	40 km	operational	1975
MM 40	5.8 m	0.35 m	860 kg	single HE	solid	70 km	operational	1981
International								
Otomat Mk 1	4.46 m	0.46 m	770 kg	single HE	turbojet	60 km	operational	1976
Otomat Mk 2/3	4.46 m	0.46 m	770 kg	single HE	turbojet	180 km	operational	1984
ANS	5.8 m	0.36 m	900 kg	single HE/nuclear	ramjet	180 km	development	2000
Iraq								
FAW 70	6.55 m	0.78 m	2500 kg	single HE/chemical	liquid	80 km	operational	1989
FAW 150	7.4 m	0.78 m	2650 kg	single HE/chemical	liquid	150 km	operational	1989
FAW 200	8.0 m	0.78 m	2740 kg	single HE/chemical	liquid	200 km	operational	1989
Israel								
Gabriel Mk 2	3.42 m	0.34 m	522 kg	single HE	solid	35 km	operational	1976
Gabriel Mk 3	3.85 m	0.34 m	560 kg	single HE	solid	35 km	operational	1980
Gabriel Mk 4 LR	4.7 m	0.44 m	960 kg	single HE	turbojet	200 km	development	1995
Japan								
SSM-1A	5.08 m	0.34 m	660 kg	single HE	turbojet	150 km	operational	1988
Russia								
SSC-3 'Styx'	6.5 m	0.78 m	2500 kg	single HE	liquid	80 km	operational	1975
SS-N-3B/C 'Shaddock/Sepal'	10.2 m	1.0 m	5300 kg	single HE/nuclear	turbojet	450 km	operational	1963
SS-N-25 (Kh-35)	4.2 m	0.42 m	600 kg	single HE	turbofan	130 km	development	1994
Sweden								
RBS-15	4.35 m	0.5 m	790 kg	single HE	turbojet	70 km	operational	1985
Taiwan								
Hsiung Feng 1	3.42 m	0.34 m	522 kg	single HE	solid	35 km	operational	1980
Hsiung Feng 2	4.6 m	0.34 m	685 kg	single HE	turbojet	80 km	operational	1993
USA								
RGM-84 Harpoon	4.64 m	0.34 m	682 kg	single HE	turbofan	130 km	operational	1977

SEA-BASED BALLISTIC MISSILES

Missile name and designation	Length	Diameter	Launch weight	Payload	Propulsion	Range	Status	In service
China								
CSS-N-3 (JL-1)	10.7 m	1.4 m	14 700 kg	single 500 kT	solid	1700 km	operational	1983
JL-2	n/k	n/k	n/k	n/k	solid	8000 km	development	1998
France								
M-4	11.05 m	1.93 m	35 000 kg	6 MRV, 150 kT	solid	4000 km	operational	1985
M-5	12.0 m	2.3 m	48 000 kg	10/12 MRV, nuclear	solid	11 000 km	development	2002
Russia								
SS-N-6 'Serb'	9.65 m	1.5 m	14 200 kg	Mod 2, single 1 MT	liquid	2400 km	operational	1967
SS-N-8 'Sawfly'	14.2 m	1.8 m	33 300 kg	Mod 1, single 1 MT	liquid	7800 km	operational	1971
SS-N-18 'Stingray'	15.6 m	1.8 m	35 300 kg	Mod 1, 3 MRV 200 kT	liquid	6500 km	operational	1977
SS-N-20 'Sturgeon'	18.0 m	2.4 m	84 000 kg	10 MIRV 100 kT	solid	8300 km	operational	1982
SS-N-23 'Skiff'	16.8 m	1.9 m	40 300 kg	4 MIRV 100 kT	liquid	8300 km	operational	1986
UK								
A-3TK Polaris	9.55 m	1.37 m	13 600 kg	3 MRV 200 kT	solid	4630 km	operational	1984
USA								
UGM-73 C-3 Poseidon	10.36 m	1.88 m	29 480 kg	10 MIRV 100 kT	solid	4630 km	operational	1971
UGM-96 C-4 Trident	10.39 m	1.88 m	29 500 kg	8 MIRV 100 kT	solid	7400 km	operational	1984
UGM-133 D-5 Trident	13.42 m	2.11 m	59 090 kg	8 MIRV 100 kT or 475 kT	solid	12 000 km	operational	1990

COUNTRY INVENTORY - IN SERVICE

Country	Offensive Weapons	Defensive Weapons
Afghanistan	SS-1 'Scud' (Russia) FROG-7 (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia)
Albania	CSS-N-1 (FL-1) (China) CSSC-3 (HY-2) (China)	HQ-2 (China) SA-2 'Guideline' (Russia)
Algeria	SS-N-2 'Styx' (Russia) SS-1 'Scud' (Russia) FROG-7 (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-6 'Gainful' (Russia) SA-8 'Gecko' (Russia) SA-13 'Gopher' (Russia) SA-N-4 'Gecko' (Russia)
Angola	SS-N-2 'Styx' (Russia) SSC-1B 'Sepal' (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-6 'Gainful' (Russia) SA-8 'Gecko' (Russia) SA-13 'Gopher' (Russia)
Argentina	MM 38/40 Exocet (France) Alacran Gabriel (Israel)	Aspide (Italy) Sea Dart (UK)
Australia	RGM-84 Harpoon (USA)	RIM-66/67 Standard (USA)
Azerbaijan	SS-1 'Scud' (Russia) FROG-7 (Russia) SS-N-2 'Styx' (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-4 'Ganef' (Russia) SA-6 'Gainful' (Russia)
Bahrain	MM 38/40 Exocet (France)	Crotale (France)
Bangladesh	CSS-N-1 (FL-1) (China) CSSC-3 (HY-2) (China)	
Belarus	FROG-7 (Russia) SS-1 'Scud' (Russia) SS-21 'Scarab' (Russia) SS-25 'Sickle' (Russia) AS-4 'Kitchen' (Russia) AS-6 'Kingfish' (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-4 'Ganef' (Russia) SA-5 'Gammon' (Russia) SA-6 'Gainful' (Russia) SA-8 'Gecko' (Russia) SA-10 'Grumble' (Russia)
Belgium	MGM-52 Lance (USA) MM 38 Exocet (France)	RIM-7 Sea Sparrow (USA) MIM-14 Nike Hercules (USA) MIM-23 HAWK (USA)
Brazil	MM 38/40 Exocet (France) RUR-5 ASROC (USA)	
Brunei	MM 38 Exocet (France)	
Bulgaria	SS-1 'Scud' (Russia) FROG-7 (Russia) SS-N-2 'Styx' (Russia) SS-23 'Spider' (Russia) SSC-1B 'Sepal' (Russia) SSC-3 'Styx' (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-4 'Ganef' (Russia) SA-5 'Gammon' (Russia) SA-6 'Gainful' (Russia) SA-10 'Grumble' (Russia) SA-13 'Gopher' (Russia) SA-N-4 'Gecko' (Russia)
Cameroon	MM 40 Exocet (France)	
Canada	RUR-5 ASROC (USA) RGM-84 Harpoon (USA)	RIM-66/67 Standard (USA) RIM-7 Sea Sparrow (USA) MIM-146 ADATS (joint programme)
Chile	MM 38 Exocet (France) Gabriel (Israel)	Crotale (France)
China	CSS-2 (DF-3) CSS-3 (DF-4) CSS-4 (DF-5) CSS-5 (DF-21) CSS-6 (M-9) CSS-7 (M-11) CSS-8 (M-7) CSS-N-1 (SY-1) CSS-N-2 (HY-1) CSSC-2 'Silkworm' (HY-1) CSSC-3 (HY-2) CSSC-7 (HY-4) CSS-N-1 (FL-1) CSS-N-3 (JL-1) CSS-N-4 (YJ-1/C-801) CY-1 CAS-1 (C-601/611)	HQ-2 HQ-61 CSA-N-2 Crotale (France) SA-2 'Guideline' (Russia) FM-80 (HQ-7) SA-10 'Grumble' (Russia)

Country	Offensive Weapons	Defensive Weapons
Colombia	MM 40 Exocet (France)	
Croatia	SS-N-2 'Styx' (Russia)	
Cuba	SS-N-2 'Styx' (Russia) SSC-3 'Styx' (Russia) FROG-7 (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-6 'Gainful' (Russia) SA-8 'Gecko' (Russia) SA-13 'Gopher' (Russia) SA-N-4 'Gecko' (Russia)
Czech Republic	SS-1 'Scud' (Russia) SS-21 'Scarab' (Russia) FROG-7 (Russia) SS-23 'Spider' (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-4 'Ganef' (Russia) SA-5 'Gammon' (Russia) SA-6 'Gainful' (Russia) SA-8 'Gecko' (Russia) SA-10 'Grumble' (Russia) SA-13 'Gopher' (Russia)
Denmark	RGM-84 Harpoon (USA)	RIM-7 Sea Sparrow (USA) MIM-23 HAWK (USA)
Ecuador	MM 38/40 Exocet (France) Gabriel 2 (Israel)	Aspide (Italy)
Egypt	Otomat (Italy) SS-1 'Scud' (Russia) CSS-N-1 (FL-1) (China) FROG-7 (Russia) SS-N-2 'Styx' (Russia) CSSC-2 'Silkworm' (China) CSSC-3 (HY-2) (China) RGM-84 Harpoon (USA) Project T	Crotale (France) Aspide (Italy) SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-6 'Gainful' (Russia) RIM-7 Sparrow (USA) MIM-23 HAWK (USA)
Ethiopia	SS-N-2 'Styx' (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-6 'Gainful' (Russia)
Finland	RBS-15SF (Sweden) SS-N-2 'Styx' (Russia)	SA-3 'Goa' (Russia) Crotale (France)
France	MM 38, AM 39, SM 39 and MM 40 Exocet SSBS S-3 Hades MSBS M-4 ASMP	RIM-66/67 Standard (USA) Crotale MIM-23 HAWK (USA)
Georgia	FROG-7 (Russia) SS-1 'Scud' (Russia) SS-N-2 'Styx' (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-5 'Gammon' (Russia) SA-6 'Gainful' (Russia SA-8 'Gecko' (Russia)
Germany	MGM-52 Lance (USA) MM 38 Exocet (France) RGM-84 Harpoon (USA) RUR-5 ASROC (USA)	MIM-104 Patriot (USA) RIM-66/67 Standard (USA) RIM-7 Sea Sparrow (USA) MIM-23 HAWK (USA) RIM-116 RAM (joint programme)
Greece	MM 38 Exocet (France) RGM-84 Harpoon (USA) RUR-5 ASROC (USA)	Crotale (France) Aspide (Italy) RIM-7 Sea Sparrow (USA) MIM-14 Nike Hercules (USA) MIM-23 HAWK (USA)
Guinea		SA-6 'Gainful' (Russia)
Guinea-Bissau		SA-6 'Gainful' (Russia) SA-8 'Gecko' (Russia)
Hungary	SS-1 'Scud' (Russia) FROG-7 (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-4 'Ganef' (Russia) SA-5 'Gammon' (Russia) SA-6 'Gainful' (Russia) SA-8 'Gecko' (Russia)
India	SS-N-2 'Styx' (Russia) SS-N-7 'Starbright' (Russia) Prithvi SS-150/SS-250	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-5 'Gammon' (Russia) SA-6 'Gainful' (Russia) SA-8 'Gecko' (Russia) SA-11 'Gadfly' (Russia) SA-N-1 'Goa' (Russia) SA-N-4 'Gecko' (Russia)

Country	Offensive Weapons	Defensive Weapons
Indonesia	MM 38 Exocet (France) RGM-84 Harpoon (USA)	Aspide (Italy)
Iran	CSSC-2 'Silkworm' (China) SS-1 'Scud' (Russia) 'Scud B' variant (North Korea) 'Scud C' variant (North Korea) CSSC-3 (HY-2) (China) CSS-8 (M-7) (China) CSS-7 (M-11) (China) SS-N-22 'Sunburn' (Russia) Gabriel (Israel) RGM-84 Harpoon (USA) Iran 130 (Nazeat/Mushak 120) Nazeat N5 MGM-52 Lance (USA)	RIM-66/67 Standard (USA) HQ-2 (China) SA-2 'Guideline' (Russia) SA-5 'Gammon' (Russia) SA-6 'Gainful' (Russia) SA-10 'Grumble' (Russia) MIM-23 HAWK (USA)
Iraq	FAW Family Otomat (Italy) SS-1 'Scud' (Russia) FROG-7 (Russia) Layth Al Hussein CSSC-2 'Silkworm' (China) CSSC-3 (HY-2) (China) SS-N-2 'Styx' (Russia) CSS-8 (M-7) (China)	Aspide (Italy) SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-6 'Gainful' (Russia) SA-8 'Gecko' (Russia) SA-13 'Gopher' (Russia)
Israel	Jericho 1 and 2 MGM-52 Lance (USA) Gabriel 2 and 3 RGM-84 Harpoon (USA) Keres	MIM-23 HAWK (USA) MIM-104 Patriot (USA)
Italy	MGM-52 Lance (USA) Otomat UGM-84 Harpoon (USA)	Aspide 1 RIM-66/67 Standard (USA) RIM-7 Sea Sparrow (USA) MIM-14 Nike Hercules (USA) MIM-23 HAWK (USA)
Ivory Coast	MM 40 Exocet (France)	
Japan	SSM-1A RGM-84 Harpoon (USA) RUR-5 ASROC (USA)	MIM-104 Patriot (USA) RIM-66/67 Standard (USA) Tan-SAM (Type 81) RIM-7 Sea Sparrow (USA) MIM-14 Nike Hercules (USA) MIM-23 HAWK (USA)
Jordan		MIM-23 HAWK (USA) SA-8 'Gecko' (Russia) SA-13 'Gopher' (Russia)
Kazakhstan	FROG-7 (Russia) SS-1 'Scud' (Russia) SS-21 'Scarab' (Russia) SS-18 'Satan' (Russia) AS-4 'Kitchen' (Russia) AS-15 'Kent' (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-5 'Gammon' (Russia) SA-6 'Gainful' (Russia) SA-8 'Gecko' (Russia) SA-11 'Gadfly' (Russia)
Kenya	Otomat Mk 2 (Italy) Gabriel 2 (Israel)	
Korea, North	SS-1 'Scud' (Russia) SS-1 'Scud B' variant FROG-7 (Russia) SS-N-2 'Styx' (Russia) SA-2 'Guideline' variant (Russia) CSSC-2 'Silkworm' (China) CSSC-3 (HY-2) (China) Scud improvement ('Scud C' variant)	HQ-2 (China) SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-5 'Gammon' (Russia)
Korea, South	NHK-1 Nike Hercules (USA) MM 38 Exocet (France) RGM-84 Harpoon (USA) RUR-5 ASROC (USA)	RIM-7 Sea Sparrow (USA) RIM-66/67 Standard (USA) MIM-14 Nike Hercules (USA) MIM-23 HAWK (USA)
Kuwait	MM 40 Exocet (France)	SA-8 'Gecko' (Russia) MIM-23 HAWK (USA)
Laos		SA-3 'Goa' (Russia)
Libya	SS-1 'Scud' (Russia) SS-21 'Scarab' (Russia) FROG-7 (Russia) Otomat (Italy) SS-N-2 'Styx' (Russia) 'Scud C' variant (North Korea)	SA-5 'Gammon' (Russia) Crotale (France) Aspide (Italy) SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-6 'Gainful' (Russia) SA-8 'Gecko' (Russia) SA-13 'Gopher' (Russia)
Malaysia	MM 38 Exocet (France)	
Mali		SA-3 'Goa' (Russia)
Mexico	RUR-5 ASROC (USA)	
Mongolia		SA-2 'Guideline' (Russia)
Morocco	MM 38/40 Exocet (France)	Aspide (Italy)
Mozambique		SA-3 'Goa' (Russia) SA-6 'Gainful' (Russia) SA-8 'Gecko' (Russia)
Netherlands	MGM-52 Lance (USA) RGM-84 Harpoon (USA)	MIM-104 Patriot (USA) RIM-66/67 Standard (USA) RIM-7 Sea Sparrow (USA) MIM-23 HAWK (USA)
Nicaragua		SA-8 'Gecko' (Russia)
Nigeria	MM 38 Exocet (France) Otomat (Italy)	Aspide (Italy)
Norway		RIM-7 Sea Sparrow (USA) MIM-14 Nike Hercules (USA) MIM-23 HAWK (USA)
Oman	MM 38/40 Exocet (France)	
Pakistan	CSS-N-1 (FL-1) (China) CSSC-3 (HY-2) (China) UGM/RGM-84 Harpoon (USA) RUR-5 ASROC (USA) Hatf 1 CSS-7 (M-11) (China)	HQ-2 (China) Crotale (France) SA-2 'Guideline' (Russia)
Peru	MM 38 Exocet (France) Otomat Mk 1 and Mk 2 (Italy)	Aspide (Italy) SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia)
Poland	SS-1 'Scud' (Russia) FROG-7 (Russia) SS-N-2 'Styx' (Russia) SSC-3 'Styx' (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-5 'Gammon' (Russia) SA-6 'Gainful' (Russia) SA-8 'Gecko' (Russia) SA-11 'Gadfly' (Russia) SA-13 'Gopher' (Russia) SA-N-1 'Goa' (Russia) SA-N-4 'Gecko' (Russia)
Portugal	RGM-84 Harpoon (USA)	RIM-7 Sea Sparrow (USA) MIM-23 HAWK (USA)
Qatar	MM 40 Exocet (France)	
Romania	SS-1 'Scud' (Russia) FROG-7 (Russia) SS-N-2 'Styx' (Russia)	SA-2 'Guideline' (Russia) SA-5 'Gammon' (Russia) SA-6 'Gainful' (Russia) SA-8 'Gecko' (Russia) SA-N-7 'Gadfly' (Russia)
Russia	SS-1 'Scud B' SS-11 'Sego' SS-13 'Savage' SS-17 'Spanker' SS-18 'Satan' SS-19 'Stiletto' SS-21 'Scarab A/B' SS-24 'Scalpel' SS-25 'Sickle' SS-N-2 'Styx' SS-N-3 'Shaddock' and 'Sepal' SS-N-6 'Serb' SS-N-7 'Starbright' SS-N-8 'Sawfly' SS-N-9 'Siren' SS-N-12 'Sandbox' SS-N-14 'Silex' SS-N-15 'Starfish' SS-N-16 'Stallion' SS-N-18 'Stingray' SS-N-19 'Shipwreck' SS-N-20 'Sturgeon' SS-N-21 'Sampson' SS-N-22 'Sunburn' SS-N-23 'Skiff' SS-N-25 3M-80 Moskit SUW-N-1 'FRAS-1' FROG-7	SA-1 'Guild' SA-2 'Guideline' SA-3 'Goa' SA-4 'Ganef' SA-5 'Gammon' SA-6 'Gainful' SA-8 'Gecko' SA-10 'Grumble' SA-11 'Gadfly' SA-12A 'Gladiator' SA-12B 'Giant' SA-13 'Gopher' SA-15 'Gauntlet' SA-19 'Grison' SA-N-1 'Goa' SA-N-3 'Goblet' SA-N-4 'Gecko' SA-N-6 'Grumble' SA-N-7 'Gadfly' SA-N-9 'Gauntlet' SA-N-11 'Grison' SH-08 'Gazelle' SH-11 'Gorgon' Anti-Satellite System

Country	Offensive Weapons	Defensive Weapons
Libya	AS-4 'Kitchen' AS-6 'Kingfish' AS-15 'Kent' AS-16 'Kickback' AS-17 'Krypton'	
Saudi Arabia	CSS-2 (China) Otomat Mk 2 (Italy) RGM-84 Harpoon (USA) MM 40 Exocet (France)	Crotale (France) MIM-23 HAWK (USA) MIM-104 Patriot (USA)
Singapore	RGM-84 Harpoon (USA) Gabriel 1 (Israel)	MIM-23 HAWK (USA)
Slovakia	FROG-7 (Russia) SS-1 'Scud' (Russia) SS-21 'Scarab' (Russia) SS-23 'Spider' (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-4 'Ganef' (Russia) SA-5 'Gammon' (Russia) SA-6 'Gainful' (Russia) SA-8 'Gecko' (Russia) SA-13 'Gopher' (Russia)
Somalia	SS-N-2 'Styx' (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-6 'Gainful' (Russia)
South Africa	Skorpioen (Gabriel 2) (Israel)	Cactus-Crotale (France) SA-8 'Gecko' (Russia)
Spain	RUR-5 ASROC (USA) RGM-84 Harpoon (USA)	Aspide (Italy) RIM-7 Sea Sparrow (USA) MIM-14 Nike Hercules (USA) MIM-23 HAWK (USA) RIM-66 Standard (USA)
Sweden	RBS-15	MIM-23 HAWK (USA)
Sudan	CSSC-2 'Silkworm' (China)	SA-2 'Guideline' (Russia)
Syria	SS-1 'Scud' (Russia) 'Scud B' variant (North Korea) SS-21 'Scarab' (Russia) FROG-7 (Russia) SS-N-2 'Styx' (Russia) SSC-1B 'Sepal' (Russia) SSC-3 'Styx' (Russia) 'Scud C' variant (North Korea) CSS-6 (M-9) (China)	SA-2 'Guideline' (Russia) SA-5 'Gammon' (Russia) SA-6 'Gainful' (Russia) SA-8 'Gecko' (Russia) SA-10 'Grumble' (Russia) SA-11 'Gadfly' (Russia) SA-13 'Gopher' (Russia)
Taiwan	Green Bee (Ching Feng) Hsiung Feng 1 and 2 RUR-5 ASROC (USA) RGM-84 Harpoon (USA)	RIM-66/67 Standard (USA) MIM-14 Nike Hercules (USA) MIM-23 HAWK (USA) Sky Bow 1 and 2
Tanzania		SA-3 'Goa' (Russia) SA-6 'Gainful' (Russia)
Thailand	CSS-N-4 (China) CSS-N-1 (China) Gabriel 1 (Israel) RGM-84 Harpoon (USA) MM 38 Exocet (France)	Aspide (Italy) Crotale (France)
Tunisia	MM 40 Exocet (France) SS-N-2 'Styx' (Russia)	
Turkey	RGM-84 Harpoon (USA) RUR-5 ASROC (USA)	Aspide (Italy) RIM-7 Sea Sparrow (USA) MIM-14 Nike Hercules (USA) MIM-104 Patriot (USA)
Ukraine	SS-1 'Scud' (Russia) SS-19 'Stiletto' (Russia) SS-21 'Scarab' (Russia) SS-24 'Scalpel' (Russia) SS-N-2 'Styx' (Russia) SS-N-3 'Shaddock/Sepal' (Russia) SS-N-9 'Siren' (Russia) SS-N-12 'Sandbox' (Russia) SS-N-14 'Silex' (Russia) SS-N-19 'Shipwreck' (Russia) SS-N-22 'Sunburn' (Russia) SUW-N-1 'FRAS-1' (Russia) FROG-7 (Russia) AS-4 'Kitchen' (Russia) AS-6 'Kingfish' (Russia) AS-15 'Kent' (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-4 'Ganef' (Russia) SA-6 'Gainful' (Russia) SA-10 'Grumble' (Russia) SA-11 'Gadfly' (Russia) SA-19 (Russia) SA-N-1 'Goa' (Russia) SA-N-3 'Goblet' (Russia) SA-N-4 'Gecko' (Russia) SA-N-6 'Grumble' (Russia) SA-N-7 'Gadfly' (Russia) SA-N-9 (Russia) SA-N-11 (Russia)
UAE	MM 40 Exocet (France) SS-1 'Scud B' (Russia)	Crotale (France) MIM-23 HAWK (USA)
UK	A-3TK Polaris (USA) MGM-52 Lance (USA) MM 38 Exocet (France) RGM-84 Harpoon (USA) Sea Eagle WE-177	Sea Dart Seawolf Rapier 2000
USA	MGM-140 ATACMS MGM-52 Lance LGM-30F Minuteman II LGM-30G Minuteman III LGM-118 Peacekeeper UGM-73 Poseidon C-3 UGM-96 Trident C-4 UGM-133 Trident D5 BGM-109 Tomahawk AGM-69 SRAM A AGM-86 ALCM AGM-129 (ACM) RGM-84 Harpoon RUR-5 ASROC B28 Nuclear Bomb B43 Nuclear Bomb B53 Nuclear Bomb B57 Nuclear Bomb B61 Nuclear Bomb B83 Nuclear Bomb	RIM-7 Sea Sparrow MIM-14 Nike Hercules MIM-23 HAWK RIM-66/67 Standard MIM-104 Patriot RIM-116 RAM (joint programme)
Venezuela	Otomat (Italy) RGM/AGM-84 Harpoon (USA)	Aspide (Italy)
Vietnam	SS-1 'Scud' (Russia) SS-N-2 'Styx' (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-6 'Gainful' (Russia)
Yemen	SS-1 'Scud' (Russia) SS-21 'Scarab' (Russia) FROG-7 (Russia) SS-N-2 'Styx' (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-6 'Gainful' (Russia) SA-N-4 'Gecko' (Russia)
Yugoslavia (Serbia and Montenegro)	FROG-7 (Russia) SS-N-2 'Styx' (Russia) SS-N-3 'Shaddock' (Russia)	SA-2 'Guideline' (Russia) SA-3 'Goa' (Russia) SA-6 'Gainful' (Russia) SA-8 'Gecko' (Russia) SA-11 'Gadfly' (Russia) SA-N-4 'Gecko' (Russia)
Zambia		SA-3 'Goa' (Russia) SA-6 'Gainful' (Russia)

COUNTRY INVENTORY - IN DEVELOPMENT

Country	Offensive Weapons	Defensive Weapons
Argentina	Halcon **Condor 2 (joint programme)**	
Brazil	MB/EE 150 SS-300/600 SM-70 Barracuda	
China	FL-7 CSSC-X-5 (C-101) CSSC-X-6 (HY-3/C-301) CSS-NX-5 (FL-2) CSSC-X-8 (YJ-2/C-802) JL-2 DF-25 (joint programme) DF-31 DF-41 M-18	KS-1 KS-2
Egypt	Badr 2000 Condor 2 (joint programme) Vector	
France	MSBS M-45 MSBS M-5 ASLP Otomat 3 (joint programme) ANS (joint programme) Milas (joint programme) Apache ASMP-C	FSAF (Aster 15/30) (joint programme) Latex Polyphem (joint programme)
Germany	ANS (joint programme)	Ground-Based Laser (GBL) TLVS Polyphem (joint programme)
India	Prithvi SS-350 Agni Rohini ASLV variant Koral	Akash
Iran	Tondar-68 (M-18) Mushak 160/200 CSSC-2 'Silkworm' variant Labour-1/2 (Nodong 1/2) (joint programme) DF-25 (joint programme) Iran 700 ('Scud C' variant) Al Fatah (joint programme)	
Iraq	Condor 2 (joint programme) SRBM Al Aabed	FAW-1
Israel	Gabriel 4	Barak/ADAMS Arrow 1 and 2 Python Plus
Italy	Milas (joint programme) Otomat 3 (joint programme)	FSAF (Aster 15/30) (joint programme) Aspide 2
Japan	SSM-1B	Tan-SAM 2
Korea, North	Labour-1 (Nodong 1) (joint programme)	

Country	Offensive Weapons	Defensive Weapons
	Labour-2 (Nodong 2) (joint programme)	
Korea, South	NHK-1A 'Hyon Mu' KSR 100	Chun-Ma
Libya	Iltisslat/Al Fatah (joint programme)	
Norway		MIM-120 NASAMS (joint programme)
Pakistan	**CSS-7 (M-11) variant** Hatf 1A, 2, 3	Anza
Russia	**SS-21 'Scarab C'** SS-NX-24 'Scorpion' AS-19 'Koala' SS-X-26 SS-X-29 SS-NX-26 SS-NX-27 YP-85 SSM Yakhont/Bastion Alfa Kh-65 SE Kh-35 Kh-41 Moskit	SA-X-17 'Grizzly' SA-X-? SA-NX-? Ground-Based Laser Airborne Laser Ship-Based Laser Future ASAT (AA-9 modification)
South Africa	Arniston	SAHV
Spain	Capricornio	
Sweden		BAMSE
Switzerland		ADATS (joint programme)
Syria	Scud improvement	
Taiwan	Sky Horse 1 (Tien Ma)	Sky Bow 3
UK		Starstreak RN Laser Weapon
USA	RUM-139 VL ASROC AGM/MGM-137	Ground-Based Laser Ship-Based Laser Airborne Laser Space-Based Laser Ground-Based Interceptor THAAD ERINT Hypervelocity Guns N-LOS MIM-120 NASAMS (joint programme) ASAM-1 Raptor/Talon Corps SAM Theatre SAM Future ASAT Peregrine SRAM/LEAP RIM-67 Standard SM-2ER block 4A Standard/LEAP Patriot PAC-3 Evolved Sea Sparrow

Ballistic Missiles and Weapons of Mass Destruction

What Is the Threat? What Should be Done?

Steve Fetter

Iraqi missile attacks against cities in Israel and Saudi Arabia have focused attention on the continuing proliferation of ballistic missile technology throughout the third world.[1] According to the Stockholm International Peace Research Institute, 25 countries have acquired or are trying to acquire ballistic missiles, either through purchase or indigenous production.[2] All but a few are developing countries, and the list encompasses some of the most volatile regions of the world. The greatest concentration is in the Middle East, where nine nations have missile programs. Missiles have also spread to other hot spots, including India and Pakistan, North and South Korea, Brazil and Argentina, Taiwan, and South Africa.

What are these missiles for, and why do countries want them? In particular, what types of warheads are emerging missile forces likely to be armed with? What capabilities will these missiles provide to their possessors, and what threats to international security will they pose? How should the United States and its allies respond to minimize these threats?

Since their invention in the 1930s, guided ballistic missiles have been used extensively in war only four times: the Germans launched over 2000 V-2

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I would like to thank Elisa Harris, Milton Leitenberg, Janne Nolan, Julian Perry Robinson, and Stephen Van Evera for their helpful comments, and the Federation of American Scientists for its generous support.

1. The proliferation of ballistic missile technology is well chronicled. See, for example, Janne E. Nolan, *Trappings of Power: Ballistic Missiles in the Third World* (Washington, D.C.: Brookings, 1991); Aaron Karp, "Ballistic Missile Proliferation," in Stockholm International Peace Research Institute (SIPRI), *SIPRI Yearbook 1990: World Armaments and Disarmament* (Oxford: Oxford University Press, 1990); Robert D. Shuey, Warren W. Lenhart, Rodney A. Snyder, Warren H. Donnelly, James E. Mielke, and John D. Moteff, *Missile Proliferation: Survey of Emerging Missile Forces* (Washington, D.C.: Congressional Research Service, February 9, 1989); and Martin S. Navias, "Ballistic Missile Proliferation in the Middle East," *Survival*, Vol. 31, No. 3 (May/June 1989), pp. 225–239.
2. Karp, "Ballistic Missile Proliferation," pp. 382–390. See Table 2 for a list of countries with missile programs.

International Security, Summer 1991 (Vol. 16, No. 1)
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missiles against urban British and European targets during World War II; Iraq and Iran together launched nearly 1000 missiles against each other's cities during the 1980–88 Iran-Iraq war; the Kabul government fired over 1000 Soviet-made Scud missiles against *Mujahideen* guerrillas in the Afghanistan civil war; and Iraq launched about 80 modified Scud missiles against cities in Israel and Saudi Arabia in the 1991 Persian Gulf war. Three of these four cases occurred in the last decade, and in all four cases the missiles were armed solely with conventional (i.e., high-explosive) warheads. Moreover, these missiles were used mainly for strategic attacks against cities, perhaps because they lacked the accuracy necessary to strike even soft military targets such as airfields.

Ballistic missiles with ranges greater than a few hundred kilometers are, however, an exceptionally inefficient vehicle for the delivery of conventional munitions. This has long been recognized by the nuclear powers, which rely on ballistic missiles almost exclusively for the delivery of nuclear warheads. The inefficiency of conventionally armed missiles seems to be well understood by the new missile states as well, since most of them are also actively seeking nuclear, chemical, and biological weapons. A missile armed with a Hiroshima-sized nuclear weapon is roughly 10,000 times more deadly than the same missile armed with high explosives. Fortunately, the development of nuclear weapons is expensive, easy to detect, and relatively easy to thwart with export controls. Chemical warheads, on the other hand, are far easier to acquire, and while they may be far less deadly than nuclear warheads, they could kill as many people as dozens or even hundreds of conventionally armed missiles. Even worse, biological warheads that disperse anthrax spores offer the possibility of inflicting casualties on the scale of small nuclear weapons.

As missile ranges increase, the civilian populations of U.S. allies (and eventually the United States itself) will become increasing vulnerable to weapons of mass destruction. Responding to this threat should be a major preoccupation of the United States, just as ameliorating the Soviet nuclear threat has been a major policy goal for more than four decades. In fact, emerging missile arsenals may be an even greater menace, since the probability of inadvertent or accidental use is likely to be much higher, crisis instabilities are likely to be more severe, and several of these states are less politically stable than the Soviet Union has been.

Policy responses might include carrots (security guarantees and arms control), sticks (export controls, deterrence, or preventive war), and defenses

(missile, aircraft, and civil defenses). The United States has tried each of these in a somewhat haphazard manner, with mixed success. Security guarantees cannot be extended to every state, and arms control is often unappealing to rogue states or their neighbors. Export controls are notoriously difficult to enforce, and are undercut by Third World suppliers and by the similarity of military and peaceful activities. Preventive war can be highly effective, but the risks and costs it entails (combined with the international environment it fosters) make it of very limited use as an instrument of national policy. Defenses are unlikely to be effective for a variety of reasons, and deterrence may not work in many situations. Nonetheless it is imperative, despite these shortcomings, that we weave these policy threads into a coherent and self-consistent fabric to protect civilians from weapons of mass destruction.

Missiles in the Middle East and Asia: Who's Got What?

To illustrate the missile capabilities that have become available to Third World countries, Table 1 gives the characteristics of missiles deployed in the Middle East and Asia. Israel has the most sophisticated missile capability, having orbited two satellites with its Shavit space launch vehicle. If the Shavit was used as a ballistic missile, it would be capable of delivering a half-tonne[3] payload at intercontinental ranges.[4] The Jericho 2, which is based on the same technology, can probably deliver at least two tonnes on any Arab country. India also has an ambitious program to develop satellite launchers and long-range ballistic missiles; its Agni missile is roughly comparable to the Jericho 2. In contrast to the indigenous Israeli and Indian development, Saudi Arabia purchased its missiles from China. The 68-tonne single-stage DF-3, which is limited to ranges of less than 3500 kilometers with a 1-tonne payload,[5] is the largest missile deployed outside of the five nuclear powers.[6]

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3. One tonne (te) = 1 metric ton = 1,000 kilograms = 2,200 pounds = 1 long ton = 1.1 short tons.

4. The estimates of throwweight versus range given here are the result of calculations based on the known or inferred characteristics of these missiles. For the characteristics of the Shavit, see Steve Fetter, "Israeli Ballistic Missile Capabilities," *Physics and Society*, Vol. 19, No. 3 (July 1990), pp. 3–4. I assume that the Jericho 2 is composed of the first two stages of the Shavit.

5. For the characteristics of the DF-3, see Zuwei Huang and Xinmin Ren, "Long March Launch Vehicle Family—Current Status and Future Development," *Space Technology*, Vol. 8, No. 4 (1988), pp. 371–375.

6. For comparison, the U.S. Minuteman III ICBM weighs 35 tonnes, the Trident II SLBM weighs 57 tonnes, and the MX missile weighs 88 tonnes. It should be noted the United States has

Table 1. Ballistic missiles deployed in Asia and the Middle East.

Missile	Country	Missile Mass (te)	Fuel/ Stages[a]	Throw-weight[b] (te)	Range[b] (km)	Supplier
Scud-B	Afghanistan, Egypt, Iran, Iraq, Libya, North Korea, Syria, Yemen	6	L/1	1	300	USSR
al-Abbas	Iraq	8	L/1	1	450	USSR (modified by Iraq)
DF-3	Saudi Arabia	68	L/1	2	2800	China
Jericho 1	Israel		S/2	1	500	
Jericho 2	Israel, South Africa?	≈16	S/2	2	2000	Israel?
Prithvi	India	4	L/1	1	240	
Agni	India	14	S/L/2	1	2500	

NOTES: Includes all missiles with a payload of at least 500 kilograms at a range of 300 kilometers, which is the threshold for export restrictions under the Missile Technology Control Regime.

a. "L" = liquid; "S" = solid.
b. Typical payload/range combinations.

At the other end of the spectrum is the ubiquitous Soviet Scud-B missile, capable of delivering a 1-tonne payload at a range of only 300 kilometers.[7] The Scud-B was modified by Iraq to carry a much smaller payload at ranges of up to 600 kilometers, enabling its use in attacks on Teheran, Riyadh, and Tel Aviv during the 1980–88 and 1991 Persian Gulf wars. A more extensive modification, called the al-Abbas, may be capable of delivering a half-tonne warhead at such ranges.[8]

struggled for nearly two decades to develop a mobile basing mode for the MX, in part because of the large size of the missile.

7. For the characteristics of the Scud-B, see Steven Zaloga, "Ballistic Missiles in the Third World: Scud and Beyond," *International Defense Review*, Vol. 21 (November 1988), p. 1427.

8. For the characteristics of the modified Scuds, see W. Seth Carus and Joseph S. Bermudez, Jr., "Iraq's Al-Husayn Missile Programme," *Jane's Soviet Intelligence Review*, May 1990, pp. 205.

WHY BUY MISSILES?

Why use ballistic missiles rather than aircraft? After all, aircraft are reusable, more versatile, and are capable of much better accuracy than first-generation missiles. The most common answer is that it is much easier to defend against an attack by aircraft. Even though British air defenses were very good late in World War II, Britain was utterly defenseless against the V-2, which reentered the lower atmosphere at speeds in excess of Mach 3. Not until the United States deployment of the Patriot anti-tactical missile system in Saudi Arabia and Israel has a country demonstrated a capability to defend itself against attack by even short-range missiles. Although the Patriot system was apparently very effective,[9] it was far from perfect and, in the face of U.S. air supremacy, missile attack was Iraq's only means to carry out strategic attacks on U.S. allies.

A comparison of costs shows, furthermore, that missiles are rarely a cost-effective means for delivering conventional explosives. Although aircraft are about three times as expensive as missiles per unit takeoff or launch weight,[10] aircraft can carry up to ten times more payload per unit takeoff weight to intermediate ranges.[11] Moreover, aircraft can be reused until they are shot down. Figure 1 shows that missiles are only cost-effective for very short ranges or if aircraft attrition rates are very high. For example, at a range of 500 kilometers, a single-stage missile is only cost-effective if aircraft attrition rates are greater than 35 percent per sortie. Even modern, solid-fuel, two-stage missiles are not cost-effective at such ranges unless aircraft attrition rates are greater than 25 percent per sortie. Attrition rates greater than 10 percent are rare, and only occur when a combatant is greatly overmatched or when targets are especially well-defended.[12]

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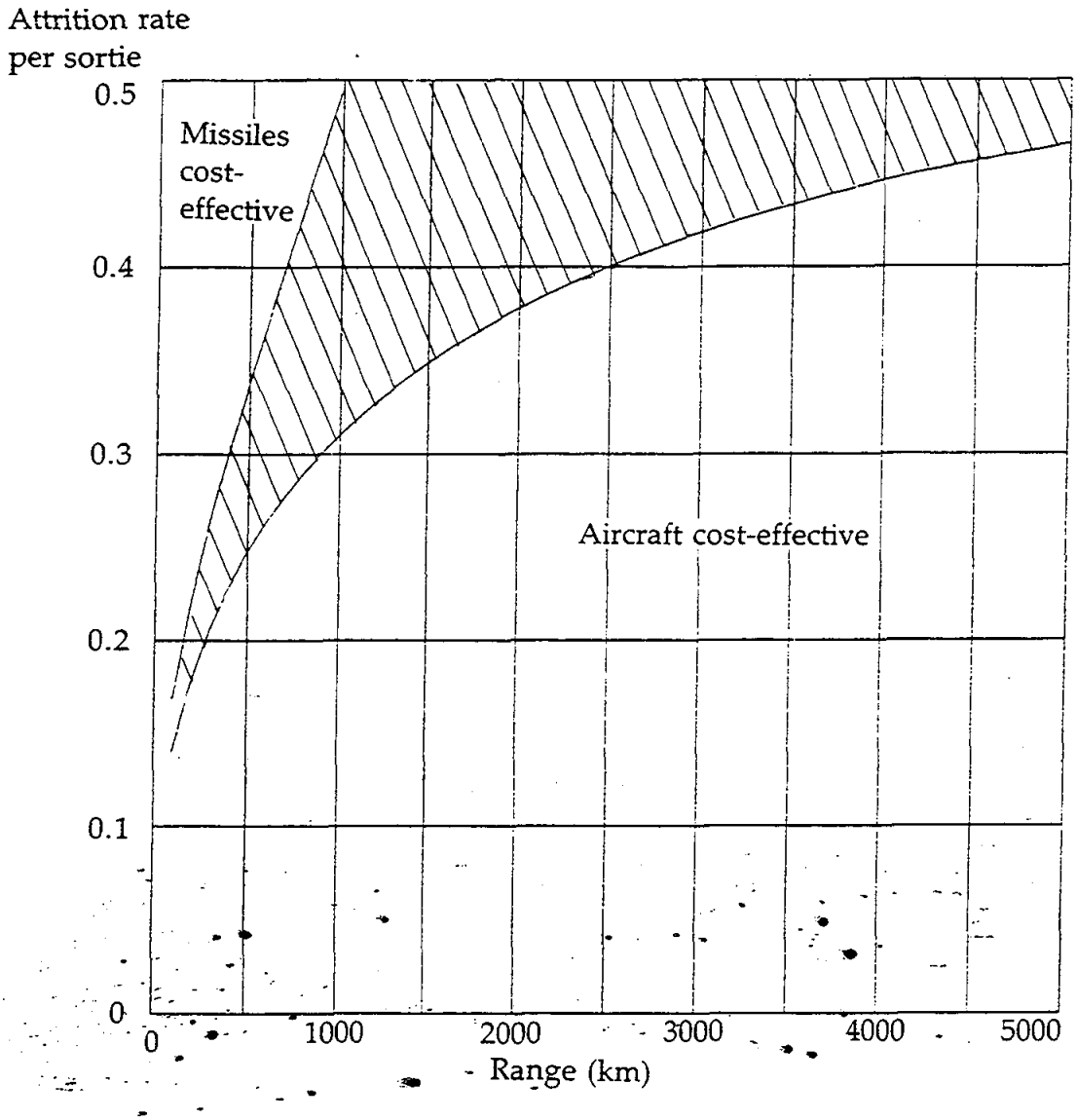
9. The actual effectiveness of Patriot interceptors in destroying Scud warheads is subject to intense debate. See footnote 61.

10. Based on unit flyaway costs and maximum takeoff/launch weights of seven U.S. missiles and seven U.S. aircraft given in Thomas B. Cochran, William M. Arkin, and Milton M. Hoenig, *Nuclear Weapons Databook*, Vol. I: *U.S. Nuclear Forces and Capabilities* (Cambridge, Mass.: Ballinger, 1984).

11. For example, 30–35 percent of the takeoff weight of U.S. aircraft is payload at unrefueled ranges of up to 1500 kilometers. International Institute for Strategic Studies (IISS), *The Military Balance 1988–89* (London: IISS, 1988). For comparison, the throwweight of the Scud-B missile is 17 percent of its launch weight at a range of only 300 kilometers, and the throwweight of the modified Scuds used against Teheran and Tel Aviv was less than 3 percent of the launch weight.

12. The overall attrition rate for American aircraft in the European theatre from August 1942 to May 1945 was 2 percent per sortie, although the loss rate in a single raid on a particularly well-defended target (the Schweinfurt ball-bearing plant) reached 20 percent. Robert Futrell, *Ideas, Concepts, Doctrine: A History of Basic Thinking in the United States Air Force 1907–1964* (Maxwell

Figure 1. The relative cost-effectiveness of missiles and aircraft as a function of their range and the aircraft attrition rate per sortie.



NOTES: Lines give the attrition rate at which missile and aircraft costs per unit payload delivered to a given range are equal, assuming that aircraft cost three times as much as missiles per unit mass; that the aircraft mass is equal to (r/900 + 2) times the payload mass, where r is the combat radius in kilometers (from a best-fit to U.S. aircraft); and that missiles have a specific impulse of 250 seconds. The top curve is for a single-stage missile with a booster-to-fuel mass ratio of 1.15; the bottom curve is for a two-stage missile with a ratio of 1.05. The attrition rate per sortie is equal to $(1 + s)^{-1}$, where s is the average number of sorties; the break-even point occurs when $s = CR(M_a/M_m)$, where CR is the cost ratio per unit mass (CR = 3) and M_a and M_m are the aircraft and missile mass per unit payload mass at a given range.

The loss of highly trained pilots when aircraft are shot down is undoubtedly an important reason for preferring to use missiles when attrition rates are higher than, say, ten percent. This consideration points to another possibility, however: remove the pilots. Pilotless aircraft or cruise missiles generally are not reusable,[13] but they could be much cheaper than piloted craft. The current U.S. sea-launched cruise missile (SLCM), with a flyaway cost of about $1.5 million and a payload of less than 500 kilograms at a range of 1,300 kilometers, is not a bargain. But with the advent of low-cost satellite navigation receivers in the near future, high accuracy will be possible without the sophisticated radar and optical digital-scene-matching technology employed in the SLCM. It should then be possible to build a simple, low-flying cruise missile with the same payload and range as the SLCM for less than $250,000.[14] Even at this price, cruise missiles would not be cost-effective unless the attrition rate for piloted aircraft were very high (e.g., greater than 15 percent per sortie).[15]

Air Force Base, Ala.: Air University, 1974), p. 80; R.V. Jones, *Most Secret War* (Sevenoaks, England: Coronet, 1979). The North Vietnamese inflicted attrition rates of 3 percent per sortie on U.S. B-52s over Hanoi in 1972 using Soviet SA-2 surface-to-air missiles (SAMs). During the 1973 war, Israeli A-4 aircraft suffered attrition rates of 1 to 1.5 percent from Soviet SA-6 SAMs. Even against the Soviet Union, which has the most extensive air defense network in the world, the U.S. Air Force estimated (in the mid-1970s) that its bombers would suffer attrition rates of no more than 15 percent. Alton H. Quanbeck and Archie L. Wood, *Modernizing the Strategic Bomber Force: Why and How* (Washington, D.C.: Brookings, 1976), pp. 64–65.

13. Cruise missiles might eventually be designed to release bombs and return to landing strips, but this would result in at least a factor of two decrease in their range and would add considerably to their cost.

14. Beech Aircraft Corporation makes a turbojet-powered drone (the MQM-107) with a maximum payload of about 200 kilograms and a range of about 800 kilometers that sells for about $160,000; a similar vehicle with a payload of 500 kilograms and range a range of 1300 kilometers could probably be built for about $250,000 (i.e., six times less than the SLCM). Northrup and Teledyne Ryan also make unpiloted aircraft for targets and reconnaissance, although at somewhat higher prices. Teledyne can equip its drones with light-weight Global Positioning System (GPS) receivers, resulting in accuracies of about 30 meters for commercial users. Teledyne has also developed a radar altimeter that allows its drone to fly over water just 10 feet above the wave tops. By using propellers instead of turbojet engines, the cost to deliver 500 kilograms to 1300 kilometers would be less than $100,000, but the speed would be much lower. (Based on author's communications with Beech Aircraft, Northrup, and Teledyne engineers, March 27, 1991.)

15. For example, the U.S. A-6 and F-15 can deliver 8100 and 9000 kilograms of payload at a distance of 1250 and 1440 kilometers for a flyaway cost of $19 and $22 million, respectively. Sixteen to 18 cruise missiles each carrying 500 kilograms would be required to deliver an equal payload, which, at $250,000 per missile, would cost about $4 million—about five time less than the cost of aircraft. Therefore, ignoring the loss of pilots, attrition rates greater than 15 percent are necessary to make cruise missiles cost-effective compared to piloted aircraft, even if the cruise missiles themselves suffer no attrition.

Apart from air defenses, there are other, perhaps more powerful incentives to buy missiles rather than aircraft. First, missile attack appears to have a greater psychological impact than bombing. The suddenness of missile attack, combined with feelings of defenselessness, terrorized the populations of London and Teheran. Even in Tel Aviv, missile attacks had a psychological and political impact far out of proportion to the physical damage they caused (only one death was caused by some 38 missiles launched at Israel, apart from heart attacks, asphyxiations, and car accidents caused by anxiety over the attacks). Such effects can far outweigh the military significance of missile attacks. For example, by threatening to provoke Israeli retaliation, and thereby possibly break up the Arab coalition arrayed against Iraq, the "militarily insignificant" Scud played a central political role early in the 1991 Persian Gulf war.

There are also domestic and international political reasons for buying missiles instead of aircraft. Programs to develop missiles can be justified as civilian space programs, just as a nuclear weapons program can be aided and masked by a civilian nuclear program. Missiles are important symbols of prestige and technological achievement. Once a nation has acquired missiles, its rivals may feel impelled to follow suit. Nations may also feel that it is easier to deter missile attack by deploying a missile force of their own rather than simply augmenting some other capability. This may explain why Saudi Arabia purchased the Chinese DF-3 missile,[16] which is an exceedingly inefficient vehicle for the delivery of conventional munitions. Further, because missiles do not require pilots, better control can be maintained over their use. Missiles do not defect.

Warheads for Ballistic Missiles

Political considerations aside, nations will choose to acquire ballistic missiles rather than aircraft if the weapons they carry are so destructive that the reusability of aircraft is unimportant, or if speed of delivery is of primary importance. (This is, after all, why all five nuclear powers rely primarily on ballistic missiles.) The destructiveness and speed of delivery of nuclear-armed

16. In March 1988 Saudi Arabia announced that it had purchased DF-3 missiles (known in the west as the CSS-2) from China. Neither the price nor the number of missiles was disclosed, but 60 to 120 missiles are generally believed to have been purchased at a total cost of several billion dollars.

ballistic missiles creates the possibility of a damage-limiting preemptive attack; the lack of defenses against intercontinental ballistic missiles makes an attack virtually unstoppable. It is also much less expensive to keep a missile force on continuous alert. Thus, the desire to be able to deliver nuclear weapons quickly and surely may explain why a few states, most notably Israel and India, are developing ballistic missiles. But what about countries that have no nuclear program, or whose nuclear programs are only in their infancy? Will their ballistic missiles continue to carry conventional warheads, or will they turn to chemical or biological warheads?

CONVENTIONAL WARHEADS

Missile attacks have so far been limited to conventional warheads, but even the largest such warheads cannot do much damage. For example, the average V-2 missile landing in London killed five people, injured 13, and damaged 40 buildings with its 1-tonne warhead.[17] The Scud-B, which also carries a 1-tonne warhead, would cause similar numbers of casualties in cities of comparable population density. Such missiles would only be useful in strategic attacks against cities, but a truly strategic threat (or a strategic deterrent) would require a capability to launch tens of thousands of such missiles. Conventionally armed missiles cannot be decisive militarily, and a nation certainly could not hope to deter nuclear attack by fielding a force of conventionally armed missiles.

Not surprisingly, then, as Table 2 shows, most of the nations with ballistic missile programs are also pursuing unconventional weapons. Because con-

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17. The 518 V-2 missiles that landed in London killed 2754 and seriously injured 6523 people, for an average of 5.3 deaths and 12.6 injuries per missile impact. Although the energy released by the V-1 cruise-missile warhead was similar to that released by the impact of the V-2 (equivalent to 1 ton of TNT), only 2.2 deaths and 6.3 serious injuries resulted per V-1 attack, mostly because warning of the approach of the subsonic cruise missile allowed residents to take protective actions. This suggests that civil defense can reduce casualties from conventional attacks by a factor of two. U.S. Strategic Bombing Survey, Physical Damage Division, "V-Weapons in London," Report No. 152, January 1947. The effective lethal area of the V-2 warhead was about 1,500 square meters (0.15 hectares); the population density of London during the attacks was about 35 per hectare. Based on the V-2 experience, the number of deaths without warning is equal to $0.15pY^{2/3}$, where p is the population density per hectare and Y is the yield of the warhead (including its kinetic energy on impact) in tons of TNT equivalent. The modified Scuds used against Tel Aviv reportedly carried 200-kilogram warheads; since the population density of Tel Aviv is about 35 per hectare, and since warning of attack was available, one would have expected an average of about 0.7 deaths per missile impact. That the actual number of deaths in Israel was far less (one death from 11 missile impacts, six of which occurred within Tel Aviv) merely emphasizes the probabilistic nature of such attacks, as does the attack on a U.S. barracks that killed dozens of soldiers.

Table 2. Third-world ballistic missiles, nuclear weapons, chemical weapons, and biological weapons.

	Acquiring or trying to acquire:			
Country	**Ballistic Missiles?[a]**	**Nuclear Weapons?[b]**	**Chemical Weapons?[c]**	**Biological Weapons?[d]**
Afghanistan	Yes			
Algeria	Yes[e]			
Argentina	Yes	Possible	Possible	
Brazil	Yes	Possible		
Burma			Likely	
Cuba	Yes[e]		Possible	
Egypt	Yes		Likely	
Ethiopia			Likely	
India	Yes	Yes	Likely	
Indonesia	Planned		Possible	
Iran	Yes	Possible	Likely	
Iraq	Yes	Possible	Yes	Likely
Israel	Yes	Yes	Likely	
Korea, North	Yes	Possible	Likely	Likely
Korea, South	Yes		Likely	
Kuwait	Yes[e]			
Libya	Yes	Possible	Likely	
Pakistan	Yes	Likely	Likely	
Saudi Arabia	Yes		Possible	
South Africa	Yes	Likely	Possible	
Syria	Yes		Likely	Likely
Taiwan	Yes		Likely	Likely
Thailand	Possible		Possible	
Vietnam	Possible		Likely	
Yemen	Yes			

SOURCES:

a. Aaron Karp, "Ballistic Missile Proliferation," in Stockholm International Peace Research Institute [SIPRI], *SIPRI Yearbook 1990* (Oxford: Oxford University Press, 1990); and Statement of Rear Admiral Thomas A. Brooks, Director of Naval Intelligence, before the Seapower, Strategic, and Critical Materials Subcommittee of the House Armed Services Committee, March 7, 1991.

b. Leonard S. Spector, *Nuclear Ambitions: The Spread of Nuclear Weapons, 1989–90* (Boulder, Colo.: Westview Press, 1990).

c. Elisa D. Harris, "Chemical Weapons Proliferation: Current Capabilities and Prospects for Control," in Aspen Strategy Group, *New Threats: Responding to the Proliferation of Nuclear, Chemical, and Delivery Capabilities in the Third World* (Washington, D.C.: University Press of America, 1990); and Statement of Rear Admiral Brooks.

d. Statement of Rear Admiral Brooks; and Statement of Admiral William O. Studeman before the Seapower, Strategic, and Critical Materials Subcommittee of the House Armed Services Committee, March 1, 1988.

e. Short-range (less than 100 kilometers) missiles only.

ventional weapons lack destructive power and nuclear weapons are difficult to develop, many believe that chemical or biological weapons will soon be the warhead of choice for emerging ballistic missile arsenals.

CHEMICAL WARHEADS

Chemical weapons have been used in war since ancient times, but they have never been delivered by modern ballistic missiles. Over 100,000 tons of chemical agents were released by artillery shells, mortars, bombs, grenades, and gas cylinders in World War I, producing about 100,000 fatalities and over 1,000,000 total casualties.[18] More potent chemical weapons were developed and stockpiled by Germany, the United States, the United Kingdom, and other combatants in World War II, but their uncertain military utility, combined with the deterrent effect of opposing chemical arsenals, prevented their use. Nazi Germany examined the possibility of arming the V-2 missile with chemical agents, but decided to use high explosives because their effects were more predictable and reliable, and because they feared allied chemical retaliation against German cities.

It is not clear how nations will choose in the future. The most deadly use of chemical weapons since World War I occurred during the Iran-Iraq war.[19] Even though both nations were armed with ballistic missiles, they used aircraft and artillery, not ballistic missiles, to deliver chemical agents.[20]

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18. For a review of the development, use, and alleged use of chemical weapons, see SIPRI, *The Problem of Chemical and Biological Warfare,* Vol. I: *The Rise of CB Weapons* (New York: Humanities Press, 1971); and Victor A. Utgoff, *The Challenge of Chemical Weapons: An American Perspective* (London: Macmillan, 1990).

19. Other large-scale uses of chemical agents since World War I include the use of lethal agents by Italy in its 1935–36 invasion of Ethiopia, by Japan during its occupation of Manchuria from 1937–45, and by Egypt during its intervention in the civil war in Yemen during the mid-1960s. Several unsubstantiated claims of large-scale uses of lethal agents have also been recorded, including alleged uses of chemicals by the United States against North Korea, by Vietnam against Laos and Kampuchea, and by the Soviet Union in Afghanistan. In terms of tonnage, the largest use of chemical agents since World War I was the use of herbicides and non-lethal agents by the United States in Vietnam, but the United States maintains that such agents are not covered by the Geneva protocol.

20. Most analysts believe that neither country had the technical capability to mount chemical weapons on ballistic missiles during the war, and there is much debate about whether Iraq had acquired this capability before the 1991 Persian Gulf War. It is unclear, however, why nations that could manufacture chemical artillery shells would find it especially difficult to arm missiles with chemical warheads. See Thomas L. McNaugher, "Ballistic Missiles and Chemical Weapons in the Iran-Iraq War," *International Security,* Vol. 15, No. 2 (Fall 1990), pp. 5–34, for a description and evaluation of the use of chemical agents and ballistic missiles in the Iran-Iraq War.

It is often claimed that one to two dozen countries stockpile or are actively seeking chemical weapons (see Table 2), but only the United States, the Soviet Union, and Iraq openly admit to stockpiling (and Iraq, to using) such weapons. Of those nations with ballistic missiles, Egypt, India, Iran, Israel, North and South Korea, Libya, Pakistan, Syria, and Taiwan are strongly suspected of stockpiling or producing chemical weapons.[21] While the United States and the Soviet Union are the only countries known to have outfitted missiles with chemical warheads, there are strong suspicions that Syria and Iraq have attempted to do so.[22]

CHEMICAL AGENTS. A variety of chemical agents have been developed that can kill and incapacitate. Choking agents, of which phosgene is the most lethal example, attack the respiratory system, causing irritation and inflammation of the bronchial tubes and lungs.[23] At lethal concentrations the lungs become so full of fluid that the victim dies of anoxia. Blood agents, such as hydrogen cyanide, act by preventing the utilization of oxygen in the blood.[24] Choking and blood gases are respiratory agents, and are therefore readily defeated by gas masks. Blister agents, of which mustard is the best known, can injure and kill by absorption through the skin as well by inhalation of vapors or aerosols.[25] Because they are liquids at normal temperatures, their dissemination is easier to control than a gas. These properties made blister agents the most effective chemical agents at the end of World War I.

Nerve agents, first discovered in Germany shortly before World War II, are far more deadly than the choking, blood, and blister agents used in World War I. Nerve agents work by interfering with cholinesterase, an enzyme involved in nerve transmission. Symptoms of nerve-agent poisoning include sweating, nausea, vomiting, staggering, coma, and convulsion, followed by cessation of breathing and death. When inhaled, nerve agents are lethal in concentrations over ten times smaller than choking, blood, or blister agents; like mustard, nerve agents are readily absorbed through the skin.

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21. Statement of Rear Admiral Thomas A. Brooks, Director of Naval Intelligence, before the Seapower, Strategic, and Critical Materials Subcommittee of the House Armed Services Committee, March 7, 1991.
22. Iraq recently revealed that it possesses 30 chemical warheads for its modified Scud missiles, but details about the design of the warheads is not available. Iraq also disclosed supplies of 75 tons of Sarin and 500 tons of Tabun. See Don Oberdorfer and Ann Devroy, "State Department Calls Iraq's Figures on Weapons 'Short of Reality'," *Washington Post*, April 20, 1991, p. A15.
23. Other common chokings agents include chlorine, chloropicrin, and diphosgene.
24. Other common blood agents include cyanogen chloride and arsine.
25. Other common blister agents include lewisite and various nitrogen mustard compounds.

They vary in consistency from sarin, which is watery and volatile, to VX, which has the viscosity of motor oil. Production costs are low—as little as $10–20 per kilogram of agent.[26]

The lethality of chemical agents is typically stated in terms of the LCt_{50}, which is the product of the concentration of the agent in air in milligrams per cubic meter (mg/m^3), multiplied by the length of the exposure in minutes that would result in death to 50 percent of the adults exposed.[27] The ICt_{50} is the dose that would result in militarily significant incapacitation to half of the exposed population. The estimated LCt_{50} and ICt_{50} for various chemical agents are given in Table 3.

CHEMICAL WARHEAD DESIGN. The United States and the Soviet Union are the only two countries known to have developed chemical warheads for ballistic missiles. The chemical warheads developed by the United States for the Little John, Honest John, and Sergeant missiles carry a large number of bomblets, each filled with a small amount of agent (about 600 grams of sarin or VX). The height at which the bomblets are released determines the diameter of the impact pattern on the ground. A burster charge containing a few hundred grams of high explosive detonates when the bomblets strike the ground, creating a small cloud of agent. Agent comprises 30–40 percent of the total weight of these warheads.[28]

Soviet chemical warheads are designed quite differently. Diagrams of the FROG and Scud-B warheads displayed at the Soviet Shikhany Central Proving Ground in October 1987 show a small, cylindrical burster charge surrounded by a large amount of liquid agent. According to the diagram, the 985-kilogram Scud warhead contains 555 kilograms of thickened VX; the burster charge appears to contain only about 20 kilograms of high explosive.[29]

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26. The United States produced sarin for about $3/kilogram during 1954–56 and VX for about $5/kilogram during 1961–67, which is equivalent to $12/kilogram and $18/kilogram at today's prices. SIPRI, *The Problem of Chemical and Biological Warfare*, Vol. II: *CB Weapons Today* (New York: Humanities Press, 1973), pp. 53. Producing the agent would therefore cost a few thousand dollars per missile, assuming that a 1-tonne missile warhead would contain 300 kilograms of agent.

27. For example, the LCt_{50} of sarin is 100 $mg \cdot min/m^3$, meaning that exposure to a concentration of 10 mg/m^3 for 10 minutes or 100 mg/m^3 for 1 minute would be fatal to half those exposed.

28. The 110-kilogram M206 warhead for the Little John contained 31 kilograms of GB; the 560-kilogram M79 and M190 warheads for the Honest John contained 177 and 217 kilograms of GB; the 680-kilogram M213 warhead for the Sergeant contained 195 kilograms of GB. Agent masses from SIPRI, *CB Weapons Today*, p. 84; warhead masses from Cochran, *U.S. Nuclear Forces and Capabilities*.

29. S.J. Lundin, J.P. Perry-Robinson, and Ralph Trapp, "Chemical and Biological Warfare: Developments in 1987," SIPRI, *SIPRI Yearbook 1988: World Armaments and Disarmament* (Oxford:

Table 3. The properties of various chemical agents.

Agent	Volatility (mg/m^3)[a]	Respiratory[b] Lethal Dose LCt_{50} ($mg \cdot min/m^3$)	Respiratory[b] Incap. Dose ICt_{50} ($mg \cdot min/m^3$)	Percutaneous[c] Lethal Dose LCt_{50} ($mg \cdot min/m^3$)
Tabun (GA)	610	400	300	40,000
Sarin (GB)	22,000	100	75	15,000
Soman (GD)	3,900	100	75	10,000[d]
VX	10	100	50	1,000[d]
Mustard (HD)	920	1500	200	10,000
Phosgene (CG)	4,000,000	3200	1600	n.a.
Hydrogen Cyanide	1,100,000	5000[e]	2000[e]	n.a.

SOURCE: FM 3-9, *Military Chemistry and Chemical Compounds* (Washington, D.C.: Department of the Army, October 1975).

NOTES: These estimates are for resting, unprotected adults; for highly active adults (e.g., soldiers in heavy combat or civilians running for cover after a missile attack) or for children, the LCt_{50} and ICt_{50} could be three to four times lower.

a. Mass of vapor per cubic meter of air at 25° C. For comparison, the volatility of water at 25° C is 23,000 mg/m^3.
b. Median lethal and incapacitating dosage for unprotected men breathing at a rate of 10 liters per minute.
c. Median lethal dosage for men in ordinary combat clothing.
d. Stockholm International Peace Research Institute, *The Problem of Chemical and Biological Warfare,* Vol. II: *CB Weapons Today* (New York: Humanities Press, 1973), pp. 42–43.
e. Depends on concentration; values given here are for a concentration of 100 mg/m^3. LCt_{50} = 2000 $mg \cdot min/m^3$ at a concentration of 200 mg/m^3.

Apparently the warhead shell is fragmented by the burster charge hundreds of meters above the ground, and wind-shear forces break the exposed liquid into droplets, which rain onto the ground below.

The effects of chemical agents depend largely on the size of the aerosol particles. Particles with diameters greater than 10 microns pose a hazard via direct absorption through the skin or, in warm weather, by the evaporation and subsequent inhalation of the vapors. Aerosols larger than 10 microns pose relatively little inhalation hazard since such particles are trapped by the upper respiratory tract, where absorption into the bloodstream is slow. Al-

Oxford University Press, 1988), p. 111; *Soviet Military Power: An Assessment of the Threat 1988* (Washington, D.C.: U.S. Department of Defense, 1988), p. 77.

though spray tanks can efficiently distribute agent as a fine aerosol, missile warheads using explosive charges probably cannot disperse more than one-half of the agent as particles with diameters of less than 5 microns, the particle sizes that maximize retention in the lung and absorption into the bloodstream.

Large particles settle quickly onto the target below, heavily contaminating a relatively small area; aerosols, on the other hand, drift with the wind, posing an inhalation hazard over a much larger area. Since large particles are not readily inhaled and do not stay airborne for long, the primary hazard is skin contact with the agent. For this reason, persistent agents are usually made into coarse aerosols, so that a particular target (e.g., an airstrip) can be made unusable, except by protected personnel, for an extended period of time. For strategic attacks against unprotected civilians, an agent capable of forming a fine (less than 5-micron–diameter) aerosol would have the greatest potential for causing deaths over a large area. The U.S. Army recommends using the more volatile agent sarin (rather than VX) against troops that are unprotected or who are carrying, but not wearing, masks.[30] Fine aerosols are carried along by the wind, gradually diluted by atmospheric turbulence and removed by deposition onto the ground, forming cigar-shaped dose contours.

The concentration of agent downwind from a chemical attack depends on the mass of agent released, the size of the particles, the height of burst, and the initial size of the aerosol cloud, as well as the atmospheric stability, wind speed, mixing height, and temperature. Since the United States has undoubtedly conducted extensive tests, it is reasonable to assume that current U.S. warheads can disseminate sarin as a fine aerosol with reasonable efficiency. While it should not be too difficult for Third World countries to develop the chemical-bomblet warhead technology that the United States had in the 1950s, it would be far easier and more efficient to spray chemical agents from aircraft or cruise missiles. Indeed, Iraq primarily used helicopters, which it bought from the United States for crop dusting, to spray lethal chemical agents on Kurdish civilians in 1988.[31]

To explore the range of casualties that might result from chemical attacks on unprotected civilians, a dispersion model was developed to predict the

30. FM 3-10, *Employment of Chemical Agents* (Washington, D.C.: Department of the Army, March 1966), p. 19.
31. Stuart Auerbach, "$1.5 Billion in U.S. Sales to Iraq," *Washington Post*, March 11, 1991, p. A1, A16.

areas that would receive lethal or incapacitating doses under a variety of conditions and assumptions.[32] Calculations were done for ground-level releases of 100 to 1000 kilograms of agent on urban targets under three sets of weather conditions: a clear, sunny day with a light breeze; an overcast and windy day or night; and a clear, calm night.[33] The agent was assumed to be released by the missile warhead in three different forms: as vapor over a period of hours, instantaneously as a fine aerosol, or half as vapor and half as fine aerosol, with an initial cloud diameter of 50 to 150 meters. The results, given as the area covered by doses greater than the lethal or incapacitating dose to mildly active, unprotected adults per tonne of agent released, are given in Table 4. In general, elevated releases, coarser aerosols, and larger initial cloud sizes lead to smaller lethal areas than small, ground-level clouds of fine aerosol.

Assuming that about half of the agent is disseminated as a fine aerosol (with most of the remainder evaporating within a few hours in warm weather), the lethal area ranges from about 20 to 40 hectares per tonne[34] (ha/te) of agent released under the least favorable weather conditions explored, to 250 to 400 ha/te under the most favorable conditions for an attacker. The corresponding areas for incapacitating effects are an additional 20 to 50 ha/te for unfavorable conditions and 300 to 400 ha/te for favorable conditions.

It should be noted that the least favorable conditions explored here are relatively unfavorable (from the attacker's point of view) but reasonably likely conditions; much higher wind speeds or larger aerosol particles would decrease these areas substantially. On the other hand, the most favorable

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32. The model was verified by comparing its results with U.S. Army estimates of the number of sarin-filled 105-millimeter, 155-millimeter, and 8-inch artillery shells required to produce 50 percent casualties among mildly active, unprotected troops over an area of one hectare. Good agreement was obtained over a variety of stability conditions and wind speeds by assuming that 50 percent of the agent is released in a small cloud of fine aerosol at ground level over rural terrain, and that at high temperatures the remaining 50 percent evaporates in a matter of hours. See FM 3-10, *Employment of Chemical Agents*, pp. 97–99. Under a reasonable set of assumptions, the model also showed good agreement with estimates presented by IISS, *The Military Balance 1988–89*, p. 248, for the effects of chemical attacks with Soviet Scud and FROG missiles. A detailed description of the model (and the computer model itself) is available upon request to the author.

33. Stability is a measure of the tendency of air near the ground to mix vertically. During unstable conditions mixing is rapid; during stable conditions air is trapped near the ground. In general, unstable conditions occur during clear, calm days; stable conditions occur during clear, calm nights. Extensive cloud cover or high wind speeds create neutral conditions (i.e., air near the ground tends neither to rise or sink).

34. One hectare (ha) = 10,000 square meters = 0.01 square kilometers = 2.5 acres. An average city block covers an area of about two hectares.

Table 4. The areas over which unprotected adults would receive lethal and incapacitating doses of sarin, per tonne of agent released.

Weather Conditions[a]	Agent Form[b]	Area Effected (hectares/tonne)	
		Lethal Dose	Incapacitating Dose
Clear,	vapor	10–18	26–37
sunny day,	a/v	17–32	47–64
light breeze	aerosol	29–48	73–94
Overcast with	vapor	9–16	13–34
moderate wind,	a/v	19–37	27–83
day or night	aerosol	37–63	54–150
Clear,	vapor	150–460	420–1300
calm night	a/v	260–400	590–820
	aerosol	240–430	380–900

NOTES: Assumes LCt_{50} of 70 mg·min/m^3 and ICt_{50} of 35 mg·min/m^3 (appropriate for mildly active, unprotected men), for releases of 100 to 1,000 kilograms of sarin on an urban target.

a. "Clear, sunny day, light breeze" corresponds to Pasquill class "A" stability for residential urban areas, a mixing height of 2,000 meters, and a wind speed of 2 meters per second; "overcast" corresponds to class "D" stability, a mixing height of 1,000 meters, and a wind speed of 5 meters per second; "clear, calm night" corresponds to class "F" stability, a mixing height of 250 meters, and a wind speed of 1 meter per second.

b. a/v = 50 percent fine aerosol, 50 percent vapor. The deposition velocity is assumed to be 0.01 meters per second for a fine aerosol, 0 meters per second for vapor.

weather conditions explored here are not uncommon—at one desert location in the southwestern United States, such conditions occur about one-third of the time.[35] Because the attacker chooses the time and place of an attack, it can therefore control to some extent the weather conditions during an attack.[36]

If we assume that the average chemical warhead is 30 percent agent by weight, and that about half of the agent is released as respirable aerosol, then under even relatively unfavorable conditions a sarin-armed missile with

35. *Reactor Safety Study*, WASH-1400 (Washington, D.C.: U.S. Nuclear Regulatory Agency, 1975), Appendix VI, p. 5-3.

36. Although Third World countries may not have weather satellites, they could use commercial weather forecasts, news broadcasts, or even spies to determine weather conditions in remote cities, even during war.

a throwweight of 1 tonne could kill unprotected people over an area of 6 to 10 hectares and incapacitate over another 8 to 11 hectares. Under favorable conditions for an attacker, unprotected people would be killed over an area of 100 hectares and incapacitated over an additional 120 hectares. If used against an unprepared city with a population density of 35 per hectare (e.g., Tel Aviv or Riyadh), 200 to 3,000 people would be killed and a somewhat greater number seriously injured, depending on the weather conditions. This is 40 to 700 times as many deaths, and 20 to 300 times as many injuries, as would result from the same missile armed with a conventional warhead.[37] Since many cities in the Middle East and Asia have much greater population densities (e.g., 100 to 300 per hectare),[38] the potential exists for huge numbers of deaths in unprotected civilian populations.

DEFENSE AGAINST CHEMICAL AGENTS. While it is possible to protect civilians against chemical attack, protection is never perfect. It is commonly assumed that by remaining indoors and closing all doors and windows the dose can be greatly reduced, but in fact agent will still leak in. Even tightly sealed dwellings will not afford much protection unless they are thoroughly ventilated as soon as the cloud passes, for otherwise the occupants will receive about the same dose as unprotected individuals, but at a slower rate.[39] Gas masks provide protection against all but very high concentrations of nerve agent, but they must be applied immediately and they must fit properly. Even among soldiers carrying masks and trained for chemical combat, the U.S. Army estimates that 4 to 8 percent of troops that would have died

37. See footnote 17.

38. Average population densities of major cities range from 25 (Miami) to 1,000 (Hong Kong) per hectare. Most cities have 30 to 300 people per hectare, with western cities at the lower end and older Asian cities at the upper end of this range. The average population densities of selected Asian and Middle Eastern cities are as follows: Bombay, 41; Haifa, 100; Baghdad, Istanbul, and Karachi, 130; Ankara and Kiev, 160; Calcutta, 190; Delhi, 200; Teheran and Lahore, 240; Alexandria, 290; Cairo, 320. *The World Almanac* (New York: Pharos, 1989), pp. 738–739.

39. If people remain inside buildings for several hours, the dose inside will be nearly equal to the dose outside. To see this, consider a house of volume V in which the residence time of air is τ; air will flow into the house at a rate of V/τ. If the concentration of agent in the outside air is C for the time of the cloud passage t, then amount of agent flowing into the house is $C(V/\tau)t$, and the concentration of agent inside the house, c, is equal to Ct/τ. Therefore, the time-integrated dose inside the house ($c\tau$) is equal to the dose outside (Ct). If the building is tightly sealed, τ will be large (e.g., 10 hours) and c will be much smaller than C, and occupants can greatly decrease their total dosage by ventilating the house after the cloud passes. To do this, however, the occupants must be told when it is safe to go outside. A series of chemical attacks, or fears of additional attacks, could keep people in their houses for many hours (comparable to the residence times of air in western dwellings). In fact, residents of Tel Aviv were kept in their houses for hours at a time merely in anticipation of such attacks.

without masks will die nevertheless because of delayed masking, mask leakage, defective or missing masks, or early unmasking.[40] The percentage of masking errors among civilians would undoubtedly be much higher; it seems unlikely that even the best civil defense program could reduce fatalities to much less than 10 percent of the number that would die without protection.

Depending on the circumstances, chemical weapons can be a minor nuisance or weapons of mass destruction. Based on the example given above, chemical warheads are likely to be more deadly than conventional munitions even if used against a well-prepared population under unfavorable weather conditions;[41] they may be 50 times more deadly if civil defense is ineffective *or* weather conditions are favorable, and 500 times more deadly than conventional warheads when used against unprepared populations under favorable weather conditions. (Compared to a Hiroshima-sized nuclear weapon, chemical warheads would result in 1/10 to 1/2000 of the number of deaths.)[42] In view of these estimates, it is not hard to see why a Third World military planner with a limited number of inaccurate but expensive missiles might prefer chemical over conventional warheads.

Although they are capable of causing widespread death and suffering, chemical warheads do not constitute a "poor's man atom bomb," especially if used against a well-prepared adversary. Biological weapons, in contrast, could approach nuclear weapons in lethality.

BIOLOGICAL WARHEADS

No nation is known to possess biological weapons today, but the United States, the United Kingdom, and Japan are known to have developed several types of biological weapons in the past (such stocks have since been destroyed), and Iraq and Syria are strongly suspected of stockpiling such weapons today.[43]

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40. FM 3-10, *Employment of Chemical Agents*, p. 36.
41. If chemically armed missiles are to be no more deadly than similar missiles armed with high explosives, civil defenses would have to limit deaths to no more than 1 percent of the number that would die without protection. Such a high degree of protection seems extremely unlikely.
42. Based on the bombings of Hiroshima and Nagasaki, the lethal area of a 20-kiloton nuclear weapon is about 10 square kilometers (1,000 hectares). Samuel Glasstone and Philip J. Dolan, *The Effects of Nuclear Weapons* (Washington, D.C.: U.S. Department of Defense, 1977), p. 544.
43. The United States believes that Iraq has anthrax as well as botulism warheads. Statement of Rear Admiral Brooks, March 7, 1991.

Biological agents can be divided into two distinct categories: toxins (toxic chemicals produced by living organisms)[44] and pathogens (living organisms that produce disease). One of the most studied toxins is botulinal toxin, which is lethal at concentrations a thousand times smaller than sarin. Botulinal toxin is not suited to air delivery (especially by ballistic missile) because it decays rapidly upon exposure to air. Experiments in which clouds of botulinal toxin were released over lines of tethered animals showed that the number of deaths caused would not be much greater than that from an equal quantity of nerve agent.[45] Other toxins have been studied, but none seems to have convincing advantages over nerve agents for strategic missile attacks.

Pathogens, on the other hand, may have significant advantages over nerve agents in their ability to kill large numbers of civilians. In particular, *bacillus anthracis*, the bacteria that causes anthrax, seems especially well suited for dissemination by missiles or bombs because of its ability to form spores that can survive violent dissemination methods and exposure to sun, air, and rain. Because anthrax is not an infectious disease, it can be used as discriminately as chemical agents. Anthrax bacteria are deadly in concentrations a thousand times smaller than nerve agents, with an estimated ECt_{50} (the dose at which 50 percent of the exposed population would contract the disease) of only 0.1 $mg \cdot min/m^3$. Left untreated, anthrax kills nearly all who contract it within a few days. Although vaccines are available, they must be administered before exposure and their effectiveness against massive doses is uncertain. Mass vaccination programs are unlikely to be popular unless the situation is obviously dire. Treatments with antibiotics have been developed, but patients must be treated early, before symptoms of the disease are apparent. It is doubtful whether sufficient stocks of antibiotics would exist to treat the hundreds of thousands of people who might fear that they were infected during an attack on a large city, let alone enough medical personnel to administer the injections in the short time available (a day or two).

Table 5 gives the ECt_{50}, incubation period, and mortality rate for *bacillus anthracis* and several other pathogens. Some pathogens have an ECt_{50} that is much lower than that of anthrax, but their mortality rates are usually lower, the incubation times are longer, the pathogens are more difficult to dissem-

44. Toxins have been produced synthetically, which blurs the distinction between toxin and chemical agents. The classification of toxins as biological rather than chemical agents dates back to a time when synthetic production was not possible.
45. SIPRI, *CB Weapons Today*, p. 60.

Table 5. Pathogens considered for use as biological weapons.

Pathogen	Disease	Respiratory ECt_{50}[a] ($mg \cdot min/m^3$)	Time to Effect (days)	Mortality Rate (percent)
F. tularensis	Tularemia	0.001	2–5	0–60
B. anthracis	Anthrax	0.1	1–4	95–100
P. pestis	Plague	[b]	3–4	90–100
C. burnetii	Q fever	0.001	18–21	1–4
VEE virus	VEE	0.001	2–5	0–2

SOURCE: Stockholm International Peace Research Institute, *The Problem of Chemical and Biological Warfare,* Vol. II: *CB Weapons Today* (New York: Humanities Press, 1973), pp. 42–43.

NOTES:

a. Median pathogen dosage that would produce the disease in resting, unprotected men, assuming agent-infested particles with diameters of 1 to 5 microns, and assuming that a fraction of the organisms die during dissemination (95 percent for tularemia, 50 percent for anthrax, 90 percent for Q fever, and 80 percent for VEE).

b. Plague is highly contagious; the number of people exposed to a given concentration of the *pasteurella pestis* bacteria would not be an accurate indication of how many people would eventually contract the disease. A dose of about 3,000 bacteria per man would result in a 50 percent probability of contracting the disease.

inate and less hardy when airborne, or the diseases are contagious, making these agents less useful than *bacillus anthracis* for strategic missile attacks. The possibility that suitable pathogens remain to be discovered that are a hundred times more lethal than *bacillus anthracis* cannot be ruled out, however.

As above, a dispersion model was used to estimate the areas that would receive a given concentration of pathogen for attacks with 10 to 100 kilograms of agent distributed as a fine aerosol.[46] Doses greater than 0.1 $mg \cdot min/m^3$ (the estimated ECt_{50} for anthrax) can be produced over 20 to 40 hectares per kilogram of bacteria released on a calm, sunny day; 65–100 ha/kg for a windy,

46. The range of delivered biological agent masses is assumed to be ten times smaller than the range of delivered chemical agent masses because biological agents are more difficult and fragile to disperse and more expensive to produce, and because more casualties could be reliably produced by distributing the available agent among many missiles. See, for example, Matthew Meselson, Martin M. Kaplan, and Mark A. Mokulsky, "Verification of Biological and Toxin Weapons Disarmament," in Francesco Calogero, Marvin L. Goldberger, and Sergei P. Kapitza, eds., *Verification: Monitoring Disarmament* (Boulder, Colo.: Westview, 1991), p. 152.

overcast day; and 30–260 ha/kg for a calm, clear night. Kilogram for kilogram, anthrax produces lethal concentrations over an area about one thousand times larger than does sarin; warhead for warhead, roughly one hundred times larger.

To illustrate the magnitude of the casualties that could be produced by biological weapons, consider a missile armed with 30 kilograms of anthrax spores. Lethal doses to unprotected adults would result over an area of 6 to 80 square kilometers, depending on the weather conditions and assumptions about the release; since the cigar-shaped lethal area would extend 10 to 30 kilometers downwind, only 5 to 25 square kilometers of the lethal area might lie within the targeted city.[47] Even with civil defense, the effective lethal area might be 0.5 to 2 square kilometers. (For comparison, the lethal area of a Hiroshima-type fission bomb is about 10 square kilometers.) Thus, even when used against a prepared population, anthrax warheads could rival small nuclear weapons in their ability to kill people, although the outcome would be highly unpredictable due to uncertainties in the weather and the effectiveness of dissemination, civil defense, and medical treatment.

Unlike chemical agents, the most persistent of which might pose a continuing hazard to large numbers of humans for up to a few weeks, anthrax spores could survive for decades in soil. Unless extensive decontamination measures are taken, spores in resuspended dust could continue to infect people long after an attack. During World War II, Britain, Canada, and the United States detonated experimental anthrax bombs on Gruinard Island; the island was only declared safe again in 1988 after burning the heather and treating the ground with formaldehyde.[48] It is difficult to make quantitative estimates of the number of people that might be exposed in this way because of uncertainties in evacuation and decontamination procedures, the lifetime of the spores, the concentration of resuspended spores as a function of time, and the time dependence of the dose-response relationship.[49] The persistency of agents such as anthrax would limit the usefulness of such weapons in

47. A city of one million inhabitants with an average population density of 35 per hectare would have a diameter of roughly 10 kilometers. If warheads are detonated in the optimal location (on the edge of the city on its windward side), then at most only the first 20 kilometers of the lethal area would lie within the city.
48. L.M. Astra, "Germs and Ideas: What the Public Record Says About Chemical and Biological Warfare, Both Here and Abroad," *City Paper* (Washington, D.C.), February 22, 1991, p. 11.
49. For example, inhaling a thousand spores a day for a thousand days will not result in the same effects as inhaling a million spores in a single day.

taking and holding territory, but it would not necessarily make the threat to use such weapons less credible than the threat to use nuclear weapons.

Table 6 gives rough estimates of the number of people that might be killed in a large, sparsely populated city by a missile armed with a conventional, chemical, biological, or nuclear warhead, with and without effective civil defenses. Up to ten times as many casualties would result if these weapons were used in a densely populated city such as Cairo, Teheran, or Lahore. In very rough terms, a relatively small (20-kiloton) nuclear warhead is 10,000 times as destructive as a 1-ton conventional explosive, 10 to 100 times as deadly as a nerve-agent warhead, but no more deadly than an anthrax warhead used against an unprotected population. Used against a well-protected population, nuclear weapons are 100 to 1,000 times more deadly than chemical weapons and about 10 times as deadly as an anthrax warhead.

Do chemical and biological weapons qualify as "weapons of mass destruction," and should we think about these weapons in the same way that we have come to think about nuclear weapons? Anthrax weapons (or weapons using similarly lethal pathogens) certainly are able to kill enough people to qualify for this dubious distinction, even if they cannot knock over buildings.

Table 6. A comparison of the casualties produced by nuclear, chemical, biological, and high-explosive warheads.

Type of Warhead	Without Civil Defense		With Civil Defense[a]	
	Dead	Injured	Dead	Injured
Conventional (1 tonne of high explosive)	5	13	2	6
Chemical (300 kilograms of sarin)	200–3,000	200–3,000	20–300	20–300
Biological (30 kilograms of anthrax spores)	20,000–80,000		2,000–8,000	
Nuclear (20 kilotons)	40,000	40,000	20,000	20,000

NOTES: Assumes a missile with a throwweight of 1 tonne aimed at a large city with an average population density of 30 per hectare. Assumes that civil defenses reduce casualties from conventional and nuclear explosions by a factor of two, and casualties from chemical and biological weapons by a factor of ten.

Whether or not chemical warheads should be classified as massively destructive appears to depend on the willingness and the capacity of civilian populations to prepare for such attacks. While civil defense is relatively straightforward, one should bear in mind that the capacity of many Third World nations to prepare and train for chemical attacks is limited; many western nations, while possessing the capacity, lack the willingness to prepare.[50] In the final analysis, however, it depends on the threshold of pain in a particular country or region. Western nations often react violently to events that involve even a handful of civilian deaths. Thus, while chemical weapons may be hundreds or thousands of times less deadly than nuclear weapons, chemical attacks on western nations may well trigger political and military responses similar to those that would be provoked by nuclear or anthrax attacks.

Why Should We Care About Proliferation?

There are five reasons that we should be at least as concerned about the proliferation of weapons of mass destruction in the future as we have been about nuclear proliferation in the past: (1) proliferation complicates U.S. foreign policy; (2) crisis instabilities are likely to more severe; (3) the probability of inadvertent or accidental use is likely to be greater; (4) transfers to terrorist or sub-national groups are more likely; and (5) at least some of the future possessor nations are likely to be politically unstable, aggressive, and difficult to deter.

To see how missile proliferation, coupled with unconventional warheads, might complicate foreign policy, consider how the response to the Iraqi invasion of Kuwait might have been different if Iraq had possessed the capability to launch chemical, biological, or nuclear weapons against Paris or London. In the face of such a threat, would France and the United Kingdom have joined the United States in attacking Iraq? Indeed, if Iraq threatened to hold European cities "hostage," would even the United States have risked an attack? And if Iraq carried out threats to launch such weapons at the first notice of an allied attack, how would the United States and its allies have

50. The dismal history of civil defense precautions against nuclear attack in the United States should give pause to anyone contemplating a similar program to guard against chemical or biological attack. See, for example, Robert Scheer, *With Enough Shovels: Reagan, Bush, and Nuclear War* (New York: Vintage, 1983).

responded? The result would not necessarily be total paralysis; in the case of Iraq, for example, the United States could have preemptively destroyed the missile sites, as it did in the war. If weapons were launched nevertheless, massive conventional attacks would have been adequate to punish and defeat Iraq.

With regard to crisis instability, Third World weapons are more vulnerable to preemptive attack than are the forces of the nuclear powers, whether based on missiles or aircraft. The short distances separating nations in the Middle East make airbases and missile launch sites tempting targets for preemptive strikes; ballistic missiles, either with more accurate or with more powerful warheads, make it possible to attack such targets in just a few minutes. While light-weight missiles such as the Scud are readily mobile and thus can be difficult to destroy if dispersed throughout the countryside, longer-range missiles weighing more than ten or twenty tonnes are too heavy to be truly mobile and probably would be launched from a few (perhaps hardened) fixed sites. Missiles have the advantage of not requiring visible facilities such as airstrips, but, unlike aircraft, missiles cannot escape attack without being used offensively.

Although missiles themselves might not significantly worsen the vulnerability problem, weapons of mass destruction might, because the benefits that could be derived from a successful first strike would be much greater. Just as the early U.S. and Soviet nuclear forces were vulnerable to preemptive attack, so may emerging arsenals of mass destruction in the Third World create instability. If, during a crisis, one side believes that war is inevitable, it may try to preemptively destroy the other side's vulnerable but valuable weapons of mass destruction. Even if both sides prefer not to preempt, each may fear that the other side will; consequently, both may decide to launch at the first (perhaps false) indication of an attack. This crisis-stability problem is even worse than the one faced by the superpowers,[51] because warning of an attack will be shorter, because of the shorter range, and much less reliable, because of the primitive intelligence-gathering capabilities of most Third World nations. The United States and the Soviet Union have managed to keep their nuclear forces on constant alert for three decades without an accidental launch. It is open to question whether the new missile states,

51. For a discussion of crisis stability in the superpower context, see Desmond Ball, et al., *Crisis Stability and Nuclear War* (Ithaca, N.Y.: Cornell University, 1987).

lacking the wealth, technology, and political stability of the superpowers, can be expected to compile as good a record.

The possibility of unauthorized use or accident also creates dangers. Although political control over weapon systems may be very strong in authoritarian states, unauthorized use and accidental launches are not physically prevented by sophisticated permissive action links and environmental sensing devices, such as those used in U.S. nuclear weapons. A group of military officers might use or threaten to use such weapons on their own authority, either to satisfy an overzealous hatred of the enemy or to blackmail their own civilian government.

The probability of large-scale attacks by sub-national or terrorist organizations will become far more worrisome as weapons of mass destruction spread to Third World countries that sponsor acts of terrorism, such as Iran, Iraq, Libya, North Korea, and Syria. If the supplier of such weapons is known, victim nations could respond by retaliating against the supplier nation; but if the supplier cannot be positively identified, a forceful response to an anonymous attack could trigger widespread resentment, especially if the suspected supplier can plausibly deny its involvement. Terrorist attacks might also be calculated to catalyze war between two states.

With the possible exception of the Soviet Union in recent times, the nuclear powers exhibit an exceptional degree of internal political stability. Many of the potential proliferators listed in Table 2 do not enjoy the same degree of stability. Some states, such as Afghanistan, Iraq, and South Africa, have deep internal divisions. Other pairs of states, such as India and Pakistan, North and South Korea, and Israel and various Arab states, have deep religious, ideological, or cultural animosities, often combined with active border disputes, that weaken deterrence. Some authoritarian states are ruled by aggressive dictators, such as Libya's Muammar Qaddafi or Iraq's Saddam Hussein, who have little regard for international norms of behavior. Many of the new missile states are not happy with the status quo, and may look upon their newly acquired capabilities for mass destruction as instruments of intimidation and change. The probability of conflict within and among the new missile states will be substantially higher than has been the case with the present nuclear powers, which increases the probability that weapons of mass destruction will be used. Even if the United States or it allies would not be directly threatened, we should still be concerned because of the human suffering that would result from the use of such weapons.

What Can We Do About Proliferation?

The United States has a declaratory policy of preventing the proliferation of weapons of mass destruction, but this policy has been applied rather unevenly over time and among nations. Many of these inconsistencies have resulted from balancing the goal of nonproliferation against other goals of U.S. policy, such as containing the Soviet Union, supporting the state of Israel, or balancing the trade deficit. In most cases nonproliferation has taken a back seat to these other goals. It is time to give nonproliferation higher priority.

Possible policy responses fall into four broad categories: carrots, sticks, defenses, and management. *Carrots* include security guarantees and arms control arrangements designed to reassure states that are worried that they might need missiles or unconventional weapons for their defense. *Sticks* include export controls, deterrence through the threat of retaliation, economic sanctions, and the threat of preventive war, all of which are intended to thwart or deter proliferation. *Defenses,* both active and passive, seek to insulate the United States (and possibly its allies) from the effects of proliferation. *Management* refers to measures designed to cope with proliferation in a cooperative fashion by, for example, transferring technology or information that decreases the probability of accident, misuse, or instability.

SECURITY GUARANTEES

Promising to defend a country if it is attacked can alleviate its desires for advanced weaponry, but this strategy has obvious limitations. The U.S. commitment to defend South Korea and Taiwan, not to mention Germany and Japan, may have averted the development of nuclear weapons by each of these nations. It is extremely difficult, however, to identify additional nations among those listed in Table 2 to which the United States could extend security guarantees. Even in the case of moderate Arab states such as Egypt and Saudi Arabia, guarantees would encounter strong opposition from supporters of Israel. Collective security guarantees, in which large groups of nations (e.g., the United Nations) agree to come to the aid of any member under attack, are more appealing, but for most nations collective security does not seem sufficiently reliable to forestall the desire to acquire advanced weapons.

ARMS CONTROL

Chemical, biological, and nuclear weapons have been the subject of multilateral arms control treaties; missiles have not. Although arms control treaties cannot prevent proliferation, they can provide a mechanism whereby nations that prefer not to develop certain types of weapons can be reassured that their rivals are also not developing them. If a nation believes that it would be better off if both it *and* its rivals refrained from acquiring certain weapons, then arms control should be an attractive solution. Unfortunately, it is not always so simple. For example, although India might be worse off if both it and Pakistan had ballistic missiles or nuclear weapons, India also faces another rival—China—which already has both and shows no interest in giving them up. Moreover, some nations (e.g., Israel) probably believe that they are better off if they possess weapons of mass destruction, even if it means that their rivals are free to develop the same weapons, for otherwise inferiorities in conventional weaponry or manpower could threaten their survival.

The 1925 Geneva Protocol prohibits the use (or, as interpreted by some countries, the first use) of chemical and biological weapons in war, but not the production or stockpiling of such weapons.[52] Virtually all nations support a verified worldwide ban on chemical weapons, and negotiations on a Chemical Weapons Convention (CWC) are continuing in the multilateral Conference on Disarmament in Geneva.[53] Although the widespread commercial uses of chemicals makes a ban notoriously difficult to verify, the verification procedures under consideration are impressive, and it appears that, through a combination of continuous monitoring and on-site inspection, nonproduction by parties to a treaty can be adequately verified.[54]

Although the Bush administration strongly supports the goals of the CWC, it has argued that the United States must retain a small stockpile of chemical weapons for deterrent purposes until all other states capable of manufacturing chemical weapons have joined the treaty. As might be expected, this

52. See Utgoff, *The Challenge of Chemical Weapons*, for a review of the history of chemical arms control.

53. On January 11, 1989, 149 countries reaffirmed their commitment to the Geneva Protocol and to a global ban on chemical weapons in the Paris Conference on the Prohibition of Chemical Weapons. Although this may appear to justify some optimism about the near-term prospects for a ban on chemical weapons, one should remember that negotiations to ban chemicals have been continuing off and on for nearly a century, and that the current set of talks began two decades ago.

54. For a review of the verification problem, see Karlheinz Lohs, Julian P. Perry Robinson, and Nikita P. Smidovich, "Verification and Chemical-Warfare Weapons," in Calogero, Goldberger, and Kapitza, *Verification: Monitoring Disarmament*, pp. 123–148.

position has come under heavy criticism by those who claim that it smacks of the division between the "haves" and the "have nots" that undermined adherence to the nuclear Non-Proliferation Treaty (NPT). The administration claims that this clause will be an incentive for potential holdouts to join the treaty. The administration's argument highlights the main problem with all multilateral arms control: what about states that will not sign the treaty? Since chemical weapons appear to be the main instrument by which some Arab states (e.g., Syria and Iraq) hope to offset the Israeli nuclear arsenal, it is unlikely that chemical weapons will disappear completely any time soon.[55] Other states with powerfully armed neighbors may draw similar conclusions. There is always the hope that nonsignatories will heed world opinion and observe the taboo on the use of chemicals, but it is wise not to put too much faith in the power of international norms, especially those that have been broken in the recent past. The CWC will not prevent proliferation, but that is too high a standard to set for arms control. The appropriate question is whether the world will be a better place with a treaty than without one; in the case of the CWC, the answer is clearly "yes."

The development, production, stockpiling, and transfer of biological weapons is banned by the Biological Weapons Convention (BWC) of 1972, but the verification provisions of the BWC are limited. Parties to the BWC agree to cooperate with UN investigations, but such investigations must be approved by the Security Council, subject to the veto power of its permanent members. Various confidence-building measures have been adopted at the BWC review conferences, but these measures fall far short of the continuous monitoring and on-site inspections contemplated for the CWC. Since chemical agents are more likely to proliferate, because they are easier to produce and disseminate and their effects are more predictable, the lack of stringent BWC verification may not be worrisome now. But if the CWC makes chemical weapons far more difficult to acquire, then biological weapons may come to be seen as an attractive alternative, and their proliferation may become more of a problem.

In a recent trip to the Middle East, U.S. Secretary of State James Baker reportedly found "a lot of sympathy" among Persian Gulf states for a regional

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55. The link between Israeli nuclear weapons and Arab development of chemical weapons has been made explicit by Arab leaders on several occasions, including during the Paris Conference on the Prohibition of Chemical Weapons. See, for example, Harry Anderson, "Showdown With Libya," *Newsweek*, January 16, 1989, p. 16.

ban on weapons of mass destruction, and even found "considerable interest" in the idea in Israel.[56] Although these discussions are commendable, there is little reason to believe that such an agreement could be achieved without solving the larger political problems in the Middle East, especially the Palestinian problem and the question of the occupied territories. If progress is not made along this front, the connection between Israeli nuclear weapons and Arab chemical (and possibly biological) weapons may create difficulties for the NPT as well as for the CWC. The final NPT review conference is scheduled for 1995, at which time the duration of the NPT will be decided. At least seven potential adversaries of Israel are signatories of the NPT: Egypt, Iran, Iraq, Libya, Saudi Arabia, Syria, and Yemen. Israel is not. All except Saudi Arabia and Yemen are strongly suspected of stockpiling chemical weapons; all but Yemen have acquired or are trying to acquire missiles capable of striking Israel. It is likely that the final NPT review conference will be used as a forum in which this group of countries, perhaps joined by other non-aligned nations, will insist that Israel join the NPT. Indeed, it is not inconceivable that these countries may tie their continued adherence to the NPT, as well as their support for the CWC, to Israeli accession to the NPT (or other equivalent steps). This situation would present the United States with a difficult management problem for which it should be prepared.

EXPORT CONTROLS

Controls on the export of key technologies and materials can slow proliferation, but such controls work much better and engender less resentment if they are coupled with a comprehensive arms control regime. In the NPT, for example, exports to signatories are accompanied by "safeguards" to verify that the exports (e.g., nuclear reactors) are not being used for military purposes. Supplier nations that are party to the NPT must require safeguards on all such exports, even to nations that are not parties to the Treaty.[57] This coupling between arms control and export controls may be an important reason for the relatively slow pace of nuclear proliferation. Unfortunately,

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56. Don Oberdorfer, "Mideast Arms Sale Curb Favored; Israel, Arabs Study Regional Ban on Weapons of Mass Destruction," *Washington Post*, March 23, 1991, p. A15.

57. NPT signatories can, however, supply technology to nations that have unsafeguarded facilities that were developed indigenously or that were supplied by a nonsignatory. This loophole has allowed several nonsignatories to use the knowledge and experience gained from imports of foreign nuclear technologies to pursue weapon development in indigenously developed facilities. Under domestic laws, however, the United States, Canada, and Sweden require safeguards on all facilities in a country to which nuclear technologies are exported.

no comparable arrangements yet exist for the control of exports of chemical, biological, and ballistic-missile technology or materials. In general, export controls in these areas have been adopted only after proliferation problems were widely recognized. Even after controls are adopted, competition among suppliers and illegal exports often undermine their effectiveness.

Multilateral export controls were recently extended to missile technology through the Missile Technology Control Regime (MTCR).[58] Although the MTCR has slowed missile programs in several countries, the regime is "too little, too late." One important flaw in the MTCR is that several current and potential future exporters of missile technology are not part of the regime, including China, India, Israel, North and South Korea, Taiwan, Brazil, and Argentina. Without the cooperation of all important suppliers, export controls can slow, but cannot stop, proliferation. Another major flaw is that the MTCR allows exports of missile technology for use in civilian applications such as space launch vehicles, even though the same technologies can be used in weapons. Even if the MTCR required safeguards to verify that exports were only being used in civilian applications (which it does not), the knowledge and experienced gained would alone be sufficient in many cases to greatly aid military programs. And even if missile technologies were only exported to nations without military programs, sounding rockets and space launch vehicles developed for peaceful uses could quickly and easily be converted into ballistic missiles.

The prospects for export controls on chemical and biological warfare capabilities are not much brighter. The Australia Group, a loosely knit group of 23 countries including the United States, has for some time limited the export to certain countries of selected equipment and chemicals that can be used in the production of chemical agents, and yet chemical weapons have spread, with key technologies often slipping through the export controls of U.S. allies. The United States recently expanded its export restrictions,[59] but this will be of little help unless most other supplier nations follow suit. Once

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58. The MTCR was initially an agreement between the Canada, France, Germany, Italy, Japan, United Kingdom, and the United States to limit the export of missiles capable of delivering a payload of at least 500 kilograms over a range of 300 kilometers, as well as missile systems, subsystems, and technologies that would be required to assemble such weapons. Spain, Belgium, the Netherlands, and Luxembourg have since joined the agreement; Sweden, Norway, and the Soviet Union have approved the MTCR restrictions but have not officially subscribed to the agreement.

59. "Fact Sheet on Enhanced Proliferation Control Initiative," Office of the Press Secretary, The White House; December 13, 1990.

again, a large part of the problem is that many of the chemicals and production techniques required for chemical and biological weapons have legitimate civilian uses.[60] Many of the items whose export the United States limits are used to make plastics, pharmaceuticals, and fertilizers. Nerve agents, for example, are chemically similar to common organophosphate pesticides. Fermenters can be used to produce antibiotics as well as pathogens. Industrialized nations will find it difficult to deny technologies essential for the production of goods such as pesticides and antibiotics, even to the growing list of countries with a suspected interest in developing chemical or biological weapons; yet it is difficult, if not impossible, to ensure that such exports would not or could not be used for military purposes.

The power of export controls by the industrialized nations is waning. Several Third World countries, such as India and Brazil, have thriving chemical industries of their own, and they are highly unlikely ever to join the Australia Group or similar supplier groups. The only hope of enlisting the cooperation of such states is to embed export restrictions in an arms control framework that makes no distinctions between western and eastern, nuclear and non-nuclear, or industrialized and developing nations. In the case of nuclear weapons, chemical weapons, and ballistic missiles, the United States has been unwilling to go this far.

DETERRENCE, SANCTIONS, AND PREVENTIVE WAR

Deterrence and preventive war represent the dark side of nonproliferation policy. Deterrence through threat of retaliation in kind is widely credited with preventing the use of chemical weapons in World War II, as well as the non-use of nuclear weapons since the end of World War II. Some claim that during the 1991 Gulf war, it was the possession of chemical weapons by the United States and the implicit threat to use these weapons that deterred Iraq from using its chemical weapons against allied ground troops, but this is far from obvious. First, Iraq apparently did not stockpile chemical weapons in Kuwait, and could not do so once the air war began destroying its supply lines. Iraqi forces might have used chemicals if they were available. Second, although most high-level officials were careful to say that the United States would consider all options if U.S. troops were attacked with chemical agents,

60. Stuart Auerbach, "U.S. to Curb Export of Ingredients in Chemical Weapons," *Washington Post*, February 27, 1991, p. G1, G3.

others made it clear that the United States would not respond in kind. Indeed, the United States did not even have chemical weapons available for use in the Middle East.

It is theoretically impossible to prove that deterrence works, since it is always possible that the other side had no intention of using that which they were supposedly deterred from using. Only failures of deterrence can be verified. If one has faith in the power of the threat of retaliation in kind, then maintaining chemical arsenals might be better than a CWC that does not enjoy universal adherence. Some states or some leaders may not be deterrable, however. Moreover, the United States can deal militarily with most of the emerging unconventional threats by means of overwhelming conventional force, thus obviating the need for "in kind" retaliation.

The war against Iraq was a preventive war in the minds of many Americans. A primary goal of the war was to destroy Iraq's potential to make and deliver nuclear, chemical, and biological weapons—to make war now, rather than later when Iraq might be armed with long-range weapons of mass destruction. The destruction of the Iraqi Osiraq reactor by Israel is another example of a preventive use of force. The use of force, especially on the scale of U.S. actions in Iraq, will generally be limited to the most exceptional circumstances and the most obviously aggressive and nefarious governments. The use of economic sanctions is far more palatable, but sanctions by the United States alone are insufficient. However, the United Nations may be able to make more widespread use of sanctions to punish nations that use or threaten to use weapons of mass destruction, thereby deterring others from following the same path.

DEFENSE

Even if arms control and export controls are reasonably effective, weapons of mass destruction will likely be acquired by a handful of determined states. Should the United States and its allies rely on the threat of retaliation to deter the use of such weapons, or should they pursue the development of defensive systems that could render such weapons "impotent and obsolete"? When this question was raised by President Reagan in 1983 in the context of the Soviet nuclear threat, general agreement emerged among defense analysts that the goal of a perfect defense was unattainable, and that the benefits of less-than-perfect defenses were unclear, and might well be negative. The use of Scud missiles in the Persian Gulf War and the apparent success of the

Patriot system in shooting them down[61] has rekindled the debate about the desirability of ballistic missile defenses.[62] Now that perceptions of a Soviet threat have dimmed, should the United States develop defensive systems capable of shooting down missiles launched by Third World countries? I do not think so.

The Patriot is a ground-launched interceptor initially designed to shoot down aircraft, which has some capability to intercept short-range ballistic missiles (which travel at relatively low speeds) in their terminal or reentry phase. Although intercepting faster, longer-range missile warheads is far more challenging (especially at ranges of several thousand kilometers), it should be possible to build a system capable of destroying long-range missile warheads with non-nuclear interceptors in the near future. But a major problem with terminal systems is that they can only defend a limited area ("footprint" or area of coverage). The Patriot system, which has a small footprint, could be successful because the number of targets within range of Iraqi missiles was small. Defending cities from longer-range missiles would not only require a more sophisticated interceptor, but would require far more interceptor sites to defend all possible targets within range of the missile.

In designing terminal defenses against chemically armed missiles, care must be taken that warhead destruction will be high in the atmosphere. If the agent is released as a fine aerosol at altitudes of a few hundred meters or more, it will be sufficiently diluted by the time the cloud reaches the ground that doses will be inconsequential. If, on the other hand, the high explosive in the chemical warhead is not detonated, the agent may be released as relatively large droplets which rain quickly onto the ground (similar to the way in which agent is released from Soviet chemical warheads).[63] The lethal area formed by such a release would, however, be much smaller than that resulting from a successful missile attack.

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61. It is not yet clear how successful the Patriot really was in destroying incoming Scud warheads. Some analysts claim that while the Patriot's fragmentation warhead many have destroyed the Scud missile body, in many cases it did not detonate the high explosives in the Scud warhead. Casualties were minimized nevertheless, because live warheads were knocked off course. See William Safire, "The Great Scud-Patriot Mystery," *New York Times*, March 7, 1991, p. A25; and R. Jeffrey Smith, "Patriot Missiles Less Effective in Israel," *Washington Post*, April 26, 1991, p. A41.

62. See, for example, Harold Brown, "Yes on Patriot, No on SDI," *Washington Post*, March 27, 1991, p. A23.

63. Theodore A. Postol, "The Prospects for Successful Air Defense Against Chemically-armed Tactical Ballistic Missile Attacks on Urban Areas," March 7, 1991 (unpublished).

Even a highly effective terminal defense is unlikely to destroy more than 90 percent of incoming targets, but if only one nuclear or biological warhead penetrates the defenses of a city, thousands of people will die. Even the penetration of a single chemical warhead could result in hundreds of deaths and generate widespread panic in an unprepared population. Military planners are not likely to be satisfied with a 10 percent probability of penetration, however. Rather, it is probable that the deployment of defenses will prompt the search for offensive countermeasures (e.g., decoys, chaff, multiple warheads, maneuvering warheads, etc.), triggering an offense-defense arms race that leaves both sides less secure. It was the avoidance of just this sort of situation that lead the United States and the Soviet Union to limit strategic missile defenses in the Anti–Ballistic Missile (ABM) Treaty.

Only intercontinental-range missiles could threaten the U.S. homeland (except, possibly, from Cuba). Outside of the five declared nuclear powers, only Israel and India could strike the United States in the near future. However, important U.S. allies, such as the United Kingdom, France, Germany, and Japan, may soon be within range of the missile forces of several countries, and the United States might wish to protect its allies from attack. But space-based systems intended to intercept missiles in their boost phase, such as the SDI "brilliant pebbles" proposal, will not be able to engage short-range missiles or intermediate-range ballistic missiles that fly slightly depressed trajectories.[64] Such systems might be able to destroy ICBMs, but their benefits are unclear, given how few countries will possess ICBMs, and given that any country sophisticated enough to develop ICBMs could certainly find other ways to deliver nuclear, chemical, and biological weapons if faced with an effective missile defense. Indeed, cruise missiles—about which SDI-type systems can do very little—may in the not-too-distant future prove to be far more effective delivery systems for emerging nuclear, chemical, and biological arsenals than ballistic missiles. Cruise missiles are extremely difficult to defend against.

Deployment of almost any type of defense against long-range missiles or the transfer of relevant technologies to U.S. allies would violate provisions of the ABM Treaty. Under the ABM Treaty, the United States and the Soviet Union are permitted to deploy no more than 100 ground-launched missiles,

64. David C. Wright and Lisbeth Gronlund, "Underflying Brilliant Pebbles," *Arms Control Today*, Vol. 21, No. 4 (May 1991), p. 16.

all at a single, fixed site. Mobile or space-based systems are prohibited, and neither country may transfer ABM technologies to third parties. Any system capable of efficiently destroying intermediate-range missiles would have some capability against strategic missiles, which may violate the Treaty. In contemplating defenses against longer-range Third World missiles, the United States must judge whether the benefits afforded by such a defense would be worth jeopardizing the ABM Treaty and the two decades of U.S.-Soviet arms control efforts that are based upon it. The United States and the Soviet Union could agree to deploy defenses in a cooperative fashion to defend against third-party missiles, but this is highly unlikely in the foreseeable future.

MANAGEMENT

As noted above, Third World missiles and weapons of mass destruction are likely to be far more vulnerable to crisis instability, accidents, and intentional misuse than U.S. and Soviet nuclear arsenals have been. While this is undoubtedly a good reason to avoid proliferation in the first place, additional nations will acquire such weapons despite our best efforts at dissuasion. Should the United States quietly offer to help improve the safety and stability of their weapons? It seems illogical to spend billions of dollars ensuring the safety and security of our own weapons, while doing nothing to ensure the safety and security of weapons that may be pointed at us or our allies. If crisis stability becomes a major problem, the United States could extend warnings or assurances as to missile attack, in hopes of preventing inadvertent launches and deterring preemptive strikes. Such measures might be in the best interest of the United States and the world community in general, but it is extremely difficult for a government to command this degree of flexibility in foreign policy. Moreover, such behavior on our part would be interpreted by other Third World nations as a "wink and a nod" to successful proliferators, and this would inevitably undermine the even more important task of preventing the spread of such weapons to additional states.

Conclusions

Ballistic missile proliferation continues, with several nations seeking ever-longer ranges. It is only a matter of time before cruise-missile technology proliferates in similar fashion. Long-range ballistic missiles armed with conventional warheads do not make military sense. This simple fact seems to

be well understood, since many of these same nations are also actively pursuing nuclear, chemical, and biological weapons. Nuclear weapons are by far the most difficult to acquire; the requisite technologies to produce nuclear materials are expensive and export controls are relatively effective. Chemical weapons are much easier to acquire, and a missile armed with a chemical warhead could kill as many people as dozens or even hundreds of conventionally armed missiles. Biological weapons are more difficult to produce and more unpredictable in their effects, but could inflict casualties on the scale of small nuclear weapons. Therefore, it should not be surprising if the future of missile proliferation points in the direction of chemical and biological weaponry, since for many states these are the only weapons that could constitute a strategic threat or a strategic deterrent.

In dealing with this emerging threat, the United States and its allies should resist calls to develop ballistic missile defenses or to rely on deterrence or threat of military force. Defenses would be costly and imperfect; they would trigger offensive countermeasures and endanger superpower arms control; and they would address only one of the ways in which weapons of mass destruction could be delivered (and probably the least likely way they would be delivered to the United States). While deterrence may work among the nuclear powers, it is an unreliable foundation for Third World security, due to the increased probability of accidents, unauthorized use, crisis instability, political instability, and transfers to terrorist or sub-national groups.

The best approach lies in the creation of a comprehensive arms control regime that covers all of these weapons, and which incorporates safeguards to ensure that exports—even to nonsignatories—are used only for peaceful purposes, coupled with the expanded use of the United Nations to foster collective security in the longer term. Comprehensive arms control regimes are unlikely to be created, however, if the superpowers continue to viewed by Third World nations as "advocating water, but drinking wine." The superpowers are unlikely to command much authority in their efforts to limit nuclear weapons or ballistic missiles if they continue to develop, test, and deploy new types of nuclear weapons and missiles that they claim are essential for their security. Nor are they likely to muster much support for a "ban" on chemical weapons that permits the superpowers to retain small stockpiles for their own security. Nor are Third World countries likely to support treaties that permit their enemies to possess (or even use) weapons of mass destruction with impunity. The United States should promote the United Nations as the appropriate forum for addressing security and prolif-

eration concerns. In particular, more use should be made of global economic sanctions to punish nations that violate agreed international norms, such as using or threatening to use weapons of mass destruction.

During the Cold War, efforts to stem proliferation often took a back seat to superpower confrontation, as illustrated by the U.S. decision to extend aid to Pakistan in support of *Mujahideen* guerrillas in Afghanistan, rather than cut it off in response to Pakistan's nuclear developments. Perhaps with the end of the Cold War and the Persian Gulf War, the United States and its allies can focus their attention firmly on the proliferation problem. A coherent, self-consistent, and high-priority effort is urgently needed if the United States and it allies are to avert the growing vulnerability of civilian populations to attacks with weapons of mass destruction.

ASSESSING STRATEGIC THREATS FROM PROLIFERATING TBM:
AVOIDING MUNICH MISTAKES

by Dr. Robin Ranger

THE U.S. AND ALLIED governments agree that the proliferation of Theatre Ballistic Missiles (TBMs) will pose an increasing strategic threat to U.S. forces deployed overseas and to U.S. allies. As Central Intelligence Agency (CIA) Director R. James Woolsey stressed on February 2, 1993 there are serious threats from "The proliferation of weapons of mass destruction (chemical and biological weapons (CBW) and nuclear weapons) and ballistic missiles to carry them . . ." He added that the U.S. and allied defeat of the Soviet Union in the Cold War means that "Yes, we have slain a large dragon. But we now live in a jungle filled with a bewildering variety of poisonous snakes. And in many ways the dragon was easier to keep track of."[1] The U.S. and its allies will need to counter the threats posed by the proliferation of such weapons by a combination of arms control measures plus offensive and defensive weapons systems, including Theatre Missile Defences (TMD). As U.S. Secretary of Defence Les Aspin said on September 1, 1993, when presenting his Bottom Up Review (BUR) of defence policy, "There is a need for TMD now."[2] Secretary Aspin and the Chairman of the Joint Chiefs of Staff, U.S. Army General Colin Powell, identified a number of what General Powell called "regional demons", notably Iraq's Saddam Hussein, who could again attack Kuwait, and North Korea's Kim Il Sung, who could attack South Korea.

In principle, the strategic threat posed by the proliferation of TBM and weapons of mass destruction is clear: governments which are regional demons can use these weapons to intimidate their neighbours by threatening to use, or using, these weapons. But in practice, U.S. and allied policy-makers need to assess the strategic threats posed by different types and levels of TBM forces very carefully. They also need to assess the effects of countermeasures against these TBM forces, including offensive counterstrikes plus active and passive defences. Unless U.S. and allied policy-makers make such careful assessments, they risk repeating the mistakes of British and French policy-makers in the 1938 Munich crisis.

In this crisis, the British and French governments seriously overestimated the technical capabilities of Hitler's Luftwaffe to cause casualties and damage to London and Paris. In addition, the British government seriously underestimated the effectiveness of its new air defence system. If the U.S. and allied governments were similarly to overestimate the capabilities of potentially hostile TBM forces and underestimate the potential effectiveness of active Anti-TBM (ATBM) defences, they could be deterred from developing and deploying such ATBM defences. Thus, the U.S. and allied governments can learn some highly relevant lessons from these British and French mistakes.

Munich Mistakes I: Overestimating Threats

The inaccurate British and French assessments of the strategic threat posed by the Luftwaffe in 1938 were the result of cumulative errors. In World War I London was bombed by Germany in the world's first strategic air offensive (1915-18). British policy-makers reacted in two ways. On the one hand, as I have noted elsewhere, they successfully created the world's first scientific, controlled air defence system which neutralised German air attacks and then, from 1935 onwards, upgraded this system to defend against the Luftwaffe, ("Defences Against Air and Missile Attacks: Lessons from the British Experience, 1915-45", *Comparative Strategy*, Fall, 1993).[3] But, on the other hand, as British historians Uri Bialer (*The Shadow of the Bomber: The Fear of Air Attack and British Politics, 1932-39*) and John Terraine (*The Right of the Line: The Royal Air Force in the European War 1939-45*) showed, British policy-makers were so shocked by the unprecedented German air attacks on British civilians that they seriously overestimated the potential for future bomber attacks to hit London with knockout blows, including to civilian morale.[4] For example, the founder of the Royal Air Force (RAF), Marshal of the RAF Viscount Hugh Trenchard claimed that, "The moral effect of bombing stands to the materiel in a proportion of 20:1."[5]

In addition, to maintain the RAF's precarious position as an independent force, Trenchard (Commander-in-Chief, 1918-1929) and his successors, claimed that only an independent RAF could conduct knockout strategic bombing strikes. In fact, such claims would not prove justifiable until 1944-45. But similar claims about knockout air blows were widely advanced by most military writers in the 1920s and 1930s, notably by the Italian Guilio Douhet. In his influential 1921 *Command of the Air*, Douhet argued that, in the future, active defences (mainly fighters and anti-aircraft artillery) would be ineffective against bombers, although passive defences could reduce casualties. Thus, strategic bombing offensives would be decisive and governments would have "to resign oneself to endure enemy aerial offensives in order to inflict the greatest possible offensives on the enemy."[6] Indeed, the U.S. Army Air Corps adopted Douhet's theories so enthusiastically that, in 1937, its leadership forced the resignation of Major Clare L. Chennault, head of the Pursuit Section of the Air Corps Tactical School, for arguing that a modern air defence system could neutralise modern bombers. (The future Lieutenant-General Chennault then helped the Chinese defend against Japanese bombers and headed the U.S. volunteer fighter force, the Flying Tigers.)[7]

Thus, when Hitler announced the creation of the Luftwaffe on February 26, 1935, the Joint Planning Committee (JPC) of the British military Chiefs of Staff assessed its capabilities in terms of a knockout blow on London, as Winston Churchill warned, "the greatest target in the world, . . . a valuable fat cow tied up to attract the beasts of prey."[8] The JPC members were extremely experienced and the RAF representative was Group Captain (later Marshal of the RAF Sir) Arthur T. Harris (Commander-in-Chief, Bomber Command, 1942-45). The JPC October, 1936, report concluded that in a 1939 war German "knock out blows" would cause casualties of 150,000 in London

in the first week and the breakdown of internal security.[9] This was more that the 146,777 total British casualties (killed and seriously injured) caused by six years of German air and missile (plus long-range artillery) attacks in World War II.[10]

The JPC prediction of a knockout blow was based on two miscalculations. One was that by 1939 Germany would have 1,700 bombers, including long range, four-engined strategic bombers similar to those the RAF planned to deploy (carrying up to seven tons of bombs). This calculation seriously overestimated German production capabilities and needed drastic revision when it became clear, by 1937, that Germany was concentrating on producing a more limited number of shorter range twin-engined bombers (carrying two to five tons of bombs). The other miscalculation was that the JPC seriously overestimated the casualties which would be caused per ton of bombs dropped by German bombers, extrapolating these from British casualties from air attack in World War I.

British policy-makers then reinforced their overestimates of a German knockout blow. In September, 1937, the new Deputy Director (effectively Director) of Plans at the Air Ministry, Group Captain (later Marshal of the RAF Sir John) Slessor conducted an assessment of the British and German bomber strengths. He accurately calculated, on the basis of Air Ministry Intelligence, that Germany had only 250 twin engined bombers.[11] But the RAF did not calculate that only the 100-200 Dornier Do-17s and Heinkel He-111s could effectively attack London and could do so only in daylight and fine weather, at their maximum effective range, and without fighter escorts (German fighters could not reach London), maximising their vulnerability to British air defences.

Then, British policy-makers saw their worst fears confirmed by two attacks by German and Italian bombers supporting General Francisco Franco's Nationalist forces in the Spanish Civil War. The German attack on Guernica (April 26, 1937) caused some 2,533 casualties (1,600 killed) and was highly publicised as the largest ever terror air raid against a European city. The Italian attack on Barcelona (March 16-18, 1938) caused some 3,300 casualties (1,300 killed).[12] British policy-makers calculated the casualties caused in this attack on Barcelona as 72 casualties per ton of bombs. They subsequently recalculated the casualties caused in all attacks on Barcelona as only 3 1/2 people killed per ton of bombs, but failed to incorporate this reassessment into their contingency planning.[13] Finally, in September, 1938 the RAF assessed Germany as having 1,019 combat ready bombers, when it had only 582.[14] This was an over-assessment by a factor of nearly two.

Thus, British policy-makers seriously overestimated the Luftwaffe's ability to inflict a knockout blow on London. They also failed to assess their developing air defence system's ability to neutralise the developing German bomber threat. French policy-makers similarly overestimated the Luftwaffe's ability to inflict a knockout blow on Paris, but correctly estimated the poor defence capabilities of the army-controlled French air force.

Munich Mistakes II: Underestimating Defences

British policy-makers made a serious, nearly fatal, strategic miscalculation in failing to consider the potential effectiveness of their air defence system against a German bomber offensive. As RAF historian John Terraine suggested, these limited British defences could probably have neutralised the technically limited German bomber offensive.[15] The German long-range bomber force able effectively to attack London in September 1938, was limited to some 200-300 Do-17s and He-111s. RAF Fighter Command's air defence system was still being upgraded, with only a few radar stations operational, only 106 of the new, fast, monoplane fighters (90 Hurricanes and 16 Spitfires), 240 modern biplane fighters and an incomplete Battle Management, Command and Control (BMC3) system. The other components of the active British defence system, including anti aircraft artillery, and passive defences, including shelters and evacuation plans, were also being upgraded.

