

# NUCLEAR- AND MISSILE-RELATED TRADE AND DEVELOPMENTS FOR SELECTED COUNTRIES, NOVEMBER 1997-FEBRUARY 1998

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The material in this overview is drawn from selected abstracts that appear in the Center for Nonproliferation Studies' nuclear and missile databases. Transactions of nuclear and missile technologies, parts, and materials are listed according to the recipient country. Other developments are listed according to the country where the event or development took place.

## ASIA

### CHINA

#### Nuclear

U.S.-based Lansing Technologies Corporation was fined \$10,000 for exporting a computer vector processor and a data acquisition controller system to China in 1992 without an export license.

*The Export Practitioner*, 11/97, p. 18.

On 11/3/97, China's Defense Minister Chi Haotian and Mongolian Defense Minister Dambyn Dorligjav met in China and reached a military cooperation agreement. Included in the agreement was China's pledge to continue recognizing Mongolia's status as a nuclear-weapon-free zone.

*Xinhua* (Beijing), 11/3/97; in FBIS-CHI-97-307, 11/3/97.

China was formally admitted to the Zangger Committee of nuclear exporting countries on 10/16/97.

Jiang Wandu, *Beijing Review*, 12/1/97, pp. 21-23.

On 12/29/97, Russia signed a contract to build a 2,000 MW nuclear power station at Lianyungang in China's Jiangsu province. Under the contract, Russia will supply two modified VVER-1000 reactors to China. The project is estimated to cost \$3 billion, and the two reactors are expected to come on line in 2004 and 2005 respectively.

*Nuclear News*, 2/98, p. 59.

On 9/9/97, Peter Lee, a 58-year-old Taiwanese resident of Manhattan Beach, California, pleaded guilty to passing classified U.S. defense information to Chinese scientists on the use of lasers in simulating nuclear detonations. Lee also admitted that he had falsely denied giving technical lectures during his 1985 trip to China. Lee, a laser energy specialist, was then employed by TRW Inc. and worked as a researcher at the Los Alamos National Laboratory.

*Deseret News*, [Online] <http://www.desnews.com/>, 2/10/98.

#### Missile

According to the Yugoslav weekly *Nedeljni Telegraph*, Yugoslav President Slobodan Milosovic signed an agreement to purchase intermediate-range ballistic missiles from

China during a recent visit there. The Federal Republic of Yugoslavia is expected to purchase GSS M [probably the M-9, the export version of the DF-15 (NATO designation CSS-6)] ballistic missiles, which have a range of over 600 km and are equipped with "a highly sophisticated system of electronic control." The China North Industries Corporation (NORINCO) manufactures the missiles. Milosovic will invest \$5.8 million in the construction of a fruit processing factory outside Beijing. Profits from this investment are expected to pay for the cost of the missiles.

*AFP*, 11/19/97; in FBIS-TAC-97-323, 11/19/97.

Russia has decided to sell its supersonic Mosquito/SS-N-22 anti-ship missile to China. This is the first such sale of the missile, which had been on Russia's top-secret list of weapons.

Simon Saradzhyan, *RFE/RL*, 12/10/97.

China is reported to be continuing development of its C-101 family of anti-ship surface-to-surface missiles. First unveiled in 1985, the C-101 uses ramjet propulsion. The missile has a maximum range of 45 km, and can achieve speeds up to Mach 2. According to

its manufacturer, the missile is 6.5 m long, has a launch weight of 1,850 kg, and employs a semi-armor-piercing warhead with delayed-action fuse. The People's Liberation Army Navy hopes to deploy the C-101 on board its Houjian and Huang fast attack craft for purposes of coastal defense during the current five-year plan.

*Jane's International Defense Review*, 1/98, p. 12.

During a meeting on 1/20/98, Chinese President Jiang Zemin promised U.S. Secretary of Defense William Cohen that China would halt all new sales of anti-ship missiles and related technologies to Iran.

Bill Gertz, *Washington Times*, 1/21/98, p. A9.

The two *Sovremenny*-class destroyers ordered by China from Russia may be delivered with the Oniks/Yakhont (export name) anti-ship missile instead of the Moskit/SS-N-22. The Oniks/Yakhont has a maximum range of 300 km in a hi-low mission configuration and 120 km when following a low-low profile. The missile's new Plamya propulsion system uses a solid rocket motor in the initial stages of flight, after which it switches to a ramjet sustainer. This combination allows the missile to achieve terminal flight speeds up to 2,800 km/h. Instead of relying solely on active radar target acquisition, the Yakhont uses a passive target seeker design that allows an unannounced approach to a target. These two features—passive target acquisition and very high terminal velocity—are intended to allow the missile to overcome current and planned ship defenses. The missile's flight-control system includes a ShYu80-066B three-axis, gyro-stabilized inertial platform. The Yakhont is notable for having been purchased by an export client before being introduced into service in Russia.

Stephen J. Zaloga, *Jane's Intelligence Review*, 2/98, pp. 17-20.

Russia is considering plans to participate in the modernization of China's strategic defense systems. During a recent visit to China, Russia's chief military inspector Andrey Kokoshin discussed the prospects of Russian participation in completing China's Type 093 nuclear-powered submarine and Type 094 nuclear-powered ballistic missile submarine.

Mikhail Urusov, *Moskovskie Novosti*, 2/1-8/98; in FBIS-CHI-98-051, 2/20/98.

China has upgraded the command, control, and communications infrastructure of its strategic missile force. The introduction of a new microwave digital communications system gives the Second Artillery forces an all-weather capability.

Lu Chunming and Chen Yansheng, *Beijing Keji Ribao*, 1/16/98; in FBIS-CHI-98-050, 2/19/98.

The China Institute of Carrier Rocket Technology (CICRT) ended 1997 with a string of six successful launches of its Long March Rocket family. In 1996, China's space program had suffered repeated failures. On 2/15/96, the Long March III-B exploded within seconds after launch. On 8/18/96, an older version of the Long March III family failed to park its satellite payload in a predetermined orbit. This failure was caused by a premature engine shutdown in the third stage of the launch vehicle. CICRT scientists and technicians traced the cause of the explosion in the Long March III-B rocket to a malfunction in a power module that resulted in the improper functioning of the rocket-control system platform.

Wei Ban, *Beijing Review*, 2/23-3/1/98, pp. 13-14.

## INDIA

### Nuclear

Indian officials said the United States was trying to destroy India's nuclear program by pressuring Brazil to halt nuclear commerce with New Delhi. The pressure came in response to U.S. contentions that Brazil's nuclear trade with India was a violation of Brazil's responsibilities under Nuclear Suppliers Group (NSG) guidelines. Brazil subsequently said that it would not transfer equipment covered by NSG guidelines to India.

Mark Hibbs, *Nuclear Fuel*, 11/3/97.

A deal between India and Russia that calls for Russia to provide a nuclear reactor for \$3.4 billion is proceeding, according to the chairman of India's Nuclear Power Corporation (NPC) Y.S.R. Prasad. Two 1,000 MW reactors will be built in Tamil Nadu, and the project is expected to take six to seven years to reach completion. The original agreement

called for Russia to deliver the reactors on a "turnkey" basis, but this arrangement fell through with the collapse of the Soviet Union.

Sugata Ghosh, *Economic Times* (Delhi), 11/21/97; in FBIS-TAC-97-325, 11/21/97.

U.S. Secretary of Defense William Cohen released a report on 11/25/97 that warned of a nuclear confrontation between India and Pakistan. The report on proliferation said, "Unresolved disagreements, deep animosity and distrust, and the continuing confrontation between their forces in disputed Kashmir make the subcontinent a region with a significant risk of nuclear confrontation." The report also said that India's preparations for a nuclear test in 1995 and 1996, backed by Indian public support for the test, increased the possibility that one or both countries could take "tangible steps" to advance their nuclear posture. "Although both governments have denied plans to conduct nuclear tests, should India test a nuclear device, Islamabad would be under immense pressure to test as well."

Shehan Sehbai, *Dawn*, [Online] <http://dawn.com/daily/>, 11/26/97.

Officials at India's Indira Gandhi Center for Atomic Research announced the week of 11/20/97 that the Fast Breeder Test Reactor (FBTR) at Kalpakkam would add 60 kg of plutonium to its core, and load a fertile blanket of Thorium-232, capable of producing Uranium-233, in 1998-99. This reactor has not yet operated with a fertile blanket on its core periphery. Critics in India's parliamentary committees say that its breeder program, and in particular the FBTR's lack of electricity generating capacity, are wasted efforts. Instead, they argue that India should concentrate on developing pressurized water reactors (PWRs) and pressurized heavy water reactors (PHWRs), and leave India's limited supply of separated plutonium to meeting national defense needs.

*Nucleonics Week*, 11/27/97, pp. 10-11.

When Russian President Boris Yeltsin arrives in India in 2/98, he is expected to sign a contract to build two 1,000 MW commercial nuclear power reactors at Koodankulam in addition to a declaration on strategic partnership. It will be "the largest strategic con-

tract ever initialed by India, surpassing by \$1.3 billion last year's record \$1.8 billion deal with Moscow on Sukhoi-30s." India's growing dependence on oil imports explains its interest in nuclear power. However, reactor imports such as the LWRs offered by Russia continue to make India dependent on external suppliers of enriched uranium fuel. In order to further its need for an "energy-security strategy to safeguard its future decision-making autonomy," India's planners designed an energy program using PHWRs. The program envisions using India's limited natural uranium reserves as fuel while also producing plutonium fuel for second-stage fast-breeder reactors, which are to be replaced by plants based on the thorium/Uranium-233 cycle.

Brahama Chellaney, *The Pioneer* (Delhi), 12/31/97; in FBIS-NES-98-001, 1/1/98.

Dr. Rajagopalan Chidambaram, chairman of India's Atomic Energy Commission (AEC), said that India has developed a pilot plant for "detritionation" of heavy water in the Bhabha Atomic Research Center (BARC). According to BARC scientists, the new technology is used to prevent health hazards and reduce radioactive levels by lowering the tritium content in heavy water circulating around the moderator circuit.

The BARC breakthrough increases India's self-sufficiency in terms of strategic materials for defense purposes. Indian scientists have been reluctant to call it "production" of tritium, but instead talk of "detritionation." The method selected at the pilot plant uses chemical exchange followed by cryogenic distillation. The process used at the BARC pilot plant can be implemented at all eight operating PHWRs at Kalpakkam, Rawathatta, Narora, and Kakrapar. Scientists refuse to discuss what is being done with the highly radioactive tritium, even under conditions of anonymity.

*Jane's Intelligence Review*, 1/1/98.

Brijesh Mishra, an official in the Bharatiya Janata Party's (BJP) foreign policy division, has stated that the cornerstone of his party's defense and foreign policy strategy would be "to exercise India's nuclear option." The BJP has calculated that although initially there could be serious consequences and

intense international pressure to prevent India from implementing this plan, "the hullabaloo would die down and India would be accepted as a full-fledged nuclear power, even by the United States." The BJP's argument states that given the regional security environment, "we [India] have no option but to go nuclear." The party is aware that India could find itself "in a sticky position" if the United States were to apply its laws against proliferation of nuclear weapons, but "it is a risk the party is prepared to take..." The BJP's policy of making India an openly declared nuclear weapons state is very different from the Indian government's policy so far. The BJP has, however, left itself "considerable diplomatic room for maneuver" by talking only about "exercising the nuclear option." The BJP, as of 2/3/98, was the front-runner in opinion polls regarding the party elections to be held from 2/16-3/7/98. U.S. Assistant Secretary of State for South Asia Rick Inderfurth expressed concern that the BJP's nuclear ambitions would be destabilizing to the region.

Neena Vyas, *The Hindu*, [Online] <http://www.webpage.com/hindu/>, 1/14/98. *Dawn*, [Online] <http://dawn.com/>, 2/3/98.

### Missile

Indian defense sources said that the Trishul surface-to-air missile was successfully test-fired twice from Chandipur Interim Test Range on 11/25/97. This was the third time in 11/97 that the Trishul was launched. The Trishul is a low-level quick-reaction (LLQR) missile that is propelled by a maraging steel solid fuel motor. The Trishul's range is 50 km, and it can be used by the army, air force, and navy.