Yet this 1938 balance of forces would have favoured the British defences: a total of 346 effective fighters to defend against some 200-300 unescorted German bombers. The RAF could have intercepted enough German raids to have limited damage to London and destroyed or damaged enough German bombers to force the Luftwaffe to call off its offensive. In addition, the British defence system would have benefited from wartime levels of production of its components and moved up the learning curve of combat experience, as it did in the 1940 Battle of Britain. (See Ranger, "Patriot's Success in Gulf War Points to A Future Key Role for Anti-Tactical Ballistic Missile [ATBM] Systems", *Defence and Security Review, 1993.*)

But in 1938 British policy-makers ignored their defences against bombers and allowed themselves to be intimidated by Hitler's threats of strategic air strikes. Prime Minister Neville Chamberlain reflected the views of most British policy-makers when he told the Cabinet that on his return from Munich he had flown up the River Thames over London and that, "He had imagined a German Bomber flying the same course [as they did in the 1940-41 Blitz], he had asked himself what degree of protection they could afford for the thousands of homes which he had seen stretched out below him [much more than his advisors thought] and he had felt we were in no position to justify waging a war today"[16]

The lesson for U.S. and allied policy-makers from this British and French experience is clear. It is essential to make careful, accurate assessments of the strategic threats they face from TBM forces in the hands of potentially hostile governments. If the capabilities of these forces are overestimated, and the capabilities of defences against them are underestimated, then U.S. and allied governments will make themselves vulnerable to strategic blackmail by potentially hostile governments. In addition, such incorrect assessments could lead U.S. and allied governments to fail to develop and deploy defences against such TBM forces. But what are these forces and what strategic threats will they pose in the mid-1990s?

Mid-1990s TBM Forces

A recent Congressional Research Service (CRS) Report (Steven Hildreth, *Theatre Missile Defence: Indigenous Programs and Interest Among U.S. Friends and Allies*) identifies those governments with TBM forces which pose potential threats to U.S. forces overseas and to close U.S. allies, "Israel is very concerned about the immediate threat . . . [from] Syria, Libya, Iran, Yemen, Egypt and Iraq [which] have short range ballistic missile with ranges up to 600 kilometres (about 375 miles)."[17]

Iraq had significant quantities of chemical weapons (CW), used them on a large scale in its 1980-88 war with Iran and may retain some CW. In addition, "Iran and Libya are trying to acquire nuclear weapons, materials, or technology. Iraq had an aggressive program to develop nuclear weapons.... Syria, Libya, and Iran also reportedly have chemical and biological [CBW] programs at varying levels of development."[18] North Korea developed and recently tested "the No-Dong missile (range of about 1,000 kilometres). A newer version of the missile (No-Dong 2) reportedly may attain a range of about 1,500-2,000 kilometres [930-1,240 miles]. In

The "War of Cities" between Iran and Iraq, began on February 28th, 1988, when Iraq began to fire several rockets a day on Tehran.

addition, North Korea has a nuclear program whose scope and purpose remain uncertain, controversial, and of mounting worry to the region and the world. Reportedly, North Korea also has a chemical weapons capability."[19]

The types of TBM forces which these governments may be expected to acquire by the mid-1990s are 10-100 (or more) Scud Bs (or Chinese M-11s) and Scud-Cs (or Chinese M-9s) and 10-150 (or more) No-Dong 1s (modified Scuds). In addition, some of these governments, notably North Korea, may deploy a few No-Dong 2s. Most of these TBMs will have single, high explosive warheads, but a limited number may have CBW warheads.

The main characteristics of these TBM are as follows. All have a single, high-explosive warhead. The SS-21 has a range of some 75 miles and a 1,100 pound warhead.[20] The liquid fuelled Scud-B was first deployed by the Soviet Union in 1967, has a range of 180-192 miles (290-310 kilometres) and a 1,100 pound warhead. The Chinese M-11 is a solid fuelled replacement for the Scud-B. The Scud-C has a range of about 375 miles (600 kilometres) and a similar warhead. The Chinese M-9 is a solid fuelled replacement for the Scud-C. The No-Dong 1 has a range of about 620 miles (1,000 kilometres) and a 1,000 pound warhead.[21]

In the Middle East, Iraq may, despite U.N. controls, have retained some 200 TBMs, mostly Scud-Bs plus a few Iraqi-modified Scud-Bs, named Al-Husayn and Al-Abbas.[22] The Al-Husayn has a range of 375 miles (600 kilometres) and a single high-explosive warhead (600 pounds).[23] The Al-Abbas has a range of some 560 miles (some 900 kilometres) and a single high-explosive warhead (some 220-660 pounds).[24] Iran has some 100+ Scud-Bs, has purchased North Korean Scud-C TBMs and is indigenously manufacturing Scud-Cs, probably with North Korean assistance. In addition, Iran reportedly arranged, in April, 1993, to purchase 150 No-Dong 1 TBMs from North Korea.[25] Thus, by the mid-1990s Iran could have a force of some 100 Scud-Bs. 100-200 Scud-Cs and 150 No-Dong 1s. Libya has some 80 Scud-Bs and reportedly may be purchasing the No-Dong 1 from North Korea.[26] Thus, by the mid-1990s Libya could have a force of some 80-100 Scud-Bs and perhaps 10 to 100 No-Dong 1s. Syria has some 18 SS-21s and some 20 Scud B/Cs.[27] Also, Iran, Libya and Syria may develop CBW warheads for their TBMs.

North Korea's No-Dong 1 tests included three successful launches in one day, showing that it has become highly reliable.[28] Thus, by the mid-1990s North Korea's TBM force will probably consist mainly of No-Dong 1/2s, plus some 30 North Korean-improved Scud B/Cs.[29] According to a recent *Wall Street Journal* article, a North Korean defector who worked in the Defence Ministry stated that "Pyongyang has finished work on two of four missile bases that the defector says will be used to target American military installations in Guam and Japan."[30] This statement, plus the reported Iranian purchase of 150 No-Dong 1s, suggest that North Korea could deploy a force of 150 or more No-Dong 1/2s. North Korea may also develop CBW warheads for its TBMs. In addition, if North Korea is able to develop nuclear weapons, and turn these into nuclear warheads, then one or two No-Dong 1/2s, could carry nuclear warheads.

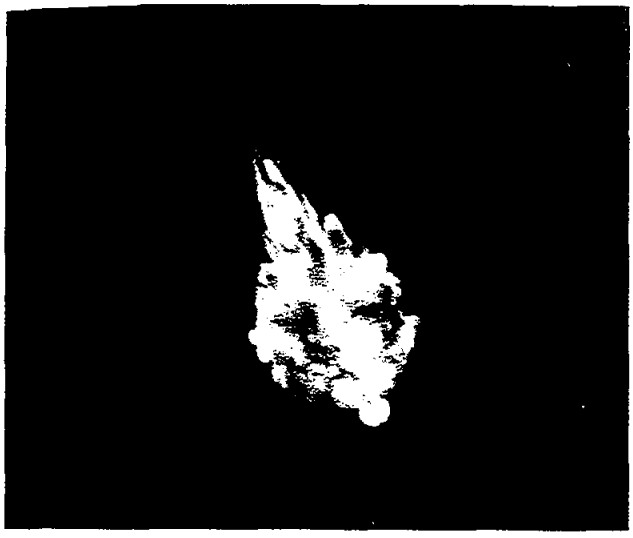
Clearly, these TBM forces are being acquired to intimidate neighbouring governments with threats of strategic bombardment of their major cities. As Hitler showed with his V-2 TBM attacks on London (1944-45) and Saddam Hussein showed in the 1988 War of the Cities, such attacks can be extremely effective. Iraq hit Tehran with limited numbers (some 135) of conventionally armed Al-Husayn TBMs, caused some 8,000 casualties (2,000 killed) and helped force Iran to make peace.[31] But in the Gulf War U.S. and allied counterstrikes, plus active and passive defences, neutralised Iraq's attacks on Israel and Saudi Arabia with limited numbers (just under 100) of conventionally armed Al Husayns. Thus, in the mid-1990s the security of U.S. forces deployed overseas and U.S. allies could be greatly enhanced by the deployment of improved counter-offensive capabilities, plus improved active and passive defences against TBM.

Part III: Typical Mid-1990s ATBM Forces

In principle, multilayered U.S. and allied Theatre Missile Defences (TMD) are likely to be highly effective against these potentially hostile forces of shorter-range (up to 620 miles/1,000 kilometres) TBM armed with single conventional warheads. The Gulf War showed how such defences could work. U.S. and allied counteroffensive air strikes forced Iraq to launch its Al Husayn TBMs only at night and mostly singly. These strikes prevented salvos of several Al Husayns from swamping the Patriot PAC-2 Anti TBM (ATBM) active defence systems. Thus, according to the U.S. Army's latest figures, accepted at 1992 Congressional Hearings, the Patriots successfully intercepted over 40 per cent of the Al Husayns which would otherwise have landed in populated areas in Israel and over 70 per cent of the Al Husayns which would otherwise have landed in populated areas in Saudi Arabia. Because relatively few Al Husayns landed in populated areas, passive defences further minimised casualties. These passive defences included the night-time evacuation of cities under attack, shelters and the provision of gas masks and antidotes against CW warheads. (Iraq reportedly had CW warheads for its TBMs, but did not use them, for reasons which remain unclear.)

However, the Patriot PAC-2 was primarily designed to defend against aircraft attacks and adapted as an ATBM system to defend small, military targets against shorter range Soviet TBMs. Patriot PAC-2 was then further adapted to defend large, urban areas against Al-Husayn TBMs and did very well to defend as effectively as it did in Israel and Saudi Arabia, including by adaptations in combat. But the Patriot PAC-2 that fought in the 1991 Gulf War could not be as effective as the ATBM systems that will be deployed by the mid-1990s. These include the upgraded Patriot PAC-2 plus the Patriot PAC-3, which has been very successful in tests, intercepting and destroying a target drone simulating an attacking TBM.[32]

In addition, by the mid-1990s the U.S. plans to deploy two additional TMD systems, with longer ranges than



A successful PAC-2 intercept and destruction of a Lance TBM target missile.

Patriot. One is the U.S. Navy force of Aegis cruisers and destroyers, which totals 22 cruisers and 26 destroyers completed or ordered. Allied Aegis destroyers could also form part of a U.S.-allied TMD system. These cruisers and destroyers were designed to defend against aircraft and cruise missile attacks with the Aegis/SPY radar and the Standard missile. The Aegis Extended Range (SM-2 Block IV Standard) missile is being developed to defend against TBMs and recently completed its fourth successful test, intercepting a target drone travelling in excess of Mach 2.5 (two-and-a-half times the speed of sound) at a very high altitude.[33] The other U.S. TMD system is the Theatre High Altitude Area Defence (THAAD) system, being developed to intercept attacking TBMs outside the atmosphere (exoatmospheric interception). These TMD systems should enable the U.S. and its allies to use THAAD to defend a country and Aegis to defend a large area, while Patriot defends cities and especially valuable small targets. In addition, these layered TMD systems will give the U.S. and allied defences two shots at attacking TBMs. The THAAD and Aegis systems will make the first, exoatmospheric intercepts of TBMs, and the Patriot system will make the second, endoatmospheric, intercepts of any TBMs which get through the first layer of defence.

These U.S. and allied TMD systems should be able successfully to counter any counter-defence countermeasures likely to be deployed on potentially hostile TBMs in the mid-1990s. For technical reasons, it is much more difficult to deploy effective countermeasures on shorter range TBM than on longer range Intercontinental and Submarine Launched Ballistic Missiles (ICBM and SLBM). For example, Al Husayn TBMs have a flight time of only about 7-8 minutes, mostly in the atmosphere, and a ballistic flight path with a maximum altitude of some 450,000 feet. These characteristics make it almost impossible to deploy effective decoys on such TBMs because, to replicate the TBM warhead, such decoys must weigh nearly as much as the warhead, otherwise they will slow down as they hit the atmosphere and show they are decoys. In addition, such decoys sharply reduce the already limited weight of the high explosive warhead (typically, 600-1,100 pounds. Also, according to former British Ministry of Defence scientist Dr. Stanley Orman, "It is generally accepted that unless five or more decoys can replace one RV [on ICBM and SLBM], the effectiveness of the system will decline."[34]

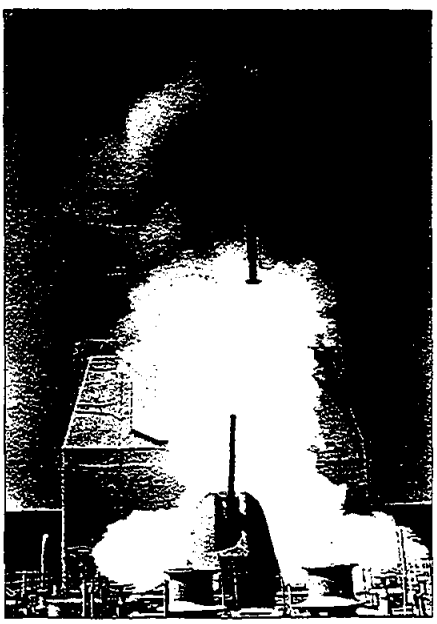
Some potentially hostile TBMs may be fitted with countermeasures, but these are likely to be effectively countered by U.S. and allied defences. For example, in the Gulf War Iraqi Al-Husayn TBMs proved to be difficult targets, because they broke up as they came in, creating multiple targets with erratic flight paths. But U.S. modifications, including to the Patriot PAC-2 computer software, enable Patriot to counter this inadvertent countermeasure.[35] Indeed, air and missile defence systems have usually been able to make such successful adaptations to counter countermeasures used by attacking bombers and missiles.

Thus, Defence Secretary Aspin proposed U.S. development and deployment of a TMD with "a permanent core made up of Patriot Advanced Capability Level Three (PAC-3), Navy Aegis lower-tier TMD and Theatre High Altitude Area Defence (THAAD) . . . [plus] a sea-based upper-tier TMD and perhaps the Corps SAM missile system and boost phase interceptor technology development".[36] This last technology is designed to intercept TBMs as they are being launched, when their rocket engines are firing and easily detectable because of their intense heat, detectable by infra-red sensor systems. Boost phase interception systems are especially effective against CBW and nuclear warheads, because the TBM and its warhead are both destroyed and their CBW or nuclear material is scattered on hostile territory. Such systems include the Raptor-Talon, an unmanned, long endurance Raptor aircraft carrying Talon missiles to intercept TBMs.[37]

In addition, a number of U.S. allies are deploying Patriot-PAC-1/2 systems. According to the CRS study, these include, in the Middle East, Saudi Arabia and Kuwait. Also, Israel deploys Patriot PAC-1/2 and is developing, mainly with U.S. assistance, the Arrow ATBM system. However, the cost, effectiveness and future of the Arrow program all remain uncertain. Other countries in the Middle East interested in acquiring Patriots reportedly include Egypt, the United Arab Emirates (UAE), Qatar and Bahrain. In Asia, Japan is deploying Patriot PAC-1/2 and other countries reportedly interested in acquiring Patriot include South Korea, Taiwan and Singapore.[38]

These large-scale mid-1990s deployments of TMD systems will also enable the U.S. and its allies to create regional defence systems. As in the Gulf War, such systems could link U.S. and allied early warning systems, including space based systems, plus counteroffensive and defensive systems.

Such a co-ordinated defence system could be especially effective. For example, the new U.S. Ambassador to Japan, former Vice-President Walter Mondale, reportedly proposed the creation of a joint U.S.-Japanese TMD system to defend Japan against North Korean No-Dong 1/2 TBMs.[39] This TMD system would include U.S.



SM-2 vertical launch.

surveillance satellites to detect and track No-Dong 1/2 attacks plus ground-based ATBM systems (presumably Patriot and THAAD), plus U.S. Navy Aegis cruisers and destroyers, and possibly also Japanese Navy Aegis destroyers (four ordered).

PART IV: Strategic Effects of Defences

As Defence Secretary Aspin and General Powell stressed, the proliferation of TBMs, of CBW, and of nuclear weapons, pose serious potential threats to U.S. forces overseas and to U.S. allies. Potential hostile powers with even a relatively small, shorter range TBM force with conventional warheads will possess a strategically powerful weapon of intimidation against neighbouring countries with no active defences.

Even though such TBM forces may be able to inflict only limited casualties and damage on large cities, the political impact of such casualties, and the threat of such casualties, would be very significant. "Regional demons" from Adolf Hitler to Saddam Hussein, have understood the strategic power of intimidation through the threat, or use, of bomber and missile attack.

But, as British and French policy-makers showed in the 1938 Munich crisis, overestimating such threats can make governments especially vulnerable to such intimidation. A careful analysis of regional TBM forces in the hands of governments potentially hostile to the U.S. and its allies in the mid-1990s shows that the strategic effectiveness of such forces will drop sharply if active and passive defences are deployed against them.

In future conflicts in which U.S. and allied forces are involved and in which allied countries are attacked by conventionally armed TBMs, future U.S. and allied active and passive defences are likely to keep casualties from conventionally armed TBMs relatively low by historical standards. Such defences are also likely to minimise casualties from the very limited numbers of TBM likely to be deployed with CBW. Such defences may also significantly reduce the chances of successful attacks by one or two TBMs armed with nuclear weapons. Equally importantly, U.S. and allied defences, plus counterstrike and retaliatory capabilities, are likely to deter such attacks.

However, as Secretary Aspin also stressed, these ATBM programs are needed now. Thus, they must be developed and deployed as quickly as is technically possible if ATBM systems are to be available to protect U.S. forces and allies in the next regional crisis in which they are threatened by TBMs. As they are developed and deployed, such U.S. ATBM systems can be modified and improved, a long lead time process with all modern weapons systems.

For example, the Patriot ATBM was designed in 1970-73 and its ATBM capability was first removed, then reinstated by the PAC-1 and PAC-2 program begun in 1985 and the first experimental PAC-2 missiles were produced in mid-1991. Because the Patriot PAC-2 production base was in place, heroic efforts by the U.S. government and private industry produced some 500 Patriot PAC-2s to defend Israel and Saudi Arabia in the Gulf War, some 21 years after Patriot design began. During this war, the major adaptations made to Patriot, including to its computer software, made the end-Gulf War PAC-2 virtually a new, more effective, ATBM system.

This long lead time poses a potential threat to Secretary Aspin's ATBM program.

Some U.S. policy-makers may seek to postpone the production of currently available ATBM systems because future systems may be more effective: they may, but they may not be available until the next century. In addition, if the U.S. defence production base is cut too far and too fast, the U.S. will not be able to crash-produce large numbers of ATBMs to defend U.S. forces and allies, as it did in the Gulf War.

Hence the U.S. and allied need to develop and deploy defences in time to counter the mid-1990s threats posed by potentially hostile TBM forces.

BIOGRAPHY

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30 Larry DiRita, "Clinton's Naivete On North Korea Could Be Deadly", *Wall Street Journal*, August 25, 1993, p.1.

31 The main sources on Iraq's 1988 TBM attack on Tehran are: Gregory S. Jones, *The Iraqi Ballistic Missile Program: The Gulf War and the future of the Missile Threat* (Marina del Ray, California: American Institute for Strategic Cooperation, 1992), pp.13-16; W. Seth Carcus and Joseph S. Bermudez, Jr., *Iraq's Al Husayn Missile Program*, *Jane's Soviet Defence Review*, June 1990, p.242, and Richard P. Hallion, *Storm Over Iraq: Air Power and the Gulf War* (Washington, D.C.: The Smithsonian Institution, 1992), p.178 (although a typographical error gives the date as 1987). These are summarised in Ranger, *Patriot's Success in Gulf War*, op cit, p.64.

32 David Hughes, "Successful Test of Advanced Patriot Confirms Value of Multi-Mode Seeker", *Aviation Week and Space Technology*, April 27, 1992, pp. 22-23.

33 *Defense Daily*, September 13, 1993, p.400.

34 Dr. Stanley Orman, *Faith in GODS: Stability in the Nuclear Age*, (Brassey's Publishing: London, 1991),, p.22.

35 Ranger, "Patriot's Success in Gulf War", op cit, p.60.

36 *Aerospace Daily*, September 2, 1993, p. 372.

37 James Hackett, "Employ UAVs in Scud Hunt", *Defense News*, August 30-September 5, 1993, p. 19.

38 Hildreth, op cit, p.11.

39 "Japan-U.S. Anti-Missile Effort Urged", *International Herald Tribune*, September 17, 1993.

Ballistic missiles hit new heights

A US MGM-[illegible] Army Tactical Missile System being launched from a Multiple Launch Rocket [illegible] vehicle

Duncan Lennox reports on developments in ballistic missiles worldwide

The past year has seen several changes to the numbers and types of ballistic missile in service or in development around the world. Among the short-range ballistic missile systems Hatf 1 (Pakistan), SA-2 'Guideline' SSM variant (North Korea), SS-21 'Scarab B' (Russia), Prithvi SS-150 and SS-250 (India), Alacran (Argentina), CSS-7/ DF-11/M-11(China), CSS-8/ M-7(China) and Project T (Egypt) appear to have entered service.

Meanwhile KSR 100 (South Korea), Sakr 200 (Iraq), SS-21 'Scarab C' (Russia), NHK-A/Hyon Mu (South Korea), CSS-7 variant (Iran) and Prithvi SS-350 (India) are recently reported development programmes listed for the first time. At the same time NATO has been taking the MGM-52 Lance out of service and France has retired its Pluton missiles.

The Chinese reported a project 8610 in the late 1980s, believed to have been a solid propellant version of the SA-2 'Guideline' SAM built in China and known there as the HQ-2 system. It seems likely that this design has been used by North Korea for its SA-2 variant, and that the CSS-8/M-7 missile that is in service in China is a similar weapon. The Russians exhibited the upgraded 'Scarab B' last year and have offered this system for export. 'Scarab B' has an increased range of 120 km and introduces submunition, electro-magnetic pulse and anti-radar homing warhead options. It is reported that the 'Scarab B' missile can be pre-programmed to perform evasive manoeuvres on re-entering the atmosphere shortly before impact, making it more difficult to be intercepted. There are unconfirmed reports of a 'Scarab C' version with range further increased to 185 km.

Additional test firings of the Indian Prithvi family of missiles indicate that the 150 km and 250 km versions are most probably in service, and there are reports of a third version with a range of 350 km in development.

The first trial launch of the Argentinian Alacran missile was reported in 1989, and it is believed to have entered service in 1990.

The CSS-7 (DF-11/M-11) was first exhibited by the Chinese in 1988 as a solid propellant replacement missile for the Russian SS-1 'Scud B' and was offered for export as the M-11. The Chinese military liked the design, and following the first flight test in 1990 it is believed to have entered service in China in 1992 as the DF-11. There have been reports that China was going to export the CSS-7 to Iran and Pakistan, although China has always denied these allegations. The revised limits in the Missile Technology Control Regime (MTCR) guidelines, published last year, are believed to have been designed so that projects such as the CSS-7 would be subject to the regime.

Project T, an Egyptian-built version of the SS-1 'Scud B' missile but with a range improvement to 450 km, is believed to have started production in 1990 and to have entered service last year.

A variant of the US MIM-14 Nike-Hercules surface-to-air missile, known as NHK-1, has been in service in South Korea for several years as a short-range ballistic missile. It is believed that a separate missile, or perhaps a further version of NHK-1, is in development and is called Hyon Mu or NHK-A.

In addition South Korea is developing a KSR series of research rockets, and uncon-

Short-range ballistic missiles in development

Weapon system	Payload (kg)	Maximum range (km)	Developing country
Hatf 1A	500	100	Pakistan
KSR 100	300	100	South Korea
Rohini	400	130	India
SRBM [Sakr 200]	500	150	Iraq
MB/EE 150	500	150	Brazil (terminated)
Mushak 160	190	150	Iran
SS-21 'Scarab C'	320	185	Russia
Mushak 200	500	200	Iran
NHK/A (Hyon Mu)	300	300	South Korea
SS 300	450	300	Brazil (terminated)
Hatf 2	500	300	Pakistan
CSS-7/M-11 variant	500	300	Iran
Prithvi SS-350	500	350	India

firmed reports suggest that one of these might be developed as a 100 km range ballistic missile known as KSR-100.

While China denies having exported CSS-7 missiles to Iran, there appears to be a development programme in Iran for a missile with similar characteristics to CSS-7, called the CSS-7/M-11 variant. Iraq is believed to be developing a 150 km missile, the maximum range permitted by the United Nations, possibly named Sakr 200.

In summary, there are around 8800 short-range ballistic missiles believed to be in service with 32 countries, in about 18 separate types. A further 11 types are in development. These figures exclude unguided rockets such as the Russian FROG series.

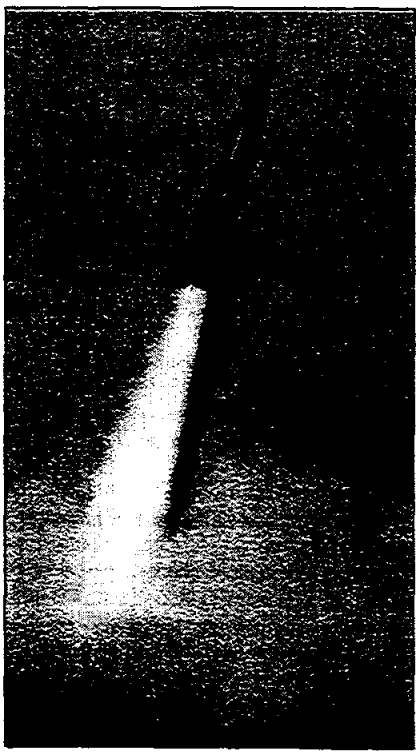
The intermediate range ballistic missiles, with ranges from 500 km to 5500 km, have seen less change in the last year. There are reports that about 70 conventional HE warhead SS-23 'Spider' missiles were exported to Bulgaria, the Czech Republic and Slovakia around 1984 and were not destroyed with the Russian missiles following the 1987 INF Treaty.

The Chinese CSS-6 (DF-15/M-9) solid propellant missile was first flight tested in 1988 and is believed to have entered service in China in 1991. Reports suggest the CSS-6 has been sold to Syria, and perhaps to Libya, Iran or Pakistan. From initial information it does seem that the Hatf 3 programme in Pakistan could be based on a CSS-6 design, but it could also be a further development of the Hatf 1 and 2 series. Iran is reported to be developing a missile known as Iran 700, which might be a version of the Chinese CSS-6, or a 'Scud C' variant based on the North Korean 'Scud C' variant which is a liquid propelled missile similar in design to the Iraqi Al Hussein used in the 1991 Gulf war.

The North Korean Nodong 1 (Labour-1) missile was flight tested for the second time last year and it must be assumed that the development programme is progressing. Reports suggest that a longer range Nodong 2 is also in development, with two more missiles known as Taepo-Dong 1 and Taepo-Dong 2 (*JDW* 12 March).

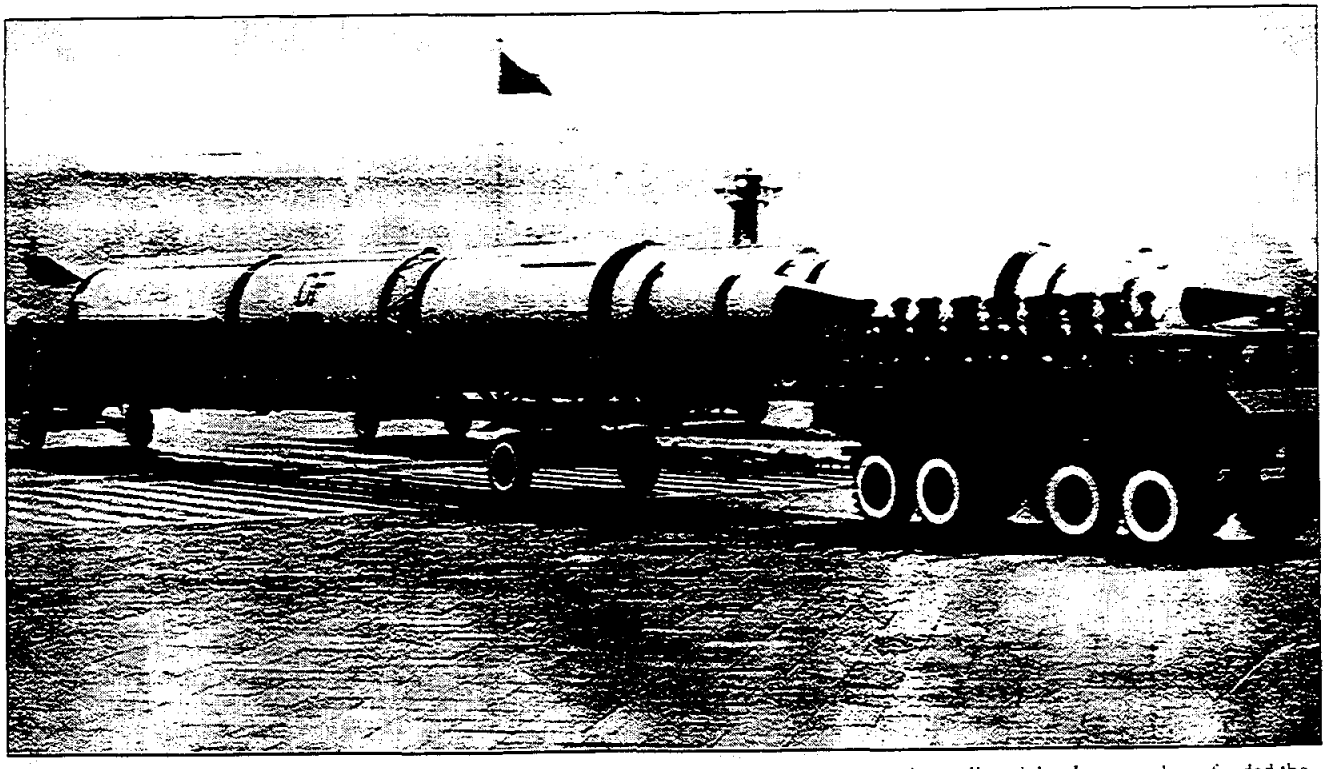
North Korea appears to be planning to seek foreign financial aid to develop a series of liquid propellant ballistic missiles.

A Pakistan HATF 1 missile, first test launched in 1989



Intercontinental range ballistic missiles in-service and development

Weapon system	RVs	Maximum range (km)	User countries
JL-2 (SLBM)	1	8 000	China (development)
DF-31	1	8 000	China (development)
CSS-4 (DF-5)	1	11 000	China
DF-41	1	12 000	China (development)
M 5 (SLBM)	10	11 000	France (development)
H1 variant (SLV)	1	12 000	Japan (capability)
H2 variant (SLV)	1	15 000	Japan(capability)
SS-11 'Sego' (RS-10)	1	13 000	Russia
SS-13 'Savage' (RS-12)	1	9 400	Russia
SS-17 'Spanker' (RS-16)	4	10 000	Russia
SS-18 'Satan' (RS-20)	10	11 000	Russia, Kazakhstan
SS-19 'Stiletto' (RS-18)	1 or 6	10 000	Russia, Ukraine
SS-24 'Scalpel' (RS-22)	10	10 000	Russia, Ukraine
SS-25 'Sickle' (RS-12M)	1	10 500	Russia, Belarus
SS-X-26	not known	not known	Russia (development)
SS-X-29	1	10 000	Russia (development)
SS-N-8 'Sawfly' (SLBM)	1	7 800	Russia
SS-N-18 'Stingray' (SLBM)	3	6 500	Russia
SS-N-20 'Sturgeon' [SLBM]	4 or 10	8 300	Russia
SS-N-23 'Skiff' [SLBM]	4	8 300	Russia
SS-NX-26 [SLBM]	not known	not known	Russia (development)
SS-NX-27 [SLBM]	not known	not known	Russia (development)
LGM-30F Minuteman 2	1	12 500	USA
LGM-30G Minuteman 3	1 or 3	13 000	USA
LGM-118 Peacekeeper MX	10	9 600	USA
UGM-96 Trident C4 (SLBM)	4 to 8	7 400	USA
UGM-133 Trident D5 (SLBM)	1 to 8	12 500	USA, (UK development)



with ranges from 300 km up to possibly 3500 km. Iran is reported to have been co-

A Chinese CSS-3 (DF-4) intermediate range ballistic missile, seen on parade in Beijing in 1984

operatively developing several missiles with North Korean assistance, and it has been alleged that Iran may have funded the Nodong 1 and 2 programmes as well as offering to allow full range test flights in Iran for these missiles.

India and Japan have civilian space

NATO has continued to take the MGM-52 Lance weapon out of service during the past year

Intermediate-range ballistic missiles in development

Weapon Systems	Payload (kg)	Maximum range (km)	Developing countries
SS-600	500	600	Brazil (terminated)
Hatf 3	500	600	Pakistan
Iran 700 (Scud C)	500	700	Iran
Al Abbas	300	900	Iraq (terminated)
Condor 2	500	900	Argentina (terminated)
Al Fatah	500	950	Libya, Iran
Tien Ma (Sky Horse)	500	950	Taiwan
Labour-1 (Nodong 1)	1000	1000	North Korea, Iran
M 18 (Tondar-68)	400	1000	China, Iran
Badr 2000	450	1200	Egypt/Iraq (terminated)
Capricornio	500	1300	Spain
Labour-2 (Nodong 2)	1000	1500	North Korea, Iran
Arniston	1000	1500	South Africa (terminated)
DF-25	2000	1700	China, Iran
Al Aabed	750	2000	Iraq (terminated)
Taepo-Dong 1	1000	2000	North Korea
Agni	1000	2500	India
S 4	900	3500	France (terminated)
Taepo-Dong 2	1000	3500	North Korea
M 45 (SLBM)	1000	4000	France
ASLV variant (SLV)	500	4000	India (capability)
M 3 variant (SLV)	500	4000	Japan (capability)

launcher development programmes that could be converted into intermediate range ballistic missiles; the Indian ASLV and Japanese M-3 projects could each offer 4000 km range missile potential.

There are believed to be around 2000 intermediate range ballistic missiles in service with 12 countries, in about 15 different types. A further 13 types are in development.

Intercontinental range ballistic missiles (ICBMs) are largely the province of Russia and the USA. Furthermore, following the START 1 and 2 agreements signed in 1991 and 1993, it is expected that if the agreements are ratified then the number of missiles in this range category will be significantly reduced during the 1990s. It is expected that Russia will remove the SS-11 'Sego', SS-13 'Savage', SS-17 'Spanker' and SS-N-8 'Sawfly' from service in the near future as these are old systems probably requiring significant maintenance.

If the much deeper START 2 reductions are ratified then Russia will remove the 10 warhead SS-18 'Satan' and SS-24 'Scalpel' missiles from service, download some of the SS-19 'Stiletto' to one warhead, remove the SS-N-18 'Stingray' from service and download the SS-N-20 'Sturgeon' to four warheads.

The USA has terminated the XMGM-134 SICBM programme and is planning to remove the LGM-30F Minuteman 2 and LGM-118 Peacekeeper MX and UGM-73 Poseidon from service by 2003. This is in addition to downloading the LGM-30G Minuteman 3 from three warheads to one and the UGM-96 Trident C4 and UGM-133 Trident D5 from eight warheads to between one and four warheads each. There have been reports that some Trident missiles might be modified to carry a single deep penetrating warhead to attack buried command bunkers.

On the other hand China is developing at least three new ICBMs: the DF-31 and its SLBM brother the JL-2 with ranges of 8000 km, and the DF-41 with a range of 12 000 km.

Japan first tested the H-1 satellite launch vehicle in 1988, and this could be converted into an ICBM. Similarly, the H-2 SLV programme could also be converted if necessary by Japan in future.

There are believed to be four Russian ICBM programmes in development as possible successors to the present generation of missiles, although the status of the SS-X-26, SS-X-29, SS-NX-26 and SS-NX-27 programmes is unclear and some may have been terminated following the START 1 and 2 agreements.

It is thought that there are around 2650 ICBMs in service with six countries, in around 17 types. A further eight types are believed to currently be in development. **JDW**

Duncan Lennox is Editor of Jane's Strategic Weapon Systems.

Intermediate range ballistic missiles in service

Weapon system	Payload (kg)	Maximum range (km)	User countries
SS-23 'Spider'	450	500	Bulgaria, Czech Republic, Slovakia
Jericho 1 (YA-1)	500	500	Israel
'Scud C' variant	500	550	North Korea, Iran, Libya, Syria
CSS-6 (DF-15/M-9)	500	600	China, Syria
Al Hussein	500	650	Iraq
Jericho 2 (YA-3)	1000	1500	Israel
CSS-N-3 (JL-1) (SLBM)	600	1700	China
CSS-5 (DF-21)	600	1800	China
CSS-2 (DF-3)	2150	2800	China, Saudi Arabia
S-3	1000	3000	France
SS-N-6 'Serb'(SLBM)	650	3000	Russia
M-4 [SLBM]	1000	4000	France
A-3TK Polaris (SLBM)	1500	4630	UK
UGM-73 Poseidon (SLBM)	2000	4630	USA
CSS-3 (DF-4)	2200	4750	China

Short-range ballistic missiles in service

Weapon System	Payload (kg)	Maximum range (km)	User countries
SS-21 'Scarab A' (OTR-21)	480	70	Belarus, Czech Republic, Hungary, Kazakhstan, Libya, Poland, Russia, Slovakia, Syria, Ukraine, Yemen.
SA-2 'variant'	130	80	North Korea
Hatf 1	500	80	Pakistan
SS-21 'Scarab B'	480	120	Russia
Ching Feng (Green Bee)	400	130	Taiwan
MGM-52 Lance	450	130	Iran, Israel
Iran 130 (Mushak-120)	190	130	Iran
MGM-140 ATACMS	450	135	USA
CSS-8 (M-7/8610)	190	150	China, Iran, Iraq
Prithvi SS-150	1000	150	India
Alacran	500	200	Argentina
NHK-1	300	250	South Korea
Prithvi SS-250	500	250	India
SS-1 'Scud B' (R-17)	985	300	Afghanistan, Algeria, Azerbaijan, Belarus, Bulgaria, Czech Repl, Egypt, Georgia, Hungary, Iran, Iraq, Kazakhstan, North Korea, Libya, Poland, Romania, Russia, Slovakia, Syria, Ukraine, UAE, Vietnam, Yemen
'Scud B' variants	985	300	North Korea, Iran, Syria
CSS-7 (DF-11/M-1)	500	300	China, Iran, Pakistan
Project T	985	450	Egypt
Hades	400	480	France

DEFENSE MARKET IN THE MIDDLE EAST.
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A. ALGERIA

1. A National Overview

Algeria has moderated its radical demeanor of the 1960s and 1970s, when it was associated with the Soviet Union, Libya, and Syria in the so-called "rejection front" (countries which rejected the Camp David agreements). A major Middle Eastern exporter of oil and natural gas to Western Europe and the United States, historically Algeria has had strong ties with the West, especially with France, its former colonial ruler. Algerian independence was established in 1962 by a referendum held in France on President de Gaulle's initiative, and Ahmed Ben Bella became the first president. The Ben Bella government was overthrown by an army junta in 1965, which established a revolutionary council under the leadership of the late Col. Houari Boumediénne. The Boumediénne regime was anti-Western and maintained friendly relationships with the Soviet Union, which then became Algeria's principal supplier of defense equipment.

The current president, Chadli Benjedid, assumed office following national elections in May 1979, after the death of Houari Boumediénne. Benjedid has pursued a relatively conservative path, especially with regard to oil and natural gas exports and international financial policy. Natural gas is an important

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factor, since Algeria has 2.7% of the world reserves of this resource. Proven reserves are estimated at about 106 trillion cubic feet.

Table I-A-1

ALGERIA: BASIC OVERVIEW DATA

POPULATION:	25.503 million
GDP (1989):	$46.91 billion
CURRENCY:	Algerian dinar (DA)
RATE OF EXCHANGE (1990):	$1 = 7.990 dinars
DEFENSE BUDGET (1990):	$1.01 billion*
FORM OF GOVERNMENT:	Republic
PRESIDENT AND MINISTER OF DEFENSE:	Col. Chadli Benjedid

*Excludes equipment and internal security costs.

Source: Frost & Sullivan, Inc., 1991

In the last few years, there has been much internal discontent in Algeria in regard to the depressed economy and lack of political freedom. This popular opposition erupted into violent strikes in 1988. Partly in response, in June 1990 President Benjedid authorized the first free elections in Algeria since the country won its independence from France in 1962. The result was a 65% popular vote for the fundamentalist National Liberation Front. Moslem fundamentalism has increased in importance as the Algerian economy has weakened.

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In September 1990 the aging first president of Algeria, Ben Bella, returned home, hoping to form a new political coalition and to oust the current government. Ben Bella urged his countrymen to support the cause of Saddam Hussein of Iraq and to protest the US military presence in the Gulf region. The Algerian government condemned both the Iraqi invasion of Kuwait and the US military buildup in Saudi Arabia. Like other North African countries, it took an ambivalent attitude toward the crisis in the Gulf.

Algeria has purchased the bulk of its arms from the USSR, although it has also bought some transports, light aircraft, helicopters, and several light naval vessels from Western nations. In 1983-1987 Algeria was the fourth largest purchaser of Soviet arms in the Middle East and North Africa, accounting for over 7% of the value of Soviet arms delivered to the region, according to US Arms Control and Disarmament Agency estimates. Due to its oil exports, Algeria can pay for Soviet arms in hard currency. Among Soviet exports to Algeria have been MiG-25 Foxbat fighters, T-72 main battle tanks, Koni class frigates, and submarines.

In foreign affairs, Algeria under Chadli has maintained a policy of nonalignment and is slowly mending fences with the West. In both the Iranian hostage crisis and the Iran-Iraq war, the Algerian government acted as an intermediary to resolve conflicts, thus winning a degree of US support.

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The Algerian debt was gradually reduced in the early 1980s, but now stands at a substantial $25 billion. An explosively growing population, a lack of fertile and arable land, and inadequate water supplies make food production a difficult problem. These factors, combined with a heavy debt service schedule and lower oil prices, put a severe strain on the economy, and worker strikes have been increasing. The bloodiest riots in Algeria since independence was won in 1962 occurred in the fall of 1988. They were put down by the army and forced the government to make economic and political reforms. Among other things, the Algerian government promulgated a new constitution in early 1989, which formally ends one-party rule. The rise in oil prices after Iraq's invasion of Kuwait in August 1990 has given a boost to the Algerian economy, bringing in an estimated extra $6.5 million per day.

Table I-A-2 shows trends in Algeria's defense appropriations, indicating an approximately 18% increase in 1990 over 1989 levels. It should be noted that the figures refer to the operating budget only, while equipment expenditures are an additional unknown factor. Specific procurement plans are unknown, except for several new vessels funded for the Algerian Navy.

2. Threat Perceptions

The largest of the North African states, Algeria shares extensive common boundaries with Morocco on the west, Tunisia

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Table I-A-2

BASIC DEFENSE DATA FOR ALGERIA
1978-1990

Year	Armed Forces (No. of Men)				Defense Budget ($ mill.) current	GDP ($ bill.) current	Population (mill.)
	Army	Navy	Air Force	Other*			
1978	70,000	3,800	5,000	10,000	456.0	10.1	18.40
1979	78,000	3,800	7,000	10,000	605.0	15.9	19.10
1980	90,000	4,000	7,000	10,000	705.0	41.5	19.50
1981	90,000	4,000	7,000	10,000	700.0	43.6	19.70
1982	150,000	6,000	12,000	24,000	783.0	45.4	19.40
1983	120,000	8,000	12,000	24,000	901.0	48.4	20.60
1984	110,000	8,000	12,000	24,000	932.0	46.2	21.70
1985	150,000	8,000	12,000	30,000	953.3	58.7	22.11
1986	150,000	7,000	12,000	30,000	1,160.0	69.2	22.84
1987	150,000	7,000	12,000	30,000	1,240.0	62.9	23.55
1988	120,000	7,000	12,000	30,000	1,050.0	54.1	23.76
1989	120,000	6,500	12,000	23,000	949.5	46.9	24.55
1990	107,000	6,500	12,000	23,000	1,010.0	NA	25.50

*Citizen military forces attached to Army, Navy, and Air Force.

Source: Frost & Sullivan, Inc., 1991

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and Libya on the east, and Mauritania, Mali, and Niger in the south. In the past, Algeria aided the Polisario guerrillas in their 15-year-old war against Morocco over the status of the Western Sahara. However, the warring parties signed a cease-fire agreement in August 1988, and President Chadli has been trying to establish better relations with Morocco. Nevertheless, true peace in the Sahara has yet to be achieved. Morocco and Algeria reestablished diplomatic relations in 1988 and plan to build a $2.2 billion Trans-Maghreb gas pipeline from Algeria across Morocco to Spain, later to France, and possibly to the UK also.

Relations with Libya have improved, especially since the formation in early 1989 of the Maghrebi Union, a largely economic agreement between the North African countries of Algeria, Morocco, Tunisia, Libya, and Mauritania.

Algeria must design its forces primarily to provide control over its own vast territories, which are rich in natural resources. Patrol, surveillance, and tactical mobility would appear to be the key requirements.

As shown in Table I-A-2, the Algerian Air Force in particular has experienced rapid growth, from a mere 2,000 men in 1970 to 12,000 currently.

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Table I-A-3

TRENDS IN US ARMS EXPORTS TO ALGERIA, FY 1950-1989
(Values in Thousands of Current Dollars)

Year	FMS Agreements	FMS Deliveries	Licensed Commercial Exports (under Arms Export Control Act)
1950-1979	-	-	1,869
1980	-	-	-
1981	-	-	243
1982	-	-	200
1983	-	-	146
1984	79	79	46,136
1985	37	37	10,531
1986	1,278	-	19,345
1987	1,760	485	2,079
1988	*	2,489	12,205
1989	953	15	1,509
Total 1950-1989	4,107	3,105	94,263

*Less than $500

Source: US Defense Dept., 1989

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The Algerians will need to decide what to do with their two Romeo class submarines, which were originally on five-year lease from the USSR. It is likely that the two subs will be returned for scrapping. Meanwhile, Algeria has procured two newer Kilo class Soviet subs, probably as a replacement for the Romeos. Reportedly under consideration in the past was the Vickers Oberon, an older model built in the UK.

Two older Soviet T43 minesweepers have reportedly been removed from service. Algeria would like to procure replacements, probably from Western Europe.

d. Tactical Missile Procurements

Algeria's missile inventory continues to be dominated by older Soviet types, and few inroads have been made by Western competitors (see Table I-A-10). Currently, Euromissile's Milan antitank missile is the sole Western system in inventory. The effort to strengthen the Algerian Navy will provide the best opportunity for missile sales.

e. Electronics Procurements

Westinghouse has supplied three AN/TPS-43 and eight AN/TPS-63 air defense radars to Algeria, from a 1977 order. Communications links have been provided by Ford Aerospace.

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Table I-A-10

ALGERIA: TACTICAL MISSILE INVENTORY (1990)

Designation	Platform	Supplier/ Contractor	Quantity/Comment
	Surface-to-Air Missiles		
SA-2 Guideline	Ground mobile	USSR	30 launchers
SA-3 Goa	Ground mobile	USSR	21 launchers
SA-6 Gainful	Ground mobile	USSR	18 launchers
SA-7 Grail	Portable	USSR	50
SA-8 Gecko	Ground mobile	USSR	
SA-9 Gaskin	Ground mobile	USSR	
SA-N-4	Koni class frigate, Nanuchka class corvette		Some 20 SAMS
	Air-to-Air Missiles		
AA-2 Atoll	MiG-21	USSR	
AA-6 Atoll	MiG-25	USSR	
	Antitank Missiles		
AT-3 Sagger	Portable	USSR	30 launchers
Milan	Portable	Euromissile	18 firing posts
	Antishipping Missiles (Shipborne)		
SS-N-2 Styx	Nanuchka class corvette	USSR	Some 52
	Osa patrol boats		

Source: Frost & Sullivan, Inc., 1991

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The two new landing ships from Brooke Marine will carry electr
warfare equipment - Dagaie chaff and infrared flare launchers
by CSEE in France.

4. Internal Production Capabilities

There is a shipbuilding facility called ECRN at the Mers-el-Kebi
naval base. Brooke Marine in the UK has built two fast attack
craft for Algeria, and five more of this class have been built
locally at Mers-el-Kebir. An eighth vessel is on order, to be
produced domestically.

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SECURITY IN NORTH AFRICA.
Ian O. LESSER.

Cote: Me 298/MR 203.

Chapter Four

ALGERIA

DOMESTIC TURMOIL AND THE SEARCH FOR A NEW INTERNATIONAL ROLE

The security environment as seen from Algiers is now driven almost entirely by the Islamic challenge to the political order and the deepening problem of internal stability. As a result, Algeria's potential in regional and international terms is, for the moment, dormant. A country with enormous resources and a well-established reputation for political assertiveness and international activism, Algeria has turned inward in a struggle to resolve basic questions of social and political organization.

Like its Maghrebi neighbors, Algeria faces the difficult external challenge of adjusting to a post-Cold War environment in which one superpower can no longer be played off against the other. Algeria's strategic importance can no longer be taken for granted. The Non-Aligned Movement, of which Algeria was a founding member and in which it played a leading intellectual and political role, has lost much of its significance as a framework for Algerian foreign policy.[1] Yet, looking beyond the current turmoil and regardless of its future ideological orientation, Algeria is likely to seek a new and substantial role in the Mediterranean. In this effort, Algiers can draw upon two sources of strategic weight. The first is an intangible sense of purpose and moral superiority in international affairs, traceable in large

[1] See Assassi Lassassi, *Non-Alignment and Algerian Foreign Policy* (Aldershot: Ave-

measure to the bitter and formative experience of the revolution against French rule—a revolution that Algerians hold on a par with those of Russia and China.[2] Indeed, the frequent observation that Algerians have never really come to terms with the experience of the revolution is relevant to the country's internal as well as external dilemmas. The one thing that most Algerians will agree on is that 40 years of FLN (National Liberation Front) rule have gone very badly wrong.

The second and more tangible source of post-Cold War strategic weight is likely to be Algeria's pursuit of nuclear and ballistic missile programs. Disturbing from the point of view of European security, and with significant implications for U.S. policy and strategy, there can be little doubt that Algeria's proliferation potential will push Algeria closer to the front rank in terms of international attention and prestige within the Arab world. Of the three countries surveyed in this draft, Algeria is most clearly the state that U.S. policymakers and strategists will need to take seriously after the Cold War.

DEEPENING UNREST AND THE CHALLENGE OF RADICAL ISLAM

After years of ossified FLN rule along Arab socialist lines, the Ben Jedid government began in the late 1980s to open up the Algerian political and economic system and encourage movement toward greater pluralism and democracy. The result was a series of remarkably free elections in which the Islamic Salvation Front (FIS) scored dramatic successes at the municipal and national level.[3] In the first round of national elections in December 1991, the FIS received 3.2 million votes, or 40 percent of the votes cast. Roughly 59 percent of the electorate voted, over half for the FIS, giving the Islamists the

[2]Parker, *op. cit.*, p. 37. On Algeria's political development generally, see John Ruedy, *Modern Algeria: The Origins and Development of a Nation* (Bloomington: Indiana University Press, 1992).

[3]In local elections in the summer of 1990, the FIS gathered roughly 70 percent of the popular vote, gaining control of 32 of 48 provinces. On the local elections, see Fouad Ajami, "The Battle of Algiers," *The New Republic*, July 9 and 16, 1990.

support of about 25 percent of registered voters.[4] Following this stunning victory, the electoral process was interrupted by a military-led coup which removed the prime minister, prevented the second round of elections, and barred the FIS from political activity.

Should the democratic process in Algeria be resumed and new elections held, most observers believe that the FIS (or its legal equivalent) would receive as many votes or more than in the elections of December 1991. For the moment, and in the wake of a succession of leadership changes in the ruling Supreme State Council including the assassination of President Boudiaf on June 29 under circumstances pointing to the complicity of the armed forces, the democratic opening in Algeria has been derailed.[5] The government is now headed by Ali Kafi, president of the Supreme State Council, together with Belaid Abdessalam, the newly appointed prime minister. Defense Minister General Khaled Nezzar remains the unofficial power behind the post-coup government.

The interruption of the electoral process prevented the formation of an Islamic-led government. This was accomplished at the cost of driving the FIS underground, strengthening the hand of more radical factions within the Islamist movement, and encouraging the emergence of an active urban insurgency. In reality, the FIS was never a monolithic movement but rather a collection of moderate and radical groups. Prominent among the latter have been "Sin and Expiation," the "Armed Islamic Movement," and the "Army of the Prophet Mohammed." Since the coup of December 1991, and with increasing force since the imprisonment of key FIS officials (Abassi Madani and Ali Belhadj), the Algerian regime has conducted a sweeping crackdown in an effort to "roll up" the Islamist organiza-

[4]On the meaning of the Islamic electoral success, see Belkacem Iratni and Mohand Salah Tahi, "The Aftermath of Algeria's First Free Local Elections," *Government and Opposition (Studies on North Africa, II)*, Autumn 1991; Jacques Girardon, "A Veiled Future for Algeria," *World Press Review*, August 1990; Khalid Duran, "The Second Battle of Algiers," *Orbis*, Summer 1989; Penny Gibbins, "Algeria's Trial of Strength," *The Middle East*, July 1991; and Robert Mortimer, "Islam and Multiparty Politics in Algeria," *Middle East Journal*, Vol. 45, No. 4, Autumn 1991.

[5]"Murder in Annaba," *The Economist*, July 4, 1992; Youssef Ibrahim, "Persistent Violence and Spreading Poverty Tighten Grip on Algeria," *New York Times*, July 29, 1992.

tions.[6] The success of this effort is far from clear. Over 200 members of the security forces have been killed by Islamic extremists since the declaration of a state of national emergency in February 1992; the number of Islamic activists killed is probably larger. Perhaps as many as 600 people have died as a result of political violence since 1991. Individual terrorist attacks on the Algiers airport and elsewhere have claimed dozens of civilian lives.[7] At least 4,000 FIS supporters continue to be held under harsh conditions in five detention camps in the southern Sahara (the government has been releasing many detainees in recent months, apparently having judged that the detentions are counterproductive). Large amounts of weapons and ammunition have been stolen from military depots and police stations. It is most unlikely that the armed forces are free of Islamist sympathizers and FIS cells.

With the leading institutions in Algeria, the FLN, and the military, in public disrepute, and with substantial grass roots support for the Islamist movement, the current political situation is probably untenable. In narrower terms, the ability of the security forces to control the internal situation in the country is highly uncertain. Continued deterioration of the security situation and the outbreak of a full-blown civil war cannot be ruled out, with serious implications for stability in Tunisia and Morocco.[8] Nor is the militant Islamic challenge the only source of domestic instability. The government faces an increasing pattern of unrest among Tuareg tribesman in the far south of the country.[9]

The engine of unrest in Algeria is, as elsewhere in the Maghreb, the problem of rapid population growth coupled with economic stagnation. The effect is particularly pronounced among the legions of

[6]"Vows War on Islamic Fundamentalists," report of an interview with Defense Minister Khaled Nezzar in *El Moudjahid* (Algiers), *FBIS-NES*, June 29, 1992, p. 6.

[7]"Blast at Algiers Airport Kills Nine and Wounds 100," *New York Times*, August 27, 1992; "Algerians Kill Two Foes in Raid on Militants," *New York Times*, October 17, 1992. Algerians who had served—or claim to have served in the Afghan resistance movement, the so-called *Afghani*, are alleged to be at the forefront of armed attacks on the security forces.

[8]See Youssef Ibrahim, "Crackdown Seems to Lead Algeria into Chaos," *New York Times*, August 20, 1992.

[9]"Tuaregs Discount Secession, Note Lack of Security," *FBIS-NES*, August 11, 1992, p. 8.

half-educated, unemployed young people. Unemployment in Algeria may be as high as 30 percent, even higher among those under 30 (70 percent of the Algerian population is under 30 years of age). Some 200,000 French-style baccalaureate degrees are given each year. Most of the recipients are unable to find full-time employment. At the same time, Algerians have tended to couch their economic expectations in European rather than Third World terms, a tendency encouraged by ready access to European television and radio. The inevitable frustration with an economy mired in bureaucracy and corruption—despite Algeria's substantial energy resources—strengthens the appeal of the FIS.

The post-coup regime is pinning its hopes for normalization on the destruction of the FIS as a political organization and the pursuit of economic improvement as a means of undercutting the principal source of public dissatisfaction. (An alternative theory holds that the FIS ought to be allowed back into the political process and be allowed to demonstrate its inability to solve the economic problems of the country.) Suggestions of reform and liberalization have most recently given way to calls for greater austerity and the revitalization of the state-run economy. In the view of many Algerians and foreign observers, the resurrection of the discredited economic policies of the FLN is unlikely to prove a viable approach, economically or politically. Above all, the failure to actively encourage foreign investment and internal liberalization is a reflection of the enduring autarkic outlook of the Algerian political elite.[10] Austerity is as likely to exacerbate as ameliorate the sense of political frustration. The militant Islamic groups pose an immediate political challenge. Given the scale of the demographic and economic crises in Algeria, even the most well-managed strategy of economic reform is unlikely to show results for years.

The FIS leadership, in Algeria and in exile in France, has said very little about the foreign and security policy orientation of an Islamic Algeria. Moderate FIS spokesmen have emphasized the movement's domestic agenda and the priority of moral rectification, religious in-

[10]The departure of Sid Ahmed Ghozali and the arrival of Belaid Abdessalam signaled a move away from economic liberalization. See Ibrahim, "Persistent Fundamentalist Violence," *op. cit.*

tegrity, and cultural revival over foreign policy goals.[11] But what little was said during the elections may be unrepresentative of views in the aftermath of the coup. The transformation of the FIS into an underground movement has strengthened the hand of more radical elements. The equivocal stance of Western and neighboring Maghrebi governments toward the elections and the subsequent coup may well have hardened attitudes even in more moderate circles. Should an Islamic regime eventually triumph in Algiers, there is a risk—although not a certainty—that it will adopt an internationalist stance, seeking to export the fundamentalist model elsewhere in the region. This has been the pattern with the Iranian-supported Islamic regime in the Sudan. An Islamic Algeria would be in a far stronger position to influence the political future of the Maghreb. The longer the delay in restoring a viable political order in Algeria—virtually inconceivable without according moderate Islamists a legitimate role—the greater the risk of a violent transition to Islamic rule with serious implications for regional stability.[12]

RESPONSE TO THE GULF WAR

The response of the Algerian government and the FIS leadership to the Gulf War provides some insight into the pressures that will continue to shape policy in Algiers regardless of the character of the regime. In the early stages of the Gulf crisis, Algiers joined its Maghrebi neighbors in condemning the Iraqi invasion of Kuwait but also proceeded to criticize the U.S. military involvement and the economic sanctions being applied against Baghdad. As the crisis deepened, and as public sentiment in Algeria echoed the pro-Iraqi manifestations elsewhere in the region, the FLN government, the FIS leadership, and other political factions (including Ahmed Ben Bella's Mouvement pour la Democratie en Algerie) began to compete with one another in an effort to embrace anti-Western public opinion. Overall, the FIS benefited from the wave of pro-Saddam demonstrations and sentiment in Algiers, placing the Benjedid government in an even more difficult position.[13] Faced with mounting public pressure and the fear that war in the Gulf could spark a wave of revolts across North Africa, President Benjedid embarked on an active but ultimately futile round of negotiations aimed at brokering a peaceful settlement. The Algerian initiative enjoyed the backing of France and Italy and followed in the traditional Algerian role as a respected interlocutor in Middle East disputes.

In the wake of the war in the Gulf, Algerian opinion remains equivocal. The Iraqi regime is unpopular in official and elite circles. But public opinion remains supportive of Saddam Hussein. Both public and elite opinion tends to regard the outcome of the liberation of Kuwait as at best a mixed victory for the Gulf monarchies and the West. On the whole, the fact that Saddam Hussein remains in power in Baghdad is viewed with considerable admiration by most Algerians. The Gulf experience continues to be seen as a Western war against the Arab world as a whole. Even sophisticated observers express concern that such conflicts, pitting north against south and the Arab world against the West, may be typical of the post-Cold War environment. Indeed, to the extent that the nonaligned movement can be salvaged after the Cold War, Algerian officials hope that it can be recast to give the south greater diplomatic weight in its dealings with the developed world.

NORTH-SOUTH RELATIONS

Algerian perceptions of Europe have been strongly influenced by the experience of the revolution against French rule and the enduring mixture of resentment and admiration toward Paris. Members of the Algerian political elite may profess strongly anti-French views, but their patterns of analysis still follow in the French intellectual tradition. This is particularly evident in discussions of international affairs, where French attitudes and political terminology are close to the surface (e.g., the notion of the Mediterranean for the Mediterraneans). With over one million workers and their dependents resident in Europe, mostly in France, many Algerians continue

[11] Youssef Ibrahim, "Islamic Plan for Algeria Is On Display," *New York Times*, January 7, 1992.

[12] See John P. Entelis, "U.S.-Maghreb Relations in a Democratic Age: The Priority of Algeria," *Middle East Insight*, January/February 1992. On Algeria as a test case for relations between Islam and the West, see Robin Wright, "Islam and Democracy," *Foreign Affairs*, Summer 1992.

[13] The FIS had been the recipient of considerable Saudi financial support. Francis Ghiles, "A Fragile Fabric Comes Under Strain," *Financial Times*, January 23, 1991.

to have ties with the former metropole. This presence has caused Algerians to follow the rise of the anti-immigrant right wing in France and elsewhere with great concern. As in Morocco and Tunisia, there is a growing sense that the Mediterranean is emerging as a more formidable cultural, political, and economic barrier between north and south. With a population of some 27 million growing at roughly 3 percent per year, the progressive tightening of EC restrictions on legal migration is a cause for concern at both the government and popular level.

Beyond the issue of economic migration, legal and illegal, looms the potential for an exodus of middle-class and professional Algerians in the event that an Islamic regime takes power in Algiers. The prospect of Islamic rule is anathema to most westernized Algerians. Large numbers of skilled workers and their families would probably choose to leave an Islamic Algeria. For reasons of language and cultural familiarity as well as proximity, France would bear the brunt of this refugee movement. The result would be a serious border control and interdiction problem for the French government, and by extension, others in southern Europe. The refugee flow and the government's response would very likely have a profound effect on domestic politics in France. The existing Algerian population in France could find itself under considerable pressure and would face the threat of violence, both within its own ranks and between Algerians and French extremists.

The development of an independent European defense identity outside the NATO framework is viewed with some alarm in Algiers. This concern is reinforced by European reference to a "threat from the south," in which Algerian observers see a clear reference to their own country and its Maghrebi neighbors. As a result, Algerians who readily criticized the U.S. presence in the Mediterranean during the Cold War are now giving some thought to the importance of a residual American role in the region as a counterbalance to what is seen as an increasingly xenophobic and anti-Islamic Europe. Europe's arm's length attitude to the current situation in Algeria also disturbs the

leadership, which is keen to give the impression of "business as usual" in Algiers.[14]

In the past, and most notably following the serious anti-government riots of 1988, Algeria has sought the active participation of France and other European countries in efforts to promote economic development and alleviate popular frustration with FLN rule.[15] The current political turmoil, coupled with a growing disinclination in Algiers to contemplate real economic reform, suggest a very gloomy outlook for foreign investment. The most attractive sector for economic cooperation on a north-south basis continues to be the natural gas industry.[16] Europe and the United States are leading markets for Algeria's hydrocarbon exports (these account for 95 percent of the country's total export revenues), and the planned construction of a new high-capacity gas pipeline to bring Algerian gas to Europe via Morocco and Gibraltar will increase the country's energy "reach." Although oil production has been steadily declining, Algeria possesses the world's seventh largest reserves of natural gas; it is the third largest supplier to the EC, behind Norway and the former Soviet Union. The eventual development of Trieste as an economic gateway to eastern and central Europe would provide another natural outlet for Algerian gas, augmenting the existing Transmed pipeline to Italy.[17] The primacy of gas exports for Algeria's economic well-being suggests that a "radical" Islamic regime in Algiers would find it difficult to dismantle the existing web of relations with the West even if it wished to do so.[18] In the same vein, regional adventurism and the prospect of conflict with Morocco or Libya would pose a serious

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[14]See Alan Riding, "France Voices Concern over Situation in Algeria," *New York Times*, January 14, 1992; "Mitterrand on Consequences of Algerian Crisis," *FBIS-West Europe Report*, January 15, 1992, p. 15; and "European Parliament Puts Algerian Aid on Hold," *FBIS-West Europe Report*, January 17, 1992, p. 1.

[15]One hundred sixty people are reported to have been killed during the "Black October" riots of October 6–11, 1988. *North Africa: Economic Structure and Analysis (EIU)*, p. 46. For an assessment of the 1988 riots in terms of Algeria's history, see Alfred Sherman, "Algeria—An Intellectual Fashion Revisited," *The World Today*, January 1989.

[16]See James Audu, "Oil: Algeria's Engine of Development," *OPEC Bulletin*, January 1990.

[17]"Imports of Algerian Gas, Petroleum Discussed," *Mondo Economico* (Milan), in *FBIS-West Europe Report*, February 19, 1992, p. 8.

[18]Mortimer, *European Security After the Cold War*, *op. cit.*, p. 38.

risk of interruption in Algeria's gas production and exports—a further disincentive to radicalism.

REGIONAL INTEGRATION

Algeria regards itself as the natural center of gravity in the Maghreb and the natural leader of efforts toward regional integration. The Algerian presidency of the AMU in the second half of 1990 was a period of particularly intense activity with agreements on the establishment of a customs union and other accords aimed at the development of an integrated market. To date, very little has been accomplished in the way of implementation.[19] Above all, and from the Algerian perspective, the AMU has been a useful vehicle for regional activism at a time when such traditional outlets as the nonaligned movement are in decline. More tangibly, the AMU framework has offered a graceful way of disengaging from the western Sahara dispute and improving relations with Morocco. To the extent that moves toward regional integration, whether symbolic or substantive, can give the Maghreb countries greater influence in dealing with the EC and the wealthy states of the Gulf, Algiers will benefit. The combination of the Gulf crisis, the Libyan embargo, and the mounting turmoil in Algiers has left the AMU in limbo. In any case, the Algerian leadership cannot be expected to focus on regional integration unless and until the internal security situation is stabilized.

DEFENSE POLICY

Since the revolution, the armed forces have been a central pillar of the Algerian regime, a position threatened by the political reforms after 1988 but reasserted strongly in the wake of the military-backed coup of 1991. Current Defense Minister Khaled Nezzar is in a position of *de facto* national leadership. Internal security concerns dominate the defense agenda, and the battle against Islamic extremists is now the overwhelming mission of the security forces.[20] The military has arrested a process under which the political power of Islamic groups was steadily increasing but at significant cost to Algerian society and, potentially, its own cohesion should the ranks of FIS sympathizers within the armed forces expand.[21]

[19]On the prospects for economic implementation, in particular, the potential complementarity (or lack of complementarity) among the Maghrebi economies, see Zallio, *op. cit.*, pp. 55–59.

[20]These forces have been strengthened substantially over the past year with the addition of 13,000 men and the formation of a new paramilitary National Security Force (16,000 men), a Republican Guard Brigade, and an augmented Gendarmerie, all lightly equipped. New coastal patrol craft have been purchased as part of a campaign against gun running. The army as a whole is being reorganized on a divisional basis; four divisions total, two armored, two mechanized. IISS, *Military Balance*, 1992–1993.

Over the last decade, the Algerian armed forces have undergone a progressive movement away from a "people's army" and toward a more professional organization capable of operating modern equipment and conducting modern warfare.[22] The bulk of the Algerian military hardware was supplied by the Soviet Union, with whom the Algerian armed forces maintained significant professional and technical contact. Soviet advisors and technicians have had a substantial presence in Algeria since the 1960s. Even in the wake of the breakup of the Soviet Union, and as late as the spring of 1992, as many as 300 ex-Soviet advisors remained in the country, including some of general officer rank.

Algeria is interested in diversifying its sources of military hardware, particularly in the wake of the Soviet collapse.[23] But the country's current economic crisis and depressed hydrocarbon revenues suggest a renewed effort to purchase easily integrated hardware from ex-Soviet stocks at low cost. Apart from a keen interest in acquiring spares for the large inventory of Soviet tanks, helicopters, and aircraft, the Algerian military is likely to seek more advanced aircraft (e.g., MiG-29s) as a counter to the Moroccan purchase of 20 F-16s. The Algerian Navy operates two Kilo-class submarines along with two Romeo-class boats for training. Algeria may seek to buy additional Kilo-class diesel submarines from Russia, a development that would reinforce submarine proliferation trends in the Third World.[24]

[21]See Remy Leveau, *Algeria: Adversaries in Search of Uncertain Compromises* (Paris: WEU Institute for Security Studies, Chaillet Paper No. 4, September 1992).

[22]EIU, p. 48. Total active strength in 1992 was 139,000 (84,000 conscripts), 150,000 army reserves.

[23]One possibility would be the purchase of Italian or Spanish equipment in exchange for natural gas.

[24]On the pattern of reported Iranian purchases from Russia, see Slade, *op. cit.*

NUCLEAR AND MISSILE PROGRAMS: A SEARCH FOR STRATEGIC WEIGHT?

Algeria's nuclear program has been the subject of considerable speculation among Western observers. Taken together with allegations that Algeria is exploring the purchase of Korean and Chinese ballistic missiles, the nuclear issue (coupled with the possibility of an Islamic political triumph) has taken center stage in the debate over Algeria's post-Cold War role. Algerian policymakers are well aware of the sensitivity of the nuclear question in the context of relations with Europe and the United States, particularly in the wake of the Gulf conflict. The Algerian leadership regards the nuclear program as closely tied to the country's international prestige and regional influence. As one leading Algerian observer and former high-ranking official asserts: "In ten years time there will be two countries in Africa which are taken seriously by the U.S.—South Africa and Algeria; both will be nuclear powers." It is difficult to know what weight to attach to this. The comment was intended to stress the significance of Algeria's civil nuclear program for the country's development and prestige, but the potential strategic implications cannot be ignored

Since the establishment of a nuclear development program in 1983, Algeria has acquired two reactors, both ostensibly for civilian purposes. The first is a small (one megawatt) research reactor at Draria outside Algiers. The second reactor, under construction at Ain Oussera 270 km south of Algiers, was not openly acknowledged until 1991 and has been the subject of intense speculation in the West.[25] The Ain Ouserra reactor, built by China, is nominally rated at 15 MW, but is potentially of 40 MW capacity—sufficiently powerful to produce plutonium for a nuclear weapons program. Chinese nuclear technicians have taken up residence in considerable numbers. Algeria has placed the experimental reactor at Draria under IAEA safeguards and has agreed to the presence of inspectors at Ain Ouserra once the reactor is completed. Algeria is not a signatory of

[25]Numerous accounts appeared in the *Times* (London), the *Washington Post*, and the *Washington Times* in 1991, all based on reputed intelligence "leaks." The expulsion of the British military attache, allegedly for taking photographs at the site, only served to heighten speculation about the plant. See LaFranchi, *op. cit.*

the Non-Proliferation Treaty, but has said that it intends to join.[26] Algeria has strongly defended the claim that its nuclear program is strictly for civilian purposes, principally electric power generation (despite the absence of a generating plant and transmission equipment).[27]

More disturbing are reports that Algeria is cooperating with Iraq to provide a sanctuary for Iraqi nuclear materials and technicians and may be pursuing a joint nuclear weapons program.[28] Regardless of the accuracy of these reports, a "nuclear axis" between Algeria, Iraq, or another Arab power would pose significant risks. Uranium and other special materials might be held in trust to avoid international scrutiny or until sufficient technical expertise can be assembled in Algeria. A more proximate risk would be the use of Iraqi uranium to breed plutonium in the Ain Oussera reactor.

The view that Algeria is contributing to the general level of Arab technological development is common in nationalist circles in Algiers. Equally pervasive is the concern that Algeria could become the victim of a preemptive western strike aimed at eliminating the country's nuclear program, on the pattern of operations against Iraq, and potentially against Libya. Above all, and perhaps this argues for the guarded approach of Algerian officials toward the matter, the possession of even a civilian nuclear program is a ready means of promoting Algeria's power and prestige. In short, it provides a substantial boost to Algeria's strategic weight in the eyes of regional actors such as Libya, Tunisia, and Morocco and in the eyes of the West. The risk that Algeria might opt for a weapons program might be compounded by the advent of an Islamic regime in Algiers, a deterioration of relations with Morocco, a crisis along north-south lines in the Mediterranean, or, most dangerously, a confluence of these developments.

[26]See Snyder, *op. cit.*, p. 89. See also Leonard S. Middle, "Threats in the Middle East," *Orbis*, Spring 1992, p. 190. Morocco, Tunisia, and Libya are signatories of the Non-Proliferation Treaty.

[27]Algeria would not be the first energy-rich state to opt for nuclear power, but its plentiful natural gas resources tend to raise certain suspicions.

[28]"Saddam Helps Algeria Make Islamic Nuclear Bomb," *Sunday Times* (London), January 5, 1992; "Algeria and the Bomb," *The Economist*, January 11, 1992; and Youssef Ibrahim, "Algeria Offers Atom Arms Vow," *New York Times*, January 8, 1992.

A more proximate risk to regional stability and the security of southern Europe is posed by Algeria's potential acquisition of ballistic missiles capable of reaching population centers and military facilities across its borders and across the Mediterranean. Libya is reported to have begun negotiations with North Korea for the purchase of Scud-C (600 km) missiles, as well as the 1000 km No-Dong 1, a Scud-C derivative.[29] Algeria will be in a position to acquire similar systems from Korea or China should the government wish to spend the necessary hard currency. The desire for regional leverage and geopolitical weight that provides much of the motivation for Algeria's nuclear program is likely to produce a similar and more easily satisfied demand for ballistic missiles. If states elsewhere in the Arab world continue to acquire these systems, and go further to develop the capability for their manufacture, the incentives for Algeria to follow suit will be very strong.

REGIONAL SECURITY CONCERNS

Algeria's external security concerns have largely receded as the government and the military have become absorbed in the repression of the Islamic opposition. Nonetheless, Algeria has a long-standing concern about Moroccan regional ambitions. Morocco and Algeria have clashed in the past over territorial issues in the Sahara, and military and political support for the Polisario Front in its struggle for control of the western Sahara has until recently been a central strand of Algeria's regional competition with Morocco. The competition with Morocco and support for the Polisario was also part of a broader competition between superpower patrons. The end of the Cold War and the disappearance of the Soviet Union from the scene combined with financial and political crisis to force a reassessment of Algerian policy toward the western Sahara. Algiers has dropped its costly support for the Polisario and has pursued a policy of detente with Rabat, leaving the field clear for a settlement of the Sahara dispute on Moroccan terms. Stabilization of the internal situation in Algeria, or the victory of Islamist forces, might produce a regime in Algiers with the ability and inclination for an active policy toward the Sahara question. Over the longer term, the geopolitical competition with

[29] *Middle East Defense News*, May 18, 1992; Selb, *op. cit.*

Morocco could reassert itself strongly, not least if Algiers fears the creation of a "greater Morocco" incorporating the western Sahara.

A militant Islamic victory in Algeria would place great pressure on Morocco and Tunisia. The prospect of Islamic insurgents operating against Rabat from bases in Algeria could well prove a *casus belli* for King Hassan or his successor. Moroccan control over the planned gas pipeline from Algeria to Spain could also prove a cause of conflict against a background of regional tension, but Morocco would have little incentive to interfere with a lucrative arrangement short of a major crisis. The pipeline is more likely to encourage a confluence of regional interests.[30]

On a secondary level, Algerians are concerned about the consequences of Libyan unpredictability and adventurism. As elsewhere in the Maghreb, the Libyan people are well liked, but Qaddafi is viewed as a wild card and a regional embarrassment. Despite concerns over Libyan intervention in Chad, the potential for a Libyan-Algerian confrontation is low (an Islamic regime that sought to export its revolution to Tripoli would transform this situation). A more serious concern is that Qaddafi's adventurism will provoke a new crisis with the West in which Algerian public opinion will rally behind a brother Arab state, posing more dangerous dilemmas on the pattern of the Gulf War.

Algerian officials are concerned about the availability of outside support for extremist factions within the Islamic movement, although this would be less an external challenge than an extension of the internal struggle against the FIS. Beyond Saudi financial support for the FIS, there is a fear that Iran may become seriously involved in the Islamic insurgency. The advent of an Islamic government in the Sudan with close ties to Teheran is viewed with alarm, both as a political precedent and as a possible conduit for arms and other assistance to groups within Algeria.

There has been a sharp increase in incidents of banditry, including the kidnapping and murder of European tourists by Tuareg tribesman in the region south of Tamanraset. The limited ability of

[30] "Agreement with Algeria for Gas Pipeline Signed," *FBIS-West Europe Report*, May 1, 1991, p. 19.

the Algerian military to fully control the vast territory in the south of the country is an additional issue of concern to the government. The military is interested in acquiring modern photographic and electronic intelligence equipment to assist in the maintenance of order in the south, and, more important, to monitor Moroccan activity along the border in the west.

Finally, looking beyond the Mediterranean shore, Algeria is aware of the potential for a preemptive U.S. or even Israeli strike against Algeria's nuclear or future ballistic missile sites, referred to earlier. A more radical regime in Algiers might well begin to view the possession of a minimum nuclear and ballistic missile capability, together with a more potent submarine force, as a useful deterrent in the absence of a superpower patron. Again, a general deterioration in north-south relations in the Mediterranean over such issues as immigration, religion, or developments elsewhere in the Middle East could reinforce the proliferation dynamic.

Algeria has supported the concept of CSCM (Conference on Security and Cooperation in the Mediterranean). Indeed, before the virtual complete absorption of the Algerian leadership in domestic problems, Algeria emerged as an enthusiastic supporter of a "global" CSCM, encompassing a vast area from Mauritania to the Persian Gulf, as originally proposed by Italy and Spain. The preferred approach from the Algerian perspective would emphasize cooperation on underlying political and economic problems, without a strong security component. Algeria has been less receptive to the alternative, French-sponsored approach centering on north-south cooperation in the western Mediterranean, but is a participant in the current "Five plus Five" negotiations along these lines. Once a leading proponent of naval arms control in the Mediterranean, Algeria now emphasizes the right of regional powers to develop adequate means of self defense, including the possession of unconventional weapons. Algerian analysts invariably point to Israel's conventional and unconventional arsenals as a justification for this stance.

PROSPECTS FOR BILATERAL RELATIONS WITH THE UNITED STATES

Despite American support for the principle of Algerian independence, which many Algerians remember and continue to cite as grounds for optimism on bilateral relations, and significant energy ties, the history of relations between Washington and Algiers since the revolution has been mixed at best. Algeria's activism in support of the nonaligned movement and close ties to radical Third World states unfolded against a background of East-West competition that made cool relations a virtual inevitability. Close U.S. ties to Morocco and Algeria's military ties to the Soviet Union and Eastern Europe (notably, Algeria never provided the Soviet Union with bases) reinforced the distance between Washington and Algiers.[31] Algerians, who take their country's reputation for activism in international affairs seriously, were particularly disturbed by the perceived failure of Washington to express adequate gratitude to Algeria for its efforts as an interlocutor in the negotiations over the fate of the U.S. hostages held in Iran and eventually released in Algiers in January 1981.[32]

In 1985, President Benjedid became the first Algerian head of state to visit Washington since independence in 1962. In the aftermath of the Cold War, and with a process of political and economic reform under way in Algeria, the way seemed open for closer bilateral relations. The abortive elections and the installation of an unstable military-led regime has made Algeria a difficult and unappealing partner for the United States in the Maghreb. The resumption of more active relations between Washington and Algiers will be difficult to contemplate until the domestic situation in Algeria is stabilized and a government with sufficient political legitimacy establishes itself. In the interim, the attitude of the United States and the West as a whole toward the Islamic movement in Algeria will be an important and potentially precedent setting example for relations between Islam and the West more broadly.

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[31] Since 1986, the United States has had a small IMET (International Military Education and Training) program in Algeria, funded at $150 million in 1992, with matching funds from Algeria.

[32] Parker, *op. cit.*, p. 50.

Over the longer term, the United States will have a strong stake in developing positive relations with Algeria. First, Algeria is arguably the region's leading actor, with immense human and material resources, and substantial actual and potential military power. Second, the political, economic, and security fate of Morocco and Tunisia will depend to a large extent on the course of developments in Algeria. Third, Algeria is unlikely to abandon its tradition of international activism for long. It will remain an influential actor within the Arab world and within the Third World.[33] Finally, Algeria's proliferation potential, coupled with its likely search for strategic weight, suggests the importance of minimizing the Algerian sense of exposure to external challenges, not least the risk of a confrontation with the United States.

The current regime clearly wishes to develop a closer relationship with Washington as a means of diversifying its relations, including its arms supply relationships. At a time when many Algerians are concerned about the emergence of xenophobic, anti-Islamic trends along the northern shore of the Mediterranean, closer relations with the United States appear as an attractive balance to Europe. Would an Islamic regime in Algiers be amenable to positive relations with the United States and the West as a whole? A moderate Islamist regime, or a coalition government in which Islamic forces share power with secular parties, probably would. Even a more radical Islamic regime would find it difficult and counterproductive to dismantle the extensive network of political and economic ties with the West. As in Iran, the imperatives of an energy-based economy will make themselves felt. But unlike Iran, Algeria is less than 200 miles from Europe, with all that this implies for access to European media and the consequences for public opinion. In the worst case, the advent of a radical Islamic regime with active international ambitions risks the creation of another and more potent pariah state in the Maghreb—closer to Iran than Libya in terms of its regional power and potential.

Algeria is likely to loom increasingly large in U.S. strategy toward the Mediterranean basin. But the potential for deeper bilateral relations

[33]These arguments for a more active U.S. policy toward Algeria are developed in Entelis, *op. cit.*

on many fronts cannot be realized without a resumption of the democratic process in Algeria. Establishing closer ties with the current military-backed regime is unlikely to improve the long-term outlook for relations as the legitimacy of the old FLN-inspired order continues to decline. U.S. policy should be firmly and unambiguously oriented toward the promotion of democracy in Algeria. Future economic and security assistance initiatives should be made contingent on progress in this direction.

Libya wants CSS-2

TRIPOLI

Libya is trying to buy CSS-2 surface-to-surface missiles from the People's Republic of China. The procurement of these missiles has the highest priority in Col Gaddafi's plans to achieve a long-range strike capability, says a senior Israeli Air Force source.

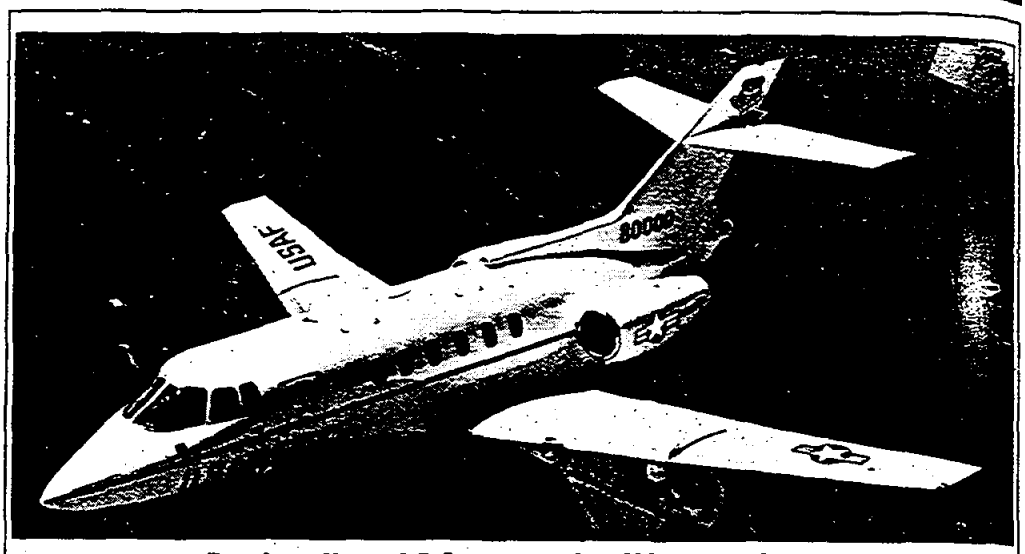
The IAF explains that, after the Russians turned down Gaddafi's requests to supply his air force with top quality aircraft, he decided to try and buy the Chinese missiles that have already been supplied to Saudi Arabia. "The Russians refused to sell MiG-29 Fulcrums and Su-24 Fencers to Libya, and if they put this country on a list of potential customers I'm sure that it was given the last place," says a senior IAF officer.

For years Libya has bought arms from every possible source; hundreds of fighters, bombers, helicopters, and transport aircraft are stored at air force bases. The training of pilots and technical crews has not kept pace with the stockpiling, however, so the Libyan Air Force is unable to operate all of its aircraft. "Five to ten years will pass before Libya will be able to man all the aircraft it bought from Russia and France in the good years," assesses the IAF officer, who adds that the lack of spares, especially for the Dassault Mirages, renders most of them unoperational. "Gaddafi's efforts to get spares in the free market didn't change the situation much."

The Soviet Union still supplies Libya with spares for its fighters and bombers, and, according to the IAF, these aircraft are kept operational with everyday help from Soviet, Polish, and Jugoslav pilots and technical instructors. According to the IAF, the Libyan Air Force has 60 MiG-25 Foxbats, 70 MiG-21 Fishbeds, 200 MiG-23/27 Floggers, 100 Su-20/22 Fitters, 35 Mirage F.1s, and 75 Mirage 5s.

The transfer of Soviet-built Scud-B missiles from Libya to Iran caused an official Iraqi complaint to the Kremlin, and the IAF claims that this also further delayed further arms deals with Libya. "Gaddafi has expressed his desire to equip his air force with long-range bombers like the Fencer in addition to the Fulcrums, but in both cases he has no reason to be optimistic."

As well as the political problems involved in obtaining high quality aircraft, Libya's economy is also a limiting factor. Up to about four years ago the annual Libyan arms procurements averaged over $1 billion. Since 1985 these have been cut to less than a third of the original, mainly because of the sharp decrease in Libyan oil revenues. In the past, Libya tried to develop its own surface-to-surface missiles with the help of German experts. These efforts failed, and Gaddafi tried again, this time using the Brazilian arms industry as a partner. This co-operation also faltered, after the USA put pressure on Brazil. "I'm not sure that the Libyan leader will not pursue his efforts to achieve a surface-to-surface missile production capability," says the senior Israeli Air Force officer.



Rockwell and BAe team for USAF trainer

Rockwell and British Aerospace have teamed to compete for the US Air Force's Tanker/Transport Training System (TTTS), basing their bid on the BAe 125-800 corporate jet. The aircraft is essentially unchanged except for the addition of a third cockpit seat for an instructor. Competing against Rockwell and BAe are teams from Lear/Boeing, Cessna/General Dynamics, and McDonnell Douglas/Beech. The winner will be announced in mid-1989, and the USAF will buy up to 200 TTTSs.

TRACER . . .

Japan says its fighters were scrambled 848 times in FY1987, compared with 825 times the previous year. Most of the sorties were to intercept Soviet aircraft near Japanese airspace. Last year, Japanese F-4s fired warning shots near a Tu-16 in Japan's air space.

Japan's second Bell/Fuji AH-1S Cobra anti-tank helicopter squadron has formed at Hachinoe in north-east Japan with eight Cobras and two Hughes/Kawasaki OH-6D Cayuse. The unit will double in size before becoming operational in March 1989.

Australia has withdrawn its squadron of Mirage IIIEs from permanent station at RAAF Butterworth, Malaysia. In future, RAAF F-18 Hornets and F-111s will be deployed to Butterworth on roulement.

Atlantic Research and TRW have been awarded a $24·7 million joint contract to produce booster rockets for the McDonnell Douglas Tomahawk cruise missile. The contract represents 70 per cent of Fiscal Year 1988 booster rocket procurement. To date the Atlantic/TRW team has produced 1,200 boosters.

CASUALTIES . . .

● A South African Air Force Atlas Impala 1 of the Silver Falcons aerobatic team crashed during an air display on April 16. After completing a loop, the pilot, Capt Kobus Griesel, reportedly lost pitch and roll control as the five-ship formation ran past the crowd line at AFB Langebaanweg. Griesel used rudder to yaw away from the crowd, pointing the aircraft towards open countryside before ejecting at 350ft. Griesel sustained minor back injuries.

● A United States Marine Corps McDonnell Douglas F-18 Hornet crashed during an air display at MCAS El Toro, California, on April 24. The crash occurred when the pilot, Col Jerry Cadick, attempted to pull out from a loop. Cadick did not eject and was critically injured.

● An Angolan Air Force Antonov An-26 Curl was shot down by an Angolan Army Sam 7 and AAA fire while on the approach to land at Tchahutete on April 28. The crew of three, plus 26 Cuban officers including Gen Francisco Cruz (Cuba's Vice-Minister of Armaments) and an anti-aircraft advisory team, were killed.

Qadhafi Modernises His Missile Industry and Goes on the Offensive

Libya, with the help of mainland China and North Korea, has now gone a long way toward modernising its strategic missile forces. But Libya's Qadhafi has also gone on the propaganda offensive, capitalising on the West's fear of Islam.

Mu'ammar al-Qadhafi's Libya has embarked on a programme of expanding its strategic industries, namely, the production of ballistic missiles and additional chemical weapons. The primary technological support for these projects comes from the DPRK (North Korea) and the People's Republic of China (PRC).

Back in the late-1980s, Tripoli embarked on the development of a SCUD derivative, *al-Fatah*, with a range of 480km. However, in order to acquire MRBMs, Gadhafi turned to Pyongyang and agreed to underwrite the North Korean development of its own SCUD-based MRBM in return for an agreement to produce these missiles in Libya. In 1992, the DPRK's own 1,000 km-range MRBM, the *Nodong 1*, is near operational status and available for export. In mid-December 1991, the joint Arab Libyan-(North) Korean Committee for Co-operation met in Tripoli to study the specific aspects of key construction, communications, transportation, and cargo transport projects toward the implementation of the SSM project.

However, since the DPRK is using such key components provided by the PRC as rocket engineers and guidance systems for the *Nodong 1* it was imperative to also co-ordinate export with Beijing. Abd as-Salam Jallud, Libya's number two man, arrived in Beijing on January 19, 1992, leading a high-level delegation of senior officials of scientific-technological and military industry agencies. The Libyans and several Chinese leaders, including President Yang Shangkun and Premier Li Peng, discussed improvements to their "joint efforts" in order to address the "imbalance of international forces" in the "turbulent" world as well as confront the "new world order". Alluding to agreements reached, Li Peng stated that "the world is more turbulent and peace is endangered, with the developing countries facing more difficulties. People of the whole world now face the common task of ensuring peace and seeking development".

Beijing agreed to assist the Libyan SSM project via the DPRK and it was learned in mid-February 1992 that Libya and North Korea would soon build a test-site for a 1,000-km-range MRBM described as a SCUD derivative. This SSM would ultimately be produced in Libya as a joint project with the DPRK. Indeed, the anticipated characteristics of the Libyan *al-Fatah* ballistic missile were changed to having 500-kg-warhead and 950-km-range, performances virtually identical to those of the *Nodong 1*.

The PRC also expands its support for the Libyan chemical industries, including chemical weapons and petrochemical projects. In late-February, Gu Xiulian, the PRC Minister of Chemical Industry visited Libya at the head of a large delegation and signed a series of agreements on joint projects and industrial development with Jadallah al-Talhi, Libya's Secretary of the People's Committee for Strategic Industries. Gu Xiulian also discussed strengthening co-operation with Nuri al-Madani, Secretary of the People's Committee for Scientific Research, responsible for acquisition of high technology. Both Libyan ministries are responsible for the acquisition of strategic weapons technologies.

Tripoli seems to be turning to the PRC for strategic technological assistance as an alternative to a growing denial of access to the West European and US technological resources.

Libyan leader Mu'ammar al-Qadhafi seems to be moving on a number of strategic fronts, some of them offensive, some defensive. The Bank of England, earlier this month, reported that Qadhafi and his colleagues had moved most of Libya's cash reserves out of UK banks during 1991, confirming the reports of *Defense & Foreign Affairs Strategic Policy* that the Libyan leadership was trying to protect its offshore reserves. Considerable cash reserves, both "government" and private, were also moved in the first quarter of this year — 1992 — from Swiss banks to banks in Abu Dhabi and Bahrain, as well as other banks around the world.

Qadhafi, meanwhile, has committed extensive funds in recent months to fund the building by European contractors of underground bunker-style accommodation in remote villages. This, he feels, will give him protection against US air strikes.

But Qadhafi also entered the propaganda offensive, to counter British and US led initiatives in the United Nations to impose a full economic quarantine on Libya as a response to Libya's refusal to allow extradition of two officials suspected of implication in the bombing of Pan Am flight 103. As he has on almost every previous occasion that Western pressure has been applied, Qadhafi has "toned down" his behaviour, and the Western media has reported that he had become more moderate. *The Observer* in London earlier this month carried a report noting Qadhafi's newly-discovered mellowness, and carried reports saying that "Western observers" now believed that it was safer to keep Qadhafi in power than to risk "anarchy" and the rise of Islamic fundamentalism in Libya should the present leadership be toppled.

The report, also picked up blindly by *The Washington Times* on March 3, 1992, was a near-mirror of reports which circulated consistently throughout the years that Qadhafi has faced maximum pressure. The reality, however, is that Libya would today not descend into anarchy, bloodshed and Islamic fundamentalism if Qadhafi and his colleagues were ousted. For the first time the Libyan opposition has united in a moderate tacit alliance which supports restoration of the Constitution drawn up by the United Nations for Libya's independence in 1951. The leadership of Libya devolves onto the Sanusi monarchy which is committed to the most moderate form of Islam, the *Sanusiyyah* movement. Indeed, the Sanusi leader-in-exile, Prince Idris al-Sanusi, formed the Al Taj Foundation in October 1986 to promote moderation and tolerance in Islam, before the threat of radical Islam ever began to seriously concern the West.

Egypt, Libya's largest neighbour in strategic terms, is, however, greatly concerned about the possible spread of radical Islam in the region, from the Sudan in particular, but also in Algeria. Cairo has focussed its top intelligence thinkers on coping with what it sees as this critical threat. ★

had supplied Patriot missile technology to China. U.S. experts were concerned that China could use the information to design missiles to evade the Patriots. Israeli officials vigorously denied the report. But in January 1993, CIA Director told a *Washington Times* editorial board "there is some indication that [the Chinese] have some of the [Patriot] technology." While not fingering Israel directly, Gates said there were "differences of view on the issue" within the administration. In April 1992, the State Department gave Israel a "clean bill of health" on the transfer issue.

Israel is suspected to be a nuclear weapon power as well. The U.S. estimates that Israel has about 100 nuclear weapons but Seymour Hersh, in his book "The Samson Option," contends Israel has nearly 300 nuclear warheads on artillery shells, missiles and land mines. Hersh says Israel went on full nuclear alert twice during the 1973 Middle East war as well as during the Gulf war.

Israel reportedly has been working on chemical weapon research since the 1960s and is believed to have an operational production capability of both mustard and nerve agents.

11.4 Libya

Libya appears intent on "acquiring missiles capable of delivering nuclear warheads to the United States," a 1988 congressional report said. Congressional and DOD concern has been fueled by reports of Libya's attempts to buy intermediate range ballistic missiles from Brazil and China, including an improved version of the Chinese CSS-2 missile that has a range of up to 2,700 kilometers with a nuclear warhead. Other reports said Libya talked with a Brazilian company about the development of a missile with a range of 740 miles.

In 1979 the West German firm Orbital Transport und Raketen-Aktiengesellschaft started work on a commercial space launch rocket in Libya. Reportedly, the program had several unsuccessful tests in 1981 before the West German government forced the company to leave. Since then, reports have surfaced that some of the German engineers stayed to work on a 500-to-750 kilometer missile. A test was reported as recently as 1987. In 1986 Libya shot two Soviet Scud-Bs at a U.S. Coast Guard station across the Mediterranean in Italy.

Analysts say Libya is unlikely to build an ICBM in the next 10-to-15 years capable of reaching the United States, nor is it likely they could acquire such a missile from China or the former Soviet Union.

Libya also appears to be developing chemical and biological weapons. In November 1991, the German magazine *Der Spiegel* reported Libya was building its second poison gas factory and was working with Syria and Iran to get German "technology mercenaries" to help them develop such weapons. In January 1992, CIA director Robert Gates said Libya has stockpiled 40,000 tons of chemical agents and wanted to buy long-range Scuds.

Der Spiegel said "Iran, Syria and Libya want to heavily arm themselves in chemical, biological and atomic areas with war technology made in Germany." The magazine said Iran planned to have a chemical plant operating by the end of the decade. A German government official told the magazine "it is known that German technicians have worked for others and perhaps still do."

In January 1992, *USA Today* reported Libya tried to hire at least two Soviet nuclear scientists to work at Libya's Tajura Nuclear Research Center, which was built by the Soviets in 1982. The Libyan foreign minister, Ibrahim Bishari, denied the story in Libya's official news agency *JANA*, saying Libya "has no nuclear program," nor a need for one. "Libya has absolutely no intention to benefit from the Soviet nuclear scientists and it is not its policy to lure or tempt them to come here." Another JANA report said Libya "is not involved in the scramble perpetuated by some Western and Zionist states to lure Russian nuclear scientists following the disintegration of the Soviet Union."

The U.S. contends Libya built a large chemical weapons production facility at Rabta and used chemical weapons in Chad in the late 1980s. Libya reportedly obtained its first chemical weapons in 1987 from Iran. In March 1990 U.S. officials said the Rabta plant had reached limited operational capability and produced "limited quantities of mustard gas and nerve gas."

But an August 1992 report by Kenneth Timmerman for the Simon Wiesenthal Center in Los Angeles said Libya had been unsuccessful in acquiring chemical and nuclear weapons capability because of mismanagement and lack of scientific expertise.

11.5 Iran

Iran also is working to develop an indigenous family of ballistic missiles. The first is expected to have a range of about 130 kilometers.

In May 1991, *The Washington Times* reported Iran test fired a medium-range ballistic missile that went more than 310 miles. It was suspected to have been an improved North Korean version of the Scud. It was fired to the east from a mobile launcher near Qom. U.S. officials say Iran might have purchased up to 100 of the improved missiles from North Korea.

In March 1992 a North Korean cargo ship suspected of carrying Scud-C missiles for Syria or Iran eluded U.S. warships and docked at the Iranian port of Bandar Abbas.

In October 1991, the U.S. contended Iran also was working on development of nuclear weapons. A U.S. intelligence estimate on Iran contended the Iranian nuclear program was initial and disorganized. U.S. officials cited Iran's purchase from China of electromagnetic isotope separation equipment, which can be used to

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IDF faces shortfall in 1988-89 Israeli budget

THE DEFENCE establishment is to be the main beneficiary of Israel's 1988-89 $33 billion budget, tabled in the Knesset (Parliament) last week.

Excluding pensions and reserve duty payments, domestic defence expenditure will account for about 9·8% of the budget, excluding foreign aid.

According to Defence Ministry calculations, the budget leaves the Israel Defence Force (IDF) approximately £600 million short of the sum to fulfil its acquisition needs. The IDF has yet to propose a new five-year plan and has not suggested ways of covering the shortfall.

No decision has yet been made on a major naval acquisition programme, including new Saar missile boats and three new submarines at an estimated cost of $1·66 billion by 1997, because of the financial constraints.

Domestic defence expenditure, including a $100 million conversion from US defence aid will total $3·8 billion, a 2% rise against defence imports.

Foreign defence expenditure will total $1·52 billion. Israel receives $1·8 billion in US military aid, of which $430 million may be converted into shekels for domestic use. Israel will spend $150 million of its own money in overseas purchases.

A treasury grant of $57 million has been made in order to encourage the IDF to cut by 3% the number of days reserve soldiers must serve.

The defence allocation does not include prior overspending or about $150 million from used weapon sales.

Libya offers to finance Brazilian missile project

LIBYA has proposed financing a Brazilian missile development programme with $400 million annually for at least five years, according to sources in Brazil's War Material Department of the Army Ministry.

The deal would allow Libya to purchase the first batch of the MB/EE series of tactical missiles being designed by Orbita Special Systems and guarantee Libya's access to the technology.

Fifteen Libyan specialists, including 12 armed forces officers, headed by Mohammed Ali, Director-General for Armament Supplies, were reportedly mainly interested in the MB/EE-150, a dual launcher missile mounted on a semi-armoured chassis, manned by a three- or four-man crew.

Electronically autonomous with a ground-based radar, the missile is planed to carry a 500 kg warhead to a distance of between 100-150 km. The missile measures more than 12 m and has an inertial guidance system and precision sensors to make last-minute flight corrections.

In initial trials, 50% of the missiles have hit their targets, according to Brazilian sources.

The Libyans were also interested in developing and acquiring the MB/EE-600 and MB/EE-1000, understood to have ranges of 600 km and 1000 km respectively.

Orbita is thought to be also developing an MB/EE missile with a range of 350 km.

Mohammed Ali, who reports directly to Libyan leader Mu'ammar al Gadaffi, also showed considerable interest in purchasing an undisclosed number of Engesa-manufactured Osorio EE-T1 main battle tanks and artillery. The Libyans visited Brazil at the invitation of Engesa.

The USA has protested to Brazil over the proposed sale of arms to Libya.

Brazil suspended arms sales to Libya in 1983 after intercepting Libyan cargo aircraft that were attempting to use Brazil as a transit point for clandestine shipments of arms to Nicaragua.

Noricum admits GHN-45 sales to Iran

NORICUM has admitted that it has sold its GHN-45 155 mm howitzer to Iran, even though the action is prohibited under Austrian law.

The sale has been under investigation by the Austrian Government for several months.

No clear information exists on the number of weapons delivered to Iran. Sources suggest that Iran ordered 600 GHN-45s to be delivered in three batches — 200 each in 1985, 1986 and 1987. As many as 500 weapons could have reached Iran.

Protecting SDI and ADI from budget cuts

PENDING CUTS in US defence spending preoccupied many of the speakers at last week's Armed Forces Communications and Electronics Association's Western Conference and Exposition in Anaheim, California.

US Air Force Gen John Piotrowski, Commander, US Space Command, told his AFCEA audience that despite the cuts, the Department of Defense would find ways of moving ahead on efforts such as the Strategic Defense Initiative and Air Defense Initiatives.

Even with the Intermediate Nuclear Forces Treaty between itself and the USSR, the USA must maintain the ability to counter Soviet ballistic and manned bomber capabilities, said Gen Piotrowski.

The Soviets are improving their manned bomber and cruise missile capabilities and expanding resources in space, he warned, adding that the USA must be able to counter such expansion.

Both SDI and ADI give the USA a capability for meeting the challenge. They represent "excellent opportunities" for enhancing US defensive resources.

Although SDI is mainly new technologies, ADI is not. ADI can be achieved with 'ongoing programs' such as improvements being made to the North American warning system, radar installations such as over-the-horizon backscatter system and other US-Canadian efforts for protecting against attack from the north, Piotrowski said.

Improvements to the E-3 aircraft also help the inception of ADI. A space-based radar will also give the USA the ability to improve its defences.

Work of the US Army for surface-to-air intercepts and US Navy improvements in ASW and other projects are applicable to ADI, Piotrowski noted.

C³I equipment must be a high priority

THE US Department of Defense must keep sensors and other equipment relkated to C³I high on its list of priorities during the coming cuts in the military budgets, according to Vice Adm Jerry Tuttle, Director, C³I Systems, Joint Chief of Staffs.

Vice Adm Tuttle, speaking at AFCEA, said that in the face of budget restraints, equipment which improves the capabilities of the operational force enables the military to deaden those cuts.

He told the conference that the US needs to "exploit our systems" in order to give battlefield commanders the information needed to counter the moves of potential enemy's.

The Joint Chiefs of Staff are putting together a world-wide C³I network that combines existing systems, improves others and creates new ones that will benefit the various levels of command — starting with the Pentagon.

Deployment of US forces in the Gulf, he said, has resulted in the creation of a C³I network through links with E-3 aircraft to command leadership 11 000 km away.

The system pulled together "scattered elements" from an area previously without the benefit of C³I, Tuttle noted.

I

(Communications)

PARLEMENT EUROPÉEN

QUESTIONS ÉCRITES AVEC RÉPONSE

QUESTION ÉCRITE E-2396/91
posée par Virginio Bettini (V)
à la Commission
(22 octobre 1991)
(94/C 332/01)

Objet: Vente par l'Allemagne de technologie militaire à la Libye

Vu le titre III, article 30, de l'Acte unique de 1986 (principes de la mise en œuvre en commun d'une politique étrangère européenne) et en particulier son paragraphe 6, points a et b,

vu la déclaration du Conseil européen de Rhodes du 3 décembre 1988 sur le «Rôle international de la Communauté européenne»,

vu la résolution du 14 mars 1989, qui souligne à quel point il est important, d'une part, de limiter et de contrôler le commerce des armes pour diminuer l'ampleur des conflits armés dans le monde et atténuer la souffrance humaine, et nécessaire, d'autre part, d'éviter que l'exportation d'armes par les États membres ne se retourne contre l'Europe,

vu la résolution du 18 avril 1991 sur le commerce des armes:

1) la Commission sait-elle que l'entreprise industrielle «Friz Werner GmbH» de Rheingau (Allemagne) vend, actuellement, à la Libye, du matériel destiné à la production de missiles sol-sol, en camouflant ce commerce derrière un contrat signé avec Tripoli pour «une installation destinée à la fabrication de conduites pour égouts et aqueducs»;

2) sait-elle, en outre, que les missiles «Al Fatah», construits par cette filière, sont en mesure de toucher une grande partie du centre et du sud de l'Italie»;

3) la Commission n'estime-t-elle pas que le moment est venu de mener les enquêtes nécessaires pour pouvoir mettre fin au commerce illégal d'armes et de technologies militaires par les États membres;

4) enfin, peut-elle indiquer si elle a élaboré les propositions relatives à l'établissement d'un marché commun des armes et à la définition d'une politique commune des ventes d'armes, que la Parlement réclamait dans sa résolution du 14 mars 1989?

Réponse donnée par M. Delors
au nom de la Commission
(3 juin 1993)

Les trois premiers points soulevés par l'honorable parlementaire ne relèvent pas de la compétence de la Communauté.

Sur le quatrième point, la réponse est négative. L'attention est néanmoins attirée sur le fait que la Commission participe aux travaux du groupe *ad hoc* CPE sur le «contrôle des exportations d'armes conventionnelles», auxquels les Conseils européens de Luxembourg et de Lisbonne ont assigné un objectif d'«harmonisation».

QUESTION ÉCRITE E-3267/92
posée par Ben Visser (S)
à la Commission
(6 janvier 1993)
(94/C 332/02)

Objet: Transport de fret aérien par rail

La compagnie néerlandaise ATAN (Air Transport Association of The Netherlands) a essayé d'instaurer un service de transport de fret aérien par rail. Un service quotidien de fret aérien intercontinental devait démarrer aux environs du 1er novembre 1992 entre l'Italie et les Pays-Bas. Cette initiative a échoué en raison, notamment, des délais d'attente aux frontières. Le week-end, le temps d'attente à la

Libya sells Al Fatah design to Iranians

BY ALAN GEORGE

Libya has sold the design of its Al Fatah medium-range missile to Iran, according to knowledgeable Western government officials.

During the 1980s, Libya tried to develop the Al Fatah, with assistance initially from the West German firm Otrag, and then with help from individual German specialists. The project, however, never advanced beyond the construction of prototypes. Test launches failed.

Most reports give the rocket's design range as about 500km (270nm), although the officials describing the sale to Iran gave the range as 950km. It may be that Iran is attempting to develop an upgraded Al Fatah, possibly in association with Libya.

The Al Fatah is just one element in Iran's plans to expand its ballistic-missile capabilities. The officials, speaking exclusively to *Flight International*, listed nine major Iranian missile systems, ranging from the MGM-52 Lance, supplied by the USA during the Shah's reign, to the DF-25, a 1,700km-range Chinese rocket, of which at least two units have been supplied to Iran for testing and development.

Of special concern in Western capitals is the joint Iranian-North Korean Nodong-1, which will be capable of delivering a 1,000kg warhead over 1,000km. The first deliveries of the missile are expected shortly. The Koreans will also help establish production plaants in Iran.

The officials say that Iran may be trying to develop its own cruise missiles and long-range (at least 2,000km) rockets. Iranian procurement agents are said to be showing interest in German and Japanese companies with satellite-launch expertise. Tehran has also been displaying interest in technology developed recently by Japanese firms for the SSM-1 and ASM-2 subsonic, turbojet-powered missiles destined for the country's defence forces.

Crucial equipment for Iranian rocket projects has already come from West European and Japanese companies, often via third countries, and Tehran has recruited missile specialists from the former Soviet Union, the officials say.

They stress, however, that the North Koreans and the Chinese are by far the most important suppliers of missile technology to Iran. □

Iranian missile systems

System	Payload (kg)	Range (km)
MGM 52 Lance	450	130
Nazeat-10	450	150
Mushak 200	500	200
Scud B (I)[1]	500	550
Scud B	985	300
Al Fateh	500	950
Nodong-1	1,000	1,000
M18/Tondar-88[2]	400	1,000
DF-25	2,000	1,700

1. Most advanced variant of the Scud-B. In March 1992, Iran took delivery of at least 18 North Korean Scud-C missiles.

2. Being developed with Chinese and North Korean assisstance. Based on the Brazilian SS-1000 design.

implement Resolution 687. In conjunction with nuclear and chemical weapons programs, the Iraqi technical infrastructure established to produce missiles was revealed to be even more extensive than had been thought among western experts. In addition to the numerous missile programs, Iraq also was involved in Project Babylon, an effort to produce long-range guns that had ranges of hundreds of kilometers, potentially equipped to carry nuclear and chemical ordnance. The future status of all of Iraq's weapons programs will depend on the UN's success in implementing and enforcing Resolution 687.

Israel

Israel is widely believed to have the most advanced missile program in the Middle East. Little about the program has been officially confirmed—the Israeli government has never admitted to possessing an indigenously produced ballistic missile, let alone a deployed force. Israeli missile development efforts date back roughly thirty years. Initially, these efforts involved a contract with France, under the so-called MD-620 and MD-660 missile programs, in which missiles were developed in France for transfer to Israel. Following the rupture of the Israeli-French arms relationship in the late 1960s, however, the production effort was transferred to Israel.

It appears that Israel has developed several generations of missiles, commonly known in the West as Jericho I, Jericho II, and Jericho IIB. Deployed versions are reported to have ranges of roughly 450 kilometers, 800 kilometers, and 1,500 kilometers, respectively. Israel may be attempting to develop systems with even longer ranges, including a system based on the Shavit space launch vehicle, which was first tested in the mid-1980s.

Israel is believed to have succeeded in developing and deploying missiles for nuclear delivery. In addition, Israel also has shown interest in conventionally armed missiles for tactical

missions. Two hundred Lance missiles armed with cluster munitions warheads were acquired from the United States during the 1970s. These are probably now second-line systems, given Israeli development of more advanced long-range artillery rockets with comparable ranges, such as the ninety-kilometer-range MAR-350. Israel also has shown considerable interest in land-attack cruise missiles. Its inventory is known to include long-endurance kamikaze drones, intended mainly to attack electronic systems. Further, Israel has indicated interest in developing systems capable of attacking an even broader range of targets with advanced conventional munitions.

Libya

The Soviet Union is believed to have supplied eighty Scud-B and forty FROG-7 launchers to Libya since the 1970s, providing the Libyans with a missile force disproportionately large for a country of its size. In addition, it appears that Libya tried to purchase missiles from China and North Korea in the late 1980s.[6]

The Libyans have also attempted to develop their own missiles, but with limited success. During the late 1970s and early 1980s, a firm owned by the Swedish government offered training in missile guidance techniques to Libyan engineers.[7] Later, a West German space launcher development firm, OTRAG, located its facilities in Libya. Although the company eventually pulled out of Libya, a group of German engineers associated with the project apparently remained in the country, working on a project known as Al Fateh.

The Libyans have tried to buy missile technology from other foreign sources. In early 1988, for example, Libya attempted to negotiate a multi-billion dollar deal with a Brazilian missile company to develop and coproduce a missile with a range of 1,000 kilometers. Nothing apparently came of the attempt.[8]

DEFENSE MARKET IN THE MIDDLE EAST.
Cote = Me 1910/W 1414

Table I-J-1

LIBYA: BASIC OVERVIEW DATA

POPULATION:	4.58 million
GDP (1989):	$24.38 billion
CURRENCY:	Libyan Dinar
RATE OF EXCHANGE:	$1 = 0.295 Libyan dinars
DEFENSE BUDGET (1988):	$1.39 billion
FORM OF GOVERNMENT:	Republic
HEAD OF STATE:	Col. Muhammar al Qaddafi
DEFENSE MINISTER:	Col. Muhammar al Qaddafi

Source: Frost & Sullivan, Inc., 1991

Qaddafi's close ties with Moscow; his open support of terrorism and of subversive groups in many countries; his use of Soviet, North Korean, and Cuban military personnel; and his granting of base rights to the Soviets have all set a tone of radicalism. The patterns of defense equipment purchases by Libya clearly reflect a tilt toward the Soviets, although some Western nations, especially Italy, France, and Brazil, have made important contributions to the Libyan arsenal.

Libya signed arms agreements with the USSR in 1977, 1978, 1980, and 1985. Soviet deliveries slowed in the late 1980s, due to Libya's worsening economic plight. Libya's current military and

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commercial debt to the Soviet Union is an estimated $5 billion. Although in the past two years the USSR has resumed deliveries of first-line aircraft and tanks to Libya, Moscow is unable to finance large-scale arms purchases such as Libya made in the late 1970s and is now less likely to wish to support international terrorism.

As Table I-J-2 indicates, all branches of Libya's standing military forces have grown dramatically, doubling since 1978. Estimates of defense spending are difficult to obtain, but outlays currently run to over $1 billion annually. From the highs of the early 1980s, Libyan arms imports dropped dramatically, to an estimated $625 million in 1987, according to the US Arms Control and Disarmament Agency. Thus Libya was omitted from the top ten arms buyers in that year.

Severe economic problems resulted from the steep plunge in oil revenues, due to the world oil glut. Libya's oil income, which reached $22 billion in 1980, plummeted to $10 billion in 1985 and $5 billion in 1986. Thus Libya's ambitious development projects, both agricultural and industrial, were curtailed. In 1985 Egyptian and Tunisian workers in Libya were expelled, due to the poor economic situation. Furthermore, the war in neighboring Chad, where Libya had committed about 5,000 troops, made austerity

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Table I-J-2
BASIC DEFENSE DATA FOR LIBYA
1978-1990

Year	Armed Forces (No. of Men)				Defense Budget ($ mill.) current	GDP ($ bill.) current	Population (mill.)
	Army	Navy	Air Force	Other*			
1978	30,000	3,000	4,000	-	448.0	18.5	2.86
1979	35,000	3,000	4,000	-	502.0	19.0	2.97
1980	45,000	4,000	4,000	-	502.0	39.1	2.93
1981	45,000	5,000	5,000	8,500(a)	557.2	31.0	3.10
1982	55,000	5,000	5,000	10,000(b)	709.3	28.5	3.13
1983	58,000	6,500	8,500	10,000(b)	1,200.0	26.1	3.20
1984	58,000	6,500	8,500	10,000(b)	NA	22.6	3.49
1985	58,000	6,500	8,500	7,000(b)	NA	19.9	3.56
1986	55,000	6,500	10,000	7,500(b)	1,410.0	18.8	3.80
1987	60,000	6,500	10,000	4,500	1,320.0	24.7	3.80
1988	55,000	6,500	10,000	5,500	1,390.0	23.8	4.30
1989	55,000	8,000	22,000	5,500	NA	24.4	4.39
1990	55,000	8,000	22,000	5,500	NA	NA	4.58

*Citizen military forces attached to Army, Navy, and Air Force.
(a)5,000 in Pan-African Legion; 3,500 in Chad.
(b)Pan-African Legion.

Source: Frost & Sullivan, Inc., 1991

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FROST & SULLIVAN

measures necessary and evoked popular opposition. Huge losses of men and materiel were reported in Chad, but Libya withdrew from that country in 1987.

There are, however, some bright spots in the economic picture, notably an increase in the current account surplus and in currency reserves. In addition, Libya stood to benefit economically from increased oil prices which resulted from the Iraqi seizure of Kuwait in the summer of 1990 and the ensuing Gulf war. In fact, at one point Libya was reportedly earning an extra $10 million per day from its oil exports.

In regard to foreign policy, Qaddafi has softened his tone and has tried to mend fences with the other Arab nations and with the West. In 1989 he joined the newly formed Maghreb Union, which aims to foster economic cooperation between the North African nations and provides for the free movement of people and goods across the region's borders. In mid-1988, Qaddafi announced the end of the conflict with Chad; he later restored diplomatic relations with that country. He also resumed ties with Iraq and, in a very important step, visited Egypt in the fall of 1989 when the two countries entered into some economic agreements.

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2. Threat Perceptions

Libya is considered by most nations as a threatener rather than the threatened. If there is a threat, it is one of potential internal dissatisfaction with the Qaddafi regime which could eventually lead to resistance. There have been a number of abortive attempts to oust Qaddafi, followed by thousands of arrests and interrogations of civilians and military personnel. Paradoxically, however, the army, generally recognized as the major force which could attempt a coup in Libya, may have become more supportive of the regime in the aftermath of the April 1986 raid by the United States.

Libya's political and military course continues to be turbulent. At this writing, it has been accused of masterminding the destruction of Pan Am Flight 103 in 1988, which was previously thought to be the work of Syria or Iran. Its involvement in the civil war in neighboring Chad, in which it has supported both sides at various times, has been considerable. Despite Libya's pledge to France in the fall of 1984 that it would withdraw completely from Chad, fighting flared up again in 1987 over the disputed Aouzou Strip on the border between the two countries. Libya reportedly lost 10% of its troops and $1 billion worth of equipment in Chad before agreeing to a cease-fire in September 1987.

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Also in the 1980s, Libya became involved in the internal affairs of the Sudan, supporting a 1985 Marxist coup in that country, sending troops there in early 1987, and supplying arms to the Khartoum regime.

Libya and Morocco announced a treaty of unification in 1984, but it was never put into effect. In the past, one of the few Arab countries in the Middle East with which Libya seemed to have good relations was Syria, a nation which was also isolated from the other Arabs and heavily supplied with arms by the Soviet Union. In fact, Libya probably stockpiled Russian arms for shipment to Syria in a crisis, such as the Lebanese war. Syria and Libya also favored Iran in its war with Iraq, and Libya aided Iran financially and militarily. However, in September 1987 even Qadaffi stated that he would no longer support Iran. And since Iraq's invasion of Kuwait in August 1990, Syria has switched sides completely and is now a part of the anti-Iraq coalition sponsored by the United States. Libya remains relatively isolated from the situation.

The relationship between Libya and the Soviet Union has been a complex one. On the one hand, in the period 1983-1987, Libya imported $7.7 billion worth of arms, all from the Soviet Union and Warsaw Pact countries, but this arms flow was later curtailed because of Libya's failure to pay its debts, which ran into the billions.

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Likewise, thousands of Soviet and other East European, East German, and Cuban military advisers are active in Libya, and many of Libya's Soviet aircraft are flown exclusively by Russians. On the other hand, Libya often denounces Soviet imperialism and Marxism, and has continually proclaimed its neutrality in regard to the superpowers.

However, in November 1981 Qaddafi openly offered the Soviets base rights in Libya. He signed friendship and cooperation agreements with the Soviet Union in 1983 and 1985, as well as similar agreements with Bulgaria and Romania, North Korea, and Poland. The Soviet Union under Gorbachev has curtailed to some extent its policy of fomenting trouble by shipping sophisticated arms to Third World countries, although the recent deliveries of Su-24 fighters, T-72 tanks, and BMP armored fighting vehicles to Libya indicate that the Russians are still willing to sell arms to favored countries. The crisis and war in the Gulf, which initially curtailed the oil supplies from that region, benefited Libya, which was earning millions of extra dollars for its oil. Thus it is likely that Libya will continue to be an important arms-buying client of the Soviet Union.

3. Major Suppliers

As mentioned above, the Soviet Union has been Libya's chief arms supplier in the past and will probably continue this role.

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Libya was briefly a recipient of US military assistance, but this was terminated in 1970, undoubtedly on the basis of the country's leftward shift following the coup. However, in the early 1970s, faced with economic and political realities, Washington approved some FMS commercial sales on a highly selective basis, and there were very limited sales of support aircraft (such as C-130 cargo/transports) and other non-combat systems.

On the other hand, France and Italy have been major exporters of arms to Libya. Libya ordered Mirage F1Cs from France in 1974. At present, about 30 Mirage F1s are in operation, armed with R530 and R550 Magic air-to-air missiles. France has also built ten "La Combattante" class fast attack craft for Libya (one was sunk in 1986).

Italy, Libya's former colonial master, has provided a variety of military equipment, including Aeritalia G-222 transports, SF-260 trainers, Lion tanks, and Fiat 6614 APCs, corvettes armed with Otomat antishipping missiles, Aspide surface-to-air missiles, CH-47 Chinook and AB-212 helicopters, and Mirach drones. Delivery of some of this equipment was initially delayed due to US-imposed embargoes on the US engines for the G-222 transports and on Collins avionics for the SF-260s, but these difficulties were overcome with the addition of new engines for the G-222. Some SF-260s were assembled in Libya.

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Table I-J-3

TRENDS IN US ARMS EXPORTS TO LIBYA, FY 1950-1989
(Values in Thousands of Current Dollars)

Year	FMS Agreements	FMS Deliveries	Licensed Commercial Exports (under Arms Export Control Act)
1950-1979	28,249	28,249	31,096
1980	-	-	221
1981	-	-	-
1982	-	-	-
1983	-	-	-
1984	-	-	-
1985	-	-	-
1986	-	-	-
1987	-	-	-
1988	-	-	-
1989	-	-	-
Total 1950-1989	28,249	28,249	31,317

Source: US Defense Dept., 1989

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Other suppliers have been Turkey, which has built 14 fast attack craft and 20 or more landing craft for Libya; and Brazil, which has supplied Urutu and Cascavel APCs. The connection with Engesa, the Brazilian tank manufacturer, has been especially active. In fact, Libya may have contributed to the development of Brazil's Osorio main battle tank and was reportedly negotiating to license-build the tank. In any case, Libya has bought large quantities of Brazilian armored cars (see Table I-J-8), in addition to the Astros II rocket-launching system. Czechoslovakia and Yugoslavia have both provided training aircraft, and Yugoslavia built two fast attack craft.

Spain sold 2,200 tons of small arms and ammunition to Libya in 1984, and Greece has been another supplier.

4. Procurement Trends

a. Air Forces

As Table I-J-4 indicates, Libya continues to be a major client of the Soviet Union. The 1989 appearance of the Sukhoi Su-24 deep interdiction fighter in Libyan inventory, which was delivered despite Gorbachev's pledge not to further destabilize the region, has evoked growing concern among arms experts. The Su-24 can carry chemical weapons.

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attack in the Gulf of Sidra by Libyan naval vessels, the United States sank one Nanuchka frigate and seriously damaged another, and sank one (and probably two) Combattante II fast attack craft.

The attacks on the United States and Col. Qaddafi's support for terrorism have severely hampered Libya's efforts to obtain Western vessels. Prior to 1985 Libya had contracted with Turkish and Italian naval yards and had hopes of securing West German submarines. However, terrorist bombing in West Germany, for which Libya was accused, negated any possibility for a deal.

Libya remains interested in obtaining submarines, and there are rumors that it may lease two Soviet Kilo class vessels. Yugoslavia has delivered six mini-submarines.

d. Missile Procurement

While some additions have been made to Libya's missile inventory, losses in the last half of the 1980s were significant. The US attacks in 1986 severely damaged or destroyed SA-5 batteries in Sidra. These are probably back in place and are thought to be Soviet-manned. The subsequent success of the US F-111 bomber attacks pointed up the inadequacies of Libyan air defenses. Severe losses were also counted up in the campaign in Chad, as routed Libyan troops abandoned sophisticated SA-6, SA-7, and SA-13 SAMs, as well as AT-3 antitank missiles.

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Table I-J-10
LIBYA: TACTICAL MISSILE INVENTORY (1990)

Designation	Platform	Supplier/ Contractor	Quantity/Comment
	Surface-to-Air Missiles		
SA-10	Mobile	USSR	Reported captured in Chad
SA-2	Mobile	USSR	36 launchers
SA-3	Mobile	USSR	2-3 brigades or 12 twins, 36 launchers
SA-6	Mobile	USSR	3 brigades, 60 launchers
SA-7	Portable	USSR	
SA-8	Mobile	USSR	3 brigades, 72 launchers
SA-9	Mobile	USSR	Reported
SA-13	Mobile	USSR	Some captured by Chadian troops
SA-5 Gammon	Mobile	USSR	36 launchers, initially Soviet-manned
Crotale	Mobile	France/ Thomson-CSF/ Matra	24 quads
Aspide	Vosper frigate Assad corvette	Italy/Selenia	
SA-N-4 Gecko	Koni class frigates	USSR	
	Air-to-Air Missiles		
AA-2 Atoll	Su-22, MiG-21/-23/-25	USSR	
AA-6 Acrid	MiG-25	USSR	
AA-7 Apex	MiG-21/-23/-25	USSR	
AA-8 Aphid	MiG-21/-23	USSR	
R-550 Magic	Mirage F-1	France/Matra	
Super 530	Mirage F-1	France/Matra	
	Surface-to-Surface Missiles		
Frog 7	Mobile	USSR	40 launchers
Scud B	Mobile	USSR	80 launchers
SS-N-2C	Ground-based	USSR	2 coastal batteries, reportedly based in Tobruk

(continued)

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Table I-J-10 (continued)

LIBYA: TACTICAL MISSILE INVENTORY (1990)

Designation	Platform	Supplier/ Contractor	Quantity/Comment
		Antitank Missiles	
AT-2 Swatter	Mi-24 helicopters	USSR	3,000 ATMs total
AT-3 Sagger		USSR	
SS-11	Helicopter	France/ Aérospatiale	
Vigilant	Portable	UK/BAC	
Milan	Man-portable	Euromissile	
AT-4 Spigot		USSR	
MSS1-2 LEO		Brazil	
		Antishipping Missiles	
Otomat	La Combattante fast attack craft, frigates, corvettes	Italy/France/ Oto Melara/ Matra	56+
SS-N-2C Styx	Frigates, corvettes fast attack craft	USSR	63+
SS-12	Susa fast attack craft	France/ Aérospatiale	24
		Air-to-Surface Missiles	
AS-9		USSR	

Source: Frost & Sullivan, Inc., 1991

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There remain, however, formidable amounts of Soviet equipment on hand, which now include SA-8s, SA-13s, and the SA-5s mentioned above. In addition, the Russians have delivered AA-7 and AA-8 air-to-air missiles, and France has supplied a number of R-550 Magic and Super 530 air-to-air missiles for Mirage aircraft, as well as the Crotale mobile surface-to-air system. Italy has supplied the Aspide SAM and the Otomat antiship missile for Libya's naval forces.

Libya is reportedly making a major effort at tremendous cost to develop its own surface-to-surface missile, with a range of 1,000 km., in the Al Fatah program. Both Germany and Brazil have reportedly been aiding the Libyans. Brazil and Libya made an arms agreement in 1988, which included the sale of MSS 1.2 Leo antitank missiles. Meanwhile, the slow pace of this program has led to Israeli reports that Libya is trying to buy 140 Chinese M-9 antishipping missiles. Of these, Libya would retain 80 and would transfer 60 to Syria. In the past, Libya expressed interest in buying the Chinese CSS-2 surface-to-surface missile, but this did not materialize.

5. Internal Production Capabilities

A fledgling aircraft industry has begun in a new desert town in Libya, where some 120 SIAI-Marchetti SF-260 training/-

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counterinsurgency aircraft are being assembled under Italian supervision.

As stated above, there are also reports that Libya, with the help of West Germany, is developing an advanced nuclear surface-to-surface missile with a range of 500 kms. This report is causing great concern in the West, as have reports on an alleged chemical weapons plant at Rabtā.

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Ballistic Missile Development in Egypt

Joseph S Bermudez Jr

Introduction

Despite the fact that Egypt became the first Third World nation to develop a serious interest in ballistic missiles during the early 1950s, less is known about Egypt's missile programmes than any other country in the Middle East. Beginning in the 1950s and extending through the mid-1960s, the Egyptian military sponsored a missile programme staffed by German engineers and scientists. The aim was to develop ballistic missiles and a satellite launch vehicle based upon the experience gained with the German Wasserfall and A4 (aka, V2) missiles of the Second World War. The available evidence suggests that the Egyptians intended to manufacture up to 900 missiles of three models by 1970.

Egypt's German engineers and scientists developed and partially tested three distinct surface-to-surface missiles: the single-stage *al-Zafir* (Victor) with a projected range of 370 km; the single-stage *al-Kahir* (Conqueror) with a projected range of 600 km; and the two-stage *Ar-Ra'id* (Pioneer) with a projected range of 1500 km. Each missile was armed with a high explosive warhead of 500-800 kg. Although President Gamal Nasser boasted that the missiles were in quantity production, none reached operational service because of insurmountable guidance system troubles and gross mis-management of the project. By the time of the June 1967 Six-Day War, the indigenous missile programme was, to all intents and purposes, at a standstill.

Immediately after the Six-Day War, the Soviet Union supplied a small number of 'FROG-7A' rockets. These were supplemented by a unit of Soviet 'Scud-B' missiles during early 1973. During the October 1973 Arab-Israeli War, Egypt launched approximately 200 'FROG-7As', *al-Kahirs* and *al-Zafirs*, along with three 'Scud-Bs', at Israeli military targets (see *Jane's Soviet Intelligence Review* Vol 3 No 12 pp 531-537). Although these missiles had only a minimal effect upon the course of the war, the Egyptians (as well as the Israelis and Syrians) came away from that conflict with the belief that ballistic missiles would play an increasingly significant role in any future conflict in the region, at both the tactical and strategic levels.

During the late 1970s, Egyptian interest in tactical ballistic missiles was revived. Initially, the aim was to maintain and upgrade its existing missile inventory but, subsequently, it was in response both to the Iran-Iraq war and as a reaction to Israeli missile developments. As a result, during the early 1980s Egypt initiated a programme (partially in co-operation with the Democratic People's Republic of Korea (DPRK)) to develop an improved version of the 'Scud-B'. This programme has continued, in one form or another, until today although Egypt is not known to have either manufactured or deployed any improved 'Scud-B' missiles. The 'Scud-B' programme was supplemented by three programmes during the early 1980s:

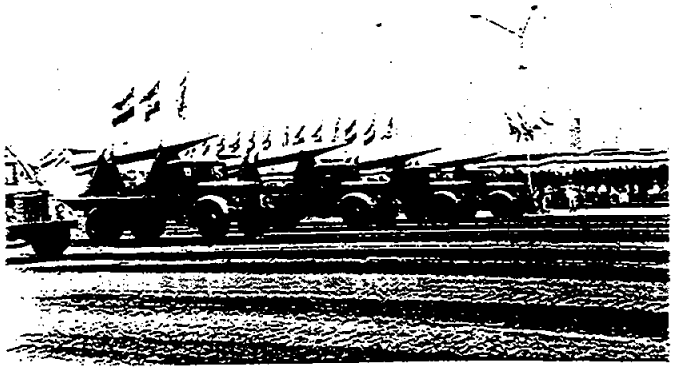
- *Sakr-80*
- RS-120
- Condor II/Vector/*Badr-2000*

By the late-1980s all three of these programmes had succumbed to lack of Egyptian funding or international pressure, or both. Egypt currently has only one known active ballistic missile programme — the improved 'Scud-B'. The resources that had been allocated to the Condor II and other missile programmes are believed to have been redistributed to the improved 'Scud-B' project. The current status of this programme is obscure. It is currently believed, however, that it is ongoing and at an advanced stage so that given the proper political climate and financial resources Egypt could quickly produce a 'Scud-B' equivalent missile.

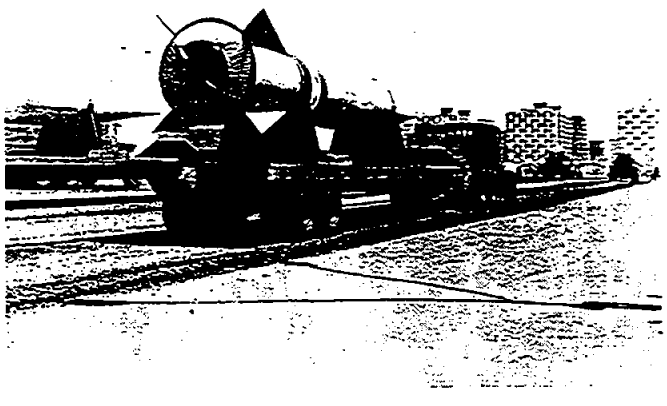
Two critical factors have strongly influenced missile development in Egypt. First, Egypt simply does not possess the economic resources to pursue a missile production programme of any significance with indigenous assets alone. Second, Egypt's military industries have repeatedly demonstrated an inability to conceive, implement and conclude major development projects. There have been notable exceptions to this, in particular when Egyptian companies have been closely aligned with Western counterparts. These financial and organizational weaknesses have adversely impacted upon Egypt's efforts at missile development on numerous occasions.

Because missile programmes overlap in time, resources and personnel, it is often difficult to distinguish exactly what was occurring in a specific programme at a specific time, or if a specific effort was intended to benefit a specific programme. More often than not, it

The *al-Zafir* (Victor) missile.



The *al-Kahir* (Conqueror) missile.



appears that efforts were directed to benefit the overall goal of fostering an indigenous missile development within Egypt.

'Scud-B'

During the past 10 years Egypt has clearly demonstrated an unwavering commitment to the acquisition of both 'Scud-B' and ballistic missile related technologies. The catalyst for Egypt's 'Scud-B' programme is believed to have been the political decision by the Soviet Union to refuse the delivery of spare parts to the Egyptian Armed Forces during the mid-1970s.

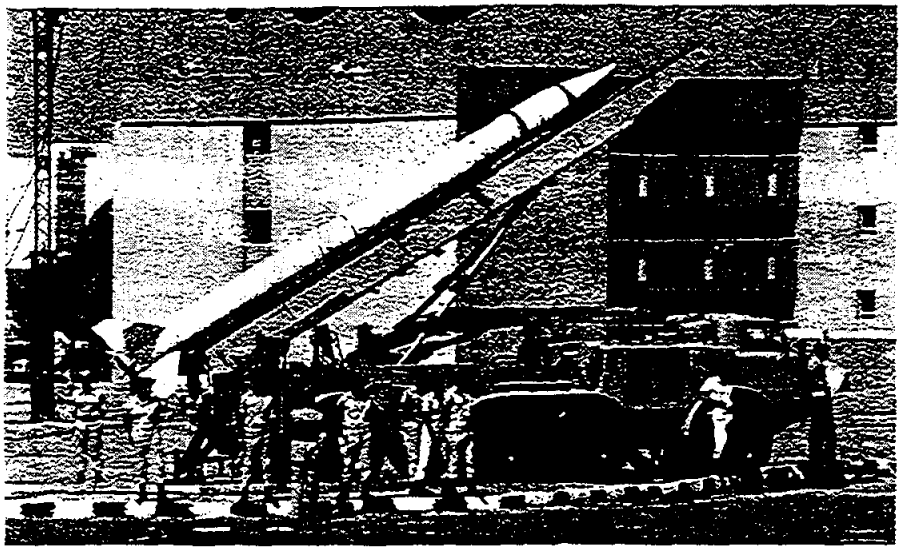
The initial programme is believed to have been limited maintaining the 'FROG-7A' and 'Scud-B' systems in the Egyptian inventory. In order to accomplish this, Egypt apparently began replacing, on a selective basis, Soviet parts with indigenously produced or foreign components. The programme is believed to have been managed primarily by the Sakr Factory for Developed Industries.

By the early 1980s, Egypt is believed to have made the decision to expand beyond the simple maintenance stage and enter development of product-improved versions of both the 'FROG-7A' and 'Scud-B'. To this end, Egypt approached the PRC and DPRK seeking co-operation and assistance. Since neither country operated the 'Scud-B', or a missile in its class, they were unable to assist Egypt directly with this request. The DPRK, however, did provide a viable alternative.

During early 1975 the DPRK had found itself in a situation where it wanted a modern ballistic missile capable of striking the strategic rear of the Republic of Korea. At that time, the DPRK approached the PRC with a request for a missile in the 'Scud-B' class. The PRC did not possess such a missile but agreed to undertake the design of a 500-600 km range ballistic missile so long as it did not interfere with its strategic missile programmes. As the design of this new missile progressed, it was assigned the designation DF-61 and certain design characteristics were finalized. It would utilize a pre-packaged, storable, liquid-fuel rocket motor; have a range of 600 km with a 500 kg payload, and 300 km with a 1000 kg payload; and be armed with a cluster munitions warhead. Because of political problems within China, the DF-61 was cancelled during 1978.

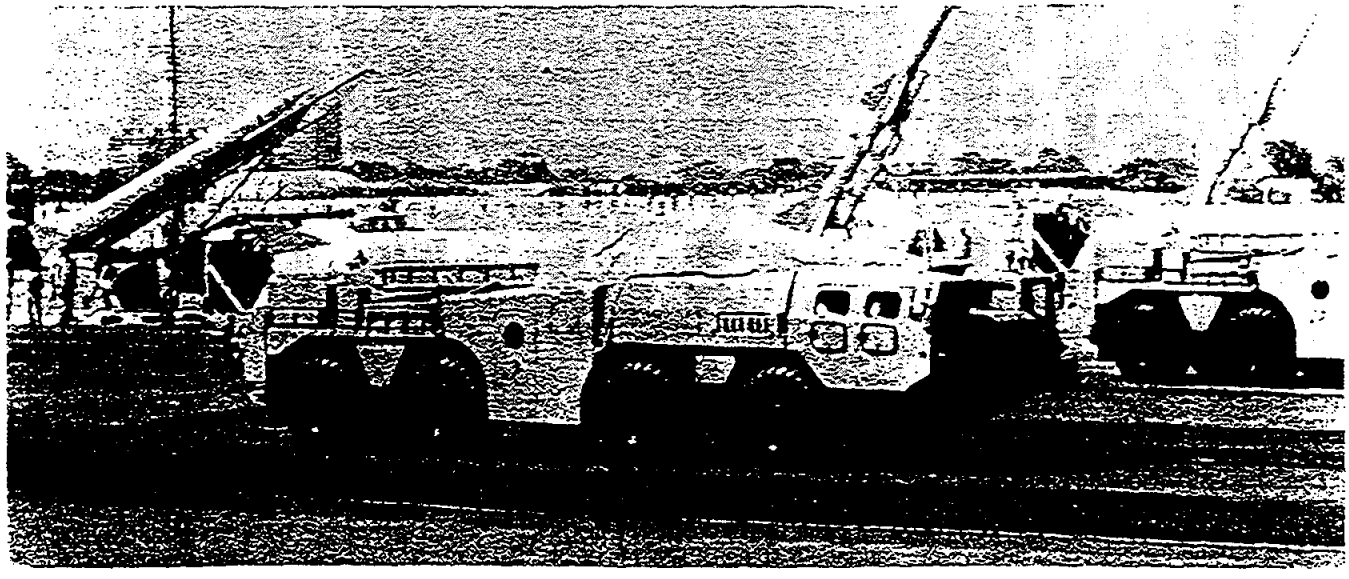
With this cancellation, the DPRK came to the conclusion that best course of action was to produce its own ballistic missile. The most efficient and economical way to achieve this task was to reverse engineer the 'Scud-B' as an interim step to the future production of an indigenously designed tactical ballistic missile with greater range and accuracy (see *Jane's Soviet Intelligence Review* Vol 1 No 4 pp 177-181, Vol 1 No 5 pp 203-207, Vol 2 No 7 p 329, Vol 3 No 5 pp 249-251, Vol 3 No 7 pp 302-305).

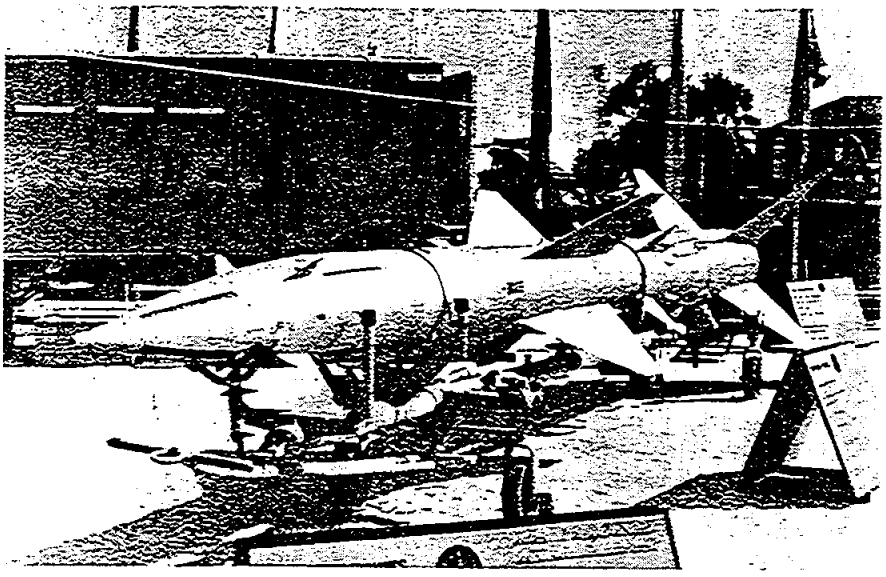
It was at this point that the ballistic missile interests of both the DPRK and Egypt coincided, and the two countries are believed to have agreed to an exchange of missile information and technicians during 1979-80. More significantly, during the early 1980s (tentatively fixed at 1981) Egypt, in violation of its agreement with the Soviet Union, transferred a few 'Scud-B' missiles to the DPRK. On 21 August 1981 the governments of Egypt and DPRK signed an agreement in P'yongyang covering co-operation in, and exchange of, scientific technology between the two countries for 1981-83. It is conceivable that portions of this agreement covered missile technology. To complement the



An Egyptian 'FROG-7A'. The *Sakr-80* can be fired using the same kind of TEL.

An Egyptian 'Scud-B'.





The SA-2b Mod 1 surface-to-air missile, the *Ta'ir al-Sabah* (Early Bird).

Egyptian delivery, the DPRK apparently requested and received technical assistance from the PRC in the areas of rocket engine design/production, metallurgy, and airframe technology.

With the transfer of 'Scud-B' missiles, and the decision to co-operate with Egypt, the DPRK reorganized its indigenous missile efforts into a multifaceted missile research and development programme. The aim of this was to produce both a reversed engineered and an extended range variant of the 'Scud-B' known as the 'Scud Mod B' and the 'Scud Mod C' respectively. It is believed that in return for the transfer of the 'Scud-B' missiles, Egypt would be allowed wide access to the DPRK's 'Scud Mod B' programme and technology. Despite an ambitious start, the 'Scud Mod B' programme proceeded slowly because of both technical difficulties and the DPRK's severe budgetary constraints.

It was shortly after the Egyptian missile transfer to the DPRK that Iran approached both the DPRK and PRC seeking missile technology and tactical ballistic missiles in the 'Scud-B' class. Although the PRC did not have a missile in this class, the DPRK was working on its 'Scud Mod B'. It is believed that during a visit to P'yongyang in October 1983, Iranian Prime Minister Musavi and Defence Minister Colonel Mohammad Salimi discussed the acquisition of 'Scud Mod B' technology and missiles. As a result of Musavi's visit, Iran agreed to a bilateral exchange of missile technology and to provide long-term financing for the DPRK's 'Scud Mod B' programme in exchange for an option to purchase DPRK manufactured 'Scud Mod Bs' when they became available. The Iranian interest and, more importantly, funding allowed the DPRK's 'Scud Mod B' programme to make rapid progress.

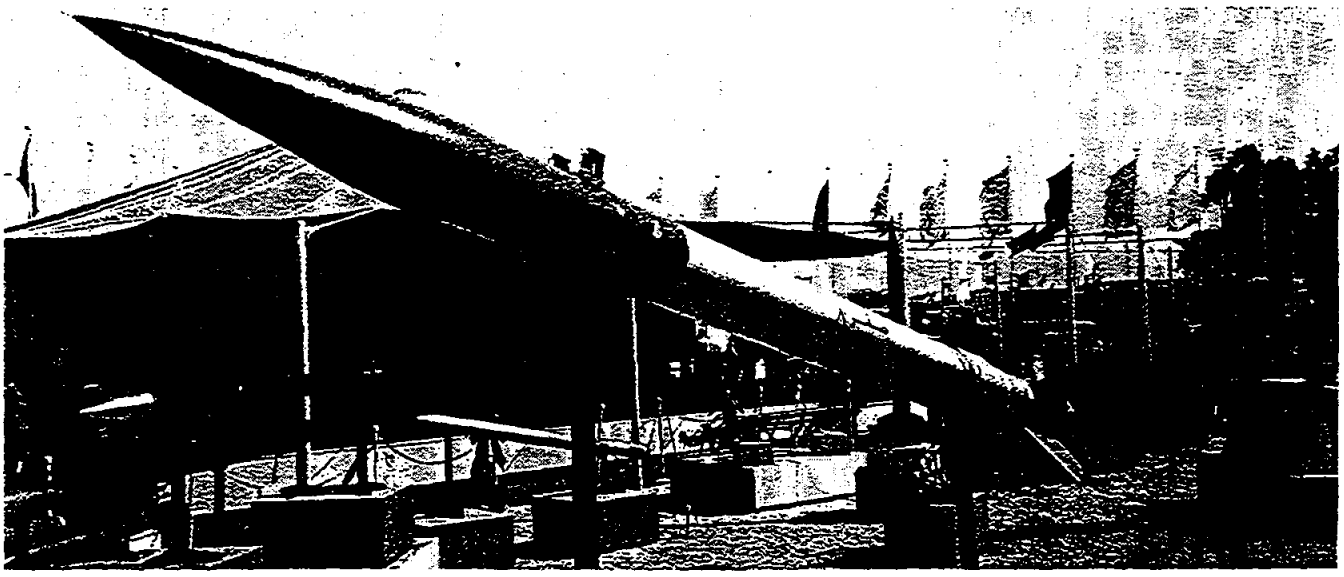
During 4-5 April 1983, Egyptian President Hosni Mubarak paid an official visit to the DPRK to discuss arms acquisitions and trade. During this visit he also renewed the 1981 scientific technology agreement. Six months later, during 5-10 September 1983, Egyptian Minister of Defence, Field Marshal Abdel Halim Abu Ghazala, led a high-level military delegation to the DPRK. It is currently believed that, among other topics, he discussed the status of missile co-operation between the two countries, and in particular the progress of the 'Scud Mod B' programme. Seven months later, during April 1984, the DPRK test launched its first 'Scud Mod B' missile. This was followed by a second test in September, which brought the total number of missiles tested fired to three. That same year both countries signed a contract calling for DPRK technical assistance with the Egyptian programme to develop a variant of the SA–2b Mod 1 surface-to-air missile, the *Ta'ir al–Sabah* (Early Bird). This agreement may have been concluded during a 12-day visit by DPRK Defence Minister Oh Jin-u to Egypt in November 1984.

Progress by the DPRK with its 'Scud Mod B' continued at a steady pace and the missile entered production during early 1987. By the end of that year, the first deliveries of 'Scud Mod B' missiles to Iran occurred. These were subsequently employed by Iran during the 'War of the Cities' (29 February–21 April 1988). It is somewhat ironic that at the same time as Egypt was co-operating with the DPRK in developing its 'Scud Mod B', the Egyptians were also co-operating with the Iraqis in their *al-Hussein*, *al-Abbas* and Condor II programmes. At present, there is currently no evidence of any transfers between the DPRK and Iraq through Egypt.

With the 'Scud Mod Bs' production beginning in 1987, reports began to surface that the DPRK was assisting Egypt with an improved 'Scud-B' programme.These accounts were followed by additional reports during 1988 and 1989 that the DPRK was directly involved in assisting with an improved 'Scud' production facility within Egypt. The extent to which these reports are correct is as yet unknown. It is currently believed that the DPRK provided Egypt with liberal access to its 'Scud Mod B' programme, including the technical documentation and drawings for the missiles. During May 1991, US intelligence officials are reported to have stated that Egypt was negotiating with the DPRK to purchase the 'Scud Mod C'. This was followed in September 1991 by Israeli reports that '...Egypt soon will start local production of enhanced 'Scud-C' missiles...'. To date there is no confirmed evidence that Egypt has either produced an improved 'Scud-B' based upon DPRK acquired technology or purchased DPRK produced 'Scud Mod Bs' or 'Mod Cs'.

The ballistic missile related co-operation between Egypt and the DPRK is, no doubt, significant and is unquestionably beneficial to both countries. It is likely to continue at its present level for the foreseeable future, as is indicated by the continued exchange of high-level political and military delegations between the two countries. It is probable that Egypt will gain access to the DPRK's 600 km 'Scud Mod C' and 1000 km 'Scud Mod D' programmes.

Although the DPRK may have occupied a leading role in Egypt's improved 'Scud-B' programme, it is by no means the only player. Egypt has pursued the acquisition of technology for its improved 'Scud-B' programme through a number of other countries including, for example, the UK and USA. During the mid-1980s Egypt conducted an ambitious covert programme to acquire missile related technology and components in the USA to support the Condor II project (see below). These operations were co-ordinated through Abdel Kader Helmy, a naturalized American citizen. Helmy and his co-conspirators either exported or intended to export a number of items specifically related to the 'Scud-B' programme (identified by Helmy as the '...Scud B-100...'). The extent to which these acquisitions have assisted the 'Scud-B' programme is presently unknown. During the first week of June 1990, the PRC and Egypt are reported to have concluded an agreement which called for the PRC to update Egypt's Sakr Factory for Developed Industries. This would allow it to produce '...newer versions of Soviet anti-aircraft missiles, the surface-to-surface 'Scud-B' and 'Silkworm'...'. During late-1991 the UK Government brought pressure on British Aerospace (BAe) to halt the production of 'Scud' components by Arab British Dynamics (ABD). ABD is a company connected



▲**The *Sakr-80* (Eagle 80) missile is a spin-stabilized missile with a maximum range of 80 km.**

with the Arab Organization for Industrialization and is located in Heliopolis (Egypt); 30 per cent of the company is owned by BAe. During early 1991 it was discovered that ABD was planning to produce 'Scud' components for the Egyptian Armed Forces. BAe was pressured into negotiating an end to ABD's production plans. As of early 1992, the Egyptian Government had resisted these actions.

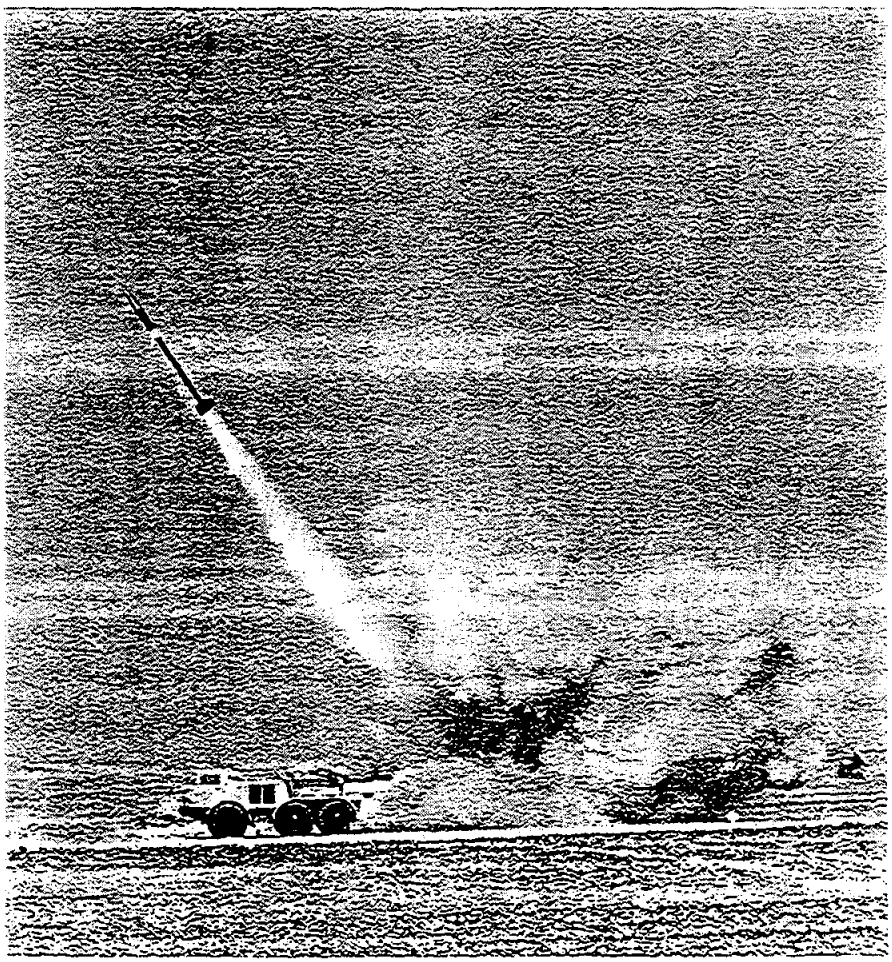
The current status of the Egyptian 'Scud-B' programme is obscure. It is, however, believed that the programme is ongoing and at an advanced stage so that, given the proper political climate and financial resources, Egypt could quickly produce a 'Scud-B' equivalent missile.

Sakr-80

By the early 1980s, Egypt's 'FROG-7A' maintenance programme had evolved into a programme to design and manufacture a 'FROG-7A' replacement known as the *Sakr 80* (Eagle 80). Primary contractor and systems integrator for this project was the Sakr Factory for Developed Industries. The Abu Zaabal Company for Specialty Chemicals was responsible for the rocket motor and propellant.

During 1983 Sakr was able to secure the services of the French company, Societe Nationale des Poudrers et Explosifs-Division Chimie Expansion (SNPE-CE) to assist it in a number of its projects. This collaboration is believed to have centred upon two projects. The development the *Sakr-30* artillery rocket, a longer ranged version of the *Sakr-18*, and the *Sakr-80*, a replacement for the Soviet-supplied 'FROG-7A' rocket. SNPE-CE's primary responsibility was to provide experience and technology in designing and developing the propulsion sub-assemblies, especially the propellant grains and ignition trains. Sakr was

▼***A Sakr-80* launch in the Egyptian desert in 1987.**



responsible for the airframe, warhead, guidance, fire-control, launchers and system integration. Provision was also made for the transfer of technology from SNPE-CE to the Egyptian company of Abu Zaabal Company for Specialty Chemicals. Sakr and SNPE-CE jointly shared the *Sakr-80* research and development costs which were reportedly to have totalled approximately $100 million in 1988. Egypt, however, retained all rights to the *Sakr-80*.

The *Sakr-80* project was undertaken in response to a request by the Egyptian Army which wished to replace its ageing inventory of Soviet supplied 'FROG-7A'

unguided battlefield support missiles. Additionally, it was hoped that the *Sakr-80* would attract interest in a number of countries that also employed the 'FROG-7A' or who were interested in an inexpensive long-range area suppression weapon (ie a 'poor man's MLRS'). Apparently, development proceeded well and during the 1987 Cairo Defence Exhibition, it was announced that *Sakr-80* firing trials were well under way. These tests confirmed the validity of the *Sakr-80* and its ability to serve as an enhanced 'FROG-7A' replacement. Sakr has stated that it could begin mass production of the missile within a year of a procurement contract being signed. At present, however, no procurement orders are known to have been received.

The *Sakr-80* is a spin-stabilized ballistic missile which is 310 mm in diameter, 6.5 m in length and has a total weight of 660 kg, of which 200 kg is for the warhead. Its maximum flight velocity is 1200 m/s and time of flight to the maximum range of 80 km is 160 seconds. The maximum altitude, which depends on the launch angle, is 29 000 m. Three warheads were developed — HE, anti-personnel/anti-vehicle cluster (950 bomblets) and anti-tank cluster (65 anti-tank mini-lets). Publicly, Sakr has stated that no chemical munitions are planned. The *Sakr-80* can be launched from the existing 'FROG-7A' launcher or from two new Egyptian platforms. These new TELs are an 8 x 8 ZIL-135 truck carrying three missiles on their launch rails and a T-54 tank chassis carrying four missiles in launch-containers. Neither of these TELs is known to have proceeded beyond the design stage.

RS-120

Very little is presently known concerning the Egyptian RS-120 missile programme. Sometime during 1986-87 Egypt approached the CONSEN Group of IFAT seeking assistance in a project known as RS-120. The initial goal of this project was to develop a missile with a range of 120 km. There are, however, some indications that the ultimate goal is the development of a much longer ranged missile. This, however, remains to be confirmed.

IFAT contracted with the German firm of Messerschmitt-Bölkow-Blohm (MBB) to provide Egypt with technical assistance and equipment. So as not to violate German Trade Ministry's export regulations, MBB agreed to undertake only part of the work. The balance was contracted out to the Italian firm of SNIA, a subsidiary of the Fiat Corporation. By December 1987, growing international concerns over ballistic missile proliferation in the Middle East (especially the Argentine-Egypt-Iraq Condor II programme) resulted in West German security authorities advising MBB to discontinue their involvement in the RS-120 project. This was accompanied by concerns that the USA might blacklist the company if it continued its involvement. As a result, during early 1988 MBB withdrew from the RS-120 project.

The ultimate fate of the RS-120 programme is presently unknown. However, it is believed to have continued for a short period after the withdrawal of MBB. Also unknown is the extent of SNIA's involvement and any accomplishments that the project may have achieved.

Condor II/Vector

During the 1980s Egypt was involved in a programme to produce a 800-1000 km range ballistic missile in co-operation with Argentina, the CONSEN Group, and Iraq. This missile is known by several code names; in Argentina it is the Condor II, in Egypt the Vector, and in Iraq the *Badr-2000*. To ease readability in this article, the more popular name Condor II will be used.

Egypt's efforts to acquire a 1000 km range ballistic missile at this time are believed to have been prompted by several factors:

- Egypt's long-term desire to acquire a ballistic missile for both political prestige and practical military use (ie the 'Scud-B' lacks sufficient range to be targeted against Israel from launch sites west of the Suez Canal or many targets in Libya).
- Egypt's realization that, in light of the 1973 War, ballistic missiles would play an important part in any future war in the Middle East.
- Israel's deployment of its nuclear capable Jericho II missile, with a reported range of approximately 1000-1500 km.
- Libya's continued efforts both to acquire ballistic missiles and to develop an indigenous capability to produce them.

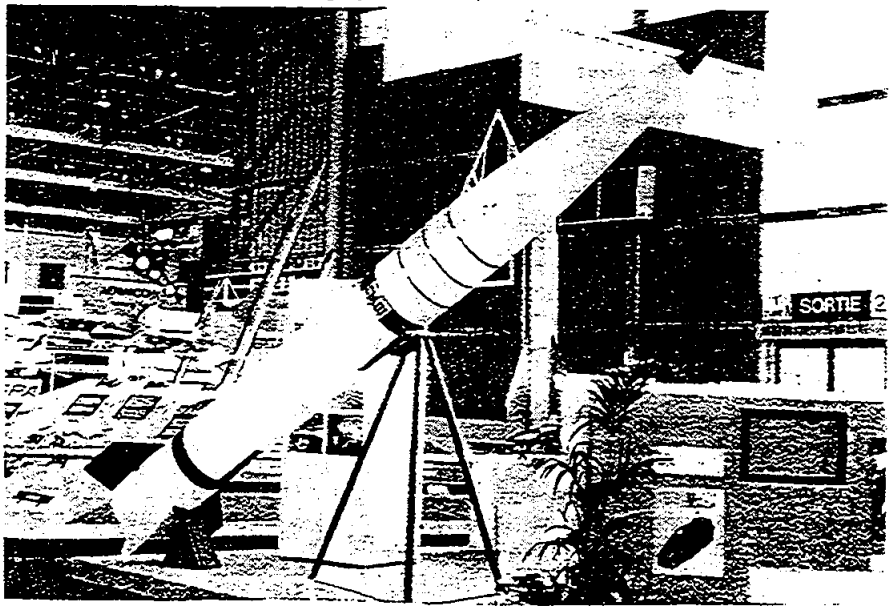
Even at this late date, 1992, the precise details of the Condor II project are still incomplete as is Egypt's involvement in the project.

The Condor II is a direct descendant of an earlier Argentine project known as the Condor I. This latter project was begun by the Argentine Air Force during 1977-78 with the intention of designing and producing a sounding rocket. Argentina realized that such an endeavour was beyond its limited capabilities, so the assistance of the German firm MBB was secured. This assistance, which was funnelled in part through a newly established industrial concern known as the CONSEN Group, resulted in the development of the Condor I sounding rocket. The Italian firm of SNIA-BPD was also involved in the project, providing quantities of solid rocket fuel.

The Condor I was a single-stage, solid-fuel, sounding rocket capable of lifting a 400 kg payload to an altitude of 70 000 m. Although the Condor I project was publicly described as being for non-military applications, it is obvious that the military utility of such systems was not ignored. Argentine Air Force Chief-of-Staff, Brigadier Jose Antonio Julia, stated that '...the idea to manufacture the Condor came about in 1977-78 when the Air Force decided to develop the technology for a missile that would carry loads for a given distance. The idea was to place satellites into orbit but with a change in the trajectory and the load, the missile could carry anything'.

The Condor I project had not reached

The Condor I-A III missile. ***(Photograph: Howarth)***



its test stage when, in late-1982, the decision was made to produce an even more capable system known as the Condor II. Although it was publicly described as a space-launch vehicle, it was clearly a ballistic missile. The impetus for the project was the Argentine defeat in the Falkland Islands (Argentine: Malvinas). Following that defeat, a requirement was established for a ballistic missile capable of striking the islands. The Condor II was designed as a two-stage, solid-propellant missile having a range of 800-1000 km with a payload of approximately 500 kg; it would be carried by a wheeled TEL. The engineers that were working on the Condor I also began work on the Condor II. Additionally, to expedite development, CONSEN arranged for a number of well-established European firms to provide key components for the Condor II project including:

- MAN of West Germany — the wheeled TEL.
- MBB of West Germany — guidance systems and general missile technology.
- Sagem of France — the inertial navigation systems.
- SNIA-BPD of Italy — rocket motors and solid fuel technology.
- Additional Condor contractors reportedly included the Swedish firm Bofors and the West German firm Wegmann.

As concerns about the transfer of ballistic missile technology to Third World nations continued to grow, the role of the CONSEN Group would become even more critical. The group would perform pivotal roles not only in Condor II but in Egyptian and Iraqi participation in the project, and in Iraq's missile, chemical and nuclear programmes.

At this time, Egypt's own interests in developing a ballistic missile coincided with those of Argentina and during late-1982 or early-1983 a memorandum of understanding was signed between the two countries calling for co-operation in the development of the Condor II. This relationship was further reinforced on 15 February 1984 when the Egyptian Ministry of Defence, through the offices of Ballistic Missile Egypt (BME), signed an agreement with IFAT for the joint development of the Condor II. By the end of 1984, Egypt, Argentina, Iraq and the CONSEN Group had entered into additional agreements that solidified Iraqi funding for the Condor II project. Egypt's primary contribution would be technical expertise. On 9 April 1985 Argentina's National Executive Branch issued decree No 604/85 approving the Condor I and Condor II programmes as part of the Air Force's expansion programme, and validating the contracts with Egypt, Iraq and the CONSEN Group (ie IFAT, Desintec, etc).

The initial plans are believed to have called for Argentina to complete the construction and testing of 10 missiles. Five of these were to be delivered to the Egyptian Ministry of Defence and five delivered to Iraq. One source estimates that each of the three countries would eventually procure 200 missiles. Both the Egyptians and Iraqis anticipated that they would then begin production of additional Condor II missiles in their respective countries by the end of the 1980s. Additionally, each would construct their own Condor II production and test facilities based upon those in Argentina. These facilities would be essentially identical, being produced from the same plans prepared by CONSEN Group. In Egypt the construction of Condor II facilities was known by the code name DOS, in Iraq it was known as DOT, and in Argentina it was called DAT. The Egyptian DOS facilities are believed to have included a missile fuel and test areas at Abu Zaabal, northeast of Cairo, and a missile production facility at Helwan (believed to be designated Factory 17). It is probable that the Abu Zaabal Company for Specialty Chemicals was responsible for the missile fuel facility, while the Sakr Factory for Developed Industries was responsible for systems integration, missile production and testing.

The two companies of the CONSEN Group which were most heavily involved with Egypt's participation in Condor II were the IFAT Corp Ltd, located in Zug, Switzerland (responsible for the financial aspects), and CONSEN S.A.M, located in Monaco (responsible for contracting). Other CONSEN Group companies (eg Transtecno, Delta Consult, etc) played smaller roles.

Egypt's Condor II programme was controlled through BME which was under the direct control of Defence Minister Field Marshal Ghazala. BME was in turn headed by General Abdel El-Gohary, a member of Defence Minister Ghazala's staff. The chief engineer for the project was Colonel Fuad al-Gamal. To co-ordinate the development of the Condor II project with IFAT and CONSEN, Colonel Ahmed Hussam El-din Yossef Khairat was selected to established an office in Salzburg, Austria. This office was co-located with those of IFAT and CONSEN.

It was Colonel Khairat, through the services of Abdel Kader Helmy, who conducted an ambitious programme to acquire missile related technology and components within the USA. The acquisitions were to not only support the Condor II programme but also Egypt's other missile projects (ie the 'Scud-B' programme known to Helmy as 'Scud B-100'). Between 1983-88, Helmy and his co-conspiritors either exported or intended to export the following missile related technology and components:

- A test stand for analyzing the thrust of rocket motors up to 20 tons. This test stand was supposed to include all the equipment for testing a variety of rocket motors and included all sensors, closed circuit TV, as well as computers needed to analyze the results. This test stand was apparently to be installed at the Sakr Factory for Developed Industries.
- Strap-down inertial guidance systems for the Condor II.
- During 1984 the Egyptian Ministry of Defence attempted to acquire US fuel-air explosive bombs and technology, reportedly for use in clearing minefields. It was, however, intended for use in developing a Condor II warhead. This initial effort was blocked by the US State Department and Customs Service because the parts were on the Munitions Control List. The following year, through the services of Helmy, they attempted to obtain these items again.
- Software for analyzing and controlling ballistic missile trajectories. This software included a strap-down inertial guidance and warhead trajectory optimization modules. This aspect of the Egyptian acquisition programme was handled through Transtecno, UK, and another CONSEN Group company.
- Carbon-carbon and ceramic-ceramic composite materials to be utilized in the manufacture of nose cones for the Condor II.
- Various chemicals required for the manufacture of composite solid-propellant rocket fuels and motors including:
  - 18 000 lbs of military grade aluminium powder.
  - 425 lbs of the anti-oxidant Cyanox
  - 11 000 lbs of the synthetic rubber compound HTPB (hydroxyl-terminated polybutadine).
  - 500 lbs of EPON from the Miller-Stephenson Company. EPON is used for gluing composite fabrics to surfaces in the aerospace industry.
  - Veramide 125 and Versamide 140 from the Hemkel Co. These two chemicals are epoxy hardeners used in conjunction with EPON.
  - 40 lbs of MAPO (tris-2-methyl aziridinyl phophine oxide), a rocket propellant component, from Arsynco Co.
  - HMDI (hexamethylene diisocyanate), a curing agent for HTPB in solid rocket fuels.
- 21 200 lbs of maraging steel which was intended to be used for the motor casing of the first stage of the Condor II. It was also to be used for making the connection between the casement sections and the head and the nozzle of the rocket.
- 185 yds of Rayon-based ablative carbon fabric from the HITCO Co. This was required for a heat shield for

Condor II payload covers.
- 436 lbs of MX-4926, an ablative carbon phenolic fabric from the Fiberite Co. MX-4926 was an essential material for manufacturing the flexible nozzles that the Condor II required for manoeuvrability.
- Microwave rocket telemetry antennas from Vega Precision Laboratories.

Due to a distinct lack of operational security and inexperience, the majority of these efforts failed and in June 1988 Helmy and a number of his co-conspiritors were arrested. The broad scope and quantity of the items desired is considerable, and serves as an indicator of the slow progress being made with the Condor II project and Egyptian missile development in general. The loss of the US conduit for missile related technology and components was a staggering blow to the Egyptian Condor II project. This is indicated by a US Defense Intelligence Agency estimate which reports, '...The progress (within the Condor II programme) has been slow due in part to the lack of indigenous technology and the need to covertly acquire the technology/materials used in the production of ballistic missiles abroad. ...without the activities of Dr Helmy and his co-conspirators in procuring restricted technology, completion of the Condor (II) missile programme is doubtful'.

By mid-1988, as a direct result of the considerable political pressure applied by the USA arising from the arrest of Helmy and his co-conspiritors, Egypt officially withdrew from the Condor II project. This was marked by the contract between the Egyptian Ministry of Defence (ie BME) and IFAT being formally cancelled on 11 July 1988. The Egyptian withdrawal was accompanied by Iraq withdrawing its financial support for the project. There appears to have been a long standing Iraqi concern with Egypt's technical capabilities and management practices. Iraq apparently believed that in numerous instances it was being charged twice for development work on Condor II. First, by contract European engineers and scientists, and second by Egypt. Additionally, workmanship at the DOS Condor II facilities in Egypt is believed to have been significantly lower then those in Iraq, and there was concern that an explosion of missile fuel would occur at the Abu Zaabal facility. These Iraqi concerns came to a head in 1988 with the arrest of Helmy.

A direct result of collapse of the Condor II project was the reorganization of the Egyptian component of the programme. This witnessed the sideways promotion of its principal backer, the former Defence Minister Field Marshal Abdel Halim Abu Ghazala in April 1989, and the replacement of a number of key personnel. In mid-1989 the project was believed to headed by a General Mustafa, assisted by a Dr Toufik, while a Colonel Essam Ayoub was responsible for the DOS construction programme. It is currently believed that sometime during 1989-90, Egypt re-examined the status of its various missile programmes and made the decision to cancel the internal development of the Condor II project. The resources that were allocated to the Condor II project were probably then redistributed to the 'Scud-B' programme which was being pursued with DPRK assistance (see above). It is conceivable that the Condor II production facilities at Helwan and the fuel fabrication facility at Abu Zaabal, which were never completed, have been reassigned to the 'Scud-B' programme.

Three of the more unusual aspects of the Egyptian involvement in the Condor II project concern reports of an Egyptian test launch; the delivery of Condor II components from Argentina to Egypt, and Egypt to Iraq; and the Egyptian acquisition of uranium.

During 1987 at least one report suggests that Egypt conducted a test firing of a Condor II missile. If this is correct, the missile must have been constructed in Argentina and subsequently delivered to Egypt for testing. There is some confusion as to the number of Condor II missiles delivered by Argentina. Most sources make no mention of any transfers of missiles by Argentina to Egypt or Iraq, or Egyptian missile transfers to Iraq. The few sources that mention missile transfers provide confusing details. One report suggests that five Condor II airframes were delivered to Egypt from Argentina. A second source, however, indicates that Argentina provided Egypt with between 12 and 30 airframes during the period from September 1988 and March 1989. A third source states that Egypt provided Iraq with three missile 'kits', including a prototype Condor II, during 1987. This was followed by a further shipment of 16 prototype Condor IIs during the first half of 1988. At present, there is insufficient evidence to substantiate any of these reports.

During the late-1980s Colonel Khairat was reportedly able to obtain approximately 100 kg of uranium in France. After having it analyzed at laboratory in Europe, he faxed a copy of the report to Helmy seeking his advice on how the material could be enriched to weapons grade. Helmy states that Khairat was hoping to ship the uranium to Pakistan to be enriched. Whether Khairat was actually able to purchase uranium, and whether he was able to have it shipped to Pakistan to be enriched, is presently unknown.

In addition to the pressure the USA focused upon Egypt concerning Condor II, it also applied considerable pressure to Argentina. This pressure was accompanied by an incentive of a $18 million arms grant, with the possibility of more in the future. This combination apparently had its desired effect, for in May 1989 Assistant Secretary of State Allen Holmes told a Senate Armed Services subcommittee that the development of the Condor II was years behind schedule '...and we believe this can be traced to problems in acquiring technology'. Several months later, during September 1989, Argentine President Carlos Menem reportedly informed President Bush that Argentina was considering cancelling the Condor project. There was a great deal of political turmoil between President Menem and the Argentine military leadership over the cancellation. The military wanted to continue development of Condor II, even if it was solely for space research. Although President Menem officially announced, in April 1990, that he had ordered the deactivation of the Condor II, efforts by Defence Minister Antonio E Gonzalez to transfer the Condor II project to the National Space Investigation Commission (NSIC) were increasing. Defence Minister Gonzalez stated during 1991 that '...I don't believe, however, that the final word has been said yet as regards the Condor II. ...(W)e still are trying to develop satellite technology (and) we are going to cede all the Condor installation and equipment to the commission. It is important to recover whatever is recoverable, especially the trained personnel'.

During April 1992 it was reported that these efforts were successful and the remnants of the Condor II programme were transferred to NSIC, which reported directly to President Menem. The final casualty of the Condor II project was the CONSEN Group itself. As a result of the tremendous amount of negative publicity it received, the CONSEN Group suffered a financial disaster. By the end of 1990, the CONSEN Corp and IFAT Corp Ltd (both located in Zug, Switzerland), and Delta Consult and Delta System (both located in Salzburg, Austria) had been placed in the hands of receivers. The remaining companies were either on the verge of liquidation or had been restructured and attempting to acquire new businesses in the civilian engineering market. Although the cancellation of the Condor II project was a significant blow to ballistic missile development within Egypt, it was not a complete loss. The project provided Egypt with practical experience in a number of areas and resulted in the transfer of a large body of missile related technology to Egypt. These benefits are apparently now being applied to the improved 'Scud-B' programme.

Jo Bermudez Jr is an authority on missile technology and issues of proliferation. A full list of references can be obtained from the Editor.

Egypt To Focus on Upgrades, Support Equipment

By PHILIP FINNEGAN
Defense News Staff Writer

CAIRO, Egypt — Egyptian military leaders are emphasizing upgrades and follow-on support rather than purchasing new equipment as a means of modernizing Egypt's armed forces.

Egypt's confidential white paper on procurement priorities submitted to the U.S. government in March ranks follow-on support for equipment, including spare parts, maintenance and training for the Army, Navy and Air Force, as the top three priorities of the Egyptian military.

Raising the readiness levels of equipment is critical for Egypt, according to Western diplomats here. Past underfunding of spare parts, maintenance and training reduced the numbers of tanks, aircraft and other equipment available for use.

The Egyptian military has an increased interest in raising its spare parts inventories, a Western diplomat said. In the past several months, it has put out requests for proposals seeking spare parts for Chinook and Westland Sea King helicopters.

The Egyptian military also has upgrade programs to increase the effectiveness and availability of systems provided by the former East bloc. Although such systems still constitute more than half of its military equipment, Egypt has been working to create an all Western-equipped force.

In the meantime, Egypt is trying to upgrade its Eastern European systems. The Egyptian Air Force is considering a program to give the country's 100 MiG-21 fighter's night vision capability. Aging SA-2, SA-3 and SA-6 air defense missiles provided by the former Soviet Union before the 1973 Arab-Israeli war will be upgraded to stretch their service life.

Ammunition used by Egypt's 800 T-62 tanks is being upgraded to provide greater armor penetration in a program between Royal Ordnance in London and Egyptian industry. U.S. technical support will enhance Russian ZSU-2 antiaircraft guns, and the country's two Russian Romeo-class submarines are being upgraded with new electronics by Loral Corp., New York.

Egypt also is upgrading its indigenously produced Fahd-30 armored personnel carrier with Russian technical assistance. The Fahd is being fitted with a BMP-2 infantry fighting vehicle turret to enable it to engage air and ground targets.

Egypt also is working to broaden its training with the militaries of other nations, say diplomatic sources. It already conducts exercises with the United States and France and is negotiating a memorandum of understanding to conduct training with Britain. In addition, Egypt will invite Saudi Arabia to take part in the annual exercises with the United States in 1996.

Failing to find new ways to finance purchases, Egypt has been focusing on improving the operation of existing equipment. Egypt's military aid from the United States has remained steady at $1.3 billion annually for nine years despite declines in purchasing power.

The Egyptian armed forces sought to receive some Russian equipment including aircraft and tanks taken out of service by the German military after the reunification of Germany. Ultimately, the German government decided it could not export lethal equipment to Egypt so the armed forces received only ambulances and other non-lethal support equipment.

Egyptian officials also sought to obtain excess U.S. equipment virtually free from U.S. stocks. Egypt's annual white paper on procurement priorities, titled "A Partnership for Peace, Stability and Progress," listed 19 types of excess weapon systems requested from the United States.

Among the systems were: 1,512 M-113 armored personnel carriers; 865 M60-A3 tanks; 94 M88 tank recovery vehicles; 12 Hawk Phase-3 air defense batteries; 237 Stinger antiaircraft systems; two Knox-class frigates; six mine hunters; 25 fast-attack boats; 24 C-130 transport aircraft and 2 KC-135 air refueling tankers.

Of that list, little has been provided as excess due to the unwillingness of the U.S. military services to give equipment away. Excess equipment that has been provided to Egypt includes trucks and six SH-2 helicopters that the Egyptian government will fit with dipping sonar to detect submarines.

Generally, Egypt has been forced to buy equipment needed from used U.S. stocks

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Egyptians To Stress Upgrades

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rather than relying on excess. A total of 340 used M106A3 tanks are being purchased. Egypt also will purchase 78 M113A2 armored vehicles. Another 70 are being provided by the United States to replace Egyptian armored vehicles sent to support Egyptian peacekeeping troops in Somalia.

Egypt will receive two FF-1052 frigates this summer that will be leased to it rather than provided as excess.

Although no Ministry of Defense officials could be reached for comment on the country's changing priorities, an official at the Ministry of Foreign Affairs said there is no alternative to U.S. military aid.

A strong military is critical to keep Middle East extremism at bay, Nagi Ghatrifi, spokesman for the Ministry of Foreign Affairs, said April 25.

Congress Ponders Sales Totaling $3.7 Billion

By DAVID SILVERBERG
Defense News Staff Writer

WASHINGTON — The U.S. Congress is considering a package of proposed arms sales totaling $3.7 billion.

Under the Arms Export Control Act, Congress has 30 days from the time it is notified of a proposed arms sale to block the sale with a vote of disapproval in both houses.

The most recent notification was made last Tuesday when the administration of President George Bush announced it intends to sell 80 F-16C and D aircraft to Turkey worth approximately $2.8 billion.

Congress was notified of the other sales on July 19.

These include:

■ Sale of 20 excess F-16 A and B aircraft to Morocco for an estimated $250 million. The planes will receive new engines and the sale will include four spare engines. The planes will supplement existing Moroccan French-made F1s and U.S.-made F-5s and will be used for all-weather, day and night operations defending Moroccan airspace and patrolling the Moroccan coast.

■ Sale of 119 V-300 Commando armored wheeled vehicles to Oman for $150 million. The vehicles will be used for border surveillance and to improve the mobility of its land forces. The prime contractor will be Cadillac Gage Textron Inc., Warren, Mich.

■ Sale of Phase III Product Improvement Program modification kits for 12 Hawk antiaircraft missile batteries to Egypt for an estimated cost of $146 million. The sale is intended to enhance Egyptian air defense. Prime contractors will be the Raytheon Co., Lexington, Mass. and the Litton Co., Van Nuys, Calif.

■ Sale of 12 AAV7 Amphibious Assault Vehicles to Brazil with associated equipment, including machine guns for $34 million. The sale will add to Brazil's current inventory of amphibious vehicles and will be used in conjunction with two Naval Dock Landing Ships leased to Brazil from the United States. The ships will be procured through competition.

In addition to these new sales, moves were also being made in Congress to question another proposed arms sale, the $2.5 billion sale of 120 F-16s to the Republic of Korea notified to Congress on July 8.

On July 15, Sen. Robert Byrd, D-W.Va., introduced S.J. Res. 177 and 178 disapproving the sale. S.J. Res. 178 prohibits the transfer of technical data and some equipment connected with the sale. The resolutions had six co-sponsors and was referred to the Senate Foreign Relations Committee, where no action has yet taken place on it.

According to a congressional source, appropriations legislation may also be introduced to block the sale.

In the House, Rep. Richard Gephardt, D-Mo., House majority leader, sent a letter to Rep. Dante Fascell, D-Fla., chairman of the House Foreign Affairs Committee expressing his opposition to the deal. He requested that Fascell hold a hearing on the subject as soon as possible.

"As with my efforts on the FSX [Fighter Support Experimental] aircraft deal with Japan, I am also considering pursuing legislation with regard to the KFP [Korean Fighter Program]," wrote Gephardt, who also asked that his and Fascell's staffs meet to discuss the options.

In 1989, Gephardt was a cosponsor of a resolution, H.J. Res. 254, that would have blocked U.S.-Japanese co-development of Japan's next generation fighter plane, a modified F-16 dubbed the FSX. Though resolutions of disapproval were passed in both houses, they were vetoed by Bush. The veto could not be overridden by Congress.

Egypt Modernizes Air Defense

The U.S. Air Force is conducting a competitive procurement to select a prime contractor to help modernize Egypt's air defense system communications. The U.S. Defense Department has notified Congress of Egypt's request to purchase approximately $70 million worth of communications gear and support services.

The Middle Eastern nation is seeking communications equipment, facility construction, spare and repair parts, support equipment, contractor engineering and technical assistance, personnel training and other logistics support.

Equipment delivery, installation and system checkout are estimated to take two years.

–SIGNAL *Staff*

Middle Eastern Upgrades:

In an age of falling markets, declining defense budgets, and soaring systems costs, most major powers and all smaller ones must seriously consider how they can continue to meet their defense needs without bankrupting themselves. Ordering a major new system—a frontline aircraft, naval vessel or main battle tank—is a massive investment for even a superpower.

As a result upgrades and retrofits have become a standard approach for many countries. The body of a tank, the airframe of an aircraft have a lifetime, with proper maintenance and overhaul, much greater than the technology which goes into the shell. A tank, for example, may find itself outmoded because it lacks the more powerful engines, night vision equipment, or fire control systems of a new generation, or because its gun is of too small a caliber: all these things can be changed, and new, more modern armor added on. New avionics, weapons management systems, even new engines can be installed in old airframes. As the US conversion of four *Iowa*-class battleships to modern cruise missile platforms shows, naval vessels may have the longest potential life of all; one of these four, the *Missouri*, was the site of the signing of the Japanese surrender more than 40 years ago.

As mentioned, however, each region has faced different challenges. The December 1985 issue of *Defense & Foreign Affairs* carried an article by Julia Ackerman and this writer called "New Wine in Old Wineskins," examining the market in east Asia, particularly the ASEAN countries. The recent defense exhibition in Cairo, profiled elsewhere in this issue, offered a glimpse of how Egypt has coped, and some new systems were shown. Israel, next door to Egypt, has much experience in upgrade as well, though the two naturally approach very different markets.

In Egypt's case, the main problem faced in the 1970s and '80s has been the vast arsenal of Soviet equipment acquired during the years of confrontation with Israel, equipment which still has some life in it if properly upgraded and maintained, and which Egypt cannot fully replace with new systems. In Israel, concern over costs (which led to the cancellation of the *Lavi* fighter program last year), difficulty at times in obtaining spares from abroad (Israel's defense industry only really took off after the French boycott in 1967) and other factors have spurred upgrade work. This article briefly looks at the experience of both countries, particularly at new programs.

Egypt

The Egyptians were left with huge inventories of Soviet built tanks, armored vehicles, and other equipment when they shifted their international orientation to the West in the 1970s. For many years, Western suppliers and Egyptian industry have been seeking ways to ugrade this large force. Western arms and avionics have been installed in MiG-21s and other aircraft; Western systems have been installed aboard Chinese or Soviet built naval vessels; today even new equipment is being tailor-made, like the new Chinese ships equipped with Western armaments or the hybrid *Sinai 23* air defense system, mounting Soviet guns with French fire control and tracking.

One area particularly in evidence at the recent defense show in Cairo (see the separate article, "Made in Egypt," Page 36) was the effort to upgrade and regun Soviet tanks. The basic body of a tank lasts, after all: Egypt even was displaying a locally made refit of an ancient T-34 during the show (mostly a case of adding smoke screening equipment, etc.), though it would seem that there must be some limit on how far back one wants to resurrect an old tank. But Egypt has some 900 T-54s and T-55s, though some of these have probably been delivered to Iraq; it also has some Romanian M-77s, a version of the T-55 which it once considered building locally. These are recent enough tanks to be of major use as a complement to Egypt's force of M-60s and hoped-for M-1s. Royal Ordnance of Great Britain already has a contract under way regunning T-55 tanks with the Royal Ordnance L7 105mm tank gun. Other upgrades on the T-55 are currently being studied. The 10-million pound sterling collaborative regunning project involves local manufacture of the kit in Egypt and joint marketing of the regunning system to third countries. In addition, many Egyptian T-54s and T-55s have had new Western searchlights, smoke launchers and other equipment added.

Now Egypt is in the midst of a competition to regun the T-54, and the competitors are Royal Ordnance again and Teledyne Continental Motors, with its *Ramses II* which was displayed at the Cairo show. The *Ramses II* aims at being a full package, not just a regunning, and Teledyne is billing it as "a world class main battle tank." It adds a 105mm stabilized gun and an advanced fire control system to the T-54, and adds increased mobility and shoot on the move capability to the existing Soviet tank. The fire control system has a night vision device. Teledyne adds an AVDS-1790 engine, TCM-304 transmission, nuclear/biological/chemical protection, and hydropneumatic suspension.

Also at the Egyptian defense show was a potential upgrade for any country with old BMP fighting vehicles, though the particular version displayed has not been sold outside of China. FMC of the US and China North Industries Company (NORINCO) of China displayed their NFV-Q infantry fighting vehicle, developed for Chinese Army requirements. The chassis is the Chinese Type WZ501 vehicle, basically a Chinese version of the standard Soviet BMP. It has been fitted with an FMC turret and weapons system, the FMC one-man electric drive turret, which FMC hopes to market on a number of other chassis. It is armed with the 25mm McDonnell Douglas *Bushmaster* and a coaxial mounted 7.62mm machine gun.

Given the amount of Soviet equipment in service around the world, much of it now in countries friendly to the West (even Morocco has T-series tanks), upgrade programs by Western and Egyptian firms have a real potential market.

The Royal Ordnance and *Ramses* projects could be of great interest elsewhere, as could the FMC/NORINCO vehicle for any country with BMPs.

Egypt to Build Scuds

Egypt soon will start local production of enhanced Scud-C missiles with a range of up to 600 kilometers (372 miles), says an Israeli arms control analyst.

Danny Leshem of Tel Aviv's Jaffe Center for Strategic Studies says secretive research for the program has taken place at a factory producing antitank missiles.

Leshem says Egypt might export the missile to Syria, Libya and Saudi Arabia. Saudi Arabia, recently a big investor in Egyptian enterprises, may be an investment partner in the production facility. He says the Saudis have purchased Chinese-made ballistic missiles with fixed launchers but could benefit from the Scud-Cs portable launchers.

An official of the Egyptian Embassy in Washington said talk of his country building Scud missiles is rumor and that in 1989 Egypt declared it would not build such a missile.

Leshem said Egypt has devoted significant efforts to development of prepackaged fuel, and on maximizing the missile's warhead size, range, rocket propulsion and accuracy. Egypt has worked closely with North Korea and Iraq in previous missile development projects.

Korea helps Egypt build Scud-B

North Korea has helped Egypt build a production facility for Scud-B surface-to-surface missiles. North Koreans are still in Egypt and working on upgrading the missile.

The joint venture began after the Soviets refused to sell Scud-B missiles to North Korea. Egypt had a large number of these missiles and agreed to sell a limited number to North Korea. Later North Korea helped the Egyptian defence industry build a Scud-B production facility.

After producing the basic version of the missile, the Egyptian facility has begun to upgrade the weapon. There is no information on the upgraded version, but the Iraqis have succeeded in improving the range of Scud-B by reducing warhead weight and adding boosters. This version has reached a range of 600km, according to Iraq.

Experts say that the Egyptian defence industry is capable of developing medium-range ballistic missiles based on existing designs or on knowhow from other countries.

FLIGHT INTERNATIONAL, 16 July 1988

Egypt's Technology Shift

Sakr Factory Schedules Three Missile Projects

Heliopolis, Egypt—Arab Organization for Industrialization Sakr munitions factory here is scheduled to enter development in early 1982 with an infrared-guided surface-to-air missile system similar to the General Dynamics Redeye man-portable weapon for air defense.

The Sakr factory, according to its chairman, Ahmed F. Ismail, also plans to enter licensed production with the Hughes Aircraft Improved TOW antitank wire-guided missile, and the Matra Magic R.550 air-to-air missile at this modern facility in the suburbs northeast of Cairo.

The three new projects will require an approximately $400-million investment by the Egyptian government, but the technology embodied in these weapons is expected to create the nucleus for an engineering team and provide tooling to enable manufacture of more advanced weapons as requirements are established.

The new weapon programs also could mean increased technical support for the armed forces here, Ismail said, along with third-country sales to improve Egypt's economic position.

The new infrared air defense missile is expected to be an 80-mm. weapon with performance characteristics based on combat lessons learned in battle against Israel.

The Sakr factory expects to collaborate with European aerospace industry in the air defense missile development program, but Sakr will remain the prime contractor with final assembly in this city of 2 million persons. The approach is similar to that employed for the Sakr-30, a 122-mm. unguided artillery rocket system developed here and tested successfully in May, 1981, firing demonstrations.

Sakr-30 Subcontractors

French and West German companies have participated as subcontractors in the Sakr-30 development and are expected to continue in the production program scheduled to begin in 1983. Static qualification of the rocket motor for the weapon is in progress here.

The 122-mm. rocket is designed to take advantage of Soviet-built BM-21 launchers with minor modifications. This offers potential for export sales by Egypt to Middle Eastern and African nations, officials here believe. The weapon will be used initially in Egypt's army.

Hughes Aircraft and Sakr have completed the first phase of a study on Egypt's production capability for the TOW system, and officials here are expecting a Hughes licensed production proposal from the contractor within approximately a month, according to Ministry of Defense officials. Matra has submitted a proposal for licensed production of the Magic R.550 missile, Ismail said, and it is being negotiated. Egypt is trying to obtain from Matra the rights to export the weapon to Arab and African nations.

The funding allocation from the Egyptian government for Sakr production of the Magic air-to-air missile is expected to be released in early 1982, Ismail said. He added that the rationale behind all three projects being undertaken simultaneously is based on sound economics, with the weapons earmarked for Egypt's military and export sales in the offing.

The three programs would infuse advanced guidance and rocket motor technology for adaptation to the development of other weapons systems, Ismail believes. Sakr also expects to gain from the three programs technology transfer in project management, advanced manufacturing processes and quality assurance, along with efficient use of existing local production facilities.

A U. S. government evaluation of the Sakr plant reveals that the factory contains 1,000 machine tools and employs a work force of 5,500, of which 400 are engineers. The plant has two test ranges, one 300 meters (984 ft.) long and another, adjacent to the factory, that is 50 meters (164 ft.) in length. The smaller range could be extended to 300 meters. The Sakr factory wants to update range instrumentation on its test ranges and has contacted U. S. companies such as Teledyne and ITT. A munitions clearance, however, is required to place such equipment in Egypt. Sakr also wants to improve quality control laboratory equipment.

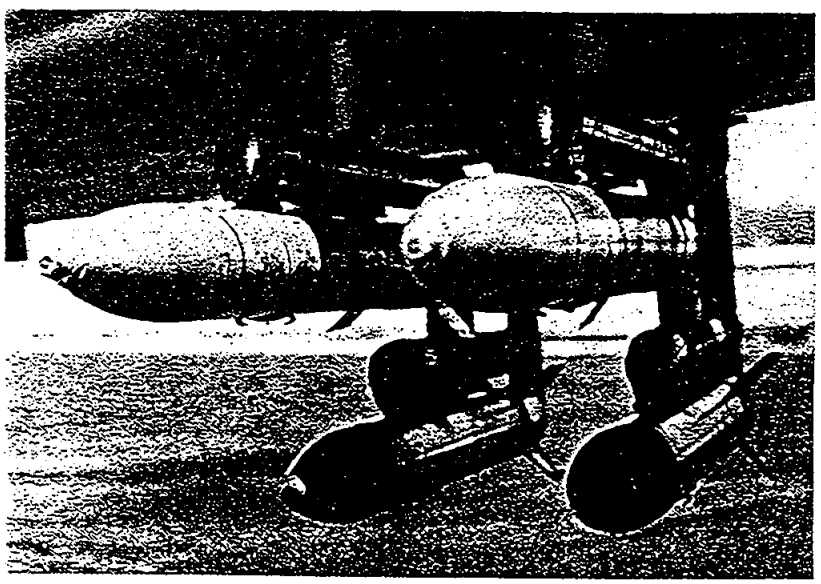
The Egyptian government wants to manufacture 105-mm. guns to upgrade its Soviet tanks, produce M60 tank fire-control equipment and 155-mm. howitzers, and develop technology to support night vision equipment production. The government here intends to select a limited number of items to upgrade the technology base and satisfy needs for better military equipment, according to a U. S. government study.

Production Arrangements

Arrangements for licensed production and coproduction of military material will be a demand by the Egyptian government in the case of any material sold to Egypt. "Materials sold to Egypt must be produced, at least in part, in Egypt," according to a Ministry of Defense officer. Egypt also will insist on offset agreements in procurement of foreign hardware, the officer said.

The Sakr factory complex covers an area 1.5 mi. in length and 0.6 mi. in width. Approximately half of this area is covered space. A large plating and metal finishing operation has been installed, which is the envy of U. S. manufacturers, according to the study by the Defense Logistics Agency.

Newest equipment at the Sakr facility includes computer numerical controlled machines, with a Digital Equipment Corp. minicomputer capable of doing all the required computer work, according to the

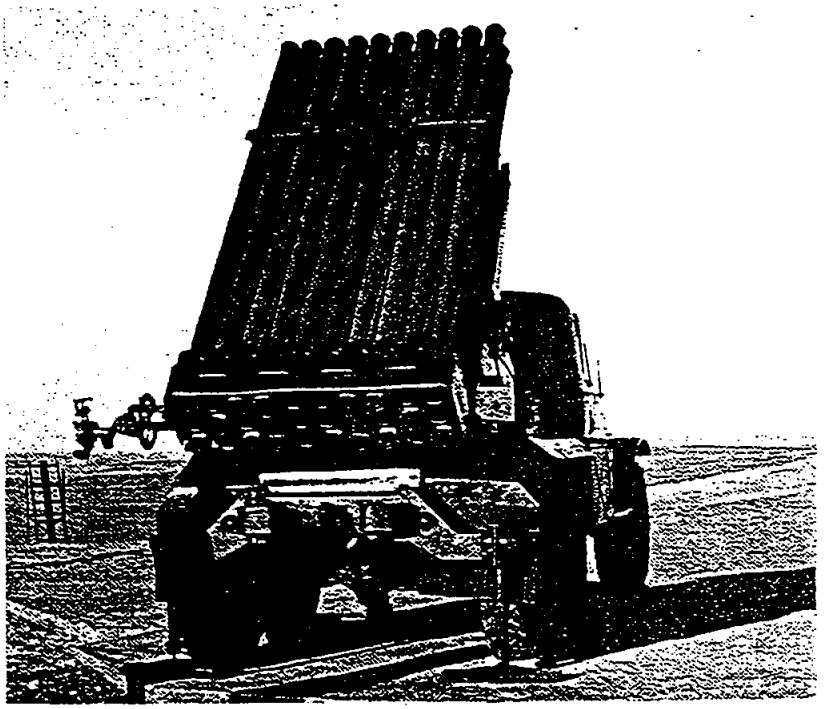


Sakr-produced 80-mm. air-to-surface rocket system for Mikoyan MiG fighters is based on a Soviet-designed system but modified to accommodate a family of warheads such as antiarmor munitions. The system is in use in neighboring nations Sudan and Somalia.

Pentagon study. Quality control responses and inventory control procedures are considered by the U. S. to be good.

The Sakr factory produces a number of munitions and weapons systems that include:

- Air-to-surface 80-mm. rocket armed with an antipersonnel and an antiarmor shaped-charge warhead.
- Antitank rocket based on the Soviet rocket-propelled grenade (RPG-7). Two shifts per day are turning out 750 RPG-7 rockets here at peak production rates. The Soviet Union initially licensed RPG-7 production in Egypt along with the sight for the weapon, the rocket and the launcher. New materials from the West have been substituted for Soviet materials and the rocket is being exported to Middle Eastern and African nations.
- Surface-to-surface 132-mm. artillery rocket based on the Soviet Katusha system with an 8-km. (4.97-mi.) range. The 132-mm. rocket is launched from a vehicle-mounted rail launcher that can fire 16 rockets, each with a 20-kg. (44.1-lb.) high-explosive warhead.
- Light artillery 122-mm. surface-to-surface rocket system based on reverse engineering of a Soviet design. The factory uses new materials obtained from Europe with modifications to the weapon to increase the range from 20-30 km. (12.42-18.6 mi.). An improved rocket motor design has been incorporated, but the weapon retains the same tactical characteristics enabling use of Soviet firing tables. The rocket is armed with 28 antitank and antipersonnel bomblets in a submunitions dispenser. The bomblets were designed here.
- Antitank grenade that deploys a small parachute to enable the shaped charge warhead to take effect and penetrate up to 120-mm. armored steel. The weapon provides a defense against an armored attack for the individual soldier at a range of 25 meters (82 ft.). It was developed at Sakr and is in mass production here for the Egyptian army.
- Surface-to-surface 80-mm. multipurpose rocket system that can be armed with a variety of warheads—smoke, illumination, antitank and antipersonnel. The weapon can be vehicle mounted on a jeep with 12 launch tubes. Folding aft fins deploy in flight for stabilization, and the weapon has an 8-km. (4.97-mi.) range. Development has been completed here and the weapon is in army field tests prior to production.
- Aerial rocket targets for air defense training to simulate a variety of aircraft signatures, operating at speeds from 100 meters/sec. (328 fps.) to 280 meters/sec. (918 fps.). Flight periods range from 12-28 sec. Sakr designed the target systems and is producing them for the Egyptian air defense force.
- Ballistic unguided solid-propellant illuminating rocket to enable detection at night of enemy mechanized or naval units within a 5-km. (3.1-mi.) area. The 122-mm. illuminating rocket produced by Sakr provides 1 million candlepower for more than 60 sec.



122-mm. light artillery rocket system provides an antiinfantry/antiequipment weapon with a range up to 20 km. (12.4 mi). The weapon is based on a Soviet design, and the warhead produces preformed fragments. The solid-propellant rocket motor uses two double base grains. The rocket has a guiding stud that rides inside a spiral groove in the launch tube to provide initial spin for stable flight. An inertial arming percussion nose fuze operates with three settings, instantaneous impact, short and long delay.

Licensed production of the Improved TOW antitank missile and the development of the new 80-mm. surface-to-air missile is expected to move Sakr from production of unguided to guided missile and rocket systems, Ismail said.

There has been interest displayed here in the Vought Corp. multiple launch rocket system (MLRS), and Sakr would like to produce the weapon under license. The tactical requirement, however, has not been established by the Ministry of Defense, and such a system, according to Ismail, would need to have a greater range than the Sakr-30 weapon.

Ismail believes it is more likely that Sakr will take part in the multiple launch rocket program in some form of coproduction, if Egypt can find the money to buy the weapon. "We are very much interested in taking part in the MLRS program to absorb the technology, but it is close to the Sakr-30 in range, and we would need a system with increased range. Any Egyptian MLRS would have to come along after the other three projects—the heat-seeking air defense missile, the Improved TOW and the Magic 550," Ismail said.

AVIATION WEEK & SPACE TECHNOLOGY was permitted to visit the production line in Sakr's facilities. The flow-forming workshop area includes machines that use high-strength steel and chrome alloys forged in Europe to produce the walls of rockets in a tube configuration 1.5-mm. thick. The material is taken to 250 atmospheres in the forming process to produce lightweight, strong rocket walls.

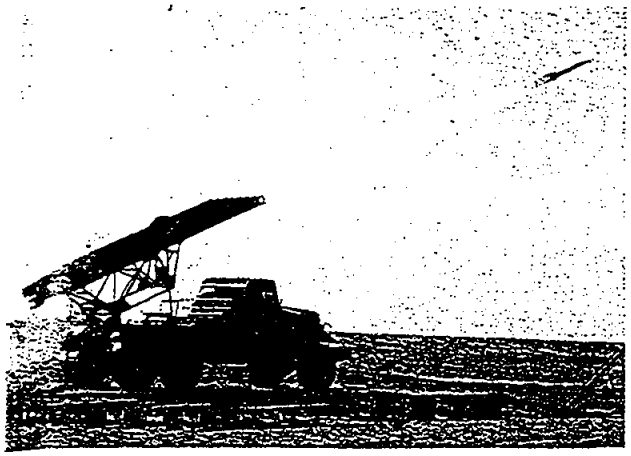
The flow-forming machine was imported from Leifeld in West Germany and is computerized.

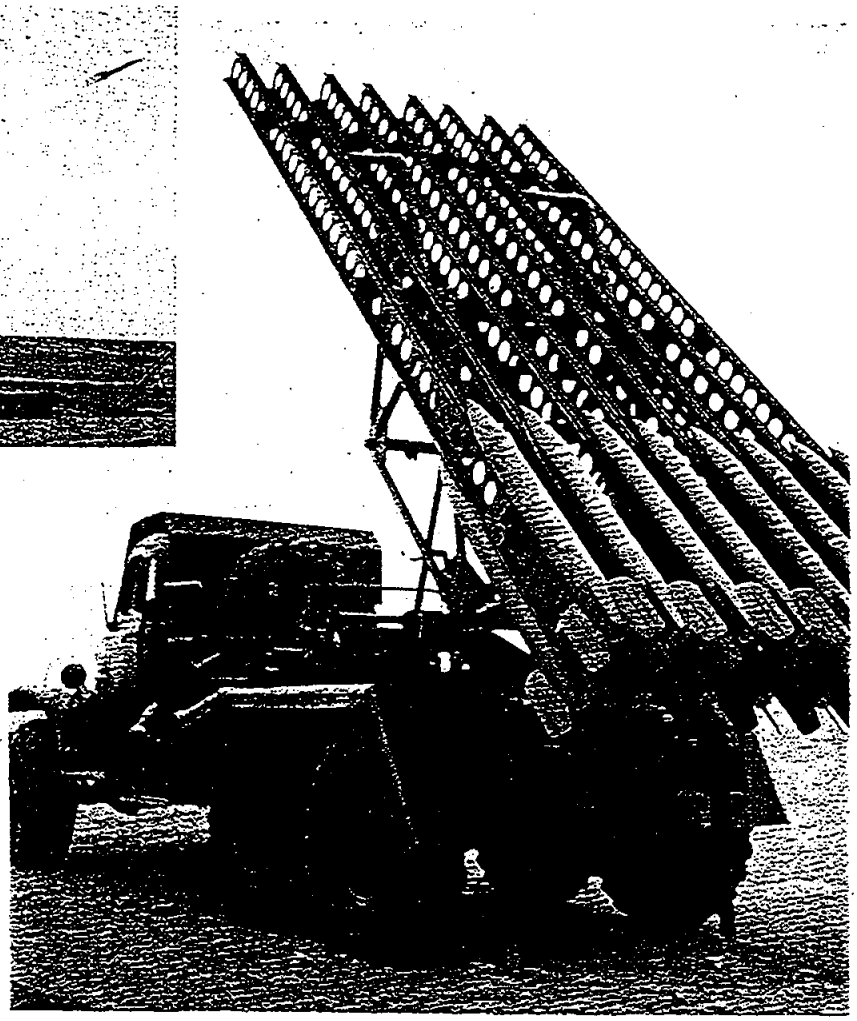
RPG-7 Warheads

In another part of the facility, a hydraulic press shaped copper cones from blanks to produce the shaped-charge warhead for the RPG-7 Soviet-designed antiarmor rocket. General Electric equipment is used here for control of the machines, and computerized control equipment that comes from Warner Swasey in the United Kingdom also is used to produce rocket subassemblies.

The Sakr-30 is what Ismail considers to be an improved version of the Soviet 122-mm. rocket to the point that it almost is a new system. The older 122-mm. Soviet version is still in production, but the Sakr-30 will be able to utilize the BM-21 Soviet-built launcher with modifications to permit programming the electronic fuze system added by Sakr.

Warhead demonstrations for the Sakr-30 have proved highly successful, according to Ismail, and static qualification tests of the extended-range rocket motor show





Production of the 132-mm. artillery rocket system is taking place at the Sakr factory. The Soviet-designed rocket is armed with a high-explosive antiarmor/equipment and antipersonnel warhead; the explosive charge weighs 4.8 kg. (10.6 lb.). The double base solid-propellant rocket motor provides an 8-km. (4.9-mi.) range, and the 12 canted holes in the motor body provide a spinning motion for stabilization in flight.

the range increases to 30 km. (18.6 mi). Ismail sees a very large market for the Sakr-30 in Africa and in Arab nations that already operate with the older 122-mm. system.

Overall system qualification with the Sakr-30 is expected to be complete by the end of 1982, according to Nabil Salama, research and development manager of Sakr. "Selection of appropriate projects can result in improving the factory's technological experience and provide marketing prospects," he said.

Sakr studied recent wars in the Middle East and Africa and determined that rocket systems that can disperse submunition warheads are the most tactically flexible weapons and that they fit within the line of specialization of the Sakr factory.

Sakr developed and successfully demonstrated two guided missile systems for surface-to-surface application. The systems included the El Zafer, translated in English as the Winner, with a range of 150 km. (93.2 mi.), and El Kaher, the Conqueror, with a 300-km. (186.4-mi.) range. The guidance system for both missiles was qualified in flight tests, according to Salama, before the government halted work on the weapons in favor of licensed production of other weapons.

Sakr is concentrating on custom-designed items that provide improved capabilities to existing weapons systems and equipment.

Salama said that support of the Egyptian army is a vital factor in the decision-making process on which systems Sakr will produce. Objectives include lower system vulnerability to countermeasures, increased combat area coverage and higher system accuracy at short ranges.

Studies at Sakr led to development of an advanced unguided artillery rocket system with dispersed submunitions from an existing weapon system for optimum production product. Increasing the range of the existing 122-mm. rocket through a new motor design and development of submunitions against tanks motivated the Sakr-30 design effort, along with deployment conditions in desert and tropical countries, Salama said.

Market Analysis

A variety of development strategies were considered by Sakr in a market analysis for the rocket system. As a result, the development plan called for Sakr to provide munitions and to improve the rocket performance of the 122-mm. system. This strategy satisfies a national objective to make the most use of available Eastern weapons and equipment. It also, Salama said, provides an opportunity for the factory to develop technical capabilities for future rocket projects.

"Although profits from the Egyptian market may be comparatively low, the widespread use of such a weapon in neighboring countries makes it very profitable for export," Salama said. He added that the financial risk is low, and the Sakr-30 provides the potential for larger projects that would encourage international cooperation with Sakr on similar projects.

Ismail cites a number of factors inducing U.S. and European countries to invest in coproduction and licensed production in Egypt. They are:

- Skilled manpower at low labor rates.
- Limited labor union power, with strikes and wage disputes illegal.
- Lower tax rates.
- Low costs for transporting products to Middle Eastern and African markets.

He also believes that financing research and development projects in Egypt for weapons earmarked for Middle Eastern and African nations would result in standardization of military equipment, which would help those countries' logistical support situation and also serve to strengthen Egypt's political ties to that part of the world. □

(The preceding articles, beginning on p. 41, are part of a series on Egypt's technology shift from Soviet to Western military equipment. Earlier articles appeared Dec. 14 beginning on p. 40 and Dec. 21 on p. 34.)

AGI produces all types of gun tubes and barrels (122 mm; 155 mm; 105 mm and 130 mm with related rifles. In addition mortars (120 mm; 81 mm; standard 60 mm; commando 60 mm) and rocket launchers (122 mm) with the I-3 gun.

Repair facilities

Iran has developed a close working relationship with Pakistan Ordnance and other defence equipment development and repair facilities in Pakistan. It is understood that Chinese battlefield equipment is maintained via the Norinco contract with Pakistan Ordnance. Two MiG-29 combat aircraft, flown to Iran by defecting Iraqi Air Force pilots, have been sent to Pakistan for evaluation in what is seen as a growing co-operation between Tehran and Islamabad.

Ballistic Missile Programmes

Iran has developed a series of ballistic missiles.

In November 1987, while discussing the status of missile production in Iran, a government minister, Mohsen Rafiqdust stated " at present we are copying 'Scud B' missiles. A factory for its production is being completed and there are no problems as far as the manufacture of the missile is concerned".

While this statement was somewhat premature, it clearly indicated that Iran was determined to commence a ballistic missile programme and that it was also devoting significant resources to that end. On 12 December 1987, the Head of the War Information Headquarters, Kamal Kharrazi indicated that Iran would soon achieve self- sufficiency in the manufacture of advanced missiles.

Progress with the programme was relatively steady and during 1988 Iranian officials claimed that the 'Scud B' had entered production. On 11 April 1988, Brigadier General Mohammad Jalali stated "two missiles with ranges of 130 km and above are being manufactured by the Defence Industries Organisation". One was the Mushak-120 (an indigenous 120 km range weapon). The second was the North Korean variant of 'Scud B,' confirmed three days later by the First Deputy Minister of Defence: "we have succeeded in manufacturing missiles with a range of 320 km." This figure coincides with the standard range of the North Korean 'Scud B' and is slightly greater than that of the standard Soviet 'Scud B' (280 km).

It is more likely that Iran assembled North Korean 'Scud B' missiles using components rather than manufacturing them.

Iran launched its first North Korean 'Scud B' in January 1988. Full scale ballistic missile attacks on Iraqi targets followed in February. For 52 days from 29 February, approximately 532 rockets and missiles were launched by both sides: Iran launched 339 missiles - 80 'Scud B', 253 Oghab and six Mushak-120. This bombardment reduced the Iranian inventory to less than 20 'Scud B'. It is believed that these weapons were armed with chemical warfare as systems of last restort and therefore held in reserve.

. By 1990, Iran reorganised its ballistic missile programme into two distinct components. The first remained centred around efforts to assemble and indigenously manufacture the North Korean 'Scud B' and later the 'Scud C' (range 800 km). The second is the partnership with China's Norinco to re-design and manufacture M-Class missiles with ranges from 800-1000 km.

Iran and China signed a number of co-operation agreements in 1988 for M-Class missile technology to be transferred to Iran to develop missiles with performances comparable to the Iraqi Al-Hussein (600 km) and Al-Abbas (900 km). This includes the training of Iranian engineers and technicians, and the provision of Chinese advisers.

Equipment and technical assistance in developing the infrastructure required to design, test and produce such missiles, including manufacturing equipment, test range instrumentation was obtained from Western Europe and North America.

By the end of 1990 launch range and test facilities for M-Class missiles are believed to have been completed near Semnan, about 175 km east of Tehran. By 1991, several reports emerged indicating that Iran had tested at least two new missiles at Semnan, one had a range of 700 km plus and the other 1,000 km plus. These new missiles are believed to be the results of the Chinese-Iranian programme.

In January 1991, the Tehran government announced the first production of ballistic missiles, although it is now clear that initial agreements with North Korea were completed in 1985. It is understood that this referred to Iranian versions of the SS-1c 'Scud B' (300 km range), with Chinese or North Korean assistance. Reports in September 1992 claimed that an 800 km range version was under development. This is believed to refer to 'Scud C.'

The Nazeat (Iran-130) short-range, road mobile battlefield ballistic missile entered service in 1990. Nazeat 10 (an improved Soviet FROG-7) has its associated support vehicles, all based on Mercedes-Benz chassis.

Japan Defence Agency officials have spoken of North Korean Nodong 1 short-range ballistic missiles being sought by Tehran and that purchases of the improved Nodong 2 (range: 1,300 km) are believed to be included in the current budget. Nodong 1 and 2 are nuclear, chemical and biological warhead capable.

■ Nuclear/Chemical Capability

Nuclear Weapons

Iran insists that, although it has in the past itself been the victim of aggression several times, it has no territorial ambitions and has no desire to acquire nuclear weapon technology.

Tehran dismisses all weapons of mass destruction as fundamentally anti-Islamic. Washington views these protestations as another example of the Iranians saying one thing and going ahead and doing the exact opposite.

Although President Rafsanjani may well, for good economic reasons, be trying to present Iran to the rest of the world as being reasonable and only concerned with its own security and prosperity, he is not entirely his own master and there are more extreme elements in Iran.

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Washington believes that if Iran acquired weapons of mass destruction and the means to deliver them, it would pose a significant threat to the stability of the Gulf area. It is likely, American analysts say, a nuclear-equipped Iran would seek to reverse the Saudi and OPEC policy of cheap oil, perhaps seek revenge on the Saudis and the Gulf Arabs for their support of Iraq in the 1980-88 war.

Israel is certainly concerned and in May 1993, extracted assurances from Beijing that ballistic missile technology was no longer being transferred to Iran.

CIA Director, Robert Gates, head of the US intelligence agency under President Bush, has stated publicly that there is evidence that Iran is involved in acquiring both nuclear and chemical weapons. He claimed that if Iran's attempts to buy components from Kazakhstan, Hungary, the UK and Germany are successful, it will have a nuclear weapon early in the next century. If significant external support is forthcoming, by the end of the decade.

US and People's Mujahideen of Iran sources claim that Iran was in the early stages of a nuclear programme but that development was interrupted by the Iraqi attack in 1980. There are reports that nuclear weapon development is or has taken place at least three sites near Quazvin, on the Caspian Sea coast, at Isfahan in the central Iran and somewhere near the southern sector of the border with Iraq.

Confirmation is not forthcoming however and the International Atomic Energy Agency (IAEA) is not able to confirm a weapons programme is underway. Evidence from resistance groups could of course be self serving and unreliable.

Iran, while accepting that it is involved in the development of nuclear power facilities, dismisses claims that this development is for nuclear weapons as American paranoia. It sees it as an attempt to justify the massive arms sales that the USA is making to the other Gulf states, where the expenditure on arms is far greater than in Iran.

Iran's economic position remains weak and government officials say the priority is to repair the ravaged infrastructure and to develop the internal economy of the country before embarking on an unnecessary expensive weapon development programme.

Chemical Weapons

CIA Director, Robert Gates, head of the US intelligence agency under President Bush, has stated publicly that there is evidence that Iran is involved in acquiring both nuclear and chemical weapons. He claims that Iran already has stocks of anything up to 2,000 tonnes of chemical weapons that include choking, blister and blood agents.

Assessment: in the longer term the present members of the nuclear club (USA, Russia, France, China, UK) are going to have to accept the fact that nations of the size and power of Iran will eventually have access to nuclear weapons. It would be entirely rational for the Iranian Chief of Staff to conclude that the best interest of his country would be well served by either having its own nuclear deterrent or to establish a climate where others believed Iran to be in possession of such a deterrent. Given the large Iranian casualty figures at the hands of Iraq, Iranian possession of nuclear weapons would almost certainly rule out any further conventional warfare between the two nations, and could arguably enhance Iran's security. It is also just conceivable that the military could be pressing ahead with nuclear research without the full knowledge of their political masters.

■ Military Forces Overview

TOTAL STRENGTH	350,000 (estimated)

General

Iran's armed forces are in the midst of a re-organisation, re-structuring and modernisation programme to repair the damage of over zealous political/religious changes post-1979. The performance of the regular forces and the Pasdaran was criticised in a report to the National Security Council in 1989.

Under the changes, the regular forces have the responsibility for the territorial integrity of the country and the Pasdaran has cultural and military roles.

The Pasdaran cultural role is in safeguarding the achievements of the Islamic Revolution. The military role is to support the regular forces when required. Pasdaran officials oversee the Baseej (volunteer force) which provides military training and organisation for all civilians. In the event of conflict the Baseej provide the vast bulk of the reserve forces available for mobilisation.

Defence minister, Akbar Torkan, said in a February 1993 interview that his defence budget for 1993 was US$750 million. US anaylsts have insisted that US$2 billion is necessary to fund the defence equuipment build up identified by the US CIA. Torkan said that his budget had to finance force improvements and that such a sum was certainly not sufficient for funding the massive arms increase that Western analysts had accussed Iran of making.

Readiness

Defence Minister Torkan identified the following priorities: spare parts, spare parts and more spare parts.

The Iranian equipment inventory still shows a majority of US and Western equipment, especially in the air force and navy inventories. Much of this equipment is non-operational because of the spares situation and although Iran is now capable of manufacturing some spare parts internally, access to US manufacturers would solve many problems.

At present this looks unlikely, but with the Clinton administration many things that were impossible a short time ago could happen with remarkable speed. For example, US analysts say, it would not be impossible for Iran to make a public assurance to the USA regarding the non-development of nuclear weapons in return for a spare parts deal - especially combat aircraft and naval radar parts.

Pasdaran capabilities

Pasdaran or Iranian Revolutionary Guard Corps has its own ground, air and naval forces. Originally formed as a

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Iran Acquires Nuclear Weapons And Moves To Provide Cover to Syria

Iran is now in the final stage of assembling three nuclear weapons from parts provided from the former Soviet Muslim republics. Its indigenous nuclear programme is also moving swiftly. Contributing Editor Yossef Bodansky reports.

By the end of 1991, Iran had all (or virtually all) the components needed to make three operational nuclear weapons: aerial bombs and/or surface-to-surface missile (SSM) warheads. *Defense & Foreign Affairs Strategic Policy* has learned from highly-reliable sources that the weapons were assembled from parts bought in the ex-Soviet Muslim republics. These weapons can become operational as early as February to April 1992. Tehran is committed to providing Syria with a nuclear umbrella before June 1992.

This weapon acquisition is but one component of a major acceleration of implementation of Iran's well-defined strategy. For the first time since the Khomeini revolution began in Iran in 1979, Tehran is now confident that the time is ripe for the realisation of the vision of a pan-Islamic revival and the establishment of an Islamic bloc dominated by Iran and not by Arabs. Moreover, Tehran's sense of urgency is based on the anticipation of a major crisis resulting from an attempt by the United States to prevent the realisation of the revival of Islam.

Iran has committed itself since Autumn 1991 to acquiring — virtually regardless of cost — an operational nuclear weapons capability from the former Soviet states of Central Asia. Iranian clerical officials have pointed out that "with Islam acting like a powerful common bond after years of communist rule", it is Iran's destiny to form closer ties with Central Asia.

Much of Iran's clerical leadership sees that a confrontation with the US is inevitable, and imminent. This group feels that the key to Iran's strategic posture is an Islamic *bloc*. But Iran is also joining the China (PRC)-led South *bloc* to challenge the US. This Islamic *bloc* is comprised of Iran, Afghanistan, Pakistan, Kazakhstan, Turkmenistan, Kyrgizstan, Uzbekistan, Tajikistan, Azerbaijan and, ultimately, also Turkey. Iranian officials believe that all of these countries will soon have some form of Islamic, or Islamic-oriented, government. This *bloc*, along with Iran's strategic axis with Syria, would compel the Arab states, and especially the Persian Gulf states, to gratiate toward Iran's influence.

Iranian officials believe that the consolidation of this axis will lead to the Syrian-Iranian liberation of Jerusalem — and the destruction of Israel — and the liberation of Islam's holy shrines in the Hejaz from Saudi control. The liberation of the Saudi shrines would help consolidate the extensive Iranian military presence in the Sudan in the year since the end of the Gulf War.

The current developments are rooted in Iranian activities in Central Asia dating back at least a year. As the Muslim republics were becoming more accessible to the Iranians, the clerical Government in Tehran despatched several intelligence delegations to the area to establish contacts with the local populations. One Iranian official was Chambiz (some translations spell his name as Kambiz), an "expert in weapons of mass destruction", who was tasked with investigating the possibility of recruitment of weapons experts and the acquisition of dedicated equipment. In the Spring of 1991, he met several officials, mainly from Azerbaijan, Tajikistan and Kazakhstan, who expressed support for the Iranian quest for an "Islamic bomb", and offered help.

The Iranian Government was wary of KGB provocation and ordered Chambiz back to Tehran. Iran was developing important new relations with the USSR (as it then was), regarding the procurement of combat aircraft, missiles, submarines and other systems, and did not wish to jeopardise these activities.

But Iran decided to pursue the subject in the early Summer of 1991. The task was entrusted to Dr Mahdi Chamran, a senior official of the General Command HQ. Dr Chamran, who has a PhD in nuclear physics from the University of California in Berkeley, has been active in managing terrorist and intelligence activities since 1968. Dr Chamran cautiously began reviving the initial contacts made by Chambiz, concentrating on the recruitment of Soviet experts for work in Iran.

He was approached by a Muslim senior official from Kazakhstan, with a detailed offer to provide Iran with nuclear weapons from Soviet stockpiles. The Kazakh official proved that he had access to both the Kurchatov Institute in Moscow — the USSR's most important nuclear weapons development institute — and the Semipalatinsk nuclear test and development site in Kazakhstan.

Dr Chamran returned to Tehran with the offer in June or July. But this time, the Iranian leadership was convinced that the Islamic world was awakening.

Iranian President Hashemi-Rafsanjani immediately convened a high-level commission to study the validity of the offer and, if found viable, the means to implement it. The members of the commission were Dr Mahdi Chamran, Said Bahradaram (the Iranian Revolutionary Guard Committee chief procurement officer), Daryaweesh (not further identified), Ali Reza Mo'ayeri (Deputy Prime Minister and a veteran of intelligence/*HizbAllah* activities), and/or Sayyid Ali Reza (a senior nuclear scientist who was among the first to work in the Pakistani nuclear programme). The growing chaos in the USSR since August, and the growing freedom of movement which Iranians were enjoying in the area, convinced the Iranian leadership that the programme was worth pursuing.

The Kazakh authorities, in late August, seized all defence-related facilities in their country, including the nuclear installations in Semipalatinsk. This development encouraged officials in Tehran, and Dr Chamran was despatched back to Kazakhstan in early September to renew negotiations. The Kazakh official explained that he was speaking on behalf of "a group of 25 people" from "security, scientific and government quarters" who could obtain the "atomic bombs" for Iran. He told Chamran that the group was "ready to hand [the weapons] over to you piece by piece. Each and every piece will come from a different republic. We will then take it upon ourselves to assemble these pieces in the place in Iran you choose. We have the experts who can do this."

Chamran returned to Tehran in mid-September for further instructions on the conclusion of the deal. Because of the strategic importance of the forth-

coming event, Pres. Hashemi-Rafsanjani put Sayyid Atta'ollah Mohajerani, the Iranian Vice-President, personally in charge of the crash programme to obtain nuclear weapons. This programme would be run separately from, and parallel to, Iran's continued quest to develop indigenous nuclear weapons.

It seems that at this stage, Tehran did not know what kind of nuclear weapons it was purchasing, so alternative means of delivery were examined. Indeed, since the Summer there had been a marked increase in the number of Chinese (PRC) military experts involved in construction, expansion and running of Iran's military industries. Most of the Chinese work was in Isfahan, Mubarka and Arak, where the strategic (missile and nuclear, chemical and biological) industries are located. The number of Chinese experts in these industries alone was estimated to be 3,000 in late 1991.

One of the new projects which these PRC experts have been working on is the development of a new Iranian medium-range ballistic missile (MRBM) which is, in essence, a locally-produced version of the M-9. Toward that end, the PRC supplied Iran with a few missiles and knocked-down launchers and additional equipment which would be used for training the Iranians as well as the basis for developing a local production line.

North Korean (DPRK) and PRC experts have been working on a major advance in SSM (surface-to-surface missile) development and production facilities in Isfahan. This SSM is an Iranian version of the Chinese M-11 under the designation *Tondar-68*. Pakistan also acquired M-11s for its strategic warheads. As a result, Iran is well taken care of with regard to ballistic missiles, with a production line also for SCUD-Bs operational since February 4, 1991, and with a steady flow of SCUD-derivative missiles coming from the DPRK. Some 170 of them have already been delivered.

Delivery of nuclear weapons by aircraft is another matter, because it requires special manœuvres and specially-modified aircraft. This problem was solved in late September 1991, when Cuba and Iran significantly upgraded their nuclear cooperation [see *Defense & Foreign Affairs Strategic Policy*, Winter 1991-92]. A high-level delegation led by Fidel Castro Diaz-Balart, the Soviet-trained head of Cuba's nuclear effort and Fidel Castro's son, visited Tehran and inspected several nuclear facilities, including the Bushehr plants. The delegates were received by Pres. Hashemi-Rafsanjani to discuss "topics related to bilateral cooperation and current affairs". At the end of the visit, Cuba and Iran signed a cooperation accord on nuclear issues.

Cuba's unique significance lies in the military expertise it has acquired from the USSR as part of the Soviet planning for operations in a possible nuclear world war. The USSR has maintained in the Cuba Armed Forces nuclear-capable delivery systems for a future war. Most important is a MiG-23BN (upgraded *Flogger-F*) regiment based in a closed part of the San Antonia de los Baños air base near Havana, and sheltered in an extensive net of tunnels in the mountains adjacent to the base. Gen. Rafael del Piño explained that these *Floggers* were "ready for nuclear delivery". [See also *Strategic Policy*, Winter 1991-92.] The September 1991 deal between Iran and Cuba involved the exchange of nuclear delivery techniques and technology for oil.

Dr Chamran returned to Kazakhstan in early October to conclude the deal and finalise the details. Iran agreed to pay US$130-million to $150-million for three nuclear weapons. A down-payment of US$3-million was deposited in a Luxembourg bank account. Additional accounts were opened in Montreaux, Switzerland, and in Germany. Meanwhile, in mid-October, the IRGC (Iranian Revolutionary Guard Committee) began hastily expanding the *Ma'allem Kelayah* nuclear facilities in Qazvin, including two enrichment laboratories and nuclear-related facilities in the Isfahan complex of defence industries, on order of the highest authorities.

[It is worth noting that the nuclear reactor, based on Soviet technology, offered by India, is to be based in Qazvin.]

Iran recruited, for the construction of the weapons, some 50 experts and around 200 senior technicians mostly from the Kurchatov (Semipalatinsk-21) nuclear production plant in Kazakhstan. The experts are paid a basic monthly salary of US$5,000 and additional bonuses. (By comparison, the average salary of a scientist in any of the Commonwealth of Independent States is around US$5 a month.) Virtually all of them would be in Iran by the end of 1991. Senior nuclear scientists from the Kurchatov Institute in Moscow were invited to train Iranian scientists in Iran or elsewhere, and were offered a monthly salary of US$30,000 and additional bonuses.

As of late October, Mohajerani persistently promoted the urgent need for the development of nuclear weapons in Iran primarily as a pan-Islamic undertaking to confront Israel. "This regime wants to continue to have the upper hand; one way of doing this is to have a nuclear capability," he said. Mohajerani admitted that Iran was developing nuclear weapons. He explained that "all Muslims, including Iran, must reach a high level in the nuclear field in order to confront the Israeli nuclear challenge ... The Muslims must act to acquire nuclear capabilities that would make them strong." Repeatedly denying that it was presently developing nuclear weapons as described by Western media, Iran did not deny its hopes to ultimately develop nuclear weapons.

The key decisions were reached within one week in mid-November 1991. Pres. Hashemi-Rafsanjani chaired the National Security Council on November 10. Members of the Iranian High Command also participated. (This procedure is highly unusual and reflects discussions of the utmost importance.) The senior commanders were asked scientific questions and told to have replies within a week.

A follow-up meeting took place on November 17. After the senior officers presented their answers, they were excused. The only officials remaining in the meeting were: Ali Akhbar Turkem (Commanding Officer, Armed Forces), Muhsin Reza'i (CO, IRGC), Ali Falahiyan (CO, Intelligence), Ahmad Khomeini (whose *al-Quds* networks operate clandestinely in Western Europe, thus capable of illegally acquiring technologies and smuggling people), Ali Khamene'i, and Pres. Ali Akbar Hashemi-Rafsanjani.

In conclusion, Pres. Hashemi-Rafsanjani outlined the resolution of the meeting: Iran must acquire nuclear weapons for the entire region, if only because the Arabs proved incapable of such action. Such weapons would be the key to the consolidation of a vibrant and rejuvenated Islamic unity. That day, Pres. Hashemi-Rafsanjani reacted publicly to US threats about Iran's possible acquisition of nuclear weapons, stating: "Under the present world conditions, reliance of the Iranian nation on its own potential is a must."

The next day, Iran began a major examination of its military capabilities in very specific discussions under the cover of the *Zohd-I* (*Devotion-1*) exercise conducted in Southern Iran under the command of the Chief of the Army Joint Command, Maj.-Gen. Shahbazi. Among the forces tested were a new air-mobile corps (estimated at around 30,000 strong), with emphasis on helicopter and heliborne operations. They were exercised in a form of rapid deployment mode, involving clandestine cross-water landings by Naval Marines and commando units. Several squadrons of fighter-bombers, 40 aircraft at one time, "dozens" of Lockheed C-130s, squadrons of Bell AH-1J, Agusta-Bell AB-214 and Agusta-Boeing CH-47C helicopters, took part in the operations along with, and on behalf of, the airmobile corps, while in the deep rear of the "enemy".

The major offensive in the exercise also included fighting on a battlefield contaminated by chemical weapons. Members of the High Command present at the exercise included Hojjat ol-Islam Mohammadi-Golpayenpani (Supreme Religious Leader Ali Khamene'i's personal representative), Dr Firozabadi (Chief of the General Command HQ), Maj.-Gen. Shahbazi, Maj-Gen. Zahirnezhad (Head of the advisory group of the General Command HQ), Brig.-Gen. Rashid and Dr M. Chamran (both of the General Command HQ), and other senior officers and officials.

It is highly important that the air-mobile corps has over-water capabilities because it indicates an anticipated rôle in pursuit of Tehran's regional aspirations, such as intervention across the Gulf into the Arabian Peninsula.

The Iranian leadership has also examined national mobilisation. In late-November, the Iranian leadership met with the *Basij* High Command to discuss these issues. "*Basij*, as a popular force, is the axis and basis for defending the revolution. Therefore, further strengthening of the corps is essential," Ayatollah Khamene'i stressed. The *Basij* commander, Brig.-Gen. Ali Rewza Afshar reported on the measures already taken to train and organise "a 20-million strong army".

At about that time, Ali Akbar Velayati, Iran's Foreign Minister, completed a major tour of Central Asia, signing diversified treaties with all six countries and promising extensive financial support for a wide range of projects and Islamic causes. "I think that the Central Asian states will follow whoever pays the most. A bulging purse will prove stronger than political sympathies and antipathies," a senior official in the Kyrgizstan Ministry of Foreign Affairs said. Iran used the Velayati and related delegations to send several intelligence officers to inspect and assist in the transportation and smuggling of the nuclear weapon components. Shipment was made by truck and rail through Turkmenistan where there are *no* cross-border checks on the frontier with Iran.

In early October, Turkmenistan President Safar Morad Niazaf signed several agreements with Iran while he was on a visit to Tehran.

Special attention was paid to the expansion of rail and road traffic between Iran and the Central Asian republics via Turkmenistan. Pres. Niazaf emphasised that Iran was "quite essential" to Turkmenistan's gaining access to the sea and the transport of goods. He announced the opening of the border beween the two countries to free movement of men and goods. Tehran sent thousands of *Basij* and IRGC engineers to begin construction of several roads, bridges and rail lines in the border area, especially Marzpol.

In the meantime, military nuclear activities in the former Soviet Muslim republics have developed further since late December 1991. Russian observers believe that the true meaning of the vast strategic nuclear arsenal deployed in Kazakhstan is that "the 'Islamic bomb' already exists". Indeed, Munar Sahanoglu, a Kazakh Deputy, stated that "the 'nuclear force' which we possess is at the service of Turkism". Niazaf said that Turkmenistan would not relinquish control over tactical nuclear weapons on its soil.

Russian officials believe that Kazakhstan provides diversified military nuclear assistance to radical Islamic governments as an expression of its return to the Muslim world. Meanwhile, Tajikistan assumed control over the uranium processing and nuclear weapons production facilities on its territory, suggestion "the possible establishment of a uranium-developing consortium with Arab countries". Discussions on the supply of enriched uranium and weapons technology were held in Dushanbe with representatives from Saudi Arabia, Iran, Iraq, Turkey and Pakistan. It was reportedly possible to buy 15kg of enriched uranium in Tajikistan in mid-January 1992. However, Tajik authorities declared that no enriched uranium would be sold abroad.

A close examination of the changes in several key Iranian weapons purchase programmes since the Summer of 1991 also points to evolving strategic priorities.

The upgrading of the Iranian Navy is being carried out with an eye to confrontation with the US Navy. Admiral Ahmad Muhammad-Zadeh, commander of the IRGC second naval zone, warned that the US was determined to dominate the Persian Gulf and assured that "the Iranian Armed Forces, equipped with the necessary training, are ready to thwart any possible intervention".

Since late October, Iran began upgrading its *Silkworm* and other anti-ship missiles in the inventory in a crash programme under IRGC Admiral Nawab and Admiral Abbas Muhtaj. As of late October 1991, batteries were withdrawn from forward positions along the Straits of Hormuz to the IRGC *Darkhovin* shops in Khozistan for retrofitting with upgraded warheads and guidance by Chinese experts.

The training of Iranian crews for the three *Kilo*-class attack submarines (SSKs) which Iran purchased from the USSR continues in Riga, Latvia, despite the chaos. The submarines will be based in Chah Bahar to protect the approaches to the Persian Gulf and the Straits of Hormuz. The delivery of the first submarine is expected imminently.

Iran embarked on a massive rebuilding of its air power following the arrival of 40 to 50 MiG-29s in the summer of 1990 and the despatch of IRGC pilots for training in the DPRK. In mid-July 1991, Brig-Gen. Mansour Sattari, commander of the Iranian Air Force, negotiated in Moscow a deal for 48 MiG-29s, 24 Su-24s, 24 MiG-31s and "supersonic Tupolev bombers and reconnaissance aircraft". Soviet (Russian) and North Korean experts and technicians are also involved in servicing the 91 Iraqi Soviet-made combat aircraft which fled to Iran during the 1991 Gulf War: 24 Su-24s, 40 Su-22s, four Su-20s, seven Su-25s, four MiG-23BNs, seven MiG-23MLs, one MiG-23U, and four MiG-29s.

At least 85 of them are operational, giving the IRGC air arm well over 100 Soviet-made aircraft. [The acquisition of advanced combat aircraft has elevated the IRGC air arm to rival the position of the Iranian Air Force, which continues to operate mostly US combat aircraft.] Iran also cooperates closely with Pakistan in the refurbishment of the IAF's 24 AMD *Mirage* F-1 fighters.

The Syrian Air Force sent a large delegation of experts and pilots to Iran in Autumn 1991, ostensibly to help the North Koreans and Soviet experts to activate the former Iraqi aircraft, but they were actually seconded to the Iranians until appropriate Iranian cadres were trained and ready to fly the growing numbers of Soviet-made aircraft.

Brig.-Gen. Sattari declared on February 7, 1992, that "Iran has deployed MiG-29, Sukhoi Su-24 and F-7 aircraft in its air force", and the Air Force was in a "very good position" in terms of equipment and personnel.

But back in mid-November 1991, as part of the affirmation of strategic arrangements with Russia, Iran asked for the acceleration of the supply of aircraft as well as an addition to the list agreed upon in July. Consequently, between mid-November and late December 1991, Russia rushed to Iran between 24 and 28 MiG-29s, 24 to 28 MiG-27s, and "a few Sukhoi fighter-bombers". By the end of January 1992, Iran was to receive 18 more combat aircraft and two "modern Ilyushin [A-50] fitted with air reconnaissance and early-warning equipment".

Moreover, 80 pilots and technicians who graduated from the Soviet Air Force Academy in Moscow also returned to Iran. The most important aircraft rushed to Iran, although it was not on the original list, is the MiG-27 *Flogger-D/J*, because, like Cuba's MiG-23BN *Flogger-F*, it is uniquely modified to carry and deliver tactical nuclear bombs in a toss-up manœuvre. This sudden acquisition of the MiG-27 therefore suggests that Tehran discovered in November an urgent need for a nuclear delivery platform.

All available evidence suggests strongly that since December 1991, Iran has been in possession of virtually all the parts needed for three tactical nuclear weapons. It was reported in early January 1992 that "the construction of three nuclear weapons has started in Iran from parts delivered from Kazakhstan". Highly-reliable Iranian sourcees confirrmed in late January 1992 that Iran already had "acquired some [nuclear] arms" and that "at least three bombs" and several Soviet specialists were already in the greater Tehran area. The Russian coverage of the incident concludes that "it seems plausible". Even Russian President Boris Yeltsin acknowledged that "certain Islamic states" attempted to buy tactical nuclear weapons in Kazakhstan but insisted that all weapons had been withdrawn to Russia before such transaction was possible. It is noteworthy that Yeltsin's admission does not contradict reports from Iran, because the Iranians are reported to have bought parts and components of nuclear weapons, while Yeltsin disclosed that *operational* weapons were withdrawn.

The first unanswered question is what type of weapons has Tehran ac-

quired? The Iranian sources did not specify. As indicated, Iran ensured that it has delivery platforms for both aerial bombs and missile warheads. The Arabic source used the term *Qanbalah Dhariah*, which means atomic bomb; that is, a bomb delivered by an aircraft.

When *Pravda* loosely covered the story, it used the specific term *zaryad*, meaning a warhead such as those on missiles. Because weapon parts arrived from diverse sources, Iran may have both types of weapons.

This leads to the second question: when will Iran have operational nuclear weapons? Much depends on the timely availability of all parts and tools. The original team in the former Soviet republics is described as professional, so it should be assumed that they collected parts of the same types of weapons. Failure to do so would complicate and prolong the assembly. But missing tools or parts are not a major impediment. The siezure by Italian officials in Como in mid-October 1991 of a Soviet specialised production tool used for carving bomb-grade plutonium for warheads, strongly suggests that most sophisticated tools could be smuggled to the West if needed.

So an educated guess can be made as to the operational date of the weapons, assuming that all (or virtually all) components and recruited Soviet scientists and technicians arrived in Iran by December 1991, and that construction has already started (as claimed by most sources), and assuming that there is no artificial delay (for example, a decision by Tehran to wait for a certain period before beginning assembly). It should take specialists no more than three to four months to run all the tests and assemble the weapons. Iran should have operational nuclear weapons between February and April 1992.

Strategic military considerations provide another deadline for the availability of Iranian operational nuclear weapons. Since the late 1980s, and particularly since the Autumn of 1991, Iran has offered Syria a "nuclear umbrella" in order to complete all aspects of "strategic parity" with Israel. The growing Syrian interest in nuclear weapons was recently expressed in efforts to acquire its own nuclear capabilities. With Iranian encouragement, Syria reached an advanced stage of negotiations with the PRC on the supply of a small reactor which could ultimately serve as the foundation for the development of indigenous military nuclear capabilities, although it would be too small on its own to be of direct military use.

Syria and Iran coordinate regional policy at the highest levels, including discussions between their presidents on joint strategy and policy. In late September 1991, Syrian Chief of Staff Gen. Hikmat al-Shihabi visited Tehran to coordinate defence policy, inspect Iranian defence industrial facilities, and decide on forms of greater mutual cooperation in military matters and on the expansion of defence industries. He brought a personal verbal message from President Hafez al-Asad to President Hashemi-Rafsanjani which "emphasised the importance of Tehran-Damascus relations". In his response, Pres. Hashemi-Rafsanjani reiterated the "unanimity of strategic objectives" between the two countries. Shihabi also clarified Syria's approach to the Peace Conference, emphasising that Syria was going to Madrid "to ensure the rights of the Palestinians and return of all occupied territories" rather than to make peace with Israel.

During Shihabi's visit, the two states reached "a comprehensive agreement on strategic cooperation which includes the sphere of nuclear weapons production". The details of the strategic cooperation were worked out by two high-level committees.

A final agreement was ready for signing on October 12, 1991, but both countries then decided to postpone formal signing for political reasons but move on toward implementation as if the agreement had been ratified. A high-level Syrian military delegation led by Gen. Dilati arrived in Tehran in early November to work on the practical and technical aspects of the treaty implementation, and was still in Tehran in late January 1992. Some sources claim that the Iranian-Syrian strategic agreement was signed in mid-January 1992 in Damascus, while others insist that it is being implemented without a formal signature.

Syria appears to have realised that there could be no compromise with Israel. Already, after the first round of the peace talks in Washington, President Asad was reportedly convinced that the gap with Israel was irreconcilable and that only a dramatic step, namely war, would break the deadlock. The second round of talks in Washington only reinforced Syria's perception of the "talks as exercises in futility".

The Syrian Government announced a decision of President Asad that "Syria will not go to the multilateral talks because Israel is resisting peace and refusing to withdraw from the occupied Arab territories". Syria objects to arms control talks because the West, instead of expressing "concerns over nuclear defiance by the Islamic countries", should first have compelled Israel to "remove nuclear weapons and all weapons of mass destruction" as a first phase in regional disarmament.

Some key Syrian officials anticipated in December 1991 that war between Syria and Israel would break out between June and September 1992. Syria has a coherent scenario for the opening phase of this war, based on deterring a pre-emptive strike by the Israeli Air Force and on hindering any deep aerial strikes by a series of deep Syrian strikes using SS-21 and M-9 ballistic missiles (specifically acknowledged) in the opening phase of a war.

Syria's strong confidence in its ability to deter a pre-emptive strike by an Israel fully aware of the Syrian ballistic missiles and their effectiveness cannot but reflect a knowledge in Damascus that Syria would be operating under "the ultimate umbrella".

Tehran further defined its approach to nuclear weapons in early February 1992. In a Friday sermon on February 7, Ayatollah Ali Khamene'i argued that the "arrogant power" of the United States posed a bigger threat to the world than nuclear proliferation, and that nuclear disarmament discussed in the US summit was raised only to mask the real danger to the developing world, namely, the "bullying of arrogant powers" led by the US. "Limit the arrogant power of the United States in the world and the nuclear threat will automatically be curbed," he said.

Khamene'i further refined his argument in a speech delivered to Air Force officers the next day, explaining that the US was using reports that Iran was seeking nuclear arms and expertise as a pretext for dominating the Persian Gulf. "Today the dominating superpowers have launched a campaign alleging Iran is arming itself with new, advanced weapons," he said, but these were "exaggerated and misleading". "Their main aim is to justify their own presence and to scare other countries, especially in the region."

All technical, political and strategic indicators point to Iran having the three nuclear weapons operational by February to April this year. Iran is also nearing rudimentary nuclear weapons capability using its own resources and is expected to have an indigenous weapon before the end of the decade. Apart from PRC and DPRK assistance, gaining access to Pakistan's operational nuclear arsenal and mature military nuclear technology considerably assists the Iranian effort. Iran coordinated with Pakistan in November 1991 over further nuclear development, but Iran is no longer rushing for shortcuts in the development of its own nuclear weapons. Tehran committed US$500-million to the completion of the nuclear programme, a huge increase from the $200-million it spent on the programme in the 1980s. Much is spent on technology from the West.

Iran, meanwhile, has embarked on an intense effort to recruit leading Soviet nuclear scientists, including Vladimir Kubov and Philip Gurkhanian from the Kurchatov Institute in Moscow, Arsen Hamidiadeh from Kazakhstan, and Aleksandr Ahmediadeh from Turkmenistan to train Iranian scientists and develop nuclear facilities in Iran. Six senior experts and scientists were already recruited and currently work on the construction of a heavy-water laboratory and a uranium enrichment facility in Karaj, near Tehran. By the end of January, "dozens" of Soviet nuclear experts were working in Iran in Gurgan, near the Caspian Sea, *Ma'allem Kelayah* in Qazvin, Karaj, Isfahan and *Darkhovin* in Khozistan.

Iran is convinced that these and other efforts will ultimately consolidate its position as a major nuclear power, and the leader of Islam. ★

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IRAN'S MILITARY INTENTIONS AND CAPABILITIES

IRAN'S STRATEGIC AIMS AND CONSTRAINTS

Shahram Chubin

The fluidity of the post-Cold War resembles more a multipolar than a bipolar world. It has not enhanced the security of all states; for some it has created new threats and it has eliminated one of the principal ordering devices that existed. This transitional system may be longlived. It seems unlikely that it will be dominated by any one power. Coercive measures to enforce principles such as non-proliferation will be difficult to apply.Increasingly attempts to create supplier regimes for denial of technology or categories of arms will prove difficult. There will be other suppliers,economic incentives, and the inexorable diffusion of science and technology will be harder to arrest. At best such regimes will buy time; what is done with that time then becomes important.

As the North Korean case demonstrates; at some point, discussions are important. These should not be seen to yield dividends only to the disturbing power because of the wider example for other states which may then seek nuclear weapons's or WMD merely to achieve a grand bargain or recognition. Yet in the absence of a ready or effective military remedy, the

motivations and priorities of other states will have to be taken into account, though not necessarily accepted or conceded. Better comprehension of a state's perspective may or may not yield greater empathy, but it would at least improve understanding of its motivations, incentives and likely behavior.

Counter-proliferation policies, the labelling of some as "rogue" or "backlash" states, the tendency to infer intentions from capabilities, to exaggerate those capabilities, and to assume a similarity in states assigned to this category, often leads to an expectation of a uniformity of behavior. This leads to stereotyping and is misleading. Hence an arms buildup does not necessarily indicate an imminent resource grab, and nuclear proliferators after Iraq are not necessarily more likely to come from within the NPT. Oversimplification of problems that are multidimensional will lead to poor policy. Iran's policies are a product of various factors including its recent experience, its world view, its capabilities, the global and regional opportunities and its other values.Its intentions are thus variable although its inclination is fairly steady. In this article I will focus on its perspectives, intentions and style of operations before dealing with the impact of resource constraints on these.

IRAN'S NATIONAL SECURITY PERSPECTIVE[1]

New security problems have replaced those of the cold war; an uncertain and unstable northern frontier zone, a new, weak but still assertive Russia like a weakened Iraq to the west, has created new concerns. Iran worries about the dismantling of "failed states", the encouragement of secessionist movements,

[1] For a much more detailed analysis, see this author's monograph *Iran's National Security Policy: Perspectives, Capabilities and Impact*, Washington, D.C., Brookings Institution (for the Carnegie Endowment), 1994.

the assertion of a "duty to intervene," and possible Western efforts to dismember Iran itself.