It is one of five weapons at various stages of development under India's Integrated Guided Missile Development Program (IGMDP). The Trishul is powered by a two-stage solid and liquid propellant system and has high maneuverability. Pakistan expressed serious concern in response to India's successful Trishul launch.

*The Hindu*, [Online] <http://www.webpage.com/hindu/>, 11/26/97. *Pakistan Link Headlines*, [Online] <http://www.pakistanlink.co/>, 11/23/97.

Indian Defense Minister Mulayam Singh Yadav said that his country would continue the Agni surface-to-surface ballistic missile

program without further flight testing. Officials in the Defence Research and Development Organisation (DRDO) said the Agni's range might be extended by "boosting" the propellant in the missile's second stage, using a "high-energy storable liquid propellant." DRDO officials also said they were working on developing a propulsion system that used solid fuel exclusively. They could accomplish this shift by removing the second stage, a shortened version of the liquid-fueled Prithvi surface-to-surface ballistic missile. India's Polar Satellite Launch Vehicle (PSLV), successfully launched in 10/97, used this kind of solid propellant motor. Agni's engineers hope to attain a 2,000 km range with the missile's first generation, to be called Agni-I. Subsequent development calls for improving the missile's range to 3,000 km. Engineers foresee further developmental test flights for Agni in order to attain "a 95 percent assurance level" and to verify the missile's performance at its full 2,500 km range. The Defense Ministry has established working groups to determine an appropriate command and control setup for the Agni. Other working group issues include the missile's integration and deployment, targeting priorities, and development of operational doctrine.

*Jane's International Defense Review*, 11/97, p. 5.

A U.S.-Indian agreement signed on 12/16/97 will allow the United States and India to explore joint research in several Earth and atmospheric science-related areas. Joint missions involving hardware exchange may still not be possible, however, because India has not joined the MTCR. Indian officials deny a connection between their space research program and arms control.

Warren Ferster, *Space News*, 1/5-11/98.

The *Times of India* reported that India's Institute of Armament Technology has developed an anti-ship missile defense system. The new system is quicker and more precise than the current defense system. Unlike the old system, the infrared sensor of the new system is able to detect incoming missiles despite potential interference from radiation from the sun and other natural objects. Also, seawater and mist, which affect the propagation of electromagnetic waves, do not

affect the new system.

*Dawn* (Karachi), [Online] <http://dawn.com/daily/>, 1/20/98.

## INDONESIA

### Nuclear

Russia has agreed to sell 1 kg of highly enriched uranium to Indonesia. The uranium will be used in the production of radioactive isotopes for medical purposes.

*Interfax*, 11/12/97; in FBIS-SOV-97-316, 11/12/97.

## JAPAN

### Nuclear

In 7/97, Japanese Prime Minister Ryutaro Hashimoto's issued an announcement that included three new principles of diplomacy between Russia and Japan. In response to that declaration, in 12/97 the Japan Atomic Industrial Forum (JAIF) exchanged a protocol with the Russian Ministry of Atomic Energy (Minatom) to promote mutual cooperation in the field of nuclear power development. Russian Minister of Atomic Energy Viktor Mikhailov and Kohei Abe, Japanese vice-chairman of JAIF and chairman of Chubu Electric Co., signed the protocol. According to the protocol, bilateral cooperation will focus on the nuclear fuel cycle, namely: spent fuel reprocessing, radioactive waste management, and the development and operation of both fast breeder and high-temperature gas-cooled reactors. Since 1977, Japan and Russia/USSR have cooperated on atomic energy. Minatom and JIAF signed the protocol in recognition of both sides' desire to enhance future economic cooperation.

*Atoms in Japan*, 12/97, p. 12.

Liquid radioactive waste reprocessing equipment, capable of reprocessing 7,000 cubic meters of waste from nuclear submarine reactors, was brought to the Zvezda Far Eastern Shipyard in Bolshoy Kamen. The event represents the first step in the implementation of the joint Russian-Japanese liquid radioactive waste program. The waste is being held on several tankers, each containing several thousand tons of waste. There are 40 decommissioned nuclear submarines with 40 to 70 nuclear reactors to be dismantled and

reprocessed.

*Nezavisimoye Voyennoye Obozrehiye* (Moscow), 11/14-20/97, pp. 42, 69.

First criticality of Japan's High Temperature Test Reactor, which was originally scheduled for 12/97, has been postponed to 6/98. The Japan Atomic Energy Research Institute will conduct additional inspections and make further improvements in "some systems" before the reactor goes critical.

*Nuclear Engineering International*, 2/98, p. 4.

According to Japan's Science & Technology Agency, as of 12/31/97, the country's inventory of unirradiated plutonium and spent nuclear fuel totaled 5,000 kg and 49,500 kg respectively. Of the 49,500 kg of irradiated plutonium, 48,000 kg are estimated to be inside reactors, 1,000 kg at the reprocessing plant, and 500 kg in nuclear research facilities. In addition, 15,100 kg of unirradiated plutonium is being stored outside Japan.

Naoaki Usui, *Nucleonics Week*, 2/8/98, p. 13.

On 2/10/98, the Japanese cabinet approved two bills to replace the government-run Power Reactor and Nuclear Fuel Development Corporation, or Donen, with a new agency. A series of nuclear accidents and subsequent falsified reports highlighted the necessity for institutionalizing transparency. The proposed new agency will achieve this transparency through "stepped-up disclosure" norms and procedures. The new agency will also oversee research and development on the fast breeder reactors (FBR) and FBR fuel, spent-fuel reprocessing, and high-level waste disposal. Under the legislation, Donen will also withdraw from research on the Advanced Thermal Reactor, enrichment, and foreign uranium exploration within five years. The new agency is expected to start operating on 10/1/98.

*Kyodo* (Tokyo), 2/9/98; in FBIS-EAS-98-040, 2/10/98.

### Missile

Japan is exploring the possibility of building a ballistic missile defense (BMD) system and will release a feasibility study in April 1999. Under the FY98 defense budget, the Japan Defense Agency is authorized to spend \$670,000 "to explore joint technical research with the U.S.A." Although total spending

on BMD remains classified, it is estimated to be about \$1.3 billion. Officials at Japan's Ministry of Foreign Affairs believe that the country faces a ballistic missile threat from North Korea. They are also convinced that Japan can offer useful technologies to the United States. Japanese press reports suggest that public support is slowly growing for a BMD system.

*Jane's Defence Weekly*, 2/25/98, p. 3.

## KAZAKSTAN

### Nuclear

Kazakstan is unable to send back to Russia 3.5 tons of spent fuel, including a significant proportion of potential weapons-grade plutonium. This is due to increased reprocessing and transport fees at the Mayak Production Association in Russia. Furthermore, there are no Kazak facilities licensed to receive the high-level waste that Russia would return after reprocessing. Kazakstan will store the untreated spent fuel indefinitely either at its BN-350 breeder reactor facility at Aktau, where it is currently being kept, or at the Semipalatinsk testing site. The United States considers the BN-350 reactor a proliferation risk, as it is situated approximately 200 miles from Kazakstan's border with Iran.

*PPNN Newsbrief*, Fourth Quarter 1997, p. 5.  
*NuclearFuel*, 10/20/97. Reuters, 11/18/97.  
*SpentFuel*, 11/24/97.

On 11/18/97, U.S. Secretary of Energy Federico Pena and Kazakstani First Deputy Prime Minister Akhmetzhan Yesimov signed an agreement to shut down Kazakstan's BN-350 fast-breeder reactor in Aktau by 2003 and to "secure, stabilize, and store plutonium-bearing spent nuclear fuel" in the reactor's core and the "spent fuel pool" at the site. According to Rose Gottemoeller, director of nonproliferation at the U.S. Department of Energy, the nuclear fuel at Aktau has been a concern to the United States because of the plant's close proximity (300 km) to Iran. The spent fuel will be stored on-site under IAEA safeguards. The joint program will last "several years." The agreement was precipitated by the inability of Kazakstan and Russia to work out a suitable arrangement to reprocess the spent fuel at the Mayak Production Association (formerly Chelyabinsk-65) in Ozersk, Russia. Under current Russian leg-

isolation and Kazak-Russian agreements, plutonium from the reprocessed Aktau fuel is to remain in Russia and the "newly generated high-level reprocessing waste" is to be returned to Kazakstan.

*Russia Today*, [Online] <http://www.russiatoday.com>, 11/19/97. Mark Hibbs, *NuclearFuel*, 10/20/97, pp. 5-6.

Due to the poor security situation at the Aktau BN-350 nuclear power plant in Kazakstan, the U.S. government has agreed to finance the temporary secure storage of spent breeder blanket fuel from the reactor. The waste contains approximately 3 tons of weapons-grade plutonium. The U.S. Department of Energy's (DOE) Office of Arms Control and Nonproliferation requested \$10 million for FY 1998 and \$15 million for FY 1999 for the project. The U.S. State Department's Nonproliferation and Disarmament Fund has also allocated \$2 million. The German firm Gesellschaft fuer Nuklear-Behaelter (GNB), a joint venture of Gesellschaft fuer Nuklear Service (GNS) and Nukem, may provide casks for permanent waste storage at BN-350 once the German government agrees to provide financing. Until then, the United States will assist Kazakstan in providing temporary storage for the material under a blanket fuel management program that is subject to the U.S.-Kazakstan Joint Commission, a bilateral organization established by U.S. Vice President Al Gore and Kazak President Nursultan Nazarbayev. The program aims to export the waste from Kazakstan to dry storage at the Semipalatinsk complex in Russia, where IAEA safeguards are in force. At first, some U.S. officials expressed doubt about storing the materials at Semipalatinsk, in contrast to the Mayak complex in Russia, which already holds large amounts of weapons-grade fissile material. The Kazaks disagreed, considering that the Mayak facility would have to reprocess the material at the RT-1 plant. As of 2/98, Russian-Kazak nuclear arrangements stipulated that any fuel from BN-350 must be imported back to Kazakstan, which does not currently possess a proper storage facility for reprocessed fuel. Another agreement requires the U.S. DOE and the Kazak government to cooperate on safe storage of the reactor fuel and to decommission the BN-

350 reactor by 2004. An arrangement is under way calling for a technology transfer from the EBR-2 reactor at the Argonne West Laboratory in the United States to Kazakstan to aid the decommissioning.

Mark Hibbs, *NuclearFuel*, 2/9/98, pp. 4-5.

### Missile

In Kazakstan, the formerly closed city of Priozersk is home to a Soviet-era missile test site, known as "test site A" or Saryshagan. The troop detachment responsible for guarding the site has been cut back so much that it is now extremely difficult to protect it adequately. In recent years, the test site has been ransacked repeatedly and, as a result, a large volume of specialized electronic equipment has been stolen. Among the stolen equipment were several components of the secret 5Zh60P and A-135 air-defense systems. Russia deployed the latter in 1995. The 5Zh60P is an experimental weapon. Although Russian weapons specialists believe the equipment was stolen to be sold as scrap nonferrous metal, some of the equipment was stolen from areas where the S-300PMU2 "Favorit" [NATO designation SA-10B Grumble] SAM system was developed and tested. There has been discussion about shutting down the test site permanently, however, Russia needs the site to safely test and demonstrate missiles with ranges of 200 km or more.

Sergey Goryainov, *Nedelya*, No. 34, 1997, p. 5.

## PAKISTAN

### Nuclear

Pakistan's All Parties Conference (APC) met in Islamabad on 11/16/97 and declared that it will not permit the government to accept any limitations on the country's nuclear deterrent, nor would it allow Pakistan to sign the Comprehensive Test Ban Treaty.

*Pakistan Link Headlines*, [Online] <http://www.pakistanlink.com/headlines/>, 11/17/97.

The Pakistani NNI news agency reported on 11/19/97 that the Chashma Nuclear Power Plant (CHASNUPP) would complete installation of two steam generators on 11/21/97. A senior advisor with the China National Nuclear Corporation (CNNC) was scheduled as the chief guest for the event. The installation involves two 250-ton steam generators

manufactured in Shanghai, China. The CHASNUPP is the first "South-South cooperation" in the area of nuclear power. CHASNUPP is designed to be an improved version of the Qinshan Nuclear Power Plant near Shanghai, which has been operating since 1991. The plant is expected to be connected to the national electricity grid in 1999.

*Pakistan Link Headlines*, [Online] <http://www.pakistanlink.com/headlines/>, 11/19/97.