Iran sees a loss of leverage in the new geopolitical setting, with the third world and nonalignment rendered irrelevant and economic strength promoted in the indices of national power. In the Persian Gulf sectarian,cultural and national rifts have been exacerbated by the strains and crises of the 1980's. The Arab states are now more openly reliant on the United States, which is present in greater strength than ever before. It continues to sell arms on a scale which is—at best—undiminished. Even the temporary eclipse of Iraq from Gulf politics, which has increased Iran's importance, is worrisome. The impact of Iraq's return to regional politics will be disruptive. In the oil area as a supplier it will be a competitor, hurting prices. Politically, its return either as a Shi'i dominated state or as a fledgling democratic coalition, which would see the relaxation of controls on it, would make it a competitor to Iran. Yet the alternative of Saddam's regime, with all its uncertainties especially regarding national unity, is not much better. The chances of Iraq emerging as a competitor are much greater than transformation of Iraq as a vassal state. Iran sees itself as the object of a double containment policy by the United States, which seeks to exclude it from regional politics both in the north and in the Persian Gulf to the south. More generally it is suspicious of the advent of a unipolar world dominated by the USA: in the selective use of the UN, in the Middle East negotiations, and in the forefront of efforts to cripple Iran economically by denying it access to technology. At the same time the Unites States is busy selling arms on a massive scale to Iran's Arab neighbors and cultivating secular Turkey, presumably with a view to a rerun of Desert Storm against Iran.

AMBITIONS AND GOALS

As a revolutionary Islamic power Iran sees its message as having resonance and applicability throughout the Islamic world.

Naturally it eschews a sectarian constituency as too limiting, Shi'is constituting only 15% of Muslims. It seeks to affirm the model of its revolution by seeing its adoption elsewhere, both as means of achieving power and in its policies of hostility to what is sees as arrogant, satisfied, mainly Western powers. Iran sees its inflexible, implacable attitude toward the dominating powers as an example for others. Its presence and striving on Muslim issues give it a claim to Islamic leadership. The Palestine issue is emblematic: it represents at once an issue of justice for Muslims; a case of U.S. hegemony and, in south Lebanon, the fate of a Shi'i population. As a Muslim (as opposed to an Arab) issue, it also provides Iran with a entry-ticket into the wider region. Does this mean that Iran considers this a core issue, that it would continue to struggle if Syria and Israel came to an agreement? Not necessarily. Palestine is a foreign policy not a national security issue. There is no intention to confront Israel militarily. However Palestine serves certain functions. For one thing it constitutes one-upmanship versus the Arab states, who are said by Tehran to practice "American" Islam. It is also a kind of proxy war with the United States. Jerusalem is also a religious issue.

Still, a kind of posturing is important. Iran in mid-1993 offered to send a force of 10,000 men to Bosnia. It was not taken up by the United Nations. There are powerful domestic incentives for such offers:

- Successes which the revolution can claim abroad substitute for (or reinforce) success at home. They can or might provide a form of ersatz legitimacy.
- For a mobilization regime, maintaining the momentum of the revolution is important.
- External entanglements not only divert attention, they furnish excuses for domestic shortcomings.

NATIONAL SECURITY PRIORITIES

Although Iran sees itself as friendless and the new world as a hostile place, it does not feel any specific or urgent source of threat. Its leaders acknowledge that if Iran is under siege, it is because it has remained true to its values; hence it is the price of pursuing independent policies. Iran's primary national security concerns are local: internal security (the "security of the revolution") against opposition elements like the Mujahedin in Iraq, the maintenance of territorial integrity against potential secessionist movements in Azerbaijan and Kurdistan, and incursions from bordering states—especially those in the process of decomposition like Iraq and Afghanistan or in conflict like Azerbaijan and nearby Tajikstan. Finally there is the U.S. presence in and around the Persian Gulf, which is seen as a potential threat which Iran would like to eliminate. Iranian military exercises and deployments as well as procurement are geared to these contingencies/fronts rather than those further afield.

Iran's anxiety about—and loud support for—the sovereignty and the territorial integrity of existing states derives from these concerns.[2] Its foreign policy priorities follow: the maintenance of good relations with Russia to stabilize the border; good relations with Japan and Europe to prevent a hostile coalition under U.S. leadership; the maintenance of satisfactory relations with the Gulf states (and Turkey) above all to buttress and stabilize oil revenues and also prevent further U.S. encroachments into the region; the cultivation of states like China, Pakistan, Syria, North Korea, and possibly India as potential strategic partners.

The other side of foreign policy is revisionist. Iran does not accept the existing order as just; and seeks to improve its standing and status in the hierarchy of nations. This implies

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[2] See for example *Tehran Times* (edit.) January 5 in BBC/ME/1888/MED/10-11, January 6, 1994.

opposition to U.S. interests and clients in the region. This is to be undertaken through indirect means without provoking confrontations .

THE LESSONS OF TWO WARS

Iran's approach to the military (force structure, arms, procurement, training and doctrine) was based on revolutionary ideas and romanticism. It stressed the overwhelming importance of morale, reliance on popular support and will and the dangers of professional military institutions and dependence on foreign sources for supplies. The war with Iraq shattered its half-baked ideas about people's war, scorched earth tactics, and reliance on willpower to substitute for materiel. Iran's experience in that war and the lessons it derived from it and the subsequent coalition war against Iraq, have driven its military thinking ever since.

Those wars emphasized the need for preparedness and standing forces; for trained, professional forces with advanced equipment; and for improved logistics, planning and organisation. The embargo on arms to Iran gave it experience in using the black market and underscored the need to diversify arms sources and increase domestic production to reduce vulnerability to supply cutoffs.In the "imposed" war Iran saw an international community unwilling to condemn Iraq for aggression or later for using CWs or missiles against Iran. This reinforced a determination to seek maximum self-reliance. The Iraqis' use of CW, increasingly more blatant as the war continued, was effective initially for its shock-effect and later in its more sophisticated delivery, militarily. Lacking an equivalent capability Iran was unable to deter its repeated use by the threat of retaliation. A similar technological surprise was evident in the missile area. Iraq was able to acquire larger stocks of longer range missiles which it used against Iranian cities. This advantage was magnified by the superiority in numbers of aircraft at Iraq's disposal. Iran had to scramble to obtain missiles that were fewer and of shorter range, while its air force—barely 15

percent of its neighbor's—was deficient in the supply of parts. Iraq thus had control of the air and the process of escalation in missile exchanges.

The second war saw Iraq deterred from the use of CWs against a foe that could retaliate in kind. At the same time, it demonstrated the flexibility of missiles; their ability to penetrate, their mobility, survivability, and shock effect. This war also demonstrated the vast and growing gap between the military capabilities of the advanced states and the others.

Given the costs and difficulty of catching up conventionally (the less advanced states might reason), it might make sense to look at other means to deter these advanced states. As for Iraq, it was clear that Iran could not afford surprises in the future; it would need CWs if only for deterrence; missiles to supplement an airforce that would be wobbly for some time to come, and to deter the use of an adversary's missiles. Missiles, furthermore, were easier to use than aircraft, and might be manufactured domestically. Above all they were available and becoming more so and could be made operational quickly, without a large backup infrastructure. Iraq had had access to aircraft with long ranges (able to reach the southern Gulf) and high ceilings that flew above Iran's air defense. Iran after the war would seek the best long range aircraft available and not stint on quality.

ARMS POLICIES AND PROGRAMS

The two wars have guided Iran's arms policies: advanced arms, professional forces, diversified sources complemented where possible by domestic production, CW and missiles for deterrence, and above all no illusions about reliance on the international community to deter local aggressors.

When Iran came to taking stock of its resources in mid-1988, it faced a mess. In addition to its losses over eight years of war (40 percent of its armor alone in 1988), it had had no real resupply or servicing of its equipment (avionics, missiles, and electronic components) for a decade. Supplies, perforce, had

been improvised, leaving Iran with equipment from some two dozen countries and a logistical nightmare. The war had seen two trends that were to continue:

- Given the U.S. (and later Western) arms embargo, Iran sought East bloc sources. From 1985-88 Europe accounted for 41 percent and China 34 percent, with North Korea also an important supplier. From 1988-92 Russia accounted for 64 percent, China 16 percent and Europe only 8 percent).[3]
- Given the difficulty of servicing and maintaining its aircraft operational, Iran sought a quick remedy ; this meant the acquisition of missiles.

Iran's arms programs since 1988 have been a combination of replacement due to attrition, modernization as a result of block obsolescence and a switching of sources of supply. The shift to non-Western sources is not necessarily optimal or voluntary. It entails moreover changes across-the-board that will take time (a decade) before they can be fully assimilated. In the interim the standardization of logistics will be difficult, especially if Iran retains its U.S. aircraft in parallel in its inventory. There is, furthermore, the question of the long-term reliability of these new suppliers, quite apart from questions about the quality of their product. Russia, China and North Korea are susceptible to U.S. pressure and could reverse themselves. A related question is whether Russia is able to provide the longterm after-sales service and support systems required in the sale of aircraft. Iran cannot have complete assurance on these counts.

Domestic arms production is no longer seen as a panacea. It can replace imports of items that are much used (ammunition, some spare parts) and serve as a medium for technology transfer, but it cannot economically substitute for imports of completed systems such as aircraft.

[3] Richard Grimmet, *Conventional Arms Transfers to the Third World, 1985-1992*, Washington D.C.: Congressional Research Service, July 1993, Chart 8 p.32.

Iran accelerated its military effort in 1988-91, allowing some two billion dollars a year for imports. But this has slowed since 1992, which saw something around half that figure; 1993 continues that trend. The figures and details of Iran's arms purchases are available and not generally disputed. Their significance though is hotly debated.

It is worth noting that Iran during the war with Iraq consistently spent less on defense than its adversary or Saudi Arabia. Between 1984 and 1991, Iraq received two and Saudi Arabia three times (by value) the arms that Iran received: $34.9 billion, $63.6 billion versus $16.1 billion. By most criteria, whether starting from a 1979 baseline, or in comparison with its neighbors' military efforts, Iran's arms programs since 1988 have been reasonable, even modest. Compared to its inventory in 1979 Iran today has fewer aircraft, ships, tanks, and helicopters. Its relative position in the region is weaker as Saudi Arabia has modernized and expanded its forces, while even Iraq *after* Desert Storm is still stronger than Iran, compared to its much weaker position numerically and qualitatively in 1979.

What have been Iran's arms programs since 1988? Essentially they have been to rebuild or replace forces and equipment lost in the war rather than expansion. The focus has been on air forces (Russian supplied Mig-29's and SU-24's) and armor and on mobility and quality over numbers. In naval forces Iran has not sought large ships but a coastal force. It has emphasized sea denial by the acquisition of submarines, missiles (Silkworm and others) mines and fast patrol boats. It has increased its capacity to monitor and track shipping. This reflects sensitivity to foreign interventions in 1987 and 1990-91 and to the loss of ships and oil-platforms and installations to US attacks. In terms of force structure, Iran has de-emphasized the Pasdaran (Revolutionary Guards) as the primary military force, concentrating them for internal missions ("defense of the revolution") eliminating their ministry and reducing their number to some 150,000. However, there is no doubt that they remain an influential interest group with specialised missions (20,000

assigned to the maritime component) such as control of missile forces, coastal patrols, guarding important installations and possibly also manning the Kilo-class submarines.

There are inherent limits to Iran's buildup and its effectiveness. Apart from the questionable reliability of suppliers, problems of logistics, the difficulties attendant to switching sources of supplies, and the gap between orders and deliveries and adequate assimilation, there are other reasons to be skeptical about Iran's arms programs translating quickly into military effectiveness. These relate partly to the sustainability of the program and availability of resources (discussed below) and partly to domestic obstacles. Foremost among these is the ambivalence of the IRI about creating a truly effective military with an *esprit de corps* capable of using advanced arms, and encouraging leadership, training and exercises with appropriate incentives. Suspicions about the reliability of the professional cadre will tend to block the development of such a force and see the continuation of a parallel structure of the Pasdaran (and the Basij), which are considered more politically reliable. Coordination and integration remains problematic. As a result no clear military doctrine has been elaborated. In light of this and the dramatic spectacle of Desert Storm (for which Iran had a ringside seat), how confident or enthusiastic will its arms program make Iran to employ force?

There are elements of the program that are worrisome: the coastal based antiship missiles, the Scud-B's and C's, and possibly soon the longer range Ro-Dong, the mines, the submarines—and even the longer range aircraft (for now the SU-24's, but possibly others). These could complicate, delay and impede U.S. access to the region. They might also be useful in intimidating the Gulf states. They could also see deliberate or inadvertent conflict with an Israel which has geared its military orders (the F-15E) to this possibility.

Such concerns are prudent. Seen from Iran, however, the buildup looks more natural. The losses of the war, Iraq's aggression, foreign intervention, the military build up of the Gulf

states by the USA, the U.S. presence—all call for some response. This does not reflect an increased willingness to employ force. Iran has not sought an enhanced power projection capability; with its present amphibious capability, it can—at most—manage to put a few tanks and perhaps 1,000 men across the Gulf.

In what scenarios would Iran use force? To annex a disputed area for its resources? To intimidate the Arab states to loosen their ties with the United States, to be deferential to its interests, perhaps to increase its quota of production in OPEC? In its war with Iraq, Iran discovered how easy it was to polarize the region between Arab and Iranian; any dispute between Iran and *any* Arab state quickly becomes an Iran/Arab dispute. It also learned that attempts to frighten the Gulf states, e.g., Kuwait can quickly backfire, bringing in outside powers against it. Furthermore after Desert Storm these states are unlikely to be frightened easily. What of subversion, assistance in a coup attempt? This is always possible, but it does not require significant military power.

Iran's military program does not denote an increased willingness to use force. It is aimed at remedying deficiencies in Iran's defense capability. It sees it greatest military threats as Iraq and the United States and its arms programs as designed to deter an attack from these sources. Iran must surely be deterred from provoking the United States if only because it can ill afford to replace expensive infrastructure and it does not have the means to defend it. Identifying Iran's negative interests is thus clear and straight forward.

WEAPONS OF MASS DESTRUCTION

What of weapons of mass destruction and long-range missiles, which might become their means of delivery? There are consistent reports of a pattern of purchases and attempts to obtain technology relating to CW and BW. The CIA and other sources point to existing Iranian stocks of agents for CW and BW weapons disagreeing only on the size of the inventory. Iran denies any such intent. It no longer repeats its call made in

1988, i.e., "We should equip ourselves both in the offensive and defensive use of chemical, bacteriological and radiological weapons." Iran has signed the CW convention, without linking it, as some Arab states have, to Israel's adherence to the NPT, but insists that technology restrictions going beyond that treaty would be discriminatory. The CW convention does not deal with CW precursors. The overlap between pharmaceutical and weapons applications of CW and BW make controls peculiarly unreliable probably even with intrusive inspections. The weaponizing of agents is possible, and several regional countries (Iraq, Syria, Egypt among others) have programs that could be designed to do this. Apparently the technology that Iran has in the BW domain is only applicable to weapons uses. Given that the effects of some BW are more destructive than that of equivalent size nuclear weapons, and that these capabilities are spreading, concern for their proliferation in a region of recent wars is understandable.

The same applies to missile proliferation. Iran has acquired older, less accurate missiles. In time it may acquire longer range missiles like the 1000 km Ro-Dong from North Korea or the more accurate M-family from China. In the meantime it is seeking to develop and refine these and other missiles indigenously. The MTCR may arrest the spread of these missiles but cannot stop them. In time Iran may acquire access to cruise missiles whose technology may be commercially available generally within this decade. These missiles are more accurate and more militarily effective with conventional warheads than the Scud family.

Is Iran's missile program intended as the delivery system for weapons of mass destruction? Or is it primarily a response to the cutoff of spare parts for its aircraft and the rapid scramble for an equivalent capability, which has taken on a life of its own?

In both the areas of CW and missiles, Iran sees itself as the victim; surprised by Iraq's use of these weapons, Iranian leaders vowed never to be caught offguard again. Since the international community was unwilling to condemn Iraq's use of CW, or

restrain it, Iran now believes its best bet is to cultivate an equivalent retaliatory weapon as a deterrent. Reports of the scale and development of Iraq's CW, BW and nuclear programs since Desert Storm would strengthen Iranian arguments for continuing this effort.

The need to maintain a CW and BW capability as a deterrent against its possible use by a regional adversary is plausible, but what of its acquisition as a shortcut—as a poor man's atomic weapon? This presumably might be intended to deter US intervention in the region. But this use appears doubtful. As the second gulf war showed, CW's do not deter conventional operations and may intensify them or bring down on the initiator in-kind retaliation or worse. The operational military utility of CWs are peculiar to very specific circumstances, chiefly if used with benefit of surprise against massed formations, against undefended troops or against undisciplined forces—all of which conditions obtained in the first Gulf War. Against a protected maneuvering force, CWs are not so effective. On balance apart from possible insurance against possible future Iraqi use, Iran's motives would appear to fall into Brad Roberts' category of "no immediate strategic purpose." Neither in the Gulf nor on its land borders is there an evident need for such weapons.

THE CASE OF NUCLEAR WEAPONS

There is, in Iran, little if any discussion about nuclear weapons (or CWs or BWs). Intentions have to be inferred from analogous cases, extrapolation from style of behavior, interpretation of incentives and imputation of likely motives, all of which are so subjective as to drive the analyst to rely on any hard data available to make his case for him.

The decision to go for nuclear weapons is driven by political will rather than technological capacity. As the diffusion of technology increases and such decisions become easier and

cheaper to implement, this will become true even of the developing countries. The main bottlenecks—fissile materials and weapons designers—cannot be a permanent impediment. Rather the critical issue will be how states view their security and place in international relations and their assessment of the contribution nuclear weapons can make to them.

Since 1988 Iran has revived the Shah's much maligned nuclear program, attempting to complete two half-finished reactors in Bushire. Stymied by U.S. pressure on Germany, France, India and Argentina, Iran has entered into agreements for reactors from Russia and China. Both of these agreements are tentative and are being delayed because of financial problems. Iran sees U.S. attempts to deny it access to nuclear energy for civil uses as discriminatory and contrary to the undertakings of the NPT, specifically Article 4 and the package deal that it represented. It sees U.S. policy as arbitrary, picking on a signatory Iran, while ignoring Israel's non adherence and its stock of two hundred bombs. This selective targeting of states by the United States, unilaterally and outside of the treaty framework, only confirms its view that the USA is hostile, seeks to deny it technology and to damage its economic development. U.S. arms control initiatives like the Bush May 1991 proposal to freeze production of fissile material in the region, rather than deal with Israel's inventory, reinforces this view. Similarly Israel's loose talk about precautionary targeting of Iran in future conflicts has caused anxiety about U.S.-Israeli intentions.

Iran emphasizes its right to nuclear technology for peaceful purposes insisting on its need to become acquainted with the current generation of technology if it is develop in the future. While its functioning program at present is limited to a research reactor and some small orders, the scope of its declared aims and attempted orders suggest a much more ambitious program. It wants nuclear power to account for 10-20 percent of its energy. In a country with some of the largest oil and gas reserves in the world, the economic logic of such a program is debatable. (The more so if one considers that reactors are vulnerable in conflict;

Iran lies in an earthquake zone; and the costs of nuclear reactor construction has gone up tremendously over the past fifteen years while their benefits are increasingly called into question.) The scope of Iran's declared ambitions, the pattern of its attempted purchases,the absence of credible energy motivation, together with size of the manpower-base and potentially also foreign exchange available, make Iran a case of concern for nuclear nonproliferation. Iran plans to train 500 to 2,000 specialists in the nuclear field domestically and abroad and has invited Iranian nationals abroad to return and contribute to the program.

Apart from the implausibility of its newfound interest in nuclear technology for energy and medicine, Iran appears to have given signs of seeking a nuclear weapons program. There are reports that it has sought "hot cells" and other technology of little use for energy purposes. A CIA expert says that Iran has considered "whether to go the enrichment route or the plutonium route."[4] Iran denies any such intention and has repudiated any statements made in the heat of the war with Iraq (*e.g.*, the 1988 statement quoted above). The denials do not ring true in part because they are mixed with insistence as a matter of right, on access to nuclear technology and because of official and semi-official statements on Iran's right to obtain nuclear weapons as long as Israel has them. Iran's denials of intent are not reassuring because Iran has the profile of a typical proliferator. The world view underlying its comments suggest at best ambivalence, at worst, deception. Comments to the effect that states do not

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[4] Dr. Gordon Oehler in the Hearings of the Subcommittee for International Security and International Organization and Human Rights of the House Foreign Affairs Committee, July 28, 1993. In essence the CIA view is that Iran's CW program is "extensive and improving" but also "relatively crude." It judges Iran to be working toward a BW capability and seeking to acquire nuclear weapons capability. The time frame for the acquisition of the latter is usually given as 10 years. See *inter alia* Robert Gates' testimony to Congress, March 1992. See also Elaine Sciolino, *New York Times*, November 30, 1992.

"obey international regulations" when their interests are threatened or that the control of nuclear weapons cannot take place unless all such weapons are controlled (Rafsanjani, 1990); or that the absence of rules and law internationally and arbitrary double standards applied by the strong against the weak, drive the latter to national deterrents (*Kayhan* newspaper, 1993) are indicative. Statements that nuclear weapons are immoral, and do not make a state strong, and are not practically usable, are interchanged with the assertion that if it had wanted them, Iran could have obtained nuclear weapons, and that even if it had a few weapons, the great powers would still have hundreds; none of this is reassuring.

Above all the quest for nuclear weapons would be consistent with Iran's world view and the role it seeks to play. The sense of embattlement and siege,of hostility and discrimination on the part of the great powers, is palpable and animates Iran's international behavior. In this view there is a conspiracy to keep independent countries like Iran weak. Iran in turn seeks to achieve recognition as an equal power and to fulfill its own mission. Nuclear weapons would appear to meet many of these aims by:

- Emphatically asserting Iran's self reliance
- Demonstrating the progress and advance of its technology
- Asserting the revolution's success and diverting attention from domestic inadequacies
- Serving as a symbolically defiant claim of equality (they might reduce the need for conventional military expenditures)
- Providing Iran with a louder amplifier with which to play a broader international role.

The sum of these motives is encapsulated by the word "status." Nuclear weapons would make Iran a contender, to be taken seriously. The "head table" argument, essentially the same as that made by France and England has its more recent adherents, China and India. None of these states cite particular

threats; all consider the issue primarily from a global standpoint.

For Iran there are no pressing regional threats. Iraq despite its dangerous ambitions and clandestine progress, is not an immediate threat. But if Iraq *had* developed its nuclear weapons undetected, against which state(s) would it have been targeted? And if used or threatened could Iran have any assurance that the international community would respond any better than it did when CWs were used? Moreover how much faith should Iran put in Western intelligence which nearly missed (and abetted) Iraq's ambitious program? What guarantees can be made that continuing surveillance will inhibit a future program? And what reassurance are the nuclear powers prepared to give to Iran in terms of positive security guarantees given Israel's nonadherence to the NPT and the future risks of an Iraqi breakout?

Seen from Iran the international community not only failed to stop Iraq's aggression or condemn its use of CWs, but it took sides in the war and intervened in such a fashion as to save Saddam Hussein so that he could launch another aggression. This intervention and the Desert Storm campaign underscored the tremendous disparity between the military capabilities of the USA and regional states. Iranian leaders surely consider Desert Storm as an implicit warning to them, if not a plot to legitimize future such actions. With the continuing U.S. military presence in the region, uncertainty about continuity of conventional arms supplies (or revenues to fund them) and the general sense of embattlement, Iran's leaders might reason that taking out an option on a nuclear weapons capability might be prudent for practical reasons.

In short, Iran's recent experience, quest for self reliance, status and self-assertion, as well as its sense of siege, would argue for the development of CW, BW, and nuclear weapons as prudent hedges in international relations today.

If Iran made such a decision, what sort of program would it pursue? It would avoid a crash program or policies that would entail confrontation like Iraq. It would instead seek to benefit from the cracks within the system. This could include the use of

deception in inspections and emphasis on the right to technology transfer. Dressing up the issue as one of principle for the third world, i.e. as a class dispute, might give it some mileage. Making U.S. demands for more rigorous inspections appear vindictive and the pursuit of a unilateral vendetta might generate sympathy for Iran and alleviate international pressures. Iran's experience with the black market for arms in the 1980's made it clear that anything can be bought at a price. Similarly Western countries are united on policies only until their pocket books are involved, then principles erode quickly and competition takes over. Regional states like Pakistan or others like China may lend a hand, although each denies doing so. Finally there is always a chance that Iran's program could benefit from its proximity to the former USSR. Scientists, weapons designers and fissile materials in quantities sufficient to make a few bombs could easily pass undetected into Iran and accelerate its still rudimentary program. The development of the means of delivery (missiles) in parallel might speed up the program. The basic limitation may not be financial as costs have declined and stretched over a number of years in the India model are well within even Iran's diminished means. The constraints are rather the (undetected) acquisition of sufficient amounts of fissile materials and their harnessing to an integrated nuclear weapons program.

IRAN'S DECISIONMAKING AND STYLE OF OPERATIONS

Iran's view of the world as a hostile place is matched by a determination to play an important role in it. Reflecting an uneasy mixture of grievance and inchoate ambition, it seeks to be a role model for other states, while achieving recognition of its rights. Nothing in its policies suggest a concrete program, timetable or strategy; indeed everything about its behavior, especially in its conduct of the war with Iraq (and decision to terminate it) suggest a sensitivity to the domestic situation and

a predilection. for the tactical and reactive .

In part this reflects the decentralization and fragmentation of power accompanying the revolution and the fractious nature of the political leadership. Public discourse is valued for hortatory purposes serving a didactic function. The result is a cacophony of voices, many not authoritative on policy, while the government lacks the authority or will to impose a uniform policy. Khomeini exploited the existence of factions; his successors are stuck with them. One consequence is that policy is incoherent or dualistic, veering inconsistently between the pragmatic and the ideological, the moderate and the extreme. Whether this is the unintended product of a domestic tug-of-war, or the deliberate effort by the regime to have it both ways (e.g., to deal with governments and to cultivate their opponents) is not known with certainty. It leads, in either case, to an erratic policy which rarely achieves its results (Iran remains bereft of allies or friends) and raises questions about who is in charge and the ability of the Iranian government to deliver.

In general the forces of inertia and the hardline, supported by interest groups (clerics, martyrs families, the oppressed, the revolutionary guard) have managed to prevail. By cornering the market in revolutionary purity, they are able to do so by framing issues and debates in ways that make departures matters of principle. Success in domestic politics has eluded the regime, faced by population growth, inflation, unemployment and the failure of the state to manage the economy properly. Foreign policy in these circumstances assumes greater importance. Posturing on that stage is easier than performing at home. Moreover it can provide a form of surrogate legitimacy by appealing to its successes and in justifying sacrifices. At the same time foreign policy provides an external focus for the regime which is itself increasingly divided and a diversion for the hapless populace. Whether it will continue to do so or have to manufacture crises for this purpose, as the "price of watermelons" become a salient political issue in Iran, we discuss below.

What are the regime's specific aims apart from the general aspirations for achieving independence and recognition and playing an influential role in the Muslim world and further afield? In order of priority, they are:

- Regime security, or the security of the revolution
- National security (maintenance of territorial integrity, regional influence)
- Taking stands on Muslim issues, to the extent they buttress the regime's position and do not undermine it.

Extending the principles and influence of the revolution serves national security as well as regime security. What those principles are in particular cases, are necessarily flexible: hence the alliance with a Syria that represses its Muslim opposition. If regime security requires taking stands on Muslim issues that are counter to national security/ interest, then so be it. Opposition to Israel may fall into this category. Finally if regime and national interest dictates dealing with the enemy and ejecting principles (arms from Israel and the United States)—"no problem." Iran has been creative in (re-)interpreting its principles and in applying the means to carry them out. Iran's leaders are not worldly, they see the world in ethnocentric and manicheistic terms, but they are not stupid. They are shrewd, cunning and devious. They believe in the importance of military power, have few illusions about their own lack of it, and retain a healthy respect for that available to the West. However, they also believe that power can be stymied, neutralized and offset by guile. They are capable of miscalculation but unlikely to arrive at this by overestimating their own power. More likely this will stem from an over-elaborate plan or simple ignorance of the forces operating on U.S. foreign policy.

Iran's behavior and style of operations demonstrate an emphasis on flexibility and the tactical, the indirect approach and avoidance of confrontation.In the arms area we have seen an emphasis on the right to obtain technology for peaceful uses, adherence to conventions; permission for inspections; and avoidance of crash programs or crises. In seeking missiles and

CW and BW, Iran is seeking shortcuts or "leveraging technologies" (in Brad Roberts' phrase) to magnify its capabilities. Such weapons decouple military competence from effectiveness. They may also serve notice to the Gulf states that a qualitative buildup will serve no purpose as they will remain vulnerable.

Iran's indirect approach is evident in efforts to use hostages to change the foreign policy of states during the Gulf war, always denying control of the hostage takers. Playing on divisions among the Gulf Arab states and on the weak point of the Western allies has been common practice. Indirect measures like mining or threatening third parties rather than confronting the USA directly has been the norm. Similarly pressure on Egypt or Algeria has been indirect or deniable.

Iran's flexibility is also evident. From Irangate (which was not revealed by the Iranian government) to Tehran's willingness to support the Ta'if agreement of 1989 regarding Lebanon (after first denouncing it); to supporting Muslim groups' entering political coalitions after first insisting on the establishment of Islamic republics; to agreeing to resume diplomatic relations with Saudi Arabia March 1991 (against Khomeini's express wishes in his will), all testify to Iran's suppleness and realism.

The question remains whether Iran is able to pursue a strategy over the longhaul and whether, if it has a commitment to a certain goal, it is able to set up the organizations and coordinate their plans and products in an integrated fashion to achieve its aim? Here there is room for doubt. The indigenous missile program has not made great strides, presumably in part due to organizational as much as technical deficiencies. The lack of coordination, the absence of skilled manpower on every level and the fragmented nature of power would make a well-thought out secret nuclear weapons program, with a large external purchasing component, costed and evaluated with a firm deadline in mind, unlikely. The nature of political life in Iran does not allow a leader to take the long-term view; unlike the one man rule in Iraq where it possible to do so. There is also a question

whether the leadership could commit significant resources to a project without gaining broad consensus, especially if the payoff were longterm at best. The IRI has not hitherto distinguished itself by its capacity for longterm planning. It seems likely that despite Iran's interest, its nuclear program will remain a small and haphazard one.

RESOURCE CONSTRAINTS AND MILITARY EXPENDITURES

Iran's military program today is a delayed response to the accumulated losses and attrition of the past fifteen years. It is an attempt at replacement, rationalization and modernization and suffers from numerous constraints already noted. At the same time as there are areas of particular concern (mines, submarines, missiles and WMD) there is the more general question: at what point does Iran's military effort exceed its legitimate defense needs, and become a source of regional concern?

Iran's leaders acknowledge that they are making a major investment in defense, calling it a prudent policy. They state that the weapons systems are "'intended to protect the revolution" and that "we do not deny ourselves the fruit of modern technology." Experience underlines Rafsanjani's phrase: "We live in a world in which one cannot afford to neglect one's defensive capability." At the same time, it is clear that military expenditures cut into resources available for other pressing needs. President Rafsanjani has insisted that domestic reconstruction takes priority over arms expenditures. Ayatollah Khamenei, formally in charge of the military, while insisting on Iran's right to arm, noted: "We abhor the idea of wasting this nation's money for purchasing various weapons from various corners of the globe, which are not needed and which have no impact in terms of defense. We do not favor militarism for the government and the nation." Rafsanjani insists that defense expenditures constitute some $850 million (or 1.5 percent of GNP)—smaller than that of its neighbors. The scale of the build-up is seen as exaggerated by the West and criticism as politically motivated.[5]

That said, Iran is determined to reestablish itself as the foremost power in the Persian Gulf. This will not be achieved easily in part because of the military buildup across the Gulf (which has included force expansion as well as systematic modernization) leaving many of the states with qualitatively superior weapons. It will also be harder because the opportunity costs of military expenditures are high and growing for an Iran which has reduced resources and competing claims on them.

To reduce expenditures Iran has sought to expand its domestic arms industries but whether this is cost-effective for major systems is dubious (although it may reduce overt dependency). Iran is also seeking to maximize the benefits of military expenditures (or avoid choosing between them and civilian needs) by using the Guards and the Bassidj to assist in civilian tasks, especially road and house construction. It hopes to find practical linkages between civil and military projects enabling them to use and train manpower without needing to demobilize these forces or create unemployment and political problems. Admirable as thus may be, it may further confuse and dilute the Guards' military mission.

It is worth recalling that the war with Iraq cost Iran some $90 billion in direct damage alone. But there are also the costs of

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[5] See Hashemi Rafsanjani "Major Investment," Vision of IRI, August 23 in BBC/ME/1467/i, August 25, 1992; Khamenei "Protect the Revolution" and "Modern Technology," Voice of IRI, October 10 ME/1509/A/8, October 12, 1992; and "Cannot Afford to Neglect" Rafsanjani, Voice of IRI, October 13 in ME/1512/A/1, October 15, 1992. See also *Tehran Times* October 19, 1992 and IRNA, October 19 in ME/1516/A/3, October 20, 1992. Akbar Torkan, the Defense Minister, reported for 1993-94 a Defense Budget of approximately $850 million (or 3.8 percent of GNP) in rials. This may represent the domestic component of military expenditures. See the bill submitted: *FBIS-NES*, May 18, 1993.

what was not done, which has to be done now: "We have a lot of work that we did not touch because of the war. This is the most expensive and hidden cost that no one takes into account. We did not build dams, so we are facing a lack of water. We did not build refineries, so we have to import oil now. We did not allocate enough for agriculture."

But as Rafsanjani explained, this was but half of it. Military expenditures would also have to rise after the war because peacetime needs entailed higher salaries and reconstruction, including the need not simply to replace but to restock as well. [6] Hence there would be no peace dividend.

Emerging from the war Iran had few debts and was proud of having controlled military spending.[7] Military expenditures under the IRI have not equalled those of Pahlavi Iran (being some 16.6 percent of GNP in 1978 versus 2.2 percent in 1990).[8] Despite the acceleration of orders for arms between 1989-1992, there is no sign that more than some $2 billion per year has been spent. The question is whether this can be sustained.

The heavy legacy of the war apart—requiring repair, infrastructural renewal, payments to veterans, martyrs' families and military modernization—there is the separate question of oil income and population growth. Oil revenues since 1986 have hovered between $12-15 billion per year. In real terms they have

[6] See Rafsanjani Friday sermon, Voice of the IRI, May 24 in ME/1082/A/3-5, May 27, 1991. Iran in short had lived off its military capital during the war.

[7] Tehran radio reported an IMF consultant mission's report indicating that Iran increased its defense budget by less than 4 percent of GNP annually during the war. IRNA in English, 26 September in *FBIS-NES*-90-189, 28 September 1990, pp. 65-66.

[8] See Cordesman and Wagner, *Lessons of Modern Wars*, p. 47, and *The Military Balance 1991-92*, p. 213. [Note GNP in 1978 was approximately $78 billion versus a GNP in 1990 of $59 billion.]

dropped precipitously even as Iran's population has increased dramatically (at over 3.5 percent annual growth) to over 60 million. Iran's current revenues barely cover its basic imports—food, pharmaceuticals, basic spare parts, oil field maintenance and exploration, oil products and the servicing of its short term debt. Subsidies, state centralization and mismanagement and corruption have not helped. After no growth in the economy for over a decade, by most criteria Iranians are poorer than before the revolution. (At fixed prices the GNP in 1988 was roughly that of 1973; per capita income in 1988 was roughly that of 1967). The government is now facing a future of weak or sliding oil prices (with each $1 drop in prices costing it $1 billion per year), a short term debt of $30 billion (which it is finding hard to service), and a large, young, restive population for which it has to find schooling, medical services, housing, education, employment and a sense of purpose. No wonder that Rafsanjani recently called this "a grave responsibility" for the government and country.[9]

The political salience of economic deterioration should not be underemphasized. Unlike perennially poor countries that have never witnessed prosperity (like Egypt or Bangladesh) populations that have a living memory of better times are apt to be politically demanding where their welfare is concerned. In 1990 Hashemi Rafsanjani pointedly told an audience of Revolutionary Guards that almost all recent revolutions in Africa, the East bloc or Latin America were defeated because of economic shortages.[10] Two years later in what appeared to be an attempt to dampen expectations, he suggested that Iran was doing well economically by comparison to Pakistan,India and

[9] In his speech reviewing the first and presenting the second Five-Year Plan and present budget on 21 December, reported by Voice of the IRI, 22 December 1993, in Special Supplement, ME/1885/SI/12, 3 January 1994.

[10] Tehran Radio, May 28 in *FBIS-NES*, May 31, 1990, p. 59.

China, implying that these rather than richer countries were the appropriate yardstick for comparison.[11] In 1992 and again in 1994 there were at least four cases of popular discontent largely over economic conditions, leading to riots and their suppression by security forces.

THE IMPACT OF REDUCED RESOURCES ON POLICY

How sustainable is Iran's drive to return as a regional military power in light of economic pressures? How will it react to an era of reduced resources?

- Will it seek additional resources? By grabs and claims on its neighbors? By technological equalizers, quick-fixes and shortcuts?
- Will it reduce its ambitions by tailoring them to its shrunken resources?
- Will it tighten its belt, demand sacrifices, batten down the hatches and make economies across-the-board? Or will it give defense priority?

And if the axe falls on expenditures where will it fall first or heaviest in the military? On purchases? On the airforce? On the Navy? On the CW, BW or nuclear weapons programs with their uncertain payoff?

And should economic conditions deteriorate will not the regime's need for reliable and contented military and security forces increase, thus fostering a continued pampering of the Revolutionary Guards over the regular military? Under pressure will the regime seek to revive the morale of the revolution by seeking to divert attention externally by making a foreign "threat" the scapegoat for its mistakes? Under such conditions might it not be tempted to resort to dangerous acts, such as the annexation

[11] Friday sermon, 18 September in ME/1491/A/10-11, 21 September 1992.

of neighboring territories, or confrontation with alleged OPEC saboteurs of its economy (taking a leaf from Saddam Hussein in 1990?).

These are all exercises in speculation. What appears clear is that Iran's military buildup so far has been modest. It will be some time before it is translated into military effectiveness. An unfortunate lesson of the war with Iraq is Iran's determination not to be caught napping again; this accounts for the CW, BW and even nuclear weapons programs. Other weapons systems like the missiles are intended as a quick fix to a major deficiency while mines and submarines are intended a deterrents against attacks on Iran by outside powers. There are few plausible scenarios in which Iran would seek to stop navigation in the Gulf or seize territory from the Arab states of the Gulf. It is more dependent than most on the waterway for its exports. Good relations are also dictated by its oil needs in OPEC. There is no reason to suppose that Iran's military buildup will make it more likely to overestimate its capabilities or more disposed to use force. This is not its *modus operandi*.

Iran remains an ambitious power in terms of status. It seeks to expand its influence. In doing so its policies have been characteristically erratic. There is a danger that with economic stringencies it may become politically volatile as well. It could then be tempted to busy a dissatisfied populace with foreign adventures; this would certainly play to what has been one of its strengths—the fact that it thrives on adversity. Yet this is an asset that has atrophied and Iranians are no longer in the mood for crusades or sacrifices. More likely then for this regime, which recognizes its military weakness, is increased dependence on the security forces for repression and a domestic witchhunt. The price of this would be a further strengthening of the Pasdaran as an interest group. However, their material needs in terms of foreign exchange would not be major.

If cutbacks fall on the armed forces, it is difficult to see the obvious areas. Except for the three Kilo-class submarines, most of the navy is intended for coastal defense. Most likely is a

stretching out of existing programs. The nuclear program has already had considerable slippage and given the costs of reactors, this may well continue. In short, Iran will seek to muddle through without making major decisions. Constraints are catalysts for choices and will impose new discipline on the IRI's leaders perhaps even to consider the tradeoffs and to think, for once, strategically. Regime security will demand more resources used and liberated domestically. Regional status and influence can alson only come with a secure and contented home base. Absent a major threat, scarce resources could be concentrated at home and defense reconstruction slowed down. For this to happen, however, Iranian leaders need to cut back and redefine their regional ambitions, end their sense of self-created embattlement and seek cooperative approaches to arms control. This in turn requires the emergence in Iran of a government able to impose itself and thus transcend the revolutionary power struggle which produces its lowest common denominator hardline consensus that has stymied its external and internal policies. Policies by other states that feed the sense of embattlement and victimization and provide no incentives for a change of direction do little to assist those in Iran who support such a change.

DÉJÀ VU ALL OVER AGAIN? AN ASSESSMENT OF IRAN'S MILITARY BUILDUP

Michael Eisenstadt[1]

By virtue of geography, military strength, economic potential, demographics, and hegemonic aspirations, Iran poses the greatest long-term threat to peace and stability throughout (the region).

General Joseph P. Hoar,
U.S. CENTCOM 1993 Posture Statement[2]

Iran has the potential of becoming the regional superpower, or minisuperpower, to replace Iraq in the Persian Gulf. Iran will realize that potential if left undisturbed.

Major General Uri Sagi,
Director of Israeli Military Intelligence, April 17, 1992[3]

[1] The author would like to thank Joseph Bermudez Jr., Benedict FitzGerald, Norman Friedman, Glen Howard, David Isby, Kenneth Katzman, and Steve Zaloga for their valuable insights in preparing this study.

[2] General Joseph P. Hoar, United States Central Command 1993 Posture Statement, p. 9.

[3] *Yediot Aharonot*, 17 April, 1992, pp. 1, 2, 28, in *FBIS-NES*, 22 April, 1992, p. 36.

■ Defence Industry

Domestic Manufacturing Capability

Prior to the 1990-91 conflict Iraq's conventional arms industry assembled T-72 tanks, converted and repaired aircraft, tanks and armoured vehicles, and produced bombs, tube and rocket artillery rounds, small arms and ammunition. These capabilities were greatly reduced during the war and Iraq is now rebuilding its conventional weapons industry since it is not prohibited from doing so by the terms of the cease-fire. There are now more than 200 weapon and military establishments across Iraq.

According to a report from the US Congress in June 1993, the Saad 16 plant near Mosul and the Al Rabiya plant near Zaafarniyah, have been rebuilt. The latter was subjected to Tomahwak cruise missile attack in January 1993, but damage has since been repaired.

Significant reconstruction activity has been observed at more than two dozen military-industrial sites and more than 200 buildings have been partially repaired. Iraq has reportedly resumed assembly of T-72 tanks and begun limited production of artillery, short range missiles and rockets, ammunition and spare parts. Production is likely to remain limited as long as sanctions remain in place. Once sanctions are lifted the conventional weapons industry could well be at pre-war levels within one to two years if sufficient funding is available.

Iraq is also believed to have achieved a measure of success in circumventing sanctions by smuggling quantities of weapons and spares into the country. Some reports suggest that some US$15 million worth of anti-tank and anti-aircraft weapons of Bulgarian origin have been smuggled into the country. The full scale of this trade in smuggled weapons in not known but it could be significant.

The defence industry is wholly owned by the state and controlled by the Ministry of Industry and Military Industry. Under the umbrella of this ministry, defence research and manufacture is organised by the Military Industrialisation Authority who maintain a central staff and co-ordinate the activities of establishments and factories reputed to have a workforce of some 100,000.

Equipment the Iraqi defence industry is known to have been involved with at the production/assembly stage include:

Anti-Tactical Missile

FAW-1 - local design of a missile with the capability of countering Iranian long range missiles: probably based on SA-2 'Guideline' with a range of 8 km.

Surface-to-Surface Missiles

Al Hussein - modified Soviet SS-1c 'Scud B' with double the original range and capable of delivering 500 kg high explosive or chemical payloads to a range of 650 km. The accuracy is given as 1000 m CEP. In the Gulf conflict, 43 were launched at Saudi Arabia and 38 at Israel. UN teams destroyed 23 conventionally-armed and 30 chemically-armed missiles in 1991/92. It is estimated that 100 to 200 remain in secret storage.

Al Hijara - said to be a version of Al Hussein, developed to attack Israel.

Al Abbas - improved 'Scud B' with a range of 900 km, a reduced payload of 350 kg of high explosive or chemical warhead and claimed accuracy of 3000 m CEP. No Al Abbas were launched in the Gulf conflict and current numbers are unknown.

Al Aabed - developed for satellite launch and to deliver a single warhead, this missile is also derived from the 'Scud.' The accuracy is unknown but the range is claimed to be 2000 km with 750 kg warhead; original in-service date was 1995.

FAW 70 - a short-range missile, developed from the SS-N-2c 'Styx' and/or Chinese HY-2 Silkworm. Several were launched against Coalition shipping in the Gulf conflict without success and at leasst one was intercepted by Sea Dart missile. Claimed range of 80 km with 500 kg high explosive or chemical warhead.

FAW 150 - is a lengthened version of FAW 70 with a range of 150 km and a warload of 500 kg.

FAW 200 - a further developed version of FAW 70 with a range of 200 km and a 500 kg warload.

Aircraft Conversions

An-12 - conversion of the Soviet An-12 to the tanker role for in-flight refuelling. Local modifications may also have been made to the Il-76 for a similar purpose.

Baghdad 1 - local conversion of an Il-76 with a Thomson Tiger radar for use in the airborne early warning (AEW) role.

Adnan-1 - local conversion of an Il-76 for use as an airborne command and control aircraft.

PC-7 - unconfirmed reports that this training aircraft has been modified for close air support and could have chemical weapons delivery system exists.

Air-Launched Weapons

Ababil - pre-Gulf conflict development of target drone with turbojet engine, range of 500 km and a launch weight of 1,000 kg.

AS-14 Kedge - adapted locally for fitting to the Mirage F1; range 12 km.

AS-30 - the French AS-30 may have been under licensed local production. Status unclear.

Bombs - local production includes 19 different types bombs up to 9,000 kg with high explosive, cluster and chemical warheads.

Armoured Vehicles

Asad Babil - Local version of the T-72 with an Iraqi 125 mm gun mounted on components assembled in Iraq.

T-54 - a modifed version with 160 mm mortar was developed pre-Gulf conflict. A second version was developed with an observation mast.

T-55 - several versions of the T-54/55 main battle tank have locally-modified in Iraq, including the addition of a 125 mm

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smoothbore gun. Some T-55s encountered in the Gulf conflict had additional, multi-layered passive armour. French and other Western radios were also fitted.

BMP-1 - locally assembled version of the Soviet infantry fighting vehicle with locally manufactured applique armour to protect against 14.5 mm cannon. Other improvements include a 30 mm automatic cannon.

Artillery

Saddam - a 122 mm D-30 type howitzer built with a Yugoslav conversion kit and technical assistance. This project is believed to be dormant.

155 mm M-46 - a developed version from the standard 130 mm weapon to 45 calibre; again using Yugoslav assistance.

Al Fao - prototype development to carry a turret-mounted 210 mm weapon on a 6 x 6 self-propelled artillery chassis.

Majnoon - prototype development to carry a turret-mounted 155 mm weapon on a 6 x 6 self-propelled artillery chassis.

MT-LB - prototype development of the artillery tractor to carry a four-tube 120 mm mortar system, modified by the Iraqi Army Facility.

Iraq manufactures ammunition for all of the above weapons.

Mortars

Mortars of 60 mm, 82 mm, 120 mm and 160 mm calibres are known to be manufactured with their respective ammunition types.

Rocket launchers

Sajeel - 40 tube launcher with 81 mm rounds.

Nasr - eight tube launcher with 240 mm rounds.

Ababeel - 12 tube launcher with 122 mm rounds.

Saqr-30 - presumed Ababeel type modified for binary chemical rounds.

Ammunition is manufactured for all of the above.

Small Arms

Qadisiyyah - copy of Kalashnikov Dragunov SVD sniper rifle.

Beretta - licensed copies of Italian pistols.

M72B1 - licensed copy of Yugoslav machine gun.

A variety of hand grendades, rifle greandes and small arms ammunition was also manufactured in Iraq.

Naval Mines

Al Kaakaa - possibly the largest mine in the world, used for oil rig demolition, destroying large bridges or underway installations. Equivalent charge of 13 tonnes of TNT.

Sumer family - locally manufactured naval mines in air-droppable, surface-launched and submarine-launched configurations.

Sigeel - a shallow water or ground mine with a 400 kg charge; it can be launched from helicopters or surface ships.

Muthanna 45 - shallow water naval mine.

Remotely Piloted Vehicles

Al-Yamamah - locally manufactured RPV with a 50 km combat radius.

Marakeb-100 - local copy of the Meteor Mirach-100 drone with fibreglass fuselage and imported electronics.

Iraq refused to give the UN Security Council, at a 28 June 1993 meeting, details of foreign companies which had assisted with the above programmes.

■ Nuclear/Chemical Capability

Nuclear Weapons

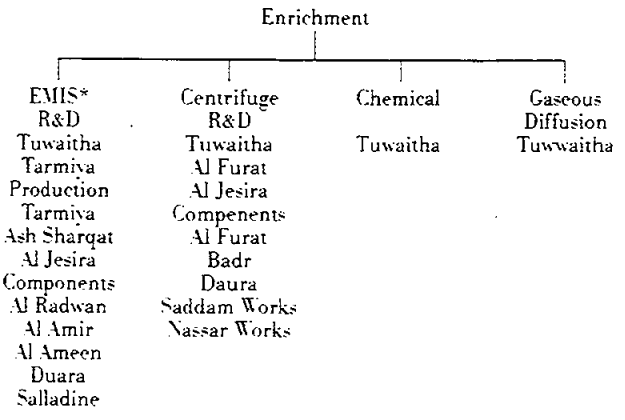
Iraq's nuclear weapons development programme was substantially damaged and probably temporarily halted by the Coalition air raids in 1991. The Rabiya facility at Zaafarniyah was also attacked and damaged by US Navy Tomahawk cruise missiles on XX January 1993.

There is increasing evidence, however, that UN inspection teams did not achieve the total destruction of the nuclear facilities and it is believed that at least one facility remains operational, east of Baghdad. International Atomic Energy Agency teams have sealed but not necessarily destroyed tools and fixtures.

In June 1993, reports of samples of highly-enriched uranium (HEU) being offered for sale by Kurds in the border region with Iran. The UN inspection teams believe that Iraq had two HEU plants in 1991, one operating and the other coming on stream. Both were subsequently reported as damaged beyond repair.

Iraq is known to remain committed to acquiring a nuclear capability and has about 7,000 nuclear scientists and technicians who retain the knowledge required to rebuild the programme.

The massive scale of the nuclear weapons programme, believed to involve 100,000 personnel by 1990, can be judged from this listing of the main facilities involved in the enrichment and weaponisation programme:



* Electromagnetic Isotope Separation

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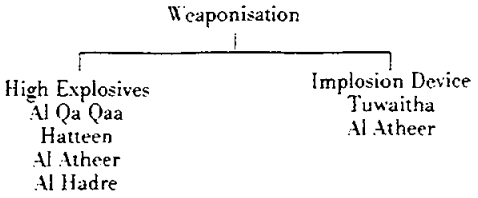


Assessment: it will take Iraq until 1997 and considerable foreign assistance to rebuild the nuclear weapons industry, even with the recent rebuilding of Saad 16 (near Mosul) and Rabiya. Recent CIA estimates suggest that if UN inspections and sanctions were lifted Iraq could produce nuclear weapons within "five to seven years." IAEA claims that the nuclear weapons programme has been dismantled may be over optimistic. The UN Security Council noted in 1993 that Iraq continues its refusal to allow long-term monitoring cameras at sites where weapons of mass destruction have been developed. Agreement is expected by 1994 to free Iraq's oil exports.

Chemical weapons

Iraq has a residue chemical weapons development and manufacturing capability despite the imposing of UN sanctions and visits by UN teams. The US CIA reported in early 1993 that it would take less than 12 months for Baghdad to restore its former chemical weapons capability. Initial inspections in 1991, showed that Iraq had 54,755 chemically-filled munitions, ranging from 120mm mortar bombs to aircraft bombs.

It would take only 12 weeks for Iraq to produce war stocks of biological weapons, said the report.

Iraq has the means of delivery with between 100-150 Al Hussein missiles in covert store. The country has no means to produce the liquid fuel required by these missiles.

Assessment: Iraq has covert stockpiles of chemical and biological weapons, as well as the means to deliver them.

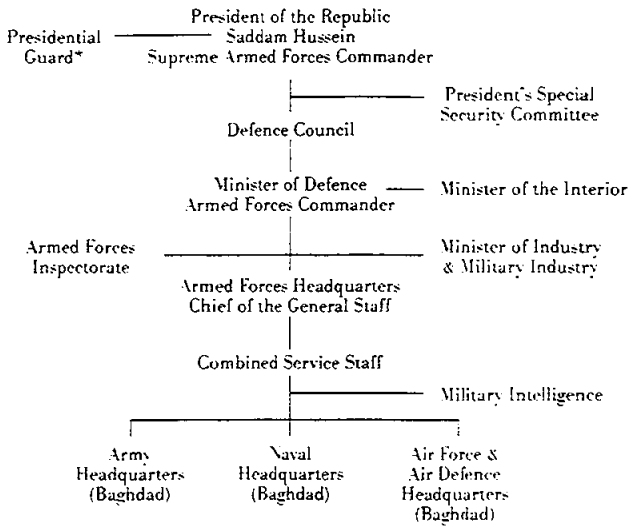
Military Forces Overview

TOTAL STRENGTH
437,500 (estimated)

General

Although the Gulf conflict may have destroyed the credibility of the Iraqi military forces, a report by the US Congress, entitled *Iraq Rebuilds its Military Industries*, suggests that most of the hardware has been repaired or replaced.

Chain of Command



* Personnel for the Presidential Guard are drawn from Republican Guard units.

War fighting capability

Military confidence and morale was shattered by the defeat of 1991. Although the military hardware is being returned to service and the army has been used against defenceless minorities with success, it will take some years for the forces to regain the necessary confidence to act as anything more than a heavily armed internal security force.

Detailed information regarding defeat at the hands of the Allies and the subsequent humiliation by UN inspection teams may well have been kept from the general population, but everyone in any position of authority in the armed forces will known the full extent of the disaster and the implications for the future.

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Tactical Vehicles, FHTV, engine for the Longbow Apache, High Mobility Multipurpose Vehicle, SINCGARS, Multiple Launch Rocket System launchers and Army Tactical Missle System.

■ In the Navy: DDG-51 destroyer, F/A-18, F/A-18E/F, Trident II missile, long-lead funding for the aircraft carrier proposed in fiscal 1995, EA-6B, CH/MH-53E, Tomahawk, Fleet Satellite Communications and T-45 trainer.

■ In the Air Force: B-2 bomber, C-17 airlifter, Advanced Tactical Fighter, Milstar, F-16, AMRAAM, Joint STARS, Titan IV, Navstar GPS and Defense Support Program.

Gates says Iraq could regain prewar capability soon without sanctions

Iraq could regain its prewar conventional military capability in three to five years if sanctions are removed but would threaten its neighbors long before then, Director of Central Intelligence Robert Gates told Congress Friday.

Gates told the House Armed Services defense policy panel in open session that Iraq has been able to preserve "significant elements" of each of its special weapons programs—chemical, biological and nuclear. The nuclear weapons development program would need the most time to recover because much of the existing infrastructure for the production of fissile material would have to be rebuilt.

He said the CIA believes that Iraq still has some mobile Scud missile lauchers and as many as "several hundred missiles." He said Iraq "could soon restore" its capability to produce Scud-type missiles, although some help from abroad might be needed.

Iran, meanwhile, is determined to regain its former stature as the preeminent power in the Persian Gulf, Gates said. Teheran has already purchased "significant numbers" of advanced warplanes and antiaircraft missiles from Russia and China, he said. It also has bought some extended-range Scud missiles from North Korea and has contracted to buy at least two Kilo-class attack submarines from Russia, he added.

The North Korean military threat to South Korea "has not changed significantly," although tensions between north and south have decreased somewhat, Gates said. The near term could be a dangerous period, he said, with North Korean strategists possibly recommending an attack on the south while the north retains its military edge.

However, he added that North Korea's weapons inventory is becoming obsolete. Difficulties in maintaining its conventional forces could reinforce North Korea's determination to develop nuclear weapons and ballistic missiles, he said.

Gates continued his assessment in closed session. House Armed Services Committee Chairman Les Aspin (D-Wis.) said the panel needed the assessment for budget decisions in developing future forces.

Retiree health charges so far top $9 billion

Charged or expected write-offs to cover retiree health benefits in the aerospace industry so far top $9 billion, with roughly a third of the big companies detailing their costs and only nine months left for the rest to catch up.

Among some of the larger projected charges trickling in last week in financial statements are write-offs for Allied-Signal, at $1.4 billion, Textron, at $650 million, and E-Systems, at $175 million.

They join Grumman, Rockwell, McDonnell Douglas, Northrop, LTV and Lockheed in either writing off or offering a guesstimate of potential charges associated with adopting the latest accounting standard for retiree benefits, known as SFAS 106 (DAILY, Nov. 21, 1991).

Together, the amounts disclosed so far would appear to reduce the industry's aggregate net worth by about a third. The new rule will also collectively raise annual costs at the nine companies by more than half a billion dollars.

The rule forces companies to account on their books for benefits other than pensions they have committed to provide to their retired employees, beginning next year. Up to now, most companies have been recognizing those costs as they come up.

Allied said in its recently released annual report that its figures assume health care costs will decline more than 6% and that it will be able to realize some tax benefits from yet another new accounting standard, SFAS No. 96, which deals with income taxes.

Adopting the rule will add some $40 million annually to Allied's postretirement plan costs, which last year totaled about $120 million. It will also reduce Allied's net worth, measured by book value, nearly 41%.

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Iraq's 'Scud' programme — the tip of the iceberg

Duncan Lennox looks at how Iraq has used Soviet-built 'Scuds' to develop its own missile technology — and how other Third World countries could do the same

The Iraqi 'Scud' missile attacks against Saudi Arabia and Israel were one of the most significant events of the first 30 days of the Gulf War. About 68 missiles were fired, while the Coalition forces flew about 65 000 sorties. Yet the 'Scud' raids appear to have influenced the perception of the war far more than any comparison of weight of high explosive delivered by each side.

'Scud' missiles have been prevalent in the Middle East. 'Scud Bs' were used by Egypt in 1973 against Israel, but only a small number were fired. Over 600 'Scud' and 'Scud variants' were fired by both Iraq and Iran during their eight-year war. Iran used only the 'Scud B', and fired about 270 missiles at Iraq.

Iraq is believed to have fired its first 'Scud B' at Iran in 1982, but used 70 'Scud B' and 150 longer range Al Hussein versions in the final four months. The motivation behind Iraq's development of a longer range version, the Al Hussein, was principally to be able to reach Tehran, 500 km from the Iraqi border.

It is not known where Iraq acquired its 'Scuds' or how many were bought. Reports suggest that maybe two batches of missiles were purchased direct from the USSR, while others were acquired from sources including Libya, North Korea or even manufactured within Iraq.

There have been reports that Iraq cannibalised 'Scuds' to make the longer range Al Hussein, but it is equally possible that this was only for development purposes, and that a production line was set up.

The Iraqi development programme for 'Scud' variants became known in 1987, when the Iraqi Government announced it had test fired a new missile called the Al Hussein, shortly to be used against Iran. Iraq claimed this was a new design, but in 1988 it became clear that it was in fact a modified 'Scud B'.

It is thought that the Al Hussein was first tested in August 1987, and started to be used against Iran shortly afterwards.

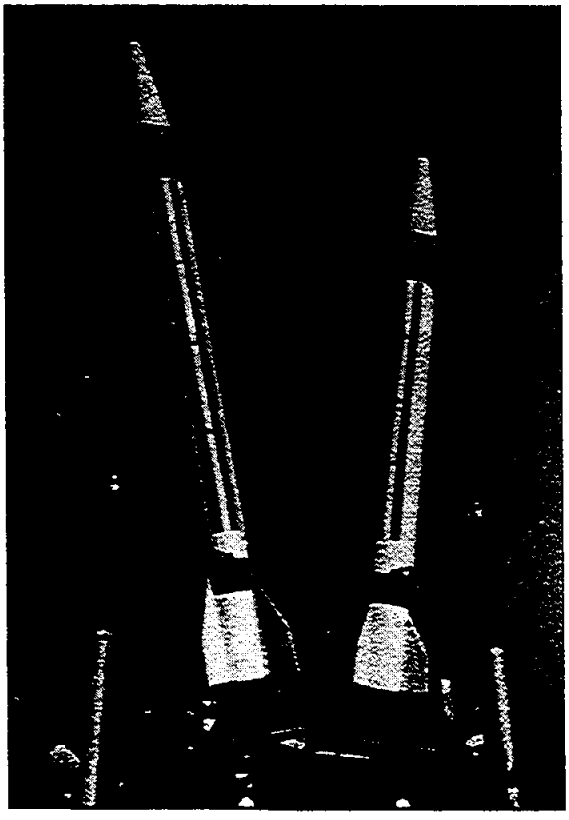
Al Hussein missiles are believed to be 12.2 m long, to have a body diameter of 0.88 m, and to weigh 7000 kg at launch. The Iraqi modification lengthened the fuel tanks and reduced the size of the warhead, giving the missile an increased range of 650 km, but with a smaller, 500 kg, warhead. It is believed that the 'Scud B' guidance system has been used, consequently making the Al Hussein less accurate over the longer range, probably resulting in a circular error probable (CEP) of 1000 m (0.6 miles). Iraq also developed a new transporter-erector-launcher (TEL) vehicle to carry both the Al Hussein and Al Abbas missiles. This Iraqi TEL is a converted articulated vehicle, called Al Waleed *(see overleaf)*.

The second Iraqi 'Scud B' modification is called Al Abbas. This missile is believed to be 13.75 m long, with the same 0.88 m body diameter, but weighing 8000 kg at launch. Again the fuel tanks have been further lengthened and warhead reduced in size. The Al Abbas was first test flown in April 1988, and is reported to have a range of 900 km. The warhead weight has probably been reduced to 350 kg, and accuracy over the increased range would also have been reduced, with an estimated CEP which would be around 1500 m.

Iraq announced the launch of a satellite test vehicle in December 1989, and claimed it had test flown two ballistic missiles derived from the same launcher with a range of 2000 km. The ballistic missiles are called Al Aabed, and the satellite launcher Tammouz. Al Aabed has been constructed by strapping five Al Abbas type motor and fuel tank assemblies together to form the missile's first stage; the second stage is formed by a sixth Al Abbas type motor and fuel tank assembly, with the third stage probably also having a liquid propellant motor and carrying a warhead of about 750 kg payload weight.

No further test flights of this 2000 km range missile have been reported, but the potential to develop ballistic missiles from old and rudimentary building blocks has been demonstrated.

During the first 30 days of the Gulf War, Iraq launched about 68 missiles at Saudi Arabia and Israel. From the range of these shots — most of them flying about 400 to 500 km — it is clear that these are Al Hussein missiles and not the original 'Scud B'. The rate of firings has varied significantly, although the Iraqis



The Iraqi-modified 'Scud Bs', the Al Abbas (left) and Al Hussein

appear to have kept a nearly equal number of launches against both countries.

On 13 February two missiles were fired at a small town in Northern Saudi Arabia about 65 km from the Iraqi border. These two missiles could have been 'Scud B', or could even have been the unguided FROG-7 rocket. Iraq fired FROG-7 rockets at Iran, and has modified this Soviet design to carry a submunitions warhead. Called the Layth, the modified FROG-7 has a range of about 90 km carrying a 435 kg warhead.

With a conventional high explosive warhead, carrying around 227 kg of HE, the Al Hussein missile is relatively inaccurate and ineffective from a military standpoint. A single modern aircraft could deliver six to eight times the weight of HE over the same distance in one sortie, with much better accuracy. However, the ballistic missile is cheap and simple, and flies a lot faster than an aircraft, covering 400 km in around 5 minutes.

Iraq has tended to use its Al Hussein missiles against civilian targets, and some 2 tonnes of warhead and empty fuel tanks descending at around 80 km per minute (50 miles per minute or 3000 mph) is terrifying and potentially lethal in a built-up area regardless of accuracy.

However, the US-designed MIM-104 Patriot surface-to-air missile system has performed well against this difficult target, having been modified only in the last few months of 1990 to extend its performance against such ballistic missile threats.

There are three basic ways to defend against any ballistic missile threat: counterforce, active defence and passive defence.

Counterforce entails attacking the missiles before they are launched, either on launch vehicles, in solos or in stockpiles. This is not easy, as shown by the Coalition forces' difficulties in tracking down and destroying the mobile 'Scud' launchers. Active defence means attacking the missiles in flight, and while the Patriot has been successful, it cannot protect every possible target. Passive defence can be achieved by building underground and hardened shelters, by camouflage, decoys or deception. Long experience has shown that any effective defence has to consist of all three basic methods.

Dates	days	Saudi Arabia	Israel	Total
18/27 Jan	10	26	24	50
26 Jan/6 Feb	10	2	25	7
7/15 Feb	10	5	6	11

There is no doubt that development of ballistic missiles will continue, and that future threats will not be restricted to weapons such as the Al Hussein which are simply a crude modification of a 1950s design.

There are many countries with extensive R&D programmes around the world; new missile systems will be mobile, smaller, and have much shorter preparation times by using solid propellant motors. Accuracy will be improved through better inertial guidance systems as well as by discarding the empty fuel tank and motor sections as soon as the propellant has been used.

A range of 2300 km, the distance from Libya to London, can be flown in around 12 minutes by a ballistic missile. The Chinese CSS-2, the Indian Agni and the Iraqi Al Aabed already have ranges within this bracket.

Nuclear, chemical or biological warheads would be absolutely devastating against civilian targets, and yet so many nations are researching these weapon capabilities that in 10 to 15 years there is every reason to expect that such warheads could be used on ballistic missiles to hold complete cities hostage.

Nuclear deterrence alone might not be sufficient to prevent the threat or actual use of such weapons, and a skilful political leader could wield considerable influence in a region simply by demonstrating his willingness to use such weapons against civilian targets.

Iraq gave a clear demonstration of the political use of ballistic missiles by attacking Israel with Al Hussein missiles. Without the ability to actively defend against such weapons their use could have had the most serious political implications.

An attack against a civilian population would shock and and initially destabilise the resolve of a nation and its political or military leadership; shock and surprise have always been among the most effective forms of warfare, and the ballistic missile is the ideal weapon to deliver such an attack.

Improving on a Soviet design

The 'Scud' was designed by the Soviet Korolyev Design Bureau, which started work shortly after the Second World War using German V2 plans and some of the engineers and scientists from the German weapons programmes.

The SS-1b 'Scud A' entered service around 1955 with the Soviet designation R-11. It was carried on a tracked vehicle, derived from the JS 2 tank chassis, which served as a transporter-erector-launcher platform (TEL). The warhead was nuclear and was believed to have had a yield in the 50 kT range.

An improved version of the 'Scud A', known to the Soviets as R-17 and by NATO as the SS-1c 'Scud B', entered service in 1962. Initially, this version was carried on the tracked JS 2 vehicle, but by 1965 the

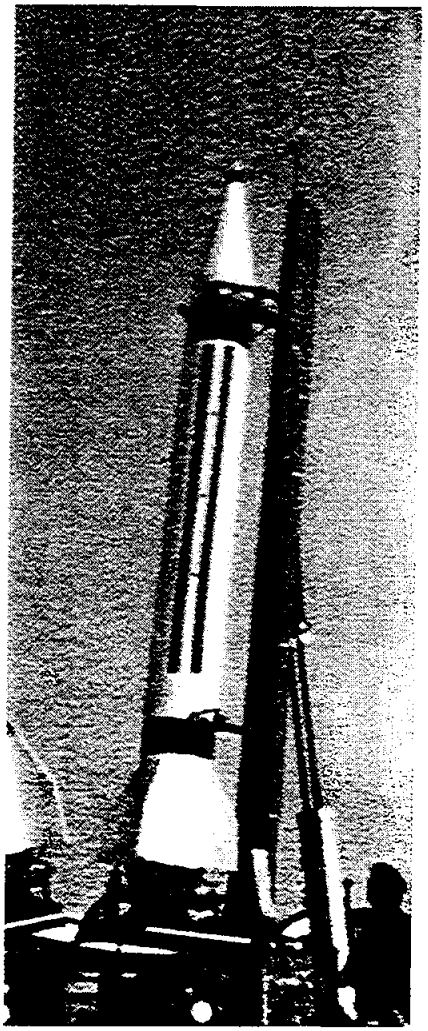
The Iraqi-developed Al Waleed transporter-erector-launcher vehicle, with an Al Hussein missile

Al Hussein

Type
Intermediate range, road mobile, liquid propellant, single warhead ballistic missile.

Development
The Al Hussein SRBM, also known as El-Hossein or al-Husayn (and Project 1728), was first reported in mid-1987, and was claimed by Iraq to be a newly designed and developed system with a range of 650 km. Other reports suggested that Al Hussein was an Iraqi identification of the Soviet supplied SS-1C 'Scud-B' missile, or even the Brazilian SS-300 which is also thought to be a modified 'Scud-B'. It is now known that Al Hussein is a modified 'Scud-B' missile, with a smaller payload and additional propellant to give the increased range, as a result of a sale of 820 'Scud B' missiles to Iraq. It is believed that the Iraqis probably received assistance from other nations, China, Egypt and France have been mentioned, and that the changes to the 'Scud-B' were based upon designs prepared by other 'Scud-B' operating countries such as the former East Germany, Libya or North Korea. It is interesting to note that reports of a 'Scud-C' with increased range having been developed by the former Soviet Union, might provide the answer to the Iraqi Al Hussein design. A longer range development was also reported in Iraq called Al Abbas, although it is believed that the Al Abbas programme was terminated in 1990 in favour of an alternative design upgrading the propellants and motor of Al Hussein, to produce a missile with a range in excess of 1000 km. Reported test firings in December 1990 are believed to have been connected with a development programme to improve the accuracy of Al Hussein, and possibly to flight test a chemical warhead.

An Al-Waleed transporter-erector-launcher vehicle, used for the Al Hussein and Al Abbas missiles



An Al Hussein SRBM on a mobile launcher

Description
It is believed that Al Hussein is 12.2 m long, has a body diameter of 0.88 m and a launch weight of 7000 kg. A payload weight of around 500 kg, reduced from the 'Scud-B' weight of 985 kg, would probably carry a single conventional HE blast/fragmentation or a chemical warhead. The missile has inertial guidance, but no terminal guidance. The liquid propelled missile has a range of 650 km, which represents a significant increase over the reported maximum range of a 'Scud-B', some 300 km. Reports indicate that Al Hussein missiles' flight time was about 7½ minutes for 600 km range, but powered flight was only for the first 1½ minutes. The apogee on a 600 km flight is around 150 km. The missile is mounted on an Al-Waleed eight-wheeled transporter-erector-launcher vehicle, but it can also be carried on modified SS-1 'Scud-B' TEL, the MAZ 543 P, and a Daimler-Benz trailer known as Al Nida. A fixed launcher, with the steel support ring mounted on a concrete base, was also used by Iraq in the 1991 Gulf War. Reports from Israel and Saudi Arabia suggest that many Al Hussein missiles broke up on re-entering the atmosphere, most probably due to inadequate design and testing.

Operational Status
Development probably started in the early 1980s, and the first test firing was reported in August 1987. It is reported that around 190 Al Hussein missiles were fired against Iran during the early months of 1988. Suggestions by Iraq, that it had developed a new ballistic missile, called 'Al Hijara' (The Stones), were generally believed to refer to Al Hussein, which has sufficient range to reach many targets in Israel from Iraqi launch positions; however, the UN inspection team identified that five Al Hijara missiles were launched during the Gulf War in 1991. It is reported that Iraq fired between 80 and 90 Al Hussein missiles during the Gulf War, but several failed to fly and 81 were reported to have landed, 43 aimed at Saudi Arabia and 38 at Israel. Following this war Iraq declared that it had a further 51 Al Hussein missiles, with 23 conventional HE warheads and 30 chemical warheads, and six mobile launchers with a further 32 fixed missile launch platforms. The remaining assets were destroyed by the UN monitoring team who reported that the Iraqis destroyed 78 Al Hussein missiles and that the UN destroyed a further 44. This would establish the total number of 'Scud B' missiles converted to Al Hussein at around 400. Unconfirmed reports suggest that Iraq has stored further Al Hussein missiles in addition to those declared to the UN and that not all the mobile launchers have been destroyed. Some stored missiles may have been removed from Iraq altogether, and unconfirmed reports have suggested that these may be in Sudan or Yemen.

Specifications
Length: 12.2 m
Body diameter: 0.88 m
Launch weight: 7000 kg
Payload: Single warhead; 500 kg
Warhead: Conventional HE or chemical
Guidance: Inertial
Propulsion: Liquid propellant
Range: 650 km
Accuracy: 1000 m CEP

Contractor
Not known.

Al Abbas

Type
Intermediate range, road mobile, liquid propellant, single warhead ballistic missile.

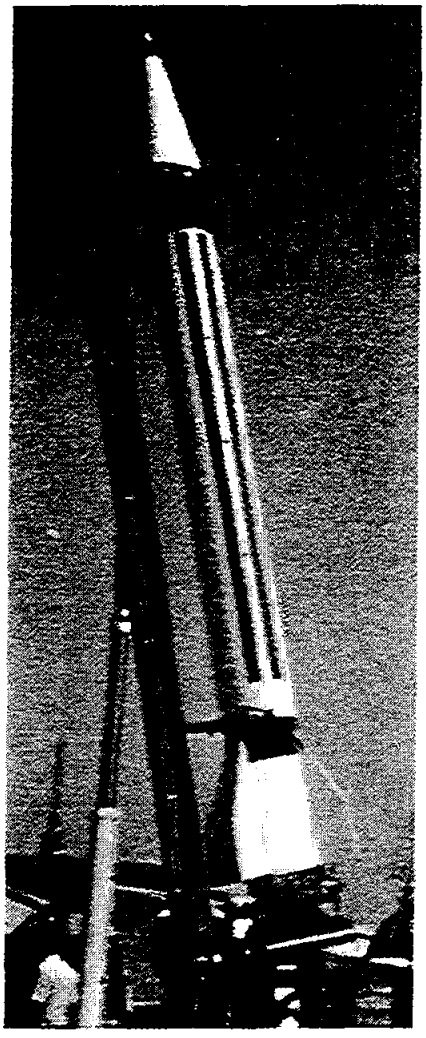
Development
The Al Abbas, also known as al-Abos or El-Abbas, was the second SRBM claimed to have been designed and developed in Iraq. First flight tested in April 1988, the missile had a reported range of 900 km. It is believed that this missile was also a modified 'Scud-B', with a smaller warhead and further increased capacity liquid propellant tanks from the Al Hussein design. Reports indicate that development of Al Abbas stopped around 1990, and that an alternative design upgrading the propellants and motor design of Al Hussein would achieve a greater range and payload.

Description
Al Abbas was probably 13.75 m long, with a body diameter of 0.88 m, and a launch weight of 8000 kg. A payload of around 300 kg, significantly reduced from the 'Scud-B' payload of 985 kg, probably included a single conventional HE blast/fragmentation or chemical warhead. The missile was believed to have inertial guidance, and at a range of 900 km an accuracy of no better than 3 km. The missile had a liquid propellant motor. It is believed that the Al Abbas missile was carried by the same eight-wheeled Al-Waleed TEL used for the Al Hussein missile.

Operational Status
Although the first test flight of Al Abbas was reported in April 1988, it would appear that no missiles were fired in the 1991 Gulf War. This probably indicates that the development programme was stopped, perhaps due to the instability of the missile and relatively poor performance. It is expected that the UN inspection team would have destroyed all Al Abbas manufacturing facilities.

Specifications
Length: 13.75 m
Body diameter: 0.88 m
Launch weight: 8000 kg
Payload: Single warhead; 300 kg
Warhead: Conventional HE or chemical
Guidance: Inertial
Propulsion: Liquid propellant
Range: 900 km
Accuracy: 3000 m CEP

Contractor
Not known.



An Al Abbas SRBM on a mobile launcher

Condor

Type
Intermediate range, road mobile, solid propellant, single warhead ballistic missile.

Development
Development work started on a project, known as Condor 1, in the late 1970s to design a space research rocket launcher in Argentina. This programme used both European technologies and European technicians to assist in the development. Condor 1 was exhibited in 1985 at the Paris Air Show as a research rocket and not as a short range ballistic missile, although it is now apparent that this earlier work was used as the base for the development of a SRBM in Argentina called Alacran, with a range of 150 km. It is believed that in the early 1980s design work started on Condor 2, a second short range ballistic missile but with a range of 900 km. The name 'Condor 2' may have been selected to give the impression that this later research and development programme was associated with a further space research rocket. Reports suggest that Egypt joined with Argentina on Condor 2 around 1984, to assist in development and with an option for later production in Egypt. There has been uncertainty over the Egyptian involvement in the Condor 2 programme, and it is unclear whether the Egyptian Badr 2000 and 'Vector' missile projects are cover names for Condor 2 or quite separate SS-1 'Scud' based development programmes. Iraq is also reported to have provided some financial assistance and there are unconfirmed reports that some development continued for Condor 2 in Iraq until 1991 with solid motor test firings taking place from 1989 onwards as well as design work for a possible nuclear warhead. The Iraqi programme was known as Badr 2000, and several components were destroyed by the UN inspection teams in 1992. An unconfirmed report suggests that early design studies on Condor 3 have started, with the aim of developing an intermediate range ballistic missile system with a range of about 1500 km.

Description
Condor 2 is a short range ballistic missile with a length of about 11.0 m, a base body diameter of 1.0 m and a launch weight believed to be 6500 kg. The missile has been reported to have two stage solid propellant motors and a range of about 900 km. The payload is thought to be around 500 kg, with conventional HE, nuclear or chemical warhead options including a suggested fuel-air explosive warhead. Guidance will be inertial, but it is difficult to assess the accuracy of Condor 2 without knowing more about the control systems being used. A diagram depicted Condor 2 as having four control fins at the base, but this may have been a view of the research rocket Condor 1. The missile is reported to be road mobile, with a transporter-erector-launcher vehicle being developed specifically for this programme.

Operational Status
Condor 2 was in early development when the programme reportedly ceased in 1990, but the precise status remains unknown although there has only been a single reported test flight in 1989 over a range of 500 km. The missile programme was believed to be a collaborative project involving Argentina, Egypt and Iraq, with missiles or components to be produced in all three countries, with another unconfirmed report suggesting possible assembly in Romania. An unconfirmed report from the USA suggested that Egypt left the Condor programme in 1989, and it is believed that the Iraqi research facilities were destroyed in the 1991 Gulf War and later by the UN inspection teams. Argentina decided to discontinue the missile development, and this was formally announced by the government in May 1991, although it is possible that Argentina will continue with Condor 2 solely as a satellite launch vehicle. Reports in 1991 suggested that up to 30 missile assembly sets were complete in Argentina, lacking only guidance components. The precise status of the Condor programme in both Argentina and Iraq remains unresolved. A report in 1992 suggests that Argentina offered Condor 2 technology to Spain, to help with the development of a satellite launch vehicle and IRBM programme known as Capricornio.

Specifications
Condor 2
Length: 11.0 m
Body diameter: 1.0 m
Launch weight: 6500 kg
Payload: Single warhead; 500 kg
Warhead: Conventional HE or chemical or nuclear
Guidance: Inertial
Propulsion: 2 stage solid propellant
Range: 900 km
Accuracy: n/k

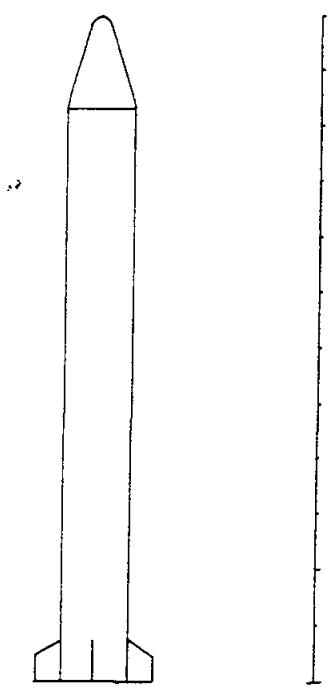
Contractor
Not known.

Jericho (YA-1/YA-3)

Type
Intermediate range, road mobile, solid propellant, single warhead ballistic missiles.

Development
The Jericho 1 missile is reported to have been developed in the mid-1960s with French assistance, based upon a Dassault design known as MD-600, and with a range of around 500 km. It is believed that the Israeli name for this missile is 'Luz' and the designator YA-1. There are reports from Iran that an upgraded version of Jericho 1 (perhaps YA-2) was developed in the 1970s with a payload weight of 750 kg, presumably to carry a larger nuclear warhead, and that this version was dismantled in Iran. The Jericho 2 missile development started in the mid-1970s, and test firings are reported to have taken place since 1986. Jericho 2 is an intermediate range ballistic missile, derived from the Shavit space launch vehicle, and is believed to have the designator YA-3.

Description
Jericho 1 is believed to have a conventional 500 kg HE warhead, although some reports suggest a 20 kT nuclear or chemical warhead, and to be about 10.0 m long with a launch weight of about 6500 kg. This missile has been described as being similar to MGM-31 Pershing 1 in terms of size and performance, and that the missiles can be launched from railroad flat trucks or from a wheeled TEL vehicle. The range of Jericho 1 is believed to be 500 km. It is reported that Jericho 2 has two solid propellant stages, similar to the Shavit (Comet) launch vehicle used to launch the first Israeli satellite into low earth orbit in September 1988. If this is correct then Jericho 2 would be about 14.0 m long, with a body diameter of 1.56 m and a launch weight of 29 000 kg. The payload capability is probably 1000 kg, which means that either nuclear or conventional HE warhead options could be used. It is believed that the missile has inertial guidance and may also have a terminal guidance system. Jericho 2 is reported to be road mobile with a wheeled TEL, or can be launched from railroad flat trucks and to have a range of 1500 km. However, the capability of the Shavit SLV implies that Jericho 2 could have a range considerably greater than 1500 km with a 1000 kg payload.

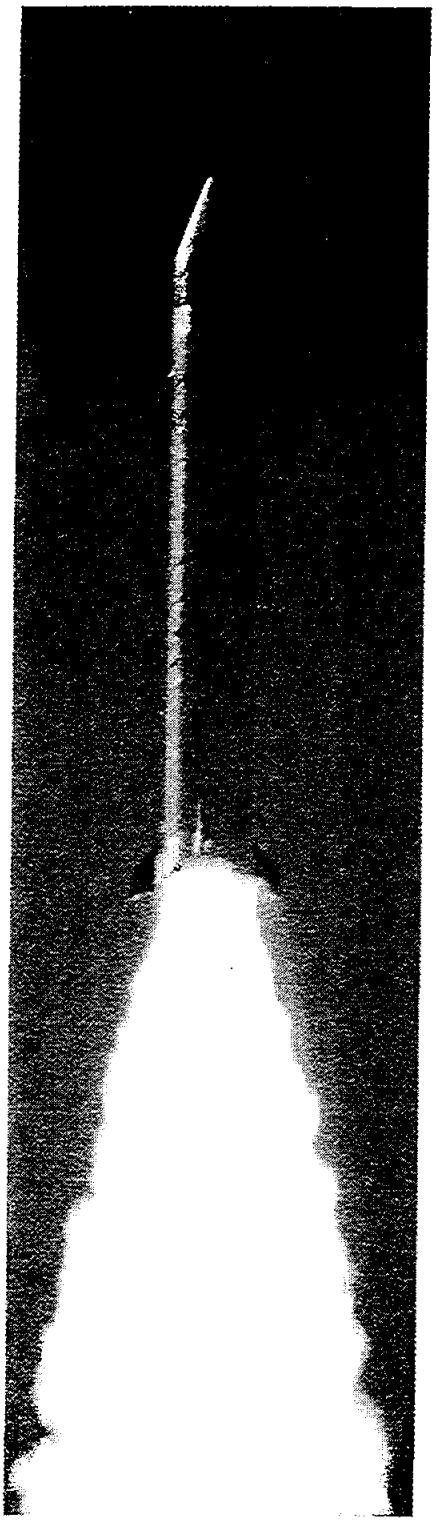


An outline diagram of the Jericho 2 intermediate range ballistic missile, similar to the Shavit satellite launch vehicle

Operational Status
Jericho 1 is thought to have entered service in 1973 and Jericho 2 in 1990, with unconfirmed reports that between 50 and 100 Jericho missiles have been deployed. A total of 14 Jericho 1 missiles is believed to have been delivered from France, and an unknown number made subsequently in Israel. There have been several reported Jericho 2 test firings since 1986, with achieved ranges of 465 and 820 km respectively on the first two (in 1986 and 1987). An unconfirmed report in June 1989 suggested that a missile similar to Jericho 2 was positioned on a launcher just north of Cape Town in South Africa. It is not known whether this missile was a Jericho 2 being tested at full range or a separate new South African missile, but unconfirmed reports suggest that South Africa has jointly funded the Jericho 2 programme with Israel. The South Africans are reported to have said that the IRBM tested from the Cape Town facility was their own development, indicating that Armscor was testing a research rocket which might be used to launch a satellite into orbit in the near future or testing a missile called 'Arniston' in South Africa. It is unclear whether 'Arniston' is a variant of Jericho 2 or a separate project.

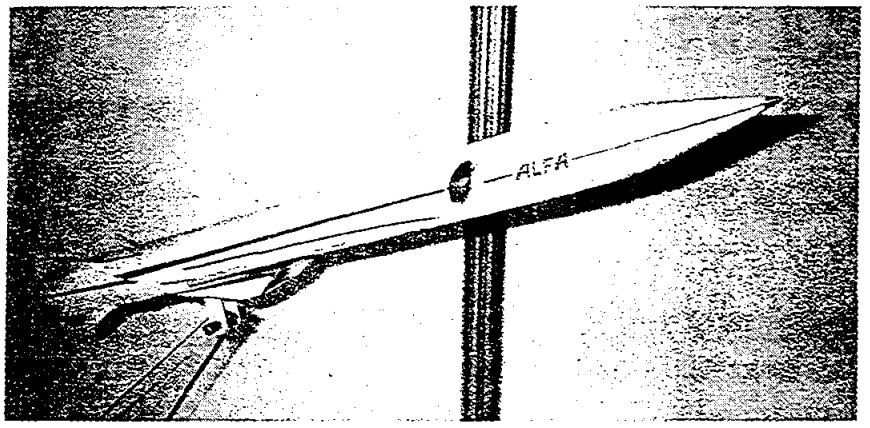
Specifications
Jericho 1
Length: 10.0 m
Body diameter: 1.0 m
Launch weight: 6500 kg
Payload: Single warhead; 500 kg
Warhead: Conventional HE, nuclear 20 kT or chemical
Guidance: Inertial
Propulsion: 2 stage solid propellant
Range: 500 km
Accuracy: 1000 m CEP

Jericho 2
Length: 14.0 m
Body diameter: 1.56 m
Launch weight: 29 000 kg
Payload: Single warhead; 1000 kg
Warhead: Conventional HE or nuclear
Guidance: Inertial
Propulsion: 2 stage solid propellant
Range: 1500 km
Accuracy: n/k



The Shavit launch vehicle, used to test the Offeq 2 satellite, in April 1990

Contractor
IAI, Ben Gurion Airport (prime contractor).



A model of an Alfa cruise missile design exhibited by Novator NPO in 1993 (Paul Beaver)

oxidant, but is believed to retain the 985 kg warhead. It is reported that production of 'Project T' improved 'Scud' started in 1990, and it is planned to build about 90 missiles.

FRANCE

ASLP

A model of the proposed *air-sol-longue portée* (air-to-surface long range ASLP) was shown by Aerospatiale at Paris in 1991. The missile has a length of about 5.25 m, with a rear delta wing contoured and blended forward into the flat undersurface of the missile body. An integral rocket/ramjet motor assembly is mounted above the rear body, but with the exhaust nozzle below the vertical rudder. The missile is reported to cruise at M 3.0 and have a range between 800 and 1200 km. A selectable yield nuclear warhead is believed to be in design, but there was no information on the guidance systems to be employed. It is planned that ASLP will be carried by the Rafale, and it was offered to the UK in response to the UK's TASM requirement. At the present time the project is simply a private venture feasibility study, which might enter service around 2005 to replace the existing ASMP.

Apache

Apache has been in full-scale development since 1989, as a submunition dispensing air-to-surface missiles with a range of 150 km and due in service around 1995. At Paris in June 1991 the prime contractors, Matra, revealed plans to further develop Apache, with a view to achieving a range in excess of 600 km and taking the system into the cruise missile category. There is as yet no French Government funding for this range extension, and it is not known how far the design work to provide possible ship-, submarine- and ground-launched options has been taken. The present design has a length of 5.1 m, a launch weight of 1230 kg and a payload of up to 770 kg. For any cruise missile version the payload would probably be reduced to about 400 kg. Guidance would probably be provided by an inertial platform and GPS updates in mid-course, with the Promethée active radar developed by Thomson-CSF for radar scene matching in the terminal phase being augmented by an IR seeker.

INDIA

Rohini/ASLV

There are reports that India developed a short range ballistic missile known as Rohini, with a range of 130 km, although this is the name given to a family of meteorological and research rockets with limited payload capacities as well as the Rohini scientific satellites currently being launched by the Augmented Satellite Launch Vehicle (ASLV) into low earth orbit. There are obvious connections, in that the ASLV programme might, at some future time, be used by India as the basis for an IRBM, with a range of 4000 km and a 500 kg payload, although the Indian Government makes it clear that no such military programme exists.

Cruise Missile

A cruise missile development programme is reported from the Aeronautical Development Establishment at Bangalore, and it is believed to be based upon the PTA unmanned air vehicle which first flew in 1985. The PTA is now called Lakshya and is being built by Hindustan Aeronautics (HAL); this UAV is reported to have a range of 500 km. The cruise missile variant is believed to use inertial and GPS mid-course guidance, with radar or IR terminal seekers. A warhead weight of 450 kg has been suggested, and a range of about 600 km.

Koral

The Koral programme is the development of an improved Russian SS-N-22 'Sunburn' ship-launched SSM for fitting in Project 16 destroyers, together with an improved engagement radar.

INTERNATIONAL

Polyphem

This is a joint French/German programme to develop a small missile guided by TV or imaging IR with a fibre optic cable relaying the picture back to a ground controller, and passing guidance commands up to the missile. Polyphem is expected to be used both to attack ground and ship targets, and may also be used for recce sorties. It is reported that Italy may join the programme. Present designs indicate a missile with a weight of 55 kg and a range up to 60 km, with a projected in-service date around 2005.

IRAN

SS-1c 'Scud B' variant

The Iranian Government suggested that Iran had a ballistic missile production capability in 1987 and this was repeated in 1991. It is believed that this probably refers to a 300 km range 'Scud B' variant developed with Chinese or North Korean assistance. Unconfirmed reports suggest that the Chinese may have provided a manufacturing capability for the CSS-7 (M-11) missile, a solid propellant 'Scud-B' replacement.

SS-1d 'Scud C' variant

Reports from Iran indicate that there is a manufacturing capability for the 'Scud' improvement, a missile with a 500 kg warhead and a range of 550 to 600 km. This capability could have been provided with assistance from North Korea with an extended range liquid propellant 'Scud', or from China with a solid propellant version of the CSS-6 (M-9/DF-15) missile.

Tondar 68/Iran-700 (M-18/Nodong-1)

A development programme for a ballistic missile with a range between 700 and 1000 km is reported from Iran, with assistance from China or North Korea. There were two test launches reported in 1991 and provisional names are Tondar 68 or Iran-700. It is possible that Iran is building a version of the Chinese M-18 missile, or a version of the North Korean Labour-1 (Nodong-1) missile. Unconfirmed reports suggest that Iran has funded both Labour-1/2 (Nodong-1/2) missile programmes with North Korea and that missiles will be built in both countries.

Nazeat N5

A series of surface-to-surface rockets has been developed in Iran, probably with assistance from China or perhaps Brazil. The largest seen so far is the Nazeat N5, which has a length of 6.0 m, a body diameter of 0.36 m and a launch weight of 850 kg. This unguided rocket has a 150 kg warhead and a maximum range of 105 km.

CSSC-2 'Silkworm' variant

Both China and North Korea manufactured the CSSC-2 'Silkworm' (HY-1) missiles and some were sold to Iran in the 1980s. Reports from Iran indicate that they now have a manufacturing capability for both the 'Silkworm' (HY-1) and CSSC-3 'Seersucker' (HY-2) versions, and that designs were available to increase the range of these missiles. Iraq developed the FAW-150 and FAW-200 missiles from the basic 'Silkworm' design, simply extending the fuel tanks to give longer ranges and it is possible that an example of these fell into Iranian hands during the war with Iraq. Recent reports suggest that Iran is now developing a longer range variant of the basic 'Silkworm' missile, that could become a cruise missile. The 'Silkworm' warhead weighs 400 kg, but the 'Seersucker' version has a 513 kg warhead, and either of these would be large enough to convert to nuclear or chemical warheads.

IRAQ

Al Hijara

The suggestion that Iraq developed a new short range ballistic missile, named 'Al Hijara', specifically to attack Israel has largely been interpreted as a reference to Al Hussein, rather than a new missile project.

SRBM

There have been continued reports that Iraq is developing a new short range ballistic missile with a range limited to 150 km to comply with the UN Security Council resolutions. The placing of UN monitoring

Iraqi Missile Operations During 'Desert Storm' — Update

Joseph S Bermudez Jr

The first detailed analysis of Iraqi missile operations during 'Desert Storm' was published in the March issue of *JSIR*. A more detailed listing is published here, and will be followed in coming months by a full analysis of Iraqi missile oprations. Additional background information on Iraq's missile programme and operations can be found in the following *JSIR* articles:

'Iraqi Missile Operations During Desert Storm', Vol 3 No 2, March 1991, pages 131-135.

'Iraqi Missile Update', Vol 2 No 7, July 1990, page 329.

'Iraq's *Al-Hussein* Missile Programme, Part II', Vol 2 No 6, June 1990, pages 242-248.

'Iraq's *Al-Hussein* Missile Programme, Part I', Vol 2 No 5, May 1990, pages 204-209.

Shown here is a listing of known Iraqi *al-Hussein* attacks during Operation 'Desert Storm'. During the war Iraqi *al-Hussein* missile attacks totalled 81: 41 against Saudi Arabia, one against Bahrain, one against Qatar, and 38 against Israel. It should be noted, however, that this is not a listing of all Iraqi missile launches. The number of *al-Hussein* missiles actually launched is believed to be 86, with 46 against Saudi Arabia, one against Bahrain, one against Qatar, and 40 against Israel. Five missiles are believed to have broken-up immediately after launch, and not have reached Saudi Arabia or Israel. Additionally, at least 10 additional *al-Husseins* are known to have been destroyed by allied air operations immediately prior to being launched. As stated above *Jane's Intelligence Review* will provide a more comprehensive study of the Iraqi missile programme and operations in the near future.

In addition to the 81 known Iraqi *al-Hussein* attacks during Operation 'Desert Storm', it has been confirmed that Iraq launched, at the minimum, five FROG-7 battlefield support rockets at allied forces in Saudi Arabia. Although the actual number of FROG-7 attacks is undoubtedly significantly greater, a discussion of this will have to wait until more detailed information becomes available.

Known Iraqi *al-Hussein* Attacks 17 January-28 February 1991

Date	Baghdad Time	Target Nation	Target	Missiles fired
18 Jan 91	03:03	Israel	Tel Aviv and Haifa	8
18 Jan 91	04:28	Saudi Arabia	Dhahran	1
19 Jan 91	08:15	Israel	Tel Aviv	3
20 Jan 91	21:45	Saudi Arabia	Dhahran	3
21 Jan 91	22:30	Saudi Arabia	Dhahran	1
21 Jan 91	00:48	Saudi Arabia	Dhahran	3
21 Jan 91	00:54	Saudi Arabia	Riyadh	4
22 Jan 91	21:30	Israel	Tel Aviv	1
22 Jan 91	07:18	Saudi Arabia	Dhahran	3
22 Jan 91	07:18	Saudi Arabia	Riyadh	2
23 Jan 91	23:05	Israel	Haifa	1
23 Jan 91	23:05	Saudi Arabia	Dhahran	2
23 Jan 91	23:05	Saudi Arabia	Riyadh	2
23 Jan 91	23:05	Saudi Arabia	King Khalid Military City	1
25 Jan 91	04:35	Israel	Dimona ?	1
25 Jan 91	06:35	Israel	Dimona ?	1
25 Jan 91	19:05	Israel	Tel Aviv and Haifa	7
25 Jan 91	22:25	Saudi Arabia	Riyadh	2
26 Jan 91	21:22	Israel	Haifa	1
26 Jan 91	23:03	Israel	Tel Aviv	4
26 Jan 91	03:30	Saudi Arabia	Dhahran	1
26 Jan 91	20:20	Saudi Arabia	Riyadh	1
28 Jan 91	22:08	Israel	Tel Aviv	1
28 Jan 91	21:05	Saudi Arabia	Riyadh	1
31 Jan 91	19:01	Israel	Tel Aviv	1
2 Feb 91	21:30	Israel	Tel Aviv	1
3 Feb 91	02:30	Israel	Tel Aviv	1
3 Feb 91	00:55	Saudi Arabia	Riyadh	1
8 Feb 91	02:15	Saudi Arabia	Riyadh	1
9 Feb 91	03:30	Israel	Tel Aviv	1
11 Feb 91	19:54	Israel	Tel Aviv	1
11 Feb 91	22:21	Saudi Arabia	Riyadh	1
12 Feb 91	02:33	Israel	Tel Aviv	1
14 Feb 91	11:30	Saudi Arabia	King Khalid Military City	2
16 Feb 91	21:13	Israel	Tel Aviv	1
16 Feb 91	21:14	Israel	Dimona	1
16 Feb 91	02:00	Saudi Arabia	Jubail	1
19 Feb 91	20:52	Israel	Tel Aviv	1
21 Feb 91	17:06	Saudi Arabia	King Khalid Military City	2
21 Feb 91	21:00	Saudi Arabia	King Khalid Military City	1
22 Feb 91	02:45	Bahrain	Al Manamah ?	1
23 Feb 91	19:48	Israel	Tel Aviv	1
23 Feb 91	05:03	Saudi Arabia	Dhahran	1
24 Feb 91	04:35	Saudi Arabia	Riyadh	1
24 Feb 91	12:30	Saudi Arabia	King Khalid Military City	1
24 Feb 91	21:30	Saudi Arabia	Riyadh	1
25 Feb 91	20:23	Saudi Arabia	Dhahran	1
26 Feb 91	01:30	Qatar		1

Known Iraqi FROG-7 Attacks

17 Jan 91		Saudi Arabia	?	3
21 Feb 91	02:30	Saudi Arabia	?	2

Israel's Nuclear Infrastructure

Harold Hough

Introduction

Israel's nuclear programme is a blend of contradictions in the sense that everyone knows that the Israelis have the atomic bomb but no-one knows anything about it. With the exception of Mordecai Vanunu, a technician from Israel's nuclear facility who talked to the press in 1987, very little has been made public. Consequently, experts are still questioning the size and capability of the arsenal.

Despite all the methods which analysts have employed to analyze Israel's nuclear programme, the use of commercial satellite imagery has been limited. Although the nuclear reactor and plutonium refining plant at Dimona have been viewed with SPOT imagery, analysts considered it of little help in studying nuclear programmes. However, by looking at high-resolution Russian and French imagery produced over the last five years, it is possible to follow the nuclear trail from nuclear reactor to final product. The results can add substance to their nearly invisible nuclear programme.

The Nuclear Footprint

One Israeli nuclear site that has been analyzed from space is the nuclear reactor and plutonium processing facility at Dimona in the Negav Desert. Except for confirming photographs taken by Vanunu, however, many pictures are useless for revealing nuclear secrets. Nevertheless, they do show how the Israeli military protects and hides its nuclear facilities.

An analysis of the Dimona facility reveals three characteristics that are unique to Israeli nuclear facilities. The first is the extremely heavy perimeter. Although other military sites in Israel are sensitive, no conventional military site has the number of patrol roads, wide perimeters and fencing that Dimona has. The second is the heavy vegetation grown around it in order to hide activity. At Dimona, this consists of several rows of trees that screen the nuclear site from the road. Although conventional military sites frequently use vegetation to hide activity, it is not as extensive as is usually seen at top-secret sites, especially in arid regions. The final characteristic is the space inside the perimeter. This gives a 'defence in depth' against intruders, but is unusual in a country as small and crowded as Israel. Intelligence sites, for example, have heavy perimeters but offer very little space inside the perimeter itself.

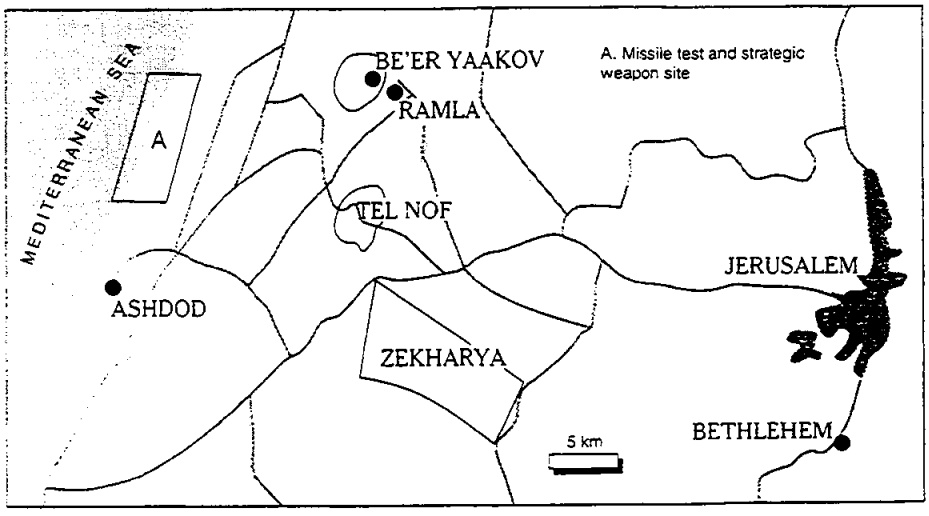
The Nuclear Infrastructure

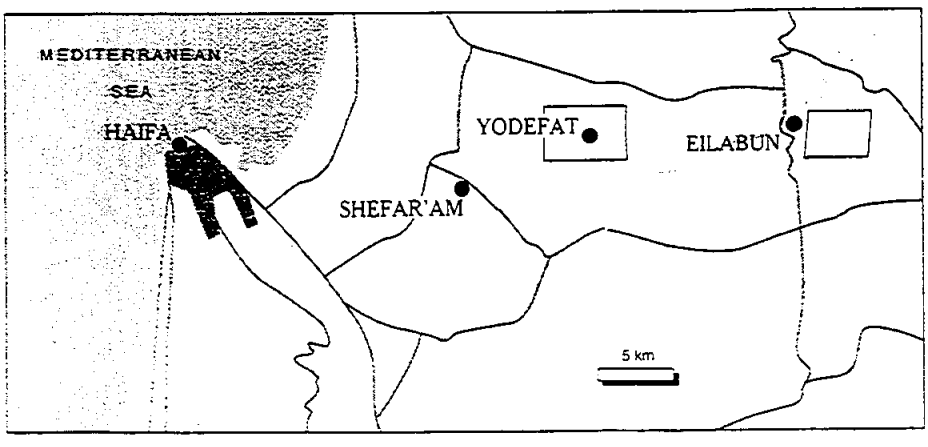
By using these three criteria, it is possible to follow the nuclear device from cradle to grave. Presented below is a list of the sites and their probable functions as they relate to the nuclear programme.

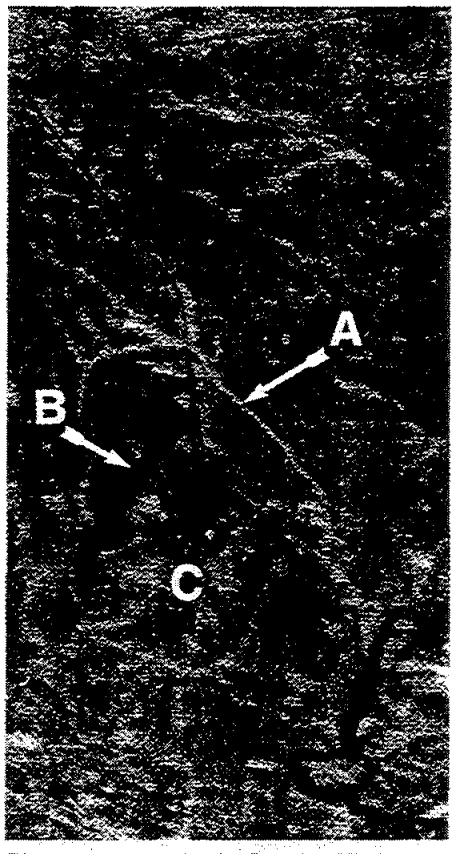
- Dimona — the site of the nuclear reactor and plutonium processing plant in the Negav.
- Soreq — called the 'Los Alamos' of Israel, this site carries out research on the design of nuclear weapons. It also houses an American-built research reactor.
- Palmikim Missile Test Range — just north of Soreq, Israel tests nuclear capable missiles like the Jericho.
- Yodefat — the location for assembling and dismantling nuclear weapons.
- Be'er Yaakov — the factory where the Jericho II missile is built.
- Kefar Zekharya — Israel's nuclear missile base and the bunker for storing Tel Nof's nuclear gravity bombs.
- Eilabun — the site of a storage site for tactical nuclear weapons.

Kefar Zekharya

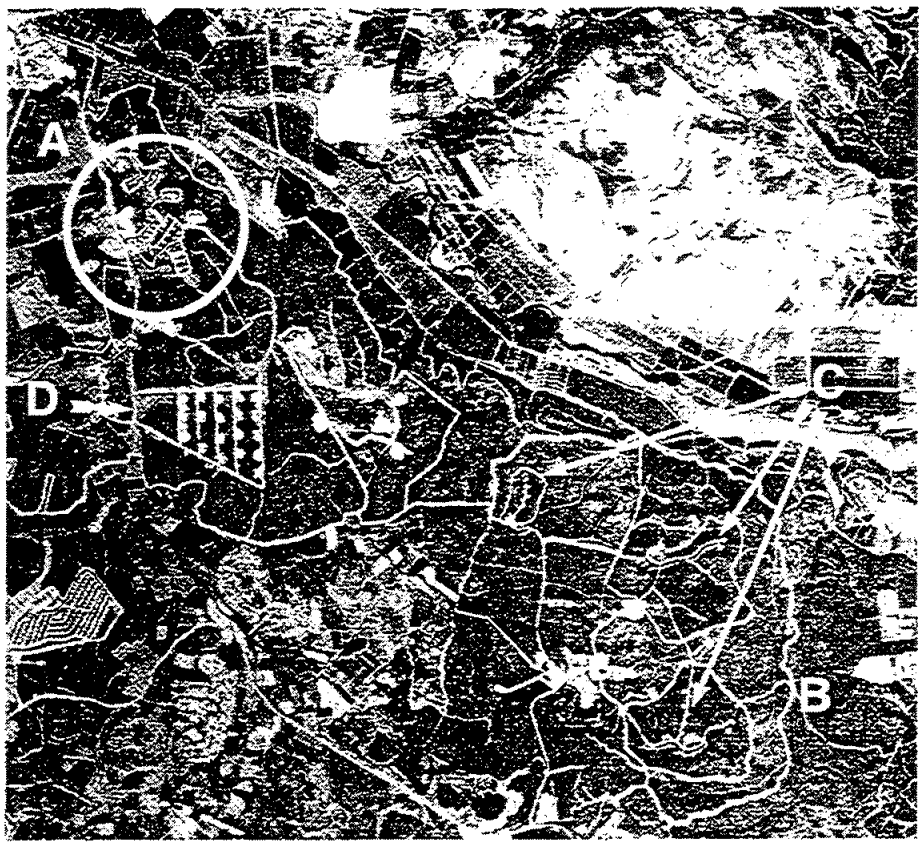
Located in the Judean hills, the missile base near Kefar Zekharya is the home for Israel's strategic nuclear deterrent. The area is naturally suited to the construction of underground bunkers because it is composed of limestone and riddled with caves. Building began in 1967 and the base became operational in the 1970s. According to current satellite imagery, it is still undergoing expansion.





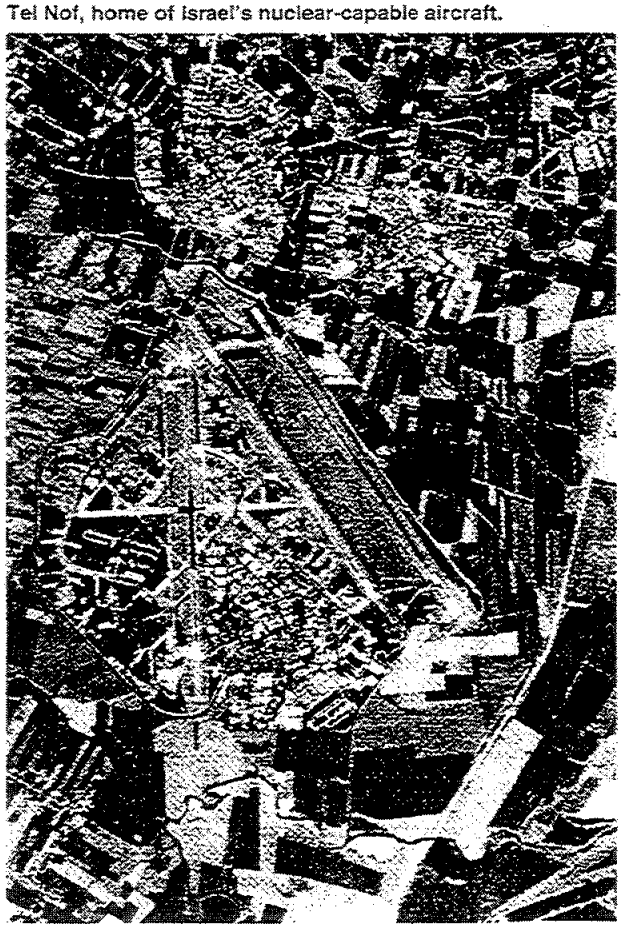


Dimona, as seen by the Russian Mk 4 satellite in 1989. A is the perimeter, B is vegetation hiding the facility from the road, and C is the actual facility.

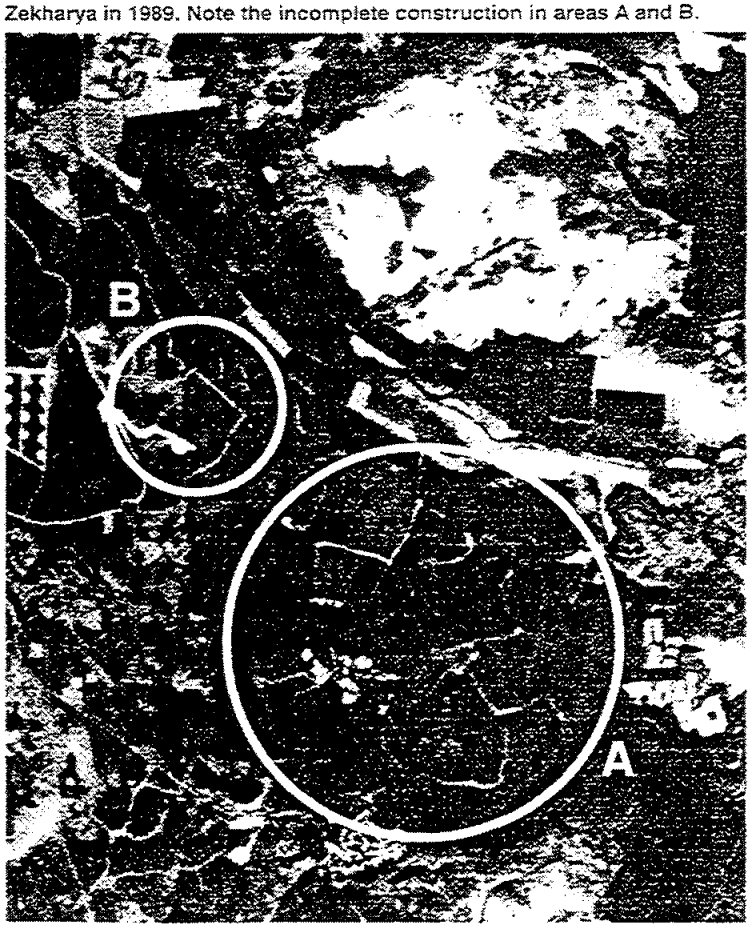


Zekharya, as seen from the Russian KFA-1000 satellite in 1992. A is the older facility begun in the 1960s, B is the perimeter surrounding the newer missile site. C are cul-de-sacs leading to underground bunkers, and D are SAM emplacements.

Tel Nof, home of Israel's nuclear-capable aircraft.



Zekharya in 1989. Note the incomplete construction in areas A and B.



ARMEMENT ETRANGER

STRATEGIC POLICY

ael's Defence Industry Adapts To New Times nd Looks For New Markets In Order To Prosper

Israeli Defence Force equipment and military system needs are limited as to quantity. Economically, this prevents efficient production of most Israeli manufactured related items without an external market. Contributing Editor Dr David Arnold examines the phenomenon and looks at the Israeli Barak-1 Missile System and the Dvora patrol boat.

THE RELATIVELY SMALL size of the Israeli Defence Force (IDF) necessarily limits the efficient internal production of many military systems without an external market for those systems. In a market economy, production economies of scale are recognised as keys to industry survival in the long-term. This applies to all industries, not only those which are defence-related.

In the case of Israeli defence industries, few military systems can be economically developed and made only for internal use, given the relatively small equipment needs of Israel. External markets are a necessity. To put total military expenditures in perspective, *Table 1* shows the 1993 total defence expenditures for several countries.

Even in the United States, home of some of the largest military systems and hardware manufacturers in the world, defence industries struggle continuously with limited production runs. The US Congress purports to strive for the lowest cost in military systems and hardware, implying optimum manufacturing levels. However, Congress often changes, sometimes annually, the number of systems to be purchased from a single assembly line. More often than not, the change results in reducing purchases, depending, among other things, on a short-term vision of US Treasury coffers. Manufacturers are then forced to raise the per system contract price to cover overhead for the entire process.

If not protected by contract, having learned hard lessons over many years, these US military systems manufacturers would face economic production challenges similar to Israeli defence industries.

Israel has, almost since the establishment of its defence industries at the beginning of the modern Israeli state in 1948, enjoyed growing success in developing foreign markets for its aerospace and defence systems. Additionally, several joint projects increasing the economic efficiency of the Israeli defence industry as a whole have been fruitful. Today, most Israeli defence manufacturers — and particularly the biggest, Israel Aircraft Industries (IAI) — derive well over half their sales from foreign markets.

On average, in fact, 70 to 75 percent of Israeli defence industry production is exported.

In the case of the Israeli-developed and manufactured *Barak-1* ship point defence missile system, the opportunity for external sales represents an example of an internationally marketed military system which (1) creates an efficiency of production for the joint manufacturers, (2) eliminates duplication of research and development expenditures by competitors; indeed, some would argue, taking an international view, it eliminates *wasted* research and development efforts, and (3) provides systems purchasers with an immediate tool for their defence; ie: the R&D has already been done.

The *Barak-1* was specifically developed to meet an identified need of the Israeli Navy. The threat of anti-ship air threats, including supersonic sea-skimming missiles, was the basis for the effort. The system allows point defence for individual vessels. Potential applications are widespread. In the 1980s, United States Navy task forces operated as a large assemblage of vessels under the umbrella protection of the AEGIS anti-air defence system. As some US Navy missions become parties of one, two or three ships, operating under a pure US flag, or under a UN request, individual protection from air threats, including sea-skimming threats, rises as a requirement on each vessel. Indeed, as airborne threats become more advanced and precocious for every combatant vessel, the currently available *Barak-1* may well be a USN purchase by the mid- and late-1990s.

Certainly *Barak's* developer, IAI, is looking at the US Navy market. A sale to the US would firmly establish the system's profitability, despite the fact that it would almost certainly be made under license in the US.

The USN looked once before at a vertically-launched point air defence missile, the British Aerospace *Sea Wolf* system, but was not convinced of the threat or the need for a response. That attitude today has changed.

The operating envelope of the *Barak-1* is impressive. The minimum intercept range is as short as 500 meters. Full range is 10 kilometers. Although vertically launched, the weapon system's thrust vector control can maintain the post-launch altitude to some 300 meters as it vectors down to capture inter-

Table 1: Total Defence Expenditures for 1993

Country	Expenditure (£ sterling)	Regular Military Personnel
Israel	£4.2-billion (US$6.6-billion)	177,500
Jordan	£277.1-million (US$425-million)	95,000
United States of America	£170.7-billion (US$268-billion)	2,000,000
Syria	£1.6-billion (US$2.3-billion)	390,000
Saudi Arabia	£10.5-billion (US$16.5-billion)	130,000
Egypt	£2.6-billion (US$4.1-billion)	435,000

Source: The Middle East Military Balance, Jaffe Center for Strategic Studies, Tel Aviv University.

Table 2: Samples of Current Israeli International Defence and Aerospace Projects

Argentina	Tank components, assistance in upgrading ASW aircraft.
Belgium	Ground forces radar technology.
Germany	Joint production in Germany of mini-UAVs.
Russia	Cooperation in production of Galaxi executive jets.
Spain	Upgrading tanks and aircraft.
USA	Aircraft components, electronics, terminal guidance bombs, UAVs

Source: The Middle East Military Balance, Jaffe Center for Strategic Studies, Tel Aviv University.

pt signals from sea-skimming threats. The system is equally impressive in tracking higher altitude inbound threats. *Barak-1* is configured in an eight-canisterised missile setting capable of above- or below-deck installation. Advanced "X" and "Ka" bands coherent pulse Doppler fire control radar provide the guidance for the system. The system's short automatic engagement cycle facilitates engagement of multiple threats, "wave" and "stream" attacks. The *Barak-1* is significantly more lightweight than comparable existing systems.

Of key importance is that (1) it is available on the market now, (2) it meets high technology airborne threats which have been identified by several navies as a current and growing concern, (3) it precludes additional short-term R&D funding needs, and (4) it provides an example of how countries with small quantitative military systems needs can efficiently self produce selected systems.

A US ship point defence system development programme could cost upwards of £382-million (US$600-million) and take seven to nine years before full deployment.

The acquisition of the *Barak-1* system would clearly free US R&D funds, Israeli officials say. And *Barak-1* could place a credible point defence system in the ranks of US Navy vessels before the close of the 20th Century. Naturally, the developers of Britain's *Sea Wolf* system say much the same thing: their system, now mature and proven, is already deployed on Royal Navy warships which operate regularly with their USN counterparts. NATO interoperability has long been a selling point between countries of the Alliance. Despite this, Israel, which has a Memorandum of Understanding (MoU) on bilateral defence procurement with the US, has fared well in its sales to the US Department of Defense.

The luxury of duplicate R&D fund expenditures is a financial relic of the past. Mind sets have been moving from "national" R&D to "international" R&D since the 1970s.

A SECOND Israeli defence industry product worthy of note is the IAI-built *Super Dvora* Mk.II patrol craft. Again, the noteworthiness comes not only in its capability, which has been combat proven, but as an existing military system capable of meeting the defence needs of several navies around the world. However, from an economic perspective, and therefore of long-term importance, is the issue of a military production run within a small country with limited internal needs.

Once again, economies of scale is a paramount issue both for the producer and the purchaser. Additionally, any savings of R&D funds related to patrol craft development from an individual country's perspective is positive. More so, from an international perspective. The final point which related directly to R&D fund expenditure risks is that the *Dvora* Mk.II performance has been proven in combat.

[It is generally accepted that the R&D costs on a small patrol boat are not large, although the incorporation in any system of first-hand combat lessons is significant. There are some economies of scale in production of warships, coupled with cost savings based on differentials in labour costs and productivity. It is likely that the most mutually effective deal on the sale of a warship design by Israel — or any other country — to the US would, in fact, be the provision of a license agreement under which royalties would be paid to the original designer and the economies of scale would be readily available to a long-run production in a US shipyard.]

US laws relating to shipbuilding and warship procurement make it unlikely that the *Dvora*, or any other foreign warship, will be acquired for the US Navy. IAI is aware of this. However, it is also aware that the US Navy has over the past decade looked at a variety of offshore designs to meet its fast patrol vessel requirements. There is, generally, a recognition that the US has lost its edge in the design of small, seaworthy fast patrol boats during its post-World War II emphasis on building blue-water fleets based around capital ships.

The *Dvora* design experience is, therefore, one of potential interest to the US. But under the most optimistic scenario for IAI, only the design and project support would be acquired from Israel. A US shipyard would build the vessel, just as US Bollinger yard did with the British Vosper International design for the US Coast Guard offshore patrol boat design some years ago.

Defence budgets, of any country, can no longer have as one of their objectives full domestic employment. Indeed, Israel and other industrial states have long recognised this fact, and that the maintenance of a skilled labour cadre is only one of the advantages of domestic production of defence goods.

THE LUXURY OF duplicative R&D fund expenditures is a financial relic of the past. Mind sets have been moving from "national" R&D to "international" R&D. This was recognised in the 1970s and 1980s within NATO, and subsequently in the US relationships with its other allies.

In the US-Israel relationship, the duplication of R&D funds is even more unacceptable because of the annual foreign military aid and security assistance received by Israel from the US [£1.15-billion (US$1.8-billion) in 1994, plus a gift of surplus weapons from the US drawdown of its European arsenal, totaling £446-million (US$700-million) over several years].

It is significant that the US, in an effort to make its aid programme with Israel more effective, did not merely transfer funds to Israel when that country sought to improve its naval patrol capability. The US has provided the Israeli Navy with three new large corvettes of the *Sa'ar 5* class, but these Israeli-designed warships were built by Litton Ingalls in the US.

The US has, in the past two decades, looked increasingly favourably on the procurement of defence-related items from Israel. The process began with low-technology items, such as Unmanned Aerial Vehicles (UAVs) but has since progressed to more sophisticated systems. The sale of *Barak-1* technology, or even the modest *Dvora* patrol boat design and manufacturing system, is no longer an exotic concept.

What is perhaps even more likely to be of interest to the US is the Israeli experience in advanced anti-ballistic missile (ABM) concepts, such as the IAI *Arrow* tactical system. That project is substantially ahead of US tactical systems such as the Raytheon *Patriot* series of SAM-turned-ABM missile systems.

Today, as the Israeli prospects of selling the *Dvora* and *Barak-1* designs to the US show, Israel is looking at two market areas: one for the sale of its *systems technology*; and the other for the ongoing sale of Israeli-*manufactured* defence items. Israeli policy is to refrain from publicising its defence exports, but those examples which are known have shown Israel to be adept in selling hardware or software and services, as the market dictates.★

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31 JAN 19

L'Afrique du Sud a reçu de l'uranium enrichi français dans les années 80

DURANT LES ANNÉES 80, l'Afrique du Sud a été approvisionnée par les Etats-Unis en uranium enrichi venant de France, ce qui a permis au pays de l'apartheid de poursuivre son programme nucléaire, malgré le boycottage international et les sanctions économiques qui frappaient alors le régime de Pretoria.

Un accord secret, conclu en 1981, a permis au gouvernement de Pretoria de recevoir pour 250 millions de dollars d'uranium enrichi, fourni par la compagnie française Framatome et livré à la centrale nucléaire de Koeberg, dans la province occidentale du Cap, révèle le journaliste Stuary Murray, dans un livre intitulé *Koeberg, l'histoire nucléaire à succès d'Eskom*, dont le journal sud-africain *Sunday Times* a publié des extraits dans son édition du 8 janvier. La Compagnie sud-africaine d'électricité et d'énergie, Eskom, qui appartient à l'Etat, a fait entrer en activité sa centrale de Koeberg, construite par les sociétés françaises Framatome, Alsthom-Atlantique et Frameteg; le 14 mars 1984 (*Le Monde* du 17 mars 1984).

En contrepartie, l'Afrique du Sud a accepté d'engager des négociations sur l'indépendance de la Namibie ainsi que sur l'inspection de sa centrale ultra-secrète d'enrichissement d'uranium située à Valindaba, près de Johannesburg. Deux semaines après la livraison de l'uranium, des experts américains se sont effectivement rendus à Valindaba. Quatre semaines plus tard, Pretoria commençait à discuter de l'avenir de la Namibie avec le secrétaire américain aux affaires africaines d'alors, Chester Crocker. La Namibie devait accéder à l'indépendance le 21 mars 1990, après la signature, le 22 décembre 1988 à New York, par l'Afrique du Sud, Cuba et l'Angola, d'un accord tripartite qui prévoyait notamment le désengagement simultané des troupes cubaines et sud-africaines d'Angola.

Interrogé par le *Sunday Times*, Pik Botha, l'actuel ministre de l'énergie et des mines, qui était au moment de l'accord chef de la diplomatie, a confirmé les propos de M. Murray, affirmant que, bien qu'il n'y ait pas eu *« d'accord explicite »*, la fourniture d'uranium enrichi avait facilité les discussions sur la Namibie.

Cette livraison a sauvé le programme nucléaire sud-africain, estime l'auteur de l'ouvrage. Le gouvernement de Pretoria essayait alors vainement de faire honorer par les Etats-Unis un contrat datant de 1974 pour de l'uranium enrichi, et pour lequel il avait versé une avance de 5 millions de dollars.

En 1978, le Congrès américain avait adopté une loi sur la non-prolifération nucléaire interdisant la fourniture d'uranium enrichi à tout pays qui n'accepterait pas de laisser inspecter ses sites nucléaires par des experts américains. Une compagnie américaine spécialisée dans le commerce du nucléaire, Edlow Resources, dont le siège social est à Washington, était alors intervenue dans la négociation et, dans l'impossibilité de livrer de l'uranium américain, s'était adressée à Framatome. – *(AFP, Reuter.)*

l'Humanité

Pas de paix sans désarmement

Correspondance particulière.

BAHIG NASSAR, Egyptien, est coordinateur des mouvements de la paix et de la campagne pour le désarmement nucléaire et la non-prolifération dans les pays arabes. Des organisations non gouvernementales et des centres de recherches sont à l'origine de ces campagnes.

Bahig Nassar a participé, ce week-end à Fréjus (Var), à une rencontre, à l'initiative de la coordination régionale CSCE du Conseil mondial de la paix, sur le thème : « Le mouvement de paix face aux échéances de 1995 ».

« La question de la prolifération nucléaire est très importante pour le Proche-Orient », constate-t-il. « Il n'y aura pas de paix durable dans cette région tant qu'Israël possédera l'arme nucléaire. La stabilité ne peut se concevoir sous un parapluie nucléaire. » Il rappelle à ce propos que Tel-Aviv refuse toujours de signer le traité de non-prolifération. Les mouvements que représente Bahig Nassar ont engagé une bataille spécifique sur le sujet. Mais, au Proche-Orient, le mot paix dépend de nombreux paramètres et, en premier lieu, du problème palestinien. « Les militants pacifistes se battent bien évidemment pour la reconnaissance des droits de ce peuple. Malheureusement, il faut reconnaître que ce droit n'est pas reconnu. Les récents événements en témoignent. »

Autre facteur qui, selon Bahig Nassar, contribuerait à l'instauration d'une paix réelle : les relations économiques entre les différents pays et, plus particulièrement, entre Tel-Aviv et les capitales arabes. « Israël est un pays développé, les autres sont en voie de développement. Dans ce cadre, il ne peut y avoir de relations équitables. Vous comprendrez qu'il faut créer les conditions pour éviter que l'un domine l'autre ou les autres. Ainsi, Israël suggère la création d'un « marché du Proche-Orient ». Nous ne sommes pas contre, mais il faut éviter la dissymétrie. C'est pourquoi nous pensons que les liens entre les pays arabes, fortement distendus après la guerre du Golfe, se resserrent. Mais la politique israélienne, menée par Yitzhak Rabin, contrecarre cette orientation. Voilà encore une attitude qui représente un obstacle supplémentaire pour la paix. »

Bahig Nassar, qui vit en Egypte, est préoccupé par l'intégrisme. En début de semaine, des affrontements ont fait plusieurs morts dans le sud du pays. Pour lui, le danger c'est « la politique des intégristes. Mais je crois que cette question est complexe. Il est clair qu'ils sont contre le progrès. Cela ne concerne pas simplement les pays arabes, puisque ce phénomène se retrouve jusqu'en Indonésie et en Europe ».

PIERRE BARBANCEY

10 JAN 1995

l'Humanité

10 JAN 1995

Washington - Tel-Aviv

Pas de dénucléarisation pour Israël

LE secrétaire américain à la Défense, arrivé dimanche en Israël, a survolé hier le Golan syrien, occupé par les troupes de Tel-Aviv depuis la guerre de 1967. L'objet de sa visite a essentiellement porté sur la question de la prolifération nucléaire dans la région.

Seule puissance atomique du Proche-Orient, Israël — qui possède plusieurs centaines d'armes nucléaires et des vecteurs capables de porter ces charges à des milliers de kilomètres — continue à refuser de souscrire au Traité de non-prolifération (TNP) et d'envisager un quelconque désarmement dans ce domaine. Ces refus ont déjà entraîné celui des autorités égyptiennes qui ont officiellement affirmé lundi que tant que Tel-Aviv ne signerait pas le TNP, Le Caire en ferait de même.

Pour William Perry, le danger ne vient toutefois pas d'Israël. Tout en affirmant qu'il souhaitait que le TNP soit mis en application par l'ensemble des pays du Proche-Orient, il a souligné qu'il n'en imposerait pas la signature à Tel-Aviv et encore moins une éventuelle dénucléarisation.

« Evolution inacceptable »

En revanche, a-t-il indiqué, il s'agit pour Israël comme pour les Etats-Unis « d'empêcher que de nouvelles technologies tombent » entre les mains de « nations dévoyées » ou de « terroristes ».

Le ministre américain s'est déclaré « très préoccupé par le potentiel » qui pourrait permettre à « l'Iran de devenir une puissance nucléaire ». Les Etats-Unis, a-t-il ajouté, « considèrent cette évolution comme inacceptable ». Même si cette éventualité n'est pas envisagée à court terme, selon William Perry, « il y a plusieurs choses que (les Iraniens) pourraient faire pour court-circuiter ce délai ».

10 JAN 1995

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ISRAEL GUERRE DU GOLFE
FAP8782

CONFLITS

Israël s'apprêtait à attaquer l'Irak lorsque la guerre du Golfe s'est achevée, révèle l'ancien ministre de la Défense

TEL AVIV 07101 (AP) -- Le gouvernement israélien s'apprêtait à lancer une attaque aérienne massive contre l'Irak quand la guerre du Golfe a pris fin, a révélé l'ancien ministre israélien de la Défense Moshe Arens.

Dans un livre dont le quotidien Yediotn Ahronoth a publié vendredi plusieurs extraits, le ministre de la Défense de l'époque donne une version des plus détaillées du plan élaboré par Israël pour répondre aux 39 attaques de missiles Scud lancées contre Tel-Aviv par l'armée de Saddam Hussein durant le conflit de 1991.

Moshe Arens écrit ainsi que le 1er février 1991, presque deux semaines après la première attaque contre Tel-Aviv, il avait approuvé officiellement le plan de l'armée israélienne prévoyant une attaque aérienne massive et un débarquement de forces spécialisées dans l'ouest de l'Irak, où les missiles étaient basés.

Deux Israéliens 'seulement' étaient morts dans ces attaques irakiennes, mais l'ancien ministre de la Défense explique qu'"au delà des calculs logiques", il avait "le sentiment profond qu'Israël ne pouvait rester sans bouger".

Mais, explique Moshe Arens, l'assaut prévu devait être retardé, par l'attitude surprenante d'un Ytzhak Shamir -alors Premier ministre- soucieux de se conformer aux volontés américaines. Le Premier ministre souhaitait, selon lui, faire oublier le refus catégorique israélien d'interrompre les colonies de peuplement dans les territoires occupés, en dépit de l'opposition américaine, en cédant aux exhortations du président américain George Bush.

Les Etats-Unis craignaient en effet que l'entrée d'Israël dans la guerre aux côtés des "alliés" ne brise l'unité de la coalition contre l'Irak, qui comprenait des états arabes, hostiles à l'Etat juif..

Moshe Arens raconte comment il devait perdre patience devant l'incapacité des Américains à détruire les rampes de lancement irakiennes, et leur refus de fournir des photos satellites récentes de l'ouest de l'Irak, ou d'assurer un couloir aérien protégé pour les avions israéliens.

Aussi, lorsque le président Bush expliqua lors d'une réunion du bureau ovale le 11 février qu'Israël ne pouvait améliorer les efforts de la coalition, Moshe Arens rétorqua: 'nous comptons envoyer toute notre force aérienne sur cette mission".

Privé de la coopération américaine, le gouvernement israélien devait décider de survoler la Jordanie, et le 27 février, Ytzhak Shamir finissait par accepter d'envoyer un avion israélien entrer dans l'espace aérien jordanien, afin de tester la réaction du roi Hussein.

Mais ce vol, reporté en raison de mauvaises conditions climatiques ne devait jamais avoir lieu: la guerre du Golfe avait pris fin. AP

sb/v0248

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FRA0114 4 I 0320 JOR /AFP-HA15
Iran-Israël

L'Iran fermement décidé à riposter à une éventuelle attaque israélienne

TEHERAN, 8 jan (AFP) - L'Iran a affirmé qu'il était fermement décidé à riposter à une éventuelle attaque israélienne contre ses installations nucléaires et un journal intégriste a agité la menace d'une destruction de l'Etat hébreu.

"Israël ferait une erreur fatale s'il pensait pouvoir mettre à exécution de telles menaces sans craindre une riposte", a affirmé samedi la représentation iranienne aux Nations unies dans un communiqué officiel publié à New York.

Le quotidien New York Times avait rapporté, jeudi, que des responsables israéliens avaient affirmé qu'Israël pourrait envisager une attaque contre les centrales nucléaires de l'Iran si ce pays n'arrêtait pas son programme nucléaire.

"Israël sait pertinemment que si une telle menace est mise à exécution, le compte à rebours commencera pour sa destruction", a affirmé dimanche le journal iranien Jomhouri-Eslami, proche des intégristes.

Selon le quotidien, "les généraux pusillanimes d'Israël comprennent bien qu'il y a une différence entre les jeunes Iraniens courageux et les rois arabes dépourvus de fierté. En Iran, la lutte contre Israël est un devoir".

"En cas de confrontation sérieuse avec Israël, le monde islamique suivra et les partisans de l'anéantissement d'Israël prendront le chemin de ce pays pour en finir à tout jamais", a soutenu Jomhouri-Eslami.

19/63 - (C) C.NEWSLETTER
NO - NEW-2637321
ET - Gurwin-1 to launch
JT - Satellite Week
ED - Warren Publishing, Inc
SO - Subscription: $750 per year as of 1/92. Published weekly. Contact Warren Publishing, 2115 Ward Court, N.W., Washington D.C. 20037. Phone (202) 872-9200.; VOL. 17; NO. 3; DP. 16/01/95
SN - 0193-2861
TC - |Gurwin-1 Israeli satellite will be launched March 28 from Russia and carried into orbit by SS-25 **ballistic** **missile**. Launch will be made from Russia to avoid risk of scattering debris on Israel's Arab neighbors. Satellite will act as testing platform for 12 Israeli technology company as well as academic researchers.

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DE - Defense and Aerospace
CI - DA

13/35 - (C) C.DMT
NO - DMT-0451414
ET - Israeli Envoy Denies Aid Discussed With DPRK
DT - JOURNAL ARTICLE
LA - ENG
PO - IL; KP
JT - Pacific Rim Intelligence Report
SO - PP. N/A; DP. 20/08/93
AB - Seoul, Aug. 19 (YONHAP)Israel never discussed economic assistance or diplomatic normalization with North Korea in return for a halt to missile sales to the Middle East, its ambassador to Seoul Asher Na'im said Wednesday. Israel met with North Korea for the first time last October without telling South Korea or the United States "to see what it would lead to," said Na'im in an interview with YONHAP at his ambassadorial residence. Seoul and Washington, "not happy" as Na'im put it at Israel's separate channel of negotiation with Pyongyang, reacted immediately, and Tel Aviv gave prior notice to the two allies before the second meeting in Beijing in June. But Washington said it will address the missile sale issue with Pyongyang and that it is better to act together than separately,"and we accepted that," the ambassador said, emphasizing that talks with North Korea will stop for now. The first meeting was arranged by "an American businessman," according to Na'im, who relayed to the Israeli Government that North Korea was willing to talk with Tel Aviv. "It was a dialogue between the deaf," Na'im said of the two sessions. "Israel talked about North Korea's missile sales. North Korea talked about economic assistance, developing mines and other things. We said can we first talk about this (missile sales). They didn't answer," he said. North Korea, even as it was contacting Israel for further talks through its embassy in Beijing Aug. 11, is believed to have shipped its upgraded Soviet **Scud** missiles to Syria, most likely destined for **Iran**. "North Korea is an adversary of Israel, it is friends of those who don't like Israel," the envoy said. The two countries never discussed diplomatic normalization or scale of economic assistance, he said, "we never reached that. "
DE - Missiles*; Foreign Economic and Financial Assistance; Intnl Economic Relations*; Foreign Trade; Israel*; Middle East; North Korea; Long full text
IP - Promt; Newsletter
PES - 3761100*; 9103100; 8ISR*; 8 ME; 9NOK; 95*; 64
NCP - Missiles 3761100; Foreign Economic and Financial Assistance 9103100
NCE - Intnl Economic Relations 95; Foreign Trade 64
NCG - Israel 8ISR; Middle East 8 ME; North Korea 9NOK

SERVEUR CEDOCAR

OK

1/3 - (C) C.DMT
NUMERO SIGNALEMENT DMT-0568795
TITRE ANGLAIS Israel
TYPE DE DOCUMENT OTHER
CODE LANGUE ENG
CODE PAYS D'ORIGINE IL
TITRE DU PERIODIQUE Air Force Magazine
SOURCE VOL. 77; NO. 6; PP. 56; DP. 06/94
ISSN 0730-6784
RESUME Israel's Jericho 1 is a short-range, solid fuel, road mobile missile capable of carrying to a maximum range of 500 km a single conventional, chemical or nuclear warhead.In terms of performance and size, the Jericho 1 has benn described as being similar to the US' Persjing 1.As for the Jericho 2, it is a road mobile IRBM, with 2 stages, and is capable of carrying 1,500 km, a 1,000 kg warhead.
NOM DE MARQUE Jericho 2; Jericho 1
DESCRIPTEUR(S) IRBMs and Other Strategic Missile*;Tactical Surface to Surface Missiles;Product Design and Development*;Israel*
INDICATION PARTICUL Unique
CODES D'INDEXATION 3761119*; 3761160; 8ISR*; 33*
NOM CODE PRODUIT IRBMs and Other Strategic Missile 3761119; Tactical Surface-to-Surface Missiles 3761160
NOM CODE ECONOMIE Product Design and Development 33
NOM CODE GEOGRAPHIE Israel 8ISR

2/3 - (C) C.DMT
NUMERO SIGNALEMENT DMT-0563209
TITRE ANGLAIS ISRAEL LOOKS TO US SPACE MARKET: But Clinton OK opens a two-way stree t
TYPE DE DOCUMENT OTHER
CODE LANGUE ENG
CODE PAYS D'ORIGINE IL; US
TITRE DU PERIODIQUE Interavia, Business & Technology
SOURCE PP. 8; DP. 03/94
ISSN 0983-1592
RESUME The recent decision by US President Clinton, allowing Israeli participation in US commercial space programmes, has been greeted with tempered enthusiasm in Israel.Although the US decision clearly opens doors previously closed to Israeli companies, Israeli experts believe it is premature to determine whether the changed US environment will bear real fruits for Israel's defence and aerospace industries in the future.On a practical commercial level, Israel Aircraft Industries (IAI) is expected to reopen negotiations with US-based TRW and Motorola for marketing of its diverse space products.In years past, IAI has attempted, unsuccessfully, to enter the US market with its advanced Shavit launcher.State-owned TAAS and Rafael will probably also begin activities in the US space market.Rafael produces the third-stage engine for the Shavit and other space systems.Privately-owned El-Op's diverse electro-optical reconnaissance systems and Tadiran's datalinks and control stations are likewise considered suitable for the US market.During the past few years, foreign sources have repeatedly reported that Israel's low-orbit boosters are a variant of its Jericho-2 surface-to-surface missile capable of carrying unconventional warheads, including nuclear ones.To date, Israel has reportedly invested more than a billion dollars

	in space development programmes.
NOM DE MARQUE	Jericho 2; Shavit
DESCRIPTEUR(S)	Missiles Space Vehicles and Parts*;Intnl Economic Relations*; Israel*;United States;Long full text
INDICATION PARTICUL	Promt
CODES D'INDEXATION	3760000*; 8ISR*; 1USA; 95*
NOM CODE PRODUIT	Missiles, Space Vehicles and Parts 3760000
NOM CODE ECONOMIE	Intnl Economic Relations 95
NOM CODE GEOGRAPHIE	Israel 8ISR; United States 1USA

3/3 - (C) C.DMT

NUMERO SIGNALEMENT	DMT-0350393
TITRE ANGLAIS	NASA Says No to Shavit Rocket Launcher
TYPE DE DOCUMENT	JOURNAL ARTICLE
CODE LANGUE	ENG
CODE PAYS D'ORIGINE	US; IL
TITRE DU PERIODIQUE	ICEN Israel Commercial Economic Newsletter
SOURCE	PP. N/A; DP. 14/12/90
ISSN	0792-3465
ORGAN GOUVERNEMENT	Space Agency
CONTRACTANT	Israel Aircraft Ind
RESUME	Israel Aircraft Industries (IAI) failed in its bid for a contract to supply NASA with a civilian satellite rocket-launcher; an American firm won the tender.As reported in Aviation Week October 1, IAI had offered NASA the civilian version of the Jericho-2.According to Aviation Week, the Shavit is none other than the three-stage rocket Jericho-2, which has successfully launched two Israeli satellites -- Ofek-1 and Ofek-2. The magazine reports that Israel wanted to keep its bid for the NASA tender secret, but the news leaked.Specific details about the Israeli missile were also leaked.Israel has never officially confirmed the existence of the Jericho rocket.According to experts, the chances that NASA would pick a launcher from a foreign country were slim from the start.Nevertheless, IAI spent $1 million preparing for the tender. THIS IS THE FULL TEXT: Copyright 1990 by Sagit Publishing Internation
NOM DE MARQUE	Jericho 2
DESCRIPTEUR(S)	Launch Veh 1 Mil Lb*;Order and Contracts Received*;United States*; Israel
INDICATION PARTICUL	Promt; Company
CODES D'INDEXATION	3764520*; 1USA*; 8ISR; 61*
NOM CODE PRODUIT	Launch Veh, 1 Mil Lb- 3764520
NOM CODE ECONOMIE	Order and Contracts Received 61
NOM CODE GEOGRAPHIE	United States 1USA; Israel 8ISR

16/23 - (C) C.DMT
NO - DMT-0382147
ET - Iraq complains to US about Israeli reconnaissance
DT - JOURNAL ARTICLE
LA - ENG
PO - IQ; IL
JT - Flight International
SO - VOL. 140; NO. 4289; PP. 16; DP. 22/10/91
SN - 0015-3710
AB - The US has asked Israel to stop intelligence-gathering flights over Iraq. The US demand follows an Iraqi complaint to the UN.
The Iraqis claim that, on 4 October, four Israeli Air Force F-15s performed a reconnaissance flight over western Iraq. According to the Iraqi complaint, the F-15s entered Iraqi airspace after flying over **Syria**.
They also claim that the Israeli aircraft over flew the H-1 and H-2 airbases in western Iraq. From this area, the Iraqis launched the **Scud** surface-to surface missiles towards Israel during the Gulf War. According to the Iraqi complaint the Israeli fighters entered Saudi Arabian and Jordanian airspace on their way back to base.
Officially, Israel refuses to comment on the US demand and on the details of the Iraqi complaint.
Israeli defence minister Moshe Arens said, on 9 October, that the Israeli Government will take ". . . all the necessary steps under the current circumstances to defend the security of Israel. According to our assessment the Iraqis are still capable of launching missiles against Israel. "
Photo THIS IS THE FULL TEXT: Copyright 1991, Reed Business Publishing, Ltd.
DE - Reconnaissance Aircraft*; Defense Analysis; Intnl Politics*; Iraq*; Israel
IP - Promt
PES - 3721182*; 9104340; 8IRB*; 8ISR; 96*
NCP - Reconnaissance Aircraft 3721182; Defense Analysis 9104340
NCE - Intnl Politics 96
NCG - Iraq 8IRB; Israel 8ISR

Syrians Focus on Missile, Tank Buys

By RICHARD C. BARNARD
And BARBARA OPALL
Defense News Staff Writers

TEL AVIV, Israel — The government of Syria has spent $1.4 billion in the past three years on a military modernization effort and will begin full-rate production of its Scud-C tactical ballistic missile by mid-1996, Israeli intelligence officials say.

In interviews here and in Jerusalem, Israeli officials said Syria has increased spending on its Scud-C program, despite an overall decline in its defense budget that Israeli officials pegged at about $3 billion in 1994, or about 44 percent of its national budget.

"Syria already has produced a small quantity of the missiles and they already have their own launchers. In 12 to 24 months, they will enter into full production capability," an Israeli official said in a June 26 interview.

Production of the Scud-C, rights for which were acquired in the late 1980s from North Korea, and other surface-to-surface missiles has assumed the highest military priority in Syria.

According to the military official, Syrian leaders view the ground-based missiles as a counter to the strike capabilities of the Israeli Air Force.

The official added that the push for strategic capability does not negate Syria's desire to pursue political solutions with Israel.

"If our government gives back the Golan Heights, there is no doubt in my mind Syria would respond with a full peace, including normalized relations and the crafting of security arrangements. So it is up to the political leaders: [Syrian President Hafez] Assad [Israeli Prime Minister Yitzhak] Rabin and the Israeli government," he said.

Israeli intelligence reports show that Syria has spent about $1.4 billion of the $2.3 billion received from Saudi Arabia after the 1991 Persian Gulf war. These funds are earmarked for military modernization in attempts to become a major military power in the region.

"Syria has purchased about 300 T-72 tanks from Russia and a similar number from [the Czech Republic]. They've bought artillery pieces from Bulgaria. But we haven't yet seen any sign of a solid deal or deliveries of the Russian Su-27, MiG-31 [fighters] or S-300 [multiple launch rocket] systems," the official said.

Maj. Gen. Herzl Bodinger, Israeli Air Force commander, told reporters June 27 Syria has renewed military buys from Russia in a two-part deal to provide spare parts for existing systems and new systems at a later date.

DEFENSE PROCUREMENTS

The Daily Listing of Defense & Aerospace Business Opportunities

*** VACUUM TUBE ELECTRONICS R&D SOUGHT.** The goals are to develop (1) the technology base required for advanced high-power millimeter-wave amplifiers suitable for radar and electronic warfare uses; (2) technologies and techniques to design for low cost and reliability; (3) to develop integrated software development system for the development and production of microwave and millimeter-wave vacuum tubes; and (4) generic technology to sustain the advancement of RF vacuum electronics. Contact: Richard Abrams, Jr., Tri-Service/DARPA/RF Vacuum Electronics Initiative, the Navy MMIC Office of Naval Air Systems Command, Code ADPO-48V, Contracting Officer, Naval Research Laboratory, 4555 Overlook Avenue, S.W., Washington, D.C. 20375-5000. SOL BAA 16-91.

*** RFP FOR DMSP SET FOR THIS MONTH.** The Air Force intends to let an RFP on or around March 29 for a contractor to perform risk reduction for a block six satellite of the Defense Meteorological Satellite Program (DMSP), to meet requirements after the year 2000. CONTACT: Stephen Miller, 213/336-8613, HQ Space Systems Division, attn. PKWA, P.O. Box 92960, Los Angeles, CA 90009-2960.

*** JSTARS GROUND STATION ADVICE WANTED.** A draft of the Joint STARS Ground Station Module (GSM) Required Operational Capability (ROC) will be available march 7, 1991. The document will be made available to U.S. industry only for comments and recommendations concerning technology and costs trade-offs that may be useful in refining the Army requirement. Contact: Ms. Newman, 201/532-4142, Commander, HQ, CECOM, ATTN: AMSEL-TC-TILO-, CECOM Bldg., Tinton Avenue, Tinton, N.J. 07703-5000.

EARLY F-14s UNABLE TO USE AMRAAM/OTHER NEW SYSTEMS.

Early model F-14 Tomcats are unable to accommodate newer air-to-air and air-to-ground missile systems, such as the Advanced Medium Range Air-to-Air Missiles (AMRAAM), because those systems are digitally operated and cannot interface with analog-driven systems, a Senate Armed Services Committee staffer tells Defense Daily.

The newer, digital F-14Ds can accommodate newer missiles, but, with OSD canceling the upgrade of early F-14s to the D model, some early model F-14s run the risk of entering the next century without the benefit of compatibility with advanced armaments, one staffer said.

However, industry sources tell Defense Daily the Navy has asked Grumman to develop a "small product improvement" that would allow the older F-14s to use advanced missile systems. Industry sources say the improvement, a new data bus, has not been "engineered" yet, but work has begun on such an upgrade. Cost estimates were not available on the upgrade, but sources say they would be "relatively small." The Navy had not commented by our press time.

Separately, the Navy awarded Hughes Aircraft Co. Tuesday a $53.8 million contract to complete manufacture of the AN/APG-71 radar for F-14D aircraft. The funds enable Hughes "to complete in-production FY '91 APG-71 radar as part of the termination of the F-14D Remanufacture program" on February 26, the Navy said. The APG-71 is installed on new production and remanufactured F-14Ds.

* * * * *

SYRIA GETS 24 NORTH KOREAN SCUD-Cs. Syria recently took delivery of two dozen North Korean Scud-C missiles and about twenty associated launchers, Israeli sources told reporters accompanying Secretary of State James Baker on his trip through the Middle East. Scud-Cs are thought to be more accurate than the Iraqi Scud-Bs used in the Gulf war.

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The New York Times

January 31, 1992, Friday, Late Edition - Final

SECTION: Section A; Page 1; Column 5; Foreign Desk

LENGTH: 1086 words

HEADLINE: CHINA SAID TO SELL PARTS FOR MISSILES

BYLINE: By ELAINE SCIOLINO with ERIC SCHMITT, Special to The New York Times

DATELINE: WASHINGTON, Jan. 30

BODY:

American intelligence reports indicate that China is continuing to sell missile technology to Syria and Pakistan despite statements by Chinese leaders that they are willing to curb missile exports, according to senior Administration officials.

Beijing has recently delivered to Syria about 30 tons of chemicals needed to make a solid-fuel missile and plans to deliver an additional 60 tons in March or April, said the officials, who added that the amount was enough to make a "significant" number of intermediate-range missiles.

It has also delivered to Pakistan guidance units that could be used to control the flight of M-11 ballistic missiles, they added.

The issue is important because the United States is ready to lift the sanctions on the sale of American satellite parts and high-speed computers that were imposed last spring after the United States learned that China had secretly delivered launchers for M-11 missiles to Pakistan.

President Bush, who favors removal of the sanctions, will raise the issue of China's proliferation practices when he meets at the United Nations on Friday with China's Prime Minister, Li Peng. Leading lawmakers and human rights organizations have sharply criticized the meeting, the first between the leaders since Chinese troops crushed the democracy movement in China in June 1989.

During the visit of Secretary of State James A. Baker 3d to Beijing in November, Chinese officials said they would abide by the provisions of a 1987 international agreement restricting the export of missiles and missile technology, but only if the Administration lifted the sanctions.

The Administration has made the issue of nonproliferation a linchpin of its post-cold-war foreign policy, and is especially eager to halt the transfer of nuclear, chemical and biological weapons and ballistic missiles to the developing world.

interavia Air Letter

Thursday, 3 October, 1991 Page 6 No. 12,343

MILITARY AFFAIRS

Raytehon wins Phoenix support contract

Lexington, MA: Raytheon Co has received a $2.6 million US Navy contract for 750 Phoenix reprogrammable programme memory retrofit kits. These enable technicians to change Phoenix tactical software without taking the missiles apart. The kits significantly reduce the time and money it takes to modify software to meet changing military needs, according to a Raytheon statement.

Unisys offers defence business to markets

Washington, DC: In an attempt to raise approximately $440-500 million, debt-laden Unisys Corp is to offer its entire defence systems business to US and overseas public investors. Unisys said the newly floated company will provisionally be called Paramax Inc, although the name could change. (Paramax Electronics is the name of the Montreal-based subsidiary of Unisys Canada that is combat systems integrator for the Canadian Patrol Frigate)

Unisys aims to sell 20 million shares in its initial public offering (IPO) at $22-25 per share. As part of the deal, Paramax will also transfer $332 million in cash to Unisys. Frederick Jenny, president of Unisys Defense Systems, will become president of Paramax.

There had been speculation that the Washington-based Carlyle Group would become a substantial investor in a publicly offered Unisys defence company, and that Carlyle partner and former US defence secretary Frank Carlucci might become chairman of the new firm.

However, Carlyle vice president Alan Menkes told the *Air Letter* that his company is not involved in the deal. "It'll be the usual IPO mix of individual and institutional investors," he said.

Byron Callan, defence electronics analyst for Prudential Securities in New York, said the IPO "at first glance appears to be a failure to find a (corporate) buyer at a price acceptable to Unisys."

Unisys recently pleaded guilty to a variety of civil and criminal charges and agreed to pay $190 million in fines following disclosure of its role in the 'Ill Wind' procurement scandal.

The company is involved in a wide array of US military programmes, including ruggedised computers, command and control systems, surveillance and radars, shipboard combat systems, electronic warfare, and submarine navigation systems.

Boeing develops new wave phased array

Seattle, WA: Boeing Defense & Space Group is developing a flat millimeter wave phased-array communications antenna. The antenna has potential military and civil aerospace applications, and reduces aerodynamic drag by conforming to an aircraft's fuselage. The $370,000 joint US Defense Department and NASA contract was awarded Monday.

While military researchers are looking into millimeter wave technology for low-probability-of-intercept communications among aircraft flying in formation, civil aircraft designers believe a millimeter wave antenna could give the cockpit crew more satellite communications capacity, and give passengers previously unavailable forms of air-to-ground communication.

Boeing's antenna will be installed on a NASA aircraft for experiments with the Advanced Communications Technology Satellite (ACTS), part of an experimental orbiting communications system aimed at expanding future millimeter wave communications for civil aircraft.

The contract calls for Boeing to develop the antenna specifically for high-performance military aircraft. Company engineers will use technology they developed previously under a $4.7 million Air Force contract.

Syria, Iran to jointly produce Scud-C

Jerusalem: Syria and Iran have decided to jointly develop ground to ground missiles. According to US and Israeli sources, a joint venture factory would produce Scud-C type missiles for use by the two countries. It is the first such agreement between Iran and an Arab country on the joint development of weapons.

Israeli sources said that Syria has been increasing its efforts to build ground to ground missiles. The sources noted that after the Persian Gulf war, Syria signed an agreement with North Korea for Scud-C missiles and several dozen arrived in Syria at the beginning of the summer. A second shipment is due to reach Syria this month.

Israeli sources noted that this deal differs from past agreements with the Soviet Union in that North Korea agreed to help in the setting up of a missile factory in Syria. Iran is now said to be connected with the deal.

In the past Syria has tried to buy Chinese M-9 missiles. Talks are still underway although no final agreement has been reached. The medium range missile is still under development.

Cuts contemplated by Spanish air force

BY DOUGLAS BARRIE

Several Spanish air force (Ejereito del Aire) procurement programmes are being revaluated as part of a general defence review.

The procurement of up to a further six further Lockheed C-130 Hercules — an upgrade of its Lockheed P-3A Orion maritime reconnaissance and anti-submarine warfare aircraft — and the number of European Fighter Aircraft (EFA) for the air force are all in the process of being reconsidered.

Spain had an original requirement for 100 EFAs although this figure has always been regarded as contingent upon a number of factors.

One EFA official says that the total figure of 765 for the four partner nations — the UK, Spain, Italy and Germany — was always going to be massaged in the political climate, and that "...Spain is likely to come down in terms of numbers". He describes reports of a reduction to 72 aircraft for the Spanish air force, however, as being "plucked out of the air".

He adds that no such figure has emerged during discussions between Eurofighter and the NATO Eurofighter Management Agency, which is working towards a finalised set of procurement figures for a production investment contract, due to be finalised by the end of next year.

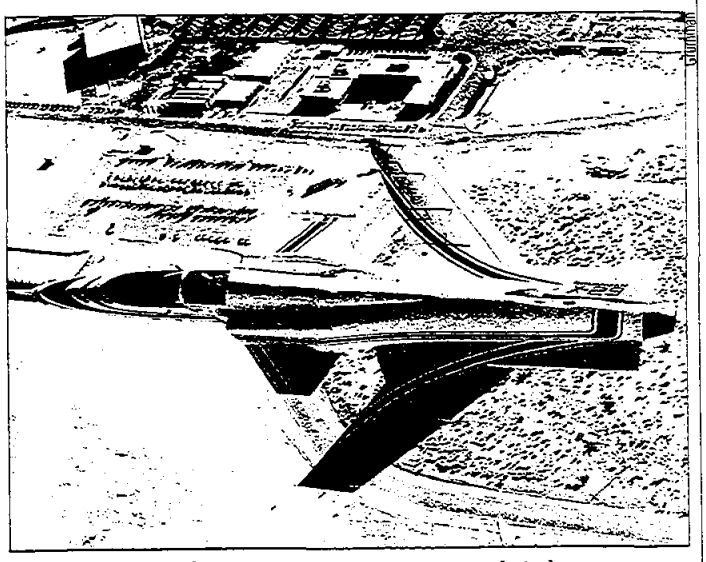
He also refutes suggestions that a cut in the Spanish requirement would increase considerably the unit fly-away cost of the aircraft by some £21 million.

EFA claims that the total procurement would have to fall below 400 aircraft before this was adversely affected.

With regard to a further purchase of up to six C-130s, a Lockheed official says: "Nobody knows anything for sure at the moment."

Officials suggest, however, that within the air force there is considerable "in-fighting" as personnel try to protect their own programmes.

The air force has also been looking at a substantial upgrade of a number of its P-3As, including an upgraded mission system. Part or all of this programme may also be jeopardised by the review. □



The X-29 — no performance penalty over conventional rivals

NASA completes X-29 programme

The USA's X-29 forward-swept wing research programme was completed when the type made its last scheduled flight on 30 September.

The National Aeronautics and Space Administration describes the Grumman-built aircraft as "...one of the most successful X-planes in history".

The programme at the Dryden research centre demonstrated drag reductions of up to 20% at transonic speeds, and excellent control response at up to a 45° angle-of-attack.

Test pilot Steve Ishmael says: "The X-29 has shown that a forward-swept wing on a transonic fighter will have at least the equivalent performance of a rearward-swept wing and it can be an excellent design alternative in high performance airplanes.

"When an aircraft is being designed, the location of the wings influences the design of the rest of the aircraft. The forward-swept wing presents a greater design latitude and there's no penalty to pay in performance."

The first X-29 flew 254 missions from 1984 to 1988, and the second reached a 67° angle of attack. Both are going into storage at Dryden. □

Syria and Iran pool SRBM resources

Syria and Iran are to co-operate in an effort to expand their surface-to-surface missile capability. Negotiations between the two countries started a few months ago and were finalised during the visit to Teheran in late September of the Syrian chief of staff, Gen Hikmat Shihabi, according to Israeli intelligence sources.

During his visit, Shihabi also concluded other deals to increase military co-operation between the two countries.

The sources say that this co-operation is connected to Syria's continuing effort to acquire missile technology, mainly from North Korea. The Syrians have already received at least one shipment of the North Korean Scud-C missiles and another shipment is expected.

There are indications that Syria wants to control some type of joint development and production centre for surface-to-surface missiles. The new military accord with Iran may lead to the building of such a centre in Syria, with the help of Iranian funds. Iran has been engaged in a massive effort to rebuild its armed forces, and the new co-operation with Syria may help its access to technologies.

The Israelis claim that as part of this venture Iran is investing money in nuclear research. Teheran has already invested $200 million in studies related to an effort that may lead to an Iranian nuclear capability. Most of the Iranian research is located at J'Abel Aljelid. □

NEWS IN BRIEF

IUKADGE/ICCS

Technical transfer from the UKSL consortium to the RAF of the much delayed Improved UK Air Defence Ground Environment/Integrated Command and Control System took place on 27 September. The handover is five years late.

Thailand buys Crotale

The Thai Government has ordered 20 Crotale NG (new generation) anti-aircraft batteries equipped with VT1 missiles from Thomson-CSF.

France, Finland and Singapore have recently acquired the Crotale NG. The manufacturer says that discussions with the Netherlands and South Korea are making good progress.

VT1 production is being moved from the USA to Europe following a missile systems alliance formed between Thomson-CSF and the Euromissile grouping of Aérospatiale and MBB. □

Arab defence spending up, says Israel

Six Arab countries have spent $51 billion over the past ten years on all types of military aircraft and missiles, claims Israeli Air Force commander Maj Gen Avihu Bin-Nun.

Bin-Nun says that Syria, Jordan, Saudi Arabia, Iraq, Egypt, and Libya have, in the last ten years, spent $75 billion on weapons, and that $51 billion of this was used to purchase aircraft and missiles.

Despite the economic problems in some Arab countries, spending on aircraft and missiles has not reduced, and in some cases has even increased, the IAF commander claims. "What we see in Syria and in some other Arab countries is that, when it comes to air warfare, aircraft, or missiles, even at the cost of other services, they have absolutely and relatively added to the budget."

Bin-Nun says the Soviet MiG-29, delivered to Syria and Iraq, can be compared with new US or French fighters such as the F-16 and Mirage 2000. "In some areas the Russian fighter is even superior . . . In manœuvrability and in weapon systems the MiG-29 is absolutely comparable."

Dassault Super Etendards for Iraq are among Arab purchases

Bin-Nun notes that the Soviet Union's policy on arms sales has changed to the point where it will sell to any country with cash, he says. □

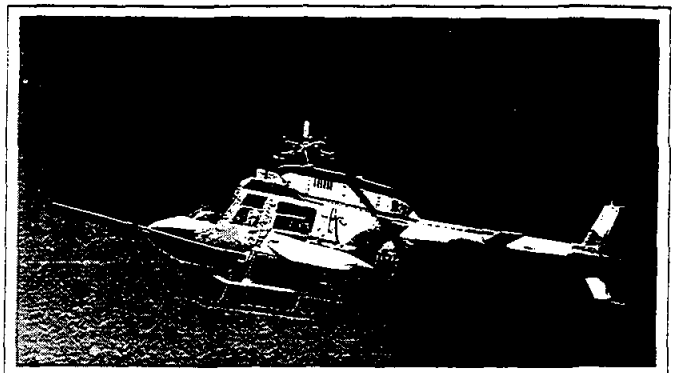
Colombian Kfirs in service

The first eight Israeli Aircraft Industries Kfirs have been delivered to the Colombian Air Force, and delivery of the 13 fighters on order will be completed this month.

The ex-Israeli Air Force Kfirs, sold to Colombia, have been completely overhauled by IAI, which has also equipped the aircraft with certain avionics requested by the Colombian Air Force.

The deal with Colombia was signed after long delays only when IAI had received sufficient guarantees for the $200 million involved. IAI crews are stationed in Colombia to help with maintenance.

Colombia is the second foreign customer for the Kfir, Equador has operated (the Israeli fighter for several years), and so far only these two sales have been approved by the USA. Because the Kfir is powered by a US General Electric J79 engine, the US administration has the power to veto any Israeli request to export the fighter, and IAI is therefore looking for a substitute for the J79. The main effort is to find a French-made engine. □



SAUDI SIGNS FOR BELLS

Bell Helicopter is supplying Saudi Arabia with 15 Model 406 Combat Scout helicopters armed with twin machine guns and TOW anti-tank missiles in a government-to-government deal worth an estimated $84 million. Deliveries start next June, and will be completed by the end of 1990. Talks are reportedly under way on a further 15 helicopters.

Syria to buy Chinese missiles

Syria is to buy Chinese M-9 tactical surface-to-surface missiles, in a deal believed to have been signed by a Syrian delegation in May. Saudi Arabia already has Chinese-supplied ballistic missiles.

The M-9 has a range of 600km, and can be armed with conventional or nuclear warheads. The missile, launched from a 8 × 8 mobile launcher, is 9·1m long, has a launch weight of 6,200kg, and is powered by a solid-fuel motor.

The Soviet Union has refused to sell the SS-23 Spider surface-to-surface missile to Syria, which currently operates about 18 SS-21 launchers. □

Iraq wants surveillance satellite

A team from Iraq's Scientific Research Centre has been visiting Brazil to discuss the purchase of a $40 million surveillance satellite, thought to weigh 150kg and have an orbit altitude of 700km.

In addition, Baghdad is expected to pay an extra $10 million for a range of associated facilities and technology, including a satellite test laboratory modelled on that used by Brazil's INPE space agency (see story on p 17).

After Brazil, the Iraqi mission went to France to discuss the acquisition of a high-resolution camera to be mounted on the satellite. □

NEWS IN BRIEF

SAUDI ANALYSIS

A joint venture between the USA's Lear Siegler and Saudi Arabia's National Telecommunications Company has won a $6·9 million contract to provide a strategic analysis team for the kingdom's air force. The team will advise on aircraft and weapons procurement and upgrading programmes for three years.

AIRDROP RECORD

Lockheed-Georgia and the US Air Force want the Fédération Aéronautique Internationale to establish a record category for airdropping, following the single drop by a 436 Military Airlift Wing C-5B Galaxy of four 42,000lb Sheridan tanks and 73 paratroops. The total drop weight was 190,396lb.

RAF SOVIET VISIT

Eight Royal Air Force officers from the RAF Staff College have visited their counterparts at the Yuri Gagarin Academy, the Soviet Air Force staff college. The RAF team was led by Air Vice Marshall Sandy Hunter, Commandant of the Staff College, who was once the UK Air Attaché in Moscow.

MISSILES DESTROYED

The Soviet Union destroyed the last of its 718 SS-12 missiles in Kazakhstan in July, under the terms of the INF treaty.

Nuclear Weapons and Radical States Pose New Situations

Nuclear weapons proliferation has once again come to the fore. Despite the fervent desire of a number of Western governments to believe that former Soviet nuclear weapons technology has not gone to radical states, there is evidence to believe otherwise. **Yossef Bodansky** *reports.*

The number of states in possession of nuclear weapons increased tremendously in recent years. However, the profound change in the global strategic nuclear posture lies in the fact that a few states now with access to nuclear weapons appear ready and willing to use them, irrespective of the possible retaliation. In other words, some of the newcomers into the nuclear club refuse to abide by the rules of deterrence which have governed the possession of nuclear weapons since the end of World War II.

Part of the reason for this "explosion" is the dissolution of the USSR into a collection of independent states under the vague umbrella of CIS. Rhetoric aside, nuclear weapons remain on the territory of each and every former member of the USSR. Other countries now either full or almost members of the new and expanded nuclear club are North Korea, India, Pakistan, Iran, Iraq (almost there), Syria (because it may have a finger on the button of an ex-Soviet warhead owned by Iran), and Algeria (getting very close by absorbing some of the Iraqi programme). They join the already widely recognized nuclear powers (USA, CIS, UK, France, PRC, and Israel).

Quantitively, the dissolution of the USSR contributed the greatest portion of the sudden increase of nuclear weapons in uncertain hands. As little as the West really knows about the Soviet nuclear arsenal, it is estimated that in 1991, the USSR had 27,000 to 30,000 operational nuclear weapons of various sizes, from shells to strategic warheads. In addition, the USSR had a stockpile of processed, fissionable materials as well as spare parts and components sufficient to build some 50,000 to 60,000 additional nuclear weapons, mostly tactical. Moscow knows for certain about, and can reliably account for, only some 85 percent to 90 percent of these weapons.

This leaves over 3,000 nuclear weapons, and components for around 6,000 additional weapons, unaccounted for. To be sure, some of these weapons (operational and components) are actually in safe storage, having fallen through the cracks of a chaotic bureaucracy and repeated failures of communications prevailing throughout the CIS. It is assumed, with good evidence, that most of the weapons were hidden by ex-Soviet units deployed in the unsafe republics for last-resort defence against the rise of anti-Slavic/anti-Russian nationalism, chaos, and anarchy.

However, there remains a small fraction of ex-Soviet nuclear weapons inventory which has escaped central or competent control. Considering that this tiny fraction amounts to several hundreds weapons (either operational or in components), the gravity of the potential problem is apparent. Some of these weapons are kept by the military authorities of the southern republics. It is unlikely, but not inconceivable, that some will be used to drastically solve an inter-ethnic dispute. Other will be sold away for ideological and financial reasons. At least some of these weapons have already ended up in the hands of radical states. As the economic and social crisis in the CIS continues to grow, more and more guardians and owners of nuclear weapons (and their components) will be willing to sell them to the radical states. It is an unravelling strategic nightmare which the world is yet to grasp and cope with.

Not all the newcomers to the nuclear club constitute a potential threat to world peace. India, and possibly Pakistan (definitely during Zia ul-Haq's leadership), join Israel as regional responsible nuclear powers. Their nuclear weapons constitute a means of last resort to ensure, primarily through deterrence, national survival against overwhelming external threats, as well as to ensure regional hegemony or a power posture. (The Pakistani nuclear strategy was clearly stated until 1988. Since then, first through "scientific" cooperation with Iran, and then through military alliances, Islamabad's clear stand has eroded.)

The other newcomers, or soon to be, are radical states already involved in major strategic confrontations with the West over issues of regional power and hegemony, as well as engaged in unconventional warfare in the form of sponsoring international terrorism, drug smuggling, etc. At present, two of these states – North Korea (DPRK) and Iran – have a few nuclear weapons.

The DPRK had some form of nuclear weapons as of early-1990. In February 1990, "development of the first atomic explosive device has been completed" in Yongbyon and that at that time "there (we)re no plans to test it, in the interest of concealing from world opinion and from the controlling international organisations the actual fact of the production of nuclear weapons in the DPRK". The due date for fully operational nuclear weapons, tactical warheads for SCUD-derivatives, is 1991-92. This estimate was reinforced by the discovery that the DPRK already built "a nuclear detonation device testing site", and even conducted a big conventional explosion test near Yongbyon as "a prelude to nuclear arms development". At the current rate of development, the DPRK would be able to produce three to five "small nuclear bombs" a year as of 1993. Advanced nuclear weapons are being developed in cooperation with the PRC.

Iran purchased its operational nuclear weapons from ex-Soviet Central Asia, primarily from Kazakhstan. Iran is known to have the following nuclear weapons:

1. Two warheads for a SCUD-type ballistic missile, that should fit on any SSM that is a derivative of the basic SCUD, and are in operational status;
2. One aerial bomb of the type carried by a MiG-27 that is in operational status; and
3. One nuclear artillery shell that is at an unclear operational status. If the current rate of development continues, Iran's indigenous nuclear weapons will not be available before 1997-1999. However, with rapidly growing scientific-technological assistance from the former USSR, the PRC, the DPRK, and Pakistan, the Iranians may complete their indigenous weapons much earlier than anticipated.

Although possessing no nuclear weapon of its own, neither purchased nor locally developed, Syria should be considered as a nuclear power, albeit a very peculiar one. This is a direct result of Tehran's guarantee to provide Da-

mascus with "the ultimate umbrella" in case of a war with Israel, a war Syria anticipates will erupt this summer. The specifics of what Iranian President Hashemi-Rafsanjani calls the "unanimity of strategic objectives" between the two countries was codified in an October 1991 "comprehensive agreement on strategic cooperation which includes the sphere of nuclear weapons production", which was being implemented as of January 1992. Although Iran "owns" the two nuclear warheads comprising the "ultimate umbrella", it still does not have ballistic missiles capable of reaching Israel from Iran. Therefore, for the nuclear threat to the credible, Iran will have to install the warheads on the shorter range SCUD-Bs and the various SCUD-derivatives in the Syrian arsenal for launch from Syria. Technically, there should be no problem to do this. However, the political-strategic ramifications are such, that Tehran has allegedly accepted that Damascus would be part of the final decision to launch weapons from Syrian territory. Thus, although in possession of no nuclear weapons, Syria may have its finger on a nuclear button.

The more one discovers about the pre-Gulf War Iraqi military nuclear weapons, the clearer it becomes how little is really known, be it entire projects or the crucial specifics clarifying the actual state of weapons. It cannot be ruled out that Iraq has a few complete, or nearly complete, tactical nuclear weapons completely unknown to the West. (These weapons should not be confused with the radiological weapons, both warheads and aerial bombs, Iraq was known to have in 1990 and which are yet to be discovered by the UN.) Many systems known to have been purchased in Western Europe and delivered to Iraq before the crisis are yet to be found. Some of these systems were smuggled out of Iraq. For example, in Autumn 1991, once Baghdad realised that the West was determined to impose the implementation of UN resolutions on disarmament, Saddam Hussein and King Hussain of Jordan allegedly reached an agreement to conceal "more than half of Iraq's nuclear programme" throughout the Ruwaishid area in eastern Jordan.

However, the major beneficiary of the Iraqi experience with nuclear weapons is Algeria. Baghdad had smuggled the core of the Iraqi nuclear stockpiles – some 10 tonnes of natural Uranium – to Algeria before the first UN inspectors arrived inMay 1991. Several Iraqi scientists arrived in Algeria to continue their work on Plutonium bombs in the Ain-Oussera reactor and military nuclear complex. The Algerian nuclear complex has been rapidly expanding in the last year. Additional assistance is provided by the PRC. The exact status of the Algerian-Iraqi nuclear weapons programme is unclear for it is a function of what the Iraqis had succeeded to smuggle to Algeria.

Another potential radical nuclear power to watch closely is Qadhafi's Libya. Qadhafi has never concealed his desire to acquire nuclear weapons. "A few years ago, we could hardly manage to procure a squadron of fighter aircraft. Tomorrow, we shall be able to buy an atom bomb and all its component parts," he declared back in January 1975. Qadhafi already came close to acquiring nuclear weapons. In late-1984, some 150 mercenaries assisted by Libyan-trained militant islanders succeeded to steal key spare parts sufficient for construction of three atomic bombs from the French test site in Moruroa, while French forces were preoccupied with riots incited by Kanaks on New Caledonia. The weapon parts were loaded into three containers that were shipped to Europe, where they were hidden until July 1986, when the Genoa police stumbled onto these containers and siezed them just before they were to be shipped to Libya. At present, using its vast financial resources, Libya is doggedly pursuing the possibility of acquiring nuclear weapons from the CIS. That Libyan talent spotters had been extremely successful in recruiting several "technological mercenaries" to come to work on Libya's nuclear programme should serve as a warning that the purchase of nuclear weapons cannot be ruled out.

Meanwhile, the PRC is adopting a strategy of actively assisting radical Third World countries in developing their military nuclear potential. Beijing is convinced that such a move furthers China's global strategic posture. The PRC warns that the US will try to reverse the further erosion of self-proclaimed global dominance – "New World Order" – by raising the nuclear threat to potential challengers, especially the Third World *bloc* led by Beijing. Here is the key to a growing threat to global stability. Beijing argues that with the reduction of Soviet threat, the US military is looking for a mission, and that therefore, the US decided to target Third World countries not susceptible to US hegemony. The countries high on the US list are Libya, Pakistan, China, India, Iran, and Syria. As the military nuclear capabilities of these, and comparable, countries improve, Beijing believes, the US would divert strategic nuclear assets away from China, retargeting them on the emerging new threats. Therefore, the greater the spread of nuclear weapons in the radical Third World, the smaller is the US strategic nuclear threat to the PRC itself. Considering that the US is already committed to a drastic reduction in its nuclear arsenal, the Chinese logic is not without merit.

Beijing's activist policy reinforces one of the primary strategic commitments of the radical Third World leaders. For years, they have felt threatened by the rise of the West and the growing importance of Judeo-Christian values, primarily individual rights, as beamed ceaselessly by the electronic media. Frustrated by the evergrowing economic gap between the North and the South, they now attribute this trend to a neo-colonialist conspiracy. The leading radical leaders see no alternative to a fateful confrontation with the West.

Nuclear weapons were perceived as the great equalizers, a global "magic bullet". Therefore, several poor radical states have committed vast sums they could not afford to pursue their nuclear weapons programmes. Pakistan's Zulfiqar Ali Bhutto spoke for many Third World leaders when he swore that "we will eat grass or leaves, even go hungry. But we will get one (nuclear bomb) of our own. We have no alternative." These leaders knowingly sacrificed national economic and technological developments on the altar of the nuclear weapon acquisition. They did so because they saw no other way for a breakout from the sliding of their countries, and the Third World as a whole, into the fold of Western socio-economic dominance.

The collapse of the USSR, the guardian and protector of all anti-West forces, sent shivers through the radical Third World. The self-confidence with which the US took on Iraq, leading a coalition of several developing states, many of them Muslim, shocked radicals. Beijing's urging to organise to meet this emerging threat, and willingness to supply diversified weapons including those considered unthinkable not too long ago, further reinforced the radical leaders' belief in an impending crisis. Thus, the emerging "New World Order" is far from being the economy-motivated, UN-abiding world of which Washington dreams.

Fuelled by poverty, frustration, and anger, a number of radical powers of the Third World are committed to confronting the Western world. However, at present, the most radical leaders consider the fateful confrontation with the West both inevitable and imminent. And, for the first time, they have the "magic bullets". ★

Libya's nuclear programme should serve as a warning that the purchase of nuclear weapons cannot be ruled out.

Syria's Acquisition of North Korean 'Scuds'

Joseph S Bermudez Jr

The recent revelations that Syria has acquired North Korean produced variants of the Soviet 'Scud B', not only highlights the relative ease with which Third World cooperation can bypass the multi-national Missile Technology Control Regime (MTCR), but also brings to light the long standing military relationship between the two countries, and the threat of further ballistic missile proliferation posed by recalcitrant nations such as North Korea.

This acquisition has its roots in both the Syrian doctrine of 'Strategic Parity' and their dramatic defeat in Lebanon during 1982.

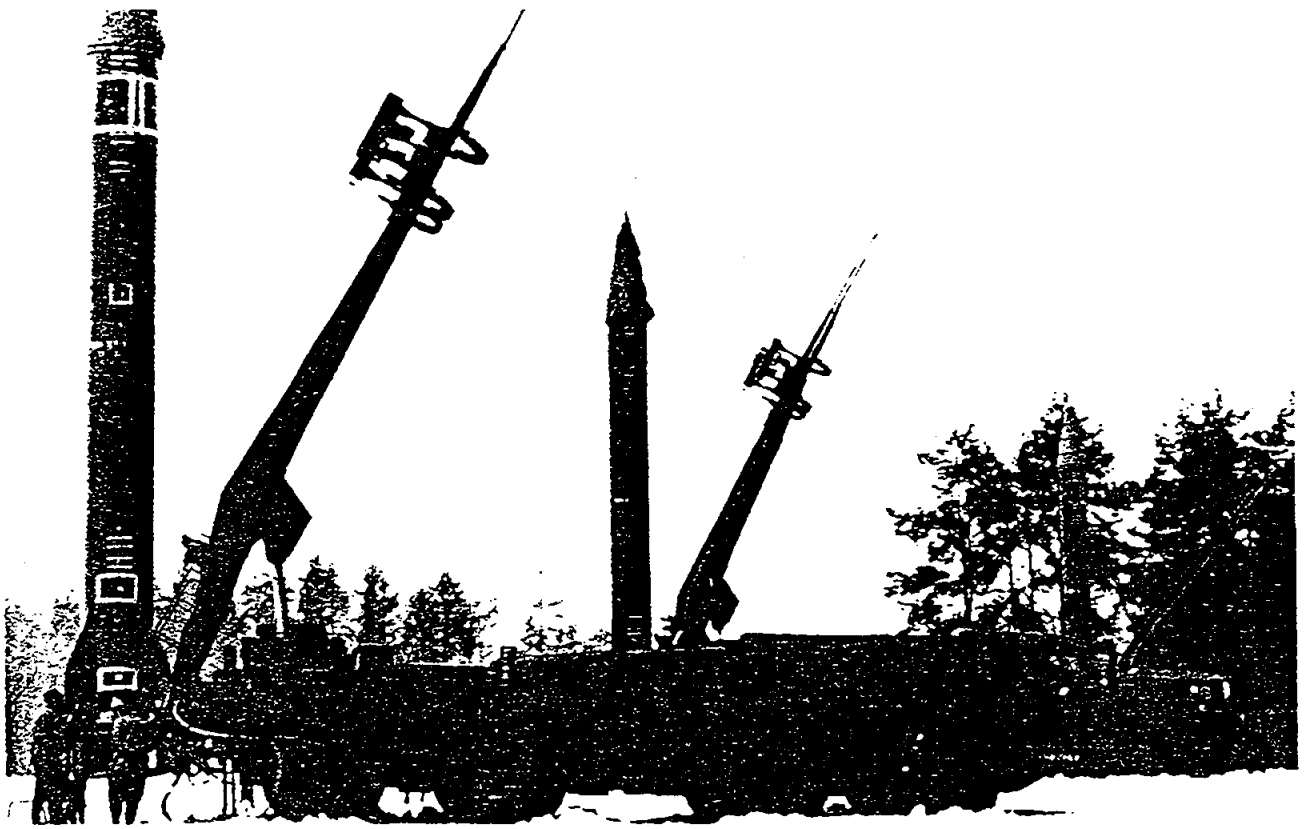
Syria formulated its doctrine of 'Strategic Parity' during the late 1970s, following Egypt's signing of its Peace Treaty with Israel. This doctrine calls for Syria to develop its military and economic capabilities to the point where it has the capacity to wage a one-on-one war with Israel and win. Integral with this strategy was the development of a capability to threaten Israel's strategic rear (eg with ballistic missiles and unconventional weapons) and to defend its own airspace from the Israeli Air Force. In effect, to redress the traditional Israeli advantages.

By 1982, Syria had made what it believed were significant strides towards achieving 'Strategic Parity'. The June war in Lebanon, and Syria's dramatic defeat, however, highlighted the fact that Syria still had some distance to go to achieve 'Strategic Parity'. Particularly during the war Syrian air and air defence forces were woefully outclassed and Syria had no viable capability to threaten Israel's strategic rear.

As a result of the Lebanon War the Syrians bitterly complained both to the Soviets, and the world, that the major reason for their defeat was that they had received only inferior weapons and training from the Soviet Union. In response to this criticism the Soviet Union quickly agreed to provide more modern and capable weapons systems and increased training. Top of the the Syrian shopping list were sophisticated Soviet SAMs and SSMs, in particular the SA-10 and SS-23. The Soviet Union believed that Syria's requests were excessive and would upset the military balance vis-a-vis Israel, so instead they provided SA-5s during early 1983 and SS-21s later the same year. While these systems did provide a significant improvement, they still did not provide the strategic capabilities the Syrians were seeking.

The Syrians were not pleased with the way in which they were being treated by the Soviet Union, so concurrent with their efforts to obtain SS-23s they also embarked on a project to develop the

'Scud B' missiles being prepared for launch. The recent revelations that Syria has acquired North Korean produced variants of the Soviet 'Scud B', highlights the relative ease with which Third World cooperation can bypass the multi-national Missile Technology Control Regime (MTCR).



requisite infrastructure necessary to produce SSMs indigenously. This indigenous project would apparently first seek to update existing stocks of Soviet supplied 'Scud Bs' and SS-21 missiles (ie, the design and production of improved conventional and chemical warheads). It would then expand either into the reverse engineering of a Soviet missile, or the production of a foreign designed missile. These efforts apparently did not proceed too far before it was realised that Syria possessed neither the financial resources, nor a sufficiently developed industrial base to go it alone.

Realising this, Syria approached at least one Western European country seeking assistance. The duration and extent of this Western assistance is presently unknown. It is believed, however, to have been minimal at best and the relationship was soon terminated.[1]

Concurrent with these efforts to acquire advanced Soviet ballistic missiles, Syria was also developing the capability to produce indigenously chemical warfare agents and chemical warheads for its missile forces. These chemical warfare efforts were quite successful, and by late 1985 US officials stated that '...the Syrians have the most advanced chemical weapons capability in the Middle East,' and that they had a production capability for nerve agents.[2]

By early 1986, it was revealed that Syria had acquired the technology to produce chemical warheads for several dozen of its 'Scuds' and possibly the SS-21s.[3] Exactly how and where Syria acquired the technology to produce chemical warheads for its ballistic missiles is uncertain.

It has been suggested that some of this capability was received from Libya during 1986. At that time Libya is reported to have provided chemical warheads, which it had obtained from the Soviet Union, not only to Syria, but also to Iran.[4] This, however, does not appear to be correct. Libya is known to have supplied 'Scuds' to Iran during this period, but there is nothing available to support the contention that chemical warheads were also provided to Syria or Iran. In fact, there is considerable debate as to whether the Soviet Union ever provided the Libyans with 'Scud B' chemical warheads.

A more likely route to the Syrian acquisition of chemical warhead technology was through some form of cooperation among Syria, Iran, Libya, and North Korea, with some possible assistance from the Soviet Union or Czechoslovakia.

In May 1986 reports surfaced that Syria was '... about to receive Soviet surface-to-surface SS-23 missiles.'[5] Although these reports would eventually prove to be wrong, it is believed that they were based upon further negotiations between the two countries. During these negotiations Syria had made another and more emphatic request for the SS-23s. The Soviets had, apparently, given this request serious consideration, and had possibly even signed a tentative agreement. By July 1987, however, the Soviet Union had publicly stated that it was not going to supply Syria with SS-23s.[6] The reason for this turnaround is uncertain, although the US-Soviet INF Treaty, Syria's financial difficulties, and the Soviet desire to pressure Syria, are all believed to have played significant roles in the Soviet decision.

Angered by the Soviet decision, the Syrians, during late 1987 or early 1988, entered into negotiations with the People's Republic of China (PRC) concerning the purchase of their 'M' series of tactical ballistic missiles. The specific missile that the Syrians were interested in was the M-9, a SRBM with a range of approximately 600 km, which the PRC then had under development for the export market.[5]

The PRC's primary motivation for M-9 sales was to obtain foreign currency, although it can not be excluded that it also sought to broaden its influence in the Middle East and South Asia. In fact, at the same time that it was negotiating with Syria, the PRC was also pursuing similar negotiations with Iran, Libya, and Pakistan.[8] Libya was also to play a crucial part in the Syrian sale. Libya reportedly agreed to finance the entire deal and signed an agreement to purchase 140 M-9s in May 1989 for a cost of approximately $170 million. Eighty missiles were to be transferred to Syria and 60 were to be retained for the Libyan armed forces.[9]

Following a December 1989 visit to Beijing by US National Security Adviser Brent Scowcroft, the Syrian-PRC missile agreement was abruptly cancelled. Syria, possibly at the suggestion of the PRC, then approached North Korea seeking to purchase their 'Scud B' or 'Scud-PIP' variants. Syria's approach to North Korea is not as strange at it might first appear. Both countries had maintained low level military relations since the late-1960s and had supported Iran during its long war with Iraq.[10] More significantly, it was North Korea, with Iranian financial backing, that had provided Iran with 'Scud B' variants to use against Iraq during the last year of the war. Additionally, North Korea was both pursuing its own improved 'Scud B' variant — the 'Scud-PIP' — and was assisting Iran with the development of its own ballistic missile infrastructure.[11]

Syria is believed to have entered into negotiations with North Korea for the purchase of 'Scud-PIPs' sometime during late 1989, or early 1990.[12]

The exact terms of this agreement are unknown, although during January 1991 the cargo ship *al-Yarmouk* left North Korea loaded with an estimated 24 missiles along with about 20 launchers. The *al-Yarmouk* followed a circuitous route from North Korea, refuelling at Singapore Roads and Madagascar, and travelling around the Cape of Good Hope, through the straits of Gibraltar, and finally arriving at the Syrian port of Latakia in the first week of March. The primary reason for this circuitous route was to maintain secrecy by avoiding the required cargo inspections if it were to transit the Suez Canal.[13]

Although both US and Israeli sources have publicly identified the missiles that North Korea has sold Syria as the '...Scud C,' North Korea does not produce 'Scud Cs'. What it does produce, and what it has apparently sold to Syria are North Korean produced 'Scud-PIPs', an indigenous product-improved 'Scud B'. Preliminary information indicates that the 'Scud-PIP' has a range of approximately 500 km and a warhead of 700 kg (ie, nearly three times the weight of the *al-Hussein* warhead). Accuracy is reported to be better than the standard 'Scud B'.[15]

Responding to US and Israeli concerns over the receipt of the North Korean 'Scud-PIPs' Syrian Foreign Minister Farouk al-Shara stated: "We are still in a state of war with Israel and Israel has so many missiles and so many types of mass destruction weapons. Peace — a just and comprehensive peace — would solve all these problems."

Exactly how the arrival of these 'Scud-PIPs' will effect the Syrian-Israeli military balance, and the prospects for a lasting peace in the Middle East, is uncertain. The 'Scud-PIPs' do provide Syria with an enhanced capability to strike with greater accuracy anywhere within Israel. This threat is further enhanced by Syria's indigenous capability to manufacture chemical warfare agents and to produce chemical warheads for its Soviet supplied 'Scud Bs' and SS-21s.[16]

Finally, it is important to note that this episode of North Korean sales of ballistic missiles is not an isolated incidence. North Korea is known to have provided either ballistic missiles, or ballistic missile technology, to Iran, Egypt, and Libya. Several months before Operation 'Desert Storm' an Iraqi military delegation is also reported to have visited P'yongyang seeking to purchase North Korean produced 'Scuds' and launchers. It is doubtful, however, that anything developed from this visit.[17] At least one recent report suggests that North Korea has also provided missile technology to Cuba.[18]

With the recent dramatic changes within the Soviet Union, and the resulting decline in Soviet arm sales to the Third World, as well as the increased efforts of many nations to control ballistic missile proliferation, North Korea stands out as a dangerous rogue willing to step into the Soviet vacuum and provide ballistic

missiles, or ballistic missile technology, to any nation that can afford it.

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Middle East Political Survey — Syria, Libya, Egypt

Robert Marquis

Syria's Assad: master tactician or latter day Sadat?

President Hafez al-Assad's acceptance in July of US proposals aimed at bridging the Arab-Israeli divide over the form and substance of a possible Middle East peace conference was based, diplomats believe, on the Syrian President's shrewd assessment of changes in the regional balance of power.

But it would be premature to conclude that Assad — his name means lion in Arabic — had given up his strategic aims, or his view of Syria as fulcrum of the Arab world. As early as 1989, Assad urged Arabs to adapt to what he called new realities in the region prompted by changes sweeping the Soviet Union and Eastern Europe.

By sending troops to join the US-led coalition that forced Iraq's occupation army out of Kuwait last February, Assad achieved three objectives.

President George Bush met him in Geneva during the Gulf crisis. It was the first meeting between US and Syrian heads of state in more than a decade, setting the seal on a dialogue between the superpower and an Arab state until recently shunned for what the West regards as its sponsorship of terrorism.

Desert Storm also shattered the offensive military capability of Syria's main Arab rival, Iraq. Not only are the two countries ruled by rival wings of the Baath Party, but they have competed strongly as champions of pan-Arabism.

Most important, perhaps, Syrian involvement in the Gulf War gave Assad the opportunity to consolidate and formalise his troops' presence in Lebanon. From the Syrian point of view, Lebanon remains vital to its national interest in that it commands access to Damascus through the Bekaa Valley.

That is where Israeli Prime Minister Itzhak Shamir's upbeat comparison of Assad with the late Egyptian President Anwar Sadat ends. True, Sadat traded land in Sinai for a separate peace treaty with Israel, and Shamir would like to engage Syria in a similar bilateral process over the Golan heights.

Sadat, it may be remembered, put out peace feelers to Israel in 1977 because he believed that only by allying himself with the US superpower could he hope to achieve regional stature. Having created mutual dependency, he would have argued, only then would Arabs be able to compete effectively with Israel's influence on the US domestic political scene.

For Assad, this is flawed reasoning that underestimates the special relationship between Washington and the Jewish state. The Syrian leader's desire to draw closer to Washington because of its paramount influence was not the only factor in Assad's waiving of conditions for direct talks with Israel. An ascetic visionary, Assad is capable of tactical acrobatics while keeping a long view. Unlike Sadat, who enjoyed the performance of statecraft for its own sake, Assad is an intellectual who shows no sign of giving up the basic plank on which his policy towards Israel has long been based, or the ideological baggage he has accumulated since coming to power in a bloodless coup in 1970.

Where Sadat enjoyed the grand gesture in front of television cameras, Assad is a recluse who neither smokes nor drinks. His 15-hour day is limited only by bouts of ill-health. He has held the view, and still does believe, that peace in the Middle East is not feasible while an imbalance of military power persists in favour of Israel.

Financing Syria's defence needs, and locating new sources of arms now that the Soviet Union can no longer be counted on as a pliant supplier, remain the priority. Syria's reported acquisition of 'Scud' variants from North Korea is an example. In other words, Assad appears to be buying time, modifying his tactics while the long-term struggle continues.

"Syria's acceptance of Baker's ideas is a no-risk policy," said a senior Soviet diplomat with many years' experience in the Middle East. "The Syrians don't believe the Israelis are sincere, and they are happy to go along with it (the peace process) in order to expose Shamir as the intransigent party."

By accepting Baker's proposals, Assad also succeeded in dealing another blow to the fortunes of Yasser Arafat, already at a low ebb over the latter's failure to condemn Iraq's 2 August invasion of Kuwait. Enmity between the two leaders remains personal as well as ideological and goes back many years.

Assad, diplomats believe, may also have his eye on finding the right successor before he disappears from the scene. That may not be far off and if so, Assad will want to stabilise the situation at home. Hence the desire for better Western ties.

For several years, Assad has not been a well man, and diplomats cite what they say have been feelers put out in recent months to his younger brother Rifaat for a possible reconciliation as a sign that Assad is paying attention to ensuring the survival of his minority Alawite regime.

The Alawite Moslem sect accounts for about 10 per cent of Syria's 11 million population. Long regarded by the Sunni ancien regime as a servant class, they were recruited as the backbone of a paramilitary force underpinning French rule.

Assad changed all that, placing Alawites in key party, military and security positions. Despite his efforts to create a new generation of Syrians irrespective of their sectarian origins, his demise could unleash a Sunni-led backlash, particularly in certain armed forces units.

Israeli observers believe that the aftermath depends largely on the manner of the President's demise. Were Assad to die peacefully in his sleep, for example, his kith and kin should be able to arrange matters so as to ensure a smooth Alawite succession, at least in the short term. A dramatic collapse in public would be a different matter.

But the fact remains that Syria's Israeli neighbours and Middle East specialists in Western capitals are pondering where their own interest lies — in a transfer of power to another Alawite, or a return to a Sunni majority government.

Rifaat Assad, notwithstanding strained relations with his brother, would be an obvious choice as successor, particularly as the President's own son has turned out to be something of a playboy and, according to diplomats, unsuited to high office.

Rifaat is a businessman — his wealth is based on the arms trade as well as production of hashish and heroin in Lebanon's Bekaa Valley and their export to the West through southern Europe — and a key figure in the Damascus power structure. Despite bumpy relations with the presidency and prolonged absences from home, Rifaat is still a Vice-President. He also retains his seat on the ruling party's 21-member Regional Command, a leadership committee that reports directly to Assad and is in some ways more powerful than the Cabinet.

Also a member of the 90-strong Central Committee, he holds the rank of colonel. He commands the Defence Brigades, used to crush the Moslem Brotherhood revolt in Hama in 1982 and traditionally

responsible for the capital's security. In 1983, US President Ronald Reagan thanked both President Assad and Rifaat for Syria's role in securing the release of an American hostage, David Dodge.

In 1984 Rifaat Assad spent six months abroad, four of them in Geneva, fuelling speculation of strains within the Syrian regime. But in November his return to Damascus was marked by volleys of welcoming gunfire from members of the Defence Brigades, and he appeared in public on 26 November at a banquet in Damascus for French President Mitterrand. The previous month a government decree had confirmed him as head of the country's security affairs.

In January 1986, Rifaat flew to Morocco for secret talks with PLO central committee member Salah Khalaf, Arafat's deputy. (Khalaf was killed in Tunis on 15 January this year). Rifaat was again absent from Damascus for six months in 1986, and fellow Vice-President Abdel-Halim Saddam lamely explained it away by saying Rifaat required medical treatment.

In July that year, Rifaat issued a statement in Paris saying he was making contacts in Europe to promote the Palestinian cause and improve Euro-Arab relations. Last year he was back in the news when four bodyguards were fined by a Spanish court for wrecking a restaurant in the Costa del Sol. They had apparently tried to intimidate the owner into selling the business.

In March this year, a former head of the French security service, Pierre Marion, told the Paris news magazine *L'Evenement* that he had demanded, and received, from Rifaat a promise that Abu Nidal's Fatah Revolutionary Council guerrillas would not be allowed by Damascus to operate in France after attacks there. Marion said he had told the Syrian that France would strike people connected with the group if the pledge was not given.

Rifaat appeared in Cairo in May, seeking a branch office for his Paris-based magazine, *al-Fursan* (The Knights), and searching the prestigious residential suburb of Zamalek for a villa. Middle East-based diplomats said he was apparently seeking to extend his influence and sought new investments by taking advantage of the restoration of ties between Damascus and Cairo after a twelve year break

Libya's 'World Front'

Despite Libyan leader Muammar Qadhafi's efforts during the past five years to project a more pragmatic and moderate image, the colonel has apparently not abandoned his habit of promoting militant international groupings hostile to Western interests.

Leftist sources in the Middle East report that representatives of Qadhafi's long-established World Anti-Imperialist Centre, the Mathaba, are currently contacting a number of Arab, African, Asian and Latin American governments and political groups with proposals for a new organisation, to be known as the World Front.

The Mathaba is headed by Moussa Kusa, one of three senior officials in charge of Libya's External Security Organisation, which, as the name implies, is Libya's external intelligence gathering body.

The World Front's purpose will be to bring together radical regimes and organisations in all parts of the world in active opposition to what Qadhafi perceives to be the interests of 'imperialist' powers. Its programme will include political and material support to selected revolutionary and liberation movements.

The Libyans are also keen to secure the participation of some of the older, Soviet-backed international communist front organisations, such as the World Peace Council and the Afro-Asian People's Solidarity Organisation. They have long experience as vehicles for thinly-veiled political influence and propaganda

Following the collapse of communist governments in eastern Europe, and because of the Soviet Union's own economic difficulties, these organisations are suffering a mounting shortage of funds and have been forced to curtail their activities, the sources said.

But Qadhafi has been quick to take

Libyan army cadets at the Women's Military Academy in Tripoli. During a speech in July, the Libyan leader Colonel Qadhafi warned his audience: "The confrontation is continuing between our nations and its foes. The current truce is temporary. A confrontation with Israelis and Americans is inevitably coming." Whether this is simply rhetoric or a warning of things to come is impossible to judge at present.

advantage of their need to find new sources of financial and political support, and representatives of the senior front organisation, the World Peace Council, were among participants in a preliminary meeting convened by the Libyans in Tripoli in mid April to discuss the structure of the proposed World Front. The April meeting also had strong Latin American representation, including senior figures from Nicaragua's Sandinistas and the Cuban Communist Party.

The Mathaba is planning further meetings with the aim of securing support in Africa, Asia, and the Middle East. Qadhafi is seemingly aware, however, that too prominent Libyan sponsorship could inhibit the success of his new organisation, and these meetings are expected to be held at regional centres outside Libya.

Qadhafi made his views clear during a meeting with students in Alexandria in July, when he urged Arabs to prepare for conflict with Israel and the United States. "The confrontation is continuing between our nations and its foes. The current truce is temporary. A confrontation with Israelis and Americans is inevitably coming," he said.

Egypt's defence ministers — present and past

Egypt's Lieutenant General Mohammed Hussein Tantawi has been appointed Defence Minister after holding the politically sensitive post of liaison officer with the US led forces that evicted Iraq's occupation army from Kuwait last February.

A veteran of five Middle East wars, he took over the Defence Ministry earlier this year from Youssef Sabri Abu Taleb. Born in 1935, Tantawi graduated from his country's military academy in 1956 — the year of the Suez crisis — and was in action the same year in the now occupied Gaza strip.

A commanding figure, Tantawi has the reputation of being a strict disciplinarian, with a wealth of experience in operations. His appointment is likely to prove popular with the armed forces.

Tantawi has pursued an uninterrupted military career. He fought against Israel in 1967, was involved in the 1969 War of Attrition and led an infantry division in the 1973 war. He followed command of a mechanised division of the Second Field Army with a stint as military attaché in Pakistan and Afghanistan before taking over as Chief of Operations.

In November 1988 he was appointed to the command of Egypt's Republican Guards, a crack brigade centred in Cairo and providing for the president's personal safety. Two years later he returned to his job of Chief of Operations.

His immediate predecessor was widely seen as something of a stop-gap. Abu Taleb, a 62 year old professional soldier, was known for his skill as an administrator and for his personal loyalty to Hosni Mubarak, a former bomber pilot and one-time head of the air force. Although he was undoubtedly able, Abu Taleb was not particularly liked by the rank and file partly because, it was said, he preferred to refer most decisions to the presidency rather than use his own discretion.

Abu Taleb had been out of uniform for some nine years, and in the unenviable job of Cairo governor made surprising progress in tackling the capital's snarled traffic and cleaning up its soot-stained buildings. In April 1989 he was brought back as Defence Minister by Mubarak following the controversial sacking of Abdel-Halim Abu Ghazala, the man known to his countrymen as 'the uncrowned king of Egypt'.

Abu Ghazala, immensely wealthy in his own right, an uncompromising believer in private enterprise and a close friend of the United States, had built up military industries and provided attractive benefits for servicemen. He and Mubarak, according to well-informed sources, fell out over the pace of economic change in Egypt and the military's role in moving towards a free-economy.

Abu Ghazala was appointed a special presidential aide, but many Egyptians saw this as a position that effectively stripped him of real power. Nevertheless, Abu Ghazala remains an influential figure and is still considered by some as a potential successor to Mubarak.

approximately 320,000 men in the ground forces, about 20,000 officers and men in the navy, some 25,000 officers and men in its air force and around 80,000 officers and men in its air defence command.

The ground forces, which at 320,000 reflect a slight decrease after the peace with Israel, consist of two armies (2nd at Ismailia and 3rd at Suez). They constitute the main battle corps with a total of seven divisions, two of which are armoured, and their various organic elements. Remaining ground forces are spread over the five territorial areas: Centre (Cairo), North (Alexandria), East (Ismailia), South (Aswan), and the West (Mersa Matruh).

Although it was responsible for a naval success that overturned contemporary naval tactics, namely the destruction in 1967 of the Israeli destroyer *Eilat* by an Egyptian missile boat, the Egyptian Navy only occupies a minor place in the country's armed forces.

It comprises 20,000 officers and men and still has 11 out of 18 *Romeo* and *Whiskey*-class submarines in service which were delivered by the Soviet Union and China. However, these vessels are in poor condition and scarcely operational.

Besides two Chinese frigates which require modernisation, there are two modern, well-armed Spanish *Descubierta*-class vessels (Harpoon anti-ship missiles, Albatros surface-to-air missile system, ASW torpedos). The 'core' of the Navy consists of 25 missile boats and of these 13 are of Soviet or Chinese origin, and 12 are from British yards or other sources.

The Egyptian Air Force has 25,000 officers and men and is organised according to the Soviet model (where one regiment equals three squadrons with 12-15 operational aircraft each). The air force has 76 bases including those shared with civil aircraft, and fields some 1,000 aircraft of all types. Recent reports in Turkish newspapers said Egypt was to buy 46 General Dynamics F-16 fighters from Turkey. US sources also report that Egypt has shown an interest in F/A-18s. Egypt's air defence sector is a separate arm of service and comprises interceptor and air-defence missile assets.

The Egyptian Army is taking delivery of 700 M-60A1 tanks from US surplus stocks in Europe and it is likely that a similar number of older and Soviet-made tanks will be retired. The army has meanwhile been building up a force of Chaparral M-54 SP SAMs with a holding of 26 fire units so far. This is a straight commercial contract with Ford Aerospace and is not funded by the US Foreign Military Sales programme.

The Navy has bought two *Oberon*-class submarines from the UK which had been retired by the Royal Navy - a delivery which is unlikely to take place in less than a year. President Mubarak has stated that Egypt withdrew from the Iraqi-Argentinian project to develop the Condor IISSM in 1988.

Syrian troops deployed in Saudi Arabia during Operation 'Desert Storm'.

A contract has been signed with China to update the Sakr factory where both SSM and SAMs are manufactured and which will now produce Silkworm HY-2 and HY-4 anti-ship missiles. Egypt has also expressed an interest in buying 100 FIM92-A Stinger SAMs from the US.

Syria

Just a year ago, Syria was isolated in the Arab world because of its alliance with Iran in the first Gulf war and its estrangement from Egypt dating from the Camp David peace treaty. Syria was also under pressure in Lebanon, where the protracted civil war seemed as far away from a solution as ever; and it was shunned internationally because of its involvement in terrorism.

But as a result of its participation in the anti-Iraq coalition, Syria's fortunes have been transformed. The Lebanese war seems to be ending. Relations with Cairo and the Gulf states are now close. Although Damascus remains on the US State Department list of states supporting terrorism, and a US arms embargo remains in force, Washington now sees Syria as an important regional ally.

Diplomatic relations with Britain, severed in 1986 after it emerged that Syria was behind an attempt to blow up an Israeli airliner in London, were restored in November, paving the way for a general Syrian rapprochement with the European Community, although an EC arms embargo against Damascus remains in effect.

As a result of this political rehabilitation, millions of dollars of development aid have been pouring into Damascus, from the Gulf, Japan and Europe. These funds, together with rising Syrian oil revenues, have greatly eased the acute foreign exchange shortages which have dogged Syria for years.

Syria's long-term aim is to achieve military parity with Israel and defence spending is a heavy burden on the economy. In the 1990 budget, defence was allocated $1.6 billion, accounting for about one third of total outlays. Moscow has been by far the biggest source of weaponry, and has about 2,400 military advisers in the country. Syria's military debt to the Soviet Union and other former Communist East European states is estimated at $14-15 billion.

With its treasury replenished, Damascus has been moving to upgrade its armed forces. A $2billion deal is reportedly in prospect with Moscow, involving aircraft, tanks and SAM systems, and another deal, for T-72 tanks, is being negotiated with Czechoslovakia. For now, Western arms markets are closed to Syria but Damascus' new political respectability could lead to the lifting of embargoes in the not too distant future.

Lebanon

As an indirect result of the Gulf crisis, Lebanon's 16-year-old civil war finally seems to be coming to an end, and in the coming months suppliers could see important opportunities relating to the reconstruction of the country's armed forces.

Although a political framework for national reconciliation was agreed by Lebanese parliamentarians in late 1989, progress was stalled by the refusal of the Christian leader and former army commander, General Michel Aoun, to co-operate. Last October, however, while

9/23 - (C) C.DMT
NO - DMT-0406984
ET - Mideast arms buildup
DT - JOURNAL ARTICLE
LA - ENG
PO - SY; CS; KP; IR; CN; SU; PL
JT - Aerospace World
SO - PP. 51; DP. 04/92
SN - 0983-1592
AB - The post-war Middle East arms buildup is in full swing, according to Israeli experts. **Syria** has reportedly decided to devote $2 billion, much of it supplied by Saudi Arabia, to modernisation of its air and land-based forces. New projects include upgrade of air defense systems, with the aid of the ex-USSR, provisions of at least 100 new Czech T72-M1 tanks and 20 North Korean **Scud** C missiles. Bulgarian equipment will also reportedly be supplied under a recent cooperation agreement. Meanwhile, Iran is said to be planning a $50-billion weapon-spending programme between now and 1995. The shopping list, on which $12 billion may already have been spent, includes 150 Chinese F7s (MiG-21s), and Mig-27, Mig-29 and Sukhoi Su-24 (Fencer) aircraft from CIS nations; three Russian submarines, 200 top-line Russian tanks and 1,500 less sophisticated armour units from Poland, and 170 Scuds from North Korea. THIS IS THE FULL TEXT: Copyright 1992 Aerospace Media Publishing (AMP
PN - T 72M1; F 7; MiG 21; MiG 27; MiG 29
DE - Defense Procurement*; Med and Heavy Tanks; Ground Based Intercontinental Missiles; Fighter Aircraft; Tanks and Tracked BF Vehicles; Government Expenditures*; Foreign Trade; Syria*; Czechoslovakia; North Korea; Iran; China Peoples Republic; USSR; Poland
IP - Promt
PES - 9104140*; 3795011; 3761112; 3721132; 3795000; 8SYR*; 6CZE; 9NOK; 8IRA; 9CHN; 6USS; 6POL; 90*; 64
NCP - Defense Procurement 9104140; Med and Heavy Tanks 3795011; Ground-Based Intercontinental Missiles 3761112; Fighter Aircraft 3721132; Tanks and Tracked BF Vehicles 3795000
NCE - Government Expenditures 90; Foreign Trade 64
NCG - Syria 8SYR; Czechoslovakia 6CZE; North Korea 9NOK; Iran 8IRA; China, Peoples Republic 9CHN; USSR 6USS; Poland 6POL

10/23 - (C) C.DMT
NO - DMT-0401707
ET - 'Scuds for **Syria**'
DT - JOURNAL ARTICLE
LA - ENG
PO - KP; SY
JT - Middle East News Network
SO - PP. N/A; DP. 10/03/91
AB - Occupied Jerusalem: **Syria** is buying improved Soviet-designed **Scud** missiles from North Korea and is capable of equipping them with chemical warheads, Israeli newspaper said yesterday, quoting military officials.

The daily Hadashot said **Syria** made the deal with North Korea because the Soviet Union refused three years ago to provide **Syria** with the improved Scuds. Source: Gulf Times THIS IS THE FULL TEXT: Copyright 1991 by Middle East News Network, In
PN - Scud
DE - Surface to Surface Missiles ex Antiship*; Foreign Trade*; North Korea*; Syria
IP - Promt; Newsletter
PES - 3761161*; 9NOK*; 8SYR; 64*
NCP - Surface-to-Surface Missiles ex Antiship 3761161
NCE - Foreign Trade 64
NCG - North Korea 9NOK; Syria 8SYR

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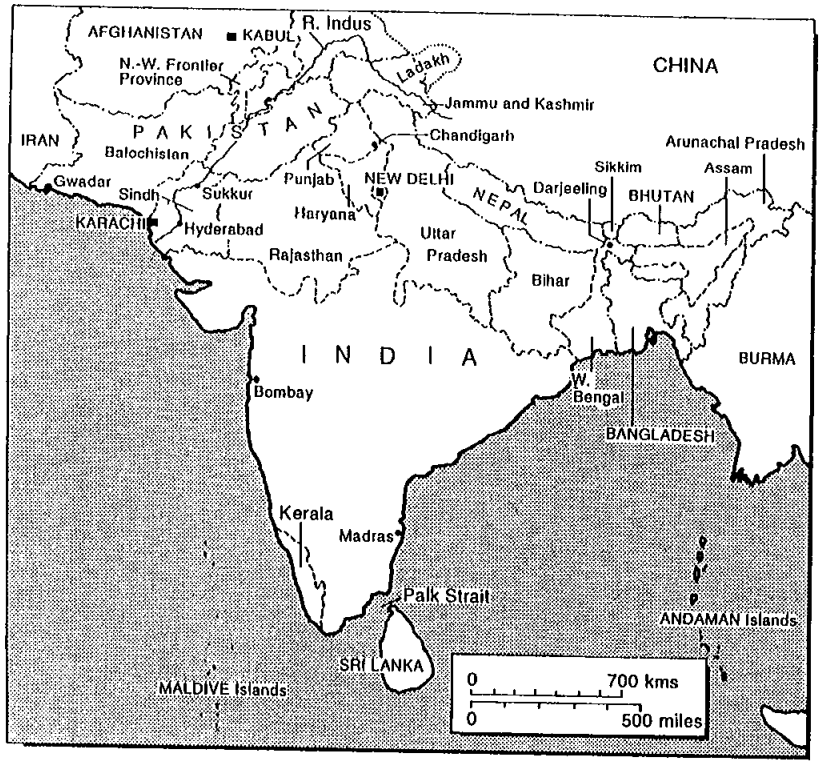


South Asian Security in the 1990s

INTRODUCTION

Rethinking security

In the past, South Asian security studies revolved around the nature of Indo-Pakistani and Sino-Indian conflict relations, the effects of superpower intrusions into the South Asian region and the resulting conventional and potential nuclear arms races there. Concerns about these issues now appear out of date as changes in the global and regional political situations have affected both the nature of the threats in South Asia and the responses needed to manage them. Problems of internal security, including armed separatist movements and domestic ethnic strife, have further altered the strategic environment of the subcontinent. In particular, confronting the 'enemy within' has complicated the business of confronting the 'enemy without'. This is compounded when the two 'enemies' are acting in tandem. Such external and internal political changes not only add a new layer of conflict to the old one, but significantly affect the nature of regional security.

The problem of internal destabilization and external transformation is illustrated by the violence in Kashmir. Unlike past crises over the area, this one involves terrorism and insurgency. Various Kashmiri insurgent groups have adopted the Islamic fundamentalist beliefs of Iran, learned from the insurgency tactics of the *mujaheddin* in Afghanistan, and have assumed the style and approach of the Palestinian *intifada*.[1]

Under such circumstances, if another Indo-Pakistani war were to take place, what would it entail? India would have to take into account the internal uprising in Kashmir, questionable Sikh loyalties in the critical border-state of Punjab, uncertain diplomatic support and military assistance from Moscow, the Chinese and American positions towards India and Pakistan, and the probability of nuclear threats. Pakistan would have to take into account the possibility of another war providing the Sindhis with the opportunity to carve out an independent Sindhudesh aided by Indian military forces. The persistence of weak governments in India and Pakistan since the late 1980s limits their ability to implement aggressive political and military policies. Although the governments of Prime Ministers P.V. Narasimha Rao of

III. CONVENTIONAL DEFENCE

If internal problems in Kashmir, Punjab or Sindh were to get out of hand and escalate into an Indo-Pakistani conventional war, there is a possibility that this may escalate further into a nuclear war. Conventional war, therefore, links internal strife with the use of nuclear weapons. Since the credibility of using nuclear weapons is relatively low during a crisis, the arms race in South Asia continues to be run in the area of conventional weapons.

Tensions and preparations for war that were so evident in 1989 continued throughout 1992, despite various efforts to promote confidence-building measures between India and Pakistan. After the Muslims of the Vale of Kashmir revolted against the Indian authorities in late 1989, a fourth war between India and Pakistan appeared more possible. And yet, although the crisis escalated, the prospect of war soon receded. Prime Ministers Narasimha Rao of India and Nawaz Sharif of Pakistan continued to hold fast to their countries' positions on Kashmir, and also declared their intentions not to allow the crisis to slide into an all-out war. Earlier, both India and Pakistan had flexed their military muscles by conducting extensive military exercises along their borders. India's large-scale *Brasstacks* military exercise in early 1987, and Pakistan's even greater *Zarb-e-Momin* ('Strike of the Faithful') exercise in 1989, appeared to the other side like the prelude to a full-scale assault.

The Sino-Indian border has remained quiet since India conducted its military exercise code-named *Operation Checkerboard* in Arunachal Pradesh along the McMahon Line in late 1987. The growing cordiality between India and China decreased the likelihood of conflict; but the border dispute remains unresolved. India reiterated its support for the Chinese claim that Tibet is part of China; but, again, the Tibetan problem remains unsettled within China. Along with the disputes over the McMahon Line and the Aksai Chin plateau, the uprising in Tibet was one of the sources of the 1962 Sino-Indian War. However, another conventional war between India and China seems unlikely in the forseeable future. With lessening tensions between the two countries, some of the forces on either side have been withdrawn and deployed elsewhere.

Thus, the earlier traditional Sino-Pakistani conventional threat, either separately or jointly, has been reduced primarily to the Pakistani threat which may have Islamic connections beyond the subcontinent. This new security relationship is still evolving. The involvement of the major powers with larger issues concerning the Muslim world, and the

prospect of nuclear proliferation from India to Israel encompassing some of the Muslim countries, will further complicate the Indo-Pakistani security relationship. The contemporary defence policies and programmes of India and Pakistan reflect past experiences, but also take into account the new ambiguities and uncertainties of the 1990s.

Threat perceptions

Since the end of the Cold War, the basic threat perceptions of India have spread over a wider area to include all the adjacent regions. At one time, India looked west towards Pakistan and north towards China to determine its defence requirements. The Pakistani threat indicated the need to build up the Indian Army and Indian Air Force, and perhaps the eventual need for nuclear weapons. The earlier Chinese threat suggested the need for mountain divisions equipped with light arms and transport, and a nuclear deterrent capability.

Looking further west and north-west, there are concerns about potential threats stemming from the Muslim countries of West and Central Asia which may provide diplomatic and material support to Pakistan in a war against India. During the 1965 Indo-Pakistani War over Kashmir, Iran and Turkey transferred some American combat aircraft to Pakistan.[1] India is currently isolated in the Islamic world over the Kashmir crisis. Looking due north, China has been increasing its conventional and nuclear-weapons capabilities, in contrast to the drastic military reductions being made by the US, Russia and Europe under the START II and Conventional Forces in Europe arms-control agreements. Looking south and south-east, Indian defence requirements are defined by long-term security problems that may emanate from the configuration of great-power naval forces deployed in the Indian Ocean. Past experience also suggests the possible build-up of Indonesian naval forces, as under President Sukarno in the early 1960s. And concerns about unstable political situations in the Middle East and South-east Asia may call for the evacuation of Indian nationals by the Indian Navy. Naval forces may be needed to intercept arms transfers to Pakistan from the Middle East. For the greater part, the Indian naval build-up is intended for general power projection and to deal with long-term threats as yet ill-defined.

The evolving nature of the 'Islamic', Chinese and naval threats will define Indian force postures in the 1990s. As with the rest of the world, India's newer threat perceptions in the 1990s tend to be speculative and ambiguous, except for the immediate Pakistani threat. The range and direction of Indian defence planning over the past 30 years may be viewed on a continuum between a minimalist and a maximalist force

posture. The minimalist posture calls for only a slight military edge against Pakistan, and the retention of the mountain divisions against China which were used essentially to fight the last war of 1962 when India was crushed. This minimalist posture prevailed during the rearmament decade between the 1962 Sino-Indian War and the 1971 Indo-Pakistan War. The maximalist force posture calls for clear conventional superiority against Pakistan, a nuclear deterrent capability against Pakistan, China and perhaps even the West, and the exercise of 'sea power' in the Indian Ocean between the Horn of Africa and the Strait of Malacca. It would give India a great-power role on a level with that of China. Just before the end of the Cold War and the withdrawal of Soviet forces from Afghanistan, India was moving towards the maximalist defence posture, creating considerable apprehension in South and South-east Asia and as far away as Australia.[2]

Between 1990 and 1992, the steady build-up towards a maximalist posture began to be reversed. First, the severe domestic economic problems and the balance-of-payments crises meant that India could no longer afford its arms build-up. Second, with the collapse of the Soviet Union, India had difficulty obtaining sophisticated weapons and military technology from abroad at affordable prices. However, the basic Indian strategic perspective that prompted the steady move towards a great-power or Asian-power role in the 1980s has not changed. This is reflected in the search for military ties and arms transfers from the United States. The reversal in the Indian arms build-up for the time being is involuntary.

Unlike India, Pakistan's basic threat perceptions have not changed since it was created in 1947: they remain focused on India. The size of Pakistan's defence capability is linked to India's weapons capability, both conventional and nuclear. All defence planning and weapons procurement policies are based on Pakistan's fear of being reabsorbed into a Greater India, or on the Pakistani objective of seizing by force the Muslim majority state of Kashmir from India. Looking farther west, there is some concern in Pakistan that Israel may eventually establish military ties with India to deal with the two countries' common fears of a transnational Islamic threat. There was some speculation in the late 1980s in Pakistan that Israel, in collusion with India, might strike at Pakistan's Kahuta enrichment plant in an operation similar to the Israeli attack on Iraq's Osirak nuclear reactor in 1981.[3] While Pakistani threat perceptions have remained about the same over the last four decades, the sources of external diplomatic and military support for Pakistan changed between 1990 and 1992.

External arms supplies and alliance support have been much more crucial for Pakistan than for India because it lacks a substantial domestic arms-production base and cannot match India's capabilities. Except for sales of some spare parts, much of the arms transfers from the United States have been cut off. Some Chinese arms sales have continued. More importantly, Pakistan is seeking to establish military ties with the Islamic world, wherever they may be forged, so as to give the country greater 'strategic depth' against India. But for the time being, the Pakistani arms build-up, like India's, has been involuntarily curtailed.

The military balance

The relative conventional military balance of power in South Asia has remained frozen since the end of the Cold War. From the Pakistani standpoint, this is disadvantageous. Pakistan has been in a state of perpetual strategic inferiority since the last war with India in 1971. The Pakistani military is not in a position to wrest Kashmir from India by force despite its internal insurgency, as well as that in adjacent Indian Punjab. On the other hand, India too perceives itself to be in a state of strategic parity or even relative military insufficiency and inferiority. Clearly, there is a major discrepancy in the perceptions of India and Pakistan on the prevailing military balance in South Asia. The main reason for this discrepancy is that India's defence assessments are usually based on its total security commitments, both immediate and long-term. Pakistan's assessments are related more specifically to India.

India believes that it has been particularly restrained in its arms build-up considering its long territorial frontiers and coastline, the number of countries that surround it, and the number of wars it has fought since independence. India's defence spending over the last 30 years has been between 3% and 4% of its GNP. This compares to about 6% to 8% in Pakistan. Compared to India's typical military expenditure of $10 per capita in 1990, Pakistan spent $25 per capita. However, China has repeatedly spent only 2% of its GNP on defence, and only $5 per capita. Of course, India and China have a lot of 'per capita' as it were; but these defence/GNP percentages and per capita military expenditures reflect the lower emphasis on defence spending and militarization in India. Periodic accusations of defence overspending by India has been a sore point. Even Pakistan's defence spending is relatively modest and has not exceeded the average of countries in East Asia and the Middle East. Nor has Pakistan's defence spending had a

disabling effect on its economy which, on average, has shown higher GNP growth rates than India.

India's traditional defence posture has been to maintain a 'slight edge' in ground, air and naval forces against Pakistan. Against China, only ground forces are deployed along the Himalayan frontiers. The next step would be to acquire a credible nuclear deterrent. Determining what defence was needed against China was, therefore, relatively easy. Whether the ten mountain divisions created after the 1962 Sino-Indian War are sufficient and effective defence against China today may be a matter of debate. The Indian Army has never been tested again, but may now be better prepared to fight the last war of 1962 effectively. Unfortunately, the next Sino-Indian war, if it did occur, may be unexpectedly different, and the mountain divisions may prove to be India's 'Maginot Line'. In any case, there was never any attempt by India to match Chinese conventional forces after 1962.

On the other hand, determining what constitutes a slight military edge against Pakistan is more problematic. In 1991, 'quantitative' differences in the number of men and weapons gave the following ratios between India and Pakistan. India had 1.1m men in uniform in the army, 55,000 in the navy and 110,000 in the air force, compared to Pakistan's 500,000 in the army, 20,000 in the navy and 45,000 in the air force (ratio of all uniformed personnel: 2.2:1). India had 3,100 main battle tanks compared to Pakistan's 1,980 (ratio: 1.5:1); 85 ships, submarines and patrol combat vessels compared to 44 (ratio: 1.9:1); and 630 combat aircraft compared to 375 (ratio: 1.7:1). Overall, India had a general numerical advantage over Pakistan of about two to one.

From the Indian standpoint this ratio is considered to be misleading. When assessing the 'qualitative' military balance between India and Pakistan, three problems need to be considered. First, there are differences in the technological quality of the weapons deployed on either side. American arms transfers to Pakistan in the 1980s following the Soviet invasion of Afghanistan (M-48A tanks and F-16 aircraft) began to tilt the qualitative military balance against India's Soviet weapons (T-72 tanks and MiG-23 aircraft). This was quickly offset by Indian purchases of advanced French and Soviet aircraft (*Mirage* 2000s and MiG-29s). As various Arab–Israeli wars and the 1991 Gulf War demonstrated, the quality of such front-line military equipment, rather than the total quantity on either side, is one of the more decisive factors in battle.

The second problem is the terrain on which wars are fought on the subcontinent. Along the cease-fire line in Kashmir, and in the 'no-man's land' in the Siachen Glacier, India faces a logistical disadvantage against Pakistan. Similarly, in Arunachal Pradesh along the McMahon Line, and to a lesser extent in the Aksai China plateau in Ladakh, India claims to be at a serious disadvantage for conducting the war on the ground or for receiving air support for its ground forces. Consequently, a Pakistani assault across the cease-fire line in Kashmir would almost certainly trigger a full-scale Indian assault across the international frontiers of the Indian border states of Punjab and Rajasthan. Thus, an Indian war to retain Kashmir is likely to be fought mainly outside Kashmir.

The third problem is the duration of wars in South Asia. The experience thus far has been one of short wars. The first Indo-Pakistani War in 1947–48 lasted a little over a year; the Sino-Indian War of 1962 lasted a little over two months; the 1965 Indo-Pakistani War lasted three weeks; and the 1971 War lasted only two weeks. In such short wars, the greater territorial advantage and spoils are not necessarily obtained by the state with more armed men and weapons, but by the state that has the advantage of surprise, motivation, superior weapons technology and operational skills. In a war of attrition, such as the Iran–Iraq War, India would no doubt prevail over Pakistan. But this assumes no external intervention on behalf of Pakistan, such as the opening of an arms-supply pipeline and the financing of the war effort. Finding enough military manpower is not a problem in either India or Pakistan.

The Indian fear is that the next war may resemble that of 1965 with added handicaps for India. A sudden and intense Pakistani military thrust into Kashmir in collaboration with armed Kashmiri insurgents within the state, backed by military assistance from other Muslim countries, could sever the Vale of Kashmir from India. In addition, India's problem could be compounded by an escalation of the insurgency by Sikh militants in the sensitive border-state of Punjab, or by a mutiny among Sikh soldiers against the authority of the Indian Army. Sikh separatists may see an Indo-Pakistani war as the opportune time to gain independence by force. With much of Kashmir irretrievably lost, the UN would then demand a cease-fire within a few weeks, thus forging a new territorial arrangement in South Asia.

India's disadvantages are offset by handicaps on the Pakistani side. Pakistan lacks strategic depth, and has only a marginal domestic arms-production base. Virtually all of Pakistan is within range of India's combat aircraft and its short-range ballistic missile, the *Prithvi*. Most of Pakistan's major cities and industrial sites are located north–south along the banks of the Indus River and its tributaries. As a consequence, Pakistani analysts argue that the annexation of Kashmir is not

only a matter of moral right, but of strategic necessity. Incorporating Kashmir into Pakistan would give Pakistan control over the head waters of the Indus River and its tributaries, and provide greater distance between India and the Pakistani capital, Islamabad.[4] However, a Pakistani attempt to seize Kashmir by force may lead to the loss of Sindh where the Sindhi nationalists are waiting for an opportunity to secede from Pakistan. What Sikhs may do in Punjab, Sindhis may do in Sindh. The 1971 war demonstrated the vulnerability of Pakistan along the Rajasthan–Sindh border. India's *Operation Brasstacks* military exercise in Rajasthan near the border with Sindh in 1987 provided a foretaste of what Pakistan may expect. Yet another disadvantage is Pakistan's inability to sustain a war for a sufficient length of time without outside military assistance. India's much larger domestic weapons production base would enable it to continue a war until the attrition rate turned in its favour.

Although India has approximately a two to one advantage over Pakistan in its total number of armed personnel and weapons, its actual deployment of forces against Pakistan suggests a more even match. Assuming that all India's ten mountain division are facing China, and that there are at least seven infantry divisions deployed in the north-east sector (four divisions are currently engaged in military operations against the armed Assamese separatists), then India would have 14 infantry divisions facing Pakistan. Assuming that Pakistan has at least three infantry divisions deployed along the Afghan frontier, it would have 15 divisions facing India. Both sides have two armoured divisions around which their Strike Corps are organized. A third armoured division/Strike Corps is being created on both sides. However, India may redeploy three or four mountain divisions to the Pakistani front along the cease-fire line in Kashmir, especially now that the prospect of Chinese military pressure along the Himalayan frontiers seems less likely. Such a calculated risk was taken by India during the 1971 Indo-Pakistani War when two or three mountain divisions each from the eastern and western sectors bordering China were diverted for the invasion of East Pakistan and the holding operation in Kashmir. But the redeployment of Indian mountain divisions to the Pakistani front may be partly offset by the redeployment of Pakistani divisions from the Afghan front where the military threat from a Soviet-backed regime has disappeared.

In the air, neither side may have the advantage. Pakistan's ageing *Mirage* III and V aircraft are being augmented by more *Mirage* III planes from Australia. Provided the 40 F-16s obtained from the US are not grounded for lack of spares, they are sufficient for a quick Pakistani military thrust. In May 1992, Pakistan reached an agreement with France on the sale of 40 *Mirage* 2000s. As against this, India has the Anglo-French *Jaguars* and the Soviet MiG-23s, both of which are partially produced or assembled in India. India purchased 40 *Mirage* 2000s from France in the mid-1980s, and now claims they are an inferior technological version of the Dassault aircraft that was offered to Pakistan in 1992. The Indian fleet of *Mirage* 2000s was augmented by the purchase of 100 Soviet MiG-29 aircraft of which 54 have been delivered so far.[5] Various versions of Soviet supplied surface-to-air missiles (SAMs) to India are now obsolete for lack of spares.

As with the other services, the naval build-up in India has also slowed down. Some of the Soviet vessels, especially the *Foxtrot* submarines, are virtually obsolete and have even become dangerous to operate. Other Soviet-made vessels now have difficulty gaining access to repair facilities in the former Soviet Union. Unlike the other two services, India's naval growth has always been steady and systematic because there was no specific, immediate or sustained naval threat to India. Until the mid-1970s, there was no serious competition from the Pakistani Navy or from other nearby navies of the Middle East. President Sukarno's naval fleet worth $1 billion bought from the Soviet Union in the early 1960s has since rotted away. The Pakistani Navy has now acquired several French, Italian, British and American vessels over the last decade and half. But these do not match the power of the Indian Navy.

The Indian Navy has argued (quite unconvincingly to the Indian political authorities so far) that the strategic location of the Indian peninsula in the centre of the arc of the Indian Ocean littoral, and the old historical maritime traditions of ancient South Indian kings, require India to play a major role in the Indian Ocean region.[6] Underlying this argument is the belief that if India wishes to become a regional or Asian power, it must be able to demonstrate 'sea power'. During the Cold War, the Indian Navy pointed to the superpower navies operating in the Indian Ocean which might have taken up hostile positions against it. The Indian political response then was to demand that the Indian Ocean be maintained as a 'zone of peace'. Since then the Indian Navy has conducted military exercises with the Australian and US navies.

In the 1990s, the Indian Navy's case for expansion may rest on the possibility of a Chinese naval threat. With the withdrawal of the old Soviet Navy, and cutbacks in the American naval presence in South-east Asia, the Chinese Navy may eventually operate west of the Strait of Malacca. China has already been involved in some major offshore

disputes with the South-east Asian countries. In 1992, there were heightened tensions in the South China Sea over the Spratly Islands which are claimed in whole by China and Taiwan, and in part by the Philippines, Malayasia and Brunei.[7] Earlier, towards the end of the Vietnam War, China had occupied the Paracel Islands claimed by Vietnam. In earlier decades, China had aided the independence movements among the Shan and Kachin tribes in Burma.

A more substantive rationale for Indian naval growth was provided after the 1971 Indo-Pakistan War when both countries' naval forces went into action for the first time. During that war, the US sent the nuclear-powered carrier *Enterprise* into the Bay of Bengal in a show of gunboat diplomacy against India. Thereafter, the Indian Navy came up with the argument that naval forces can raise the stakes and threshold of external military intervention even against great-power navies.[8] While the Indian Navy may perceive its strategic environment along these lines, other arguments advanced for a naval build-up were based on the need to protect India's long coastline and extended maritime zone, and to protect its growing sea-borne trade which constitutes over 85% of India's total overseas trade.

There has been no similar short- or long-term naval planning on the Pakistani side, a casualty of army dominance in the Pakistani military. It was only after the disastrous Pakistani defeat by the Indian Navy in 1971 that Pakistan woke up to the realization that naval forces are essential for the protection of its main port, Karachi, and its overseas commercial lifeline. Otherwise the Indian Navy would be able to bottle up Karachi as it did during the 1971 war. Following this, Pakistan's naval bases in Karachi and Gwadar were upgraded, and several new combat vessels procured. But Pakistan still remains vulnerable to an Indian naval attack and clearly will not be able to keep pace with Indian naval growth. The main rationale for the modest expansion of the Pakistani Navy is similar to that made by the Indian Navy: that the Pakistani Navy may not be able to win a sea war against the larger Indian Navy, but that it can raise the threshold of Indian military intervention even given an imbalance between the two naval forces.

Weapons procurement

The period of transition from the Cold War era into the early 1990s displays a curious mix of two opposing trends. In the short term, the traditional sources of arms have either been cut off or are inaccessible. This problem is aggravated by a shortage of foreign exchange and other domestic economic pressures in South Asia. In the long term,

oversupply and falling prices in the international arms market may make sophisticated arms more accessible and affordable.[9]

Unlike the continuing and successful drive in India and Pakistan to increase their nuclear weapons capabilities (or nuclear-weapon technology capabilities), on the conventional front both countries have been compelled into a state which one US Department of Defense official described as 'involuntary unilateral disarmament'.[10] The old strategic motivation on the part of the United States, the former Soviet Union and China to transfer arms to India and Pakistan no longer exists. The US has cut off its arms supplies to Pakistan in accordance with the Pressler Amendment, and Russia is unwilling to supply arms to India under the old rouble–rupee exchange rate on easy credit terms. In India, the situation has been accentuated by annual defence budget cuts (after adjusting for inflation) for three years in a row beginning 1990–91. These constraints are aggravated by the lessons of the 1991 Gulf War which demonstrated, especially to India, the ineffectiveness of Soviet weapons against the advanced weapons of the West. It also raised the question of the utility of the indigenous production of advanced weapons when adversary states may have ready access to top-of-the-range weapons produced in the West.

On the other hand, the motivation in the successor states of the former Soviet Union to sell arms for hard currencies has increased, suggesting the continued availability of former Soviet weapons in the future. Their salesmanship may be constrained, however, by the unreliability of future arms supplies and, especially, of spare parts. Yet this may only be a temporary situation. With the end of the Cold War, some Western states, such as France, Germany and Australia, have sought to sell their excess stockpiles of weapons to the Middle East, South Asia and South-east Asia. These trends have led to an abundance of available arms on the supply side. On the demand side, however, buyers are constrained by a lack of foreign exchange, especially in South Asia. In general, international market forces based on strategic necessity in the developing world and commercial availability in the industrialized world are likely to determine the nature of future international arms trade – not great-power confrontations, the search for regional allies or global defence strategies. The search for arms by India and Pakistan will continue as before in a radically transformed market-oriented sellers' environment.

Even with lower arms prices on the international market, there will be a considerable drain on foreign exchange reserves with adverse effects on the development programmes of both India and Pakistan. In the Indian case in particular, the deleterious effects of defence spend-

ing on development was not so much due to the domestic arms-production programme as to the opportunity costs of foreign exchange used to purchase overseas arms and military technology. Most of the domestic arms-production programmes in aeronautics, shipbuilding and armoured vehicles require the import of several parts, or the payment of licensing fees in hard currency. The foreign exchange component of the Indian defence programme can be quite large, thereby depriving critical areas of the development programme of much needed machinery and technology.

This trend of declining military capability has produced considerable concern and apprehension in the Indian military and among defence specialists. In 1989–90 and 1990–91, increases in the Indian defence budget were about 8%. In 1991–92, they were under 4%, and the allocation for 1992–93 showed an increase of 7% to a total of Indian Rupees 175bn ($6.1bn).[11] The inflation rate during this time has been between 10% and 20%. Together with the devaluation of the rupee by about 20% against the dollar in 1991, there was a relative decline in Indian defence spending as against the previous year in both rupee and dollar terms. The Indian Air Force has been reduced from 40 to 35 squadrons, with several MiG-27s and MiG-29s grounded for lack of spares. Between 1990 and 1995, no new warship joined or is expected to join the Indian Navy which is likely to reduce its long cruises by as much as 30% in the future in response to the budgetary crunch.

Soviet disintegration has thrown India's weapons procurement programme into disarray.[12] Since the T-72 tank production in India is still not completely indigenous, parts have to be obtained from Belarus, and overhauling of the T-55 tank has to be undertaken in Ukraine. The factories of the 'Soviet' BMP armoured personnel carriers which are assembled in India are located in Ukraine and Belarus. The manufacturing facilities of the whole range of Soviet surface-to-air missiles from SA-6 to SA-16 are scattered throughout Russia, Belarus, Ukraine and Kazakhstan.

Pakistan has experienced a similar decline with the ending of US military supplies. The 1992–93 Pakistani defence budget was increased by 8.4% from the previous year to Pakistani Rupees 82.5bn ($3.26bn). This meant that there was no relative change from the previous year after taking into account the Pakistani inflation rate of about 8%.[13] After having received 40 F-16 fighters from the United States (including 12 twin-seat trainers), the negotiations for the purchase of another 60 F-16s was suddenly stymied. Many of the existing 40 F-16s are grounded for want of spares. Indeed, the objective of

developing a new air defence system around a planned total of 150 F-16s has now been abandoned by Pakistan, although it still has access to Chinese aircraft from which it has purchased several F-6, F-7 and the Q-5 *Fantan* jets in the past.

The already weak Pakistani Navy was badly hit by the ending of US military aid. Of the 17 surface combatant vessels, nine frigates and destroyers had been leased from the United States.[14] These presumably will have to be withdrawn. The remaining eight are old British *County*-class destroyers and *Leander*-class frigates. Pakistan's four *Daphné*-class submarines are now near the end of their specified operational life of 20 years. Perhaps the most harmful effect of the US arms embargo was the withdrawal of proposed sales of *Harpoon* missiles. These missiles were expected to give the Pakistani surface combatant ships considerable advantage over their Indian counterparts which carry the relatively short-range and inaccurate Soviet-made *Styx* missiles.

In India, short-term procurement problems are being countered by various long-term plans to renegotiate arms purchases and licensed production of weapons on a commercial basis with the former Soviet republics. The first major indication of this change is the Indian negotiations with Russia for the purchase or licensed manufacture of the Su-27 interceptor.[15] India continues to negotiate for the purchase of engines for its planned Light Combat Aircraft (LCA) from General Electric and Pratt and Whitney, but these efforts have not made much headway since 16 GE-304 engines were purchased in the late 1980s. The eventual large-scale production of India's LCA still seems distant, if not improbable.

Meanwhile, Pakistan overtook India in the race to obtain new weapons when it ordered 40 *Mirage* 2000 multirole fighters from France.[16] Pakistani pilots also fly the *Mirage* 2000s of the United Arab Emirates (UAE) where the Pakistani Air Force (PAF) is under contract to train the UAE Air Force. Thus Pakistan may have immediate access to another 36 of these planes. To add to the PAF's existing fleet of *Mirage* III aircraft, an agreement was reached with Australia in 1990 for the purchase of 50 of these earlier versions of the *Mirage*. The PAF, therefore, is now building its air power around French combat aircraft.

Compared to the other two services, the Indian Navy has nurtured the domestic arms industry for its weapons procurement more effectively. After a period of excessive dependence on the former Soviet Union for various types of combat ships, the Indian Navy is now able to procure virtually all of its major combat ships through indigenous

design and production or licensed production at home in collaboration with an overseas manufacturer.[17] These include submarines, destroyers, frigates and corvettes. But the domestic procurement process is painstakingly slow. The Navy is anxious to obtain at least one more carrier for its fleet. Its existing two carriers are refurbished British vessels that date back to the 1940s. In spite of some naval optimism, India's earlier naval power projection has begun to mellow as much of the Soviet-equipped Indian Navy becomes obsolete or difficult to repair.

Conventional deterrence

India's 'maximalist' defence objective is rationalized not only by perceptions of immediate and long-term threats, but by its self-image in world affairs. India is a country of almost 900m people, strategically located at the centre of the Indian Ocean arc between South Africa and Australia. It has a population nearly eight times the size of Pakistan, and frontiers and coastlines that are proportionately almost as great. More importantly, the preponderance of Indian military power was expected to prevent wars and stabilize the region. Indeed, since India's military victory in 1971 and the subsequent policy of maintaining clear military superiority over Pakistan, no major wars have been fought between the two countries. No doubt, this policy of maintaining military superiority was temporarily set back with the renewal of American arms supplies to Pakistan in the 1980s following the Soviet invasion of Afghanistan. But the swift Indian decision to acquire advanced French and Soviet combat aircraft signalled India's determination to maintain its lead. In the present crisis in Kashmir, Pakistan has perhaps refrained from seeking a military solution because of doubts as to whether a conventional war with India is winnable at an acceptable cost.

While India's objective in the 1990s is to maintain its military superiority, Pakistan's objective is to restore some semblance of the old military balance that prevailed in the 1950s and 1960s. Indian military preponderance does not guarantee Pakistan's independence and sovereignty. Pakistani fears of being absorbed back into a 'Greater India' remain at the core of its defence doctrines and objectives. From the Pakistani standpoint, India's demands that a distribution of military power should in some way reflect the differences in relative size and security needs of the two countries in a ratio of about 3:1 (if not 8:1) is doubtful. A serious imbalance of forces in favour of India may deter Pakistan from attacking it to achieve its objectives in Kashmir, but will not deter India from attacking Pakistan to achieve its objective of a Greater India.

Pakistani fears depend considerably on whether India is a status-quo or an expansionist state. Pakistan periodically points out India's seizure of Goa in 1961, the absorption of Sikkim in 1975, the dismemberment of Pakistan in 1971, the military intervention in Sri Lanka from 1987 to 1990 and the military intervention in the Maldives in 1988.[18] India counters these allegations by arguing that the liberation of Goa was necessary to end the vestiges of colonial rule; that Sikkim was merely one of the nearly 600 princely states which were then Indian protectorates; that the Bangladesh liberation struggle became an Indian problem when 10m refugees fled to India; that Indian military intervention in Sri Lanka was by mutual agreement, with Indian forces fighting on the side of the Sri Lankan government instead of protecting the Tamils; and that the military intervention in the Maldives was at the request of the ruler and was undertaken with the endorsement of the United States.

Despite Pakistani fears, there is much to indicate that India is a status-quo state.[19] India withdrew from Bangladesh when it could have annexed it, and it could probably have annexed much of West Pakistan during the same war, but chose not to do so. India withdrew from Sri Lanka, and from the Maldives as soon as it had quashed the coup and restored the previous government. Most Indian arguments for a Greater India is for the creation of a voluntary confederation in South Asia based on the model of the European Community, rather than an empire created through military force. In fact, interest in such a confederation has been declining in recent years. With the rise of Hindu nationalism in India, parties such as the BJP and the *Vishwa Hindu Parishad* are anxious to create a narrower Hindu state. The annexation of Pakistan and Bangladesh would imply the inclusion of another 220m hostile Muslims in addition to the 120m already in India, a prospect that Hindu nationalists and most other politicians would prefer to avoid.

IV. NUCLEAR WEAPONS PROLIFERATION

Internal security problems are paramount in the minds of South Asian decision-makers. These problems are not always contained within national boundaries and could – through a series of escalatory moves – trigger a full-scale war on the subcontinent. Since the early 1970s, both India and Pakistan have been engaged in a 'latent' nuclear arms race. In the 1990s, the prospect of war is one of conventional war accompanied by nuclear threats and counter-threats that could finally break out into an all-out nuclear war.

While the sources of regional conflict may be internal, the motivation for acquiring nuclear weapons is primarily external. Such weapons may also be sought by political parties and their leaders to impress an internal audience. Developments elsewhere in the world have affected the nuclear situation in South Asia in both positive and negative ways. China acceded to the Nuclear Non-proliferation Treaty (NPT) in early 1992, and France, the other nuclear-weapons state which refused to adhere to the NPT for more than two decades, followed on 3 August 1992. South Africa has also acceded to the NPT. In 1991, Argentina and Brazil reached a bilateral agreement to ratify the verification and compliance procedures of the Treaty of Tlatelolco which would make Latin America a nuclear weapons-free zone. Both have now signed 'full-scope' safeguard agreements.[1] These newer developments are increasing the pressure on the remaining three significant states withholding their accession – **Israel, India and Pakistan – to sign the NPT or an NPT substitute such as a nuclear weapons-free zone treaty.** There are also some indications of internal political pressure within India and Pakistan to sign the NPT and to get on with the more important business of economic development.[2]

However, there have been other developments in the world that indicate gloomy prospects for containing proliferation in South Asia.[3] Efforts by NPT signatories Iraq and North Korea to acquire nuclear weapons suggest not only that International Atomic Energy Agency (IAEA) safeguards are insufficient, but that the Treaty may be a good cover for a nuclear weapons programme. Again, the emergence of new nuclear-weapons states from the disintegrated Soviet Union means that the bomb has spread, at least temporarily, until these weapons are scrapped or withdrawn to Russia. Within South Asia, despite repeated denials, Pakistan appears to have reached nuclear-weapons capability, and may even have stockpiled one or two bombs. India has threatened to respond with a nuclear-weapons programme – if it has not already done so. Analysts in South Asia suggest that it may now be too late to establish a nuclear weapons-free zone.

The spillover effects of proliferation

Although the roots of proliferation in South Asia are to be found mainly in the dynamics of Sino-Indian and Indo-Pakistani relations, proliferation tendencies in the Middle East, Central Asia and North-east Asia add to the proliferation pressures in South Asia. North Korea's efforts to build the bomb at its Yongbyon nuclear complex may carry no direct or immediate security implications for South Asia, except to demonstrate the failure of the NPT to check the spread of the bomb among its signatories.[4] A worst-case scenario might be a South Korean response in kind to North Korean nuclear weapons production, followed by similar responses in Taiwan and Japan triggering a complex nuclear arms race among these countries and with China. A regenerated and active Chinese nuclear arms build-up within the new and expanded Asian strategic nuclear context would then call for an Indian nuclear response. A Pakistani nuclear arms build-up would certainly follow the Indian decision.