Pakistan, India, and Israel opposed a 11/19/97 U.N. resolution sponsored by Japan concerning nuclear disarmament. The resolution called for states that are not parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) to "accede to it at the earliest possible date, recognizing the importance of universal adherence to the treaty." The Japanese resolution was adopted by a vote of 143-3, with Cuba abstaining.

Masoon Haider, *Dawn*, [Online] <http://dawn.com/daily/>, 11/25/97.

The Pakistan Atomic Energy Commission (PAEC) said on 12/10/97 that press reports of cracks developing in the foundations of the nuclear power plant under construction at Chashma are "not only false and misleading, but totally fabricated." The 300 MW Chashma nuclear power plant, 165 km southwest of Islamabad, is being built with assistance from China.

*AFP*, 12/10/97.

A statement issued by the Foreign Office in Islamabad said that India and Pakistan would exchange lists of nuclear installations and facilities on 1/1/98. "Both the countries are required to exchange on the first working day of each year lists of nuclear installations and facilities as required under the Article II of the Pakistan and India agreement of 1988 on prohibition of attacks against each other's nuclear installations and facilities," according to the statement.

*Pakistan Link Headlines*, [Online] <http://pakistanlink.com/headlines/>, 1/1/98.

On 2/4/98, Pakistani President Mohammad Rafiq Tarar refuted allegations that the country was downsizing its army and nuclear program. But he said there would be "no reduction of any kind in the country's defense capability" and that "the nuclear pro-

gram will continue in accordance with the country's specific requirements."

*Jasarat* (Karachi), 2/5/98; in FBIS-TAC-98-036, 2/5/98.

### Missile

Gordon Oehler, former director of the U.S. CIA's Nonproliferation Center said that Pakistan "had developed a 1,500 km missile which they call the Ghauri." The Ghauri could be similar to the North Korean Nodong-2, since the two surface-to-surface ballistic missiles have similar ranges. Earlier this year, the Pakistani press referred to the missile as the MK-3. U.S. analysts believe that Pakistan received technical advice from China, but Pakistan said the missile was developed indigenously.

Barbara Starr, *Jane's Defence Weekly*, 12/4/97, p. 15.

Pakistan reported that it has developed a new ballistic missile that has a range of 1,500 to 2,000 km. The "Ghauri would fulfill a long-held Pakistani ambition to counter India's "strategic depth." Pakistan said that the Ghauri is designed to counter India's Prithvi missile.

*All India Radio Network* (Delhi), 1/5/98; in FBIS-TAC-98-008, 1/8/98.

In an interview with "Voice of America," Pakistani Foreign Minister Gohar Ayub Khan said that Pakistan is indigenously manufacturing missiles. He denied reports that Pakistan was receiving missiles from China. "Pakistani engineers have themselves acquired this technology and they are manufacturing [missiles] indigenously."

*Pakistan Link*, [Online] <http://www.pakistanlink.com/>, 2/21/98.

## SOUTH KOREA

### Nuclear

Officials from Korea Power Engineering Co. Inc. (KOPEC) have informed foreign nuclear vendors that a "business decision has been made in principle" to standardize future reactor designs on the pressurized water reactor (PWR) as against the pressurized heavy water reactor (PHWR). This means that Atomic Energy of Canada Ltd. (AECL), which was in direct competition with Asea Brown Boveri-Combustion Engineering, will not build any more reactors in South Korea be-

yond the current Wolsung-4. The Wolsung-4 is expected to come on line in 1998. Senior AECL officials claim, however, that they have not been informed of any such decision. South Korea's current economic crisis has also led to a postponement in some nuclear sector investments. The Korea Electric Power Corp. (KEPCO) has delayed construction work on the Ulchin-5 and -6 PWRs. These reactors were originally scheduled to begin operation in 2003 and 2004 respectively. However, no delays have been experienced on the Yonggwang-5 and -6, which are scheduled for completion in 2001 and 2002 respectively.

Mark Hibbs, *Nucleonics Week*, 1/29/98, p. 11.

### Missile

South Korea plans to purchase 100 Popeye long-range missiles, which are produced jointly by the U.S. firm Lockheed and Israel's Raphael. The Popeye has a range of 111 km, which would allow South Korea to strike North Korean military facilities near Pyongyang in the event of war.

*Chungang Ilbo*, 11/1/97, p. 2; in FBIS-EAS-97-306, 11/1/97.

## KOREAN PENINSULA ENERGY DEVELOPMENT ORGANIZATION (KEDO)

The U.S. Department of Energy has completed "canning" more than 95 percent of North Korea's spent nuclear fuel. Despite a two-month delay, KEDO was able to meet its commitment to supply North Korea with 500,000 tons of heavy fuel oil. The delay was caused both by KEDO's financial difficulties and North Korea's poor infrastructure for offloading and storing the oil. Meanwhile, U.S. President Bill Clinton has reassured Congress that all of North Korea's weapons-grade spent nuclear fuel would be canned for safe storage by 4/1/98.

Howard Diamond, *Arms Control Association*, 11-12/97, [Online] <http://www.armscontrol.org>.

Financially strapped South Korea has informed Japan and the United States that it will be unable to pay the "lion's share" (70 percent) of the \$5.2 billion needed to build two light water nuclear power reactors in North Korea. As a result, the project being headed by KEDO is expected to be delayed.

South Korean officials, speaking on condition of anonymity, have proposed alternative methods for financing the project. One alternative would be for Japan and the United States to provide more money in the early stages of the project with "South Korea paying later when its foreign-currency situation improves." The United States has made it clear that it does not expect Congress to fund the light water reactors directly. It has also expressed concern that any weakening of South Korea's commitment to finance the project could embolden North Korea to break the 1994 U.S.-DPRK Agreed Framework, under which the latter agreed to freeze its suspected nuclear weapons program in return for two light water reactors.

Mark Hibbs, *Nucleonics Week*, 1/8/98, p. 7; *AFP*, 2/2/98, [Online] <http://dialog.carl.org/>. David E. Sanger, *New York Times*, 2/5/98, p. 1.

In a significant change of position, the United States has indicated its willingness to shoulder a part of the construction cost of the light water reactors in North Korea. On 2/13/98, U.S. Assistant Secretary of State for East Asian and Pacific Affairs Stanley Roth told a press conference in Japan that "if the U.S. Congress receives a request from the administration to approve the cost of the light water reactors, Congress will positively review it." But the United States has demanded South Korea's participation in the supply of heavy oil to North Korea in exchange. South Korea estimates the future cost of supplying oil to North Korea to be between \$300-\$400 million. On the other hand, the costs that the United States would incur for the reactor project would largely be symbolic (from a minimum of tens of millions of dollars to a maximum of \$100-\$200 million). For that reason, according to a South Korean official requesting anonymity, South Korea has rejected the U.S. proposal. According to figures released by South Korea's national unification and foreign ministries, South Korea and Japan will spend \$3.5 billion and \$1 billion respectively on the nuclear power project. The United States is expected to share some of the remaining \$670 million cost.

*Chosun Ilbo* (Seoul), 2/16/98, p.1; in FBIS-EAS-98-047, 2/16/98.

South Korea has urged the United States to circumvent its export control laws in order to export nuclear reactors and related equipment to North Korea. The pressure comes in the wake of mounting uncertainty as to whether the export of nuclear reactors to North Korea, as stipulated in the 1994 Agreed Framework, can be undertaken in the absence of a nuclear cooperation agreement between the two countries. According to Clinton administration officials, however, there is no move in the executive branch to alter U.S. policy or seek alternate means to push the policy forward. In January 1998, U.S. nuclear vendor ABB-CE withdrew its December 1997 export license request to supply nuclear equipment to North Korea. The request was withdrawn on advice from the U.S. executive branch that it could not be granted in the absence of a U.S.-North Korean nuclear cooperation agreement. One proposal is to dub ABB-CE technology as "South Korean" technology. North Korea, however, has refused to accept a "South Korean" reactor. It is also doubtful whether ABB-CE would be willing to give up its U.S. label. U.S. officials have also expressed concern that because of a two-year delay in taking samples from the Yongbyon nuclear complex, the IAEA will be unable to account for North Korea's nuclear inventory. Any certification, therefore, would have to be a "political judgement call." U.S. State Department officials have denied that there has been a formal shift in position in favor of increased funding for the light water reactor project. But another source close to the project has said that there is now a "raging debate" within the Clinton administration on the future course of U.S. policy on the project.

Mark Hibbs, *Nucleonics Week*, 2/26/98, p. 3.

## TAIWAN

### Missile

Taiwan has welcomed the 9/30/97 U.S. House of Representatives committee proposal inviting it to participate in the theater missile defense (TMD) program. Taiwan's legislators, however, are divided on the issue. One group believes that Taiwan's participation in the TMD program could prove to be very expensive and trigger an arms race with China. A second group believes that partici-

pation would enhance Taiwan's security.

*Jane's Defence Pointer*, 1/98, p. 9.

Taiwan's Chungshan Institute of Technology and Science (CITS) has modified the Tien-kung surface-to-surface missile and will test it in an anti-ballistic missile mode in 5/98. In 1/98, preparations were completed for the target missile to be used in the test. CITS has also achieved a breakthrough in the development of supersonic cruise missiles. It has succeeded in using the Hsiung-feng anti-ship missile as a test-bed to integrate a ramjet engine with the rocket section of the missile. The development plan has been dubbed the "Chien-Tien Plan," and the new missile is called Hsiung-feng 3. The missile, however, is too long to be deployed on fighter aircraft and warships.

*Taipei Chung-Kuo Shih-Pao*, 2/25/98, p. 1.

## THAILAND

### Nuclear

Thailand's Office of Atomic Energy (OAEP) has sought permission to start construction of a 10 MW research reactor in 11/98. In 6/97, the OAEP contracted America's General Atomics to build a research reactor, an isotope production system, and radioactive waste plants in the country's Ongkharak district. Thailand's Nuclear Facility Safety Subcommittee has stipulated, however, that the OAEP pass a safety analysis review conducted by the U.S. Nuclear Regulatory Commission. If approved, construction of the reactor will be completed by the year 2000.

*Bangkok Post*, 2/7/98, p. 3.

### Missile

Less than one year after its inception, Thailand's space-launch program has been cut due to the recent collapse of Thailand's currency, the *baht*. Thai Ministry of Communication sources say that cooperation with Israel, the United States, and a few European governments concerning satellite telecommunications technology will continue.

Barbara Opall, *Space News*, 11/2/97, p. 3.

## VIETNAM

### Nuclear

A "chunk" (80 g) of plutonium, left behind in Vietnam after a failed wartime retrieval effort,

has been located and placed under international safeguard. The plutonium was left behind at the end of the Vietnam War in 1975. The missing plutonium came to light in January 1997, when the Department of Energy declassified documents that detailed failed recovery efforts at a U.S.-built nuclear reactor in the Vietnamese hill resort of Dalat. Previously, Vietnam had disclosed the possession of a "small radiation source of unknown origin," after concluding a safeguards agreement with the IAEA on 2/23/90.

Jim Wolf, *Reuters*, 2/10/98.

## EUROPE

### AZERBAIJAN

#### Missile

According to a U.S. Central Intelligence Agency (CIA) annual report, in 1997 Azerbaijan, with the mediation of the Swiss firm Intora, sold Peru a shipment of air-to-air missiles for \$8 million. The Azerbaijani Defense Ministry denied the report.

*Turan* (Baku), 1/14/98; in FBIS-TAC-98-014, 1/14/98.

### BULGARIA

#### Nuclear

On 11/28/97, Moldovan Ambassador to Bulgaria Mihai Koshkodan, Chairman of the Bulgarian Energy Committee Ivan Shilyashki, and Oleksandr Smeshlyov of the Ukrainian government signed an agreement regulating the transport of fresh nuclear fuel from Russia to Bulgaria (and spent fuel from Bulgaria to Russia) through the territories of Ukraine and Moldova. Russia is expected to sign the agreement in 12/97. The duration of the agreement will be 10 years and it will be renewed automatically if no objections are raised. Bulgaria signed a separate agreement with Romania. The agreements apply specifically to the transport of nuclear fuel to and from the Kozloduy reactors in Bulgaria.

BTA (Sofia), 11/28/97; in FBIS-EEU-97-334, 11/30/97. RFE/RL Newsline, [Online] <http://www.rferl.org/newsline>, 11/18/97.

## CYPRUS

### Missile

Russian Foreign Ministry spokesman Gennadiy Tarasov strongly denied on 12/19/97 that Russia might halt the sale of S-300 missiles to Cyprus in return for financial compensation. The S-300 missiles for Cyprus are being assembled in Russia at the Avangard plant and tested at the Fakel design bureau. The Avangard factory once mass-produced missiles for Soviet air defense, but is now dependent on exports for its survival.

Reuters, 12/19/97. Lionel Barber, John Barham, and Bruce Clark, *Financial Times* (London), 12/19/97. Aleksandr Sychev and Gennadiy Charodeyev, *Izvestiya*, 11/12/97, p. 3; in FBIS-TAC-97-317, 11/13/97.

## GEORGIA

### Missile

The Georgian government, in a parliamentary session in late 1/98, said that it had violated an embargo by exporting "precision devices" to Iran. Two unique lathes weighing a total of 200 tons had been dismantled and exported to Iran. The lathes belonged to the Akhalkalki factory producing cable equipment and were shipped to Iran in nine trailers.

*Georgian Times*, 2/20/98, No. 223, p. 2.

## GERMANY

### Nuclear

On 11/13/97, German Chancellor Helmut Kohl told a parliamentary committee that he knew nothing about a 1994 plutonium sting operation, which allowed smugglers to transport 362.9 g of plutonium on board a passenger aircraft from Moscow to Munich. The committee questioned Kohl as to whether he knowingly jeopardized the safety of passengers by allowing the shipment of nuclear material into Germany, rather than arresting the smugglers before the flight departed. On 12/13/97, a hand-written note from then-Assistant Head of the Bavarian Ministry of Justice Karl Huber alleged that he had been informed of the sting operation prior to the event. According to a German spokesman, the Russian government acknowledged that the material originated from a research reactor in Obninsk. However, Nikolai Kovalev, head of the Russian Federal Security Ser-

vice, denied the confiscated radioactive material was of Russian origin. Kovalev reiterated this position in an interview on Russian television, saying that "the plutonium which was confiscated was not of Russian origin, and there are expert findings to this effect."

Reuters, 11/13/97. Karl-Ludwig Guensche, *Die Welt* (Internet version), 12/13/97; in FBIS-WEU-97-347, 12/13/97. Vladimir Smelov, ITAR-TASS, 10/26/97; in FBIS-TAC-97-299, 10/26/97. Dmitriy Pogorzelskiy, Moscow NTV, 10/26/97; in FBIS-TAC-97-299, 10/26/97.

Western criminal justice agencies reported that in 1997 there were no new diversions of plutonium or weapons-grade highly enriched uranium (HEU) from former Soviet Union inventories. The main reason for this was that potential smugglers are becoming aware that there is no practical buyer's market. Germany has seen a continual drop in incidents of nuclear material smuggling for the past three years: from 267 cases in 1994 to 77 cases in 1996. The decline continued for the first half of 1997. However, Germany reported in the second half of 1997 an upturn in incidents involving natural uranium sources such as Cesium-137, but no HEU or plutonium.

Mark Hibbs, *Nucleonics Week*, 1/8/98, pp. 11-13.

## HUNGARY

### Nuclear

Hungarian police arrested four men, including two Slovaks, for allegedly trying to sell a radioactive isotope of strontium in Debrecen, eastern Hungary. Dezso Csonka, a local police investigator, said that the men were carrying a black plastic box of radioactive material wrapped in a transparent plastic cover. The material's radiation level was above the limit prescribed by the Nuclear Research Institute of the Hungarian Academy of Science. However, there was no leakage because "the material was wrapped up in an expert way so it could not affect the environment," Csonka said.

AFP, 02/07/98; in Dialog@Carl, [Online] <http://dialog.carl.org>, 02/09/98.

## LITHUANIA

### Nuclear

Two men were arrested in Lithuania after trying to sell 10 kg of illegal radioactive material "believed to be uranium or some other kind

of fuel used in nuclear reactors." There have been two other incidents involving the discovery of radioactive material in Lithuania in the past five years. One, in 2/96, included approximately 100 kg of highly radioactive material in Visiginas, near the Chernobyl-style nuclear power plant called Ignalina. The other was in 5/93, when 4 tons of radioactive beryllium, which is used to make nuclear warheads, were found in Vilnius.

Reuters, "Lithuanian Police Seize Radioactive Material," 1/13/98.

## POLAND

### Missile

The Polish government is considering several options for radar and missile systems for its Loara anti-aircraft missile vehicle. Poland is particularly interested in an offer from Israel's Rafael, which has proposed designing a turret equipped with its Barak missiles and with radar from Sweden's Ericsson. Poland considers this option attractive because Warsaw's Radwar plant would be involved in the design and production of the turret, which is considered to have export potential. Several NATO and Latin American countries have already expressed interest in acquiring mobile anti-aircraft missile systems like the Loara.

Wojciech Luczak, *Prawo i Gospodarka* (Warsaw), 1/24/98; in FBIS-EEU-98-027, 1/27/98.

On 1/30/98, Defense Ministers Janusz Onyszkiewicz of Poland, Gyorgy Keleti of Hungary, and Michal Lobkowicz of the Czech Republic announced plans to cooperate in the procurement of weapons and military equipment, in preparation for joining NATO in 1999. Specifically, Hungarian Defense Minister Gyorgy Keleti stated that in the near term the three countries would be "seeking tenders for an air-defense rocket."

AFP, 1/30/98.

## RUSSIA

### Nuclear

Russia is helping China develop its new generation of Type 093 nuclear-attack submarine and Type 094 nuclear-powered ballistic missile submarine. China sought Russian assistance in the area of nuclear propulsion in 1996. Russia is also aiding China in de-

signing quieter hulls that are covered with a layer of anechoic tiles to reduce noise during operation. Foreign observers believe that it will take another decade before the Type 093 and Type 094 become operational.

*Beijing Jianchuan Zhishi*, 10/97, p.10; in FBIS-CHI-98-065, 3/6/98.

Russia's Minister of Atomic Energy Viktor Mikhailov read an announcement by President Boris Yeltsin at the IAEA General Conference in Vienna, Austria stating that Russia will withdraw up to 50 tons of plutonium and 500 tons of HEU from nuclear warheads. The fissile materials will be for use in U.S. civilian nuclear reactors. Russia intends to redistribute 120 tons of the HEU by 2000. By 10/13/97, Russia had already withdrawn 36 tons of HEU from military use.

*SpentFuel*, 10/13/97, p. 4. *Uranium Institute News Briefing*, 10/8/97-10/14/97.

Russian scientist Aleksey Yablokov, said that Russia has 700 atomic demolition munitions (ADMs), and that the United States had 608 but has since destroyed them. Yablokov said that the mines were made to be detonated on enemy territory by a "saboteur." In addition, he said that the United States intended to use its mines during the Vietnam War. Yablokov said he believed that all nuclear weapons located at Russian army depots are under strict control, but he wanted to verify if any were missing. He noted that the Palestine Liberation Organization had twice reported it had nuclear mines, and that it had illegally purchased them from Russia. In addition, he said there were two reports of such weapons in Chechnya. He said that the probability of any missing ADMs was not great, but that he wanted to reduce the probability to zero. After writing an article for *Novaya gazeta* about ADMs in mid-October 1997, Yablokov wrote to President Boris Yeltsin on 10/27/97 warning that if Yeltsin did not reply he would publicize the technical characteristics of the weapons mentioned in the letter. In early November 1997, the Russian Defense Council suggested that Yablokov take part in drafting a new presidential decree resolving "the main problems of controlling compact nuclear mines." Yablokov said he wanted the decree to reflect three main parts. First, nuclear mines must be completely destroyed.

Second, the president must confirm that after their destruction the devices never be manufactured again. Third, there must be added to the criminal code a statute stipulating personal responsibility for the design and production of compact nuclear weapons. A similar statute exists with reference to biological weapons. Another source reported Yablokov as saying that besides "nuclear briefcases," "nuclear kegs" also exists. "Nuclear kegs" differ from "nuclear briefcases" in weight, power, and shape, he said. "As far as I know, a 'keg' is much more powerful than a 'briefcase,'" said Yablokov. He also mentioned that he did not know whether Russia had more "kegs" or "briefcases." On 11/11/97, Georgiy Kaurov, spokesman for the Russian Ministry of Atomic Energy (Minatom), told Interfax that Minatom, "has designed nuclear charges for all kinds and groups of soldiers with different strengths, different compositions, and different purposes. We are producing nuclear charges that can be made into different forms: a torpedo, a mine, a warhead or something else. We have produced no nuclear mines, but we have produced charges." Kaurov also said that the term "keg" was "professional jargon" for "an automatic block of nuclear weapons." Minatom is unaware of the existence of any "nuclear briefcases," Kaurov said.

Vladlen Maksimov, *Novaya gazeta*, 11/10/97-11/16/97, pp. 1, 2. *Jamestown Monitor*, 11/4/97. Interfax (Moscow), 11/10/97; in FBIS-TAC-97-314, 11/10/97. Interfax (Moscow), 11/11/97; in FBIS-UMA-97-315, 11/11/97.

According to an Interfax report, Russian Minister of Atomic Energy Viktor Mikhailov said that Russia will cooperate in the peaceful use of nuclear energy with any country that agrees to adhere to international accords. Mikhailov said this condition "fully applies to Iran" and any other country that has placed its nuclear program under IAEA control.

AFP, 11/24/97.

Stolen radioactive material, from what may have been the largest such theft ever, apparently from Russia, was found in Lithuania. "The Russian Ministry of Internal Affairs (MVD) is investigating 30 criminal cases of misappropriation of nuclear materials." MVD officials say that "80 percent of checkpoints

at Russian nuclear facilities were not equipped with apparatus capable of registering ionizing radiation." The materials stolen cannot be used to create nuclear weapons, said officials.

NTV (Moscow), 1/14/98; in FBIS-SOV-98-020, 1/20/98.

The United States and Russia are considering a joint project to design, develop, and construct nuclear fuel casks which will allow safe handling and interim storage of spent and damaged fuel assemblies in the Murmansk region of Northwest Russia. Many fuel assemblies originated from civilian nuclear-powered icebreakers and decommissioned naval submarines. The United States will commit \$500,000 to the \$1.5 million project. The casks will be placed on concrete pads for up to 25 years. The casks will relieve the burden of fuel stored on the ships *Lotta* and *Lepse* anchored in Murmansk harbor. The project will also allow other fuel from decommissioned submarines to be removed from unsafe conditions. The project will use Russian expertise and technology. Russia's goal is to have cask production at one or more former weapons production facilities.

U.S. Department of State Press Release, 1/22/98.

Agents from the Novosibirsk office of Russia's Internal Affairs Ministry (MVD) Office have arrested five suspects in connection with an attempted illegal sale of Uranium-235, which is believed stolen from Ust-Kamenogorsk in Kazakstan. According to the criminal investigation report, the group, formed in 1995, dealt mainly in non-ferrous metals but later tried to sell several ceramic capsules containing the Uranium-235, which they obtained from an intermediary. The suspects, Sergey Gorin, Aleksandr Marinov, Viktor Fominin, Aleksey Aristov, and Oleg Pchelintsev, were unsuccessful in selling the uranium. After the group failed to sell the radioactive material, the local MVD organized crime unit learned of the attempted sales. An undercover unit was assigned to the case and two officers posing as businessmen from Novosibirsk contacted the group. The pair were successful in obtaining two of the capsules for testing, telling the suspects that if the quality of the samples was acceptable they would purchase the

whole shipment. On 3/20/97, the undercover agents contacted Fominin in Rubtsovsk. All five have been charged in connection with 22 separate incidents involving the illegal sale and storage of radioactive materials. All face a maximum prison sentence of eight years. Moreover, all have suffered serious health problems after being exposed to the radioactive materials.

Konstantin Voronov, *Kommersant-Daily*, [Online] <http://win.www.online.ru>, 2/7/98.

Russian Minister of Atomic Energy Viktor Mikhailov said in a news conference on 2/18/98 that "Russia does not cooperate with Iraq in nuclear energy." He went on to say that the research reactors in Iraq had been shut down and the fuel supplied for them had already been taken back to Russia and reprocessed.