Other proliferation links with South Asia are to be found in the Middle East and Central Asia. Previous Indian concerns arose from possible Libyan–Pakistani connections in the development of an 'Islamic bomb'. India alleged in the early 1980s that various Libyan holding companies had been set up in Pakistan to channel Libyan petrodollars and uranium ore from Niger (channelled through Tripoli) for the Pakistani nuclear weapons programme.[5] Indirect financial assistance for the bomb through regular economic aid channels was also alleged to have come from Saudi Arabia: the construction of the uranium enrichment plant at Kahuta was facilitated by such indirect Arab financial backing. Whatever the veracity of such earlier Indian reports, there are no further allegations of Arab connections in the 1990s, perhaps because the Pakistani programme has become self-sufficient. Pakistan has now stockpiled weapons-grade enriched uranium at the Kahuta plant and further efforts in this direction continue.[6]

Iraq's experience during the 1991 Gulf War may provide some dangerous lessons for would-be proliferators elsewhere, including states in the subcontinent. Irrespective of the rights and wrongs of the Iraqi invasion and annexation of Kuwait, one lesson that may be learnt by the near-nuclear weapons states is that if Iraq had possessed even a small arsenal of crude nuclear devices before it annexed Kuwait, the course of events might have been different. Either the threatened attack by the US-led coalition might have been deterred; or the attack might

have been deferred until the security of Iraq's neighbours, especially Israel and Saudi Arabia, was assured – and until probable casualties to Western forces from Iraqi nuclear weapons attacks could be avoided.

Thus, the possession of a few crude nuclear bombs may be perceived by near-nuclear weapons states in the less industrialized world as either a means of deterring attacks, or of raising the threshold of military intervention by the industrialized West with their advanced high-tech conventional weapons.[7] Iran declared its right to nuclear weapons following the Gulf War and called upon other Muslim nations to match Israel's capabilities.[8] That nuclear weapons may constitute the 'great equalizer' among unequal states is a lesson that has not been lost on such states, including Pakistan and India.

The continued possession of nuclear capabilities in Ukraine, Belarus and especially Kazakhstan will increase the determination in India and Pakistan not to give up their nuclear weapons option. All three former Soviet states have indicated their willingness, in principle, to give up their nuclear weapons. In the interim, however, global proliferation will already have taken place.[9] There are now eight states that overtly possess nuclear weapons. Along with Russia, Kazakhstan has claimed that it was one of the original nuclear weapons states which were parties to the NPT finalized in 1968. The sentiments expressed within Kazakhstan in 1991 for not giving up its nuclear weapons will strike sympathetic chords in South Asia. Referring to the 'respectful' visits of former US Secretary of State James Baker, British Foreign Secretary Douglas Hurd and former French Foreign Minister Roland Dumas to the capital Alma Ata in 1991–92, Scitkazy Matayev, a spokesman for President Nursultan Nazarbayev, declared: 'If we didn't have nuclear weapons, they wouldn't have bothered'.[10] Matayev continued: 'A state with nuclear bombs has a decisive voice in world affairs'. However, under pressure from the United States, President Nazarbayev agreed in May 1992 to scrap all nuclear-weapon systems on its soil and to sign the NPT as a non-nuclear weapons state. Likewise, Ukraine initially backtracked on its commitment to dispose of its nuclear weapons.[11]

Proliferation in West and Central Asia will constitute a positive trend for Pakistan, but a disturbing development for India. Indian reports have alleged the possibility of nuclear collaboration between Pakistan and Kazakhstan, and the possible transfer of enriched uranium from Tajikistan in the future.[12] Such allegations are unconfirmed and the probability of such an occurrence may be low, but more speculation of this kind (the classic security dilemma) may provide the basis for a change in India's nuclear policy. For Pakistan, the existence

of more friendly Muslim nuclear-weapons states would reduce the relative strategic nuclear power of India in the region, a development these states would favour. Faced with multiple deployments of nuclear weapons in China, Pakistan and some of the Muslim countries further west, the credibility of an Indian nuclear deterrent posture would become more complex, and perhaps ineffective. Israeli reactions to such trends would further complicate the delicate balance of mutual deterrent relationships in West, Central and South Asia, leading to unstable nuclear relationships all round.

Thus, positive trends elsewhere in the world in containing proliferation may have little or no impact in South Asia. The dynamics of the Indo-Pakistani and Sino-Indian nuclear relationships will not be affected much by the decisions of South Africa, Argentina and Brazil, three significant 'hold-out' states, to sign the NPT or to support a regional nuclear-free zone. A decision by China, a long-standing nuclear power, to sign the NPT is more relevant for the containment of nuclear proliferation in South Asia in the 1990s, but not yet persuasive. It may add to the pressure on India and Pakistan to sign the NPT, but ultimately it is their own security interests that will determine their decision.

South Asian proliferation

Two underlying characteristics may be noted about the nuclear arms race in South Asia, one of which reflects a perpetual condition, and the other a relatively new situation. First, Pakistan's propulsion towards nuclear weapons arose mainly from strategic imperatives, namely, the threat from India. The nuclear energy rationalization put forward by Pakistan was an afterthought. The Pakistani programme may be viewed, therefore, as a 'top-down' problem or a 'security-to-energy'-driven phenomenon. In India, on the other hand, a nuclear energy programme was perceived as critical for meeting anticipated shortfalls in the country's overall energy needs. Various security rationalizations for nuclear weapons, such as the Chinese nuclear threat, fitted nicely with the technological capability generated by the energy programme. The Indian programme, therefore, was in part a 'bottom-up' problem or an 'energy-to-security'-driven phenomenon. This analytical distinction is important. In the case of Pakistan, it is more critical to address its security concerns, real or imagined. In the case of India, it is more meaningful to watch its nuclear energy and space programmes. These may be for genuine civilian development purposes, but they could be diverted to the making of nuclear weapons and missile delivery systems.

The second characteristic is the change in the direction of India's primary nuclear threat perceptions. As before, India still insists on maintaining its 'nuclear option': it will neither acquire the bomb, nor sign the NPT for the present. But India also holds the right to acquire nuclear weapons in the future if its security were to warrant such a move. However, the same policy now exists in a radically different setting. Before the 1974 Indian atomic test, India's nuclear option policy was directed at the perceived nuclear threat from China. The ultimate decision to exercise the option in response to this threat was then conditioned by the potential consequences of Pakistan's reactions. But as Pakistan acquired the bomb after the 1974 Indian test, there followed a decade of ambiguity and uncertainty in India about the direction from which it faced a nuclear threat. Was it China or was it Pakistan? By the early-to-mid-1980s, Indian analysts were convinced that Pakistan had put together an effective nuclear weapons programme. Thereafter, India's nuclear-option policy was directed primarily at the Pakistani nuclear threat. The decision to exercise this option in response to the Pakistani programme was then conditioned by the possible aggravation of the now largely dormant Chinese nuclear threat.

This change in the orientation and direction of India's perceived nuclear threats continues into the 1990s. It also indicates a significant change in India's ability to manage the nuclear situation in South Asia. At one time, India had the 'luxury', as it were, of deciding whether or not South Asia would become nuclearized. Now it is Pakistan which determines whether South Asia will become nuclearized while India can only respond. The situation has moved beyond India's control.

Proposals to establish a 'nuclear-safe zone' rather than a 'nuclear-free zone' in South Asia are based on the assumption that the containment of nuclear proliferation in this region has already failed. This has not been firmly established as yet and much depends on definitions of a nuclear-weapons capability. India tested an atomic device in 1974, but its stockpile, as George Quester put it, 'went from one to zero' thereafter.[13] However, India clearly has the technological capability and the stockpiles of plutonium to produce several bombs at short notice. The plutonium is available from the nuclear-power plant facilities at Kalapakkam near Madras, and from the Dhruva research reactor at Trombay near Bombay. Unlike the reactors supplied by Canada and the US for the Rajasthan and Tarapur power plants, the Kalapakkam and Dhruva reactors were built indigenously and are, therefore, not subject to IAEA inspection.

Pakistan has either produced sufficient highly enriched uranium at its Kahuta facilities to produce the bomb, or has already assembled one, as Senator Larry Pressler of South Dakota alleged during his visit to Pakistan in January 1992.[14] Pakistan has denied such allegations for over a decade. In February 1992, however, Pakistani Foreign Secretary, Shahryar Khan, stated in Washington that his nation now had the components and the know-how to assemble at least one nuclear explosive device.[15] But the Pakistani Foreign Office immediately issued a statement claiming that Khan's statements had been distorted by the press.[16]

The Pressler Amendment passed in the Senate in 1984 calls for an annual certification by the American President that countries receiving military and economic aid are not pursuing nuclear weapons. The Amendment has since been interpreted as being 'Pakistan specific'. A Pakistani newspaper report commented: 'When asked why the US is ignoring highly developed military-oriented nuclear programmes of Israel and India, the diplomat candidly admitted that the Pressler Amendment did not apply to these countries. "The Pressler Amendment was drafted with Pakistan's concurrence to continue the assistance programme when it ran into difficulties with the Congress. Hence Islamabad cannot complain now," he added'.[17] Based on US intelligence, the Bush administration was unable to provide the necessary certification of clearance for the Pakistani nuclear programme after 1990. Consequently, US military and economic aid to Pakistan was cut off.[18]

On the other hand, India's growing technological capability and accumulation of plutonium stockpiles from its reprocessing facilities are in some ways similar to the Japanese nuclear energy programme which is technologically far more advanced and extensive, and which routinely involves the stockpiling of large quantities of plutonium. Japan currently uses enriched uranium supplied by the United States. The spent fuel is reprocessed in Europe and the plutonium then transported back to Japan, each shipment sufficient to make 100–150 bombs.[19] Because of the safety risks in the transportation of the fissile material over long distances, Japan plans to create its own 'plutonium cycle' which would give it an annual weapon-making capability several times greater than that of India.

While India's growing nuclear technology and plutonium stockpiles have certainly generated greater international concerns than the parallel case of Japan, India still has not been castigated as a nuclear weapons proliferator in the way that Pakistan has been. The American determination of who is or is not a proliferator, therefore, appears to

rest more on the perceived motivation and intentions of states to acquire nuclear weapons than on the capability and materials possessed.[20] There are perceived differences in the nuclear motivation of Pakistan, India and Japan.

Pakistan's intentions were revealed in the late 1970s following the Indian 'peaceful' nuclear explosion when Pakistan attempted to obtain a reprocessing plant and then an enrichment plant to generate plutonium and enriched uranium. At this time, the Pakistani nuclear energy programme was insignificant, consisting mainly of a small Canadian reactor in Karachi. First, under the chairmanship of Munir Khan of the Pakistan Atomic Energy Commission, Pakistan sought to purchase a reprocessing plant from France to be set up at its Chasma nuclear facilities. The sale was prevented by the United States. By the late 1970s, it became apparent that Pakistan was engaged in a secret operation under the leadership of Abdul Qadir Khan to piece together an enrichment plant at Kahuta through the import of various parts from Europe and North America. This clandestine operation proved successful and Pakistan reportedly had enough enriched uranium in 1992 to assemble two or three bombs.

There is also a significant difference between the Japanese and Indian programmes, revealing India's military motivations. Japan has not been engaged in developing ballistic missiles, unlike India which has been developing intermediate-range ballistic missile (IRBM) and even intercontinental ballistic missile (ICBM) capabilities. The testing of the IRBM *Agni* in 1987, and again in 1992, suggests that these missiles are intended eventually to be tipped with nuclear warheads. The 1987 *Agni* test was capable of carrying a 500 kilogram warhead a distance of 1,500 kilometres, and the 1992 test of carrying 1,000 kilograms a distance of 2,500 kilometres.[21] It would make little sense to develop such costly long-range systems for delivering conventional bombs. India's peaceful rocket development programme for satellite launches undertaken by the ISRO also increases its technological capability to produce ICBM delivery systems. The Augmented Satellite Launch Vehicle (ASLV-3) which was successfully tested in 1992, and the Polar Satellite Launch Vehicle scheduled for testing in 1993, can both be converted to ICBM delivery systems to give India global nuclear reach by the late 1990s.[22]

Stability in a nuclearized South Asia

The dynamics of the continuing Indo-Pakistani latent nuclear arms race (developing and upgrading the weapons technology but remaining just a screwdriver away from the production of bombs) might suggest

that it is only a matter of time before both countries embark on an overt nuclear arms race.[23] Several doubts have been expressed about the stability of an Indo-Pakistani nuclear arms race. In principle, if the strategic nuclear relationship among the United States, the former Soviet Union and China could be maintained on a stable basis during the Cold War, then it might be possible to maintain a similarly stable relationship among China, India and Pakistan today. China would occupy the same position as the United States in the global Cold War strategic triangle, India that of the former Soviet Union and Pakistan that of China. A situation of 'mutual assured destruction' would exist between China and India similar to that which existed between the United States and the former Soviet Union; and one of strategic nuclear superiority between India and Pakistan similar to that between the former Soviet Union and China. Any imbalance in the India–Pakistan relationship would be offset by the intrusion of China on the Pakistani side.

Although the traditional Cold War rules of deterrent relationships may apply in South Asia, the actual behaviour of the states may prove to be quite different. Four arguments may be advanced as to why the China–India–Pakistan nuclear relationship would be more unstable than the old Cold War triangular relationship. First, there was a difference in the emotional intensity of the relationship among the US, the former USSR and China, even at the height of the Cold War, compared to that between India and Pakistan. Ideological differences do not generate as much fear and irrationality between two states as antagonism based on religion. Therefore, under conditions of acute crisis between India and Pakistan, there may be a greater temptation to launch pre-emptive attacks than between the United States and the former Soviet Union during the Cold War.

Western fears of potential Indian and Pakistani irrationality or irresponsibility may be exaggerated or misconceived. Whereas Hindu–Muslim rioting and killing have been spontaneous, savage and endemic before and after partition, the decision-makers in India and Pakistan have generally remained quite rational and responsible during crises. All Indo-Pakistani wars have been essentially 'gentlemanly'. Civilian targets, or even targets where civilian casualties could occur, were never attacked; prisoners of war were treated humanely and returned after the cessation of hostilities. Nuclear responsibility between the two sides was also demonstrated in a formal treaty signed by India and Pakistan in 1991 not to attack each other's nuclear energy installations in case of war. This is quite unlike the American war in

Vietnam or the Soviet war in Afghanistan, where large numbers of civilian casualties were caused by bombing raids on cities.

Second, the geographical proximity of the two countries would generate greater paranoia about a nuclear attack by the other side since there would be virtually no warning time. Mutual rules of 'no first use' may be introduced in principle, but may not work in practice. Yet this argument, too, can be countered. Geographical proximity and the interrelated nature of societies on either side may in themselves constitute a deterrent. An attack by India on Pakistan may cause radioactive fallout in India, and vice versa. Even if Pakistan were to attack distant targets in India with IRBMs (which Pakistan does not possess at present), death and destruction would also be inflicted on thousands of Indian Muslims whom Pakistan is supposed to protect.

Third, the movement from a non-nuclear status in South Asia to a nuclear one would be a sudden and dramatic change, producing much uncertainty and paranoia. It would imply that the antagonists had not had sufficient time to understand the nature of nuclear deterrent relationships – quite unlike the evolution of nuclear thought and doctrine among the nuclear powers during the Cold War. At least in the short run, and especially under conditions of crisis such as the one in Kashmir, a conventional war could quickly escalate to a nuclear war in South Asia. Again, an opposing argument may be advanced to counter this belief. A sudden change does not necessarily imply that Indian and Pakistani decision-makers have not learnt the nature and operation of deterrent relationships from the experience of the Cold War nuclear antagonists. Indeed, both India and Pakistan have been on the brink of nuclear weapons capabilities for a sufficient length of time to have already taken into account the probable consequences of nuclearization in South Asia.

Fourth, wars have been more frequent in South Asia than in any other region except the Middle East. Unlike the existing five nuclear powers, India and Pakistan have fought three major wars with each other since independence in 1947, and have been on the brink of a fourth war over Kashmir since 1990. Therefore nuclearization of the subcontinent is more likely to lead to nuclear wars. But this argument may be countered as well by pointing out that no wars between India and Pakistan have occurred since 1971.

Arguments claiming that a nuclear South Asia would be stable suggest that even conventional wars may be avoided by India and Pakistan in the future for fear of such wars escalating to nuclear levels.[24] This would match the behaviour of the nuclear powers during the Cold War when no direct conventional wars occurred. However,

wars of proxy, as in Vietnam and Afghanistan, are likely to take place in South Asia as well. Such a war has been taking place in Kashmir where Indian forces are engaged in combatting Pakistani-armed Kashmiri guerrillas. On the other hand, the often predicted fourth Indo-Pakistani war has not yet taken place over Kashmir, perhaps because India and Pakistan are on the brink of a nuclear weapons capability, or may already possess such capability, thus deterring both sides from taking any conventional military risks as well.

All of this is not to suggest that a nuclear South Asia may be preferable to a non-nuclear one in the 1990s. The spread of the bomb to the Middle East and Central Asia followed by an overt Israeli nuclear arms build-up could complicate both Indian and Pakistani nuclear deterrent strategies. An Iranian bomb with appropriate delivery systems would make India less secure. Similarly, if the development of a Pakistani bomb is perceived as an 'Islamic bomb', then this would not only face east towards India, but west towards Israel, thus possibly inviting an Israeli pre-emptive attack.[25]

Weapons in other Muslim countries are unlikely to be aimed directly at India and, in any case, with its IRBM capability, India could deter potential threats from this direction together with those stemming from Pakistan and China. But maintaining such a multiple deterrent posture could prove both tenuous and costly for India. In general, efforts to establish deterrent relationships among several states involved with different or cross-cutting conflict issues could prove unstable and dangerous both for South Asia and the world.

Nuclear politics and arms control

Nuclear proliferation, both within South Asia and into West and Central Asia, appears advantageous to Pakistan and disadvantageous to India. For Pakistan, nuclear weapons constitute the 'great equalizer' with India, a country with more advanced technology and greater resource capabilities. Pakistan can no longer keep up with India in the conventional arms race where an approximately equal balance of forces is considered essential for its defence.[26] On the other hand, ten Pakistani bombs could well deter one hundred Indian bombs and also paralyse any conventional military action that India may contemplate for fear of this escalating to a nuclear level. A decision by India to embark on a nuclear weapons programme would appear to be playing into Pakistan's hands, and the spread of nuclear weapons west of the subcontinent would only add to the burden of maintaining a credible Indian deterrent posture. Yet it is Pakistan that has repeatedly and consistently offered to sign the NPT or an NPT substitute.[27] India has consistently rejected such offers.

For almost 30 years now, India's arguments against signing the NPT have remained fundamentally unchanged. One is a regional argument, and the other a global argument. According to the regional argument, the renunciation of nuclear weapons through a treaty with Pakistan would not enable India to address current or future perceived nuclear threats from China. According to India's global argument, the NPT discriminates between the nuclear 'haves' and 'have-nots'. The dangers of nuclear war arise as much from vertical proliferation (the growth of nuclear weapons capabilities among the 'haves') as from horizontal proliferation (the spread of such capabilities among the 'have-nots').

India's regional argument makes less sense as Sino-Indian relations continue to improve in the 1990s. Perhaps the Chinese test of a one-megaton nuclear bomb in May 1992 just prior to the visit of India's R. Venkataraman to China may have sent a confusing message. But the message of the test seemed to be directed more at the West than at India. Besides, India has lived with the Chinese nuclear threat for more than 25 years, and surely can live with it for another 25 years under more friendly circumstances. The regional argument was further defused when Kazakhstan declared its intention to sign the NPT as a non-nuclear weapons state. But India may now argue that Iran, like Iraq, may attempt to acquire nuclear weapons. Moreover, Pakistani efforts to acquire a weapons capability over the last two decades indicated that Islamabad had no intention of giving up its nuclear weapons objective. Signing the NPT did not prevent Iraq and North Korea, for instance, from pursuing nuclear weapons and missile programmes, and it will not stop Pakistan either. In fact, the Pakistani offer to sign the NPT or a nuclear-free zone treaty may well have been made on the expectation that India will not sign, and therefore that it is safe for Pakistan to make the offer.

India's global argument appears unconvincing in the 1990s following the end of the Cold War. While the discriminatory aspects of the treaty between 'haves' and 'have-nots' still remain, vertical proliferation has slowed, ended or is even being reversed. There are drastic cutbacks in the nuclear arsenals of the United States and Russia, and fewer additions are being made to those in France and Britain. These are welcome trends, but total nuclear disarmament, for the time being, appears inconceivable. Meeting the Indian demand that all nuclear weapons should be eliminated in accordance with Article 6 of the NPT may not only not be feasible, but may also be dangerous. If all existing nuclear powers were to give up their nuclear weapons several new states on the nuclear threshold may be tempted to acquire such weapons. The Indian complaint about the discriminatory nature of the NPT also makes increasingly less sense since nearly 150 other countries have signed the NPT. If they can live with it, then why not India? At least the arguments of Pakistan and Israel, two of the other three hold-out states, are based on the logic of national security and self-preservation. India's arguments are only partly based on issues of national security, but primarily revolve around nebulous concerns about international discrimination and global security.

Those who argue that nuclearization has already occurred in South Asia are usually those who favour this outcome – the pro-bomb lobbies in both India and Pakistan. Even if both countries have stockpiled a handful of nuclear weapons, these can still be dismantled and the region denuclearized. India, after having tested its first atomic device, chose not to pursue a nuclear weapons capability. Assuming that both sides have some nuclear weapons, the alternative to reversing the situation to a non-nuclear one would be a tacit agreement to 'freeze' the relationship at the present levels.[28] Meanwhile, the covert capability will remain formally undeclared, maintaining the myth of preserving the present non-proliferation regime – a situation similar to the undeclared Israeli nuclear weapons capability. Such a posture may curb proliferation elsewhere, and may even deter nuclear and conventional wars between India and Pakistan. However, such a frozen and undeclared nuclear situation cannot be sustained indefinitely. It is dangerous because of the uncertainty of the nuclear weapons programmes on either side; it will not allow for arms-control talks because nuclear weapons are not supposed to exist; and proliferation may then spread to West and Central Asia, and other parts of the world.

Ironically, global nuclear proliferation has already occurred, not because of India's refusal to sign the NPT, but because of the disintegration of the Soviet Union and tensions elswehere in West, Central and North-east Asia. Unlike the Cold War US–USSR nuclear arms build-up ('vertical' proliferation), the problem in the 1990s is the spread of nuclear weapons among new states ('horizontal' proliferation). The spread of the bomb to Kazakhstan, Israel, Iran and North Korea will fuel fears about nuclear security in South Asia. In the future, India may have to worry about nuclear threats from both Pakistan and Iran, and Pakistan from India and Israel. Under these evolving conditions, India's global arguments will take on a new meaning and direction, and the NPT will be resisted further.

There are severe domestic constraints in India and Pakistan that make the acceptance of the NPT difficult. While radical turnabouts have taken place in India's economic and foreign policies, a sudden change in India's 'nuclear option' policy remains constrained by

hardline pro-bomb lobbyists that include the Hindu nationalist BJP. Statements by Senator Larry Pressler in January 1992 during his visit to India and Pakistan reinforced the BJP's position that India must have nuclear weapons. The BJP leader, L.K. Advani, declared that Pressler's statement was a warning 'not only to our part of the globe, but also to all countries'. According to Advani, 'my party has been prompted by the hard realities of our region, mainly the fact that China is a nuclear power, and that Pakistan has crossed the nuclear threshold'.[29] The minority Congress government of Prime Minister Narasimha Rao is dependent on the parliamentary support of the BJP, and can only move cautiously towards participation in the proposed five-nation talks, if it has any inclination to do so. In Pakistan too, there is a strong but not so visible lobby against the NPT. The leader of the *Jamaat Islami*, Qazi Hussain Ahmed, warned of dire consequences for any Pakistani leader who signed the NPT.[30] His views were supported by some members of the Pakistani Senate such as Tariq Chaudhary, and more tacitly by the Pakistani President, Ghulam Ishaq Khan.

By early 1992, there appeared to be a tentative shift in India's traditional position that refuses to endorse the NPT or a nuclear weapons-free zone arrangement.[31] During his visit to Washington in March 1992, Foreign Secretary J.N. Dixit stated that India may be willing to enter into bilateral negotiations with the United States on resolving their differences on the nuclear issue. But on his return to India, Dixit denied that he had agreed to the proposed five-nation talks. (Apart from India and Pakistan, the other three states in the talks would be the United States, Russia and China.) According to the Indian Foreign Secretary, India's nuclear policy makes a distinction between signing the NPT and the commitment to non-proliferation.[32] India will not sign the NPT, but will not contribute to proliferation either by producing nuclear weapons except in response to proliferation by others. In practice, the distinction is not meaningful. By not signing the NPT, India provokes or encourages Pakistan and other would-be proliferators into seeking nuclear weapons, and an Indian nuclear response becomes inevitable.

Despite India's eagerness to foster new economic and military ties with the United States, the Bush administration was unable to push India towards the proposed five-nation talks. The Clinton administration will face similar resistance. In the short run, the prospect of Indian participation remains low.[33] By late 1992, New Delhi had moved away once again from signing the NPT and from participating in the five-nation talks.[34] India's hesitant and fluctuating policies may be expected to continue.

V. PROSPECTS FOR STABILITY

Can war be avoided in South Asia in the 1990s? Can the region move towards a stable environment conducive to cooperation and development? There are grounds for both pessimism and optimism. The grounds for pessimism are the increasing levels of violent ethnic conflict and separatist movements within South Asia and the surrounding regions; the possible spread of aggressive Islamic nationalism from West and Central Asia; continuing instability in Afghanistan; the growing impulse to acquire nuclear weapons among some states, especially in the aftermath of the Gulf War; and the emergence, even if temporary, of three more nuclear-weapons states following the disintegration of the Soviet Union. The grounds for optimism are the end of the Cold War and a shift in emphasis from global arms races to economic issues; the increased role and power of international organizations such as the UN and the World Bank; and the establishment of democracies in every state in South Asia (except Bhutan and the Maldives).

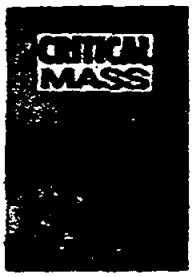
Some of the West's grounds for optimism may not be shared by the regional actors. For example, a Western monopoly on nuclear weapons is not considered desirable or advantageous by some of the states in Central, West and South Asia, especially when the new Russia no longer opposes the foreign-policy goals of the three Western nuclear powers. There is no countervailing power to 'deter' the West from acting against the wishes of states who had earlier relied on Soviet support. Similarly, the increasing power of international organizations such as the UN and World Bank may be viewed as essentially Western instruments to enforce their political and economic agendas throughout the world. However, stronger Western policies to prevent nuclear weapons proliferation by controlling the nuclear energy and space programmes of other states, or policies that seek to prevent human rights violations through the threat of economic sanctions, appear more likely in the future. Such pressures against developing countries will be perceived as interference in their national economic and political decision-making authorities. Indeed, the West's new military and economic dominance has begun to encroach on the sovereignty of weaker states.

The return of a Democratic administration in the United States under President Bill Clinton in January 1993 also portends a return to two of President Jimmy Carter's foreign-policy themes from 1977 to 1980: the containment of nuclear proliferation; and the promotion of

INDIA AND PAKISTAN

"OUR GOD CAN LICK YOUR GOD"

As a sequel to last issue's extracts, INDIA TODAY presents the second installment from *Critical Mass*, an expose on the proliferation of nuclear weapons in the world. This time the focus is on India's nuclear and missile programme, which the authors assert is far more secretive than Pakistan's.

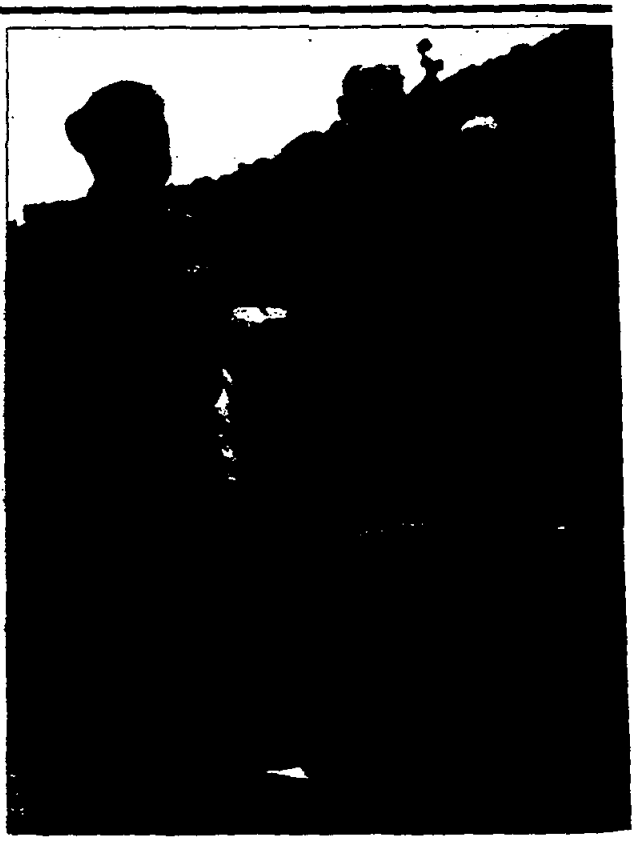


IN mid-October 1984, ten years after India startled the world by exploding an atomic bomb, Pakistani intelligence learned—perhaps from its great friend CIA Director William Casey—that India was about to launch a surprise attack against Pakistan's own nuclear research facility at Kahuta. The installation is situated in the rugged foothills of the Himalayas just to the east of Islamabad.

The activities at Kahuta are driven by Pakistan's long, secret, almost frenzied pursuit of atomic weapons to offset India's early lead. Without its own nuclear weapons to offset India's, the reasoning has gone, Pakistan would forever be at its rival's mercy. Every disagreement, every border incident, every clash for whatever reason—and certainly the disputed Kashmir region is always an excuse for such confrontations—would happen in the shadow of India's ultimate weapon: nuclear bombs. That was intolerable. And so Kahuta, the nuclear Shangri-La, had to be protected at all costs.

Pakistan therefore sent an explicit message to New Delhi through diplomatic channels to then Prime Minister Indira Gandhi. If India attacked Kahuta on October 21 as planned, the Pakistanis warned, there would be a reprisal that would cost them dearly. Fighter-bombers would strike every nuclear installation in India, civilian as well as military. These included five power reactors that generated electricity, four research reactors used in India's nuclear weapons program, and a spent-fuel reprocessing facility. All ten installations were near the heavily populated cities of Bombay and Madras and along the Ganges River. Most of them were in Bombay's northern suburbs, at the Bhabha Atomic Research Center. The consequences of such an attack were readily apparent to the Indians. Massive amounts of radiation pouring out of shattered reactors and nuclear storage sites would contaminate vast areas. Indians would die by the thousands. Others would suffer the effects of radiation poisoning for years, if not for untold generations. The Indians backed down.

Nor would 1984 be the final chapter in the saga. Over the next eight years, either outright nuclear competition or tensions over Hindu-Muslim flare-ups, first in Kashmir and then throughout India and Pakistan, would sound the nuclear alarm. Even in the months after Indira Gandhi reined in her military, there were rumors of yet another raid. The rumors were spurred by Mrs. Gandhi's assertion that Pakistan's nuclear weapons program required that a "new dimension" be added to India's defense posture. Her own assassination provided only a short respite. In 1985, Mrs. Gandhi's son and successor, Rajiv, hinted several times at new developments in India's nuclear arsenal. In June, Rajiv told a Paris interviewer that India might have already made components for nuclear weapons. In July, ABC and NBC News reported on ominous developments in the Pakistani weapons program, including reports that it had tested the conventional explosives necessary to detonate a bomb.



Pakistan sent an explicit message Kahuta on October 21, 1984, fighter-bombers would strike civilian as well as military, killing

Critical Mass, © *William E. Burrows and Robert Windrem, 1994, by permission of Simon and Schuster Ltd.*

In August, the Indian Atomic Energy Commission chairman announced the start-up of a huge 100-megawatt research reactor at the Bhabha center with a none-too-subtle declaration that the reactor could produce plutonium. Attempts to lessen the tension ultimately led to an agreement in December between Gandhi and Zia ul-Haq, Pakistan's President, that they would not attack each other's nuclear facilities.

Meanwhile, one close call followed another. In November 1986, half of the Indian Army went on maneuvers called Operation Brass Tacks. Fearing that the hour of final conflict was at hand, the jittery Pakistanis launched their own massive mobilization. And to up the ante, they "cold tested" a nuclear device to assure themselves it would work if the Indians attacked. The following March, with the near-war fresh in his mind, Zia ul-Haq appeared to confirm that Pakistan had all the components needed for nuclear weapons. Both nations moved to the brink again in the spring of 1990, again over Kashmir, and yet again in December 1992, when the sacking of the Ayodhya (*sic*) temple by Indian Hindu militants followed news reports that Pakistan had planned to use nuclear weapons against India in 1990.

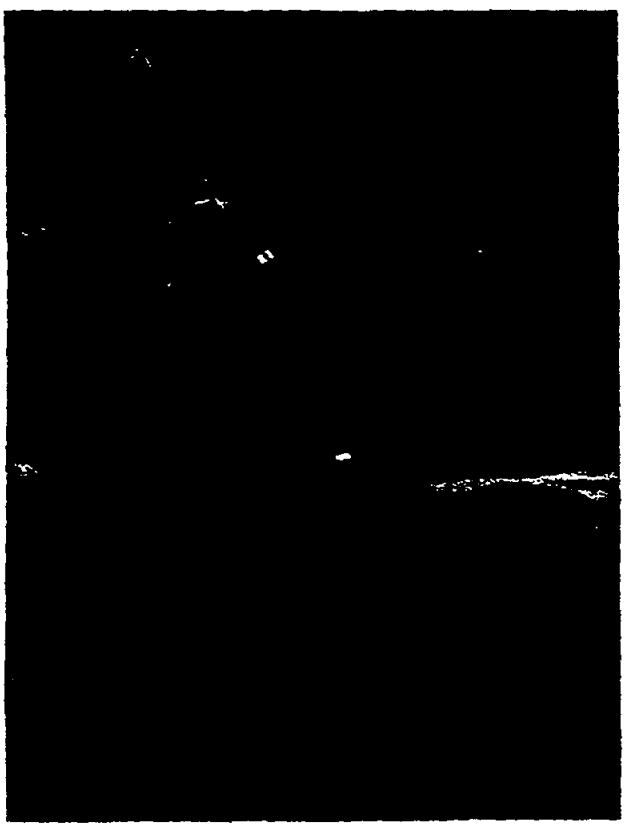
While both sides have invented elaborate excuses for developing nuclear weapons—strategic deterrence, for example—their real purpose is genocide. The Indians and the Pakistanis fundamentally despise each other. Even in the polite salons along Washington's Embassy Row, the diplomats who represent both nations make remarks that betray the depth of their hatred. Pakistani Ambassador Abida Hussain asks guests what the difference is between India and Pakistan. "In Pakistan, we worship one God," she answers rhetorically. "In India, they worship many gods, some with nine arms and legs."

AT the same time, the intensely emotional religious animosity has a hard-edged political component. Had the Indians done to Kahuta what the Israelis had done to the Osirak reactor at Tuwaitha in 1981, and had Islamabad retaliated as it threatened, pressure on the Gandhis to finish off Pakistan with nuclear weapons once and for all would have been enormous. And if the subcontinent had become the scene of the planet's first nuclear war—whether in 1984, 1986, or 1990—it would have been caused by politico-military currents that went even deeper than the mutual hatred of the combatants themselves. It was contentious geopolitics on a grand scale that got both nations their superweapons in the first place.

India's and Pakistan's race to arm with nuclear weapons encompasses all aspects of proliferation. It has to do with coveting the weapons as trophies of national prestige; with technology transfer, in terms of both knowledge and hardware, until self-sufficiency was achieved; and with the tone of the larger proliferation that was struck by East-West rivalry during the cold war. But most of all, it has to do with the role of patriots—their countrymen would call them visionaries—who were driven by the single-minded goal of making their respective nations so powerful that none would dare challenge their sovereignty.

India entered the nuclear club on the morning of May 18, 1974, when it detonated a twelve-kiloton bomb—almost exactly the size of the Hiroshima one—in the Rajasthan Desert, southwest of Delhi and very near the Pakistan border. The event was a disillusioning experience for many of those who observed India closely and who looked to it as a paradigm of peace and order.

The Indians, however, were just as mindful of their pacifistic image as were outsiders. They therefore seized upon the old dream of nuclear scientists and engineers—to harness atomic explosions for massive civil engineering projects such as diverting rivers and leveling mountains—and adapted it to their new weapon. They called it a PNE, or peaceful nuclear explosion, and blithely told the rest of the world that it would be used for such colossal enterprises as moving huge tracts of earth. The Pakistanis, who had already clashed with New Delhi over Kashmir in 1948 and 1965 and over the creation of Bangladesh out of East Pakistan in 1971, could only hope that the huge tracts of land the Indians wanted to move were not inside their borders.



to Indira Gandhi. If India attacked as planned, the Pakistanis warned, every nuclear installation in India, thousands and spreading radiation.

FORCING INDIA'S NUCLEAR HAND

Or why Bhabha learned to love the bomb...

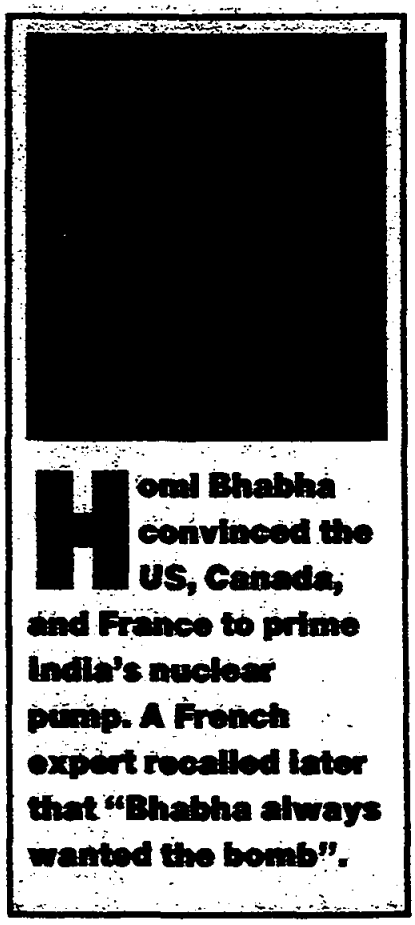
BESIDES proclaiming that their bomb was a strictly peaceful one, which was as stunningly hypocritical as it was brazen, New Delhi also boasted that "Not a single thing in it was foreign." While that may have been true where the weapon's actual design and components were concerned, it was another bald-faced lie in spirit. India's atomic bomb came from Canada, France, and the US. And it was developed as a direct consequence, not just of some "traditional rivalry" with Pakistan, but also of a deep fear and hatred of China. India's bomb mushroomed out of three seemingly unrelated events:

unrelated except where India was concerned.

First, there was the battle with China over Tibet in 1950. When the smoke cleared, Buddhism's picturesque mountain stronghold, long an important buffer between the world's two most populous countries, was overrun by the People's Liberation Army. It was soon one of Beijing's "autonomous" republics. Then there was the humiliating defeat by China in a border war in 1962. The rout remains embedded in the Indian psyche and has done the most to transform the Indian military from a pathetic post-colonial weakling into the fourth-largest institution of its type in the world. And two years later, in 1964, China's own inaugural nuclear explosion left no doubt within India's civilian and military leadership that China had become a long-term menace of fearful proportion.

INDIA'S nuclear energy program, from which the first bomb and its several descendants evolved, was started in 1945—even before independence—with the creation of the Institute for Fundamental Research. The IFR was headed by an enthusiastic Cambridge-educated physicist, Homi Bhabha, who shaped nuclear research for war and peace and, in the process, saw to it that the program always moved toward self-sufficiency. At Bhabha's instigation, India built an extensive uranium mining industry, fuel fabrication facilities, heavy water plants, and even two small research reactors at Trombay, just north of Bombay. More important, he convinced Canada, France, and the United States to prime India's nuclear pump.

The Canadians contributed Cirus, a large and sophisticated heavy water research reactor fueled by natural uranium, as part of the Colombo Plan to aid former British colonies in south Asia. It was similar to the reactor France sold to Israel. And like the Dimona reactor, Cirus's fission process produced an important by-product: bomb-grade plutonium. Canada also helped start a heavy water plant and a nuclear fuel complex. The heavy water facility was as critical as the reactor. Although the reactor used plentiful natural uranium, it needed the heavy water to moderate the heavy neutron flux as the chain reaction took place. Heavy water would therefore become a critical commodity for the Indians. Those who could obtain it would become, and in fact *did* become, heroes.



Homi Bhabha convinced the US, Canada, and France to prime India's nuclear pump. A French expert recalled later that "Bhabha always wanted the bomb".

The French signed a nuclear cooperation agreement with India in 1951 that called for the always critical personnel exchanges and the training of Indian technicians in the then arcane realm of nuclear energy. French scientists also taught Indian scientists how to extract plutonium from spent nuclear fuel, a process that is fundamental to plutonium-fueled bombs. There could be no illusions about the end result of the extraction process. Dr. Bertrand Goldschmidt, who headed the French Atomic Energy Commission's international relations division (and who also helped Iraq's, South Africa's, and Israel's nuclear weapon programs), recalled years later that Homi Bhabha's plan had certainly included nuclear weapons. "Bhabha always wanted the bomb," Goldschmidt recalled matter-of-factly. Whatever moral problems there may have been in ingratiating themselves with the Indian nuclear science community, it made very good business sense for the French. Getting a foot in the door, they knew, could mean lucrative reactor sales later.

Typically, the United States outdid its cohorts in generosity. It subsidized loans and research grants for 1,300 Indian scientists and technicians to study at nuclear facilities in the United States. It provided two complete light water power reactors (built by General Electric for $118 million and largely paid for by the Agency for International Development). Most important, where the development of the bomb was concerned, it helped to build a small reprocessing plant at Trombay with which the Indians could learn how to extract the plutonium that grew on Cirus's fuel rods. The facility was built from declassified plans of the Purex solvent extraction process developed by the United States at Hanford, Washington. At least 24 Indians were trained to operate the plant.

Indians trained in the West would ultimately include the two most critical figures in the weapons program: Raja Ramanna and P.K. Iyengar. Ramanna was the young nuclear scientist most responsible for making the "Buddha smile"—the code words that told Indira Gandhi in 1974 that she was the second woman, after Golda Meir, to have her finger on the nuclear button. Iyengar, who was also part of the nuclear weapon team, was almost certainly responsible for the importing of heavy water during the 1980s. Like Israel before it, and Iraq after it, India realized the value of a good Western education. But it also understood the importance of indigenous supply lines and facilities. Both Ramanna and Iyengar later rose to become chairmen of the Indian Atomic Energy Commission. In addition Ramanna, a nuclear hawk, became Minister of State for Defense.

No one in authority ever doubted that India would somehow come up with the money for a bomb. And it did. Between 1954, when its Department of Atomic Energy was established, and 1991, India pumped about $2.3 billion (in 1991 dollars) into its nuclear weapon program. Much of that was spent on purchasing or building reactors and the infrastructure that went with them. Perhaps it was a good investment after all. By 1991, India would be manufacturing its own reactors and trying to export them to Cuba, Argentina, Egypt, Iran and Syria. That, after all, was the traditional way to gain a decent return on investment.

Finally, Washington helped India to go nuclear in a rather negative way. The Nixon administration cynically ignored atrocities committed by Pakistan against secessionists, including Hindus, during its brutal invasion of East

Pakistan in March 1971. Since Nixon was using Pakistan as a conduit to improve relations with China, he failed to condemn his ally for genocide. The rampage, which may have caused up to three million casualties, led to India's intervention and the birth of Bangladesh. While America's support for Pakistan did not in itself compel India to push for nuclear weapons, it certainly convinced Indian policy makers that their course was correct.

THE Pakistanis often made veiled references to their relatively modest but efficient program in order to stave off the Indians. "In view of the disparity that had developed in the conventional areas between the two countries," one leading Pakistani strategist publicly observed, "and India's achieving a nuclear power status, it became imperative for Pakistan to acquire nuclear technology. Pakistan is left with no choice but to create a nuclear deterrent, whether by bluff or by possession. For a poor country like us, a conscious policy of ambiguity is highly effective to keep the enemy at bay." It was David drawing attention to himself and waving his slingshot at Goliath.

The giant, on the other hand, let his size speak for itself. But even India's size belied the extent of its colossal arsenal and a remarkable indigenous capability to stock that arsenal. While they loudly professed their peace-loving nature throughout the 1980s, the Indians were in fact embarked on an all-out armament binge of astounding proportions. And since they neither did it openly nor bragged about it, the West remained largely ignorant of the program's true dimension.

During that decade, India designed and built—not imported—five power reactors, each larger than 200 megawatts and each a potential plutonium producer. It constructed a uranium purification and conversion plant and a laboratory needed to enrich the metal to bomb-grade. It also set up three heavy water facilities, a fuel fabrication plant, and three separate research reactors. At 100 megawatts, one of the research reactors was the largest such plant in the world. The Indians even set up their own small fast-breeder in preparation for a much larger one they ordered from the Russians.

And while the dozen or so nuclear weapons were the crown jewels of their national defense system, they were set among many others. That decade saw the development and the first serial production of the Prithvi, a Scud-like mobile missile, and the successful testing of Agni. The Indians were also manufacturing their own MIG-29s under license from the Russians and diesel submarines under license from the Germans. No fewer than five facilities worked on biological weapons. They also bought two aircraft carriers from the British and began designing their own. India, after all, had the world's third-largest pool of technically trained personnel. It was no accident that the nation that produced the best microchip designers in the world at Intel also produced missiles and nuclear weapons and the computers to create them.

And what they could neither develop nor import legally, they smuggled. Throughout the 1970s and into the 1980s, for example, India smuggled hundreds of tons of heavy water from Europe, the Soviet Union, and China even as it struggled to build its own production facilities at Hazira. The complex itself was designed to produce 110 tons of heavy water a year.

BHAWAN SINGH

Between 1954 and 1991, India pumped about $2.3 billion into its nuclear weapon program, spearheaded by Raja Ramanna and P.K. Iyengar.

Most of the biggest Western firms claimed to have been deceived. Siemens sold India a Teleperm computerized fluid mixing system for the heavy water manufacturing process: the same system it sold to Libya for mixing poison gas at Rabta. Siemens says there were many other Western components as well. The software to run the Teleperms came from two companies: Imperial Chemical Industries of Great Britain and MTI of New Jersey. The minicomputers on which the software ran came from the Digital Equipment Corporation, the American computer giant. The entire system was managed by another U.S. company, Kellogg USA, a management company, Siemens claimed.

Asked about the role Siemens played at Hazira, its public relations man said that India had made vague reference to an ammonia plant. "The consumer never tells details of the process to the supplier of the system," he said. "That would be similar to revealing the Coca-Cola formula." Coca-Cola, however, cannot turn Beijing or Islamabad into a radioactive wasteland. There is no evidence that the companies actually knew the intended use.

Much of the illicit heavy water was to end up at Bhabha, the most modern and complete nuclear weapons development complex in the Third World. Not even Israel and North Korea, and certainly not Pakistan, had such an impressive facility.

CHARIOTS OF FIRE

'Joining the Big Boys in Space'

EARLY on the morning of May 22, 1989, a rocket named Agni roared off a launch pad at India's Chandipur test facility, about 150 miles southwest of Calcutta at Balasore. Fifteen years after the successful testing of its first nuclear bomb, New Delhi finally possessed a ballistic missile that could carry it. All of Pakistan, as well as large parts of central Asia, the Arabian peninsula, and China, suddenly lay within striking distance of India. A nuclear

warhead miniaturized to 1,000 pounds could be hurled all the way to Beijing.

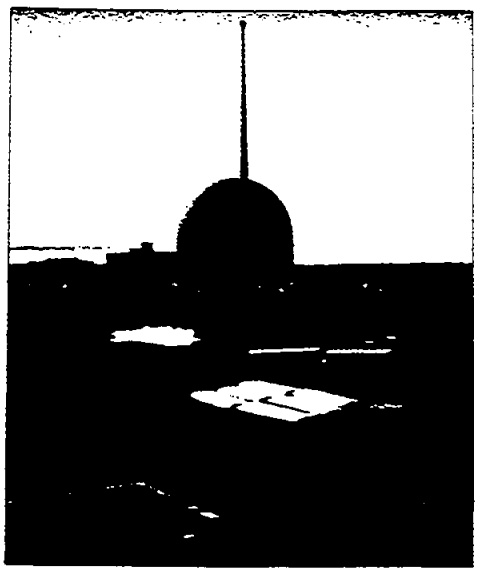
In an interview shortly after the test, the father of India's space program declared that Agni could carry either conventional or nuclear warheads. But, Avul Pakir Jainullabuddin Abdul Kalam added, "It can also carry flowers to offer as a symbol of peace." The remark was reminiscent of Mahatma Gandhi, the great pacifist himself, and brought to mind the fact that India had even called its first nuclear weapon a "peaceful bomb." No one, however—certainly no one who spoke Hindi—would have been taken in by Kalam's allusion to flowers. Agni does not mean chrysanthemum. It means fire.

AND fire was precisely what Agni's designers had in mind. India's Integrated Guided Missile Development Program, which masterminds the development of New Delhi's ballistic missiles, insists that its products are home-grown. Indian journalists have repeated that assertion, calling Agni "the most spectacular of a series of success stories in indigenous missile development." Agni was indeed spectacular. But although its development was indigenous, its technology was definitely imported.

If the so-called world car is designed in one country, put together in another, and uses parts from still others, Agni is a world ballistic missile. Its heritage traces back to 1963, when the United States started New Delhi's space program by launching a small scientific sounding rocket in India.

It also helped design the Thumba test range, where more than 350 U.S., Soviet, British, and French sounding rockets were fired in the ensuing years. During that time, Abdul Kalam himself studied rocketry at NASA's Langley Research Center in Virginia, where the advanced Scout rocket was developed, and at the Wallops Island Test Center, off the Virginia coast, where Scouts were used to launch small payloads into orbit. NASA was even willing to sell a Scout to India with the blessings of the Commerce Department, according to one missile expert, and was only prevented from doing so by the Department of State. No matter. Kalam was able to collect so much material on the unclassified rocket that it eventually metamorphosed as Space Launch Vehicle No. 3. The indigenously developed element is Kalam's organizational genius.

SLV-3 not only was India's first satellite launcher, but became the scientific prototype and political cover for Agni. That is how the line between civilian and military programs can be blurred to the point of being meaningless. The technology required to orbit a satellite or drop a warhead onto an enemy target is similar: it's basically only a matter of how high the sights are set and what the rocket carries.



In the '70s and '80s, India smuggled tons of heavy water from Europe, the USSR, and China. Much of it ended up at Bhabha, the Third World's most modern nuclear weapons complex.

Even before Agni's successful test, the missile was decried in Washington as "a highly destabilizing development in the region." Twenty-two senators sent a letter to president Bush denouncing the weapons as being "in direct contradiction of U.S. and Soviet efforts to lessen global tensions by reducing ballistic missiles." The sentiment was commendable. It was also hypocritical. U.S. aid to India's missile program was extensive and did not end in the space age's formative years.

Historically, Agni was the true son of Scout, which was first used in 1960. Yet, incredibly, only a week before Agni's successful test, meetings were scheduled between American and Indian officials to discuss new ways in which Washington could expedite the sale of advanced space technology to India—technology, for example, that would help Kalam and his colleagues simultaneously test how a missile performed when it was vibrating and accelerating during launch. The Department of Commerce, which is supposed to foster exports, again approved the sale. But the Pentagon and the CIA, which worry about superweapons proliferation, blocked it.

Ironically, even as intelligence reports on the Agni launch were coming into Washington that May 22, two special agents of the Department of State's Office of Munitions Control were busily pounding out a telling memorandum to the U.S. Attorney in Newark. It reported on the progress of their investigation into how radiation-hardened General Electric computers and microchips used to guide and control U.S. nuclear missiles had found their way into the Indian Space Research Organization's inventory. What it all boiled down to, the agents explained, was that their investigation was dead. The computers and chips were ambiguous, so called dual-use items, which meant that they could have as easily gone into a civilian rocket as a military one. Since U.S. policy encouraged the peaceful uses of space by other countries, particularly with products made in America, export law would no doubt allow the transaction. That being the case, as it often was, the U.S. attorney decided that pursuing the matter further was futile.

The U.S. contribution to India's missile program pales, however, in comparison to France's and is nearly eclipsed by Germany's and the Soviet Union's. France not only launched sounding rockets from India, but licensed Indian production of one of them, Centaure, in the late 1960s.

The Soviets sold the Indians SA-2 guideline surface-to-air missiles—the same weapons that brought down the U-2 spy plane piloted by Francis Gary Powers in 1960—which had a surface-to-surface range of up to twenty-seven miles when paired and specially configured. The Agni rocket's upper stage

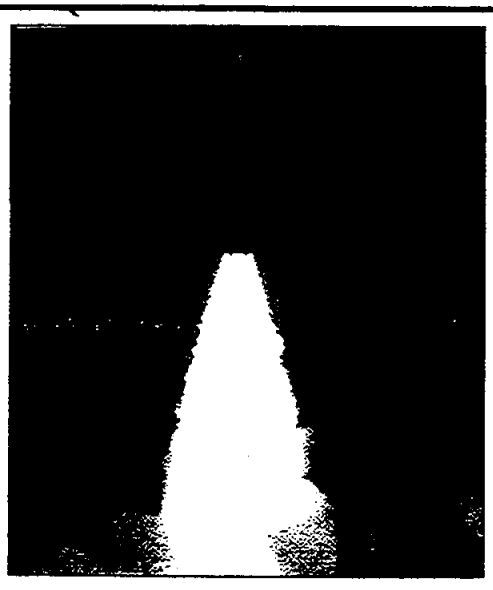
is identical with India's Prithvi, a Scud-like short-range tactical missile, which is in turn powered by a pair of SA-2 engines mounted side by side.

A TRUE SUPERPOWER HYBRID

Or how to beat the system

THE lineage of India's first long-range ballistic missile is, therefore, as complex as the television monitors that were used to follow its launch. It is the result of Indian technical and managerial skill and a great deal of help by Western corporations and Soviet ministries, all out to make a profit with the encouragement of governments that wanted to extend their economic and political spheres of influence. India, in common with several other nations, was and remains determined to use superweapons to lay to rest the ghost of a colonial past, assure its survival in a precarious and heavily armed world, and project military power within its region and commensurate political power in it and beyond.

Any lingering doubts on that score should be dispelled by the Polar Satellite Launch Vehicle and ABR 200 (1). The former, a fourteen-story-high, 275-ton brute of a rocket, was designed to place a satellite weighing as much as an automobile in a 500-mile-high polar orbit. It will therefore, also be adaptable to the intercontinental ballistic missile role. The ABR 200 (I), which has been successfully tested, is a top-secret air breathing rocket engine that uses oxygen from the atmosphere instead of carrying a tankful of it from the ground. The highly advanced concept is also under investigation by U.S., Russian, German, and French scientists for possible use as a hypersonic space plane capable of orbiting Earth with reconnaissance cameras, bombs and missiles, or other military equipment. The test model has already reached twenty-three times the speed of sound.



PSLV and ABR 200(1) spell out India's intention to project its power. The ABR 200 (1) is a top-secret air breathing rocket engine that has been successfully tested.

Alarmed because of the deal India made with Russia in 1992 to buy advanced rocket engines (and which ultimately collapsed because of U.S. pressure on Moscow), the United States slapped an embargo on the export of its own rocket technology to India. But it was too late. The years of deals had made India virtually independent. U.R. Rao, head of the Indian Space Research Organization, reacted to the U.S. freeze by saying that it would have "only nuisance value." Referring to the PSLV's powerful satellite launch capability, he quipped proudly, "We would then be among the big boys in space."

Following that first successful test of Agni, Dr. Kalam was asked by a reporter what would happen if the West slapped a technology embargo on India. "If there are restrictions," the rocket scientist explained, "we must beat the system. At that time," he added in reference to Agni's formative years in the early 1980s, "we had anticipated this problem and taken a consortium approach toward critical components. An industry, a lab, and an academic institution were identified for a particular problem, and we generated indigenous bases in various critical areas. If embargoes come in a particular area, we will activate the relevant groups. They cannot throttle us."

Kalam, the fifty-eight-year-old doyen of India's space program, was to Agni what A.Q. Khan was to the Pakistani bomb program and what Dr. Frankenstein was to the renowned monster. It was Kalam who conceived Agni many years before. It was he who had in effect assembled the thing and breathed life into it. And it was he who fully understood its several purposes. "It gives us the confidence that we are capable of designing any kind of missile," he was to explain. "We are now self-sufficient both in design and in missile technology. It is a technological strength," he went on. "Strength respects strength. Weaklings are not honored. So, we should be strong."

WHATEVER India's level of self-sufficiency in the art of missile development in 1989, Agni and the series of lesser rockets that preceded it derived from foreign designs and technology, much of it dual-use. In fact, Agni's earliest ancestor was Scout. Kalam knew a great deal about Scout because he had studied its plans, seen it put together, and watched it fly.

Scout was designed at the end of the 1950s as a low-cost way of getting small research satellites into orbit. The four-stage, solid-propellant rocket was first launched in 1960. Three years later India invited the United States, France, Great Britain, and the Soviet Union to help it start an ostensibly civilian space program. All four responded enthusiastically. Between 1963 and 1975, more than 350 of those nations' scientific rockets blasted off from the new Thumba test range, which the U.S. had helped to design.

Meanwhile, Kalam spent four months in 1963 and 1964 at both Langley and Wallops Island becoming intimately acquainted with Scout. It would have been clear to the Indian that a larger and more powerful version of the rocket could carry a warhead deep into China. Given what the Chinese had done to his country in 1962, the notion of being able to strike back over long distances—high over the heads of the People's Liberation Army—would have been sorely tempting. And it was in 1962 that the National Committee for Space Research was founded and placed under India's Atomic Energy Commission. The committee was headed by none other than Homi Bhabha, who, of course, was feverishly working on an atomic bomb. Scientific space research was to be undertaken by the

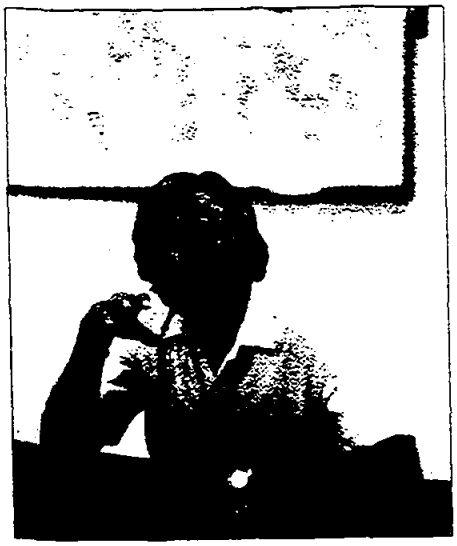
Indian Space Research Organization (ISRO).

In 1965, with Kalam's tutorial complete, India asked NASA for financial and technical information about acquiring Scouts of its own. NASA answered that while the rocket was unclassified owing to the purely scientific nature of its work, and was therefore available for purchase, the Department of State would have the ultimate say. NASA nonetheless proceeded to send technical reports on Scout's design to the man who requested them. His name was Homi Bhabha. This pattern—of sending specialists abroad to gather supposedly peaceful technology while acquiring the means to turn it into weapons surreptitiously—would be used by Israel, Iraq, Pakistan, and other nations more than a decade later. Under Kalam's exhaustive efforts, Scout became Space Launch Vehicle 3, or SLV-3, India's first satellite launcher. Both rockets are seventy-five feet high, both use four solid-fuel stages, and both can put a ninety pound satellite into orbit. SLV-3's first stage and Agni's are virtually identical.

The Soviets further contributed to India's space progam mostly by letting the Indians build a variety of short-range missiles under license while helping them to develop their own satellites. With the launching of the Rohini satellite in 1980, India became the seventh nation to send an indigenous spacecraft into orbit. Viking is the same engine France was going to sell to Brazil until the United States vigorously protested. India's version of Viking is used in Prithvi, its short-range missile.

True to form, the Germans were the most helpful of all. Beginning in 1976, West Germany's Aerospace Research Establishment, DFVLR, sent experts to help the Indians with guidance systems. They also were instrumental in teaching the Indians about the intricacies of navigation systems, including an "autonomous payload control system"—an inertial navigation system—that could be used to guide either satellites or warheads without using signals from the ground. They taught the Indians how to perform high-altitude rocket simulation tests, helped construct rocket test facilities, arranged delivery of electronics and other equipment from German firms, conducted wind tunnel tests in Germany of the SLV-3, sold rocket motor segment rings, codeveloped and tested computers for rocket payload guidance, and provided DFVLR-developed software for satellite orbital analysis.

Finally, the Germans provided extensive help with carbon composites: materials so light but strong that they are used for rocket nozzles and, more ominously, as ablative heat shielding for the nose cones of ballistic missiles that must plunge through the Earth's dense atmosphere before exploding. DFVLR's contribution, including plans for a precision, filament-winding machine that India began using in 1985-86, ultimately allowed the country to manufacture its own nozzles and nose cones. The late Prime Minister Rajiv Gandhi noted cryptically that the carbon composites produced by the machine would be for "atmospheric reentry." But some of his subordinates were more to the point. They said that the end result would be a "domestically developed heat shield."



Abdul Kalam was to Agni what A.Q. Khan was to the Pakistani bomb project. It was Kalam who conceived Agni and breathed life into it.

MADE FOR EACH OTHER

What will the shield shield?

AND what would the shield shield? In 1983, New Delhi established the Integrated Guided Missile Development Program under its Defense Research and Development Organization. IGMDP currently uses nineteen laboratories and is supported by fourteen academic institutes and government facilities and twenty-seven industrial firms. It is charged with creating a coherent, indigenous, surface-to-surface missile program whose products would use any appropriate explosive technology. As Pakistan elevated A.Q. Khan to head its nuclear weapons research program, India eventually moved Kalam from the civilian Space Research Organization to head IGMDP. Although Agni (and a 3,000-mile-range follow-on) should ultimately be able to carry conventional warheads, it will be capable of carrying far more powerful stuff.

For one thing, India has been experimenting with fuel-air explosives. While these are extremely difficult to use on ballistic missiles, the task (as Honeywell engineers demonstrated for Condor-2) is not impossible. But in the end, there can be little doubt that the nuclear and ballistic missile programs will be brought together. "Implict in the IGMDP programme, though never acknowledged officially, has been the instruction for proving a whole range of technologies that relate to an IRBM/ICBM system," the *Jane's Defence Weekly* correspondent in New Delhi wrote in reporting the Agni test. "The ambiguity in the mandate parallels that of the nuclear weapons programme because the existence of an effort in the IRBM/ICBM area minus the nuclear weapons component would not be credible." Indeed, in a manner of speaking, they were made for each other.

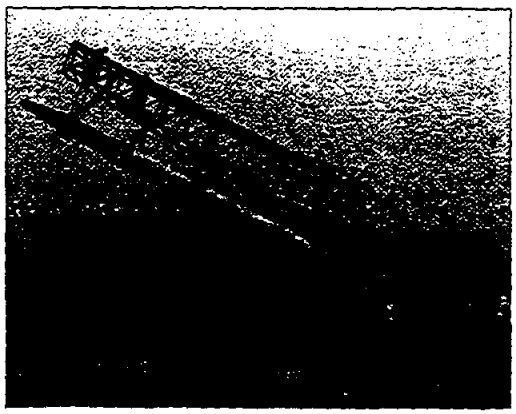
The Indian ballistic missile program had become so ambitious and specialized by 1990 that New Delhi could select particular missiles to match separate targeting requirements the way a golfer chooses the right iron for a particular shot. Agni could be trained on Beijing and other

Chinese targets. Prithvi, which was Agni's first stage rewired and topped with a warhead, was a Scud-like missile with a range to match. That meant it could be used against Pakistani ground forces or against Karachi, Islamabad, Rawalpindi, or Lahore. So could a new air-launched cruise missile then under development.

In August 18, 1992, just before the Indian and Pakistani foreign secretaries conferred on "reducing tension" over Kashmir, India indulged itself in some classic missile diplomacy: It tested one of its Prithvis. Whatever else was on the missile, it certainly carried a message.

BUT India's long-range plans extend well beyond even the mating of atomic or thermonuclear warheads and IRBMs. It sees itself as both a great culture and as the regional superpower responsible for the subcontinent and ocean that bear its name. Accordingly, New Delhi now possesses the world's fourth-largest army and navy. But even that isn't quite enough. Ultimately, the Indian military establishment intends to put hydrogen warheads on intercontinental ballistic missiles with ranges of up to 5,000 miles.

As early as May 1989, Director of Central Intelligence William H. Webster warned that "indicators" showed that New Delhi was working hard to develop H-bombs. That, he added, would touch off a full-blown nuclear arms race on the subcontinent. India's purchase of beryllium, which is used to enhance fission reactions, was one of the indicators. The beryllium was supplied by Degussa with authorization by Bonn's economic office. Typically, India rejected Webster's assertion as "baseless." Nevertheless, both Robert Gates and R. James Woolsey concurred with their predecessor.



The delivery vehicle for India's hydrogen bomb is to be an ICBM, and Agni's true importance is as a proof-of-concept vehicle that only needs to be scaled up to turn it into one.

The delivery vehicle for India's hydrogen bomb is to be an ICBM whose range would extend over most of Central Asia, Russia, the Indian Ocean, all of China, and as far as the Philippine Sea and Australia. Agni's true importance is not its role as an intermediate-range missile. It is really a proof-of-concept vehicle that needs only to be scaled up and given an improved guidance system to turn into an ICBM. This, as one Indian defense official put it, is "the next logical step." And that step, as usual, points to China. "As long as China can reach New Delhi with its ICBMs, India will remain in a weak position. India's self-defense demands a strategic reach to Beijing. Anything less than that will not be acceptable." Agni, he continued proudly, "is a manifestation of India's self-reliance and a reiteration of faith in our capabilities. In its own way it is an expression of aggression. China can reach our territory at any time. Can any self-respecting country accept that?" If the official was asked how Pakistan would feel under similar circumstances, his answer went unrecorded.

If the Indian-Pakistani relationship reflects almost unprecedented mutual hatred, it also reflects pervasive and cynical big-power manipulation. The dynamics of the region have been profoundly affected not only by relations between India and Pakistan, but by the falling-out of China and the Soviet Union in 1959 because of ideological differences and by the way each, as well as the United States and some of its NATO cohorts, played off that falling-out.

Relations between the two Communist behemoths became so strained after their parting of ways that border clashes took place and a war almost broke out. It was therefore understandable that Moscow courted India and cultivated it as a military client. And if the Soviet Union was an ardent suitor—supplying factories to build late-model MIGs, bombers, tanks, and later even a nuclear-powered submarine—India was an equally willing recipient of the attention because of its problems with China.

It was ironic that Pakistan decided that it needed nuclear weapons after it was routed by India in 1971. This was nuclear dominoes, given the fact that India had come to the same conclusion after China got the bomb, and the Chinese felt compelled to get theirs because of the Soviet threat. Furthermore, the cozy Soviet-Indian relationship—both united in their hostility toward China—made Beijing a natural ally of Pakistan. The Chinese felt the same way. A special relationship between the two countries therefore developed during the 1960s. So two sets of belligerents emerged during the 1970s: the Soviet Union and India versus the People's Republic of China and Pakistan.

K. Subrahmanyan, Director of the Institute for Defense Studies and Analysis in New Delhi, was almost sanguine about his country exchanging atomic or even thermonuclear salvos with Pakistan or even with China. His thoughts, in fact, were eerily reminiscent of those in the American far right who believed in the 1980s that their countrymen could ride out and survive a nuclear war with the Soviet Union by hiding in trenches in their backyards that had been covered with doors and dirt:

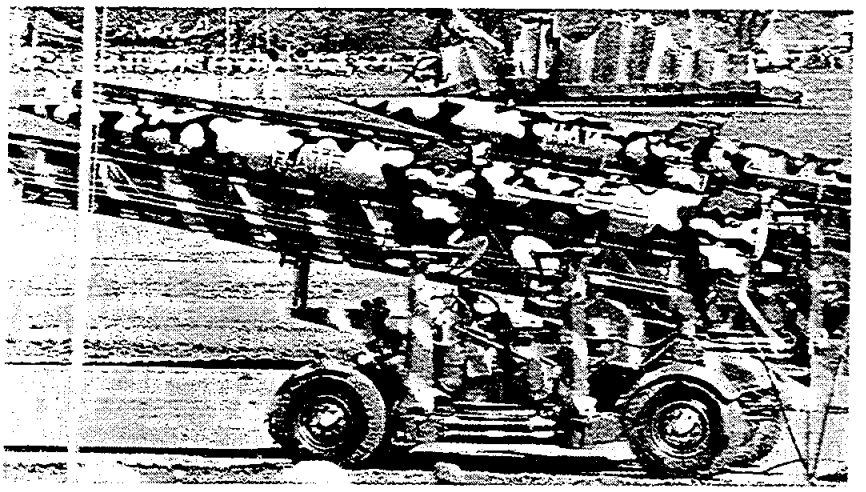
"Even the failure of deterrence will cause vast, but still finite damage, considering the kind of arsenal the two sides are likely to have for a long time to come, with the advantage being in favour of India if India were to exercise its option (to arm with nuclear weapons). It will not mean nuclear winter, rapid escalation involving the use of hundreds of warheads and loss of control over the war. It will be analogous to the situation between the superpowers in the early fifties. *That situation will still be preferable to one of India remaining non-nuclear, facing the threat of humiliation, defeat and disintegration.*" ■

Hatf

Type
Short and intermediate range, road mobile, solid propellant, single warhead ballistic missiles.

Development
It is believed that development of the Hatf (Deadly) missiles started in the early 1980s and, although the Pakistan Government claims they are indigenously built, there are persistent reports that the Chinese have provided assistance and so have some European companies. There are conflicting reports of a missile programme known as Shadoz (King Hawk), but this is believed to be the Hatf 2 programme. However, a report that the Hatf missiles are SS-1 'Scud' variants seems erroneous from the photographs that have been made available. Hatf 1 and 2 were both revealed by the Pakistan authorities in early 1989, and there are unconfirmed reports that a further missile with a range of around 600 km has also been tested. It is believed that this last missile is known as Hatf 3. There are suggestions that the Hatf 2 missile is closely related to the Chinese M-11 although from available photographs Hatf 2 appears to be a modified Hatf 1 with an additional boost stage. There are reports that the Hatf 3 is related to the Chinese M-9 and perhaps even the Brazilian SS-600. Reports in 1992 indicate that an improved Hatf 1, known as Hatf 1A, has been developed with a range of 100 km. In addition, a SUPARCO multi-stage space research launch vehicle took a 150 kg payload to 480 km altitude in January 1989, and such a vehicle could form the basis for the development of an intermediate range ballistic missile in the future.

Hatf 1 shown mounted on a mobile transporter vehicle (Christopher F Foss)



Two Hatf 2 SRBM, mounted on gun trailers, shown on display in Rawalpindi in March 1989

Description
Hatf 1 is an 80 km range ballistic missile, with a length of 6.0 m, a body diameter of 0.56 m and a launch weight believed to be around 1500 kg. The missile is a single stage solid propellant system, with a payload of 500 kg. It is assumed that the guidance is inertial, with four rectangular control fins at the base of the missile. Trials of an improved version, with a range increased to 100 km and improved accuracy, known as Hatf 1A, started in 1991.

Hatf 2 has a range of 300 km, it is 9.75 m long, has a body diameter of 0.56 m and appears to be a two stage missile with four clipped-tip delta fins at mid-body and four more fins at the base of the missile. It is estimated that Hatf 2 weighs about 3000 kg at launch and is reported to have a 500 kg payload. The first stage length is 3.75 m and the second stage 6.0 m. It appears that the Hatf 1 missile has been used as the second stage of Hatf 2, with a new boost motor added as the first stage. Both stages are believed to have solid propellant motors, and these characteristics seem far more closely related to earlier French sounding rocket designs than the SS-1 'Scud', but there may have been some assistance from China.

Both Hatf 1 and 2 missiles are ground mobile; however, the Hatf 2 missiles displayed in Rawalpindi in March 1989 were mounted on ex-Second World War anti-aircraft gun converted trailers, rather than on a modern missile transporter-erector-launcher vehicle.

Hatf 3 is believed to be 10.0 m long, to have a first stage body diameter of 1.0 m and length 4.0 m, and a second stage diameter of 0.56 m and length 6.0 m using Hatf 1 again. The launch weight is 6500 kg and the payload is expected to be 500 kg. The maximum range is 600 km.

Operational Status
The development programmes for Hatf 1 and 2 probably started in the early 1980s, and the first test firings were reported in February 1989. Although the 500 kg payload of both Hatf missiles would be adequate for nuclear warheads with yields in the 100 to 200 kT region, it is assumed that conventional HE or chemical warheads will be developed. It is believed that Hatf 1 entered service in 1992 and Hatf 2 may enter service in 1995. An improved Hatf 1A and a longer range Hatf 3 are also believed to be in early development, with Hatf 3 expected in service around 1998.

Specifications

	Hatf 1	Hatf 2	Hatf 3
Length	6.0 m	9.75 m	10.0 m
Body diameter	0.56 m	0.56 m	1.0 m (1st stage); 0.56 m (2nd stage)
Launch weight	1500 kg	3000 kg	6500 kg
Payload	Single warhead; 500 kg	Single warhead; 500 kg	Single warhead; 500 kg
Warhead	Conventional HE or chemical	Conventional HE or chemical or nuclear	Conventional HE or chemical or nuclear
Guidance	Inertial	Inertial	Inertial
Propulsion	Solid propellant	2 stage solid propellant	2 stage solid propellant
Range	80 km	300 km	600 km
Accuracy	n/k	n/k	n/k

Contractor
Not known.

P O I N T C H A U D

L'armée pakistanaise veille sur l'Islam et les frontières

Confrontée à de sérieuses difficultés budgétaires, le Pakistan de Benazir Bhutto n'en continue pas moins de consacrer une part importante de ses moyens à son armée. Laquelle demeure plus que jamais - malgré des périodes tendues - le pilier de l'État, garante de l'intégrité du sol, de la religion islamique et de la démocratie. Avec un oeil fixé en permanence sur l'Inde et le désir jamais démenti de posséder l'arme nucléaire...

Depuis sa naissance en 1947, le Pakistan a connu de multiples crises politiques. Chaque fois, l'Armée y a joué son rôle. A deux reprises, en 1958 et en 1977, elle a même imposé la loi martiale. L'année dernière encore, l'Armée est intervenue lors de la nouvelle crise que traversait le pays. Elle a apporté son soutien au processus démocratique durant la campagne électorale et lors des élections. De l'avis des observateurs étrangers, celles-ci se sont déroulées dans des conditions qui ne se prêtent à aucune contestation. A cette occasion, les forces armées et notamment l'Armée de terre, sont

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vraiment apparues comme les garantes de la démocratie. L'Armée de Terre bénéficie en effet de près de la moitié du budget (45% très exactement) de la Défense pakistanais, et son influence par rapport à l'Armée de l'Air (30 % du budget) et à la Marine (25 %) se mesure exactement à ce critère-là. Mais, en 1993, il est patent qu'il y a eu concertation entre les différents chefs d'état-major sur la conduite à adopter à l'occasion des élections. C'est dire que les décisions politiques qui ont été ou seront prises par le gouvernement de Mme Benazir Bhutto ne peuvent l'être qu'avec la caution des militaires. Et que ceux- ci sont assurés de recevoir les crédits, les moyens et les armements dont ils estiment avoir besoin. Dans la mesure des disponibilités du pays, bien entendu. Le conflit latent avec l'Inde est là comme un rappel permanent des efforts que la nation doit consentir pour la sauvegarde du territoire. Le Pakistan maintient en permanence sous l'uniforme quelque 550.000 hommes, auxquels s'ajoutent des forces paramilitaires. Parmi celles-ci se rangent les forces territoriales, soit environ 65.000 garde-frontières, 20.000 Rangers, 2000 garde-côtes, qui dépendent du ministère de l'Intérieur. Plus une garde nationale composée de volontaires et qui regroupe 125.000 hommes. Si l'on fait le total des matériels blindés, on aboutit au chiffre de dix neuf cents, y compris les véhicules de transport de troupe d'origine américaine M-48. Certains de ces matériels sont fabriqués ou en tout cas rénovés sur place. Côté avions de combat, on en dénombre quatre cent trente, tout en remarquant que certains sont parfois relativement anciens. Enfin, on ne peut passer sous silence la possession probable par le Pakistan de quelques armes nucléaires. Même si cette plus que probabilité doit être nuancée par le fait que le pays ne dispose comme vecteurs nucléaires que d'avions, ou, à la limite, de quelques missile M 11 d'origine chinoise (voir encadré). Ce missile, a une portée de 185 milles, soit près de 300 km. Le Pakistan poursuit d'autre part des travaux sur la mise au point de missiles à moyenne portée (HATAF 1 et HATAF 2), mais on connaît assez mal l'état d'avancement de ces recherches. Une chose est sûre, en tout cas: le pays est bien décidé à moderniser ses forces armées, afin de les maintenir à un niveau suffisamment dissuasif vis-à-vis de l'Inde, en particulier. Cette opposition avec le grand voisin revient comme un leitmotiv dans les propos des responsables pakistanais devant leurs hôtes étrangers. En janvier dernier, lors de la visite officielle qu'a effectuée à Islamabad le ministre français de la Défense, François Léotard, que ce soit le Premier Ministre, Mme Benazir Bhutto, le ministre pakistanais de la Défense, ou les divers chefs d'état-major, tous ont abordé cette question, soulignant en particulier l'acuité du problème du Cachemire. Et, sur les neuf corps d'armée pakistanais, sept sont déployés le long de la frontière avec l'Inde... L'Armée de Terre réclame des chars modernes, pour remplacer petit à petit le millier de T 59 d'origine chinoise dont elle dispose, elle les aura. Notamment des T 69 de même origine (il est prévu d'en acquérir trois cents exemplaires, deux cents ont déjà été livrés). Et surtout des chars lourds T 85, chinois également, dont soixante sont déjà en service , l'Armée de Terre estimant ses besoins à plus de trois cents. Ce recours au "fournisseur" chinois s'expliquerait en partie essentiellement, selon un diplomate occidental en poste à Islamabad, par les facilités de maintenance du parc des blindés, facilités dues à la proximité de la Chine; Les chars chinois viendront s'ajouter aux trois cents T 62 et T 72 soviétiques déjà acquis. Ce n'est pas sans raison que les Pakistanais insistent sur les chars. Étiré du nord au sud sur quelque 2000 kilomètres, le Pakistan souffre d'un manque évident de profondeur stratégique, notamment vers l'ouest et vers l'est. Dans ces secteurs, les zones désertiques constituent ce que les spécialistes de la bataille terrestre appellent des "plaines à chars". Cela est particulièrement vrai de part et d'autre de la frontière indienne. Lors des affrontements indo-pakistanais, les batailles de blindés qui s'y sont déroulées figurent parmi les plus importantes de la guerre moderne. On note une même vulnérabilité pour ce qui concerne la façade maritime méridionale, longue de 1200 kilomètres. Le pays ne possède qu'une seule base aéronavale, à Karachi, qui est par ailleurs le seul grand port pakistanais. Le blocus de 1971 est resté dans toutes les mémoires. C'est pour cette raison qu'Islamabad désire acquérir trois nouveaux sous-marins, un marché pour lequel la France et DCNI se trouvent en compétition avec la Suède et les chantiers Kockums.

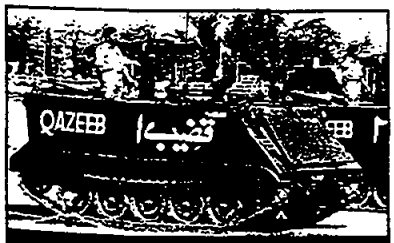
Quatre types d'avions de l'armée de l'air pakistanaise : F-16 (en haut à gauche) ; A-5 (en haut à droite) ; F-16 (en bas à gauche) ; Mirage III (en bas à droite).

Selon les desiderata des Pakistanais, le premier de ces submersibles serait acheté tel quel, c'est-à-dire en état opérationnel, par le vendeur. Alors que les deux suivants seraient assemblés à Karachi. Cette démarche est constante chez les Pakistanais: toute acquisition d'armes nouvelles doit en même temps permettre d'améliorer l'autonomie du pays en cette matière... et diminuer les sorties de devises.

LES SOUFFRANCES DU BUDGET

Selon des informations recueillies sur place, un comité de Défense du cabinet s'est réuni le 21 décembre dernier sous la présidence du Premier Ministre, Mme Benazir Bhutto. Il s'agissait de définir les programmes à long terme en fonction de la situation stratégique et des données de politique internationale. Pour le premier point, le comité de Défense a souligné le déséquilibre actuel, défavorable au Pakistan, en particulier du fait de l'embargo américain sur la fourniture d'armements modernes, comme les avions de combat F-16, embargo décrété au nom de ce que l'on appelle l'amendement Pressler, qui vise en quelque sorte à "punir" les pays soupçonnés de vouloir se doter d'armements nucléaires (voir plus loin). Le comité a donc fixé les orientations futures en matière de Défense. Comme indiqué ci-dessus, la priorité a été donnée à l'achat de sous-marins, une somme équivalente à un milliard de dollars ayant été prévue pour cela, somme qui englobe la modernisation des chantiers navals de Karachi, où devraient être assemblés deux des trois sous-marins que le Pakistan se propose d'acquérir. Près de quatre milliards de dollars (soit environ vingt-trois milliards de francs français) devraient être consacrés à l'achat d'avions de combat modernes, qu'il s'agisse de Su 27 russes ou de Mirage 2000-5 français. L'Armée de l'Air pakistanaise utilise en effet quelque soixante-huit Mirage III-C/E français (ou fournis, d'occasion, par les Australiens), plus une cinquantaine de Mirage V. Auxquels il faut ajouter pas loin de trois cent cinquante appareils chinois dérivés de modèles soviétiques et surtout trente-cinq F-16. Le Pakistan, on le sait, a commandé soixante et onze exemplaires supplémentaires de l'avion américain, dont une soixantaine sur ses fonds propres, c'est-à-dire payés par l'acheteur et non pas fournis au titre d'un quelconque programme d'assistance militaire tel que le pratiquent volontiers les Américains. Mais l'embargo décrété par Washington bloque cette transaction et Islamabad se voit contraint de se

tourner vers d'autres fournisseurs. Sans parler du handicap que représente pour le Pakistan la fin de l'assistance américaine. Dernière importante décision prise le 21 décembre dernier: l'achat de chars T-85 chinois supplémentaires, ainsi qu'il a été dit et la poursuite du programme de char purement national AL Khalid (le brave), en coopération technique avec les Chinois. Même si ce programme ne va pas sans difficultés, les Pakistanais paraissent bien décider à le mener à son terme. Les Pakistanais disposent en effet d'importants moyens industriels non loin du site archéologique de Tixila, à une cinquantaine de kilomètres d'Islamabad. Ils y réalisent les modifications de modernisation sur leurs blindés T 55 et T 65, ou fabriquent les véhicules transport de troupe de conception américaine dans ce qui est souvent présenté comme une "Tank factory", une usine à tanks, en réalité un complexe de grandes dimensions et d'aspect tout à fait moderne. Cependant, cette volonté de moderniser les matériels existants semble aujourd'hui buter sur certains obstacles techniques, et atteindre en tout cas une limite. D'où le désir des Pakistanais d'acquérir d'autres matériels plus sophistiqués. Désir qui, lui, se heurte aux impératifs budgétaires. Le budget de la Défense pakistanais représente en effet 6% du produit intérieur brut, lequel est d'environ 50 milliards de dollars. Il absorbe 34% du budget total de l'État, lorsqu'il est voté, mais en réalité l'expérience prouve que ce chiffre est généralement soumis à des rallonges en cours d'année. Si l'on ajoute à cela les remboursements des dettes militaires, on arriverait à un budget de la Défense qui dépasserait très largement les 40% du budget fédéral. D'où la difficulté, d'ailleurs, d'obtenir des chiffres très précis, les estimations variant souvent de plusieurs points selon l'interlocuteur, pakistanais ou occidental, auquel on s'adresse. D'où, aussi, la méfiance des fournisseurs étrangers, lorsqu'ils prennent en compte l'état de l'économie pakistanaise au moment de discuter de contrats à plus ou moins long terme. La dette extérieure du pays atteindrait en effet plus de 27 milliards de dollars, le service (les intérêts) de cette dette absorbant environ le tiers des recettes du Pakistan. A titre d'exemple, les réserves en devises ne couvraient que deux semaines d'importations, à la fin de l'année 1993. Et, au mois de juillet de cette même année 1993, ces réserves étaient tombées à cinq jours d'importations.



Transport de troupes M-113, armé de lance-missiles TOW.

LE NUCLÉAIRE, SUJET EXPLOSIF

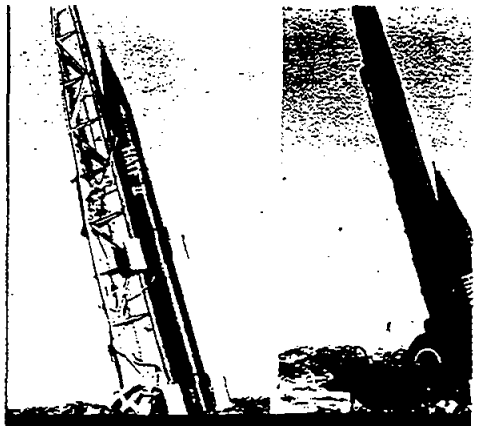
Le 15 janvier dernier, le Premier Ministre pakistanais, Benazir Bbutto, a réaffirmé le droit absolu de son pays à mener à bien les projets pacifiques qu'il a entrepris dans le domaine nucléaire. Elle a notamment rappelé que c'était son père, Zulfikar Ali Bbutto, qui avait lancé ces projets voici un quart de siècle en fondant le PAEC, Pakistan Atomic Energy Council et en initiant des programmes de coopération avec les États-Unis. "Aujourd'hui, a-t-elle dit, mon gouvernement, avec l'aide de la Chine, mène à son terme la construction de la centrale de Chashma..." Et dénoncé ceux qui, à l'intérieur du pays comme à l'extérieur, présentent le programme nucléaire pakistanais comme une menace. La crise énergétique que connaît le pays aurait pu être évitée, selon Benazir Bbutto, si les efforts pour acquérir une usine de retraitement et des centrales nucléaires n'avaient pas été" sabotés par les forces réactionnaires", dans le passé. Pas un mot, bien entendu, sur le programme militaire qui prête justement à contestation et a provoqué les sanctions contre le Pakistan, en particulier de la part des États-Unis. Un sujet sans aucun doute beaucoup trop explosif pour être abordé par la Première Dame du Pakistan.

G.C.

UN RÔLE SOCIAL DE PREMIER PLAN

De telles considérations doivent être à la fois nuancées et accompagnées par la mise en exergue des particularités militaires propres au Pakistan et à l'Armée pakistanaise. Au Pakistan, on peut vraiment dire que l'armée est imbriquée dans l'économie et la vie sociale du pays, et pas seulement pour obtenir les crédits qu'elle estime nécessaires à l'accomplissement de sa mission. Les forces armées symbolisent dans le pays certaines vertus de courage et d'amour de la patrie, font remarquer des Occidentaux en poste dans le pays, vertus qui n'ont sans doute pas leur équivalent symbolique autre part. C'est que le Pakistan se présente comme une sorte de forteresse assiégée de l'Islam dans le sous-continent indien, les militaires en étant les défenseurs attitrés. Une image et une notion qui paraissent particulièrement ancrées dans l'esprit du public. D'autant plus que l'Armée apparaît véritablement comme l'institution la plus solide, la plus structurée et la plus "structurante", dans un pays où se mêlent les ethnies et les particularismes régionaux. Les militaires composent un ensemble de main d'oeuvre hautement qualifiée qui trouve à s'employer à la fois dans le domaine de la Défense, mais aussi dans celui de l'activité civile. Aujourd'hui même, un quota de 10% des emplois dans l'administration est réservé aux anciens militaires. Les officiers et sous-officiers retraités n'ont apparemment aucun mal à se reclasser dans le civil, celui-ci cherchant à utiliser les compétences acquises sous l'uniforme ou les relations que les gradés se sont faites dans les sphères dirigeantes du pays durant leur temps d'activité. De plus, il existe au Pakistan ce que l'on nomme les "fondations", qui visent à aider les anciens militaires . Chaque armée, Terre, Air, Marine, a la sienne. Les "fondations" possèdent et gèrent des sites industriels qui sont ouverts en priorité aux anciens militaires et fabriquent des produits destinés à l'armée, mais aussi au secteur civil. La fondation Armée de Terre gère ainsi depuis quarante ans un complexe agro-alimentaire (céréales et farines) connu pour la qualité de sa production. Des programmes d'éducation et de formation sont également menés par les fondations. A un niveau hiérarchique plus élevé, il est courant de voir des officiers supérieurs ou des généraux diriger de grandes entreprises, lorsqu'ils prennent leur retraite. Quitte à revenir ensuite dans l'armée, après une période de ce que nous appellerions le "pantouflage", nous, Français. Ainsi l'actuel chef d'état-major de l'Armée de l'Air, le général Farooq Feroze Khan, n'est-il autre que l'ex-président des Pakistan International Airlines. Bel exemple de l'imbrication entre civils et militaires, même si cela ne va pas, parfois, sans une certaine ambiguïté...

Germain Chambost


A gauche, missile tactique HATF 2. A droite, le HAT

26Aug94 PAKISTAN: INTERNATIONAL - PAKISTAN NUCLEAR CLAIM 'TO DEFY US'.

By Ahmed Rashid in Lahore.

THE Pakistani opposition leader, Mr Nawaz Sharif, said his declaration that the country has a nuclear bomb was made to prevent the Prime Minister, Ms Benazir Bhutto, selling out the nuclear programme because of American pressure.

The former prime minister said: "Whatever I said was a well thought-out statement. By coming on the record I have not only pre-empted the Indian aggression against Azad [Pakistani-held] Kashmir and th government's planned rollback of the nuclear programme, but made it clear to the international community that Pakistan should be treated on a par with India."

He accused Ms Bhutto of preparing to compromise the nuclear programme because of American pressure. However, talks between Pakistan and America on a compromise on Islamabad's nuclear ambitions so that US aid to Pakistan could be restored, have already broken down.

Ms Bhutto accused Mr Sharif of making "a highly irresponsible statement which we categorically contradict". Sources in Islamabad said his declaration was probably prompted by the Pakistani military which wanted to send a strong signal to India.

Last week the military was angered when Mr Narasimha Rao, the Indian Prime Minister, said India might annexe the Pakistani-held part of Kashmir, if Islamabad continued arming separatist militants in the Indian part of the disputed state.

(c) The Telegraph plc, London, 1994.

DAILY TELEGRAPH

India and Pakistan's Nuclear Arms Race: Out of the Closet But Not in the Street

David Albright

CIA Director James Woolsey testified before the Senate on February 24, 1993, "The arms race ween India and Pakistan poses perhaps most probable prospect for future use weapons of mass destruction, including ear weapons."

Currently, both countries are depend- on relatively crude nuclear bombs that ot appear to have been deployed. Ac- ing to U.S. officials, because of fears of dental nuclear detonation, both sides ld only assemble their nuclear weap- when absolutely necessary. Neverthe- according to Woolsey, both nations ld on short notice, assemble nuclear ons." Each has combat aircraft that deliver these bombs in a crisis.

dia and Pakistan continue to im- their nuclear weapons. Unless their ms are stopped, they might succeed ng from large, cumbersome bombs aturized, easily armed and fuzed ons able to be permanently deployed k aircraft or ballistic missiles, which ng developed or sought by both es.

Nuclear Program

an government officials have fre- nted that it would not take long to assemble nuclear weapons, ded to do so. In 1990 P. K. Iyen- chairman of the Indian Atomic ommission, said, "In how much make it, will depend on how much get."[1]

one questions India's ability to mic bombs. In 1974, it detonated a "peaceful" nuclear explosive in han Desert. According to Iyengar in a 1992 interview, the facilities that made that weapon still exist. India's 1974 test, however, was not a prelude to building a nuclear arsenal.

> ***"India and Pakistan continue to improve their nuclear weapons. Unless their programs are stopped, they might succeed in moving from large, cumbersome bombs to miniaturized, easily armed and fuzed weapons . . . ."***

Unlike other countries that had earlier detonated a nuclear explosive, India choose not to build nuclear weapons. Instead, the Indian government decided to keep open its option to build and deploy them. In practice, New Delhi has continued its nuclear weapons research and development, largely out of sight of the public.

Since 1974 India has increased its ability to build and field nuclear weapons. And as Pakistan's nuclear weapons program achieved successes in the 1980s, India accelerated its own program, which is generally viewed as more advanced than Pakistan's. India is currently enlarging its inventory of separated weapon-grade plutonium, the nuclear explosive material at the heart of its weapons program, at the equivalent rate of about four to six weapons a year. It also continues to explore more advanced nuclear weapon concepts and delivery systems.

There is concern that India is moving toward a capability to deploy a nuclear arsenal with miniaturized atomic bombs, nuclear-tipped intercontinental ballistic missiles and perhaps thermonuclear weapons. However, achieving these goals would take several years and require the allocation of significant resources. The development of hydrogen bombs would necessitate a small number of full-scale nuclear detonation tests.

Plutonium Production in India

The plutonium for India's nuclear weapons is produced in the "Cirus" and *Dhruva* research reactors at the Bhabha Atomic Research Center (BARC) near Bombay. Canada supplied the 40-megawatt (thermal) Cirus reactor in the 1950s on the condition that it be used for peaceful purposes only, but did not require International Atomic Energy Agency (IAEA) safeguards on this reactor or an accounting of the amount of plutonium produced in it. India maintains that its agreement with Canada did not preclude the use of Cirus-produced plutonium in "peaceful" nuclear explosions. Each year this reactor produces about 10 kilograms of weapon-grade plutonium.

Because India could not legally use Cirus plutonium in nuclear weapons, it had to wait until the mid-1980s for plutonium truly free of international restrictions. In 1985, New Delhi commissioned the 100-megawatt (thermal) *Dhruva* reactor, an indigenous project that was largely a scaled-up version of the Cirus reactor. But because the reactor experienced start-up problems, it produced little plutonium until the late 1980s. This reactor currently produces an estimated 22 to 25 kilograms of weapon-grade plutonium per year, assuming the reactor operates at full power an average of 60 percent to 70 percent of the time.

bright, president of the Institute for d International Security, is the co- World Inventory of Plutonium and nched Uranium, 1992.

The plutonium produced in these two reactors is chemically separated from the irradiated fuel at the nearby Trombay facility, which began operation in 1964. It was closed in 1974 for refurbishment and enlargement and reopened in the early 1980s.

India's inventory of weapon-grade plutonium as of the end of 1992 is estimated to be about 320 kilograms.[2] About two-thirds of this amount is Cirus-produced plutonium, which might not be available for use in nuclear weapons. The other third is from the *Dhruva* reactor, which is completely free for use in nuclear weapons. Assuming India requires about six kilograms of plutonium per weapon, and that it would also use Cirus plutonium in weapons, India had enough plutonium by the end of 1992 for almost 55 weapons. If Cirus plutonium is excluded, New Delhi had enough for about 20 weapons. *Dhruva* produces enough plutonium on average to make about four bombs each year.

By the end of 1995 India is expected to have enlarged its weapon-grade plutonium stock to about 425 kilograms, enough for 70 weapons if Cirus plutonium is included, or about 32 weapons otherwise. India could dramatically increase its weapon-grade plutonium production by using its unsafeguarded power reactor program and the plutonium separation plant associated with this program at Tarapur, north of Bombay. However, there is no evidence that India plans to do so.

Uranium Enrichment in India

India might also be developing the capability to make highly enriched uranium (HEU), the other main nuclear explosive material. India maintains a gas centrifuge uranium enrichment research and development program and built a small gas centrifuge facility at BARC, where about 100 machines were operating by the mid-1980s. India has also built a larger enrichment facility close to the city of Mysore in the south of India. In an interview in March 1992, Iyengar said the purpose of the centrifuge plant is to further develop centrifuge technology. The Mysore plant is believed by U.S. and Western officials to have several hundred machines and to have begun producing enriched uranium no earlier than mid-1990. Currently, however, this facility could produce a few kilograms of weapon-grade uranium each year at most, significantly less than the amount needed for nuclear weapons. Iyengar said India had no current plans to start serial production of centrifuges.

In the absence of such plans, the ultimate goal of the centrifuge program is unclear. One obvious benefit of the program is that it allows India to claim parity with Pakistan's nuclear capabilities. According to the Department of Atomic Energy's 1990-91 annual report, India is also designing a small research reactor. A relatively small number of centrifuges could allow India to indigenously supply enriched uranium to this reactor.

Alternatively, the enrichment program might be part of a long-term option to build thermonuclear weapons. These weapons rely on the nuclear fusion of deuterium and tritium for most of their explosive yield, but the fusion process is started by atomic blasts. Although plutonium is used in the "primary," which provides the initial atomic blast, weapon-grade uranium is colocated with the thermonuclear fuel to provide an extra "kick" to get the fusion reaction going.

India's research and development of nuclear weapons started in the 1960s, most likely following the first Chinese nuclear test. In 1971, with a design in hand, the government of Indira Gandhi decided to move ahead with the detonation of a nuclear device. Most of the work was done at BARC, although the Defense Research and Development Organization (DRDO) developed and fabricated [illegible] plosives for the device.

Although India has consist[ently] that it has not built or deplo[yed] weapons since 1974, it has main[tained] expanded its "complex" of labo[ratories] industrial support activities wh[ich] sential to any nuclear weapons p[rogram]

According to Iyengar, Ind[ia] tained its ability to machine pluton[ium] bomb components. He stated [in] that India had not made plutoni[um] components, although it was pre[pared] do so quickly. Iyengar said that Ind[ian] nicians could make such compon[ents] matter of weeks.

Philosophy Still Unclear

In general, however, India's [nuclear] weapons production philosophy [is] unclear. From all indications, Ne[w Delhi] has probably built up a stock of cer[tain] components, and it maintains capa[bility] for the rapid production of other nec[essary] components. Because the weapons [development] program has made progress, Ind[ia is] believed to have developed nuclear d[evices] that are smaller, lighter and mo[re] liverable than its first test device. Acco[rding] to Woolsey's February testimony, "In

The Bhabha Atomic Research Center (BARC) near Bombay, established in 1957, is India's largest nuclear science institution. India's research leading to its nuclear weapon capability began at BARC in the 1960s, and the center is believed to now be capable of producing weapon-grade uranium.

program, older and probably larger than Pakistan's, culminated in 1974 with a nuclear detonation, and we are convinced has progressed from there."

But if India's weapon design deviates too much from that was used in the 1974 test, the military could lose confidence in the weapon's ability to perform predictably and reliably. Some of this concern can be reduced by extensive calculations and nonnuclear testing, including implosion package testing using sophisticated diagnostic equipment. But the designers might have a difficult time knowing the yield with any degree of accuracy without conducting full-scale nuclear tests.

India might also be exploring more advanced weapon designs, including boosted fission and thermonuclear weapons. India can make tritium, which gives it the capability to explore tritium-boosted fission bombs. Weapons experts, however, believe India would need to conduct additional full-scale nuclear tests to develop this type of weapon. A few grams of tritium mixed with roughly equal amounts of deuterium, placed inside a warhead, can "boost" the yield of the fission explosion several-fold, allowing significant reductions in the size and weight of a weapon.

One of the more surprising aspects of the weapon program is India's possible interest in the development of thermonuclear or hydrogen bombs, which typically use lithium-deuteride as thermonuclear fuel. Initial loadings of tritium are not necessary, because large amounts of tritium are produced once the thermonuclear reactions start.

Although Indian officials have denied trying to manufacture a hydrogen bomb, there are several indirect indications of such a program, including lithium-6 purification and production, and an extensive inertial confinement fusion (ICF) program at BARC. An ICF facility would be useful in the study of phenomena associated with a hydrogen blast.

A West German intelligence document written in 1985 cited an agent's unconfirmed report that "the leadership of BARC had been given the assignment by the Indian Defense Department, after consultation with the highest cabinet officials and Prime Minister Gandhi, to continue working on the development of a thermonuclear weapon." According to the document, preparations were to be made so that "within two months of a Pakistani nuclear test, the second Indian test could be carried out. Such an Indian test should simultaneously be used for the development of a fusion explosion."

India's Delivery Systems

India has several aircraft capable of delivering nuclear weapons against both Pakistan and China and is actively developing missiles that could also be fitted with nuclear warheads. An October 1988 article in *Defense and Foreign Affairs Weekly* cites top-level sources in London as saying that since 1984 the DRDO had been perfecting a nuclear aerial bomb and techniques for its delivery on Soviet-supplied MiG-23 and MiG-27 aircraft. The MiGs, operated at high speeds and at low level, would rely on "computer-slaved toss-bombing techniques" to deliver their bombs onto targets many kilometers distant, allowing the planes to turn and escape the area before the detonation. The article said that six squadrons of MiGs were expected to be operational by mid-1989.

The DRDO is also developing nuclear-capable missiles. The *Agni*, currently under development, can carry a payload of between 500 and 1,000 kilograms to a distance of about 1,000 to 1,500 miles. New Delhi has denied that it intends to deploy the *Agni* militarily, calling it a "re-entry technology demonstrator." But Indian and Western officials have indicated the missile will be deployed once it is developed. Western officials worry that if it is deployed, India could arm it with a nuclear warhead.

Technical problems have apparently delayed the *Agni* program. The second test firing was originally scheduled for 1990, but was postponed twice for technical reasons. During the missile's second test firing on May 30, 1992, however, the missile did not perform as expected. Premature ignition of its second stage caused it to miss its target.

India is also developing the *Prithvi*, a military missile capable of carrying a nuclear warhead about 150 miles, sufficient to hit the majority of major cities in Pakistan.

Pakistan's Nuclear Program

In February 1992, Pakistani Foreign Secretary Shahryar Khan admitted in a *Washington Post* interview that his country had the components to assemble at least one nuclear bomb. His announcement was not news to experts who have tracked Pakistan's clandestine program. Pakistan acquired the ability to make nuclear bombs several years earlier. Many sources indicate that Pakistan has been pursuing nuclear weapons since the early to mid-1970s. Its uranium enrichment program is capable of producing enough weapon-grade uranium on a sustained basis to build as many as six nuclear bombs a year.

Although it is believed to have stopped making weapon-grade uranium in 1991, in essence "freezing" its weapons program, Pakistan could resume production at any time. And because the Pakistanis are still producing low enriched uranium, they could stockpile this material for later enrichment to weapon-grade levels. If it implemented this option, Pakistan could increase several-fold its rate of weapon-grade uranium production, while its stock of low enriched uranium lasted.

Weapon-Grade Uranium Production

During the mid-1970s, Pakistan created a well-funded, secret procurement network in the West aimed at obtaining uranium centrifuge enrichment know-how and components and the equipment to make the centrifuges themselves. According to a declassified 1983 State Department memorandum, gas centrifuge designs "were stolen by a Pakistani national" from Europe.[3] The European technology holder was Urenco, the gas centrifuge enrichment consortium. Most reports identify the agent as A. Q. Khan, a Pakistani metallurgist.

Pakistan's efforts have been largely successful, and it now has an indigenous enrichment effort based at Kahuta, near Islamabad, but questions remain about whether it can produce all the raw materials necessary to build centrifuges.

The Kahuta facility began operation in the early 1980s, but was plagued by chronic delays. The 1983 State Department memo says: "We believe that the Pakistanis have experienced difficulty in making there [sic] centrifuge machines work and that the Pakistanis have not yet produced any significant quantities of enriched uranium."

Because of these difficulties, the State Department memo says Pakistan then sought assistance from China, but the nature and extent of the assistance is unclear. The *Foreign Report* of the *Economist* reported in January 1989 that China supplied enough weapon-grade uranium to make two nuclear bombs. However, one U.S. official said such assistance was unconfirmed, adding that China might have supplied unenriched uranium hexafluoride, or "hex," the chemical form of uranium used in centrifuges. Pakistan obtained its own uranium hexafluoride production equipment from a West German company in the late 1970s, but it could still have been experiencing difficulties in producing hex in the early 1980s.

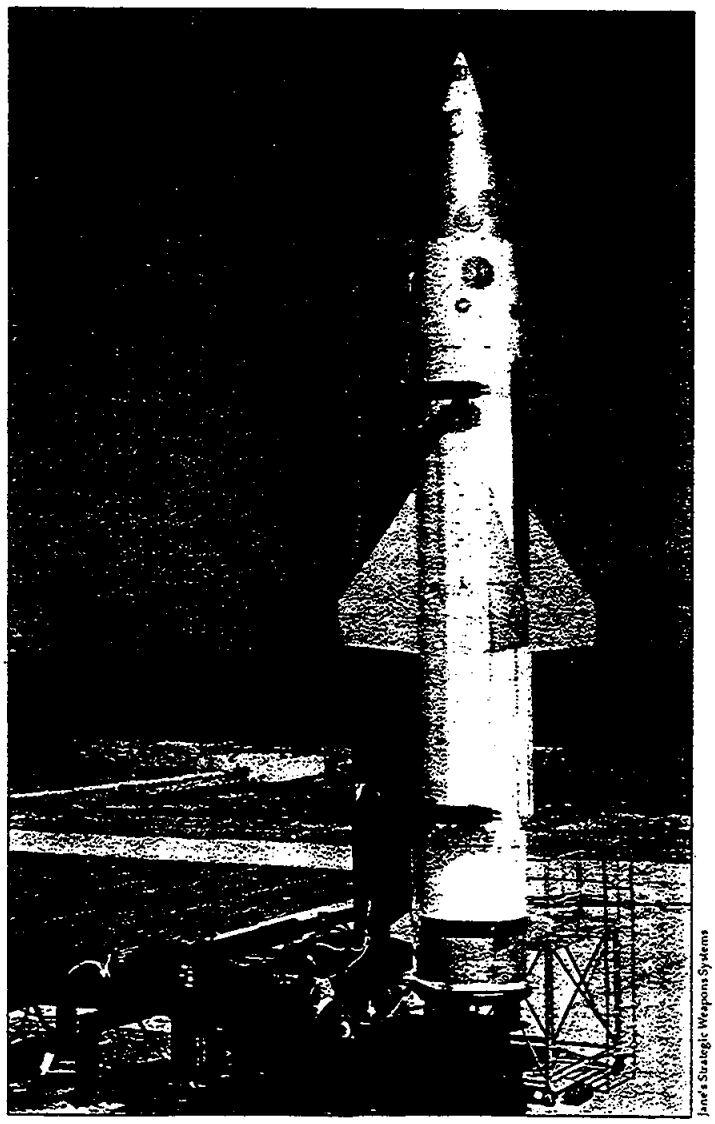
In 1984, A. Q. Khan announced that Kahuta was producing low enriched uranium. By 1986, U.S. intelligence had concluded that Kahuta had produced weapon-grade uranium. According to a declassified 1986 memorandum for Henry Kissinger, then a member of the President's Foreign Intelligence Advisory Board, Kahuta had a nominal capability sufficient to produce "enough weapons-grade material to build several nuclear devices per year."[4] The memo did not give any indication of the amount produced.

Prior to her visit to Washington in June 1989, Prime Minister Benazir Bhutto reportedly stopped weapon-grade uranium production, a step which the United States was able to verify. But when tensions with India over Kashmir mounted in the spring of 1990, Pakistan decided to resume production, which evidently continued until sometime in 1991, according to what Khan told the *Post* during his 1992 interview.

Based on the type of centrifuges Pakistan is believed to have obtained in Europe and the number it is believed to have built at Kahuta, it is estimated that Pakistan had produced about 130 to 220 kilograms of weapon-grade uranium by the end of 1992.[5] Assuming a Pakistani weapon requires about 15 kilograms of weapon-grade uranium, Kahuta has produced enough weapon-grade uranium for eight to 15 atomic bombs.

If Kahuta resumed its production of weapon-grade uranium, it would be capable of producing an estimated 45 to 75 kilograms of weapon-grade uranium a year, or enough for three to five bombs. This assumes that natural uranium is "fed" into the plant, and that the waste contains depleted uranium with 0.3 percent uranium-235 (U-235). By increasing to 0.5 percent the amount of U-235 left in the waste, Pakistan could increase the output of Kahuta to 55 to 95 kilograms of weapon-grade uranium a year—enough material for up to six bombs a year.

If low enriched uranium is used as feedstock, Pakistan could increase its rate of weapon-grade uranium production several-fold. Because such a strategy could produce weapon-grade uranium much faster than normal, Pakistan could, after a relatively short period, produce almost as much weapon-grade uranium as it would have done if there had been no freeze in weapon-grade uranium production. For example, if Pakistan produced only 5 percent enriched uranium during the first two years of its self-imposed production freeze, it could use this material as feed to produce an estimated 110 to 180 kilograms of weapon-grade uranium in six months. (The waste would contain 1 percent uranium-235.) Without the freeze, Pakistan could have produced from 140 to 240 kilograms of weapon-grade uranium in that same period.



Jane's Strategic Weapons Systems

India is developing two ballistic missiles, the Agni *and the* Prithvi *(above). The* Prithvi *is a short-range, ground-launched single-warhead missile that was first tested in 1988. It is designed to carry a 2,000-pound warhead about 150 miles, sufficient to hit most of Pakistan's major cities.*

Plutonium Reprocessing in Pakistan

Pakistan has established a small capability to separate plutonium at a facility, called "New Labs," at the Pinstech complex near Rawalpindi. The facility is based on blueprints delivered by France, with key equipment bought from a variety of suppliers. One U.S. official says he believes Pakistan probably did some experimental separation of plutonium, although on a very small scale.

Because Pakistan lacks a significant supply of unsafeguarded irradiated fuel, raw intelligence reports have stated, and experts have speculated, that Pakistan has been trying to build a nuclear reactor that would generate significant amounts of plutonium free for use in a nuclear weapons program. China assisted Pakistan in building a tiny research reactor containing about one kilogram of Chinese-supplied weapon-grade uranium fuel that is under IAEA safeguards. Without a much larger reactor, Pakistan could separate only tiny amounts of plutonium from the small quantities of fuel it could legally withdraw from safeguards, or produce clandestinely in its safeguarded reactors.

Early Program

Pakistan developed the ability to produce nuclear explosive material at the same time it mastered weapon design and production, an effort that required substantial foreign assistance. The 1983 State Department memo says, "nuclear explosive design and development work began in Pakistan soon after the 1974 Indian nuclear test." An organization within the Pakistan Atomic Energy Commission was responsible for most aspects of the work, aimed at developing an implosion-type nuclear weapon. The 1983 memo reported that "Pakistan has already undertaken a substantial amount of the necessary design and high explosives testing of the explosive triggering package and we believe Pakistan is now capable of producing a workable package of this kind."

Pakistan obtained bomb components and testing equipment from Europe and the United States. According to the same State Department memo, in late 1981 through 1982, *Pakistani procurement* agents ordered metal components from European companies that have been "unambiguously identified as those of a nuclear explosive device." Following U.S. protests, the memo says Pakistan shifted from "procurement of weapons components themselves to procurement of machinery necessary for their manufacture."

U.S. officials have said on many occasions since the early 1980s that Pakistan received a demonstrated weapon design from China. It has been reported that the design was proven at China's fourth nuclear weapons test in 1966 at Lop Nor, and involved the detonation of a warhead carried across China on a missile. If Pakistan received a copy of this design, it has a warhead that is probably much smaller than early Chinese test devices and is able to operate under much more exacting conditions. Little is known about that particular Chinese design. In a 1991 interview, one U.S. official said the Chinese design used a nearly solid sphere of weapon-grade uranium with a tiny hollow hole, surrounded by a "tamper" and high explosives—a design that would require roughly 15 kilograms of weapon-grade uranium.

In 1990, the Bush administration stated that it was unable to certify, as required under the Pressler Amendment, that Pakistan did not possess a nuclear explosive device. Senator Larry Pressler (D-SD) told *Nucleonics Week* in January 1992 that "some covert steps by Pakistan" in 1990 led the CIA, the State Department and the White House to conclude that Pakistan had built an atomic bomb. Press reports have stated that in 1990 Pakistan most likely fashioned weapon-grade uranium metal parts for a weapon.

In September 1992 General Aslam Beg, Pakistan's former army chief of staff, told George Perkovich, a program director at the W. Alton Jones Foundation, that "concerning the so-called red light of the Pressler amendment, we crossed it in the Zia [ul-Haq] days. They could have applied Pressler then." Perkovich could not determine whether this statement implied that Pakistan had all the necessary components for a weapon prior to President Zia's death in August 1988, or what Beg believed constituted a violation of the Pressler amendment. But Beg's statement underscores that Pakistan had worked to obtain a nuclear weapon for many years, and the exact year when it succeeded is open to interpretation.

Pakistan is probably looking at the development of more sophisticated fission bombs, boosted fission bombs and perhaps hydrogen bombs. A German convicted in 1990 for illegal exports to Pakistan testified that his clients sought equipment and material for a hydrogen bomb program. But without a proven design for a significantly more sophisticated fission weapon, a boosted fission weapon, or a thermonuclear weapon, it is doubtful Islamabad could develop one without full-scale testing.

Delivery Systems

Pakistan has combat aircraft capable of delivering nuclear bombs, and is trying to secure ballistic missiles from China. Its most sophisticated aircraft are F-16 attack fighters supplied by the United States, which could be modified to carry nuclear bombs.

In a crisis, Pakistan is thought to be capable of delivering its atomic weapons on its U.S.-supplied F-16s. According to a U.S. official, however, uncertainties remain as to whether Pakistan's atomic bombs can be delivered safely by attack aircraft. Lack of adequate safety can make deployment risky, reducing the likelihood of such an action except in a crisis.

On January 12, 1989, the *Foreign Report* reported that Pakistan had a nuclear aerial fission bomb that could be carried beneath one of its F-16s. The report said the detonation mechanism had been perfected and the bomb casing was suitable for high-speed flight. But the report said Pakistan had only made "some progress" on developing a fusing mechanism that keeps the bomb safe while in storage and during flight and then detonates the bomb properly after release from the aircraft. Shortly before leaving office, CIA Director Robert Gates said in Senate testimony January 15, 1992, that his information suggested Pakistan is "interested in enhancing the ability of the F-16 to deliver weapons safely."

In 1989, Pakistan tested two short-range surface-to-surface missiles with estimated ranges of 80 kilometers and 280 kilometers respectively. Although Pakistan claimed at the time the missiles were developed indigenously, the *SIPRI 1990 Yearbook* concluded the missiles were based on French-supplied rockets.

China has also assisted Pakistan's ballistic missile program. In 1991 the United States applied sanctions to both countries because China transferred missile-related technology to Pakistan. The transfer involved mobile launchers for the Chinese M-11 missile, which has a range of 300 kilometers with a reported payload of 500 kilograms. After China agreed to observe the Missile Technology Control Regime (MTCR), the Bush administration waived the sanctions (see p. 32).

The New York Times reported on May 6, 1993, that U.S. intelligence agencies had compelling evidence that China had shipped M-11 missile parts to Pakistan in early 1993, in violation of its pledge not to supply such technology. The parts are reported to be intended for later assembly into Pakistan's version of the M-11 missile. On May 12, Under Secretary of State for International Security Affairs Lynn Davis said, "We've not determined that the missiles have actually been transferred." She said the United States is reviewing the evidence.

Conclusion

Although both India and Pakistan appear anxious to avoid deploying their nuclear weapons, both can be expected to resist domestic and international pressures to back away from their current course of silently building up nuclear weapon production infrastructures.

Although the main priority in the region must remain the elimination of nuclear weapons and the capabilities to make them, another goal must be to prevent India and Pakistan from improving their existing nuclear arsenals. Key to achieving that goal is to prevent technology and equipment imports that can make that task easier. ACT

NOTES

1. *Collected Scientific Papers of Dr. P. K. Iyengar: Volume 5, Selected Papers and Speeches on Nuclear Power and Science in India*, Bhabha Atomic Research Center: Bombay, June 1991, p. 247.

2. This estimate is based primarily on the operating history of the Cirus and *Dhruva* reactors, minus the amount of plutonium already used for non-weapon purposes. A full explanation of this estimate is in David Albright, Frans Berkhout and William Walker, *World Inventory of Plutonium and Highly Enriched Uranium, 1992* Oxford: Oxford University Press, 1993.

3. U.S. State Department, "The Pakistani Nuclear Program," June 23, 1983. Obtained under the Freedom of Information Act by the National Security Archives, Washington, DC.

4. The National Security Archives, *U.S. Nuclear Non-Proliferation Policy: 1945-91*, Alexandria, VA: Chadwyck-Healey Inc., 1991, document number 0232.

5. *World Inventory of Plutonium and Highly Enriched Uranium 1992*, op. cit.

07Sep94 USA: INDIA, PAKISTAN CAN BUILD NUCLEAR BOMBS-REPORT.

WASHINGTON, Sept 7 (Reuter) - India probably can build hydrogen bombs, while Pakistan may be able to produce uranium fission bombs with China's help, according to a recent report by the U.S. Congressional Research Service.

"Analysts conclude that India could build plutonium fission bombs and possibly even thermonuclear (hydrogen) weapons," CRS analyst Zachary Davis said in the report. The CRS provides information to Congress.

"Speculation about the weapon design reportedly provided to Pakistan by China suggests that Pakistan would probably build a solid sphere uranium fission bomb," he added.

Davis said India and Pakistan could both deliver nuclear weapons by aircraft or missiles.

India has tested a nuclear explosive, but denies possessing a nuclear arsenal. Pakistan says it has produced cores for nuclear weapons but denies it has produced any weapons.

Neither country has signed the nuclear nonproliferation treaty, but Pakistan says it will sign if India does.

Davis said continued nuclear weapons activity by India, Pakistan and Israel was one of the negative factors affecting progress toward nuclear non-proliferation.

He said positive forces include the U.S. agreement in August with North Korea to exchange its existing nuclear reactors for modern technology which is somewhat less suited to making bombs. That came after North Korea threatened to withdraw from the nuclear non-proliferation treaty.

Other positive steps include steps by Russia and other former Soviet republics to dismantle some of their nuclear warheads, South Africa's decision to destroy its nuclear weapons and the success of U.N. inspectors in finding and destroying Iraq's nuclear weapon facilities.

Davis said U.S. policy options to promote nuclear non-proliferation in south Asia include continuing the current policy to press both India and Pakistan to end their nuclear weapons programmes.

Another option would be to accept both countries as nuclear weapons states and provide them with technical assistance to improve the control and safety of their weapons and reduce the risks of accidental nuclear war, he said.

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REUTER NEWS SERVICE

25Aug94 PAKISTAN: 20-YEAR RACE FOR BOMB.

By Roger Highfield Science Editor.

India and Pakistan have been engaged in a race since the 1970s to develop nuclear weapon know-how and the necessary missiles to deliver a warhead.

Both countries have long been suspected of possessing facilities to produce weapons-grade nuclear material, and have been regarded as de facto nuclear weapons states.

Mr Harold Feiveson, a specialist in proliferation issues at Princeton University, estimates India may have acquired 0.3 tons of weapons-grade plutonium by the end of 1990, enough for 100 bombs, and Pakistan 0.2 tons of uranium, enough for 15 bombs.

India conducted its first and only nuclear test in 1974, using plutonium from a Canadian-supplied research reactor. It has since built more reactors capable of producing plutonium.

Pakistan's programme relies on technology to enrich uranium. However when German police recently raided flats in Berlin they claimed to have found evidence that smugglers have been planning, or had shipped, plutonium to Pakistan, suggesting it is maintaining the option of a plutonium weapon. It is known that a home-grown source of plutonium - a reprocessing programme - has stalled.

Pakistan's programme has been linked to China, said Prof Gary Milhollin, director of the Wisconsin Project on Nuclear Arms Control in Washington.

In 1983, America discovered China had supplied Pakistan with a design for a 25-kiloton warhead - twice the power of the Hiroshima bomb.

According to US officials, American agents constructed a model of the bomb - about the size of a soccer ball. Computer modelling showed it to be reliable.

Both countries would probably deliver a weapon by aircraft but have rapidly advancing missile programmes, said Prof Milhollin.

The first test of India's Agni missile in 1989 provoked sharp condemnation from America and other countries. The Agni, "Fire" in Sanskrit, has a range of up to 1,240 miles.

India has successfully test-fired its Prithvi tactical battlefield missile and will introduce it into service this year. The weapon is believed to have a range of 155 miles.

Indian officials justify their missile programme by arguing that it has civilian applications, that it is necessary to deter China from a pre-emptive strike, and that Pakistan is attempting to acquire a missile capability.

Again, China has stepped in to provide Pakistan with the necessary technology. Pakistan has deployed the 32-ft Chinese M11, capable of carrying a warhead up to 185 miles.

(c) The Telegraph plc, London, 1994.

DAILY TELEGRAPH

LA COREE DU NORD

Nodong-1 details fuel new fears in Asia

NORTH KOREA

BY PAUL BEAVER
LONDON

First details of the North Korean Nodong-1 short-to-intermediate range ballistic missile, showing its ancestry in the 'Scud' programme, have been acquired by *JDW*.

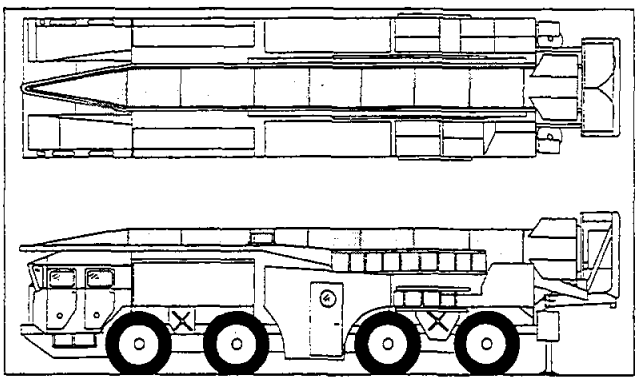
Nodong-1 is a conventional single stage, liquid-fuelled missile with no booster. Its 15 m length gives it a similar appearance to a stretched Iraqi Al-Hussein missile, according to South Korean defence officials. It is nearly 4 m longer than the 'Scud B' and carries a smaller warhead, believed to weigh about 500 kg. South Korean specialists believe that it could carry a 50 kT nuclear device or a viscous VX chemical warhead.

It is known that North Korea is working on a series of warhead configurations for the earlier 'Scuds' and has probably already developed a submunition warhead for the B and C models.

It is likely that a commercial version of the Global Positioning System (GPS Navstar) satellite navigation system has been acquired by North Korea to give the Nodong series greater accuracy.

At present, using the three gyroscope, inertial 'Scud,' navigation system, the North Korean missile has a CEP (circular error of probability) of about 700 m. The 'Scud B' is thought to be accurate to +/- 450 m. The discrepancy is accounted for by the Nodong-1's higher terminal velocity and greater length.

Like the 'Scud' and the Chinese M-11 missile, the Nodong-1 is transported and launched by a copy of the MAZ 543P transporter, erector, launcher TEL vehicle.



The Nodong-1 missile. The weapon is due to become operational in 1996 fuelling Japan's new emphasis on missile defence (Derrick Ballington)

Unlike the older 'Scud' models, the North Korean system has a range of between 800 km and 1000 km. Last May's first test flight impact site in the Sea of Japan was only 500 km from the launch pad in western North Korea, according to Japanese officials. Experts in Seoul say the flight was deliberately short for security reasons, to prevent local intelligence gatherers assessing true performance and to ensure safe recovery.