Oleg Lebedev, *RIA-Novosti*, 2/18/98.

### Missile

Senior U.S. officials said that the Russian government has promised to stop Russian companies and scientists from assisting Iran's ballistic missile program. In the last six months, Russia has thwarted two attempts made by Iran to acquire ballistic missile technology. First, Russia expelled an Iranian diplomat based in Moscow for his efforts to secure Russian missile help. Second, Russia canceled a contract with Iran made by NPO Trud, a former state owned Russian company. One U.S. official said, "for their own interests, the Russians are getting serious about closing the gap between what they've said repeatedly and what's actually happening." U.S. officials also said that the Russian government has stopped any state assistance which would violate Russia's commitment to the Missile Technology Control Regime (MTCR).

Steven Erlanger, *New York Times*, 1/16/98, p. 8.

In their fourth round of discussions since August 1997, the United States and Russia have made little progress in reaching an agreement ending Russian missile aid to Iran. The goal of these negotiations is effective enforcement and monitoring of export control on Russia's part to avoid U.S. sanctions. According to U.S. law, Russian institutes and research facilities are subject to sanctions if

they assist Iran's missile program. U.S. sources say Russia is helping Iran "develop two new ballistic missiles, providing guidance systems, laser equipment, tungsten-coated graphite, and conducting wind tunnel tests." U.S. Ambassador Stephan Sestanovich identified Iran and Iraq as the "biggest and most difficult challenges in U.S. ties with Russia." He said that Iran is "taking advantage of Russia's economic woes and large reservoir of advanced technology and scientific talent to accelerate development of an indigenous ballistic missile capability."

*Russia Today*, 1/16/98, [Online] <http://www.russiatoday.com>.

The head of the Russian Space Agency, Yuri Koptev, said on 1/30/98 that Russia has halted technical assistance to Iran's missile program. Western sources say Iran is trying to produce a missile that could hit both Israel and U.S. troops in Saudi Arabia. Russia will, however, continue maintaining its relations with Iran as it has some influence over other countries in the region, including Afghanistan.

*Milwaukee Sentinel & Journal*, 1/30/98.

Three foreigners were apprehended in Russia by Federal Security Service (FSB) officials in mid-4/98. The suspects had attempted to smuggle 21.7 tons of "alloy steel" [likely maraging steel] to Iran through Azerbaijan. The foreigners, whose nationalities were not disclosed, used the credentials of several Russian trade companies. Alloy steel, such as that being smuggled, can be used in rocket technology. An unnamed FSB official said that the foreigners would be charged with smuggling but not with violating international missile technology nonproliferation accords. Alloy steel is not on the Russian list of materials subject to export restrictions. Representatives from the Iranian embassy said Iran "has never in any way tried to gain access to Russian missile technology," nor will it in the future. A Russian Foreign Ministry spokesman announced on 4/14/98, "There is no cooperation whatsoever in the area of development of any technology which has anything to [do] with [the transfer of] missile technology to Iran."

Interfax, 4/15/98. AFP, 4/15/98, [Online] <http://guide-p.infoseek.com>.

## UKRAINE

### Nuclear

On 11/4/97, the Ukrainian State Property Fund (FSPU) endorsed the statutory documents for the Ukrainian-Russian joint nuclear fuel venture, TVEL-Energy, and agreed to represent the national nuclear utility Energoatom in the resulting joint stock company. The endorsement marked the last step in creating TVEL-Energy, which officials created to arrange payment for Russian nuclear fuel sent to Ukrainian nuclear power plants. The initial agreement to create the new company was signed on 10/6/97. In 1997, Ukraine owed Russia \$19.6 million for supplies and \$3.5 million for nuclear fuel due to not being paid by its own customers. Ukrainian customers usually pay for approximately six percent of consumed electricity. Thus, Ukraine's biggest advantage in the deal will be a 150-day "credit on Russian reactor fuel." Another source said that the establishment of TVEL-Energy will permit Ukrainian power stations a six-month grace period to pay for the fuel. Payments will be in cash, "valuable papers," and goods in kind (e.g., food, metal, and other goods) with each category amounting to about a third of the total price. Also, according to the deal, Ukraine must pay Moscow \$100-150 million annually for spent nuclear fuel that will be sent to and buried in remote areas of Russia. As of 11/17/97, Ukraine and TVEL were still negotiating a Russian proposal to create an insurance fund (roughly \$200 million) for the joint venture. TVEL-Energy will have 1.85 million hryvnas in "nominal equity" (about \$1 million). The FSPU will control 30 percent of TVEL-Energy for Ukraine. Two private Ukrainian firms, VA Bank and a Ukrainian-Andorran joint venture, AMP, will control 10 and 15 percent, respectively. The Russian fuel maker, TVEL, will hold 35 percent of shares. Russia's Inkombank will possess the remaining 10 percent. Energoatom Executive Director Vitaly Tolstonogov said that by the end of 1997 Russia would finish supplying fuel in exchange for all of Ukraine's strategic nuclear warheads, which it gave up under the 1994 trilateral agreement between Ukraine, Russia, and the United States. By signing the \$1 billion deal, Ukraine received free fuel in exchange for allowing Russia to destroy its

nuclear warheads.

Alexei Breus, *NuclearFuel*, 11/17/97. *Ukrainian Weekly* (Kiev), 10/12/97. *Financial Times East European Energy Report*, 10/97.

The European Union's TACIS (Technical Assistance to the CIS) 1997 budget included ECU13 million to improve safety in Ukrainian nuclear power plants. On 11/20/97 in New York, delegates from 50 donor countries will debate plans for the closure of the three remaining Chernobyl nuclear reactors and the funding of a new sarcophagus over the ruined fourth reactor. Ukrainian President Leonid Kuchma and US Vice President Albert Gore will chair the conference. The new sarcophagus will cost an estimated \$750 million. In June 1997 in Denver, at the "Summit of Eight," the G-7 countries decided to grant \$300 million to the project. As of 11/19/97, the European Commission was looking at possibly donating \$100 million, while the European Bank for Reconstruction and Development already provided some funds. Also, the Czech Republic has offered Ukraine \$50,000 toward upgrading the old sarcophagus. Ukraine will share in funding the construction with \$50 million, and add the \$100 million needed to service the shelter over seven years. The current sarcophagus, which was put in place after the 1986 disaster, is in "very poor condition."

Kuchma has promised to close down Chernobyl's three operating reactors by the year 2000. Nonetheless, his promise is conditional upon Western aid, among other prerequisites. If the preconditions are not met, Ukraine may decide to upgrade the reactors, Yuri Kostenko, Ukrainian minister of environment and nuclear safety, told Interfax on 11/17/97. Among the issues to be discussed at the 11/20/97 conference in New York, is how Ukraine would compensate for its lost energy-production capacity if the Chernobyl plant were to close. Plans as of 11/19/97 called for two new VVER-1000 reactors to be built at the Khmel'nitsky and Rovno nuclear power plants. Construction on these reactors started in the mid-1980s but was halted after the Chernobyl accident and the break-up of the Soviet Union. On 11/14/97, Kuchma and Russian First Deputy Prime Minister Anatoly Chubais reviewed possible Russian participation in that construction. The VVER-1000

reactors are of Russian design, and 75 percent of the required parts are Russian-made. The European Bank for Reconstruction and Development has pledged financial support for these projects in an effort to shut down Chernobyl by the year 2000.

Thomas Nilsen, *Bellona: Nuclear Chronicle From Russia*, 12/97, pp. 6-7.

Ukrainian law-enforcement officials confiscated a capsule containing Rubidium-87 and detained two individuals shortly after they entered Ukraine from Belarus. It has been speculated that the rubidium may have come from Russia since most laboratories that produce the radioactive substance are located there. One gram of Rubidium-87 on the world market is worth approximately \$2,000, however, its sale is strictly regulated. Therefore, the confiscated material may have commanded a much higher price on the black market.

Viktor Yadukha, *Segodnya*, [Online] <http://home.eastview.com>, 12/23/97.

On 2/14/98, U.S. envoy Stephen Sestanovich and Secretary of the Ukrainian State Commission on Security and Defense Vladimir Gorbulin agreed in Kiev on a Ukrainian policy not to sell nuclear technology or equipment to Iran, as well as other issues concerning nonproliferation and missile technology. U.S. State Department spokesman James Foley stated that the United States does not want Ukraine to supply Iran with nuclear power turbines. Washington has asked Ukraine not to sell such turbines to Russia, which in turn would sell them to Iran. The agreement stems from U.S. efforts to reduce Ukraine's dependence on Russia for nuclear fuel and equipment. The United States has also expressed interest in signing an accord with Kiev on peaceful nuclear cooperation. This accord would allow U.S. firms, such as Westinghouse Electric, to bid on a \$1.2 billion project to finish construction of two Russian-designed nuclear power plants in Ukraine. On 2/8/98, the Clinton administration prevented the sale of nuclear fuel and technology to Ukraine until it officially cancels its plans to sell nuclear-powered turbines to Iran.

*Xinhua*, 2/9/98. *Xinhua*, 2/14/98.

The United States and Russia are placing conflicting pressures on Ukraine over its potential sale of turbines to Russia. Russia needs the turbines to construct a nuclear power plant in Iran. Ukraine would prefer to allow turbine manufacturer Turboatom to sell at least one turbine to Russia. Ukraine is not expected to make a final decision until late March 1998. If Ukraine sells the turbines to Russia, Russia has promised to provide its own technology and credits to complete two power plants in Ukraine. If Ukraine decides not to sell the turbines, however, they will be forced to forfeit all future dealings with Russian firms, resulting in a loss of hundreds of millions of dollars. The United States opposes the transfer of any nuclear technology to Iran, despite the fact that Iran has promised to accept international safeguards for the new facility.

Pavel Polityuk, *Ukrainian Weekly*, 2/22/98, p. 2. Yaro Bihun, *Ukrainian Weekly*, 2/22/98, p. 1.

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## LATIN AMERICA

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### ARGENTINA

#### *Nuclear*

In 1998, Argentina will privatize as a package its three nuclear reactors: Embalse, Atucha-1, and the unfinished Atucha-2. Energy Secretary Alfredo Mirkin said it is possible that no company will be interested in purchasing Atucha-2, which has an accumulated debt of \$2.5 billion.

*El Clarin*, 12/23/97; in National Commission on Atomic Energy, [Online] <http://www.cnea.edu.ar>.

### BRAZIL

#### *Nuclear*

On 11/19/97, the United States announced that it will sell nuclear fuel to Brazil. The announcement marks the end of a 25-year ban on U.S. nuclear sales to Brazil. The U.S. firm Westinghouse will supply fuel for Brazil's Angra-1 nuclear reactor at a cost of \$100 million.

Rede Globo Television (Rio de Janeiro), 11/21/97; in FBIS-LAT-97-325, 11/21/97.

### Missile

The first prototype of the Brazilian space launch vehicle (VLS) was destroyed by ground control 65 seconds after launch on 11/2/97. One of four booster rockets failed to ignite, and the VLS-1-VO1 drifted off course until destroyed at an altitude of 3,230 m. On board was the second Brazilian data collection satellite, SCD-2A, manufactured by the National Institute of Space Research (INPE) at a cost of \$5 million. The VLS was produced by the Aerospace Technology Center (CTA) of the air force for \$6.5 million. Russian technicians, who designed the inertial guidance, anti-rolling, and mechanical fin-activation systems used in the VLS, had presented a report warning that the missile launch had only a 15 percent chance of success, and identified propellant failure as a possibility. That report noted that VLS stages had been ready for launch for over two years and were stored in a horizontal position until 9/97, while the guidance system was being developed. The inertial guidance system was originally designed for use in an anti-ballistic missile system, as part of the Soviet response to the U.S. Strategic Defense Initiative program. Brazilian technicians in the CTA developed software to recalibrate guidance beyond the 30,000 m limit of the Russian system.

Ricardo Bonalume Neto, *Folha de Sao Paulo*, [Online] <http://www.uol.com.br/fsp>, 11/3/97. Pedro Paulo Rezende, *Correio Braziliense*, [Online] <http://www.correioweb.com.br/>, 11/3/97.

Brazilian Foreign Minister Luiz Felipe Lampreia and Russian Foreign Minister Yevgeniy Primakov signed an agreement on 11/21/97 to jointly launch satellites and to permit Russian launch of satellites from the Brazilian Alcantara launch facility. The deal replaces a 1988 protocol specifying more operational content in congruence with both states' international nonproliferation commitments. A second agreement was signed to create a high-level commission on bilateral relations to be headed by Russian Prime Minister Viktor Chernomyrdin and Brazilian Vice President Marcos Maciel. The agreements provide for the exchange of researchers. Brazilian Science and Technology Minister Israel Vargas noted that Brazil seeks to recruit Russian space and nuclear energy

specialists.

Agencia Folha, 11/21/97; in Brasil Online, 11/21/97, [Online] <http://www.uol.com.br/bol/>. Luis Felipe Lampreia, Ministry of Foreign Relations (Brasilia), [Online] <http://www.mre.gov.br>, 1/21/97. *O Estado de Sao Paulo*, [Online] <http://www.estado.com.br/>, 11/25/97. Monica Yanakiew, Agencia Estado (Sao Paulo), 11/21/97; in FBIS-LAT-97-327, 11/23/97.

## MIDDLE EAST AND AFRICA

### ALGERIA

#### Nuclear

Algerian Ambassador to Ethiopia Smail Chergui deposited Algeria's instrument of ratification for the Treaty of Pelindaba (the African nuclear-weapon-free zone treaty) in Addis Ababa on 2/11/98. Algeria is the third member state of the OAU to ratify the treaty, of the 48 that have signed it.

Xinhua, 2/12/98; in *Dialog*, [Online] <http://dialog.carl.org>, 2/12/98.

### EGYPT

#### Nuclear

Argentine President Carlos Menem inaugurated a \$100 million nuclear research reactor during his visit to Egypt on 2/4/98. The Argentine firm Invap constructed the 22 MW reactor, which will be used to train personnel and fabricate radioisotopes for industrial and medical purposes. The reactor is installed at the Inshas Nuclear Research Center, 60 km from Cairo, under the jurisdiction of the Authority of Atomic Energy. Egypt was responsible for engineering, management of construction and design, and assembly, and will be responsible for daily operations of this turnkey facility. The plant complies with standards established by the IAEA, and is subject to IAEA inspections. Invap chairman Hector Otheguy said the facility abides by the maximum recommendation of 20 percent enriched uranium for this type of reactor.

*El Cronista*, [Online] <http://www.cronista.com/>, 2/4/98. AFP English Wire, 2/4/98; in *Dialog* [Online], <http://dialog.carl.org/>. *Diario Los Andes*, [Online] <http://www.losandes.net/>, 2/4/98. ESC

Television (Cairo), 2/4/98; in FBIS-NES-98-035, 2/4/98. Christine Hauser, Reuters, 2/4/98.

### IRAN

#### Nuclear

On 10/29/97, Chinese officials provided "authoritative, written communications" that China will not engage in new nuclear cooperation with Iran. China will complete two current projects: a zero-power research reactor that uses heavy water and natural uranium, scheduled to be completed by the end of 1997; and the production of zirconium tubes, designed to hold fuel pellets in the core of a nuclear reactor. China has also agreed not to provide equipment to construct a heavy water, low-enriched uranium nuclear reactor to Iran, and to halt its plans to build a uranium hexafluoride (UF6) conversion plant in Iran.

*Nuclear Fuel*, 11/3/97, p. 3.

Israeli intelligence sources reported that Iran is recruiting nuclear scientists employed during the apartheid era in South Africa. An unidentified South African government spokesman said "There may well be nuclear experts who have been made redundant in South Africa and who are willing to give their skills to any country prepared to pay."

Matthew Campbell and Uzi Mahnami, *Sunday Times* (London), 12/21/97.

The *Israel Consulate News* reported on 2/18/98 that Iran has been working with the Russian Atomic Energy Ministry in hopes of purchasing a 40 MW nuclear reactor from Russia. Professor Gerald Steinberg, an expert on arms control at Bar-Ilan University, said that if Iran sought to produce plutonium for a nuclear weapons program, "a 40 MW dedicated reactor is a far more efficient means than the Bushehr reactor for the production of electricity." However, Russian Atomic Energy Minister Viktor Mikhailov said that "nuclear cooperation between Russia and Iran has never been nor is of a military nature." Iran is receiving assistance from China, the Czech Republic, Slovakia, and Russia for uranium mining, and for construction of a research reactor and a uranium concentration plant.

IINS News Service, [Online] <http://www.iinsnews.com/>, 2/19/98. Valentin Kunin, RIA-Novosti, 2/19/98.

Russia will finish construction on a 1,000 MW light water reactor at Bushehr to fulfill a \$780 million contract. While Iran has finished the equivalent of five months of work on the reactor in the past 25 months, Russia plans to complete the reactor in the next 30 months. Both Iran and Russia deny that the project will provide Iran with nuclear weapons technology.

David Hoffman, *Washington Post*, 2/22/98.

### Missile

On 11/5/97 the U.S. House of Representatives voted to extend from 30 days to 120 days its review of President Bill Clinton's certification that China had agreed not to provide nuclear weapons technology to states "such as Iran and Pakistan." The House asked Clinton to impose sanctions on China and Russia for selling advanced missiles and technology to Iran. House members criticized companies in Russia and China for delivering cruise missiles and ballistic missile technology to Iran.

Reuters, 11/6/97.

Western intelligence services are concerned that U.S. firms are contributing to Iran's missile development through Russian companies. Several Russian companies that have cooperation programs with U.S. firms are also working together with Iran. The companies are Energomash, a Russian consortium that produces engines and has relations with Pratt & Whitney; the Polyus Institute, which specializes in guidance systems and has links with Litton; and the TsAGI Institute, which is working on aerodynamics and is cooperating with Lockheed-Martin.

*Le Point* (Paris), 11/8/97, p. 33; in FBIS-WEU-97-316, 11/8/97.

U.S. intelligence reports that China, despite a May 1997 pledge not to provide nuclear technology to unsafeguarded nuclear facilities, has continued its nuclear cooperation with both Iran and Pakistan. China has supplied missile technology to Iran since 1985, when it transferred solid-fuel technology. Iran subsequently built the solid-fuel Zelzal-2, a 200 km-range artillery rocket, and the 150 km-range Nazeat-10. To avoid restrictions on its ability to acquire the materials to manufacture solid fuel, Iran asked China to construct

solid fuel propellant plants in Iran. Iran is now believed to be "self-sufficient" in the chemicals needed for solid fuel. China has also been a supplier of "subsystems, guidance kits, and telemetry equipment" for the Shahab-3 ("shooting star") and Shahab-4 liquid fuel surface-to-surface missiles. A German intelligence report estimated that Iran's missile program, with China's help, "when completed, will be comparable to modern Western systems." The report says that Iran's purchases of equipment from China "clearly demonstrate the intention in the future to manufacture large quantities of solid rocket fuel." Iran has embarked on a long-range solid-fuel surface-to-surface missile program. Surface-to-surface missiles emerging from this program will have ranges of 4,500 km and 10,000 km respectively. According to U.S. intelligence experts, these longer-range projects are probably based on Russian rather than Chinese technology.

*The Iran Brief*, 11/10/97, pp. 1, 2.

On 11/12/97, the U.S. House of Representatives approved stronger sanctions against countries, companies, and research institutes that aid Iran in developing medium-range and long-range missiles.

Reuters, 11/13/97.

An Iranian diplomat was arrested on 11/14/97 in Moscow for attempting to purchase missile designs from Russian specialists. The Federal Security Service (FSB) detained the Iranian as part of an operation aimed at preventing "illegal exports of technology, scientific, and technological information and services used in creating WMD, arms and military technologies." The report did not say whether this was the Iranian's first attempt at acquiring missile designs from Russia, however, the diplomat was immediately deported to Iran. On 11/16/97, Iran denied any connection to the "businessman." Russian President Boris Yeltsin's spokesman, Sergei Yastrzhembsky, said, "the man's arrest showed Moscow was not cooperating with Tehran in missile development."

Reuters, 11/16/97. Anatoly Verbin, *Washington Times*, 11/17/97.

An unnamed Israeli diplomat said on 11/18/97 that experts in North Korea's Scud-C sur-

face-to-surface missile program were working in Iran.

*Yonhap* (Seoul), 11/18/97; in FBIS-TAC-97-322, 11/18/97.

The U.S. CIA announced that Kazak Colonel Oleg Sinkin was involved in a scheme to buy SS-21 Scarab short-range missiles from Russia and then sell them to Iran.

Bill Gertz, *Washington Times*, 11/19/97.

China and North Korea have sent "teams of technicians" to Iran to work on the final stages of Tehran's surface-to-surface ballistic missile program. Earlier efforts in this program concentrated on using Russian technicians to extend the range of Scud surface-to-surface missiles. The latest program involves more than 100 Chinese and North Korean technicians, with the goal of giving Iran the indigenous capability to build ballistic missiles by the middle of 1998. Those technicians are working to extend the range of the Nodong missile to more than 1,000 miles. Iran is attempting to develop the Shahab-3 and Shahab-4 surface-to-surface missiles with ranges up to 1,000 miles. Leaders in Iran's Revolutionary Guard said they had successfully test-launched a Shahab prototype in 10/97.

Con Coughlin, *Washington Times*, 11/23/97, pp. 1, 5.

On 12/15/97, satellite reconnaissance of Iran's Shahid Hemat Industrial Group research facility detected "the heat signature of an engine test for a new generation of Iranian ballistic missiles, each capable of carrying a 2,200 pound warhead more than 800 miles." The test marked another advance of a liquid-fueled intermediate-range missile that would enable Iran for the first time to strike Israel, all of the Persian Gulf emirates, most of Saudi Arabia, and Turkey with warheads capable of carrying chemical and biological agents. U.S. government analysts agree that "this is the gravest short-term menace to U.S. troops and allies in the Middle East."

Barton Gelman, *Washington Post*, 12/31/97, p. A16. *Globes*, [Online] <http://www.globes.co.il/>, 12/31/97.

Senior U.S. officials said that the Russian government has promised to stop Russian companies and scientists from assisting

A two-year investigation by Britain's MI-5 intelligence agency and its European counterparts has uncovered a sophisticated supply network from Britain through Germany and Austria ending in Iran, used to accelerate the Iranian program for producing missiles and nuclear warheads. British customs officials said that Iran planned to use Britain as "a conduit for acquiring high-strength steel of a quality used in missile casing, and centrifuges for weapons-grade uranium." Iranian scientists have already acquired other vital components for their program, disguising some as medical equipment and auto parts. A police raid in Germany uncovered a front company for the Defense Industries Organization, an arm of the Iranian Defense Ministry. German authorities found documents detailing a huge purchasing operation.

Douglas Davis, *Jewish Telegraph Agency*, [Online] <http://www.jta.org/>, 1/19/98.

U.S. CIA Director George Tenet testified before Congress on 1/28/98 that Iran would have the capability to launch missiles against Saudi Arabia in less than 10 years. He said that China recently renewed its pledge to halt sales of anti-ship cruise missiles to Iran. Further, as he testified in 1997, Iran received extensive missile assistance from North Korea and would probably have medium-range missiles capable of hitting Saudi Arabia and Israel in "less than 10 years." Since that time, Iran has succeeded in gaining technology and materials from Russia. Tenet stated that in 1998, combined with recent Iranian advances, Iran "could have a medium-range missile much sooner than I assessed last year."

*Hearings of the Senate Intelligence Committee: World Threat Assessment*, 1/28/98.

Russia's Federal Security Service (FSB) is cooperating with the Iranian intelligence service to coordinate exchanges under a joint Russian-Iranian missile research program. U.S. intelligence officials said that in the coming weeks, three Russian missile experts are expected to be in Tehran. The experts will teach subjects ranging from "guidance systems to firing circuitry and the pyrotechnics of explosive systems." If Russian missile experts continue to aid in Iran's missile development their actions would contradict

Russia's claim that it is curbing assistance to Tehran's medium-range missile program. The continued aid to Iran also demonstrates that the Clinton administration has been unable to stop the exchanges.

Bill Gertz, *Washington Times*, 2/23/98.