According to sources in Tokyo, Japan has changed the axis of its perceived security threat after the break-up of the former Soviet Union to North Korea. Theatre missile defence has become the top priority of Japan Defence Agency planners.

Tokyo is increasingly concerned that the performance of the new missile will render its Patriot PAC-2 anti-missile defences ineffective.

Japanese concern centres on the JDA's intelligence estimate that Nodong-1 has a much faster terminal velocity than the nearest comparison, the Al-Hussein. Current estimates give the Nodong-1 about Mach 3.5 against the 'Scud B's less than Mach 2.5 velocity immediately before impact.

During the Gulf war, Iraq launched a number of Al-Hussein modifications of the basic Soviet SS-1B 'Scud' at targets in Israel and Saudi Arabia, defended by Patriot.

The Patriot's success rate has been questioned by the Congressional committee and much has been made of negative comments by Japanese politicians. Japan is due to receive its first Patriot PAC-2 s in 1997.

Last month, the JDA's Director of Defense Policy visited Hawaii with a military team including Yishinori Katori, Director of the National Security Affairs Division at the Ministry of Foreign Affairs. They attended the first meeting of the US-Japan Joint Working Group on Theatre Missile Defense. This was convened under the auspices of the US/Japanese Security Sub-Committee.

It is understood that the Tokyo team raised the shortfall in the PAC-2's performance against the Nodong-1. Tokyo is expected to request deployment of the US Army Theatre High Altitude Area Defense in Japan in 1996, the year in which the Nodong-1 is expected to be become fully operational.

Gen Bakar appointed as new UNOSOM head

SOMALIA

Malaysian Lt Gen Aboo Samah Aboo Bakar has been appointed to command the United Nations Operation in Somalia (UNOSOM II). His appointment comes at a critical juncture for the mission with the USA due to complete withdrawal of its 8000-strong contingent by 31 March and growing attacks by Muslim fundamentalists.

Gen Bakar is the first Malaysian to command a UN peacekeeping force. He succeeds Turkish Lt Gen Cervik Bir on 21 January.

UN officials are concerned about the future of the mission following the withdrawal of US and other Western peacekeeping forces. The 1500-strong German and the 2500-strong Italian contingents are also to be withdrawn by 31 March. France, Belgium and Sweden are withdrawing their troops too. Pakistan, which already has 5000 troops in Somalia, has offered to contribute a further 2500 provided they are equipped by the UN.

Under increasing pressure about the effectiveness of UN peacekeeping in Somalia and Bosnia-Hercegovina and unable to find additional troops, UN Secretary General Boutros Boutros-Ghali is expected to recommend to the Security Council that UNOSOM II be halved to 15 000. This will increase fears about the safety of aid agencies which have been attacked by fundamentalists.

The M-class missiles in China's arsenal include the M-9 and M-11 and possibly an M-7, M-8, M-12, or M-18. All use solid-propellant fuel. The M-9 is a single-stage missile, and the M-11 has two stages. Carried on road-mobile transporter-erector-launchers (TELs), the M-9 is believed to have inertial guidance and a range of about 600 kilometers. The M-11 is believed to have a range of about 300 kilometers.

North Korea. Pyongyang has been producing missiles since about 1987 after the completion of Scud B production lines franchised by the Soviet Union.

In May 1993, the No Dong missile, which has an estimated maximum range of 1,000 kilometers, was test-fired over the Sea of Japan. It did not travel its full range and struck the water after about 500 kilometers.

Earlier this year, US intelligence agencies detected two completely new North Korean ballistic missiles, which the agencies have designated the Tae-Po Dong 1 and Tae-Po Dong 2. The government of Iran has expressed interest in buying the longer-range missiles once they are fully developed.

Israel. Israel's well-developed space industry supports its military ballistic missile program and vice versa. The program, active since the 1960s, was assisted by France. The road-mobile Jericho 1 short-range missile uses solid propellant and can carry a single warhead—conventional, nuclear, or chemical—a maximum range of 500 kilometers. It has been described as similar to a US Pershing I in terms of size and performance.

The Jericho 2 is a two-stage IRBM, capable of launching a 1,000-kilogram warhead a distance of about 1,500 kilometers. It is carried on a road-mobile launcher.

Iraq. All of Iraq's ballistic missiles were developed indigenously, based on the design of Scud Bs acquired from Moscow and Scud B and C derivatives provided by North Korea. Al Hussein, with a range of 650 kilometers, was first launched in 1988 during the Iran-Iraq war and was used again in the Persian Gulf War. The longer-range Al Abbas has not seen action, but its range is estimated to be 900 kilometers. It is believed to be a modified version of Al Hussein, with longer propellant tanks and a lighter warhead. Both Al Hussein and Al Abbas are road-mobile and are carried on eight-wheeled TELs.

Al Aabed is reported to be a three-stage missile with a range of 2,000 kilometers. Its first stage was tested in 1989 as part of the Tamouz 1 satellite launcher. The first stage is powered by five Al Abbas motors configured together, the second stage by a single Al Abbas motor. The third stage has an unidentified motor capacity.

Iraq was required under United Nations mandate to destroy all its ballistic missiles and weapons of mass destruction, but its compliance continues to be questionable. US officials recently detected covert efforts by Iraq to purchase missile-related technology, and they suspect Iraq will reconstitute its missile development program should UN sanctions be lifted.

Iraq took part, along with Egypt and other nations, in Argentina's Condor 2 missile program. The Condor is a 900-kilometer missile. Iraq dropped out of the joint venture but retained some missile technology. US officials are concerned about Iraq's plans to develop a Badr 2000, which is said to have a range of about 1,200 kilometers.

Iran. Tehran has relied on foreign assistance, including support from China, in developing its indigenous ballistic missiles. One missile, known as the Iran-130 Nazeat, may have been deployed operationally in 1990. This road-mobile missile uses solid propellant and is armed with a single warhead. Its range has been estimated to be 130 kilometers. A second missile, the Shahin 2, may be under development.

North Korea has shipped Scud missile production equipment to Iran to support missile manufacturing, and North Korea also sold Iran Scud Bs and Cs in unspecified numbers. Iranian government officials have gone to North Korea for several missile tests that US officials say were sales demonstrations.

India. India's ballistic missile program was an offshoot of its space industry. India has one of the most extensive space industries among developing countries. Its military missiles are the Prithvi and Agni, and its ballistic missile program is second only to China's among developing nations.

The Prithvi is a short-range missile that uses liquid propellant and carries a single warhead. It was first tested in 1988. The design may have been supported by European and other foreign companies. The Prithvi has a range of about 250 kilometers and is inertially guided. Warhead varieties include high-explosive, cluster munitions, and possibly fuel air explosive.

The Agni is an Indian IRBM with a single warhead carried by two or three stages. Only one "technology demonstrator" was built, and US officials expect India to announce a new type of missile in the future, based on the Agni design.

Pakistan. Pakistan has received assistance and technology from China in building its ballistic missiles. According to some intelligence reports, it has purchased M-11 missiles from China. Pakistan's own missiles are known as the Hatf 1 and Hatf 2. They are short-range, road-mobile missiles with ranges of eighty kilometers and 300 kilometers, respectively. The M-11s purchased from China currently use the designation "Hatf 3," but that is only temporary. Pakistan is working on a new, 600-kilometer missile, which will be designated Hatf 3. The Chinese weapons will then get a new name.

Libya. Libya has supported Brazil's MB/EE family of road-mobile missiles, and a Brazilian missile reportedly was test-fired in Libya in 1988.

An indigenous missile program has been under way to build the Al Fatah missile, and US officials say Tripoli is making slow and steady progress with its development. Libya fired a Scud missile in 1986 at the US Coast Guard facility at Isola di Lampedusa, in the Mediterranean Sea. The missile missed narrowly.

Egypt. Egypt sought to build long-range missiles at one time but did not succeed. Instead the Egyptians have developed an indigenous Scud missile production capability with assistance from North Korea. Another missile program under way is the Vector, which may be an outgrowth of either the Scud or Condor program. The Vector may have a range of 1,200 kilometers.

Argentina. Under pressure from the US, Argentina announced that it

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No Dongs may soon be nuclear, warns USN

THREAT ASSESSMENT

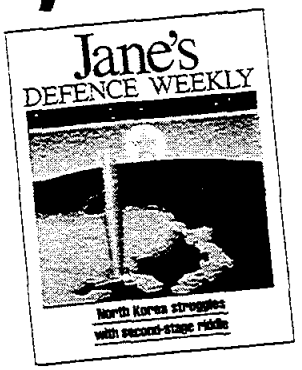
BY BARBARA STARR
WASHINGTON DC

The US intelligence community has warned that the North Korean No Dong-1 missile could have a nuclear warhead as early as next year.

A draft copy of the 1994 posture statement of Rear Adm Edward Shaefer, Director of Naval Intelligence, says the navy believes the No Dong "will probably be able to be equipped with a nuclear warhead by 2000. The report also notes, however, that "some authorities believe" No Dong could have a nuclear warhead by 1995. This was added to accommodate the view in some of the latest national intelligence estimates that North Korea could accelerate its nuclear deployment capability if it does not give up its overall nuclear development efforts.

The posture statement surveys programmes worldwide. Few new systems are detailed, but the report says the planned Russian fifth-generation fighter, the so-called Multi-role Fighter Interceptor, could have an initial operating capability in the 2005-2008 timeframe. "The cost of the *MFI programme* will be very high, however, and it is possible that Russia will choose not to produce the aircraft," states the report.

If the project proceeds, technologies to be incorporated in that aircraft include advanced multi-mode radars, advanced infra-red sensors, reduced radar and infra-red signatures, extremely long-range air-to-air and air-to-surface missiles, improved manoeuvrability and active hard-kill defences.



Concerns continue over North Korea's ballistic missile aspirations

Adm Shaefer also noted that the first Russian intelligence collection ship (AGI) patrol off the US east coast in two years began late last year by a *Balzam* class AGI.

In Chinese developments, the report states that Beijing is believed to be working on an indigenous design for a second-generation nuclear-powered ballistic missile submarine to carry a new ballistic missile, also in development. That submarine could also be launched by the year 2000.

Overall, the report says that the "principal threat" to US Navy forces over the next 20 years will come from over 100 different current, developmental or planned anti-ship cruise missiles. Also of concern is surface-to-air missile systems using multiple target detection and tracking sensors.

Ballistic missiles will generally not be a threat to naval forces until terminal homing sensors are deployed, the report suggests. It is noted, however, that Russia is attempting to sell an anti-radiation homing version of the SS-21 short-range ballistic missile and a terminally guided, area correlation homing version of the SS-1C Mod 2 'Scud-B' variant.

Chinese test defies moratorium

NUCLEAR WEAPONS

China has exploded a nuclear device at the Lop Nor site in Xinjiang Province, its second test in less than a year. One Western agency estimated its yield as between 10 and 60 kT.

China's last test was in October 1993. Of the other declared operational nuclear powers, the USA last tested in 1992. France and the UK in 1991 and Russia in 1990. These countries have all applied a moratorium on testing, but China has declined to join. Japanese diplomats described the test as "extremely regrettable".

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French Defence Minister François Léotard

COVER: JDW reviews the tapestry of French defence, from p23. Artwork: Jeff Pye

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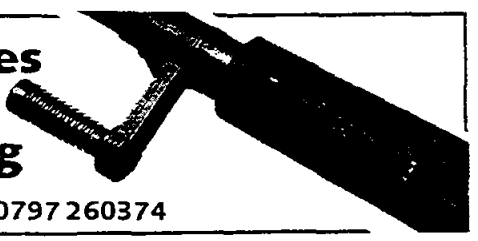
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N Korea casts a longer shadow with TD-2

North Korea is developing two new ballistic missiles, one of which is capable of reaching beyond Okinawa in the Pacific, *JDW* has learned from US intelligence sources, *writes Barbara Starr.*

Last month US intelligence detected what is described as a new 'missile simulator' at the Sanum Dong R&D Facility. Reports of a simulator apparently refer to a hardware mock-up detected by intelligence satellites.

The missile has been given the provisional designation Taepo Dong-2 (TD-2). It is a two-stage missile. The mock-up was 32 m long, consisting of an 18 m by 2.4 m diameter first stage and a 14 m by 1.3 m second stage. The second stage appeared to be similar to a No Dong-1 missile with a rounded nosecone, while the fatter lower stage is around the size of a 1970s-vintage Chinese CSS-2/DF-3/Dongfeng-3 IRBM propellant section.

The TD-2's dimensions indicate the missile would have a range far greater than the 2000 km range of the Taepo Dong-1 (TD-1), also under development by North Korea. This projects an offensive capability beyond the Korean Peninsula.

ASIA

BY BARBARA STARR
WASHINGTON DC

US officials also believe it has a much-improved targeting capability with the missile perhaps achieving the 3500 km range needed to attack Guam. There is no view in the US intelligence community as to the status of TD-1 and TD-2. However, US officials believe the next generation beyond No Dong is being planned.

One advance is the development of two stage weapons compared to the derivatives of the single-stage 'Scud B', which spawned the first generation of North Korean missiles.

Some sources say that the so-called No Dong-2 programme is already devoted to developing a two-stage weapon.

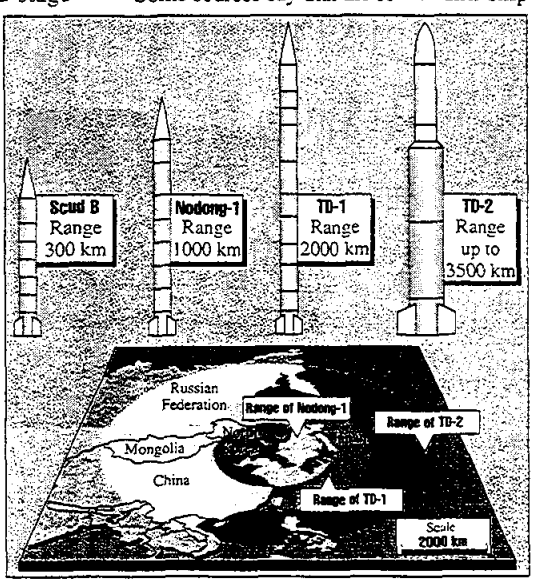
Non-government analysts reviewing the dimensions of the two stages of Taepo Dong as specified by US intelligence also question whether TD-2 could reach the estimated range.

The facility has long included a diverse military hardware display which has included items available for export, say US sources. They conclude that the TD-2 could be available for purchase, but not for some years. The presence of the simulator may also indicate an upcoming inspection by North Korean leadership.

Imagery also revealed other items including a Silkworm anti-ship cruise missile and a launcher and a mobile crane, as well as a Taepo Dong-1 missile/simulator, a 'Scud', an SA-2 and a T-62.

Estimates of the TD-1 assess its range at 2000 km with a 1000 kg warhead. It is believed to have a No Dong-1 first stage, and a 'Scud B' or 'C' second stage and warhead section.

A test is also unlikely for some time even though the Taepo Dong site could be ready for a launch this year.



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France's first white paper for 20 years is profiled in Analysis *(p15)*

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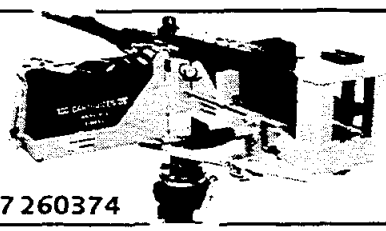


Japan/USA dispute FS-X technology

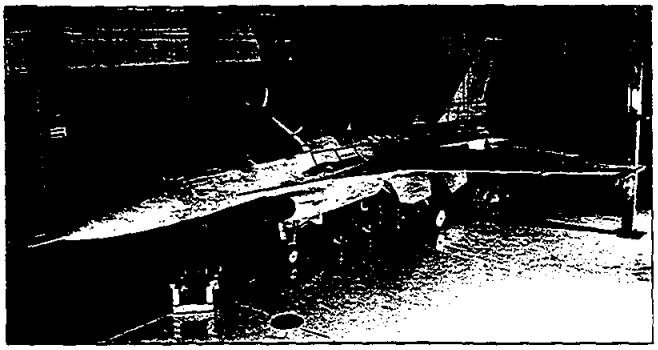
BY JOHN BAILEY
IN SINGAPORE

The Japan Defence Agency (JDA) is locked in a dispute with the US Government over ownership of some of the new technology developed for the FS-X fighter programme.

The JDA claims that around 50 of about 200 items developed specifically for the FS-X, based on the Lockheed/General Dynamics F-16, use only indigenous technology. This would qualify the components as "non-derived", giving their various Japanese developers sole exploitation rights.

The argument is unlikely to affect the development of the single-engined support fighter, which is about two years behind its original schedule, but one industry source says: "The Japanese need to demonstrate to their own hierarchy that this programme is adding jobs to their economy. They are in a recession like everyone else now and, within the context of the workshare agreement, they are trying to protect their industrial base."

The argument centres mainly on sub-systems such as the liquid-crystal multi-function display made by Yokogawa Electric, and a holographic display from Shimadzu.



The Japan Defence Agency fights for FS-X fighter technology ownership

If it is agreed that these items contain no US technology, the Japanese companies would retain sole production rights, and be able to use them for other applications without clearance from the US Government.

An attempt will be made to break the deadlock at a meeting to be held between the JDA's Technical Research and Development Institute and the US Air Force's F-16 System Programme Office at Wright-Patterson AFB late in March.

The source also says: "The US position is that everything is derived, until proved otherwise. My understanding is that the Japanese side is providing a rationale to try to convince the US Government [that the technology is non-derived]."

Mitsubishi Heavy Industries (MHI) was nominated as prime contractor under the terms of the FS-X joint-venture agreement, but US companies retain 40% of the workshare and will share rights to "derived technologies".

General Dynamics was originally the principal US subcontractor, but the agreement has now been amended to transfer GD's interest to its new parent company, Lockheed.

Lockheed will produce the aft fuselage and the MHI-designed co-cured composite wing. The aircraft will be powered by the General Electric F110-GE-129 improved-performance engine, with the first prototype due to fly in the third quarter of 1995. □

Russia reveals Korean missile scheme

South Korea built and tested its own two-stage ballistic missile in 1987, according to a newly released report from the Russian Federation's Foreign Intelligence Service.

The unclassified report, *A new challenge after the Cold War: The Proliferation of Weapons of Mass Destruction*, says that the missile, with a range of 180-250km (100-135nm), is a reworked version of the American Nike-Hercules surface-to-air missile, with new guidance and control systems and a new warhead.

The unclassified report notes that South Korea's ballistic missile expertise has "to a considerable degree been gleaned...from the technology of the American Lance missile system". It adds that the South Koreans have upgraded their US-made Honest John missiles and "...increased their precision considerably".

The South Korean missile programme was prompted by a far bigger programme in North Korea. The Russian intelligence report says that the North's missile potential derives from Soviet-supplied Frog 5, Frog 7 and Scud B rockets and from the North Korean-upgraded Scud-C, which has a 600km range.

The report stresses North Korea's ambitious export plans. "Using technology obtained from Egypt, North Korea is upgrading the Scud-class missiles...and exporting them to countries in the Middle East", says the document. It notes that the No Dong-1 intermediate-range missile, with a range of about 1,000km is "at the testing stage" and that "...North Korea intends taking [this rocket] onto the world market".

The report concludes that it is "...possible to speak of the presence in North Korea of a national missile industry, creating models which could be used as systems for the delivery of chemical and, after modification, nuclear weapons also".

North Korea is being hindered, however, by a "shortage of skilled scientist and engineer personnel" and by "the comparatively low-engineering state of industry". An "active quest" is under way to recruit foreign specialists "to convert missile manufacturing into a competitive export sector". □

Italy completes G.222 avionics tests

The Italian air force has completed testing of the updated avionics suite for the Alenia G.222 light tactical transport aircraft.

The programme was conducted by the service, with an off-the-shelf system, using equipment common to other air-force aircraft. The weather radar is the SMA-710, used on Agusta HH-3F search-and-rescue helicopters, while the new navigation platform is the Litton Italia LTN-92. A new five-channel global-positioning system receiver, produced by Elmer, completes the suite.

The update of the navigation system will improve the G.222's capability to perform long-range missions in areas where traditional radio-navigation aids are not available.

The aircraft was field tested successfully during a humanitarian-aid mission to Somalia. The air force will now propose a retrofit programme for its 31-strong G.222 fleet. □

NEWS IN BRIEF

NSA RADAR

Paramax Systems Canada has selected Texas Instruments to develop the surveillance radar for the New Shipborne Aircraft, the Canadian Forces' version of the Agusta/Westland EH101 helicopter. The $70 million contract covers 35 X-band pulse-compression radars, derivatives of the APS-137 inverse synthetic-aperture radar.

cameras at missile test ranges supports these reports.

ISRAEL

Keres

The existence of the Keres SSM programme was confirmed by Israel in 1992, as a ground-launched variant of the AGM-78 Standard anti-radar missile sold to Israel as part of the 'Purple Fist' programme. Keres has a launch weight of about 615 kg and a range of 40 km. The missile was used against SAM radars in the Bekaa Valley conflict in 1982. It is believed that Keres was modified for ground launch by Israeli industry.

Popeye 3

Reports in 1994 suggested that Rafael had proposed an extended range Popeye 3 missile as a cruise missile with a range of 300 km. The Popeye 1 missile entered service in Israel in 1989, and is a 1360 kg solid propellant TV-guided missile with an 80 km range. The USAF has conducted trials and Popeye 1 is known as AGM-142 in the USA, with a small number ordered for operational evaluation.

JAPAN

M-3 variant

The M-3 space launch vehicle has a launch weight of 61 700 kg and whilst the present Japanese constitution prohibits development of offensive weapons if there were to be a change then the M-3 might be converted into an intermediate range ballistic missile with a payload of about 500 kg and a range of 4000 km. The M-3S11 version has a length of 27.8 m, body diameter of 1.41 m and uses three solid propellant stages. The first M-3 launch was made in 1980 and the first M-3S11 was launched in 1985.

H-1 variant

The Japanese H-1 satellite launch vehicle was first launched in 1986, and has a launch weight of 139 000 kg. There are no known plans to convert this SLV into an ICBM as this would contravene the Japanese constitution, but if it were to be converted it would have a range of about 9 000 km with a payload of 1100 kg. H-1 has been flown with two and three stages (first stage liquid and second stage solid) and is basically a licence-built McDonnell Douglas Delta SLV. H-1 is 40.3 m long and has a body diameter of 2.44 m.

H-2 variant

The H-2 SLV programme began in 1985 and a first launch was made in 1994. There are no known plans to convert this SLV into an ICBM as this would contravene the Japanese constitution but, if it were to be converted, then the missile would have a range of about 10 000 km with a 4000 kg payload. H-2 has a launch weight of 256 000 kg, a length of 50.0 m, a body diameter of 4.0 m and uses two liquid propellant stages with strap-on solid boosters.

NORTH KOREA

SA-2 'Guideline' variant

There have been reports that North Korea developed a surface-to-surface variant of the Russian designed SA-2 'Guideline' SAM, with a range of around 80 km, but this remains unconfirmed. However, the Chinese have developed CSS-8, believed to have been Project 8610 (M-7), which is based upon the HQ-2 SAM; the North Korean missile might have been developed in a similar way.

SS-1c 'Scud B' variant

North Korea reverse engineered the Russian R-17E missile in the 1980s and manufactured its own variant, entering service in 1986. These missiles were exported to Iran in 1987 and 1988.

SS-1 'Scud' improvement ('Scud C')

Several reports have indicated that North Korea has developed an improved version of the Russian SS-1 'Scud' short range ballistic missile, probably similar to the Russian SS-1 'Scud C' design or to the Iraqi Al Hussein programme. Tests of a mobile vehicle TEL were reported from 1984 onwards with trial firings over several years, and a test launch into the Sea of Japan of around 500 km range in October 1991. It is believed that the 'Scud-C' variant has a 500 kg warhead and a range of 550 km. It is reported that 35 to 50 North Korean missiles and about 20 launch vehicles were exported to Syria in 1991 as part of a total order for 150 missiles, with possibly some missiles being assembled in Syria as well as the development of a Syrian chemical warhead. Sales may have been made to Cuba, Egypt, Iran, Iraq and Libya with an annual production capability of around 100 missiles. Reports from Iran suggest that the 'Scud-C' variant missile is being manufactured in Iran, with a test flight in May 1991 over a range of 500 km.

Taepo Dong-1 (Nodong-3/Labour-3)

Reports in 1994 indicated that North Korea had assembled mock-ups of a further development of the Nodong-1/2 series of missiles, designated as Taepo Dong-1/2 by the USA, as they were seen at Taepo Dong, a new launch site about 3 km from the Nodong site. Taepo Dong-1 (which could be known as Nodong-3 or Labour-3) is believed to be a two stage liquid propellant ballistic missile with a maximum range of 2000 km. It is reported to use part of Nodong-1 as the first stage and a 'Scud B' or 'Scud C' variant second stage with a 1000 kg warhead. The missile is believed to be 25.0 m long and to weigh around 27 000 kg. An in service date of 2000 might be feasible.

Taepo Dong-2 (Nodong-4/Labour-4)

Taepo Dong-2 (which could be known as Nodong-4 or Labour-4) is also believed to be a two stage liquid propellant ballistic missile, but with a maximum range of 3500 km. This missile is reported to use a new 18.0 m long and 2.4 m diameter first stage and a second stage similar to the Nodong-1 missile (14.0 m long and 1.3 m diameter). The missile is believed to have a total length of 32.0 m and to weigh around 60 000 kg at launch. A warhead weight of 1500 kg is assumed. An in service date of 2002 is considered possible.

SOUTH KOREA

Nike-Hercules variant (NHK-1)

It has been reported that the South Koreans developed a surface-to-surface variant of the US designed MIM-14 Nike-Hercules SAM, with a range of about 250 km. This variant is believed to be in service. A separate missile, or perhaps a further variant of the Nike-Hercules, is called 'Hyon Mu' probably also known by the designator NHK-A, and it is reported that this was first tested in 1978.

KSR ballistic missile

A series of KSR research rockets is being developed by the Korean Aerospace Research Institute with a view to developing their own satellite launch vehicles. Unconfirmed reports suggest that a secondary use might be for a series of ballistic missiles with ranges from 100 to 900 km.

LIBYA

Iltisslat or Al Fatah

A development programme by Libya with rumoured Brazilian, Chinese and German participation, to build a ballistic missile known as Iltisslat or Al Fatah, was first reported in 1984. Little had been heard about this project since 1985, until a report in May 1990 suggested that the Al Fatah programme to develop a liquid propellant SRBM had continued, and that static motor tests of the 950 km range missile were expected. Reports continue to suggest that the programme is making slow progress, with an unsuccessful launch in 1993. An unconfirmed report links the Al Fatah programme with Iran, with joint testing and assembly plants.

PAKISTAN

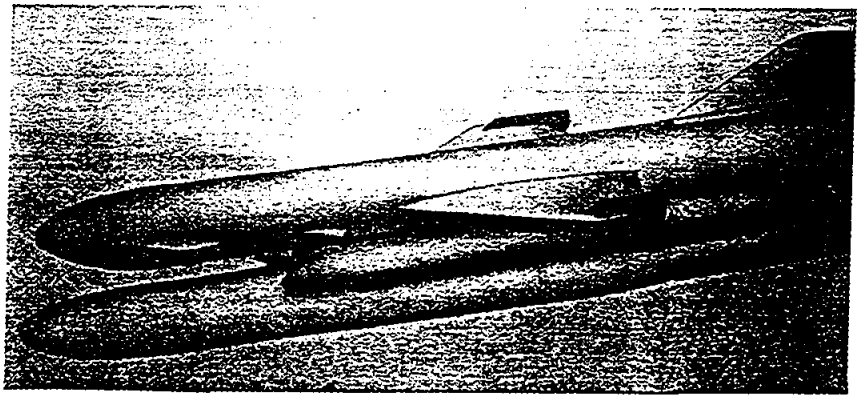
Hatf 3

Unconfirmed reports suggest that a third Hatf missile, known as Hatf 3, is being developed in Pakistan with a range of 600 km.

RUSSIA

SS-X-26

Russia reported a new class of ICBM,



A model of the Russian anti-ship/submarine torpedo carrying YP-85 missile, first shown in 1993

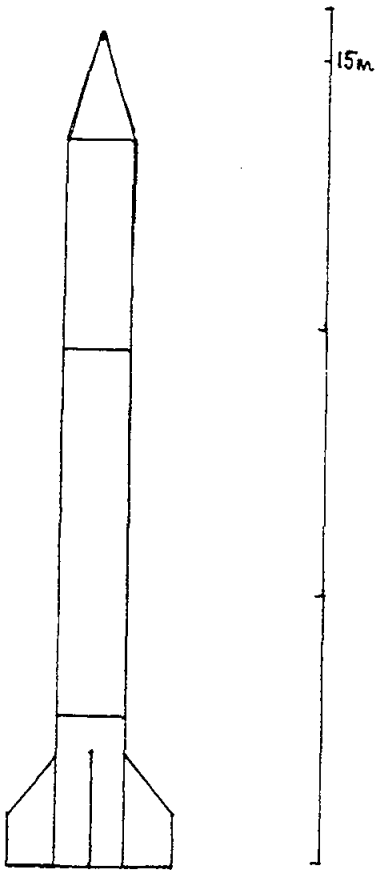
Nodong-1/2 (Labour 1/2)

Type
Intermediate range, ground mobile, liquid propellant, single warhead, ballistic missiles.

Development
North Korea began to build SS-1 'Scud B' liquid propellant ballistic missiles in the mid-1980s, and then extended their range with a 'Scud C' variant. It is believed that design work on the Nodong-1, thought to be called Labour 1 in North Korea, started in 1988. It is not clear if the Chinese assisted North Korea directly, and it seems possible that the North Koreans used earlier collaboration with China on a project known as Dong Feng-61 as the basis for the Nodong-1 approach. Nodong-1 test firings were reported in June 1991 and May 1993, and it is estimated that development may be complete by 1995.

A further development, known as Nodong-2 (Labour 2), has been reported since 1992, which may have a smaller warhead and an increased range. In 1994 reports suggested that Nodong-3 and 4 missile mock-ups, named Taepo Dong 1 and 2 in the USA, had been seen close to the Nodong test facility in North Korea and that these future missiles might have ranges of 2000 and 3500 km respectively.

Description
The Nodong-1 missile is believed to be about 15.5 m long, to have a body diameter of 1.3 m and a launch weight of 21 000 kg. The shape is reported to be similar to that of the Russian SS-1 'Scud B' design. The missile is believed to have a single stage liquid propellant system, using UDMH and probably IRFNA or N_2O_4. Reports suggest that four 'Scud B' type motor assemblies have been used, resulting in a 70 second burn time. Nodong-1 is thought to have inertial guidance with graphite vanes reacting on the motor exhaust to control the missile during the boost phase, similar to 'Scud B'. The payload is believed to be 1000 kg, with a warhead section separating from the missile shortly before re-entry to the atmosphere. There is a wide range of warhead options available with a 1000 kg payload, which could include nuclear, chemical, unitary HE or submunitions. The range of Nodong-1 is reported to be 1000 km, but the first three test flights have been about 500 km and bearing in mind the weight at launch it is possible that the maximum range is perhaps no greater than 800 km.



North Korea is believed to have converted the Russian designed SS-1 'Scud B' TEL, the MAZ 543, to carry the Nodong-1 missile.

Nodong-2 is reported as a longer range version of Nodong-1, with the range increase achieved by reducing the payload to 500 or 750 kg and perhaps by reducing the structural weight. The maximum range of Nodong-2 is reported to be between 1300 and 1500 km.

Operational Status
The first test firing of a Nodong-1 missile was reported in June 1991, and two further test flights were made in May 1993. It is expected that Nodong-1 will enter service in 1995/96, with Nodong-2 probably in service around 1998. There have been unconfirmed reports that Iran has entered into a joint development programme for Nodong-1 and -2 with North Korea, and that a test range in Iran would be used for full range trials; these reports have been denied by North Korea. There are also unconfirmed reports that Libya, Pakistan and Syria have negotiated to purchase Nodong missiles.

Specifications
Nodong-1
Length: 15.5 m
Body diameter: 1.3 m
Launch weight: 21 000 kg
Payload: Single warhead 1000 kg
Warhead: Nuclear, chemical or HE
Guidance: Inertial
Propulsion: *Single stage liquid propellant*
Range: 1000 km
Accuracy: 3000 m CEP

Contractor
Not known.

FOREIGN POLICY GOALS

Kim Il-song believes the presence of US forces on the peninsula impedes reunification.

One of North Korea's major national policy goals is to remove US forces from the Korean peninsula. Pyongyang believes the US military presence in South Korea directly impedes the peninsula's reunification. Most Koreans, Northern and Southern, want to reunify the peninsula. In North Korea's desire for reunification it consistently structures its proposals to ensure communist control. Today, North Korea is using largely political means to further its efforts. However, Pyongyang steadily has developed well-equipped, combat-ready forces that could aid an attempt to reunify the peninsula.

North-South Dialogue

Intermittent North-South talks on a variety of subjects have not effected any substantial changes.

North Korean policy and activities directly and indirectly encourage anti-US and anti-government activity in South Korea. To weaken the South Korean government's position, Pyongyang uses propaganda and all its North-South contacts to encourage sympathy and support for its proposals. North Korea claims South Korea is a US semicolony and maintains the Seoul government may attack again, as it claims happened in 1950. Even though North Korea recently sponsored a series of peace proposals, Pyongyang has not changed its basic goals, which include removing US troops from South Korea and reunifying the peninsula under Kim Il-song's leadership.

Since 1986, Pyongyang has suspended North-South talks unilaterally during the annual US-South Korea military exercise. North and South dialogue included meetings on sports (to form joint teams for sports events), the Red Cross (to develop a solution for separated families), prime ministerial meetings (to encourage face-to-face meetings between the respective prime ministers), and parliamentary talks (to achieve meetings of parliamentary delegations to discuss a mutual declaration of nonaggression). More recently, North and South Korea have begun a series of high-level prime ministerial talks. In 1990, the prime ministers met three times, twice in Seoul and once in Pyongyang, with a fourth meeting scheduled for February 1991 in Pyongyang that was unilaterally suspended by the North over the TEAM SPIRIT exercise. Essentially, the meetings have been long on rhetoric but short on substance and progress. However, the North-South dialogue made some progress by forming a joint Ping-Pong team and a joint youth soccer team in 1991, and by rescheduling the fourth prime ministerial meeting.

Pyongyang appears to pursue dramatic political breakthroughs while Seoul prefers an incremental approach to dialogue, believing economic agreements and increased personal contacts provide an atmosphere more conducive to meaningful political agreements and a reduction in tension. However, the basic areas of contention remain unresolved.

Confederation

Although both governments agreed in principle to reunify peacefully and without foreign influence in 1972, the practical means of attaining these ends has substantial problems. Since then, North Korea proposed establishing the Democratic Confederal Republic of Koryo (DCRK) — a system of unification based on mutual convenience and toleration. Seoul rejected this proposal as another propaganda ploy.

According to Kim Il-song, both sides would participate equally in the DCRK. Each party would exercise regional autonomy with equal rights and duties and would recognize and tolerate the other's ideology and social system. The DCRK would be a neutral country and would not participate in any political or military alliance. As a unified state "embracing the

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STRATEGIC SURVEY 1993-1994

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ARMS CONTROL
NON-PROLIFERANCE

Akashi, who had previously helped to coax the Japanese into the Cambodian operations, that it send the SDF to the former Yugoslavia. The contradictory approaches within the coalition's largest party, the SDPJ, have also been inhibiting. While the party officially still opposes the SDF's role overseas (and, indeed, supported calls for Nakanishi's resignation), SDPJ members of the cabinet are constitutionally required to endorse it. Future commitments are likely to remain selective and limited.

Hosokawa himself is not out of sympathy with aspirations for a 'peace dividend'. In October he surprised defence officials by telling an annual SDF parade that Japan should take initiatives in implementing disarmament; he then proposed reconsidering not just the current five-year mid-term programme, but also the National Defense Program Outline, which has been the basis of Japanese defence policies since 1976. His intention is to carry out a thorough review during 1994, in time for its recommendations to be reflected in the defence budget for 1995–96. The thrust, however, may well be on reducing manpower, especially in the ground forces, while introducing more sophisticated military weaponry.

The acquisition of military technology, however, will be influenced by Japanese threat perceptions in North-east Asia. Japanese defence planners have gradually become reconciled to Western assessments of declining Russian military power in the Russian Far East. While that power remains the highest priority for planners, their concern has now shifted to Russian nuclear waste contamination of the air and seas around Japan. During Boris Yeltsin's visit to Japan in October 1993 little progress was made on the outstanding 'Northern Territories' question (other than to obtain a Russian commitment to withdraw troops from the islands). In addition, the rising support for ultra-nationalists within Russia has further diminished prospects of a settlement.

Japan has continued to monitor Chinese military enhancement with a wary eye and to take note of China's demands on the Spratly Islands. But it is North Korean capabilities which have most heightened Japanese fears. Although the Japanese played a relatively low-key role in the international efforts to open up the suspected North Korean nuclear weapon sites, the test-firing of a North Korean missile, *Nodong-1*, in May 1993, with a range stretching over most of Japan, prompted sudden and active consideration of new anti-missile systems. More advanced models of the *Patriot* missile system are due to be deployed in 1995, and the Japanese are now discussing with the Americans a combined missile defence and satellite detection system.

Nuclear developments in North Korea raised the long-taboo question of Japan developing nuclear weapons. The Miyazawa cabinet believed that it was unnecessary to take a firm stand at this time on the UN's proposed extension to the Nuclear Non-Proliferation Treaty beyond 1995. It preferred to act ambivalently to avoid the political pressure

developed by an unholy alliance of nationalists and left-wing pacifists. Hosokawa, however, quickly made it clear that Japan would come into line with US and UN wishes, declaring at the UN in September 1993 a

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THE KOREAN PENINSULA

The issue of nuclear proliferation cast a darkening shadow over the Peninsula. North Korea as usual huffed and puffed, while its own house seemed more and more shaky. After threatening to leave the NPT in March 1993, it played hard to get for the rest of the year, but was brought to the negotiating table by a US administration which proved willing to play the game long. By December, despite some tricky moments caused by unscheduled off-the-cuff comments by senior members of the Clinton administration, the US had succeeded in getting the North to agree to allow the resumption of some IAEA inspections and to reopen contacts with the South. In return, there would be further talks with the US and the cancellation of the *Team Spirit* exercise in 1994. While Pyongyang continued to withhold permission for inspection of suspect facilities it termed 'military sites', the US hoped it would be able to corner the renegade regime in the end. By March 1994, however, the tables had turned again, with North Korea refusing to allow the IAEA into previously agreed sites, thus forcing the Agency to declare North Korea in non-compliance with the NPT.

Democracy took a firmer grip in South Korea. Once elected to the presidency in December 1992, Kim Young Sam, long thought of as just an opposition politician, proved to many that the office was making the man. He tackled the major issue of corruption and money politics head

on, without the dire consequences some had predicted. His long-term plans, assuming they exist, have yet to be revealed, but in his first 12 months he has made far more impact than had been thought possible. There are some unresolved problems, for example on human rights, but it has been a good year for the first elected civilian government since the 1950s.

There was no movement on North–South relations. The North, having achieved a long-term aim of negotiating directly with the US, rejected all attempts to persuade it to talk to the South. Kim Young Sam, for whom the North–South dialogue is perhaps a less pressing issue than it had been for his predecessors, did not seem too downcast by this development.

The Nuclear Issue

This rumbled on throughout the year, overriding all other issues on the Korean Peninsula. North Korea had precipitated the crisis by finally agreeing in late 1992 to IAEA inspection of its nuclear sites under the NPT. It did not expect the inspectors to be able to deduce from the 'time signature' of the plutonium and waste samples Pyongyang had provided that it had processed more plutonium than it had admitted. The North Koreans were caught by surprise. Alerted by US satellite photography that there were two suspicious warehouses that might contain the missing nuclear waste material that would match the additional plutonium, the IAEA had demanded on 25 February 1993 special inspection access to these two sites. In response, North Korea abruptly announced on 12 March that it would cancel its adherence to the Nuclear Non-Proliferation Treaty, because the IAEA inspectors were asking to examine what it insisted were military installations, not nuclear sites.

Alarmed by the possibility that North Korea intended to join the ranks of the nuclear powers, the United States dropped its long-held position of not talking directly to North Korea. A series of meetings between US Assistant Secretary of State for Political-Military Affairs, Robert Gallucci and North Korean Vice-Foreign Minister Kang Sok Chu resulted in an agreement at the very last moment in June under which the North announced the suspension of its withdrawal, in return for further talks with the US. This had been preceded by a referral of the issue to the UN Security Council in May. In Resolution 825 the Security Council called upon North Korea to reconsider its withdrawal from the NPT, to honour its NPT/IAEA obligations, and the Council undertook to remain seized of the matter and to take further action if necessary. The UN otherwise remained little involved until December, when the Secretary-General on his own initiative decided to visit the Peninsula. He managed to avoid offending either party, but this was his only achievement. He was received politely enough in Pyongyang, where Kim Il Sung gave him lunch on Christmas Day, but it was made clear that the North would not accept mediation by the UN, which it considers a 'belligerent party' in Korea.

Meanwhile, the North Koreans, having brought the US to the negotiating table, did little more than pound it for much of the year. Talks with the IAEA produced no breakthrough. The North allowed some IAEA teams in for minor routine servicing of existing monitoring equipment but adamantly refused access to the two suspected sites at Yongbyon. The level of access allowed to the IAEA helped fudge the issue of when or if the IAEA safeguards had actually been breached. The IAEA was reluctant to announce publicly that safeguards had been broken since there is clearly no one point when this can be said to happen.

There were loud protests from North Korea when the IAEA discussed the non-compliance, both at its board of governors' meeting and at a general session on 1 October 1993. During his visit to Seoul in July 1993 President Clinton issued stern warnings to the North about not developing nuclear weapons. During the APEC meeting in Seattle in November, US Secretary of State Warren Christopher threatened Pyongyang with sanctions, saying that it could not be allowed to refuse IAEA inspections and should resume the dialogue with the South. Nevertheless, the US seemed anxious to keep the North Koreans in play and to avoid sanctions. Similar considerations clearly weighed with both South Korea and Japan. By the end of November, the US–South Korean side was prepared to offer further talks with the US and the suspension of the 1994 *Team Spirit* exercise. In return, the North had to agree to resume dialogue with the South and to accept inspections which would allow the IAEA to say that continuity of controls had not been broken. This 'package agreement' enabled the IAEA and the North Koreans to begin talking in January, but as so often is the case, the North seemed to want to re-open the discussion as soon as agreement appeared to be reached.

The IAEA, frustrated by the North Koreans' stonewalling, adopted a strict line. It made clear that if Pyongyang was not more forthcoming by 22 February, when the IAEA board of governors was due to meet, it would report to the Security Council, citing North Korea for failure to meet its obligations and thus opening it to UN sanctions. Once again, Pyongyang, only days before the deadline, moved to relax the tension. It agreed to allow IAEA inspectors in to recheck equipment at the open nuclear sites, recover and replace film, and physically examine the sites, but it still refused to open the two hidden nuclear sites. Once again, when the IAEA was allowed into the open sites in March 1994 the North Koreans refused complete access. As a result of the consequent IAEA report of non-compliance, the UN Security Council discussed and accepted a Chinese-sponsored request for North Korean compliance within 45 days when it will examine the issue again.

Thus the possibility of sanctions remains. To impose them would be a slow process because of the difficulty of enforcement. It would, however, allow the North Koreans time to ponder the consequences and also give time to bring around doubters. The Chinese, in particular, have

ther areas await reform and there is still much for him to tackle. Human-rights' abuses remain, albeit at a lower rate than in the past, and there is evidence that the police and the procurators, for example, still think in the old ways. Trade union rights are not fully respected either by the state or industrialists.

A few dark clouds still hang on the horizon. The opening of the rice market has become a major issue for the government. It is pressed on one side by the US which demands a firm commitment to free trade. On the other are vociferous and increasingly violent protests from South Korean farmers. So far, Kim has managed to handle the issue with skill, using his December cabinet reshuffle to deflect pressure away from himself. Doubts also remain over Kim's grasp of and approach to foreign affairs and the all important question of North–South relations, areas where he has little expertise, and no clear policies. There have been allegations in the newspapers that members of his family are also mixed up in politics, although not to the extent of Roh Tae Woo and Chun Doo Whan. Yet hopes are high, and Kim's position, based on his long years in opposition and his election victory, is a strong one.

Steady As She Goes

There have been no major changes in the direction of foreign policy under Kim Young Sam. The appointment of the American-educated former Professor of International Relations, Han Sung Joo, as Foreign Minister was widely welcomed outside South Korea. Han was well known in academic and journalistic circles as a shrewd commentator, and speaks excellent English. His reception at home was perhaps more muted at first. For many Koreans, he seemed too foreign in his ways, and there were early rumours that his children were US citizens. The Foreign Ministry staff also indicated that they were not happy that one of their own had not been chosen. Han seems to have overcome internal opposition but some South Koreans remain concerned that he is too prone to see the US point of view. In particular, many, echoing a constant fear in South Korea, believe that he has allowed the US to make too much of the running on North Korea, thus sidelining South Korea.

Han pursued a vigorous policy of travel and networking, including visits to China, the UK and the US, but there were no spectacular diplomatic breakthroughs to match former president Roh Tae Woo's triumphs with the Soviet Union and China. Kim Young Sam's own foreign policy agenda was low-key. He met Japanese Prime Minister Hosokawa in November when Hosokawa visited South Korea. This was a relatively relaxed occasion – Hosokawa and Kim were photographed in casual clothes at the historic site of Kyongju. Hosokawa expressed his deep regrets for Japan's past misdeeds, about which he gave more detail than usual. Both sides hailed yet another milestone in their relations, which will remain good until the next problem appears.

South Korean–US relations also displayed the usual rift. On the security–military side they remained good, despite leaks of Pentagon studies which indicated that South Korean defences would collapse quickly in the event of an attack from the North. During his visit in July 1993 President Clinton assured Seoul of continued US support. At the same time, he warned the North that if it used a nuclear bomb it would provoke immediate retaliation. This rather self-evident proposition went down well with some of the more gung-ho commentators around the world. The US promised even further devolution of control over the joint forces to South Korean commanders by December 1994.

In economic matters, the two sides remained at loggerheads over market access and deregulation. A new issue of banking liberalisation was added to existing quarrels, and the US announced that it was prepared to implement Section 301 against South Korea. The US Environmental Protection Agency threatened to curb the illegal plant and wildlife trade. A niggling argument, which has gone on for years, about the US refusal to pay rent for its Embassy and certain other facilities, surfaced once again with no sign of a solution. US attempts to involve South Korea more in international issues, such as Somalia, met with stonewalling, but eventually some South Korean troops were sent. In all these cases, Korean officials expressed surprise at US, and other, requests, professing that they have done or were doing all that is required.

President Kim's main foreign affairs initiative came when he went to the APEC summit in Seattle, and on to talks in Washington. He was the first speaker in Seattle, and this added to his domestic prestige. The South Koreans like APEC, which they see as a useful bridge between East Asia and North America. It is also seen as providing a fairly small power like South Korea with some protection from its giant neighbours, perhaps not just in economic terms. While Kim was in Washington it was not economics but the North that dominated the agenda.

North Korea: Still In Isolation

As ever, it was the best of times according to the North Korean media, and the worst of times according to virtually everybody else. The North Koreans claimed a bumper harvest, the only one in North-east Asia, not surprisingly giving credit for this to Kim Il Sung whose personally designed irrigation system has removed the need for rain. The North also announced further measures to attract foreign investment, especially to the remote north-west. South Korean sources maintained that the North's economy continued to contract, and there were more stories of malnutrition and food riots. Visitors had mixed reports but none confirmed the worst accounts.

By the end of 1993, however, things had apparently become so bad that North Korea was forced to admit that the targets for the current seven-year plan had not been met. Blame was put on the collapse of

socialist systems abroad and the huge defence burden forced on North Korea by outside pressures rather than on any faults within the North Korean system. Continuing uncertainty about the country's political future prevailed, and the dispute over the nuclear issue cast further clouds.

At the usual brief meeting of the Supreme People's Assembly in December 1993 a number of personnel changes were announced, but their exact import remained unclear. Kim Il Sung's younger brother, who had reappeared earlier in the year after an 18-year gap, became a vice-president. To some this was a sign that 'Dear Leader' Kim Jong Il was in trouble; to others, proof that the succession is on course. Since there were no other signs of problems for Kim Jong Il, the latter interpretation seems the more plausible. Similarly conflicting messages could be drawn from the move of Kim Dal Hyon from the State Planning Commission. His replacement was another technocrat, and the way his move was reported did not seem to rule out another senior position for him in due course. Kim Pyong Sik, linked in the past with Koreans in Japan, was given a vice president position. His appointment could be seen as a further endorsement of the opening up policy, especially since much of the limited foreign investment so far attracted to North Korea has come from the Korean community in Japan.

Foreign trade showed further decline. By the end of the year, the Japanese were reporting falling bilateral trade, and intra-Korean trade was also down. In both cases, uncertainty arising from the nuclear issue was a factor in the decline. The prospect of UN sanctions as a consequence of the North's refusal to fulfil its NPT obligations and/or violent political upheaval seemed likely to put off those few businessmen who had not already been dissuaded by bad debts, hard-to-get visas and North Korean obduracy, from becoming involved in such a remote and isolated country.

North–South Relations

Since the cancellation of the scheduled December 1992 ninth round of prime ministerial talks, the North–South dialogue has ground to a halt. It was widely believed that the North postponed the talks in order to take the measure of the Kim Young Sam government, and it was expected that the talks would resume after the end of *Team Spirit* in April 1993. Although the North did suggest in May that there should be summit talks between the two sides, vice-ministerial talks, which were held at Panmunjom to discuss the issue, petered out in the usual mutual recrimination.

US pressure on the North to resume the dialogue with the South led to three rounds of talks in October. At the third, Pyongyang made a new procedural proposal. By the time of the fourth scheduled meeting in early November, however, the North announced a boycott, alleging that the South Korean defence minister had made bellicose noises – this was

in the context of the strong position the IAEA had taken in October. There were further North Korean protests when the annual US–South Korean *Foal Eagle* exercise began in November.

Neither Pyongyang nor Seoul seem in any real hurry to recommence substantive dialogue, especially while the nuclear issue is still unresolved. They do not want to make short-term concessions over nuclear matters and run the risk of losing points in the broader dialogue. Without some movement on other issues, however, that dialogue will not take place in any regular fashion.

EAST ASIAN SECURITY BEYOND ASEAN

The end of the Cold War in Asia has not changed regional geography, but its impact has changed local governments' views of the relationship between strategic perspectives and geographic categories of convenience. As a result, two separate initiatives, which will affect how regional security is organised, have been advanced, sending out mixed signals. The first initiative came from the Association of South-East Asian Nations whose members have begun to look beyond proprietary regional boundaries in the interest of common security. The second came from US President Clinton with political economy and security in mind. A little organisational work for each initiative has followed but little thought appears to have been given as to how the two might mesh.

The ASEAN Regional Forum

ASEAN had been exploring the possibility of expanding its view of regional security for two years before any definitive action was taken. At a summit meeting in Singapore in January 1992 the use of the post-ministerial conference as a forum for a security dialogue beyond conventional regional bounds was sanctioned. Although initial discussions in Manila in July 1992 were on a serial, rather than truly multilateral, basis, the time was ripe for greater change. Japan, supported by the United States, put its considerable weight behind encouragement to expand both the scope and the form of dialogue.

Prime Minister Kichii Miyazawa capped his first tour of South-east Asia with remarks he made in Bangkok on 16 January 1993. His speech was careful, because he wanted to open the way for Japan to play a larger role in regional affairs without making it appear that Japan wished to push for a leadership position. Miyaza was also trying to provide assurances to countries in the region about Japan's role, which had generated some concern because of its participation in United Nations peacekeeping in Cambodia.

Thus, he called on the countries of the Asia–Pacific to 'develop a long-term vision regarding the future order of peace and security for their region' and advocated a political and security dialogue, promising

DIALOG(R)File 636:PTS Newsletter DB(TM)
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N.Korea Exchanges Missiles for Tech with Iran
Korea Economic Daily November 15, 1993
WORD COUNT: 95
PUBLISHER: Korea PC Telecom

North Korea has given Iran the technology to build its Rodong-1 modified Scud-c missile, which has a range of 1,000 kilometers, in exchange for Western technology and equipment, Izvestic reported on November 13.

North Korea exchanged the Rodong-1 for Western technology and equipment to which it has no access, the newspaper quoted a source with ties to an international arms fare in the Middle East as saying.

Iran has bought eight of the missiles from China and deployed them along the Strait of Hormuz, and its ultimate goal is to develop and inter-continental ballistic missile, the paper said.

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Subscription: Won 296,000 per month as of 1/90. Published daily. Contact Korea PC Telecom, 441 Chungnim-dong, Chung-gu, C.P.O. Box 960, Seoul, Korea. Phone (82) 02-313-5511. FAX (82) 02-312-6610.

INDUSTRY: Pacific Rim (PC)

LES PAYS DE L'EX-URSS

The Russian View of its Strategic Nuclear Arsenal

Dr Christoph Bluth

Introduction

The strategic nuclear arms race was arguably the most dramatic feature of the Cold War. It was the existence of two large and growing arsenals of nuclear weapons and the capability to inflict total devastation at any part of the world that gave the East-West confrontation its global character and imbued it with an apocalyptic quality. One of the peculiar paradoxes of the political processes which saw the end of the Cold War is that while the military confrontation in Europe was effectively ended by the Soviet withdrawal from Eastern Europe and the CFE regime, the strategic nuclear postures remained virtually intact.

The end of the Cold War, however, should in principle also mean the end of the strategic nuclear confrontation. As the Yeltsin government is seeking a close co-operative relationship with the USA, the political function of large strategic nuclear arsenals needs clarification. It seems strange for two countries who are partners or even allies to target nuclear weapons at each other.

In neither the USA nor Russia is there a clear articulation of the purpose of strategic nuclear forces in the post-Cold War era. However, it is possible to discern two well-defined sets of attitudes which are at opposite ends of a spectrum. At one end, the concept of 'co-operative denuclearisation' has been proposed by some scholars in the West. This is defined as the elimination of tactical nuclear weapons, the elimination of the bulk of strategic nuclear weapons, and the establishment of international norms which push nuclear weapons to the fringe of international exchanges. At the other end, there is the concept of 'residual deterrence', a view held by the Russian General Staff. This concept defines the future of the strategic relationship. Although at the political level, Russia and the USA no longer consider one other enemies, they still continue to deploy nuclear weapons as deterrent forces. This means that Russian strategic arms policy must be formulated with the purpose of maintaining strategic parity with the USA.

At the high political level, it is the START process which is the obvious vehicle to redefine a new strategic relationship. START I, if implemented, will be the first treaty in the history of nuclear arms control to result in a substantial reduction of strategic warheads. START II will reduce the number of warheads deployed on strategic delivery vehicles to less than one-third of the pre-START level. If the warheads withdrawn from service are dismantled, then START can be described as the first stage of a co-operative denuclearisation. However, the logic underlying both START agreements is one of arms control, incorporating the principles of strategic stability - this assumes a bipolar confrontation.

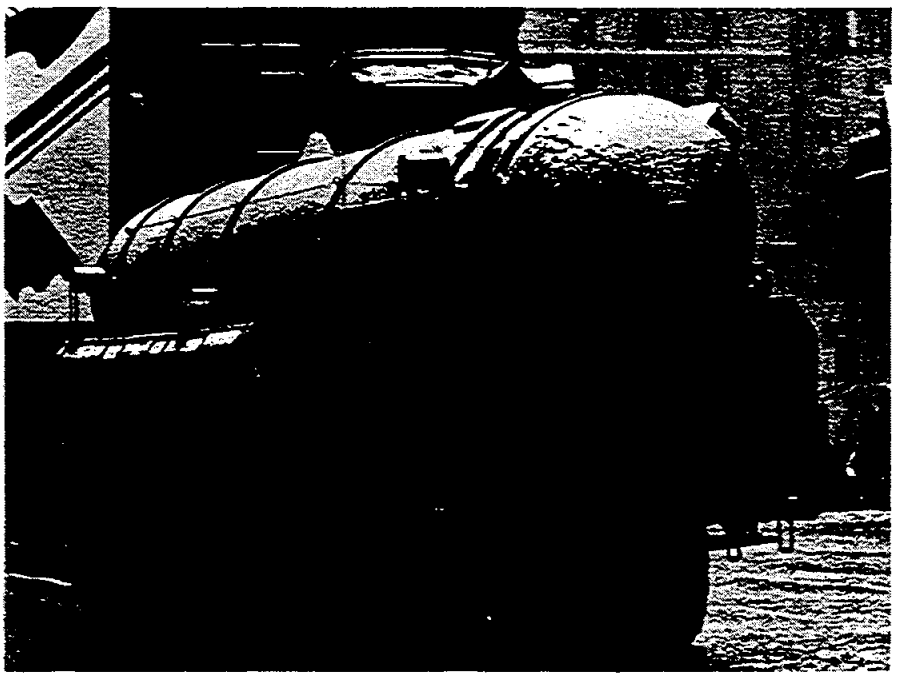
The Technical Aspects of START

In order to get a sense of the current direction of strategic arms negotiations, it is useful to outline some of the technical aspects of the accords achieved so far in the START framework. At present, the USA and the former Soviet Union have deployed a total of 10,875 and 10 271 strategic nuclear warheads respectively. After START I has been implemented, these will have been reduced to at most 6000 on both sides. The provisions of START I can be summarised as follows:

- The total number of strategic nuclear delivery vehicles (ie ICBMs, SLBMs and heavy bombers) and associated launchers is limited to 1600.
- The total number of warheads deployed is limited to 6000, with a sub-limit of 4900 on ballistic missiles (ICBMs and SLBMs) and 1540 on heavy missiles (only the Russian SS-18 currently counts as a heavy missile). No more than 1100 warheads may be deployed on mobile missiles.
- Under the agreed START counting rules, warheads on ballistic missiles are recorded singly whereas the entire load of gravity bombs or short-range attack missiles (SRAMs) carried on a heavy bomber are recorded as one weapon. For air-launched cruise missiles (ALCMs), it has been agreed that both sides can deploy 20 per bomber but these will only count as 'ten warheads'.
- Various future developments have been precluded. New types of heavy ICBMs, ICBMs with more than 10 warheads, heavy SLBMs and their launchers, rapid reload ICBM launchers, and ALCMs with multiple warheads are all banned under START.

START II envisages a further reduction in two phases. During the first seven years after ratification of the treaty, both sides will cut their strategic arsenals to between 3800 and 4250 warheads each. After the first phase, not more than 1200

The mobility of the 690 SS-25 'Sickle' ICBMs (under START II) enhances the missiles' survival at the expense of responsiveness. ***(Photograph: TASS)***



warheads may be deployed on ICBMs with multiple re-entry vehicles (MIRVs). By 1 January 2003, both sides must reduce their strategic nuclear warheads on both sides to a total of 3500.

Arguably the most important feature of the treaty is the elimination of land-based missiles with multiple warheads. From the American point of view, the elimination of the SS-18 is particularly welcome. The liquid-fuelled SS-18, code-named 'Satan' by NATO, was regarded as the symbol of Soviet aggression since it could have 10 warheads, carrying 0.55 MT, and deliver them to an accuracy of 0.14 nautical miles. This made it the most effective 'silo-buster' in the Soviet arsenal. Half of the SS-18 force is due for removal under START I, the remainder under START II.

The Politics of Strategic Arms Control

Both the implementation of the agreements and the continuation of the process depend, in large measure, on the perception of the strategic implications, the nature of the future strategic relationship between the USA and Russia, and the role of nuclear weapons in the evolving security policies and defence postures of both states. Whereas START I was readily ratified by the Russian parliament, START II will prove more controversial. An analysis of attitudes among the political elite in Russia to START II reveals some distinctly alternative approaches.

A detailed critical analysis of the START II accord has been published by Alexei Arbatov, the Director of the Centre for Geopolitical and Military Forecasts in Moscow and one of the best known Russian strategic analysts. He argues that Russia concluded the agreement too hastily, that the USA was determined to keep too great a part of its strategic arsenal intact, and that the outcome is inequitable. He points out that MIRVed land-based ICBMs form the backbone of the Russian strategic missile force (with more than 60 per cent of strategic warheads deployed in this manner), whereas the USA has a mere 18 per cent of its strategic warheads deployed on MIRVed ICBMs. On the other hand, the USA can retain its sea-based MIRVed counterforce system, the Trident II (D5). Not only does Russia not possess a sea-based system equivalent to the Trident D5 (especially in terms of hard-target kill capability), but also its sea-based weapons are much more vulnerable to anti-submarine warfare (ASW).

Central to Arbatov's argument is the view that START II eliminates the foundation of Russia's strategic deterrent which was based on an urgent counterforce capability configured to a launch-on-warning (LOW) posture. This was based on the assumption that, in the age of highly accurate counterforce systems, even hardened systems could not survive a determined, large-scale first strike. Early warning and command and control (C2) systems were designed to enable such a posture to become operationally responsive. Mobile ICBMs such as the SS-25 are not well-suited to LOW, although their mobility makes them less vulnerable. START II will thus effectively require the abandonment of the basic principles of Russian strategic force doctrine. At the same, it will require a costly expansion of its single-warhead missile force.

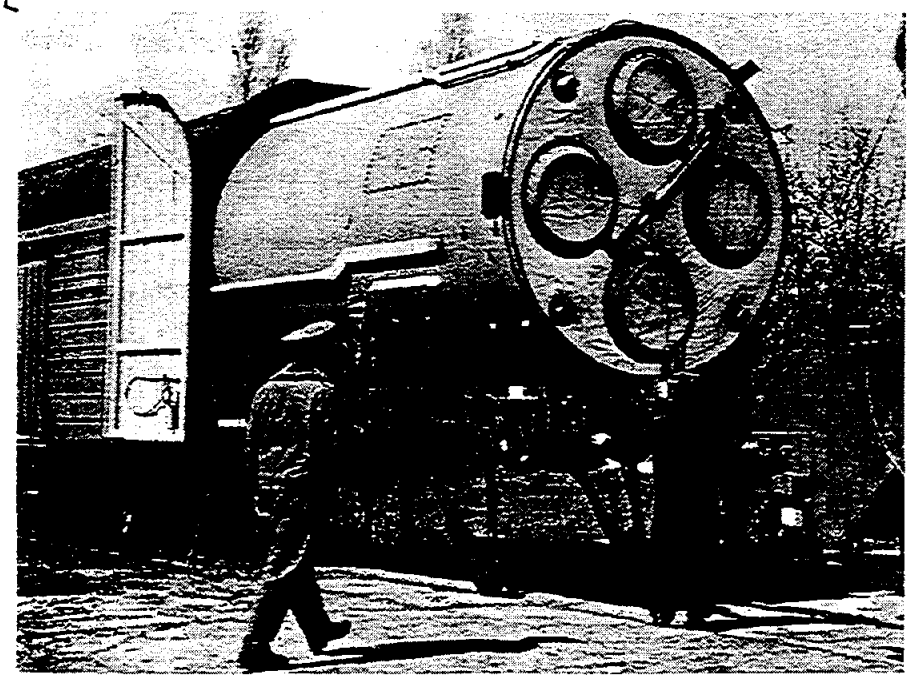
Critics of the START II accord writing in the Russian press have made the point that it forces Russia to restructure it forces along lines which the USA has sought to bring about for a long time. It not merely emasculates Russian strategic nuclear forces but also ensures US efforts in ballistic missile defence will protect against what remains of Russian nuclear capabilities. Russia, on the other hand, has to cope with the fact that six of its 11 early warning radars are outside its territory, and the Krasnoyarsk radar had to be dismantled. Thus the technical basis for executing what was Soviet nuclear strategy has been undermined.

Much is made of the planned deployments of Tomahawk cruise missiles (SLCMs) on warships, including multi-role nuclear submarines. Although all nuclear-armed SLCMs have been withdrawn under a directive from former President Bush, their role as a strategic weapon, be it with a nuclear or conventional warhead, is emphasized. Thus, Vice-Admiral Rudolf Golosov argues that the capability to strike at strategic nuclear forces with high-precision conventional forces should be taken into account in all arms control treaties.

With the notable exception of the writings of A Arbatov, the detailed Russian critiques of START II are based on the image of continued US-Russian strategic competition. Arbatov, on the other hand, recognizes that the changed political situation requires the abandonment of traditional Soviet strategic thinking. In an international environment where Russia is no longer focusing on a US strategic threat but rather plans for 'multilateral deterrence' of emerging nuclear powers with ballistic missiles, a LOW posture is no longer useful. Indeed, it may significantly enhance the likelihood of inadvertent or accidental nuclear war if a wide range of potential threats are faced. This is particularly so if the early warning and C2 infrastructure is inadequate to support a LOW posture and may require a return to a strategy of pre-emption.

At the root of the disagreements about the merits of START II and the uncertainty about the future role and shape of Russia's strategic nuclear forces lies uncertainty about the nature of Russia's national interests, its role in the world and, consequently, the foreign and security objectives that ought to be pursued. Yeltsin and his team have given priority to relations with the USA. In this context, they have made gestures to signal the end of a strategic nuclear confrontation with the USA and supported deep cuts in strategic forces. Indeed, Yeltsin proposed to go to a level as low as 2000 warheads. The perception which governs the thinking in the Russian Ministry for Foreign Affairs and amongst Yeltsin's advisers is that the

Dismantling the 130 SS-19 'Stiletto' missiles on Ukranian soil will still leave Russia with 105 missiles of this type. ***(Photograph: PA)***



strategic balance is no longer a relevant issue. What is important is that Russia maintains sufficient strategic nuclear forces to provide an adequate minimum deterrent. This amounts to an explicit abandonment of the pursuit of strategic parity and thus the strategic competition with the USA.

One of the factors which compelled the Yeltsin government to seek a rapid conclusion of START II was the perception that the Russia would not be able to maintain a strategic nuclear force beyond post-START II levels. Most of the ICBMS are aging and need to be modernised. This may be beyond Russia's means in the future. Another factor was that Yeltsin wanted to use the START process as a means to put pressure on Ukraine to give up its nuclear weapons (see also JIR, Vol 6, No 5, pp 204-207).

When efforts began to obtain parliamentary approval of the ratification of START II, the government was aware that its way of thinking would not be acceptable. Therefore, it sought to defend START II in terms of the established criteria of strategic arms control. The influence of the military industries and traditionalists in the Russian parliament resulted in the START II ratification becoming a test case for the foreign policy orientation of the Yeltsin government. Many critics saw the policy as being too pro-Western and not taking sufficient account of Russian national interests. Until February 1993, the Ministry of Foreign Affairs lobbied hard for START II ratification. Since then, the issue was temporarily dropped as the power struggle between the president and the parliament intensified. Whether prospects for START II ratification improve with the new parliament remains to be seen. The more conservative outlook of the new parliament, which expresses itself in demands for a more assertive foreign policy, makes it unlikely that START II will be ratified soon, if at all.

The Moscow agreement of January 1994 to detarget US and Russian strategic missiles, while merely a symbolic and unverifiable gesture, is another expression of President Yeltsin's desire to move along the path of co-operative denuclearisation. It seems unlikely at this point, however, that the political consensus for this can be maintained in Russia in future.

The View of the High Command

Strategic analysts from the Russian military have a different perspective of strategic arms control and the future of Russia's strategic forces than the one featured in the public debate. There is widespread acceptance among the military leadership and the political elite that there is no threat to Russia from the USA and the principal military threats are coming from the southern periphery of the Russian Federation. This is particularly true with regard to the Third World countries which are acquiring weapons of mass destruction and the ballistic missiles to deliver them. In line with a general restructuring of the Russian military to rapid reaction and crisis intervention roles, there is a fundamental change in thinking about the role of nuclear weapons to meet the new range of threats. The utility of nuclear weapons in this environment is perceived to have declined fundamentally. Russian military research and development efforts are now almost exclusively focused on high technology conventional weapons.

The new military doctrine appears to reflect these priorities (see also JIR Special Report No 1, January 1994). The emphasis has been placed squarely on nuclear deterrence. There is a policy of no nuclear use against non-nuclear states which have acceded to the nuclear Non-Proliferation Treaty. There is no longer such a policy vis-a-vis nuclear weapons states or non-nuclear states which enjoy a nuclear guarantee by nuclear weapons states. This constitutes an abandonment of the pledge not to use nuclear weapons first which some commentators have found alarming. However, it should be pointed out that the 'no-first-use' pledge was made in the context of the confrontation in Central Europe where the Soviet Union was determined to avoid escalation to the nuclear level in any conflict. The new doctrine is more in line with the notion of a deterrent as a last resort in the kinds of conflicts Russia is preparing for now. It could also be interpreted as a warning to Turkey against any involvement in the conflict between Armenia and Azerbaijan, or to Ukraine as it is considering the fate of nuclear weapons on its territory.

Despite the acceptance of the political analysis of the global security environment, strategic analysis in the Russian General Staff is still based on the relationship between American and Russian strategic forces. The objective of strategic arms policy remains that of strategic parity with the USA.

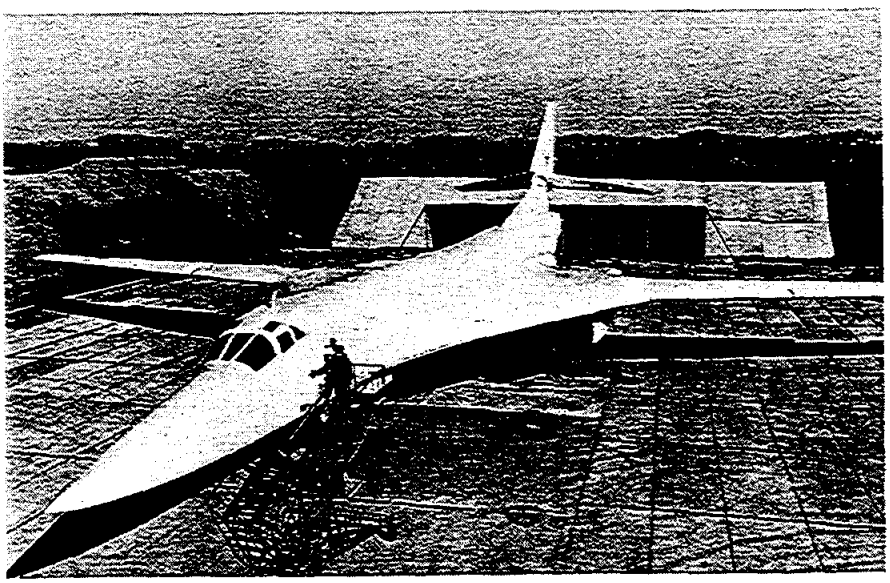
Russian military planners do not rely on a notion of a 'minimum deterrence' as interpreted by civilian analysts. From the military, strategic parity presupposes the qualitative equality of the strategic capabilities of both sides in their ability to conduct effective operations against the strategic offensive forces of the other side. It also means that Russia must try to maintain, at a minimum, an adequate second-strike countervalue reserve force.

Russia's options for the planning of strategic forces are constrained by a number of factors which include the future of strategic arms control and, in particular, the START process and the implementation of START I and II. It also incorporates the future relationship with Ukraine, and the economic and financial resources that will be available for strategic force maintenance and modernisation. The following points will address likely developments on the basis of different assumptions about the political environment in which planning takes place.

Strategic Bombers

In the final years of the Soviet Union, the strategic bomber force appeared to be finally emerging as a genuine third leg of a 'strategic triad'. However, this branch of the strategic forces was most severely affected by the break-up of the Soviet Union. A substantial portion of the strategic bomber fleet was lost to Ukraine, including most of the modern

The TU-160 'Blackjack' bomber has a maximum range of 12 000 km and can carry six AS-15 or 12 AS-16 missiles. *(Photograph: TASS)*



Tu-160 'Blackjacks'. According to the data provided by the Soviet Union for START I, there were 21 operational Tu-160s - 13 at Priluki (Ukraine), six at the Zhikovsky Heavy Bomber Test Flight Centre, and two at the Kazan factory. Although several 'Blackjacks' were flown back to Russia in July 1992 by dissident pilots, the bulk of the fleet remains in Ukraine.

The 'Bear H' bomber force has likewise been severely fragmented by the break-up of the Soviet Union. Out of 88 bombers, 40 were based in Kazakhstan and 26 in Ukraine, including five at the only repair facility for the 'Bear' at Belaia Tserkov in Ukraine. The only Il-78 'Midas' strategic tanker aircraft were also in Ukraine. The indications are that Kazakhstan may be more amenable to returning at least some of the aircraft to the Russian Air Force, leaving it with a modest force of about 50 bombers, capable of carrying ALCMs. Nevertheless, any expansion of the bomber force as part of a restructuring of Russian strategic forces under START appears unlikely, not least because of the cost.

Interviews with Russian military experts confirm that there is no substantial interest in rebuilding a strategic nuclear bomber force. One proposal under serious consideration is to reassign the remaining bombers to non-nuclear missions against US aircraft carrier task forces.

There is also a proposal which is currently being pushed by the 'Ukrainian lobby' (ie managers from the missile production complex in Dnepropetrovsk, led by the former Ukrainian Prime Minister Kuchma), the Russian Air Force, and heavy transport aircraft production enterprises at Ulianovsk, and the missile factory at Miass. It involves equipping a force of 15 cargo planes with two SS-N-18 missiles each. These would be deployed at a military air field in Russia in such a manner that at least one of the planes would be airborne at all times, thus providing a reserve force of six warheads. This scheme, however, can only be realised if the START process is abandoned and closer co-operation between Ukraine and Russia is re-established.

The most likely scenario for the bomber fleet is that, despite the fact that START I favours deployment of bombers, it will be abandoned by Russia or at best maintained at a minimal level.

ICBMs

At the heart of the concept underlying START is the reduction of land-based missiles which are highly-accurate counterforce systems. The preferred option of the military leadership is to plan strategic forces without arms control. However, it feels it can live with START I in so far as it only marginally affects future ICBM deployment plans.

START II is a different proposition, however. The principal objection to START II in the public's perception is that the most powerful weapon in the Russian arsenal, the SS-18, is to be eliminated. In the view of the military, this is not the main problem. By the end of the decade, the SS-18 will be scheduled for replacement in any event. However, production of this missile - manufactured at the Yuzhny engineering works in Dnepropetrovsk in Ukraine - has ceased and is unlikely to be resumed in the current climate of relations between Russia and Ukraine. The design documentation and intellectual property rights associated with the design are in the possession of the Yuzhnoe design bureau. A modernisation of the SS-18 may, therefore, not be possible.

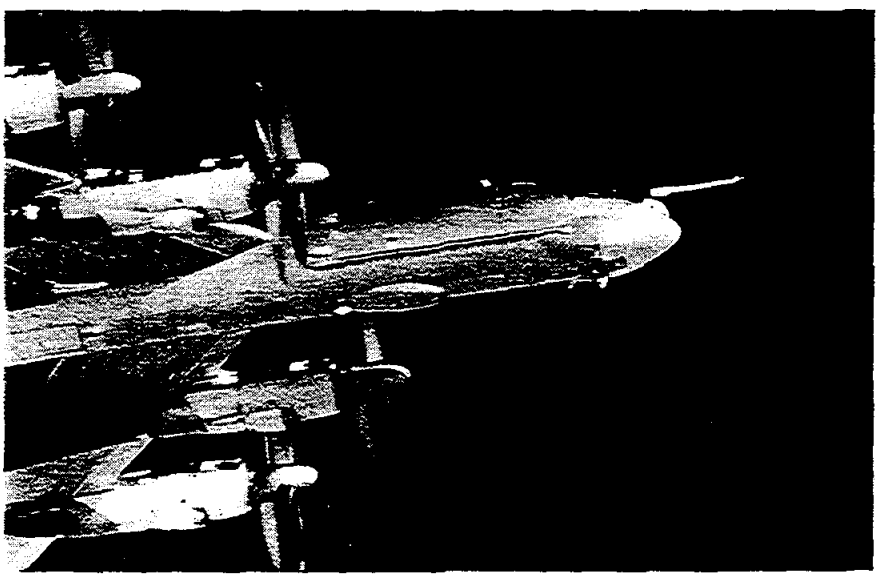
If START II is not ratified and Russia decides not to implement it, then it might continue to deploy heavy missiles, nevertheless. Two possible options for a future heavy missile are under consideration. If co-operation with Ukraine is restored, then the missile construction complex in Dnepropetrovsk could produce a new heavy missile capable of lifting 300 t, one that could carry 30-40 warheads. Without Ukrainian involvement, Russian design bureaus and missile production facilities could create a new type of heavy missile within seven years. However, heavy missiles are not considered an essential element of Russia's strategic missile force and thus not a major concern with respect to START.

The principal problem for Russian military planners is that under START II the land-based force has to consist of single-warhead ICBMs. Except for 109 downloaded SS-19s, these will all be SS-25. Under START II ceilings, Russia intends to deploy ultimately 690 SS-25. The problem is that, during the first seven-year phase of START II, drastic reductions in MIRVed ICBMs are required to a level of 1200 warheads, with only 650 on heavy missiles ie the SS-18. This means that the number of MIRVed launchers will have to be drastically cut to a level of at most 120. On the other hand, the projected production rate of SS-25 will not be adequate to restore what is considered an acceptable balance with the USA for some time. Russian planners foresee a 'window of vulnerability' for its land-based force lasting from the end of the first phase of START II until the year 2010. It is assumed that if a certain imbalance exists in the number of ICBMs deployed on both sides, the USA can take out even mobile SS-25s using a barrage of nuclear warheads targeted at the patrol area of the road-mobile ICBMs.

Assuming that the Russian parliament votes to ratify START II, the Russian General Staff will press hard for amendments to the treaty in order to prevent this potential problem from occurring. It will seek permission to deploy a new type of SLBM in silos on land - this is currently prohibited under START II. The missile is being developed as a MIRVed missile with 3-4 warheads but will be deployed in a downloaded, single-warhead mode as an ersatz ICBM with about 300-500 missiles. The buses for the MIRVed system will be stored, together with the warheads, to provide a recovery potential of up to 2000 warheads in the event of a break-out from the treaty regime by the USA. This approaches the estimated recovery potential of the USA as a consequence of the downloading of Minuteman III ICBMs.

The General Staff will also seek for the silos of missiles dismantled under the treaty to be destroyed since the

The TU-9SMS 'Bear H' has a maximum range of 12 800 km and the latest models can carry 16 AS-15 missiles. ***(Photograph: US DoD)***



construction of new silos is considered to be too costly. Finally, it wants the two-phase structure of the reductions to be abolished. If the USA proves unwilling to accept such amendments, there will be much pressure from the military to abandon START II. There are also plans for a follow-on ICBM to the SS-25, which will be designed in such a way as to be so similar to the SS-25 in terms of its physical characteristics but which does not have to be declared as a new type of ICBM under START.

If START II is abandoned, then, in addition to the heavy missiles already mentioned, Russia will deploy the new SLBM on land in the silos currently housing SS-18 and SS-19. In that case, the missile will be MIRVed. If co-operation with Ukraine can be restored, it will also retain some SS-18s and SS-24s and seek to prolong their service life for as long as possible. There are also plans for a new mobile ICBM (about 300-400 missiles) with 3-4 warheads each.

SLBMs

The Russian leadership seems to recognize that the naval component of the strategic nuclear triad will become more important as a result of START. Russia could maintain virtually all of its most modern missile-carrying submarines - the 'Delta IIIs', 'Delta IVs' and 'Typhoons' - and remain under the START II limit of 1750 SLBM warheads by downloading some of its MIRVed SLBMs under the agreed rules. Currently, about 30 per cent of Russia's long-range ballistic missiles are deployed on submarines. Under START, this could increase to over 50 per cent without any new nuclear submarines having to be built or missiles having to be manufactured. Russia's sea-based forces, however, cannot be used to execute the kind of co-ordinated attack on urgent hard targets as the currently deployed land-based force. Any such a shift would, therefore, require a completely different strategic doctrine and operational plans. The Russian submarine force is also plagued by communications problems which hinder effective C2 in situations of crisis. It is also vulnerable to ASW.

The Russian military leadership is determined to preserve a reserve force at sea. A new type of submarine with a new type of SLBM (similar in characteristics to the Trident C3) is currently being designed (see also *JIR*, Vol 6, No 4, pp 154-159). It is believed that 3-4 boats of the new type will be in operation at the beginning of the next century.

Conclusions

For the West, a commitment to co-operative denuclearisation would be the most favourable trend in the US-Russian strategic relationship. However, despite support for this at the presidential level, the political climate in Russia is against such a policy. The START process may very well become unstuck. On the other hand, the economic situation in Russia may prevent the implementation of strategic force planning currently taking place in the General Staff. Consequently, the future of the US-Russian strategic relationship remains uncertain.

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Russian and US Strategic Forces (before and after START)

US Strategic Nuclear Warheads (Projected figures after implementation of agreements)

	Pre-START (1991)	START I	START II
ICBMs			
Minuteman II	450	0	0
Minuteman III	1500	944	500
MX (Peacekeeper)	500	500	0
Total	2450	1444	500
SLBMs			
Poseidon (C-3)	1920	0	0
Trident I (C-4)	3072	1536	768
Trident II (D-5)	768	1920	960
Total	5760	3456	1728
Bombers			
Total	2665	1066	772
Overall totals	10 875	5966	3500

Soviet/Russian Strategic Nuclear Warheads

	Pre-START (1991)	START I	START II
ICBMs			
SS-11	326	0	0
SS-13	40	0	0
SS-17	188	0	0
SS-18	3080	1540	0
SS-19	1800	105	105
SS-24	890	890	0
SS-25	288	588	690
Total	6612	3258	795
SLBMs			
SS-N-6	192	0	0
SS-N-8	280	0	0
SS-N-17	12	0	0
SS-N-18	672	336	336
SS-N-20	1200	960	960
SS-N-23	448	448	448
Total	2 804	1744	1744
Bombers	855	820	461
Overall totals	10 271	5687	3000

Note: These figures represent one amongst several possible configurations of future strategic nuclear forces under START. (The numbers of warheads are based on START I and START II counting rules respectively.)

Russian Defence Sales: The Insiders' View

What Is Being Sold, Why, To Whom And How

Over the past couple of years, MILITARY TECHNOLOGY has devoted quite a substantial number of pages towards reporting and analysing all the aspects and implications of the current Russian export drive on the international defence market — and some readers may perhaps start to feel that enough is enough. Still, the fundamental issues raised by Russian efforts at achieving a breakthrough in traditionally Western-dominated markets are so momentous, that we believe they deserve maximum attention.

The following report has been prepared by the Mönch Moscow's staff, and particularly by Yuri Laskin and Alla Glebova, based on a very long series of frank interviews with dozens of individuals in key positions with the government, the bureaucracy, the export organisations and the industrial enterprises. As such, it represents a unique "insiders' view" on the current Russian posture and policy as regards defence sales.

The Legal Framework

Weapons trade (or "military-technical cooperation" in Russian parlance) is placed under the state's strict supervision. The only official document currently in existence to determine the legal aspects of this trade is the "Statute on Military-Technical Cooperation of the Russian Federation with Foreign Countries". It became effective on 12 May, 1992, by Decree of the President of the Russian Federation.

The Statute makes a clear distinction between the competence of the President and the Government in taking decisions on matters of military-technical cooperation, depending on their significance. It also defines the procedures for the state's control on exports and imports of weapons and other military equipment and services, and establishes the basic rights and duties of all interested individuals, agencies and organisations.

Military-technical cooperation today involves several ministries and agencies, foreign trade associations, design and development bureaux, manufacturers of "special equipment" (i.e. armaments and other military materiel), joint-stock companies and other organisations that have been granted the government's permission to engage in this activity. The Interdepartmental Commission on Military-Technical Cooperation of the Russian Federation with Foreign Countries (ICMTC), currently headed by Vice-Premier Aleksander Shokhin, is made up by the heads of the interested ministries and agencies.

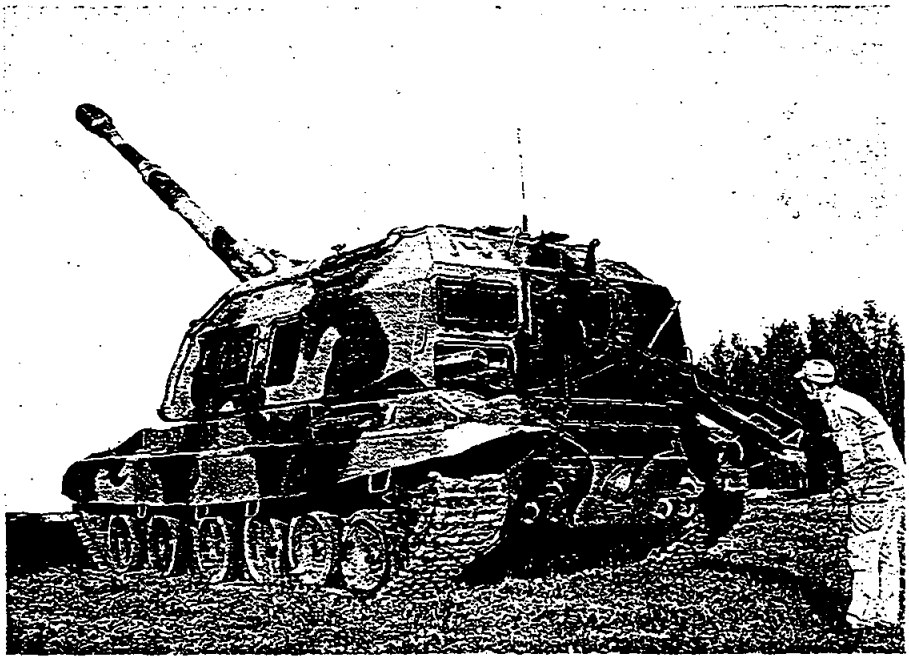
Accordingly, the Statute lays down the responsibilities of the different ministries and agencies involved. Specifically, the Ministry of Foreign Economic Relations (MFER) is responsible for formulating proposals for government-to-government agreements on military and technical cooperation, signing them and guaranteeing fulfillment of mutual commitments in conformity with such agreements. This also covers regulation and redemption of debts, supervision over prices of "special equipment," and formalising and issuing licences to participants in military-technical cooperation, which are given the government's permission for export of armaments and combat equipment.

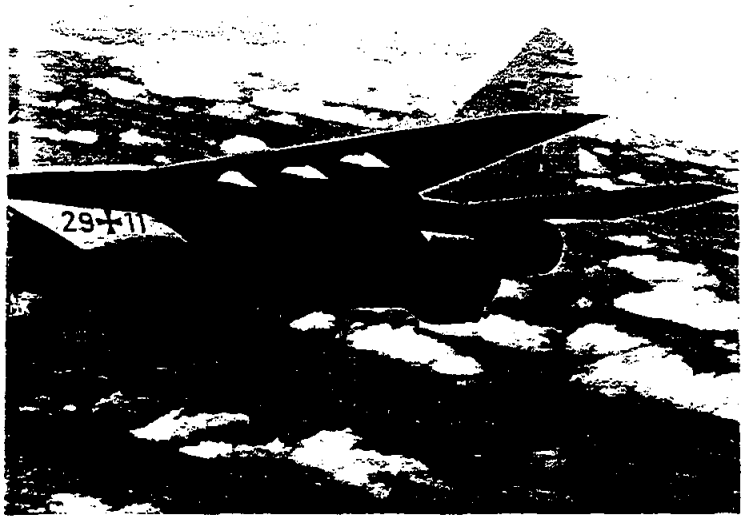
Within the MFER, these activities are embodied by the Main Administration for the Military-Technical Cooperation (MAMTC). The MAMTC actively cooperates with the Ministries of Defence, Foreign Affairs and Economy, as well as with State Committee for Defence Industry and other ministries and agencies which are involved, in one way or another, in military-technical cooperation. The MoD, for instance, renders assistance to foreign customers in mastering the combat equipment they have acquired; the State Committee for Defence Industry coordinates the activity of enterprises and organisations of the military-industrial complex; and the Ministry of Economy, jointly with other participants in military-technical cooperation works out proposals on the range and volume of exported and imported products.

Enterprises, organisations and concerns, as well as manufacturers of "special equipment," export it through specialised associations within the MFER, e.g., the Oboronexport foreign trade association, the Spetsvneshtekhnika state foreign trade company and the Main Administration for Cooperation.

These organisations are all state entities. They are capable of tackling the entire scope

The 2S19 MSTA-S SP artillery system features the very latest design in artillery from Russia. The potential market for such systems is primarily focussed on the Middle East, particularly in Kuwait and the UAE. (photo: Oberonexport)





The adoption of the MiG-29 (shown) by the German Air Force was initially considered to have been a significant endorsement of the aircraft's capabilities. However, since the collapse of the Soviet Union very few aircraft have actually been sold and those being offered tend to come from existing inventories or factory stocks. (photo: Mönch Archive)

of export-related problems, including the analysis of the international armaments market, search of clients, studies of national legislation of the buyer country and international trade rules. They also engage in negotiations, and prepare and sign intergovernmental agreements and contracts for deliveries of special equipment both inside the country and abroad. Furthermore, they render assistance to foreign customers in mastering and operating the equipment being delivered and its servicing, and are enpowered to carry out financial operations (for instance, involving foreign banks).

Based on ideas evolved by the MFER, the ICMTC has prepared a draft law on military-technical cooperation of the Russian Federation with foreign countries that would help regulate cooperation between industrial enterprises and foreign-trade organisations, and raise military-technical cooperation to a higher level. The draft law was to be discussed by the Supreme Soviet, but recent events have, as official parlance goes, "caused the discussion to be postponed to a more suitable moment."

Who Is To Be In Control?

With Russia rapidly moving towards a market economy, the directors of defence enterprises have become increasingly vociferous in their efforts to start trading independently on the international arms market. Understandably enough, the main reason for this is the desire to acquire direct control over foreign exchange; such a control may well be a question of life or death for industries that can no longer count on the national orderbook and at the same time receive insufficient state support towards conversion.

Recognising this point, the Russian Government has embarked on a programme of "demonopolisation" of defence trade, stripping the old structure of part of its previous exclusive responsibilities and granting a number of enterprises, joint-stock companies and firms (e.g., the Kalashnikov joint-stock company, the Republican Firm Baikal and the Promexport All-Russian Association) the right for independent activity in the field of military-technical cooperation. Regrettably, however, virtually all these enterprises have so far failed to exploit their newly-acquired right by winning an export order on their own. Moreover, some cases of non-professional activity by manufacturing enterprises have led to a number of negative consequences.

The point is, the world's weapon market has a definite capacity, which cannot be expanded at will through extension of the number of maybe exporters. This is even more true in times when the overall market is shrinking and competition — particularly against Russian products — in becoming increasingly fierce. Not a single manufacturing enterprise in today's Russia is capable of providing the entire range of services related to deliveries and operation of armaments. Besides, independent and uncoordinated defence export activities are conducive to leakage of technologies and know-how, and are very likely to result in "fratricide" competition among different Russian exporters — with the result of forcing prices for Russian products down and tarnishing the image of Russia as a reliable partner.

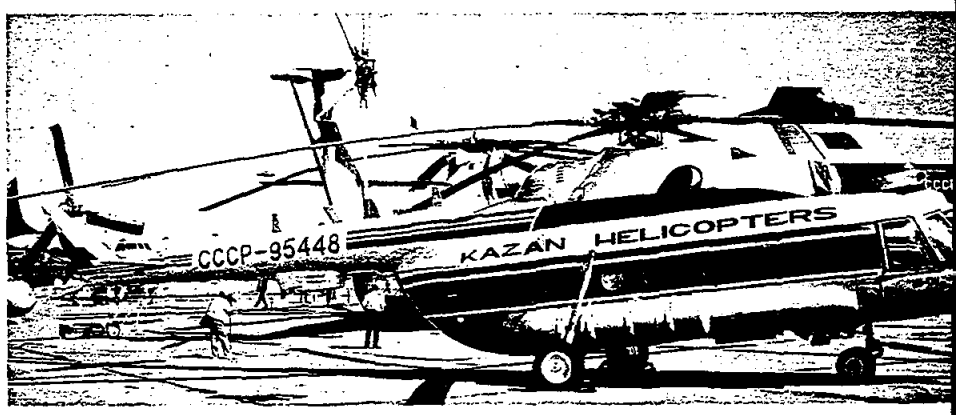
Past experience suggests that in the current difficult transition period, military-technical cooperation with foreign countries must be strictly supervised by the state. On the other hand, the MFER thinks that it would be practicable for the largest weapons manufacturers, that can boast the required capabilities and background in the field of arms trade, to eventually enter the world weapons market on their own. This would be dependent, however, on such capabilities being assessed and certified. A draft statute on certification, developed by the MFER and the State Committee for Defence Industry is now being considered by the Government of the Russian Federation.

The issue is, thus, far from being settled. While the current three main export organisations (Oboronexport, Spetsvneshtechnica and GUSK) wait for a Presidential Decree that would establish a single company within the MFER to have exclusive control over all defence export activities, the industrialists count on further "de-monopolisation" through the liberal granting of certificates for export operations.

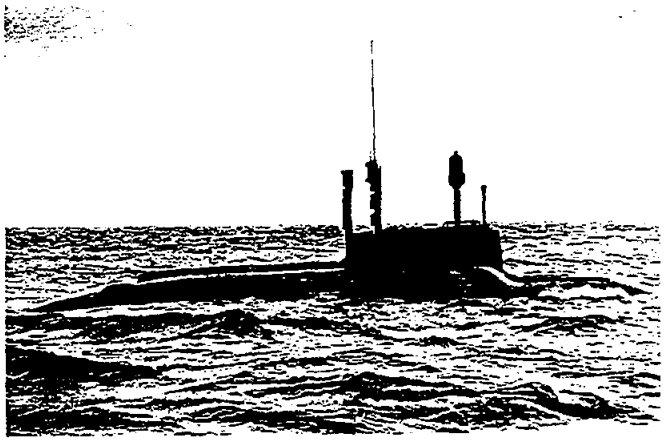
Commercial Strategy

One of the major shortcomings affecting the Russian defence export drive is the lack of a single, coherent commercial strategy. As a matter of fact, there are several commercial strategies, which are often in conflict or at least in contradiction to each other.

A particularly significant example is provided by the negotiations with Malaysia about MiG-29 fighters. After Malaysia expressed its interest, at a time there were no less than 18 different Russian organisations, companies and individual mediators offering their services in procuring the aircraft — which prompted the Malaysians into formally complaining to Moscow. Early attempts at redressing the situation were not particularly successful, either. When the then Vice-President of the Russian Federation, Aleksandr Ruskoy, visited Malaysia in March 1993, with the specific task of pushing the deal forward, in his eagerness to bring the contract home he abruptly offered to take a million tons of palm oil as payment for 85% of the contract value — which, according to Valery Tretyak, a highly-placed official in the



Recent sales of Russian transport helicopters include deals with both Turkey and South Korea. Pictured here is an Mi-8 aircraft from Kazan who have made a significant effort to market and sell aircraft by their own efforts. (photo: Mönch Archive)



In the field of naval technology the PIRANHA *miniature* submarine has attracted strong interest by many navies. The design of the PIRANHA is unique for a specialised submarine. (photo: Oberonexport)

Interministerial Commission for Defence Procurement Cooperation, came as a complete surprise and somewhat to the dismay of all partners from the Russian side. Although that particular offer has since been withdrawn (current negotiations still foresee the possibility of partial payment in palm oil, but this would be a small amount most likely to be immediately resold on the local Malaysian market), the episode remains as unpleasant indication.

According to Mr. Belousov, Chief Assistant of Oboronexport's external relations department, Oboronexport's overall strategic approach is based on the following points:

- Advance financing to cover enterprises' participation into international exhibitions (Oboronexport spent US$3 million for the Abu Dhabi Expo in February, this year) and their advertising campaigns, with the implication that these sums will be reimbursed after sales are obtained;
- Aggressive marketing, with the formulation of specific commercial policies tailored to each given region or country;
- Making the best and most advanced Russian defence products available for export, and focusing efforts on these;
- Providing full-scale service within Oboronexport.

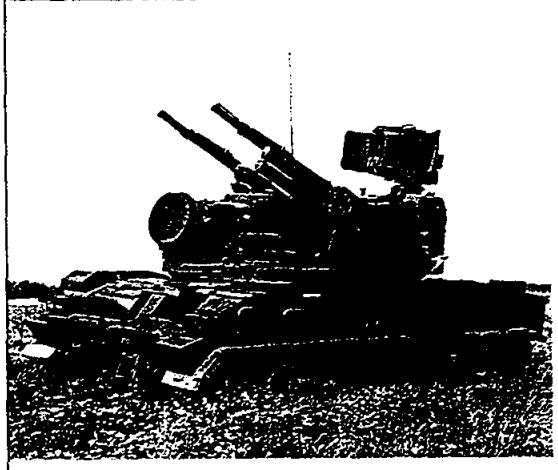
On the other hand, industries have substantially diverging goals and priorities. Their overall commercial strategy is summarised by Gennady Yanpolsky, Chief Assistant of Roscomoboronprom (the Association of Russia's Defence Enterprises), as follows:

- First and foremost, industrial enterprises should be allowed to manufacture defence products above and beyond State orders, and to export these directly;
- Based on the above, enterprises should be authorised to cash in the hard currency revenues from export operations, and to place them in hard currency bank accounts in their own name;
- Enterprises should establish direct contacts with the customers, in order to be able to modify a given system according to the customer's wishes and requirements;
- Increasing attention should be given towards international cooperation projects.

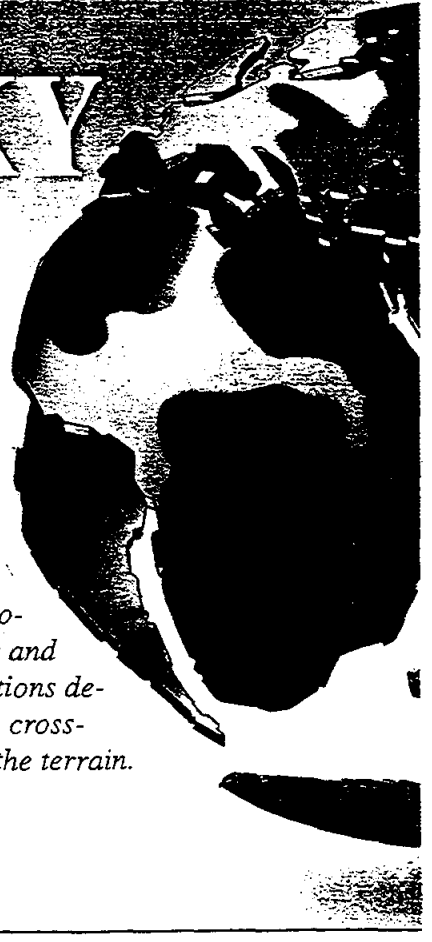
Several observers believe that the Ministry of Defence has a hidden strategy of its own to eventually become the dominating and indeed single structure for arms sales and defence export control. According to Belousov, the most dangerous aspect of this activity is the MoD's

CLEAR BLUE SKY

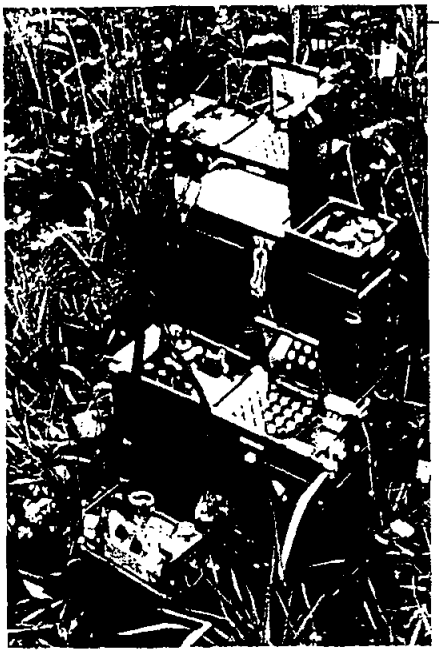
TUNGUSKA-M ALL WEATHER ANTI-AIRCRAFT GUN AND MISSILE AIR DEFENCE SYSTEM



The TUNGUSKA-M is a highly mobile self-propelled air defence system intended for the protection of mobile and fixed targets in a high threat environment during both daylight and nighttime operations. The high mobility of the TUNGUSKA-M system provides a guaranteed air defence protection capability from both static and mobile positions to vehicle formations deployed or moving on roads and in cross-country operations regardless of the terrain.



Russian electronic systems tend to be more dated that their Western counterparts but, on the other hand, feature a robust and cost effective design suitable for second tier export customers. Pictured here is the ARBALET family of tactical radios. (photo: Maschproborintorg)



apparent willingness to sell, through some export companies it controls, single items of very advanced Russian weapon systems. For instance, ahead of President Yeltsin's latest visit to the UK the Voentech company delivered to the British MoD a single T-80U. This was most probably intended as a "goodwill gesture", and the British military and defence industrialists will surely be grateful for this opportunity of having a close look at a latest Russian tank; still, the move could hardly be seen as conducive to the ultimate interests of the Russian military-industrial complex.

Arms Exports and Conversion

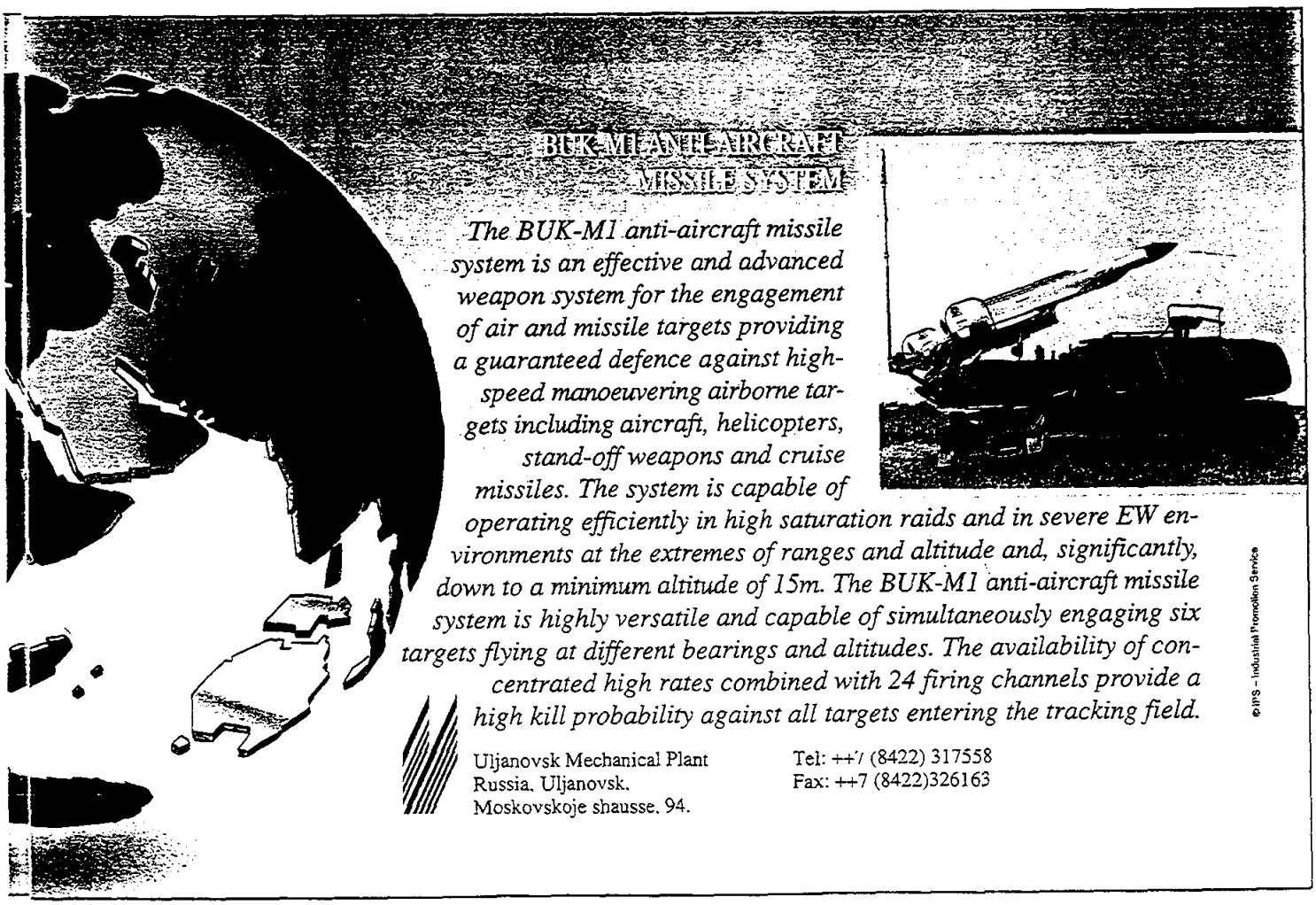
Contrary to widespread assumptions both abroad and in Russia itself, the fixed production assets of the military-industrial complex actually make up only 6% of the overall Russian industry's potential.

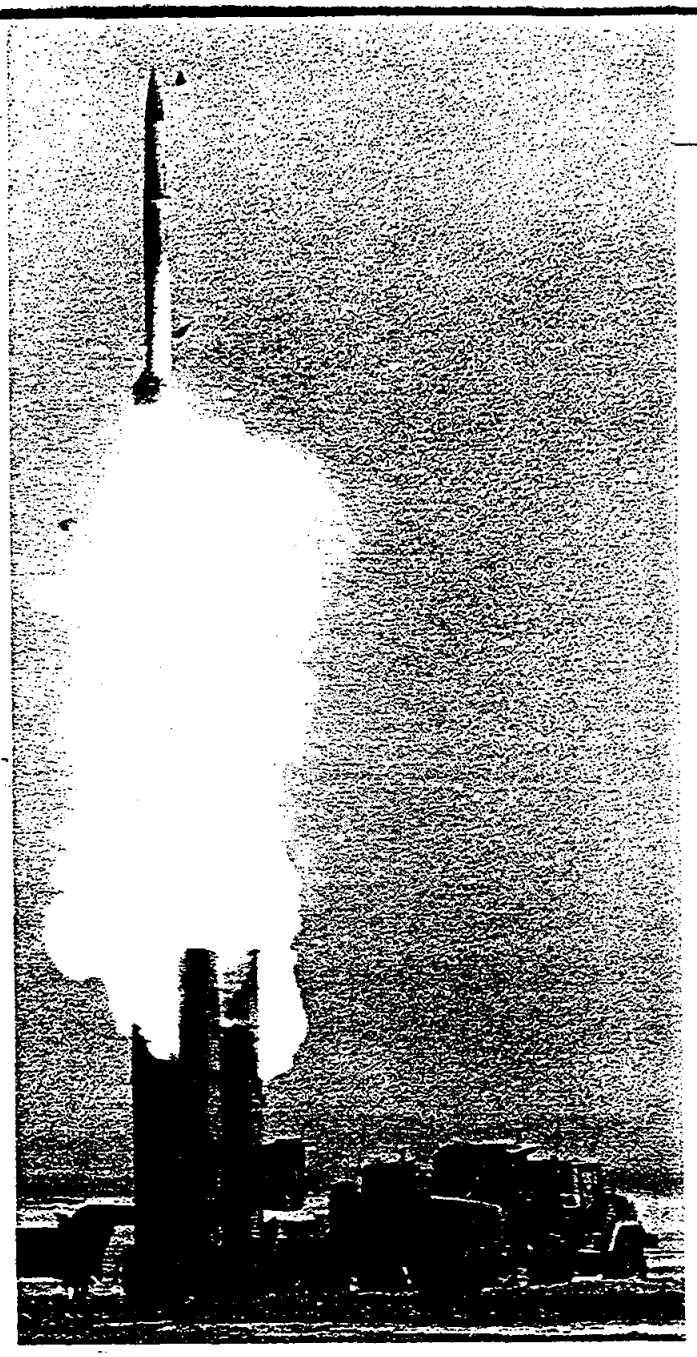
After a short-lived and highly unsuccessful attempt at directly shifting defence plants to the production of consumer goods (an attempt which resulted in such "industrial horrors" as a missile industry being requested to turn out baby carriages), the current political/industrial strategy for conversion is based on the idea, originally advanced by Foreign Affairs Minister Andrei Kozyrev and subsequently adopted by President Boris Yeltsin, that hard-currency profits gained from arms sales could be used to help finance the conversion process.

Unfortunately, this concept is a hopeless no-starter. According to experts' estimates, complete conversion of the existing Russian defence industry would require the equivalent of US$150 billion. Even assuming that arms exports attain US$10 billion per year, enterprises in the military-industrial complex — after having covered all expenses for production and marketing, satisfied suppliers and subcontractors, paid duties and taxes, and deducted reserves, R&D, investments and other funds — could only invest a few percent of the sale incomes towards re-orienting and converting themselves. To obtain the required US$150 billion, it would be necessary to trade for 50 years at the best and 200 years at the worst.

The maximum feasible conversion percentage is on the average around 3-5%. Over recent years, Russia has converted up to 30% of the previous capacities of its defence industries; by way of comparison, the overall estimates for conversion of the US defence industry over a ten-year period (1992-2002) stand at more than 46% of the existing capabilities being eliminated.

Amongst all former Soviet republics, Russia has the most serious problems related to de-





Pictured here at a firing in Abu Dhabi the S-300 is a demonstration of leading edge ATBM and AD missile technology. Customers include China with further potential in India, Kuwait and Hungary. (photo: Mönch Archive)

fence industry conversion, in that the percentage of workers engaged in weapons production at its plants attained a staggering 71% of the former USSR total (as against 17.5% in Ukraine, 3.2% in Belarus, 1.7% in Kazakhstan and 1.4% to 0.1% in the remaining republics).

Sales Volume

The volume of Russian weapon deliveries is constantly decreasing. In 1986, the best export year ever, arms sales brought the then USSR US$29 billion, while in 1992 Russian earned no more than US$3 billion. Over the period 1985-1990, export volumes have plummeted: -64% for missile systems, -25/30% for armoured equipment, -48% for artillery, -53% for combat aircraft, -56% for combatant ships.

While the decline in Russian defence exports is quite real and dramatic, it would be misleading to take the financial figures at their face value. For instance, in 1990 the the USSR exported US$14 billion-*worth* of defence materiel, but this actually netted only about US$4 billion; the rest was provided free of charge in the framework of military assistance programmes to friend and allied nations and regimes. A quite substantial part of the decrease over the last couple of years is, thus, to be *attributed* to the Russian Government no longer being willing to pursue such a policy.

According to Gennady Yampolsky, Director of the Defence Industry Department in the Russian Ministry of Industry, 30% of the volume of military hardware requested by the Department of Export was sold in 1991, and in the first half of 1992, only 7.2% of the planned annual volume. The former Minister of Foreign Economic Relations Sergei Glazyev declared (18 May, 1993) that Russia's support of UN sanctions banning weapons deliveries to some countries cost it *US$16 billion. Incidentally*, foreign countries received relevant compensations, whereas Russia received none.

Export Potential

According to Viktor Glukhikh, Chairman of the Committee for Defence Industries in the former Supreme Soviet, Russia has inerhited three quarters of the Soviet Union's defence complex. Russia numbers 1,700 enterprises producing military hardware, with some six million people working there. Industrial sources estimate that exports currently cover no more than 10-25% of the total production capacities of the Russian military-industrial complex, and *maintain* that this figure must be increased up to 40-50% in order to compensate for the declining national orderbook.

Before new production orders could be won on the export market, a solution should be found for the existing surplus stocks. In the view of Mikhail Bazhanov, *Chairman* of the State Committee for Conversion (this is subordinated to the President of the Russian Federation), Russian currently has surplus weapons for a total value of nearly US$10 billion. This only covers brand-new equipment, and does not include the veritable *mountain of* older equipment now being made redundant. According to the data provided by the Ministry of Defence of the Russian Federation (as of February 1993), the aircraft plants have more than 200 new fighters and bombers fit for sale and the tank plants close on 1,000 MBTs, while several different enterprises have hundreds of tons of various armaments and ammunition. This situation has been brought about in part by the Russian Armed Forces being financially unable to accept deliveries of equipment originally ordered by the former USSR, and in part by excessive hopes being put on export sales. In late 1991, the then Head of Spetsvneshtevhnika, Adm. Krasnov promised to sell US$7.5 billion worth of Russian weapons in 1992. As a result, the government passed production orders to several plant — but all this material has not been sold yet, and the plants haven't got a single rouble for the production (forget about dollars).

Aleksei Shulunov, President of the Association of Russia's Defence Enterprises, estimates that Russia's export potential in 1993 could reach US$25-30 billion. Russia is certainly capable of bringing the volume of its military-technical cooperation deals to US$12-14 billion annually. On *the other hand*, the state order for the production of weapons in 1992 decreased by 500 to 700%. The share of MFER-controlled sales to the overall defence orderbook for 1992 was about 32%.

What Russia Sells

According to Mikhail Bazhanov, all types of Russian weapons are competitive on the world market, and small arms are beyond any competition. Viktor Glukhikh thinks that the greatest demand of the world market is likely to be for combat aircraft such as the MiG-29s, MiG-31s and Su-27s, T-72s tanks, anti-tank guided missiles, small missile FAC, Kalashnikov-series small arms and ammunition.

Independent Russian experts, however, hold a much more pessimistic view, and maintain that all that Russia can actually sell easily is small arms and ammunition. Western and in particular US analysts also believe that Russia is currently incapable of competing with high-*technology* US weapons. These analyses seem to forget that there exists a huge armaments market at a lower technical level, where

Much of the equipment currently being marketed by Russian trade organizations is available from stock (pictured here are MiG-29 aircraft at the MAPO plant near Moscow) that had originally been intended for service with Soviet Forces. (photo: Mönch Archive)

Russian offers such as early-series MiG-29s, ground-to-air missiles and small arms could be extremely attractive. Russia's competitors on this market would not be Western countries but, rather, East European countries, China and the emerging defence industries in some Third World countries.

In 1991, the former USSR sold abroad 553 tanks, 658 other armoured fighting vehicles, 381 large-calibre artillery systems, 40 combat aircraft, one combat helicopter, three surface ships, 1,783 missiles, and one SAM system.

Prices And Pricing Policy

In 1991, weapons in Russia "cost" very little. For instance, the MiG-29 went for 7 million roubles, the S-300 air-defence system for 1.5 million roubles, and so on (at that time, the rouble was officially assumed to bring two dollars). In our discussions with the various personalites within the Russian defence community it is quite apparent that their perception of the world markets and individual programmes is, in some cases, markedly different from the viewpoint of their Western counterparts in industry and government. The following examples serve to highlight this perception.

On the international market, the MFER tried to keep the price of the T-72 at a level of US$2 million (the price in Russia is 960,000 roubles), as against about US$5.2 million for the US M1A1 ABRAMS and US$4.5 million for the British CHALLENGER II; today, however, the price can drop to US$500,000 or even lower. Nevertheless, it will still be profitable for manufacturers to sell at this price. This, however, does not apply to the T-80, which the MFER would like to sell for US$3 million. Moreover, Poland, the Czech Republic and Slovakia, Russia's former friends, all produce the T-72 on licence, which enabled them to beat down the price to US$300,000.

The AK-74 assault rifle goes for US$150, the SVD sniper rifle — possibly the world's best weapon in its category — for US$1,000. As to the Makarov 9mm pistol, the price during the last three years has dropped from US$100 to US$60-70. The reason is that the then USSR shared the relevant technology with China, which now produces a nearly identical weapon; besides, many pistols have been sold legally and illegally from military bases in Germany and East European countries. The MiG-29 is normally offered at US$21-24 million; as to newly-built MiG-31, they can be offered, as Glukhikh believes, at US$45-50 million.

Nobody but nobody, however, still believes that it would be possible for Russian products to break into the world defence market only by playing on the current difference between Russian prices and average world prices. A flexible commercial strategy is needed.

Russian export organisations and enterprises have also been experimenting with barter deals. While such deals used to be a fairly common and acceptable practice as regards the defence sales activities of the former USSR, under the new economic climate they have proven less than satisfactory, and are currently regarded by at least the industrialists as the less preferable choice. For instance, the Chinese Su-27 deal proved to be particularly disappointing. The agreed upon payment scheme called for 35% of the total in hard currency, 15% in high-quality Chinese industrial goods supposed to be competitive on the world markets, and the remaining 50% in "other" Chinese industrial goods. These latter proved to be mostly of very poor quality, and Russia has so far been unable to find a use or a market for them. By the same token, Mr. Abanin, the director of the Ulianovski Mechanical Plant (where the TUNGUSKA and BUK air-defence systems are manufactured), told us that he had "no way out" but to organise a special trade company to sell the tea and coffee he had to accept as payment from India.

Based on these negative experiences, barter deals are not likely to feature prominently in future Russian marketing activities — unless such deals are a *conditio sine qua non* to win a contract.

The first steps are also being taken towards designing offset and compensation schemes that would be competitive with similar proposals by Western companies. For instance, according to Mr. Belousov the proposed Malaysian MiG-29 deal is to include both direct and indirect offsets in the form of Russian investments towards the establishment of repair and service facilities, as well as local manufacture of some spare parts (parachutes, batteries, etc.) and some ammunition production.

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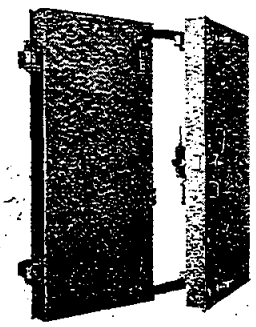

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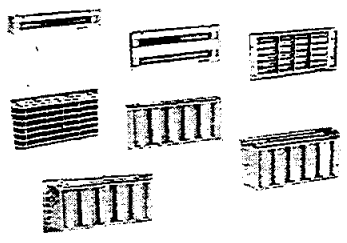

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With a proven reputation in small arms and infantry weapons Russian exports look favorable for systems such as the extended RPG family which includes the RGP-27 and RPG-29 (shown), both of which have been demonstrated in the Middle East. (photo: Mönch Archive)

Credit Policy

In the former USSR and before the change over to a market economy, there existed different methods of payments for deliveries of special equipment to foreign countries: cash, clearing, state credit, and also transfer free of charge in the framework of military assistance programme.

For instance, during the 1986-1990 timeframe credit deliveries amounted to 37% of the total, and only a portion of these deals (32%) called for payment in hard currency. Equipment sold through credit agreements accounted for no less that 95% of the total sales to India, 92% to Algeria, 76% to Iraq, 72% to Libya and 46% to Syria.

Beginning in 1991, however, Russia started demanding all payments for arms supplies to be made in hard currencies, while at the same time toughtening its credit policy. While "preferred" countries such as India were previously granted exceedingly favourable conditions (17-year loan at 2.5% yearly interest rate), the very maximum that can be obtained today is a 5-7 year credit at the standard interest rates in the financial market. When combined with the financial and economic difficulties many traditional Russian clients are currently facing, and with their corresponding desire to cut defence appropriations, this has had a significant adverse effect on Russian marketing efforts.

India is a case in point. The country used to be the USSR's best defence trade partner, but in recent years the "drying up" of the Russian credit line, plus the problems stemming from the disintegration of the USSR (particularly as regards logistic assistance and spare parts supply) have considerably reduced the volume of Russian defence exports to India. Other manufacturers have jumped at the opportunity, offering India long-term credits to be partially covered by barter trade items. Besides, India has of late been receiving proposals from Eastern European countries and republics of the former USSR for deliveries of Soviet-made armaments at dumping prices.

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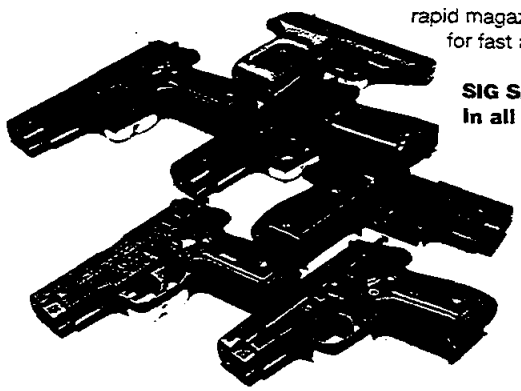

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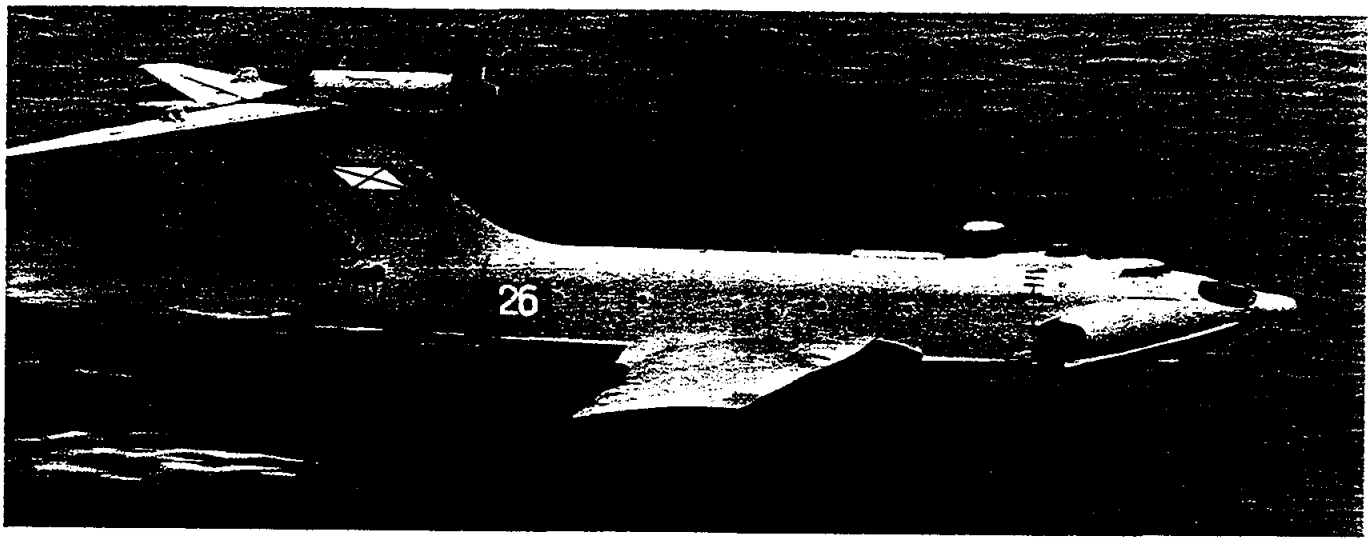


The design and research institutes of Russia have produced some startling and potentially viable leading edge technologies. Pictured here is the unique EAGLET Ekranoplane wing-in-ground effect demonstrator. (photo: Mönch Archive)

Be this as it may, in 1992 the two countries signed a govertnment-to-government agreement under which Russia has granted India a US$600 million credit, under the provision that US$400 million out of this sum will be used to purchase Russian defence materiel over the 1993-1994 timeframe. To date, Oboronexport and the Indian MoD have signed contracts (mostly covering aircraft repair, maintance and spare parts delivery) to the tune of only about US$280 million, with more than US$100 million of this total being financed through the Russian credit line. The Indians are currently considering an option to use the remaining credit (some US$270 million) to partly finance the purchase of an additional 26 MiG-29s, while further potential acquisitions will have to be handled on a purely commercial basis — or dropped.