## IRAQ

### Nuclear

The International Atomic Energy Agency (IAEA) has said that it has a "technically coherent picture of Iraq's past nuclear program," but also that "it is not possible to guarantee the picture is complete, nor that there could not be some concealed components, activities and facilities." Rolf Ekeus, former chairman of UNSCOM, reported in June 1997 that the key ingredient needed by Iraq to build a nuclear weapon was 35 pounds of highly enriched uranium. Ekeus said, "it is clear that the Iraqi specialists managed to acquire a considerable understanding of weapons design and warhead designs." Iraq sent a letter to the IAEA in September 1997 which said that Iraq "had been unable to locate any additional documentation that might have indicated the extent of development of the nuclear weapon and associated technologies at the time of the program abandonment." Also, the IAEA reported in September 1997 that Iraq was "unable to provide a verifiable explanation of the missing drawings" or of a missing "drawing register which should have recorded the title of each drawing." David Kay, UNSCOM's first chairman, estimated that at the time of the 1990-91 Gulf War, Iraq was six months away from building a crude nuclear weapon and two years away from a refined weapon. Gordon Oehler, former director of the U.S. CIA's Nonproliferation Center, said that despite U.N. and U.S. intelligence efforts, some materials removed from Iraq's main uranium enrichment facility at Tarmiyah "have still not been found." In response to these allegations, Iraq insists that "all nuclear program activities were practically terminated and abandoned during April 1991, three months after the Gulf War."

Bob Windrem, *MSNBC*, [Online] <http://www.msnbc.com/>, 12/5/97.

The Russian Federation has drafted a resolution for the U.N. Security Council (UNSC)

proposing that UNSC Resolution 687 (1991) be modified to terminate IAEA investigative activities in Iraq. However, the IAEA is still uncertain about some aspects of Iraq's pre-war program, such as their gas centrifuge enrichment program and progress in weaponization. The IAEA does not have a complete picture of Iraq's procurement network, and some documents seized by the IAEA are still untranslated. These documents could turn up new leads about the developments in Iraq's nuclear program since the 1990-91 Gulf War, such as information about its weapons activities, centrifuges, or electromagnetic isotope separation (EMIS).

Mark Hibbs, *Nuclear Fuel*, 1/12/98, p. 3.

A 16-member U.N. arms inspection team, headed by Scott Ritter, left Iraq on 1/16/98 after Iraq blocked it from carrying out missions for two consecutive days on the grounds that "the composition of the team lacks balance." Ritter said, "We'll be back," stating that the departure of his team in no way reflects "a change in UNSCOM's determination to conduct inspections." Other U.N. inspection teams have been able to carry out their work without limitations.

*Xinhua* (Beijing), 1/16/98; in *FBIS-CHI-98-016*, 1/16/98.

A draft report of the U.S. House of Representatives Task Force on Terrorism and Unconventional Weapons released on 2/10/98 alleged that Iraq has moved some of its WMD and related materials to neighboring countries. The report stated that 400 Scud missiles were moved to Yemen and Sudan in mid-1991, and that in 1992, Iraq moved 27.5 pounds of highly enriched Uranium-235 to Sudan, and later moved it to Algeria. The report also said that Iraq and Sudan have jointly built a mustard gas weapons plant in Sudan. This plant allegedly employs Iraqi technicians and has produced chemical weapons for the Sudanese government. In response to this article, the Algerian ambassador to the United States denied that Iraq was storing nuclear weapons material in Algeria.

Richard J. Newman, *U.S. News and World Report*, 2/23/98, pp. 18-26.

### Missile

German prosecutors opened the trial of four businessmen accused of exporting missile launchers for Scud surface-to-surface missiles to Iraq. The lead prosecutor said that the former managers at Havert Industrie had sold 35 missile launchers and components for 50 additional launchers to Iraq's arms industry from 1988 to 1990. The accused businessmen used faked documents to secure government export guarantees. In customs documents, the managers described components for the missiles as "seamless pipes, round in diameter," while communications equipment was labeled "erasers and school notebooks."

*The Times* (London), [Online] <http://www.Sunday-times.co.uk/news, 11/5/97>. Reuters, 11/4/97.

New UNSCOM chief Richard Butler said on 11/5/97 that Iraq may be using the break in U.N. inspections to move equipment that could be used to manufacture missiles out of range of cameras set up to monitor the equipment. According to a report Butler filed with the U.N. Security Council, Iraqi officials appear to have moved "significant pieces of dual-capable equipment, subject to monitoring by the commission's remote camera monitoring system, out of view of the cameras." That equipment includes balancing equipment used to position precision gyroscopes that could be used in ballistic missiles. The report states that some cameras appear to have been tampered with, moreover, the lighting was turned off in areas subject to camera monitoring. If inspections were to resume immediately, inspectors would still need to reset security cameras and recheck the machines or stocks they watch, according to Butler's report. In the meantime, inspectors would be unsure whether equipment had been used to produce prohibited arms or components, and then "carted away to hiding places."

John M. Goshko, *Washington Post*, 11/6/97. Barbara Crossette, *New York Times* [Online], <http://www.nytimes.com/, 11/6/97>.

Members of the "Iraqi opposition" said on 11/5/97 that the Palestine Authority's embassy in Baghdad was being used to hide documents related to Iraq's WMD. Opposition sources said that diplomatic immunity at the embassy prevented U.N. arms inspec-

tors from gaining access to the material. A "senior figure" in the opposition movement said the documents deal with the purchase of raw material to be used in Iraq's WMD program and that his knowledge came from "sources inside Iraqi intelligence."

Jay Bushinsky, *Jerusalem Post*, [Online] <http://www.jpost.co.il, 11/6/97>. Christopher Walker, *The Times* (London), [Online] <http://www.Sunday-times.co.uk/, 11/7/97>.

UNSCOM head Richard Butler reported that Iraq fitted biological weapons into missile warheads. Butler said "the biological weapons were loaded onto missiles that could be put on mobile launchers and driven away to avoid being hit by bombs." Butler did not say where he received his information, but said Iraq had enough biological material like anthrax or botulin toxin to "blow away Tel Aviv."

Christopher S. Wren, *New York Times*, [Online] <http://www.nytimes.com/, 1/27/98>.

Russia, France, and Turkey discussed a diplomatic plan to resolve the crisis between Iraq and U.N. weapons inspectors. Russian envoy to Iraq Viktor Posuvalyuk said that the "absolute majority of countries are against any military action" to force Iraq to allow arms inspectors into presidential palaces. At the same time, international experts on missile warheads have gathered in Iraq with Iraqi and U.N. officials for a five-day forum. U.S. Secretary of State Madeleine Albright said that she was still seeking a diplomatic resolution, but if that failed, "Washington would use substantial force to make Iraq back down."

*New York Times*, [Online] <http://www.nytimes.com/, 2/2/98>.

Western estimates indicate that the Iraqi army's current capability is only a fraction of what it was during the 1990-91 Gulf War. Iraq has managed to hide large number of biological (botulin, anthrax germ culture) and chemical (nerve and mustard gas) weapons from U.N. inspectors. Even if Iraq succeeds in loading the biological and chemical weapons on missile warheads, launching the missiles will be difficult as Iraq has few launchers (two to four) and not more than 30 Scud missiles.

Yoshi Melman, *Ha'aretz* (Tel Aviv), 2/2/98, p. B3.

Yossef Bodansky, director of the U.S. House of Representatives Task Force on Terrorism and Unconventional Warfare, said that Iraq maintains the capability to produce WMD through joint programs with Libya and Sudan. Bodansky said that the Task Force's report was compiled using information from Arab opposition movements and British, German, and Israeli intelligence sources.

Richard J. Newman, *U.S. News and World Report*, 2/23/98. Jim Wolf, Reuters, [Online] <http://dailynews.yahoo.com, 2/15/98>.

Sergei Yastrzhembsky, a spokesman for Russian President Boris Yeltsin said on 2/2/98 that Iraqi President Saddam Hussein "had agreed to let United Nations teams inspect eight special sites [in Iraq] that they had been forbidden to enter," and that Hussein would meet with U.N. chief inspector Richard Butler. Iraq immediately denied that any such agreement had been reached. Iraqi deputy foreign minister, Riyadh al-Qaysi said he was "shocked." "I should like to say that that statement is totally, totally, incorrect. No such thing has been discussed."

Michael Specter, *New York Times*, 2/3/98, [Online] <http://www.nytimes.com>.

During the third quarter of 1997, U.N. inspectors in Iraq seized a confidential document that outlined a 1995 agreement between Russia and Iraq. The agreement said the Russian government would sell Iraq "sophisticated fermentation equipment that would be used to develop biological weapons" and the deal would be worth millions of dollars. Other evidence that confirms Russia's support for Iraq includes Iraq's purchase of Russian missile gyroscopes in 1995. Also, a Moscow based company, Mars Rotor, "provided facilities for the testing of missile equipment in Russia before it was sent to Iraq." Russian President Boris Yeltsin warned that if the United States attacks Iraq for refusing to allow inspections, it could lead to a "world war."

Jeffrey Smith, *Washington Post*, 2/12/98, p. A1, [Online] <http://www.washingtonpost.com>.

### ISRAEL

#### Missile

Israel asked the United States to fund the \$150 million production and development

cost of a third Arrow anti-missile battery. Israel intends to use the Arrow system to destroy incoming missiles armed with non-conventional warheads at an altitude of 40 km.

Yerach Tal and Amnon Barzilai, *Ha'aretz*, [Online] <http://www3.haaretz.co.il/eng/>, 11/6/97.

Israeli Prime Minister Benjamin Netanyahu said on 11/16/97 that Iran's missile program could make that country a bigger threat to regional security than Iraq. He said that while the international community focused on Iraq, Iran was proceeding "unseen, unperturbed, and undisturbed" in developing a formidable arsenal that includes intercontinental ballistic missiles. "Stage One would reach our area, Stage Two it [sic] would reach Britain, and Stage Three, believe it or not, they actually plan to reach the eastern seaboard of the United States, Manhattan," said Netanyahu.

Paul Majendie, Reuters, 11/16/97.

For fiscal year 1998, the U.S. Congress authorized budget increases beyond the \$1.8 billion annual foreign military financing package that had been allocated previously for Israel's in-country defense research, development, and production programs. The authorization includes: an additional \$12 million for the Arrow anti-ballistic missile program for a total of \$50.7 million; an additional \$44.5 million for the Nautilus laser anti-tactical missile program for a total of \$61 million; an additional \$12 million for Israel Aircraft Industry's "Hunter" unmanned aerial vehicle (UAV) program, for a total of \$14.2 million; and an additional \$3.6 million for the "Pioneer" UAV program for a total of \$50.6 million.

Ran Dagoni, *Globes*, [Online] <http://www.globes.co.il/>, 11/26/97.

Israeli Defense Minister Yitzhak Mordechai announced that "Israel will launch preemptive strikes against Iran if they continue to pose a threat with missiles or non-conventional weapons." Mordechai's warning also appeared to be directed towards Syria, with whom peace talks have been stalled since December 1995. Israel claims that Iran is within 18 months of developing a liquid-fueled ballistic missile identified as the Shahab-3.

Ed Blanche, *Jane's Defence Weekly*, 12/5/97.

Israeli Defense Minister Yitzhak Mordechai and Turkish Chief of General Staff Gen. Ismail Karadayi met in Turkey on 12/8/97 to discuss new weapons contracts and enhancement of the Israeli-Turkish strategic alliance. "When we lock hands, we form a powerful fist," said Mordechai. He stated, however, that defense cooperation between Turkey and Israel was not directed at any third party. Both sides confirm that it was agreed in principle to jointly produce the Arrow anti-missile missile. However, Israeli officials said that Washington's approval was necessary and that negotiations had not been concluded.

Arieh O'Sullivan, *Jerusalem Post*, [Online] <http://www.jpost.co.il/>, 12/9/97. Arieh O'Sullivan, *Jerusalem Post*, pp. 1-2; in FBIS-NES-97-344, 12/10/97.

Israel received the first of 25 advanced F-15I fighter planes in 11/97, part of a \$2.2 billion deal with the United States. Israel selected the F-15I instead of the F-16 due to the former aircraft's range and payload capabilities. The aircraft can reportedly reach Iran without refueling and deliver 11 tons of bombs and missiles. The acquisition is part of a military plan to neutralize Iran's Russian-backed nuclear and missile program. Two options are under consideration: striking Iranian missile plants in the cities of Shiraz, Kuramabad, Farhin, and Semnan, or targeting foreign scientists rather than the buildings at the sites. Air Force commander Major General Eytan Ben-Eliyahu said that the air force's primary mission is to provide Israel with an aerial umbrella that includes defense against surface-to-surface missiles. When asked by the Israeli newspaper *Yedi'ot Aharonot* if the air force has the ability to destroy Iranian missiles on the ground, Ben-Eliyahu said that "we are getting ready for that possibility, too."

Christopher Walker, *London Times*, 12/9/97, p. 12. Ron Ben-Yeshay, *Yedi'ot Aharonot*, (Tel Aviv), 12/7/97, p. 22; in FBIS-TAC-97-313, 11/9/97.

The London-based *Foreign Report* newsletter reported that Israel's activities in Turkey include preparing for possible air attacks against Iranian nuclear facilities and monitoring military activities in northern Syria. With Turkish consent, Israel has built monitoring stations near the Syrian border to

monitor military air traffic and electronic communications of Scud missile brigades in Syria. The newsletter reports that Israel seeks to station some of its F-15 and F-15I aircraft in Turkey for possible use against Iranian nuclear facilities. Under the terms of the military cooperation agreement signed in 1995, Turkey and Israel are permitted to station eight of their military aircraft in each others' territory permanently. Israel has used its aircraft stationed in Turkey to conduct flights up to the Iranian border. However, on 12/11/97, a senior Israeli Air Force official denied that Israel will permanently station fighters in Turkey.

Douglas Davis, *Jerusalem Post*, [Online] <http://www.jpost.co.il/>, 12/11/97. Arieh O'Sullivan, *Jerusalem Post*, 12/12/97, p. 3; in FBIS-NES-97-346, 12/12/97.

The U.S. Department of Defense announced on 12/23/97 the possible sale of 45 AGM-142D (Popeye) air-to-ground missiles to Israel at an estimated cost of \$41 million. The AGM-142D missiles will allow Israel to increase its capability to target, strike, and destroy high-value and hardened/buried targets.

Defense Link News, [Online] <http://www.defenselink.mil/news/>, 12/23/97.

Israel's surveillance satellite Ofek-4, launched on 1/27/98, failed to reach proper orbit and is expected to burn up upon reentry into the Earth's atmosphere. Ofek-4 was to replace Ofek-3, which was launched in April 1990 and has been operating nine months longer than planned. Israel plans to integrate its surveillance satellites with its Arrow-2 anti-tactical ballistic missile, to create an anti-missile system to counter the threat of attack by missiles armed with non-conventional warheads by Iran, Iraq, and Syria.

Arieh O'Sullivan, *Jerusalem Post*, [Online] <http://www.jpost.co.il/>, 1/23/98. Ed Blanche, *Jane's Defence Weekly*, 1/14/98, p. 4.

The Israeli firm Rafael is developing the MOAV air-launched anti-tactical ballistic missile system, which aims to destroy short-range ballistic missiles during the early stages of flight. MOAV incorporates elements of the Python-4 infrared guided, short-range, air-to-air missile, and of the classified radar-

guided air-to-air missile known as Alto or Derby. MOAV will be fitted with an Alto/ Derby propellant motor, and will have an estimated range of about 80 km. The launch platform is an unspecified long-endurance unmanned air vehicle under development at Israel Aircraft Industries.

*Flight International*, 2/18-2/24/98, p. 31.

## SOUTH AFRICA

### Nuclear

The South African Atomic Energy Corporation (AEC) will sell its zirconium tubing plant to China for \$5 million. SABC television news said it uncovered the sale in a joint probe with the *Sunday Independent* newspaper. On 12/3/97, police and immigration officers raided AEC premises at Pelindaba, finding 40 Chinese nuclear technicians who had been working there in secret since October 1997 to dismantle the plant for shipment back to China. The sale was reportedly rushed to conclusion so that it would take place before the government's review of scientific and technological institutions is reported to the cabinet in 1998. A U.S. Department of State spokesman said that although "the transfer of zirconium fuel fabrication technology and equipment is not normally a proliferation-sensitive issue," the United States is seeking assurance that the facility will not be transferred to Iran after its export from South Africa to China.

Andrew Koopman, *Cape Times*, 12/12/97; in Independent Online, <http://www.inc.co.za>, 12/12/97. *Star*; in Independent Online, <http://www.inc.co.za/>, 12/12/97. *Guardian* (London), 12/14/97. Simon Barber, *Business Day*, [Online] <http://www.bday.co.za>, 12/18/97.

The South African Ministry of Foreign Affairs (MFA) confirmed on 12/18/97 that China has not yet provided end-user certification for the zirconium tube plant South Africa is selling to China. According to Waldo Stumpf, AEC chief executive officer, the AEC will require an end-user statement from China before the plant leaves South Africa to assure that "this plant will not be re-exported to Iran." The MFA said that there are three pieces of equipment, described by Stumpf as CNC machines tools used to make complex molds, which require authorization for export under the Nuclear Suppliers Group

dual-use guidelines. The South African zirconium tube plant was built between 1979 and 1984 using machine tools and other equipment from West Germany. The deal has raised questions about the effectiveness of the South African nuclear export control system. After the AEC board of directors approved the sale of the plant, the AEC sold the components to Pacific Development Services (PDS) of the Channel Islands. PDS, which is run by experts who worked in South Africa's nuclear energy program, was responsible for obtaining the necessary export licenses. Stumpf said that in early December 1997 the AEC and PDS separately notified the Council for Nonproliferation of Weapons of Mass Destruction, the country's authority on dual-use nuclear goods, that the plant would be exported to China. However, neither the AEC, nor PDS, nor China has filed an export permit request with the council. Abdul Minty, deputy director-general of South Africa's Ministry of Foreign Affairs and chairman of the export control authority, only learned of the case from the press in December 1997. Minty is responsible for all of the country's nuclear proliferation and international arms control affairs. According to Stumpf, it is not clear whether PDS should get authorization for export because it is "technically a foreign company." Chinese experts worked at the Pelindaba plant for several weeks packing equipment for shipment, while the council took no action. In recent years, the council has suffered from limited resources and expertise.

Mark Hibbs, *NuclearFuel*, 12/29/97, p. 3. Mark Hibbs, *NuclearFuel*, 1/12/98, pp. 4-5.

The AEC announced in November 1997 that it will cease development of the molecular laser isotope separation (MLIS) uranium enrichment process, after French partner Cogema withdrew from the venture. AEC chief executive officer Waldo Stumpf said on 12/18/97 that due to AEC budget cuts and South Africa's budget deficit, "we are out of that business." Stumpf said that a staff of 200, many of them among "the world's most advanced laser specialists," will be directly affected by the closure. He said "a number of these specialists are negotiating with overseas organizations to accept appointments." Unconfirmed reports indicate that some re-

searchers have been approached by Silex Systems to work on a similar project in Australia.

Ann MacLachlan and Michael Knapik, *NuclearFuel*, 12/29/97, p. 4.

## SYRIA

### Nuclear

According to Russian Atomic Energy Minister Viktor Mikhailov, Russia and Syria signed a memorandum on bilateral cooperation in the civil nuclear power industry to affirm a similar 1983 understanding between the Soviet Union and Syria. The memorandum envisions Russian aid to Syria's nuclear research. Russian Justice Minister Sergei Stephashin headed the government delegation, which included Mikhailov, to Syria on 2/20/98. A Minatom spokesman said that one promising area for cooperation was nuclear waste disposal.

RIA-Novosti, 2/23/98, [Online] <http://www.ria-novosti.com>. Interfax, 2/20/98.

## TURKEY

### Nuclear

The Turkish Electricity Generation and Transmission Corporation (TEAS) has ordered the construction of Turkey's first nuclear center, which is to include two reactors and will be completed in 2006. According to TEAS, the three construction bids under final consideration by Turkey are from the U.S. firm Westinghouse, Atomic Energy of Canada Limited (AECL), and NPI, a joint venture between Germany's Siemens and France's Framatome.

*Foro Nuclear FLASH* (Madrid), 11/1/97, p. 8.

### Missile

While Turkish authorities had earlier threatened to block delivery of Russian S-300 PMU-1 surface-to-air missiles to Cyprus (or to use air strikes to destroy them if delivered), on 1/17/98 Turkish Prime Minister Mesut Yilmaz said that Turkey would not interfere with delivery of the missiles or seek to destroy them. In justifying the decision, Yilmaz noted assurances from the United States that the Cypriots could not actually use the missiles, as well as concerns that an attack on the missiles could escalate tensions between Turkey and Greece. Although Turkish civil-

ian officials are said to be in agreement with Yilmaz's decision, some military officials express doubt.

Gennadiy Charodeyev, *Izvestia* (Moscow), 1/13/98, p. 3; in FBIS-TAC-98-014, 1/14/98. Zeynep Gurcanli, *Hurriyet* (Istanbul), 1/17/98, p. 16; in FBIS-WEU-98-021, 1/21/98.

Turkey will increase its order of Israel's Popeye missiles from 100 to 200 missiles. The missiles will be deployed on Turkey's F-16 and F-4 aircraft, which can destroy Russian-made S-300 missiles recently purchased by Cyprus. By the end of the modernization program of the aircraft by Israel Aircraft Industries, all of Turkey's fighter aircraft will be equipped with Popeye-1 and -2 missiles. Israel has already begun delivery of the first of 100 Popeye missiles sold to Turkey in an earlier \$100 million deal. According to senior defense sources, Turkey and Israel are also planning joint production of Delilah and Arrow missiles. They have agreed in principle to the joint production of hundreds of Popeye-2 missiles, and are expected to agree on a \$500 million deal to jointly produce an advanced, long-range model of the Popeye-1. The first Popeye-2 is expected in two-and-a-half years.

Metehan Demir, *Jerusalem Post*, [Online] <http://www.jpost.co.il/>, 12/5/97.

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## UNITED STATES

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### *Nuclear*

The U.S. government has acknowledged an expert panel's findings that the 8/16/97 seismic disturbance on the Kara Sea floor was not caused by a secret nuclear test conducted at the Russian nuclear test site of Novaya Zemlya. The U.S. Central Intelligence Agency reported earlier that the disturbance had suspicious characteristics, and asked Russia to explain the event. Russia insisted all along that an earthquake caused the tremors. On 11/13/97, Vladislav Petrov, a spokesman for Russia's Minatom, said that no nuclear tests were conducted at the Russian nuclear test site on Novaya Zemlya and that none were under way there. However, Petrov said that Russia had used the Novaya

Zemlya site to conduct hydrodynamic tests, which did not release any nuclear power, in order to verify the safety and storage of nuclear weapons. Petrov noted that all other countries which possess nuclear arsenals conduct such tests. The Japanese news agency Kyodo Tsushin reported that Russia had conducted sub-critical nuclear tests on Novaya Zemlya, but Petrov denied that report.

*Jamestown Monitor*, 11/5/97. Lyudmila Boiko, RIA-Novosti (Moscow), [Online] <http://www.ria-novosti.com>, 11/13/97.

The *Proliferation Primer* was published by the U.S. Senate on 1/12/98. The report, which followed a year-long investigation by the Senate's Governmental Affairs Subcommittee on International Security, Proliferation and Federal Services, was particularly critical of China as a supplier of weapons of mass destruction (WMD). The report named China as "the most significant supplier of WMD-related goods and technology to foreign countries." The report was also critical of Russia's missile aid to Iran. The report voiced concern about North Korea's ballistic missile capability and its missile development program.

*Disarmament Diplomacy*, 1/98, p. 35

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## WORLD

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### *Nuclear*

According to a secret report leaked to Greenpeace by "industry sources," world stockpiles of plutonium will triple over the next 12 years. NAC International of Atlanta, Georgia, which transports spent nuclear fuel, is the author of the report. The company predicts that by 2010, the amount of plutonium separated by the world's nine commercial reprocessing plants will rise from 140 tons to 400 tons. The report, dated 3/95, estimates that 119 tons of plutonium will originate from the Sellafield reprocessing plant in England, while the Marcoule and La Hague plants in France will account for an additional 208 tons. The remaining 73 tons will come from smaller plants in Japan, Russia, and India.

*New Scientist*, 1/17/98, p. 12.