A return to the practice of granting credits for the purchase of defence equipment is increasingly being perceived as a key tool to preserve the considerable potential of the defence enterprises, contribute towards full use of the existing manufacturing capabilities and consolidate Russia's positions on the world defence equipment market. Therefore, a return to such a policy is a distinct possibility, perhaps using the assets of the existing bank structures.

Markets For Russian Weapons

At the present time, Russia sells weapons to 47 countries. Nations on the official "black list" include Iraq, Kuwait, Libya (since April 1992), Yugoslavia, Ethiopia, Cambodia and the Transcaucasian republics. Weapons deliveries have also been unilaterally discontinued to Yemen and North Korea. Military-technical cooperation with Nicaragua is now practically non-existent, and is much less active with Cuba, Laos and Vietnam. From December 1991, onwards, Russia also stopped free-of-charge deliveries to Afghanistan; experts maintain, however, that the latter country has enough weapons to wage war for another several years.

The Middle East has always been the best market for Russia, as it has large quantities of petrodollars and nearly always wages, or gets ready for, another regional war.

Russia still continues to work at its formerly basic East European markets: Poland, Hungary, Czech Republic, Slovakia, Bulgaria, Germany. According to Mr. Glukhikh, these used to account for about a quarter of the total volume of Soviet defence exports, but the current figure is substantially lower.

Competitors are trying to oust Russia from its traditional markets, e.g. Iraq and Libya (although the loss of these was due to an international embargo that the Russian Government intends to respect), and lately from India and even neighbouring Finland (as witnessed by the Finnish decision to procure the F/A-18 rather than the MiG-29). Austria, Israel, Switzerland and Sweden on the one hand, and Brazil, Singapore and South Korea on the other, are vigorously struggling for a place on the market they perceive as having been vacated by Russia. All of them, however, are being pressured by China and North Korea.

Russia tries hard to find new markets, or maintain those where its positions were rather weak; this applies for instance to the countries of South East Asia (Malaysia, Singapore, Thailand, Philippines), Africa (Morocco), the Persian Gulf (Saudi Arabia) and Latin America (Peru). Russia's potential partners are likely to be South Africa, Taiwan and Pakistan. However, there are certain problems here. South Africa has tried to find out whether Russia would agree to let it use converted SS-25 missiles for the launching of nine satellites, while Armscor is reported to be negotiating a purchase of MiG-29 fighters and radar equipment from Ukraine. However, the UN has not yet lifted its arms sanctions against South Africa.

Taiwan has requested quotations for the MiG-29 and has signalled its potential interest towards acquiring up to 1,500 tanks, warships, small arms and other equipment. Russia, however, does not recognise Taiwan, and would not jeopardise its good relationship with China. Despite this, Glazyev believes if the Russian Government was to give the "green light," Russian exports to Taiwan could surpass anything China would conceivably buy.

Pakistan also has an interest in Su-27 and MiG-29 fighters. Point is, negotiations with it must not be held to the detriment of India, which happens to be one of the largest importers of Russian weapons.

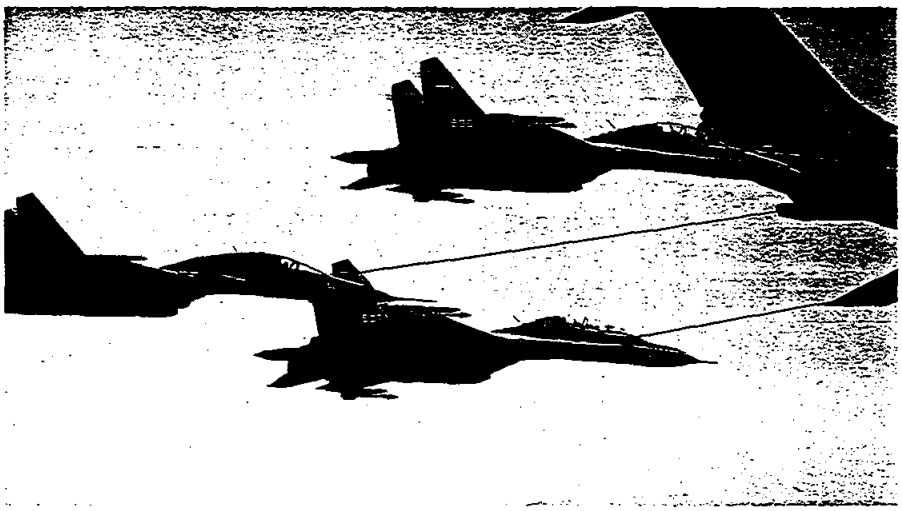
According to foreign experts, Russia's chief customers will be China, Iran, Syria and India, which now account for 80% of weapons exports, and probably Taiwan and Malaysia. What follows is detailed analysis, complete to the best of our knowledge, of what Russia has been selling, and to whom. As a preliminary note, it should be pointed out that in line of principle, everything produced or anyway available in Russia is permitted for sale, except nuclear weapons, fissionable materials and chemical/bacteriological agents.

China is regarded as a serious and reliable partner. It has received or is receiving materiel for the ground forces, the air defence forces and the air force (including transport aviation), as well as radar equipment. Russia has already supplied a batch of 26 Su-27 fighters and more than 100 S-300 air-defence systems; the status of negotations about further purchases and/or licence construction of either (or both) the Su-27 or the MiG-31 is not known, but these seem to have led nowhere. Delivery of conventional attack submarines is also a distinct possibility, as the Chinese Navy faces a very serious problem of block obsolescence of the whole of its Soviet-designed submarine fleet. However, Moscow was severely criticised by Washington for having sold three submarines to Iran, and a Chinese deal could perhaps attract the same type of flak.

Beijing has also made cautious exploratory moves towards the possible acquisition of the incomplete aircraft carrier VARYAG (at about US$2.5 billion), and/or the V/STOL helicopter carriers MINSK and NOVOROSSIISK (reportedly, these non-operational vessels were to be had at the scrap value of US$50 million each), but nothing came of this — perhaps because of the very negative reaction by Japan, the US and Taiwan.

The T-80 MBT is being actively marketed by Russian agencies in some instances as a direct competitor to Western platforms such as the M1 ABRAMS, CHALLENGER and LECLERC. The price for such a vehicle is reported is to be US$3 million, a figure which compares favorably with Western competitors. (photo: Mönch Archive)

Combat aircraft such as the Su-27, Su-35 (both shown) and MiG-29 have attracted much international interest. The sale of the Su-27 to China marked an early and significant turn around in Russian defence export policy. (photo: Mönch Archive)



Iran. From 1984 to 1987, Moscow did not deliver weapons to Iran. Russia, however, has inherited from the USSR contracts covering the delivery of US$3.5 billion worth of armaments to Teheran. The largest contract was signed in 1989 to the tune of US$6 billion, which, according to some observers, was immediately paid by Iran, cash on the nail. Other sources maintains that the Iranian willingness to advance prompt payment was actually due to Moscow having "frozen" weapons deliveries when Teheran started defaulting its arrears for previously-supplied equipment.

The latest Soviet/Russian deliveries to Iran included about 200 MiG-29s fighters and Su-24 strike aircraft, several hundred T-72 tanks, and three KILO-class submarines (US$250 million each). At the present time, Teheran has an interest in the Russian VOLGA (SA-5 GAMMON), BUK (SA-11 GADFLY) and STRELA-10 (SA-13 GOPHER) surface-to-air missile systems.

India. India has long been Russia's best traditional partner in the defence trade. From 1985 to 1990, India received from the then USSR US$10 billion worth of arms, which is 70% of the entire Indian imports of defence materiel. As a result, 50% of India's tank fleet, the greater part of the artillery park and three quarters of the combat aircraft, as well as 90% of the submarines and surface warships are made or designed in the USSR. Furthermore, India is manufacturing the MiG-27 attack aircraft under licence to equip a planned total of eight squadrons, and a similar project involving some 160 MiG-29s is being discussed; licence production of the T-72 is also continuing. Contracts have been or are being signed for the delivery of a further 26 MiG-29s, T-72 tanks, BMP-3 MICVs, TUNGUSKA air-defence SP systems and transport helicopters.

As regards future programmes, India is seriously considering the possible purchase of the V/STOL carrier MINSK as a replacement for one of her two ex-British carriers. Russia has also offered to deliver the MiG-31 interceptor and the new S-54 trainer aircraft, whose production will start in 1994. The latter can also be easily converted into a light strike fighter to replace the MiG-21.

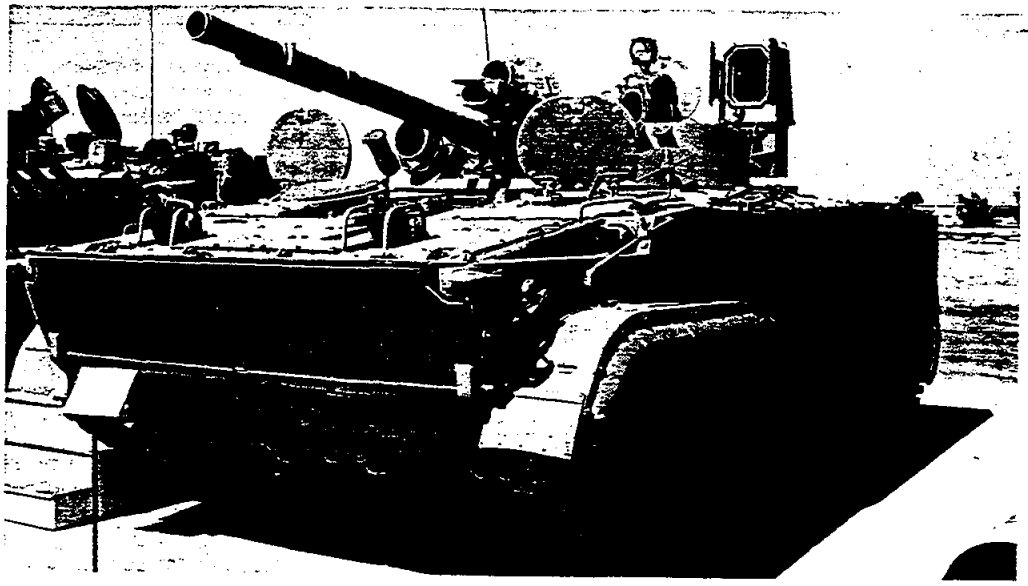
As already indicated, however, India objects to the proposed terms of delivery. Unless some form of "creative financing" is found, it is rather unlikely the the proposed deals as mentioned above will all go through.

Middle East and Persian Gulf. This region has been identified as potentially the most lucrative market for Russian arms exports. Although the Gulf War showed the poor efficiency of a number of obsolete models of Soviet weapons, certain countries (namely Syria, Iraq and Libya) will nevertheless be forced to keep buying spare parts for their Soviet weapons for a considerable period of time. Much more importantly, Persian Gulf countries and specifically Saudi Arabia, which strive to diversify the sources of their military materiel, may well become interested in purchasing latest-generation Russian weapons. The United Arab Emirates has ordered a batch of BMP-3 mechanised infantry combat vehicles, which proved superior to both the US M-2 BRADLEY and the British MICV-80 WARRIOR during desert trials. Further potential deals currently being explored in the region involve T-80U MBTs (Dubai), S-300 PMU1 and TOR air-defence systems (UAE and Kuwait), MSTA-S SP artillery systems and anti-tank guided missiles (SHTURM-S and METIS).

It may be significant to point out here that according to Mr. Belousov, the desire by some countries to diversify their arms procurement sources as a way of avoiding dependency on the West in general and the US in particular has been identified as a key potential leverage to foster Russian exports. This applies not only to the Middle East, but to Asia and possibly other regions as well.

Turkey recently bought 25 wheeled APCs and 20 transport helicopters to the tune of US$75 million, thus becoming NATO's first country to purchase military equipment from Russia. Ankara is due to pay US$15 million in cash, while the remaining sum will be written off against the Russian debt towards Turkey. There also are unconfirmed reports to the effect that Turkey bought weapons in the former GDR to transfer to Azerbaijan.

Malaysia. In a potentially "epoch-making" deal, Russia is negotiating with Malaysia the details of a proposed sale of 18 MiG-29s fighter and six MiG-35 helicopters, at a total package price of about US$800 million. The deal is in jeopardy, however. Although the Government of Malaysia did take a political decision to purchase the MiG-29s as well as the F/A-18, and after the two parties had already agreed upon the price (US$24 million apiece), the Americans have now made a last-minute proposal offering the F-16 as an alternative to the MiG-29 at US$21 million each. This abundantly shows to what lengths the US will go, in order to prevent a Russian breakthrough in one of its "reserved" markets. [This is not confirmed by US sources. Furthermore, it would be illegal for Lockheed or the US Administration to offer the F-16 abroad at a lower price than the USAF



The integration of the MAMUT thermal imaging sight incorporating both Russian and French systems for the BMP 3 MICV paved the way for the procurement of a reported 250 vehicles by the UAE. (photo: Mönch Archive)

pays its aircraft. Still, Russian sources are adamant that this is indeed the case — Ed.].

South Korea. Earlier this year, the Russian Government put forward a formal offer to offset part of the large Russian debt towards South Korea through the delivery of a wide range of military equipment. The South Koreans were particularly interested in the S-300 air-defence system to fend off the threat by North Korean SCUD-derivative IRBMs, and the Samsung Corporation did reach a tentative agreement with the Russian enterprise Almaz regarding joint development and production of a derivative version of the system. Eventually, however, US pressure forced South Korea into declining the Russian offer. The country did, however, procure some Mi-17 transport helicopters for civil use.

United States. The US military has purchased a few IGLA and IGLA-1 MANPADS. It is also attracted by the Yak-141 supersonic V/STOL aircraft, whose technologies are of interest to the Marine Corps (Russian experts reckon that a Western analogue to the Yak-141 would only appear around 2015). By far the potentially more important US acquisition of Russian technologies, however, would be in the field of wingships. The Russian scientific and technological lead in this sector is undisputable, and the US DoD is very intrigued by the many different possible applications of the concept, particularly as regards rapid overseas transport.

Europe. For a while, the Beryev DE-4 RUSALOCHKA ("Mermaid") flying boat appeared to be a possible contender for the British requirement for a new MP/ASW aircraft to replace the NIMROD, but this option has now been dropped. The T-80 MBT is currently being tested in Sweden for possible adoption by the mechanised brigades, and seems to have a fairly good chance of being eventually procured [this programme is distinct from the ongoing Swedish competition for a new MBT to re-equip the armoured brigades - Ed.]. In June 1993, the German *Luftwaffe* formally accepted into service 24 MiG-29 fighters inherited from the late East German Air Force, which equips an air defence squadron and are the most modern and capable fighters in German service.

Hungary has also started taking delivery of a batch of 28 MiG-29 (including four two-seaters). These aircraft are being transferred as a barter repayment for half of the Russian debt towards Hungary (US$800 million). Hungary had actually asked for the S-300 air-defence system, but was eventually forced to accept the MiG-29s Russia offered. Budapest is not at all enthusiastic about the deal, in part because they had hoped to receive some F-16s as a sign of their hoped-for affiliation to NATO, and in part because the MiG-29s would place them under long-term dependence on Moscow owing to the problem of logistic support and spare parts.

A similar "arms-for-debts" deal, covering four MiG-29s, is currently being negotiated with Slovakia.

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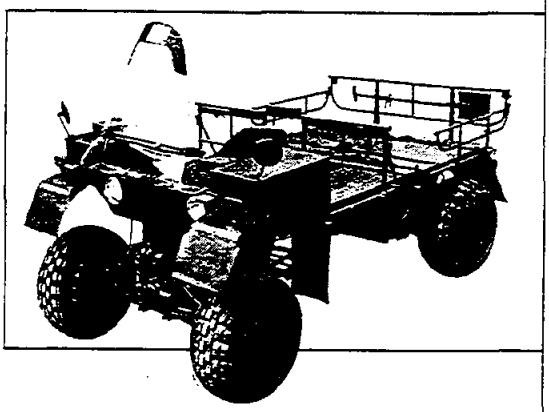

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Japan, Belarus Agree on Rules To Destroy Nukes

By NAOAKI USUI
Defense News Correspondent

TOKYO — Japan has worked out preliminary details with the former Soviet republic of Belarus to dismantle 54 strategic nuclear missiles under a $100 million Japanese program announced earlier this year.

To allay fears that Japan is pursuing nuclear warhead technology, the two sides agreed during Nov. 8 meetings in Minsk that Japan will not dismantle the warheads.

Russian officials, who signed a similar agreement with Japan in October, also held a bilateral meeting Nov. 10-11 in Moscow, said Terusuke Terada, the Foreign Ministry press secretary.

The agenda included the possible cooperation on the disposal and storage of radioactive waste, Terada said.

Tokyo plans to sign agreements with two other states of the former Soviet Union, Ukraine and Kazakhstan, to dismantle nuclear missiles, officials said.

But Ukraine, which has refused to give up its inherited nuclear arsenal, is presenting some difficulties, Japanese officials said.

> *"There is no timetable for Ukraine, due to a number of factors, including Ukraine's reluctance to give up [nuclear weapons]."*
>
> **Sadaaki Numata**
> **Japanese Foreign Ministry**

"There is no timetable for Ukraine, due to a number of factors, including Ukraine's reluctance to give up the weapons," Sadaaki Numata, foreign ministry deputy press secretary, said Nov. 5.

In Belarus, Japan's role will be to destroy the missile itself as well as dispose of the propellant. While Belarus will dismantle the warhead, Japan likely will dispose of the radioactive waste. The disposal of radioactive wastes also emerged as an important issue last month between Japan and Russia after the Russian Navy released 900 cubic meters of low-level radioactive sludge into the Sea of Japan. The move triggered protest in Japan.

Russia then pledged not to dump radioactive wastes into the Sea of Japan but also complained it has no onshore facility to store the waste.

Japanese Prime Minister Moriohito Hosokawa also addressed the prospect of sanctions against North Korea for its refusal to grant international inspections of its nuclear weapons' facilities.

Hosokawa and South Korean President Kim Young Sam agreed Nov. 6 to continue diplomatic efforts to persuade North Korea to accept inspection by the International Atomic Energy Agency.

Japanese officials are concerned about a confrontation if North Korea denies the inspections. While a naval blockade of North Korea is possible, Japan may be constitutionally prohibited from joining, Tomohisa Sakanaka, international relations professor at Aoyama Gakuin University in Tokyo, said Nov. 11.

KAZAKHSTAN

Kazakhstan's defence profile revealed

CENTRAL ASIA

BY ROBERT KARNIOL
ALMATY

The restructuring of Kazakhstan's Army is expected to take about a year, in a process which began late last year.

The Central Asian republic, under President Nursultan Nazarbaev, declared its independence from the former Soviet Union in 1991. Steps to ensure the security of the new state were taken the following year with the creation of structures and the appointment of individuals, mainly of Russian origin, to control these.

The initial focus was on internal security. The Republican Guard, an instrument of Presidential power with a proposed strength of 2000, was formed in March last year.

In October, internal troops, initially under Presidential control, were placed under the Interior Ministry. Border troops, as under the Soviet system, have been assigned to the National Security Committee, Kazakhstan's primary intelligence service.

In April last year Almaty, formerly Alma-Ata, essentially 'nationalized' most of the former Soviet 40th Army, stationed on Kazakh territory.

The next month the Defence Ministry was established together with the national armed forces. The Defence Ministry answers to a new body, the National Security Council, which is Kazakhstan's supreme military institution and is headed by the President.

An element of parliamentary control was introduced last December with the creation within the legislature of a Committee of National Security and Defence.

Russian-supplied Kazakh multi-launch rocket system

The structure of Kazakhstan's armed forces is based on a Defence Ministry, General Staff and five service arms: Ground Forces, Air Forces, Air Defence Forces, Naval Units (operating mainly on the Caspian Sea) and the Republican Guard (subordinate directly to the President).

Of particular significance is Kazakhstan's status as a nuclear power, with its 104 SS-18 'Satan' ICBMs fitted with multiple warheads. Almaty initially declared its intention to 'denuclearize' its arsenal by 1995 but has since made this conditional, requesting monetary compensation and security guarantees. The planned timeframe has consequently become less realistic.

Prior to these developments the Kazakh armed forces were under the joint command of Moscow and Almaty, though effectively under Russian control. This situation ended late last year when Moscow withdrew its command and control elements.

The High Command/Ground Forces has since created a structure based on one army corps (1st Army Corps) headquartered in Semipalatinsk, three independent brigades and one independent regiment. The 35th Airborne Brigade is headquartered in Kapchagay, the 304th Field Artillery Brigade and the 376th Multiple Rocket Artillery Brigade are in Samsy, and the 97th Pontoon Bridge Regiment is in Kapchagay as well.

The 1st Army Corps comprises two operational divisions: the 68th Motorized Rifle Division, headquartered in Sary Ozek; and the 78th Tank Division, headquartered in Ayaguz. It also includes three independent regiments, all headquartered in Semipalatinsk: the 987th Rocket Regiment, the 645th Field Artillery Regiment and the 962nd Multiple Rocket Artillery Regiment. Subordinate, as well, is the 80th Training Division, based in Otar.

The 68th Motorized Rifle Division is, in turn, made up of five regiments. These consist of the 385th Motorized Rifle Regiment, based at Pervomayskiy (Almaty); the 188th Motorized Rifle Regiment, based at Zharkent; the 517th Motorized Rifle Regiment, based at Taldy Kurgan; the 301st Tank Regiment, based at Sary Ozek; and the 343rd Field Artillery Regiment, based at Sary Ozek.

The 78th Tank Division consists of the 156th Tank Regiment and 180th Tank Regiment, both based at Ayaguz; the 143rd Tank Regiment, based at Aktogay; the 369th Motorized Rifle Regiment, based at Uch-Aral; and the 1062nd Field Artillery Regiment, also at Uch-Aral.

Supplementing these are three reserve Motorized Rifle Divisions, staffed only with cadres. These are the 203rd based at Karasanda; the 155th, based at Ust'Kamenogorsk; and the 71st, at Semipalatinsk.

In general terms, forces are concentrated in the east facing China. However, their mobility allows for rapid redeployment.

Stocks of advanced equipment, in particular, armoured vehicles and artillery, shifted east of the Urals by the Soviets under the Treaty on Conventional Armed Forces in Europe have been inherited by Kazakhstan and ensure that its land forces have few requirements.

DynCorp sweeps up $407m deal

MAINTENANCE

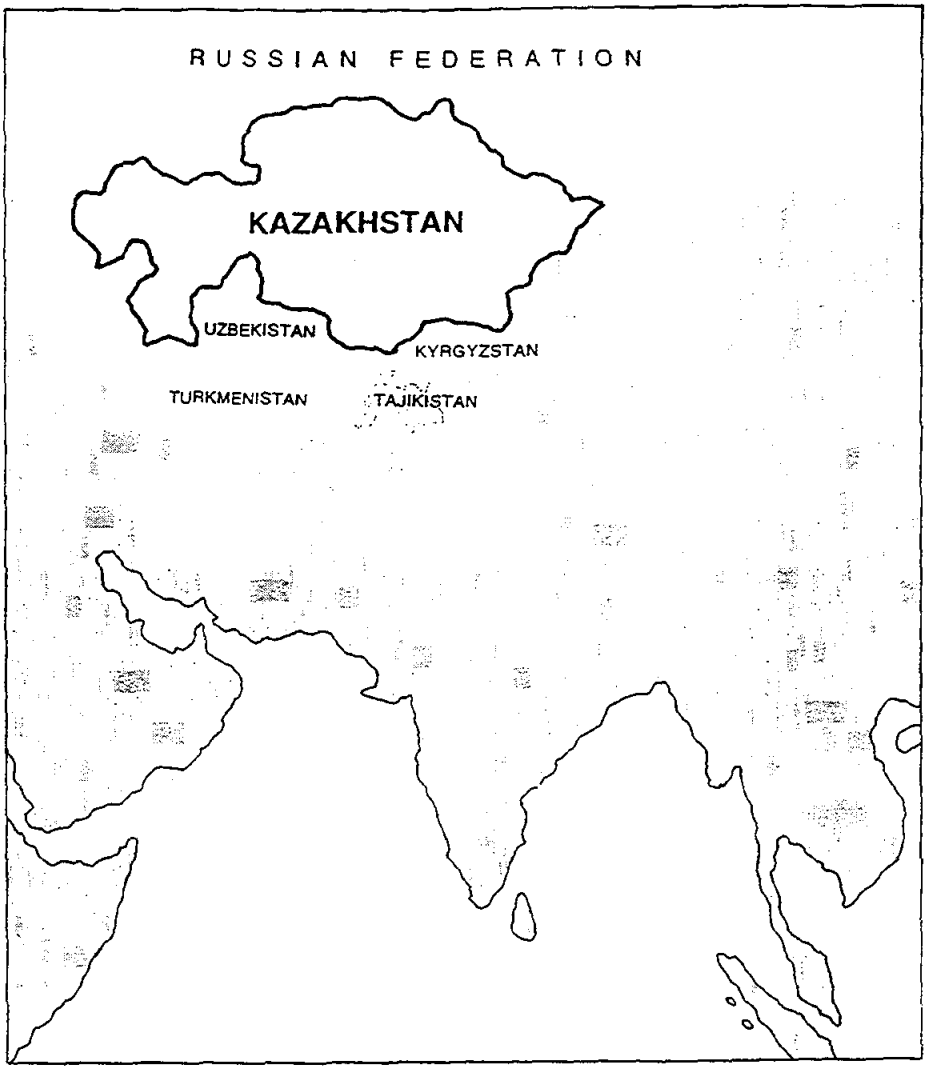
DynCorp has won a second five-year contract worth $407 million to maintain over 500 US Army helicopters and fixed wing aircraft at the Army Aviation Warfighting Center at Fort Rucker, Alabama.

All US Army pilots and other US and overseas helicopter pilots are trained at Fort Rucker.

The army's newest helicopter, the TH-67 Creek, will be based there, and DynCorp anticipates adding it to the maintenance roster.

Bell Helicopter Textron won the New Training Helicopter contract earlier this year. Deliveries of the TH-67 are to begin within the next month.

KAZAKHSTAN—Profile Of A Latent Central Asian Power



"It is without doubt that the 'free world community', will now focus its attention towards the newly independent cluster of republics of the former Soviet empire—the CIS. The Russian Federation will be a case on its own thus leaving the other 14 former satellite nations to seek their own fortunes. *ADJ* will play its part (in the interest of Asia-Pacific readers), to portray powers there might be from the east of the Urals—Kazakhstan, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan. Begining in this new series of regional studies is an overview of Kazakhstan, from our Moscow based writer."

Valentin Shishlevskiy

The restructuring of Kazakhstan's Armed Forces is expected to take about two years since the process began in late 1992. The Central Asian republic, under President Nursultan Nazabayev, declared its independence from the former Soviet Union in 1991. Steps to ensure the security of the new state were taken following years with the creation of structures and the appointment of individuals, mainly of Russian origin.

Potentially one of the richest countries in the world, Kazakhstan lies right in between Europe and Asia. In square kilometres (2,717,000), this state is second only to Russia in size, in former USSR. Its territory extends 2,000km from north to south and 3,000km from west to east. Its population, according to 1989 figures, is 16.7 million people, of which only about 40% are Kazakhs. Russians make up some 38%. Ethnical Germans forcibly moved to the Republic by Stalin and Ukrainians constitute another large group. Most Russians live in the more industrial north, were Kazakhs are less than 15% in the cities. The capital, Alma-Ata (more than 1 million people) itself is two-third Russian. The agricultural south is inhabited by mostly Kazakhs.

Most of the Republic's territory is steppe land. In 1954, about one million volunteers from all over the Soviet Union came to Kazakhstan to develop the

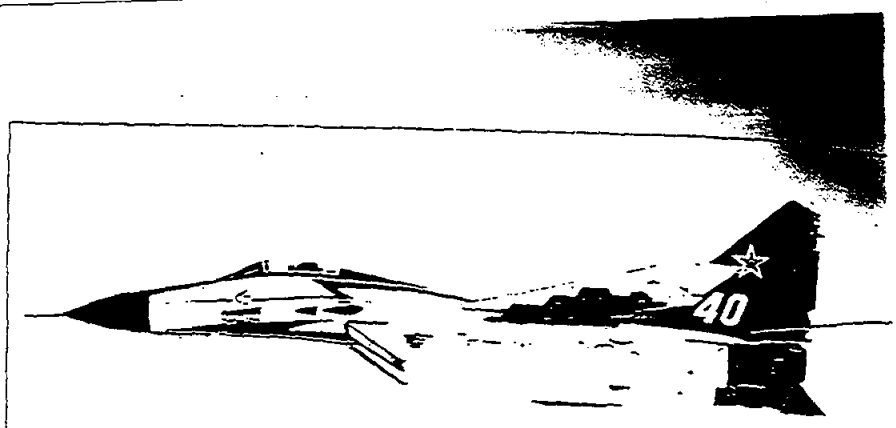
Nursultan Nazarbayev, President of Kazakhstan.

virgin land. In six years, they cultivated 25 million hectares and built dozens of towns and farms. East of the Caspian Sea lies the desert where the temperature rises to 40°C in summer and drops to 40°C in winter. Sandstorms and droughts are frequent and there is no fresh water.

Kazakhstan has some of the largest unexplored oil, gas and mineral deposits in the world. It has zinc, lead, titanium, magnesium, vanadium, tungsten, molybdenum, iron, coal, gold, silver, copper, manganese, bauxites and phosphorites and many other minerals. Under the former USSR, it was one of the major fuel and power centres. Twenty electric power stations utilise 300,000 tons of coal extracted daily. These power stations supply Central Asia, the Urals and Western Siberia with electricity. The main space station of the CIS—Baikonur Cosmodrome—is located in Kazakhstan. In March 1994, a bilateral agreement was signed on the leasing of the Baikonur Cosmodrome to the Russian government for about 20 years, worth US$115 million annually.

Today, oil and natural gas are extracted mainly on the arid Mangyshlak Peninsular. In the town of Shevchenko, which is located on the peninsular, there is a nuclear reactor that desalinates sea water for use by the population and industry the first of this kind in the world. The government estimates that Kazakhstan has about 25 billion barrels of oil reserves and by the year 2010 the country aims to produce 1.6 million barrels a day from new oilfields.

Kazakhstan holds first place among the CIS members in terms of the number of cattle per capita. The Republic breeds sheep, cattle, horses, camels, marals and fur-bearing animals. The rivers, lakes and seas are abundant in fish. Sturgeon is bred and caught in the Caspian Sea and in the Ural River.



Kazakhstan have about 14 MiG-29s—adequate airpower at least to support deserving neighbours.

Considered as one of the most prominent reformers, the President of Kazakhstan, N. Nazarbayev prefers stable, well-balanced and gradual pace of reforms. This year, he plans to visit Malaysia and other ASEAN countries. Its internal stability, balanced political approach and natural wealth has made many economists view Kazakhstan as potentially one of the richest countries in the world; foreign companies are investing huge amounts of money into Kazakh economy, signing sometimes multi-billion dollar deals.

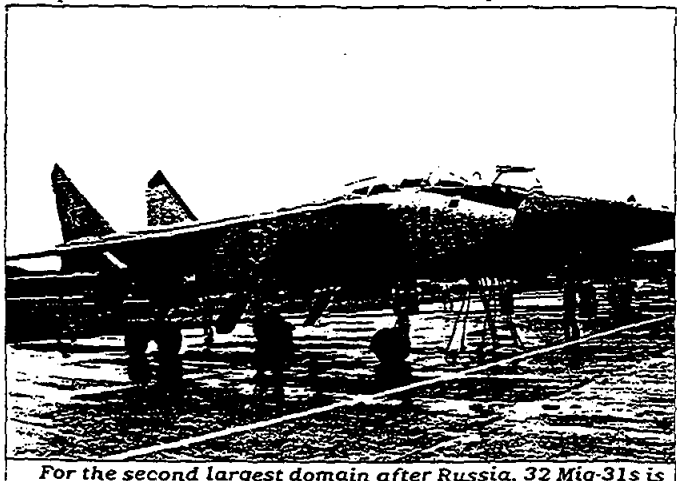
THE RUSSIAN-KAZAKHSTAN TREATY SIGNED

Twenty three Russian-Kazakh documents including treaties and agreements on political, economic and military cooperation were signed on March 28, 1994 in Kremlin. The main objective of the Russian and Kazakh President's meeting was to clear up the problems that had accumulated in the bilateral relations between the two countries which includes military ties. The experts had been searching for ways to settle many of those problems throughout the year.

"We are doomed to ever live side by side," said the Kazakhstan's Head of State Nursultan Nazarbayev before putting his signature to the Treaty on Military cooperation. "We used to have a single army, common weapons and the same military school and it is not sensible to break up those ties. All the more so as ours are friendly states. We have already achieved a meaningful agreement on friendship, cooperation and military assistance. And I am of an opinion that the Russian Armed Forces should be supplied with provisions necessary to enable it to make use of the former Soviet military installations on Kazakh soil".

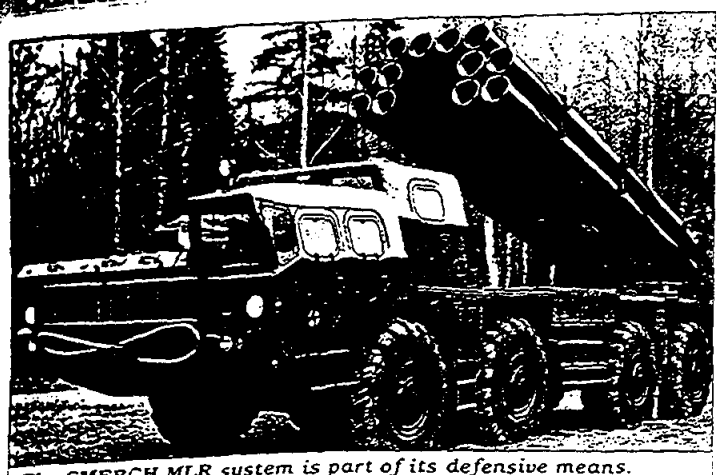
The two Presidents also signed the Agreement of Strategic-Nuclear Forces temporarily bases within the territory of the Republic of Kazakhstan.

Among the 18 documents signed by the prime ministers Victor Chernomyrdin and Serguei Tereschenko, of a special significance is the Agreement providing Russia with rights of access

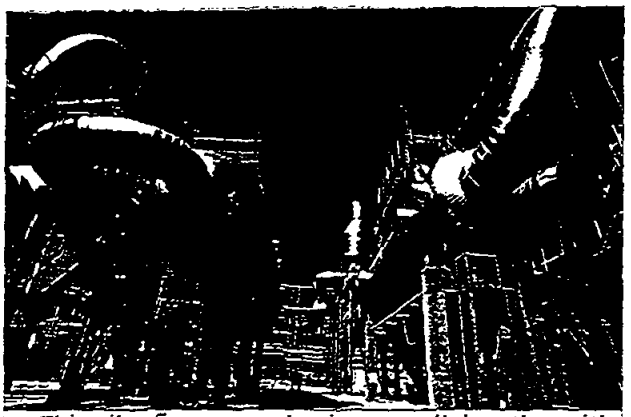


For the second largest domain after Russia, 32 Mig-31s is more than enough to preserve its sovereignty.

Kazakhstan has more than 1,000 MBTs in its inventory including this menacing T-80 type.



The SMERCH MLR system is part of its defensive means.



This oil refinery complex is now collaborating with Chevron of the US since 1993 to explore further the Prycaspian oilfield.

to the Launching pad in Baikonur. Russia and Kazakhstan have agreed that the Baikonur installation would be rented out to Russia for 20 years with an option to extend the arrangement for another 10 years. Russia's sovereignty and jurisdiction in Baikonur have been acknowledged which means that Russians employed there would be governed by Russian Laws. Russian Space Forces (military and space exploration personnel) would still be deployed in Baikonur. "Baikonur is an unique installation," Nursultan Nazarbayev said. "I am happy that together with the Russian counterparts we have arrived at mutually acceptable arrangement providing for its continued use for the best interests of both Kazakhstan and Russia."

There need be no doubt that a friendly, integral and stable Kazakhstan is the key element for Russia's geopolitical inte-rests in the Central Asia and on an even broader scale—in the vast zone of the south border of the former USSR.

A question arises in this connection: What are Russia's future policies over CIS and does Moscow generally have a strategic line in the "near abroad"? From recent authoritative statements, it may be concluded that there are two guiding principles—the protection of the Russia-speaking population's rights in the "near abroad" and the preservation by all means of Russian military presence there.

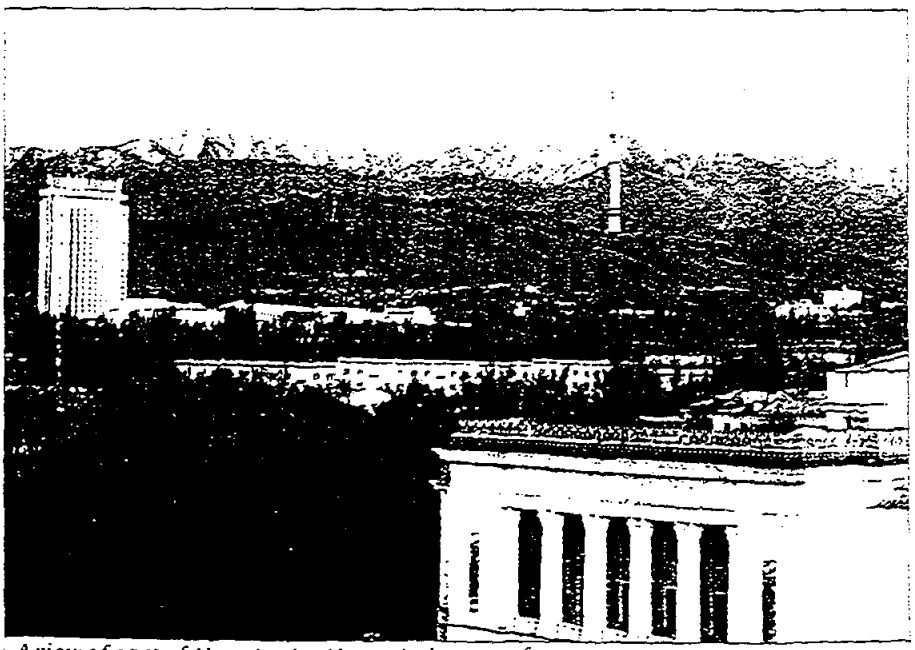
CHINA-KAZAKHSTAN RELATIONSHIP

In 1993, Russia and China reached agreement on most of their common borders. Attention was turned to China's borders with Kazakhstan, Kyrgyzstan and Tajikistan, where 7,000km of border is in dispute.

China has lodged a formal protest with the government of Kazakhstan over the latter's recognition of a locally-based political organisation whose goal is to establish an independent state in China's Xinjiang-Uighur Autonomous Region. Kazakhstan subsequently rejected Beijing's objections, which centre on a Uighur group headquartered in Almaty. The Uighurs are a Turkic speaking Muslim community whose traditional homeland is in China's remote north-west region. Uighurs comprise important minority population in Kazakhstan, Kyrgyzstan and Uzbekistan while both Kazakhs and Kyrgyzs are prominent among the Turkic-speaking Muslim groups of the Xinjiang Uighur Autonomous Region.

Advocates of an independent Uighurstan acted to further their aspirations in June last year with the convening of their first congress, held in Almaty and attended by over 4,000 delegates. This resulted in the creation of two formal organisations, the East Turkestan Committee and the Uighurstan Organisation of Freedom (OUF).

The former, headed by Yusupbek Muhlisi, is a steering group of 24 members. Its registration with the Kazakhstan authorities mid-year prompted the Chinese protest. The latter organisation, under chairman Hashir Vahidi, appear more broad-based with a claimed membership of 7,000 spread through the Central Asian republics of the former Soviet Union. Also headquartered in Almaty, it is sanctioned by the government of Kazakhstan but appears to be tolerated nonetheless.



A view of part of Alma Ata (or Almaty), the seat of government.

Kazakhstan is concerned about the potential threat to its security posed by China, and this may explain its tolerance of the Uighur nationalists. Almaty is also seeking to develop stronger links with Turkic-speaking Muslims in Xinjiang and hopes to further this aim by opening a consulate in Urumqi, a move that China has so far resisted.

KAZAKHSTAN DEFENCE PROFILE REVEALED

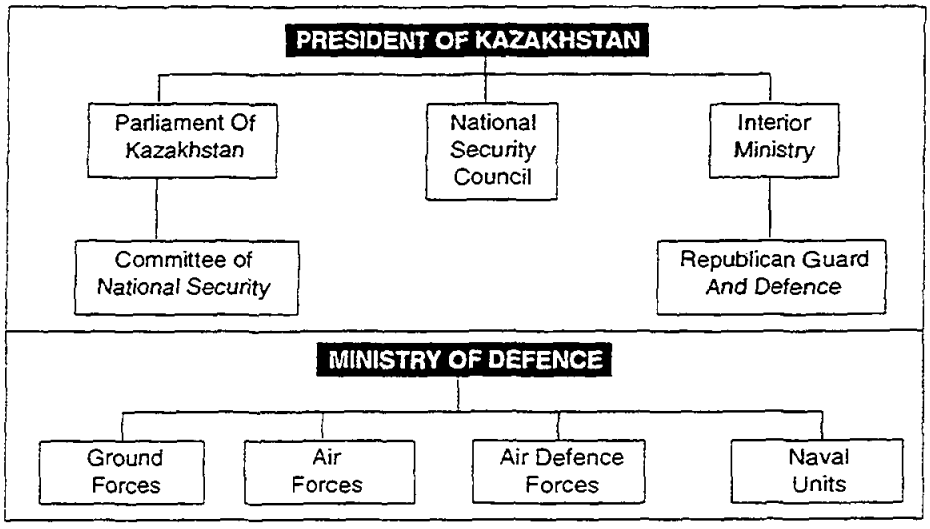
The country is also known to have over 2,000 main battle tanks, towed and self-propelled artillery systems, mortars, surface-to-surface rockets and missiles. The latter include the FROG-7 on an 8 x 8 chassis and the SS-21 "Tochka" on its amphibious 6 x 6 chassis.

That Kazakhstan Armed Forces has made advances to restructure following independence. The initial focus of Kazakhstan's security was on internal security. The Republican Guard, an instrument of Presidential power with a proposed strength of 2,000, was formed in March 1992. In October, internal troops, initially under Presidential control, were placed under the Interior Ministry and the number was increased up to 4,000. Border troops, as under the Soviet system, was assigned to the National Security Committee, Kazakhstan's primary intelligence service.

Kazakhstan, while originally firmly supporting the formation of Joint General Purpose Force, has more recently issued two decrees regarding its own armed forces. First, on April 20, 1992, the Kazakhstan President claimed command of the 14th Army, although the army remained within the CIS combined armed forces. Second, on May 8, 1992, the Kazakh Armed Forces were created and all property of CIS forces transferred to Kazakh jurisdiction. This second decree also forbade the redeployment of units and military equipment beyond the borders of Kazakhstan.

The Defence Ministry was established together with the national armed forces. The Defence Ministry answers to a new body, the National Security Council, which is Kazakhstan's supreme military institution and is headed by the President.

An element of parliamentary control was introduced in December 1992 with the creation within the legislature of a Committee of National Security and Defence.



KAZAKHSTAN ARMED FORCES RESTRUCTURES

The structure of Kazakhstan's Armed Forces is based on a Defence Ministry, General Staff and five service arms: Ground Forces, Air Forces, Air Defence Forces, Naval Units (operating mainly on the Caspian Sea) and the Republican Guard (subordinate directly to the President).

NUCLEAR DEVELOPMENTS

Of particular significance is Kazakhstan's status as a nuclear power, with its SS-18 'Stan' ICBMs fitted with multiple warheads. Almaty initially declared its intention to 'denuclearise' its arsenal by 1995 but has since made this conditional, requesting monetary compensation and security guarantees. The planned timeframe has consequently become less realistic.

Kazakhstan signed a Protocol in Lisbon on May 23, 1992 in which it, with the other nuclear armed republics of the former USSR, assumed the obligations of the former USSR under the START Treaty. It further declared that it would adhere to the Treaty on Non-Proliferation of Nuclear Weapons (NPT) as a non-nuclear state 'in the shortest possible time' (START allows seven years for its conditions to be fully implemented). At the time of the signing of START, Kazakhstan had 104 SS-18 ICMB and 40 Tu-95 Bear bombers deployed on its territory.

Prior to these developments, the Kazakh Armed Forces were under the joint command of Moscow and Almaty, though effectively under Russian control. This situation ended in late 1992 when Moscow withdrew its command and control elements.

GROUND FORCES

The High Command/Ground Forces has since created a structure based on one army corps (1st Army Corps) headquartered in Semipalatinsk, three independent brigades and one independent regiment. The 35th Airborne Brigade is headquartered in Kapchagay, the 304th Field Artillery Brigade and the 376th Multiple Rocket Artillery Brigade are in Samsy, and the 97th Pontoon Bridge Regiment is in Kapchagay as well.

The 1st Army Corps comprises two operational divisions: the 68th Motorised Rifle Division, headquartered in Sary Ozek; and the 78th Tank Division, headquartered in Ayaguz. It also includes three independent regiments, all headquartered in Semipalatinsk: the 987th Rocket Regiment, (40 FROG-7/SS-21) the 645th Field Artillery Regiment and the 962nd Multiple Rocket Artillery Regiment. Subordinate, as well, is the 80th Training Division, based in Otar.

The 68th Motorised Rifle Division is, in turn, made up of five regiments. These consist of the 385th Motorised Rifle Regiment, based at Pervomayskiy (Almaty); the 188th Motorised Rifle Regiment, based at Taldy Kurgan; the 301st Tank Regiment, based at Sary Ozek; and the 343rd Field Artillery Regiment, based at Sary Ozek.

The 78th Tank Division consists of the 156th Tank Regiment and 180th Tank Regiment, both based at Ayaguz; the 143rd Tank Regiment, based at Aktogay; the 369th Motorised Rifle Regiment, based at Uch-Aral; and the

US SEEKS TIES WITH KAZAKHSTAN

The US and Kazakhstan have signed a Memorandum of Understanding (MoU) and cooperation on defence. The agreement was signed in Washington by US Defence Secretary William Perry and General of the Army Sagadat Nurmagambetov, Minister of Defence of Kazakhstan.

The agreement establishes exchanges between the two ministers, their chiefs of staff and key senior military officials. It also sets up a bilateral working group on defence cooperation, and encourages participation in the Pentagon's International Military Education and Training programme for foreign military personnel.

1062nd Field Artillery Regiment, also at Uch-Aral.

Supplementing these are three reserve Motorised Rifle Divisions, staffed only with cadres—the 203rd based at Karaganda; the 155th, based at Ust' Kamenogorsk; and the 71st, at Semipalatinsk.

ARMY: (63,000)
- 1 army HQ
- 1 TD
- 2 MRD (1 trg)
- 1 AB bde
- 1 MLR arty bde
- 1 arty bde
- 1 Spetsnaz bde
- 1 Pantoon Bridge Regt
- 1 attack hel regt
- Reserve: 3 MRD (with cadres only)

EQUIPMENT
Some 1,200 MBT 1,500 arty/MRL mor, 40 FROG/SS21.
48 attack hel, plus over 1,000 MBTs in store.

AIR FORCES

Kazakhstan has built up an air force of 216 combat aircraft since its armed forces were established in May 1992 and became fully operational in early 1993.

Kazakhstan Air Force (KAF) is headed by Maj Gen Aliy Petrovich Volkov, and has at least six bases inherited from the former Soviet Union.

The KAF is structured around the 11th Fighter-Bomber division headquartered at Taldy Kurgan, and three independent regiments.

The 11th Division includes the 129th Fighter-Bomber Regiment based at Taldy Kurgan, with a strength of 34 MiG-27 'Flogger' aircraft and about 500 personnel; the 134th Fighter-Bomber Regiment at Zhang-iztobe, with 38 MiG-27 and 530 personnel, and the 149th Bomber Regiment at Nikolaevka, with 26 Sukhoi Su-24 'Fencer' and 600 personnel.

Independent elements comprise the 715th Fighter Regiment at Lugovaya, with 14 MiG-29 'Fulcrum', 31 MiG-23 'Flogger' with 400 personnel, the 39th Reconnaissance Regiment at Balkhash, with 13 MiG-25RBs 'Foxbat-Bs' and 12 Su-24 MNR 'Fencer' supported by 550 personnel; and the 486th Helicopter Regiment based at Ucharal, with 48 Mi-24 'Hind' supported by 800 personnel (army aviation).

Its transport capabilities are not known, but are likely to be extensive given the organisation of the country's land forces which are concentrated along the eastern border with China, but suited for rapid deployment throughout the country.

AIR FORCE: (8,000)
- FGA: 1 div with 72 MiG-27; 26 Su-24
- FIGHTER: 1 Regt with 14 MiG-29, 31 MiG-23
- RECCE: 1 Regt with 13 MiG-25 RB; 12 SU-24 MNR

AIR DEFENCE FORCES

A separate air combat element is placed under the Air Defence Command of the Air Defence Forces. This is the 356th Fighter Regiment at Semipalatinsk with 32 MiG-31. Air Defence Command also includes about 20 surface-to-air missile regiments. As well as the SA-5 "Gammon" surface-to-air missile, other air defence systems in service include the SA-2 'Guideline' medium-to-high altitude system and the SA-3 'Goa' low-to-medium altitude system.

The SA-5 is a medium-to-high altitude surface-to-air missile system which entered service in 1966 and is normally deployed in battalions of six launchers.

AIR DEFENCE: (9,000)
- FIGHTER: 1 Regt with 32 MiG-31
- SAM: 150 (SA-2; SA-3; SA-5)

NAVY

In June 1993 after deciding to create a naval element in its armed forces Kazakhstan plans to rebuild two navy bases. The proposed bases are situated at Fort Shevchenko on the Caspian Sea and Aralsk on the Aral Sea. There are some former Soviet Navy facilities at both sites.

Kazakhstan's naval units are to defend coastal areas on the Caspian Sea and ensure ship movements there, in the Aral Sea and along adjacent waterways and navigable rivers.

Moscow agreed Kazakhstan is entitled to a proportion of the former Caspian Flotilla, possibly one quarter of the ships (5-7 patrol and coastal combatants, 3-4 mine warfare vessels and 2-3 support vessels).

Kazakhstan's future requirements are expected to focus on coastal patrol ships. A timetable for development of the Kazakhstan's maritime forces have not been set yet by Almaty.

CONCLUSION

There are no CIS combined forces today since most CIS members have formed their own armed forces and the creation of CIS, CAF in the future is problematic. The current KAF structure has been in place since early this year, with its elements operational.

In general terms, forces are concentrated in the east facing China. However, their mobility allows for rapid redeployment. Stocks of advanced equipment, in particular, armoured vehicles and artillery, shifted east of the Urals by the Soviets under the Treaty on Conventional Armed Forces in Europe have been inherited by Kazakhstan and ensure that its armed forces have few requirements.▲

Valentin Shishlevskiy or 'Val', is *ADJ*'s latest in its lineup of regionally based correspondents. Born in 1968, Val graduated from the prestigious MOSCOW STATE TECHNICAL UNIVERSITY, majoring in robotics and aerospace engineering. Eventhough with a 'workable' degree and like other aspiring young Russians, Val joined the Russian Army Air Defence Corps as a reserve officer. He is currently holding the rank of a captain. Being a writer-member of the Association of Scientific and Technical Publishing Companies, Val is well equipped to write on (Russo-CIS) regional issues, weapons, technical and scientific matters for *ADJ* readers.

The Security of an Independent Ukraine

Frank Umbach

Introduction

The Moscow coup in October 1993, as well as the parliamentary elections in December, has raised the question of not only the fate of Russia in the near future but also the destiny of Ukraine as an independent and sovereign state. Statements by the leader of the Russian Liberal Democratic Party, Vladimir Zhirinovsky, that he would like to reannex Ukraine and other former Soviet states, if necessary by using nuclear weapons, have certainly sent shock waves through all European capitals, not just Kiev. However, because Ukraine has been weakened over centuries of cultural and demographic Russification, it is perhaps not surprising that the new republic with its 53 million people sees itself as the key obstacle to a new Russian dominated union.

Russian pressure on Ukraine is heightened by the fact that many in the West underestimate the potential of a strong and stable Ukraine in a geo-strategic context. Together with Poland, Ukraine might constitute a significant strategic axis in Europe's evolving geo-political arrangements and could act as a regional counterweight to its huge neighbour if a neo-imperialist Russia emerges. The creation of a cordon sanitaire and an isolated Russia should clearly be avoided at all costs.

Equally underestimated by the West has been the potential threat and escalation of conflict between Russia and Ukraine in terms of European security and stability. The most sensitive issues are the fate of the Black Sea Fleet and the status of the Crimea; both problems are closely linked to one other. They even threaten to overturn the recently signed tripartite agreement between Russia, Ukraine and the USA which offer some territorial integrity for and economic security to Ukraine. It is the domestic front, however, on which perhaps the biggest storm clouds are gathering. In contrast to their differences in foreign policy, Russia and Ukraine face many of the same internal challenges.

The Balance of Power

The domestic political struggle in Kiev is mainly responsible for the government's failure to implement a coherent reform programme. It is also true that Ukraine's economy is collapsing because the nationalists and democrats secured their country's independence by co-opting, not overthrowing, the local communist elite — the old *nomenklatura* is still working in the country. In contrast to other CIS states, the Baltics and even Russia, nothing has changed in this respect in Ukraine. The old *apparatchiks* are still ruling the country, thereby defending their old privileges. Consequently, corruption is one of the results of the political and socio-economic crisis in Ukraine. Lacking the market incentives that come with privatisation, state enterprises depend on lobbying both the cabinet and the parliament for their particular interests. So the parliament, which oversees the central bank, keeps asking for more money. Given the degree of hyperinflation, the state deficit and the energy problem, the advocates of a pro-economic union with Moscow have been strengthened.

President Kravchuk has taken over a centralist political programme and believes that without an economic union, the sovereignty of Ukraine cannot be safeguarded in the future. In trying to prevent the country's economy from plunging into chaos, the president and his deputies have to decide whether to spend enormous sums of money on reconstruction and the creation of new jobs, or put even greater amounts into subsidies for money-losing enterprises. Given the balance of forces domestically and his own centralist position between the different regions and their political attitudes, President Kravchuk has chosen the second option. Symptomatically, he announced that Ukraine can only become an associate member of the Economic Union.

Economic Destabilisation

The real danger with the failing market reform policy comes from the growing polarisation of national-democratic forces and unionists. This generates a deeper political and cultural divide between eastern and western Ukraine. The economic crisis and the paralysis coming from Kiev also contribute to the regionalisation and destabilisation within the country. Moreover, these factors in this multinational Slavic state exacerbate the cultural divide between the eastern and western regions. In contrast to its eastern ethnical and cultural Russified area, western Ukraine is the home of Ukrainian's independence and the nation's more nationally democratic parties. It is also the region which has made most progress in privatisation.

Confronted with hyperinflation or even stagflation — inflation and recession simultaneously — after two years of independence, the government in Kiev must try to prevent a schism appearing between west and east/south, the latter being the bastion of heavy industry. The largely Russian-speaking Donbas regions alone contain 17 per cent of Ukraine's population and account for 21 per cent of its industrial output, including important mining, chemical and metallurgical plants. These areas want closer economic and political union with Russia in contrast to the national politicians of western Ukraine who are trying to push Ukraine out of the orbit of Russia and lead it toward the rest of Europe, both economically and politically.

A chronic shortage of fuel supplies and an unusually cold November and December in 1993 have contributed to the feeling of alarm in Ukraine. In several areas, municipal officials asked the Ukrainian president to increase gas supplies in order to prevent civil unrest. In particular, food price rises of 300-600 per cent in the summer and autumn of 1993 have already caused unrest within the eastern and southern regions of Ukraine.

The Donbas Basin has answered Kiev's policy with not only strikes but also political demands for recreating ties with Russia. Living next to the Russia, the influential western orientated politicians in the Ukrainian government and parliament have proposed creating a special security zone with the former Warsaw Pact members and the Baltic states as a strategic counterweight to Russia. However, the largely Russian speaking eastern and southern regions (11.5 million Russians) remain a stumbling block and are the most powerful force in the country against a westwards directed foreign policy.

The Russian minority also fears Kiev's attempts to 'ukrainianise' its regions and is quick to point out that its area contributes more than it receives from the state budget. Although the Russians voted overwhelmingly for Ukrainian

independence in December 1991 in the hope that it would improve their social-economic position, they are increasingly disillusioned today. They realize that the links have been severed between not only factories but also families by, in their eyes, a symbolic and unnatural border.

These Russians have repeatedly demanded stronger ties with Russia — especially during the recent months of economic decline and falling living standards. In the fear of potentially explosive repercussions, President Kravchuk is trying everything to appease both the east and the south. This is the reason why the government has paid enormous subsidies to unprofitable industries. It wanted to satisfy the 'disloyal separatists' but by so doing has contributed to the hyperinflation of the past months. The economic and political strikes in the Donbas during this time have indicated how weak the common 'national identity' and tradition of statehood of a multinational state like Ukraine are in times of severe socio-economic crisis. Under such circumstances, only more radical reforms could have averted further stagflation. However, the prospects for such reforms under President Kravchuk seem not to be very promising. The new appointments in the government demonstrate once again that the establishment of command methods of government will continue and Kravchuk will continue 'relying on the red directorship'.

Political Cohesion

In contrast to the first year of independence, the political life in the southeastern regions are now controlled by powerful alliances of new regional political groups. These new political parties and movements in the Donbas area, opposed to key elements of the current economic and foreign Ukrainian policy, are the new dominant political forces in the next parliamentary elections; they will certainly gain seats in the *Verhovna Rada* in Kiev. There are still, however, moderate political programmes in Ukraine which are in favour of a closer union with the CIS, a federal system of government and a system of several state languages.

While the political forces in the Donetsk areas are more radical, the eastern part (around Kharkiv) has so far adopted more centralist and independent positions in the debates. Nevertheless, they are politically closer to Donbas rather than to Kiev. These are the reasons why the next Ukrainian parliament might be confronted with sharper political differences between the political representatives of the different Ukrainian regions than today. In this light, the next parliament may be even more conservative than the present ex-communist dominated one which is widely discredited. These worsening political and economic trends are likely to deepen the divisions and frictions between the Russian speaking, industrialised Ukraine and the more progressive western regions.

Another new phenomenon in the regions is the creation of new paramilitary formations (for further details, see article on pp 123-125). Such organisations create the ingredients for a 'yugoslavisation' of Ukraine and generate the conditions for violent conflict between the various ethnic groups. As a result, the Ukrainian parliament banned all paramilitary formations and organizations before the legislative and executive branches of the Ukrainian state could lose control of events. Whether the ban can really stop political disintegration is doubtful given the growing socio-political instabilities, the threat of an open schism between the regions, and the huge stock of weapons in Ukraine.

The old Soviet flag is unceremoniously torn down by Ukrainian nationalists in Sevastopol. ***(Photograph: T Kuzio)***

The Old and New Communist Party

Linked with these developments was the registration of the Communist Party of Ukraine in the beginning of October 1993. The process of restoring the communist organisation is particularly strong in the eastern and southern regions. Within a few weeks, the new Communist party had 128 000 members, making it Ukraine's largest and most well organised political party.

The communists' political goal is the restoration of the former Soviet Union or at least a Slavic state between Russia, Belarus, Ukraine and Kazakhstan. By the end of August 1993, the leader of the Russian Communist Party, Gennadiy Zyuganov, stated that the first stage of reviving the USSR should be the restoration of unity between these four states at least. The following plan for reunification consisted of two additional stages: economic and military integration; and then a political alliance with economic and military unification by the end of 1993. Although this statement was clearly over-optimistic, current events seem to suggest events are moving in their direction.

Growing Nationalism

In both Russia and Ukraine, nationalism is growing. On the Ukrainian side, however, it does not yet go beyond its own borders — even national-democratic movements like *Rukh* renounce any territorial claims on other states. Nevertheless, the freedom of movement for moderates like the President Kravchuk, with his pragmatic policy towards Russia, has been drastically reduced; the same can be said of Yeltsin and Belarus after the dismissal of Shushkevich.

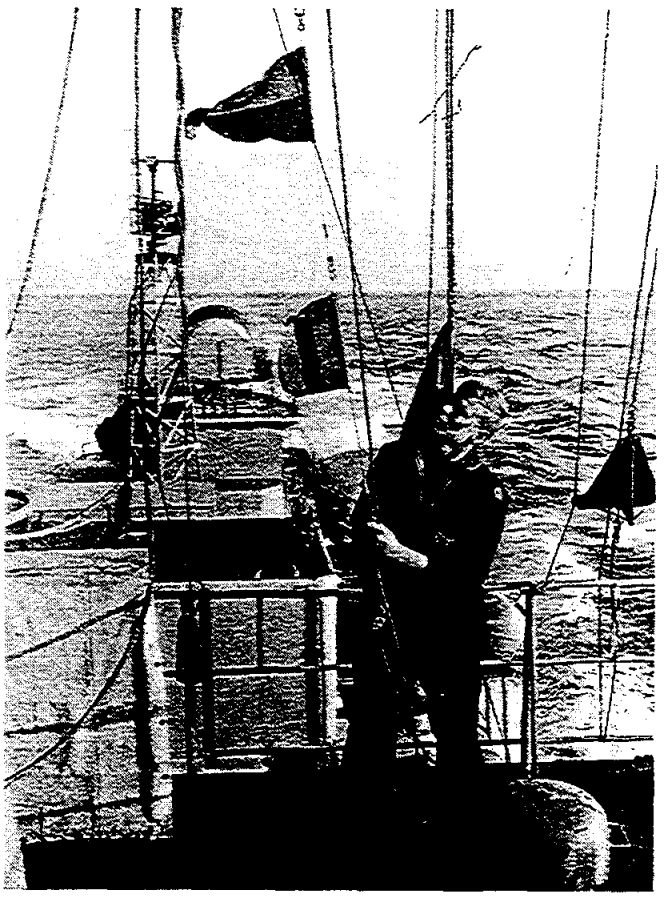
In the absence of a coherent reform programme, increasing political nationalism has filled the gap. The national activists in Ukraine, for instance, blamed former Prime Minister Leonid Kuchma for failing to carry out economic reforms and for not actively seeking other sources of oil and gas. Many nationally patriotic and even liberal forces in Russia would be all too ready to fuel the possible break-up of Ukraine. If the people in the east of Ukraine fight back, the nationalists in Russia would certainly use this 'window of opportunity' to intervene more openly than today on the

side of their Russian-speaking brethren.

This is not a scenario on the far horizon. It is a process already well under way in a number of areas. For example, in contrast to former strikes in the Donbas region which have previously focused on pay increases, the last one was mainly about greater political power and economic independence from Kiev. In addition, more than 20 left-wing parties and socio-political associations in Ukraine appealed to the government in 1993 to sign the treaty of economic union with Russia and Belarus. While that seems understandable, they, like others in Belarus, do perceive closer economic ties as only the first step to closer political and maybe military union, a union which threatens the political independence of Ukraine. As a final line of evidence, these pro-Russian forces in Ukraine are supported politically, organisationally and financially by the Russian 'Red-Brown Alliance' of pro-communist and pro-nationalist forces. This old communist network has not been destroyed and works very well in the background — Crimea or Narva (Estonia) are good examples of that. The nationally patriotic forces are particularly strong in the three Ukrainian security ministries and the armed forces.

Furthermore, a reactionary, separatist organization called the Officers' Union, was formed in December 1991 as the military wing of an extreme Russian body, the National Salvation Front (NSF). This has successfully created an underground network of cells in the new sovereign CIS-states. Its aim is to establish a military dictatorship, and destabilise the Slavic brother countries, including the Baltic states, in order to reunite them with Russia. The Officers' Union has sought to intervene directly in CIS-interstate affairs and has played an important role in the local and regional civil-military relationships in the 'near abroad'. Together with other pro-Russian officer organisations, they formed a patriotic inter-republic grouping which 'unites the officer corps through the idea of a revived, single (Soviet) state. This 'USSR Officers' Union' was created in Minsk shortly before the events in Moscow in October 1993.

Russia has done little to win Ukrainian confidence. Russian diplomats and Yeltsin's senior advisers have warned East European countries behind closed doors that they should not develop close ties with Ukraine because it falls within Russia's sphere of influence — its independence will be a temporary phenomenon only. Moreover, Ukrainian embassies would soon be 'downgraded to consular sections' it has been said. However, this shortsighted Russian policy can only backfire and play into the hands of the Ukrainian nationalists and their 'little brother complex'. If Russia cannot come to terms with its loss of empire without war, then Yeltsin's policy could well accelerate the disintegration of both Russia and Ukraine. In October 1993, a new and rather unexpected organisation appeared on the Russian political stage under the title of the Association of Ukrainians of Russia (AUR). This party could represent the interests of 6-8 million ethnic Ukrainians in Russia. Together with the Russian minority in Ukraine, the formal assembly of the two largest communities in neighbouring countries could become a weighty factor in future bilateral relations.



A sailor raises signalling flags on a Russian anti-submarine vessel of the Black Sea Fleet. *(Photograph: TASS)*

Conclusions and Prospects

Today, Ukrainian politicians and parliamentarians are confronted with a twofold challenge. On one hand, they have to appease the eastern and southern parts of Ukraine without jeopardising the nation's independence. On the other hand, they must push forward more radical economic reforms. So far, the Ukrainians have concentrated on securing their independence by creating their own armed forces at the risk of neglecting and undermining its basis, namely the economy. However, to reconcile these twofold challenges will certainly be the most difficult task of modern times and the Ukrainians have no time to waste. The ingredients for a Ukrainian version of civil war like that in the former Yugoslavia, Georgia or Azerbaijan are already there.

Under these circumstances, the disintegration and regionalisation of Ukraine seem to be much more serious than in Russia. Coupled with the neo-imperialist tendencies in Russian foreign policy, commentators like Henry Kissinger and Zbigniew Brzezinski argue that more help should be given to Ukraine and other CIS-states, instead of concentrating on Russia only. Such assistance would in fact help to prevent the build up of a new Russian empire.

Additional escalation cannot be excluded and would be much more dangerous. Yuri Meshkov, leader of the pro-Russian nationalist Republican Movement of Crimea (RDK) and president elect of the Crimea, has said that 'None of us should come to terms with being citizens of another state (Ukraine). Maybe we're different from Yugoslavia. But the strength of the explosion will be greater than in Yugoslavia.' The West should take these words seriously and not neglect them as a typical statement by a political extremist. Considering all the internal threats and challenges to both Russia and Ukraine, Western nations need to develop a more differentiated and balanced policy toward the two greatest Slav countries. Given the fact that Western influence can only be modest, it is all the more urgent that Western states conceive of a common strategy against the potential conflicts in Europe. However, in order to achieve this, it is necessary to break with our mind set of the bipolar past.

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The Military Doctrine of Ukraine

Charles Dick

Introduction

Following the declaration of independence on 1 December 1991, the first priority of the former communist, turned nationalist, government was to ensure that this move would be irreversible. Naturally, in the process of state building, the creation of Ukrainian national forces figured largely in Kiev's plans. With commendable rapidity, the Ministry of Defence produced a draft military doctrine for the newly independent state early in 1992. This draft was, however, rejected by the *Verkhovna Rada* in October 1992 and again in April 1993. Apparently, the sticking point was the declared policy on nuclear weapons. It was not until 19 October 1993 that a revised draft was enacted into law. (See also, *Pointer*, No 2, p 3.)

The Politico-Military Aspects

The unspoken background to the strategic section of the new doctrine is fear of Russia. Thus, Ukraine advances no territorial claims on other states 'and does not acknowledge territorial claims on itself'. Existing borders must remain inviolable. There must be 'mutual respect' and 'non-interference in the internal affairs' of other countries, and the principles of the UN, CSCE and the Helsinki Final Act are stressed.

Many, perhaps most people in Russia, particularly in the military, do not regard Ukraine with respect and consider it as an equal. On the contrary, for many, the notion of Ukraine being separate from Russia makes as much sense as the Confederacy's attempt to leave the USA in the 19th century. Even those prepared to countenance an independent Ukraine see no reason why predominantly Russian inhabited areas should be part of the new state. This applies particularly to the Crimea which has been Russian since its conquest from the Turks until whimsically given to Ukraine by Khrushchev in 1954. For its part, Crimea has shown a clear preference for Russia. Other largely Russophone areas (the four eastern *oblasts* and, to an extent, Odessa) supported the independence referendum in 1991 because Ukraine looked like a better bet than Russia. Given the state of the former's economy today, they would possibly demonstrate a change of heart if given another opportunity to voice their preferences. This situation is of grave concern to Kiev as Russians account for up to 21 per cent of the country's population.

The sources of insecurity and possible causes of military conflict which can be identified in the document clearly relate to the Russian threat. Economic or political blackmail is foremost. Indeed, Ukrainian nationalists tend to regard Russia's insistence, from January 1994, on charging world prices for oil as an example of the former. Worse could well follow. Moscow is seen as all too likely to stir up 'ethno-national' discontent within Ukraine to destabilise the country, either to provide an excuse for intervention leading to a restoration of greater Russia or at least to seize the Russophone areas.

The argument in the doctrine against stationing foreign troops on the territory of states without their agreement is a clear dig at Russian use of such forces to preserve influence in such areas as Transdnestria and Abkhazia. The way in which Georgia has been coerced into the CIS by the use of 'peacekeeping' forces and the judicious manipulation of separatist factions and insurgencies stand as a warning of what could happen in parts of Ukraine.

The insistence on Ukraine's 'non-bloc' status is presumably intended to allay Russian concerns. Ukraine has not joined in the rush to join NATO, though this may be due merely to a realistic judgement that is not likely to happen in the near future: Ukraine would undoubtedly like to join. Kiev is, however, trying to sponsor the creation of a 'Central and Eastern European Stability and Security Area' (the 'Baltic to Black Sea Zone'), a regional security system which is seen as a subset of the CSCE. As this excludes Russia, it is not likely to be regarded favourably in Moscow or, for that matter, in Minsk.

The doctrine's prohibition of 'the use of the armed forces in dealing with internal political problems' is consistent with the distaste of the former Soviet military for such employment. It rules out, at least in theory, any Ukrainian equivalent of the storming of the White House on 4 October 1993. More importantly, it probably reflects a realization that the Ukrainian Army could not be employed to suppress Russophone political movements without precipitating its disintegration.

Attitudes to Weapons of Mass Destruction

The doctrine is confused and confusing in its nuclear provisions. Ukraine will never threaten, let alone resort to, nuclear use — a novel approach to deterrence. Elimination of the nuclear arsenal, as agreed in Moscow on 14 January 1994, appears to be conditional on the granting of security assurances of the sort that have evaded other former Soviet and Warsaw Pact states, as well as sizeable financial contributions towards the cost of eliminating the weapons and compensation for their loss. (See also, *Pointer*, No 3, p 3.)

It may be significant that the doctrine is merely against the proliferation of chemical and biological weapons technology. The Russian version goes further, banning production and stockpiling and calling for the destruction of stocks. It is hard to imagine Ukraine resorting to the use of such weapons, even in self-defence, but the failure to repudiate such weapons explicitly is unlikely to be accidental.

The Military-Technical Aspects

The only sort of conflict envisaged for the armed forces would appear to be a large-scale conventional war. The doctrine stresses the need to supply world-class weaponry, especially precision strike, air, air defence and missile systems, electronic warfare elements, air mobile units and an ocean-going navy. Substantial redeployments are obviously envisaged in order to 'organise an effective defence in all directions'. For historical reasons, the locations of military bases and formations are presently geared largely to the execution of theatre strategic offensive operations against NATO; the Russian border is largely bare.

The doctrine also demands the retention of a mass mobilisation capability. The stress on deterring or, failing that, repulsing invasion is understandable in the context of asserting national independence in the face of an overtly hostile Russia. However, it is far from inconceivable that Ukraine could be faced with an internal security problem *(see article on pp 114-116)* and, apparently, no steps will be

taken to equip or train troops for this role. Indeed, the very use of the armed forces for such a purpose seems to be excluded — unless, of course, it is not deemed 'political'. In theory, such actions are the exclusive province of the forces of the Interior Ministry and the National Guard, but it must be open to question whether these would be sufficiently numerous or well trained to deal with serious disturbances.

Security is not sought solely through the fielding of large armed forces. Political and diplomatic efforts will be made to defuse potentially explosive situations and reduce confrontation. Indeed, the doctrine insists on solving all inter-state disputes by political means: all states, it pleads, should undertake to renounce the use of force and respect the national interests of others. This, of course, presupposes that a potential adversary will live by the same rules: it takes two to negotiate. There is an unspoken fear implicit in the doctrine that Russia will not. Some effort will also go into creating regional security systems: by implication, though not explicitly, these will have anti-Russianism as their unifying theme.

The willingness to assign troops to the UN to 'halt aggression ... and support peace and security in different regions' may be for a number of reasons. Such actions will increase Ukraine's standing in the world, and the country should, after all, 'be an influential power'. They will also remind others that Ukraine is a civilised, responsible member of the European community of nations to which a duty is owed. They can also absorb some troops from a currently overlarge army which cannot easily be reduced through fear of creating dissatisfaction.

When laying down personnel policy, the doctrine aspires to all-professional armed forces: presumably, these would be more reliable in the event of conflict with Russia. In the meantime, cost considerations prevent a departure from conscription. This is probably at least as much a result of the prejudices of a traditionally minded, former Soviet military leadership, however. This Soviet mentality is also evident in the call for 'military-patriotic education for pre-conscription and conscripted youth and all personnel'. The desire to resuscitate DOSAAF, or some similar organisation, and to include military subjects in school and university curricula, is probably implicit both here and in the statement that the armed forces' educational system is an integral part of the state's educational system. Unsurprisingly, given the appalling conditions endured by many servicemen, the resolution of 'questions relating to social protection' are considered worth including as a principle. If the army is to be reliable, this certainly deserves the 'first call on financial resources' that is envisaged in the military-economic section. The elimination of party-political influences and the prohibition of political activities in the armed forces may be sensible, but it will be unpopular with many officers, especially those in the Union of Ukrainian Officers who are used to exerting political influence. It must be doubted whether a government fiat will be able to insulate the army from political ferment.

The Military-Economic Aspects

The doctrine recognizes the limitations which economic conditions impose on defence spending. It calls for more efficiency in the use of resources allocated to defence, demanding, for instance, a competitive approach to procurement. If the military and the defence industries, together a powerful political force, get their way, this will be mere verbiage. There is no reason to believe that the Ukrainian military leadership has been any more successful than its Russian counterpart in adjusting its expectations and way of thinking away from the Soviet period to the harsh realities of today.

The tone, and much of the content, of the military-technical and military-economic sections of the Ukrainian military doctrine echo that of the Russian — a brief acknowledgement that money is tight, followed by a shopping list reminiscent of the Soviet era. It is noteworthy, in this context, that both military doctrines dismiss the whole issue of the conversion of military industries to civilian production with the comment that it must be 'rational': clearly, rational means as little as conceivably possible. Furthermore, at least in the case of Ukraine, the idea of saving money through the application of competitive principles and contracts is not only unpopular with the defence suppliers but is also at variance with present governmental practices and tendencies. The military sector is surely the least likely of all to escape the general reversion to command methods of economic management.

A Security System Against Russia?

As the Ukrainian military doctrine makes clear, one part of the answer to the Russian threat is the creation of security systems to check Russia's aspirations. The tripartite agreement of January 1994 must be seen as a first step in this direction. Furthermore, there will probably be an intensification of efforts to create a 'Baltic to Black Sea Security Zone'. This will be an uphill struggle, however. Belarus is happy to align itself with Russia. Most of the other states in the region are certainly keen to see Ukraine remain independent but are probably fearful of incurring Russia's wrath by aligning against her. Without Western backing, the project probably has a low chance of success.

The other track followed by the Ukrainian military doctrine in attempting to attain security is that of fielding armed forces strong enough to deter or repulse aggression. At least in the short term, this is likely to be a chimera for three main reasons:

- The Ukrainian economy is a disaster. Inflation is running at 70-100 per cent per month and no attempt is being made to control it: the budget deficit is at 40 per cent of GDP and taxation revenues have collapsed; production has plummeted — in 1991 it was 10 per cent less than in 1990, in 1992 it was down by a further 13 per cent, and in 1993 it will probably be down another 20 per cent; living standards have collapsed. In this situation, the economy cannot possibly support the military's appetite for investment. Any attempt to give the armed forces what they think they need could ruin any prospect of economic reform and possibly create the sort of revolutionary discontent that would play into Russia's hands. These scenarios will not necessarily give all of the Ukrainian defence establishment pause for thought. The military-industrial complex is, if anything, even stronger than in Russia — defence production accounted for 45 per cent of Ukraine's GDP in Soviet times. It is certainly just as intransigently opposed to reform, for that would lead to its collapse. Significant elements of the military-industrial lobby would even prefer reunification with Russia for their links are with the Russian Armed Forces rather than with those of Ukraine.
- The Ukrainian Armed Forces would perhaps be better described as a collection of military units. Independence came suddenly, as a surprise. As a consequence of this, and the fact that it was Russia which inherited the Soviet Ministry of Defence, Ukraine has no military system and no one who knows how to organise and run an army: all it has is three former Soviet military districts which are now reorganised into two. The military carries on the old, Soviet daily routine, and thinks only tactically and operationally but not strategically. Moreover, a deep gulf of distrust sunders the military and civilian leaderships while the latter exerts limited control over the former.
- The armed forces possess an impressive inventory of hardware. Given the collapse of the Soviet military system, however, it must be open to question as to how much of it is functional and how long it could be sustained in combat. Even if the means were reliable and there was competent strategic direction, it

would be exceedingly doubtful if the army could be relied upon to defend the country against Russia. Of the 500 or so people working in the Ukrainian MoD, 53 per cent are Russian, as are well over half of all officers and 90 per cent of the generals: Defence Minister Colonel General Radetskyy maintained in October 1993 that only 46 per cent of service personnel are Ukrainians, and that as few as 25-30 per cent of these actually speak Ukrainian. Moreover, morale in the army is dire. There is a collective loss of the self-respect which characterised the Soviet period. Material conditions are dreadful for many officers — up to 70 000 lack homes, for instance. Bare subsistence level pay rates are a universal grievance. A poll on 22 November 1993 showed that 93 per cent of officers were discontented with their lot and 50 per cent of younger ones want to quit the army; indeed, 9000, mainly specialists, are reported to have left prematurely in the first 10 months of that year. The ordinary soldiers, too, share all the miseries and hardships of their Soviet and Russian counterparts. Like them, their barrack blocks are dominated by informal groups, subversive of military and societal values and often with criminal tendencies. In short, the army lacks the motivation and cohesion necessary to withstand the strains of combat.

How Serious is the Russian Threat?

For a myriad of reasons, a Russian invasion of Ukraine, at least in the near future, must be judged highly unlikely. The Yeltsin government is anxious to remain on good terms with the West and such a move would not only sour relations but also revive widespread perceptions of a Russian threat. The January 1994 agreement, which contained certain concessions to Ukraine with economic and security caveats, was in part a recognition of this. Even an ultra-nationalist Russian president might shrink from a threatening move, if not for fear of the West then for pragmatic, domestic reasons. It is as yet far from clear that the centre will be able to hold the Russian Federation together: there are some centrifugal forces at work which could yet see the Federation go the same way as the USSR, at least temporarily. The first business of any government in Moscow must be the preservation of Russia and the re-establishment of firm control over all its regions. Finally, while the Ukrainian Armed Forces are in poor shape, those of Russia are not all that much better. Embarking on a war with Ukraine would be a gamble for which the military might have little stomach.

Any sensible government in Moscow will reject the notion of military reconquest. That does not mean that nothing can be done. Other means can and probably will be used with the aim of reducing Ukraine to satellite status. Alternatively, such pressure, when applied to an already disintegrating economy, could be instrumental in provoking widespread unrest or even civil war. In that case, Russia could well embark on a limited military intervention, described as peacekeeping or defending the rights and interests of Russophones. This would be a relatively low-risk strategy, both militarily and in terms of international relations. However, it would give a high probability of bringing the 'Russian' *oblasts* back into the fold and leaving a rump of dubious viability that might follow eventually. Of course, such actions would serve to increase the intransigence of Ukrainian nationalists, especially in western Ukraine, and would multiply the already formidable problems faced by Moscow. If, however, it was believed desirable, it would probably be relatively easy for Moscow to destabilise the Russophone areas if conditions in Russia are seen to be improving and those in Ukraine stay the same as today or worsen. The Ukrainian military doctrine contains no answers to such a threat.

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Vice Admiral Vladimir Bezkorovainy — Commander of the Ukrainian Navy

Closely linked with the personnel changes within the Ukrainian Defence Ministry in October 1993 was the departure of Rear Admiral Boris Kozhin, the first commander of the Ukrainian Navy. Since his appointment in April 1992, Kozhin — like former Defence Minister Morozov — remained a controversial figure. Russian-born and educated, Kozhin made many friends and adherents but failed to establish his authority.

Just as Kozhin's impending departure had long been predicted, the identity of his successor was likewise an open secret. The new commander of the Ukrainian Navy, Vice Admiral Vladimir Bezkorovainy, arrived in Ukraine in May 1993. Until his official appointment by presidential decree on 8 October, Bezkorovainy served as a senior advisor to the Ukrainian defence minister. On his arrival in Kiev earlier in the year, Bezkorovainy was immediately accorded greater influence over the formulation of policy regarding the future of the Ukrainian Navy than Kozhin himself; this situation was helped no doubt by the fact that the two chief players in the Russian team — Admirals Feliks Gromov and Igor Kasatonov — were former wardroom comrades.

The new commander, unlike Kozhin, is Ukrainian. Born in August 1944 at Uman in the Cherkassk *oblast*, he entered the Caspian Higher Naval School (Baku) in 1963. On graduating in 1967, he went on to serve in nuclear submarines, spending most of his service with the Northern Fleet. During the 1980s, Bezkorovainy served as a staff officer and commanded a nuclear submarine formation in the Northern Fleet, latterly under the command of Vice Admiral Feliks Gromov, commander-in-chief of the Russian Navy since April 1992. In May 1993, he transferred to Ukrainian service.

There is a strong possibility that the move was 'arranged' between Kiev and Moscow prior to taking over command of the Ukrainian Navy. What is beyond doubt is the fact that Bezkorovainy's appointment has been greeted in Moscow. Recently, the former commander of the Black Sea Fleet and present first deputy commander-in-chief of the Russian Navy, Admiral Kasatonov, greeted the 'personnel revolution' within the Ukrainian Defence Ministry and expressed the view — without mentioning names — that Moscow 'could do business with the new men'.

Despite the favourable omens, the appointment of Vice Admiral Bezkorovainy — with or without pressure from Moscow — will not render a final solution to the dispute over the Black Sea Fleet any easier. There are too many other factors influencing both the Russian and Ukrainian negotiating positions despite the will at the top to reach an equitable solution. Both the January 1993 accord and the subsequent Massandra agreement were attacked as 'a sell-out' and ignored by radical circles, not only in Sevastopol but also among radical nationalist politicians in Kiev and Lvov.

The new commander of the Ukrainian Navy is an officer of outstanding professional ability and considerable intellect. Given the pressures from radical circles, Bezkorovainy is likely to be a skilled and hard bargainer but not intractable. Meanwhile, the build-up of the Ukrainian Navy continues, both in terms of weapons systems and personnel. In November 1993, the Navy took delivery of a new light cruiser, the *Lutsk*. Equally significant was the appointment of Major General of Aviation Nikolai Volovin to command the Ukrainian Naval Aviation. At the moment, the Ukrainian leadership is hedging its bets over the outcome of the Black Sea Fleet enigma.

Richard Woff

Ukraine's ICBM Arsenal

Dr Bhupendra Jasani

On 7 July 1993, President Kravchuk of Ukraine stated that 'Ukraine must be the owner of nuclear weapons on its territory pending their destruction'. This stance was in spite of the earlier acceptance by the Ukrainian Supreme Soviet *(Verkhovna Rada)* of the 'Declaration of State Sovereignty' (16 July 1990). Under this declaration, the 'Ukrainian SSR solemnly proclaims its intention to become in future a permanently neutral state, taking no part in military blocs and holding to three non-nuclear principles, namely not to accept, produce or acquire nuclear weapons'.

The agreement between Russia, Ukraine and the USA on 14 January 1994 has given some grounds for hoping that Ukraine will eventually relinquish its nuclear arsenal. The country has yet to accede to the 1970 nuclear Non-proliferation Treaty (NPT) — apparently after parliamentary elections on 27 March — but, on 3 February, the *Verkhovna Rada* did agree to ratified START I and accepted the associated Lisbon Protocols.

It now remains to be seen whether Ukraine will rid itself of its nuclear stockpile. Until this is realised, it would be of benefit to know whether Ukraine's missiles can be kept under observation. While both the USA and Russia are able to conduct such scrutiny, access to their data is not possible. However, because of the question of Ukraine joining the NPT, it is important for the international community to have information on its nuclear activities, information which is independent of the two major international powers. In view of this, the usefulness of observations by civil satellites has been investigated and the results of an examination of the Ukraine missiles deployed in the region of Pervomaysk are discussed below.

Ukraine's Nuclear Arsenal

There are 130 SS-19 ICBMs (90 at Khmelnitskiy and 40 at Pervomaysk), and 46 SS-24s at Pervomaysk. Two ICBM production facilities are based at Pavlograd for SS-24 silo-based and rail-mobile missiles and at Dnepropetrovsk for SS-18s. An air base for heavy bombers equipped for long-range nuclear air-launched cruise missiles (ALCMs), believed to total 600, is at Priluki (500° 35'N, 320° 24'E). There are 13 Tu-160 'Blackjack' bombers also deployed there, as well as 13 heavy bombers attributed with eight long-range nuclear ALCMs. Repair facilities for heavy bombers such as the Tu-95 'Bear' are situated at Belaya Tserkov (490° 49'N, 300° 10'E).

The SS-19 missiles are fourth-generation, two-stage, liquid-fuel MIRVed ICBMs carrying six warheads each. The launch platform is an underground hardened silo and each missile is contained in a launch-canister within the silo. Such silos were going to be retired as SS-24 missiles became available. The SS-24s are fifth-generation, three-stage, solid-fuel, mobile ICBMs as well as silo-based systems. Each missile carries 10 MIRV warheads. The 46 missiles at Pervomaysk are all silo-based.

Pervomaysk from Space

Both START agreements have elaborate procedures on the elimination of missiles. In some cases, the missiles are destroyed and the silos are either converted for use by other types of missiles, or they are destroyed. As for verification of both treaties, national technical means (NTM) provide the basic method of assessment. This is largely supplemented by detailed data exchange and on-site inspections.

Like the INF treaty, START I and II also have lists of sites where various types of land-based missiles and bombers are deployed. The difference is that START's lists do not contain the co-ordinates of the locations of missile sites but only the name of the nearest city.

A SPOT image was acquired of the Pervomaysk area on 8 February 1991. The full scene is shown in Figure 1. From it, 42 missile sites can be identified; the remaining 44 silos must be deployed outside the area covered by the image. Knowing the co-ordinates of the corner points of the image, it was possible to compute the location of each of the sites identified in the image. Some of these were then plotted on a map (scale 1:50 000) of part of the area. The accuracy of the positions from the image is to within 500-800 m but this could be improved if the image is further corrected using more accurate maps.

Figure 2 shows four of the missile sites which were identified in Figure 1. At this resolution, it is difficult to identify any particular characteristics that can be used to separate the SS-19 sites from those for the SS-24s. However, it is interesting to note that while the SS-19s use liquid fuel, there are no obvious signs of fuel storage facilities. This may mean that the fuel is stored underground and cannot be seen or that all the silos observed belong to SS-24s. Another possibility is that fuel is stored in buildings in which case SS-19 silos would have a number of building close to them. Twenty-seven silos were found to be isolated and without any buildings. These may, therefore, belong to SS-24s. An example of such a silo is shown as Figure 2B.

Thirteen silos were found to have several buildings associated with them. In START I, the SS-19s and SS-24s are grouped in tens. There are 10 silos, one being a command and control centre. Therefore, some of the buildings near a silo may be the C^2 facilities. The silo at 21 was identified as a command centre. An enlargement of this is shown Figure 2A. This is surrounded by nine silos (22 to 30) where missiles might be deployed. There are three such complexes surrounding silos 1, 11 and 33. Silos 41, 42 and 43 may be part of two other such complexes outside the range of the image.

Therefore, it could be surmised that isolated silos may belong to SS-24s and those with buildings may be either C^2 centres or SS-19 silos. The former are easy to identify because they are at the centre of nine other missile silos. Also, it is interesting to note that there are no signs of nuclear weapons storage facilities.

Implications

It would be very difficult to determine which country attacked a civil remote-sensing satellite from, say, a high-flying aircraft. General Charles Horner, Commander-in-Chief of US Space Command, recently argued in Congress that the US anti-satellite (ASAT) programme should be revived because the quality of civil observation satellites has improved so much and the technology has spread so widely that sensitive data is becoming available to many more nations causing national security concerns. This new situation could threaten future military operations of the type conducted during the Gulf War in 1991, for example, as the adversary would have access to the

uncontrolled data acquired from civil spacecraft. During the Gulf War, such data was denied to all except US allies.

If images for satellites are geocoded using accurate maps, the precision with which each target on the ground can be located is improved considerably. For instance, the position of a target can be determined with an accuracy of only a few tens of metres. Thus, even satellites such as the SPOT and Landsat with coarse resolutions could be used rather effectively for acquiring targeting information. This means that the survivability of civil remote-sensing satellites is jeopardised further.

The sensitive nature of the data generated by satellite observations may well give impetus to a possible anti-satellite arms race. One solution might be to have observation satellites controlled by either multinational or international organisations. While the latter idea may not be realised at present — the unresolved debate on the establishment of an international satellite monitoring agency under the UN is an example of the delay — a regional concept has been accepted. In fact, such an agency has already been established in Europe. If civil satellites are recognized as verification tools, then the usual non-interference rules over verification could also be applied. At least, this would give some protection to civil satellites which are currently without such cover.

Figure 1. Full SPOT scene over Pervomaysk taken on 8 February 1991. Forty-two missile sites are identified and marked on the scene. ***(Source: CNES/SPOT. Image processed at Defence Research Agency, Farnborough, UK)***

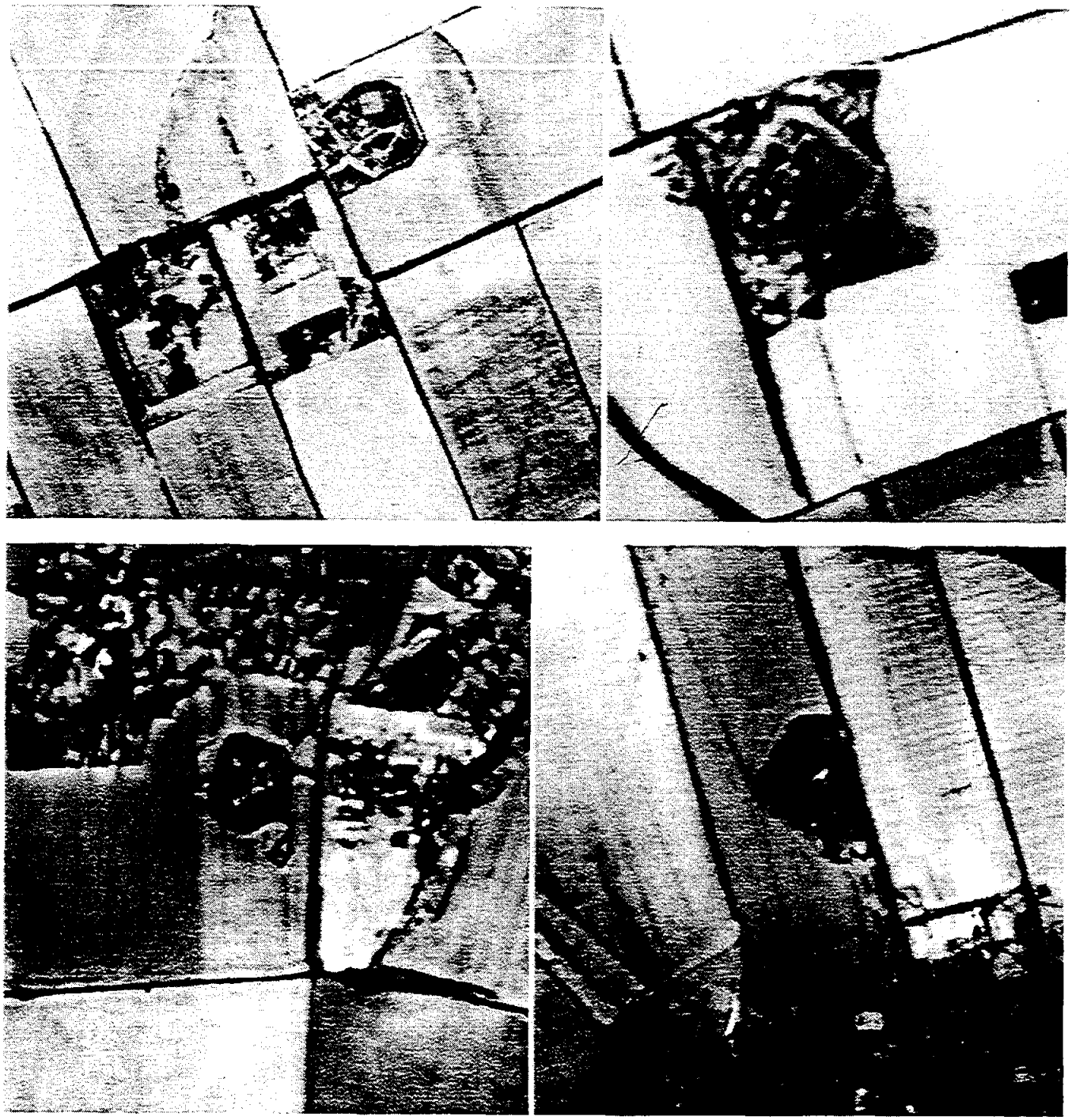

Figure 2. Four of the missile sites 21, 1, 4 and 6 identified in Figure 1 are enlarged in A *(top left)*, B *(top right)*, C *(bottom left)* and D *(bottom right)* respectively. *(Source: CNES/SPOT. Image processed at Defence Research Agency, Farnborough, UK)*

Conclusions

In the past two decades or so, the quality of civil remote-sensing satellites has improved by a factor of about 80. For example, the early US Landsat satellites had a resolution of 80 m (pixel size). The French SPOT satellites improved this to 10 m and now some of the data available from Russia is in the region of one metre (pixel size). This has now made the participation of the international community in the verification process possible. The result could add to building confidence between nations and improve international relations even more.

If used by groups of governments in co-operation, such satellites are less likely to be misused. A positive aspect of military observation satellites is their ability to monitor arms control treaties and crisis areas in detail. In this process, even civil remote-sensing satellite can now play an important role. The disintegration of the Soviet Union and the revelations of Iraqi and North Korean nuclear weapons programmes indicate the importance of developing observation capabilities from space independent of the USA and Russia. The use of commercial satellites is a first step towards this aim.

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This article forms part of a larger study which was funded by the Volkswagen Foundation, Germany, on verification using civil satellites. All references can be obtained from the editor.

Paramilitary Groups in Ukraine

Taras Kuzio

Growing Popularity

The growing domestic crisis, coupled with regional separatism within the country, has resulted in the increasing popularity of the Ukrainian People's Self Defence Forces (UNSO) — the paramilitary arm of the far right Ukrainian National Assembly (UNA). (See also *JIR*, Vol 4, No 12, pp 540-541.) This popularity has been accompanied by the call from other political groups to establish their own paramilitary structures.

The Union in Support of Ukrainian State Independence (DSU), for example, has established its own 'Guard' *(Varta)*. As a representation of its views and programme, the DSU has called for the ethnic cleansing of all Russians and Jews from Ukraine. The Social National Party of Ukraine has also established a paramilitary structure. This caused widespread commotion in L'viv when it attacked members of more moderate Ukrainian student groups during a debate. After the Massandra summit in September 1993, committees for the 'Salvation of the State and Nation' were also formed throughout western Ukraine; these committees held a number of rallies during which Russian flags were burnt. Furthermore, reports from western Ukraine of the newly relegalised Communist Party talk of vandalism against Russian schools and houses with slogans such as 'Muscovites get out of Ukraine' daubed around. Terrorist attacks against official Communist and Socialist Party members have also been undertaken or threatened.

The growing popularity of the UNSO et al is evidenced in both the attention given them by the Ukrainian Security Service (the SBU, successor to the Ukrainian KGB — see *JIR*, Vol 5, No 3, pp 115-117), as well as the growing chorus of demands for their banning. In the Odessa *oblast*, the newly appointed head of the SBU claimed that of all organisations and parties in his region, UNSO was the biggest threat. UNSO's activities have also been directed against Romanian nationalists in northern Bukovina (Chernivtsi *oblast*) and separatist groups in Transcarpathia. A UNSO training camp was established near Uzhorod, capital of Transcarpathia, in October 1993 with the intention of intimidating local separatist sentiment.

Apparently, 20 criminal cases are actually pending against members of the UNSO, some of whom have been caught with weapons. Three UNSO members escaped from prison in Cherkassy with four others, taking weapons from two prison warders before they were recaptured. Moreover, the SBU and MVD have alleged that, during 1992-93, the authorities had confiscated from the UNSO three automatic machine guns, one revolver, 14 grenades, 400 rounds of ammunition and 10 Molotov cocktails.

Beyond the Law

After the storming of the Russian White House in October 1993, President Kravchuk, together with the chairman of the Ukrainian parliament, Ivan Plyushch, called for a ban on paramilitary formations in Ukraine. They claimed that the right to bear arms should be reserved solely for the militia, army, Security Service and National Guard.

The main aim of the amendments to the Code of Criminal Practice is, in fact, to ban structures such as the UNSO. On 11 November 1993, the Ukrainian parliament amended the criminal code in accordance with which the formation of, or participation in, illegal militarised formations is punishable by 2-8 years imprisonment. The leadership of such formations, financing them or supplying them with military equipment is punishable by 3-10 years imprisonment, and the participation in attacks by such groups on property or individuals is punishable by 7-15 years imprisonment. The criminal code was also changed regarding 'mercenary activity' and 'participation in armed conflicts of other states'.

The changes in the law were quite vague and, in the words of many commentators, were deliberately phrased in order to be ineffective. After all, 'militiarised formations' could be also applied to Cossack groups, national youth organisations and scouts. Consequently, UNSO leaders stated that they were ready to take the oath of loyalty to the Ukrainian state and become an 'official' structure to circumvent the change in the law. The UNSO would then become the cradle for a volunteer militia.

Even the chairman of the SBU, Yevhen Marchuk, has questioned the wisdom of the ban. What of other separatist and Russian chauvinist groups, in particular the National Salvation Front which is banned in Russia but active in Sevastopol? It is claimed that such groups threaten not only Ukraine's territorial integrity but also internal social order. Marchuk conveniently forgot to mention the Communist Party, banned in September 1993 in Russia and relegalised in Ukraine the following month (it was banned between August 1991 and October 1993). Members of the Kiev branch of the All Union Youth Bolshevik Guard and the Kharkiv based *Komsomol* of Ukraine actually fought on the side of the Russian parliament, although these organisations have not been signalled out for a ban.

The UNA has responded to efforts to arrest its leadership by threatening to unleash a terrorist campaign against law enforcement officers and members of the SBU. If the UNA-UNSO alliance is disbanded, the group has also threatened terrorism and anarchy. The fact that there are quite a few people in the organisation who have combat experience means that such threats should be taken seriously. 'If the organisation is disbanded, nobody will stop them from taking resolute action', one UNA leader has stated.

The leader of UNA, Dmytro Korchynsky, added his contempt for the SBU by adding that 'the Security Service of Ukraine is working for Russia. If our boys fought on the Russian side, the Security Service would not be trying to impede us. But because we are fighting against Moscow for the freedom and independence of Georgia, they are resorting to threats and provocations. We are saving the nation's honour, defending our geopolitical interests.'

What is more, the UNSO has openly stated its intention to drag Ukraine into the Georgian-Abkhazian conflict in order to worsen relations with Russia. The next phase of the campaign will be the creation of 'hot spots' within Russia with the help of the Don Cossacks. The UNA-UNSO also contrasts itself with the armed forces, Ministry of Internal Affairs, parliament and other official bodies. It is 'the only organisation that does not sell anyone, does not profiteer on anything and does not deceive anybody', the membership claims. Furthermore, 'We can only protect ourselves from gangsterism and burglary if we join forces because today the militia is more concerned with defending its corporate interests.'

recently complained about Ukrainian military supplies, including tanks, to Azerbaijan; to this, the Ukrainian side retorted that they had been sent for repair and were merely being returned. Ukraine did refuse to allow its nationals to be used in the Black Sea Fleet landings in Georgia in order to defeat the rebel supporters of the deposed President Zviad Gamskarkurdia. According to UNA, the best fighting unit on the disorganised Georgian side was the *Spetsnaz*, staffed mainly by Ukrainian volunteers.

Impending Parliamentary Elections

According to UNSO leaders, legislation to make the organisation illegal is aimed at removing 'an influential political power' before the parliamentary elections on 27 March 1994. Korchynsky added, 'Wherever there is the UNA and UNSO, we have order, stability and prosperity. We cannot be remodelled. The UNA-UNSO is not just an organisation, it is a state of heart; it is a phenomenon.'

There is no question that the national communist authorities, sensing both the failure of their economic policies and the breakdown of their honeymoon with the democrats, are afraid for their future. Therefore, the opposition to the UNA-UNSO is a sign of their weakness on the eve of parliamentary and presidential elections. Nevertheless, predictions that the extreme right would be as popular in parliamentary elections in Ukraine as they proved to be in Russia are unfounded.

The UNA has made tentative connections at the local level in eastern Ukraine with the Socialist Party of Ukraine (SPU), the more moderate of the three offshoots from the Communist Party of Ukraine when it was banned in August 1991. They were both attempting to co-opt strike committees and trade unions, with which democratic parties have still only weak links. 'Order and Well Being' could be the joint election slogans of the SPU and UNA. Both are suspicious of foreign investment and hostile towards organised crime and corruption, making a potential 'Red-Brown alliance' possible.

The leaders of the UNA-UNSO argue that Ukraine's greatest threat is the 'state apparatus'; this includes the administrative and economic *nomenklatura*. They are the people who are illegally exporting capital out of the country and this is the main cause of Ukraine's economic crisis, they allege; it has led to the demoralisation of society. The interests of these social groups are diametrically opposed to those of the rest of society.

The political aims of UNA are, therefore, to 'build an organised and unified force which can remove the regime, establish order, take upon itself responsibility for the state and government, form a new state apparatus, and control it'. In this endeavour, the allies of the UNA-UNSO would be sections of the officer corps, workers groups and commercial structures with an orientation towards inward investment. In a statement issued on the second anniversary of Ukrainian independence, the UNA-UNSO alliance claimed that it has established for itself 'a leading role in the opposition forces. We will be next in power'. As Korchynsky has pointed out, the UNA-UNSO feels comfortable in the current domestic crisis which engulfs Ukraine, believing it will give the organisation an opportunity to come to power.

Ukrainian paramilitaries in Abkhazia.

Conclusions

The UNSO and its political arm, the UNA, believe that their greatest recruiting ground is in eastern Ukraine, an area which has many of the traits of the former GDR. It will not have been lost on the Ukrainians that the Abkhazians were supported by mercenaries from the Russian 14th Army based in the Dniester Republic, a formation which also sent volunteers to defend the White House in October 1993. The similarities between Russian support for Abkhazian and Crimean separatists were pointed by both Shevardnadze and UNSO's public supporters within Ukraine.

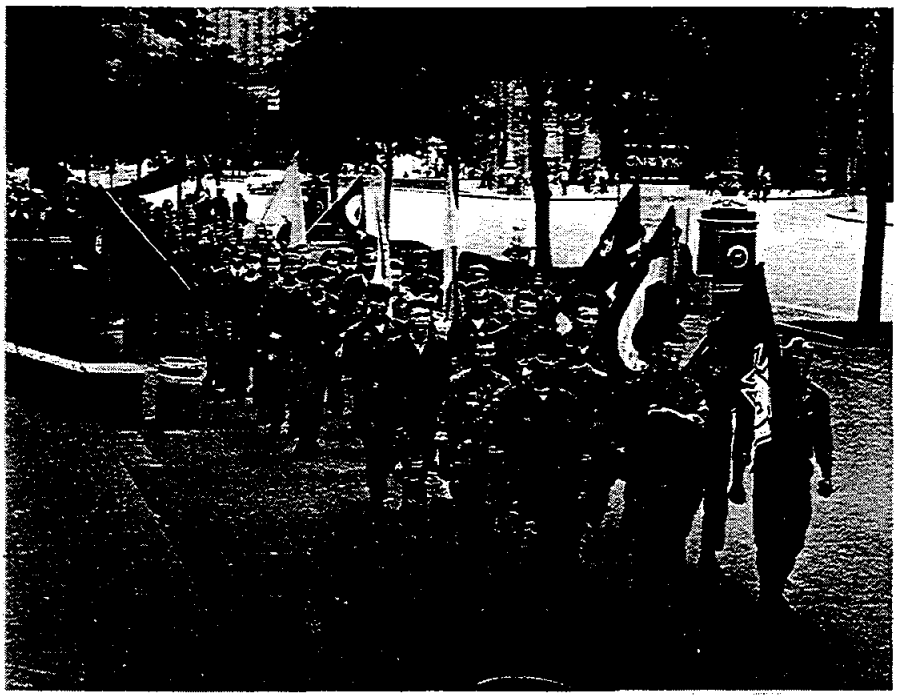
With the growing domestic crisis, the right will give the radical authoritarianism of the UNA and the UNSO a 'window of opportunity' to increase their influence, especially as tough measures will be needed to combat hyperinflation and secure Ukraine's territorial integrity. In October 1993, a car carrying Don Cossacks with 5000 cartridges for various types of weapons including Kalashnikovs, was intercepted in the Kherson *oblast* on its way to the Crimea. It is not beyond the realms of possibility that the political assassinations and terrorist acts in late 1993 on the eve of presidential elections in the Crimea were the work of the UNSO. Any conflict in Sevastopol and the Crimea, which looks increasingly likely after the presidential election victory of a pro-Russian separatist in January 1994 (see *Pointer*, No 4, p 3), would destabilise Ukrainian-Russian relations throughout the country, especially in the more nationalistic Western regions.

In an opinion poll, only one-third of Kievites were optimistic about the future while another study showed that 68 per cent of Ukrainians would support the coming to power of an authoritarian government. According to the IMF, only Georgia outstrips Ukraine in terms of potential domestic instability. The UNA will actively take part in the parliamentary and presidential elections in March and June 1994 respectively. It will have 'solid representation...The UNA as a political entity seeks power', Korchynsky warned.

Taras Kuzio is a specialist on contemporary Ukrainian affairs, director of the Ukraine Business Agency and deputy editor of Ukraine Business Review.

Organised Crime and Corruption

Both the UNA and UNSO have increased their popularity by adopting populist slogans, including ones directed against organised crime. The UNA-UNSO alliance has helped to establish a rival military organisation to the Union of Ukrainian Officers (see also *JIR*, Vol 5, No 1, pp 23-26). This is titled the 'Independent Trade Union of Military Personnel of Ukraine' and its aim is to defend the legal and social rights of servicemen.



Members of the UNSO parade through the streets of Kiev in July 1993. ***(Photographs: T Kuzio)***

The UNA-UNSO has also established the National Assembly of Labour which would 'save the economy, defend national interests, establish order, take upon itself responsibility for the state, and reform the government'. 'The working people regard us as their only defender from oppression on the part of the authorities and mafia', a UNA statement claimed. 'It is the circles which smuggle capital from our country, the fifth column of geopolitical enemies of Ukraine and their henchmen that treat the UNA and UNSO as their foes', the statement went on to argue. It ended with the words: 'It is obvious that today we are the main opposition force in Ukraine. Next time, power will belong to us.'

According to Korchynsky, the Donbas is the region in Ukraine with the greatest UNA-UNSO recruitment. Here, the ranks of UNSO even include non-Ukrainians while close contacts have been established with strike committees. In the highly Russified Luhansk *oblast*, members of the Independent Trade Union of Miners have joined the UNSO as a result of its campaign for law and order against the mafia and the revived Communist Party. The Independent Miners Trade Union has recently recommended that self-defence units be established 'to protect the life and health of its families'.

In the city of Vinnitsa and the surrounding *oblast*, UNA and other nationalist structures have been in the forefront of particularly fierce anti-mafia mafia activities. The UNA has organised large rallies against the mayor of the city who they accuse of mafia links. UNSO and UNA activists have been arrested, leaflets confiscated, searches have been conducted in members' apartments, and *Berkut* riot police have been called out to prevent a rally from taking place and to conduct 24-hour patrols.

The headquarters of the UNA in Vinnitsa has been subjected to a gas attack by 200 riot police, armed and in bullet proof vests. Ten members of the UNA-UNSO were detained in a special centre for one month. Nearly 10 000 people blocked the road and demanded their release but the centre of Vinnitsa was surrounded by the militia and riot police after the entire *oblast's* militia were mobilised. The police were given weapons to counter the perceived threat from the UNSO.

Abkhazia

In contrast to democratic political parties, the UNA, as well as the communists and socialists, criticised President Yeltsin for attacking the Russian parliament in October 1993. In the event of Yeltsin's victory, the UNA-UNSO alliance believed that Russia would have a more strongly co-ordinated foreign and military policy. It was believed that this policy would be directed against Ukraine. In December 1993, therefore, UNA organised in Kiev a conference of Russian nationalist groups who opposed Yeltsin's policies, hoping to reorientate them towards Ukraine through a pan-Slavic union.

The activity of the UNSO in the Dniester Republic in the summer of 1992 was opposed by all Ukrainian political groups whose sympathies lay with Moldova, and not the Russian-backed separatists. In contrast, the UNSO's participation on Georgia's side against Russian-backed Abkhazian separatists has been widely supported in Ukraine, further increasing its popularity and visibility. The chairman of the provisior extraordinary committee of the Georg republic, Dzhaba Ioseliani, even sent letter of gratitude to President Kravcl and the Ukrainian parliament for the actions of the UNSO which was remembered for its good discipline.

Members of UNSO arrived in Abk on 20 July 1993. Yury Shukhevych, leader of UNA, argued that the Georgians were fighting 'regular R units', including those from the 14t of the Dniester Republic. Shukhev believed that UNSO 'will help any republic that will fight against the empire'. A UNA statement added 'The blood of our compatriots has shed for the freedom and indepe of Ukraine. By aiding Georgia in repulsing Russia, we are prevent from unleashing a full-scale war Ukraine'.

Eduard Shevardnadze, presid Georgia, welcomed the arrival o UNSO and recommended 10 of volunteers for military decoratio UNSO members were killed in t engagements and 20 were wou Ochamchire and Shroma as the back to Samtredia and later Tbi Korchynsky claimed that they h come across Russian military u witnessed the bombing by Rus planes of Sukhumi. After the si ceasefire between Georgia an Abkhazia, the UNSO offered t sabotage operations.

The popularity with which U military activity in Abkhazia w in Ukraine reflects the widely concern about Russian policy the 'near abroad'. In March 1 Ukraine and Georgia signed ranging treaty, although She request for a military alliance rejected by President Kravc Ukrainian Armed Forces did however, to Shevardnadze's help evacuate refugees fro trapped in the mountains af Sukhumi. In addition, Armer

Soviets Seek Partner For Launch Business With Refitted SS-24s

By PETER B. de SELDING
Space News Staff Writer

ROME — A large Soviet manufacturer of launch vehicles is canvassing Western industrialists to market refitted intermediate-range SS-24 nuclear missiles as space boosters to put small payloads into low Earth orbits.

The Yuzhnoye Design Office of Dnepropetrovsk in the Ukraine has proposed that with an investment of about $75 million, a Western joint venture partner will become owner of two Antonov An-124 jet aircraft and will have access to dozens of reworked SS-24 missiles.

The new launch vehicle, called Space Clipper, will be a three-stage vehicle capable of placing 500-kilogram (1,100-pound) payloads into a 600-kilometer (370-mile) low Earth orbit, according to the company's documents.

Judging from Yuzhnoye documents and illustrations, the Space Clipper's concept and mission bears a strong resemblance to the Pegasus spacecraft built by Orbital Sciences Corp. of Fairfax, Va. But the procedure by which the launch vehicle separates from the plane is radically different.

Pegasus is fitted under the wing of a B-52 carrier aircraft, then released in the upper atmosphere before its engines fire and carry the delta-winged vehicle into orbit.

Space Clipper is placed on a launch ramp in the cargo hold of the An-124. At its launch altitude of around 10,500 meters (34,500 feet) the aircraft's rear cargo doors are opened. A parachute and both the launcher and its ramp are released from the aircraft. Three to five seconds later, the vehicle's first stage is fired and the ramp floats to Earth under the parachute, where both are recovered and reused.

Yuzhnoye has contracted with the Eke Group of Espoo, Finland, a diversified trading company, to solicit bids in the West, particularly Europe.

Esa Paavolainen, Eke's director of international trading, told *Space News* September 17 that Yuzhnoye officials appeared to face no obstacles from Moscow in their bid to take possession of the SS-24 missile structures.

The Soviets have deployed about 90 SS-24 missiles, referred to in NATO parlance as Scalpels. They entered production in 1987 and their military mission is to carry 10 nuclear warheads weighing up to a total of 800 pounds on a ballistic trajectory with a range of 5,500 miles. The SS-24 is designed to be based ei-

Soviets Seek Partner for SS-24 Launcher Proposal

CLIPPER, From Page 4

ther in a fixed silo or on a mobile rail-car platform, and the Soviets have deployed some of each.

The Strategic Arms Reduction Treaty would allow the Soviets to deploy up to about 96 SS-24s and to keep as many as 125 of the rail-car-mounted variant as non-deployed missiles. Estimates of the Soviets' total production of SS-24s vary, but the Soviets "almost certainly have some surplus" SS-24 missiles, according to Dunbar Lockwood, a senior analyst at the Arms Control Association in Washington.

Paavolainen conceded that the fast-changing Soviet political and economic scene made it hard to assess who owns Soviet military hardware, but said the broad Soviet effort to convert military business into civil applications would seem to bolster Yuzhnoye's claim. He said he does not know who will have to approve the transfer of the missiles to Yuzhnoye.

"They say they can proceed with this as soon as there is a foreign partner and could be ready to launch in 1994," Paavolainen said during a space-insurance meeting here.

Yuzhnoye Design Office manufactures, among other vehicles, the Tsyklon three-stage, liquid-fueled vehicle that has been in operation since 1977.

Ukraine Struggles To Keep Its Space Program Alive

History of Expertise Threatened By Economy, End of Cold War

By ANDREW LAWLER
Space News Staff Writer

DNEPROPETROVSK, Ukraine — Behind the grim iron gates of NPO Yuzhnoye, tens of thousands of workers built some of the former Soviet Union's most fearsome ballistic missiles. The quiet streets of this enormous collection of factories now are lined with stacks of tires and lines of tractors fresh from the factory, signaling the company's move into civilian production.

NPO Yuzhnoye managers, however, say they are intent on saving their hard-earned rocket expertise from extinction in the wake of the Cold War's end.

Ukraine, the homeland of the facility, has produced a stream of scientific satellites and instruments in the past few decades for the Soviet civilian and military space program. The huge rocket factory about 500 miles south of Moscow is the new country's flagship space and missile facility.

It has produced the Zenit rocket as well as many of the former Soviet Union's most deadly missiles, such as the SS-18.

The Zenit launcher, which can place 30,000 pounds in low-Earth orbit, is built and launched using a highly automated system extending from tank welding to launch operations. First launched in 1985, the rocket was designed to be used as a booster for the huge Energia vehicle and as a separate launcher.

In the past few years, the rocket has been considered as a commercial launcher for a proposed Australian spaceport on the Cape York peninsula, but the project has made little progress. Also, its technical reliablity was called into question after the vehicle suffered three consecutive failures after a string of 14 straight successes.

A Yuzhnoye manager told *Space News* during a recent visit to the factory that the problem was an unnecessary design change to the engine which the company now is rectifying by reverting to the old and proven design. He said the next launch is slated for October from Baikonur Cosmodrome in Kazakhstan.

But one U.S. industry manager said that a rapid decrease in quality control in former Soviet factories like Yuzhnoye raises serious concerns about the ability of either Russia or Ukraine to produce rockets of the same caliber as in the past.

Even if the Zenit proves a technical success, its future is in doubt. The Energia has no clear missions in the future, and the commercial entry of Russia and Ukraine into the commercial space launch market is apt to be slow, according to U.S. officials. U.S. and European fears about increased competition in the commercial launch market will limit Russian and Ukrainian participation. Industry managers in the two new countries said they are aware of the possible difficulties.

During a July 17 meeting with a U.S. government team led by NASA Administrator Daniel Goldin, the Yuzhonoye managers proposed substituting the U.S. space shuttle's solid rocket boosters with the Zenit, a liquid fueled rocket used to loft the huge Energia rocket. U.S. officials declined to respond to the proposal, but a senior NASA manager said later such a configuration would require major design changes to the shuttle system.

"You would have to use three Zenits," he added, dismissing the possibility, since it would involved substantial redesign to the shuttle system.

With the end of the Cold War and new agreements prohibiting production of missiles, company managers also are considering civilian and commercial uses for their military rockets.

Company officials entertain hopes that existing SS-18s, designed to carry multiple nuclear warheads, could be converted to civil launchers, and production even resumed for a space launch version of the missile.

"After removing the warheads, we would be able to offer this as a commercial vehicle that can place eight tons in orbit," one company official told Goldin. The vehicle's re-entry capsule also could be used for microgravity or biological experiments, or even for delivering supplies to disaster areas in inaccessible regions.

"Within two to five years we could work out such a system," the official said. Production of SS-18s was suspended in 1991 under an arms control agreement between the former Soviet Union and the United States. The Commonwealth of Independent States has 308 SS-18 launchers, 204 in Russia and 104 in Kazakhstan. Under U.S-Soviet agreements, all the silos must be eliminated by about 2000. Launch vehicles, however, do not have to be destroyed.

Vladimir Gorbuline, director general of Ukraine's new space agency, said later that an SS-18 mission with a retrievable capsule would cost between $20 million and $40 million.

At a banquet, Goldin warned Ukrainian and Russian officials that "there is overcapacity in the space business . . . and we should not pretend we can keep the same structures in place. Each of us cannot do everything."

SPACE NEWS FILE PHOTO

Vladimir Gorbuline,

director general of Ukraine's new space agency, plans to market the Zenit launcher and the SS-18 ballistic missile commercially to boost Ukraine's space program.

New Country Looks Beyond Traditional Space Partners

By ANDREW LAWLER
Space News Staff Writer

DNEPROPETROVSK, Ukraine — This new country is looking both east and west to rescue its threatened space industry. Ukrainian space officials said they intend to cooperate closely with their traditional Russian partners, but the government also is considering ties to the European Space Agency and seeking commercial contracts with the United States.

With several major space facilities, including a factory here that produces the Zenit rocket, but dire economic circumstances, Ukraine is struggling to organize its own space agenda in the wake of the Soviet Union's disintegration at the end of 1991.

The National Space Agency of the Ukraine was set up three months ago, and the Ukrainian parliament will debate its budget and direction in October, according to Vladimir Gorubline, director general of the new agency. The next launch of the Zenit rocket built here is slated for the same month.

"Our problem is lack of finances," he said in a recent interview here. Gorubline added that the Ukraine's president supports the space effort, "but we have difficult economic problems."

Sandwiched between Russia on the east and Czechoslovakia and Romania on the west, Ukraine is seeking stronger ties with the West while building a new relationship with Russia. In an effort to find international support, the country is moving to develop closer cooperation with France, Sweden and the European Space Agency (ESA), Gorubline added.

Ukraine has requested membership applications from ESA, and Gorubline met with ESA representatives in New York in June to discuss joining the organization. "We will study the applications to consider membership," he said.

Because of the fiscal problems confronting the government, the new space program is expected to pay for itself through contracts with foreign countries and companies, he said. That gives a decidedly commercial bent to the agency's efforts.

Ukraine can offer inexpensive satellite components and scientific instruments, as well as the Zenit launcher, Gorbuline said. The country, for example, has extensive expertise in solar research and remote-sensing platforms, which could prove beneficial for western space science efforts, he added.

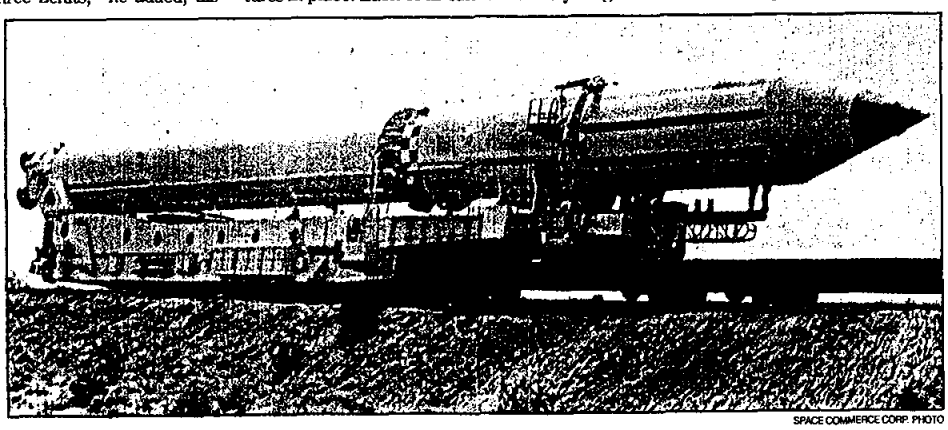
Finding customers might be difficult however, given ESA and U.S. focus on the much larger and more visible Russian space effort. The first high-level team of U.S. space officials to meet with their Ukrainian counterparts, for example, expressed little interest in proposals put forth by their hosts during a July 17 visit. A U.S. government and industry team seeking commercial contacts in Russia later in the month bypassed Ukraine altogether.

Ukrainian officials assured U.S. government officials July 17 that they will abide by agreements that limit proliferation of ballistic missile technology, and that their country had clearly chosen a democratic system. "We will not go back," said one.

Despite the overtures to Europe and the United States, the Ukraine will remain bound to the Russian space program and the Baikonur launch site in Kazakhstan, Gorubline said. NPO Yuzhnoye is a major subcontractor to NPO Energia based outside Moscow, and other Ukrainian companies are subcontractors to Russian organizations.

The vast majority of the former Soviet Union's space facilities are in Russia, causing some tension between the two countries.

"I hope it is understood by all that the Ukraine is a fully independent nation," a senior Ukrainian space official said. He added, however, that his country's program is dependent on international cooperation.



SPACE COMMERCE CORP. PHOTO

The Ukraine-built Zenit Rocket

was offered to the United States, during a recent visit by NASA officials, as a replacement for the space shuttle's solid rocket boosters. However, using the Zenit would require a redesign of the shuttle.

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Les Dossiers Documentaires du CEDOCAR rassemblent une information documentaire originale sur des sujets divers touchant à la Défense :

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En général, ces dossiers ne sont pas des études directement exploitables, mais des références aussi complètes que possible permettant de situer un système d'arme futur dans son contexte concurrentiel, de préparer une mission ou une négociation, de faire le point des informations non confidentielles disponibles. Les documents cités dans les dossiers sont sélectionnés parmi des millions de titres.

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CEDOCAR Sous-Direction de l'Information

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