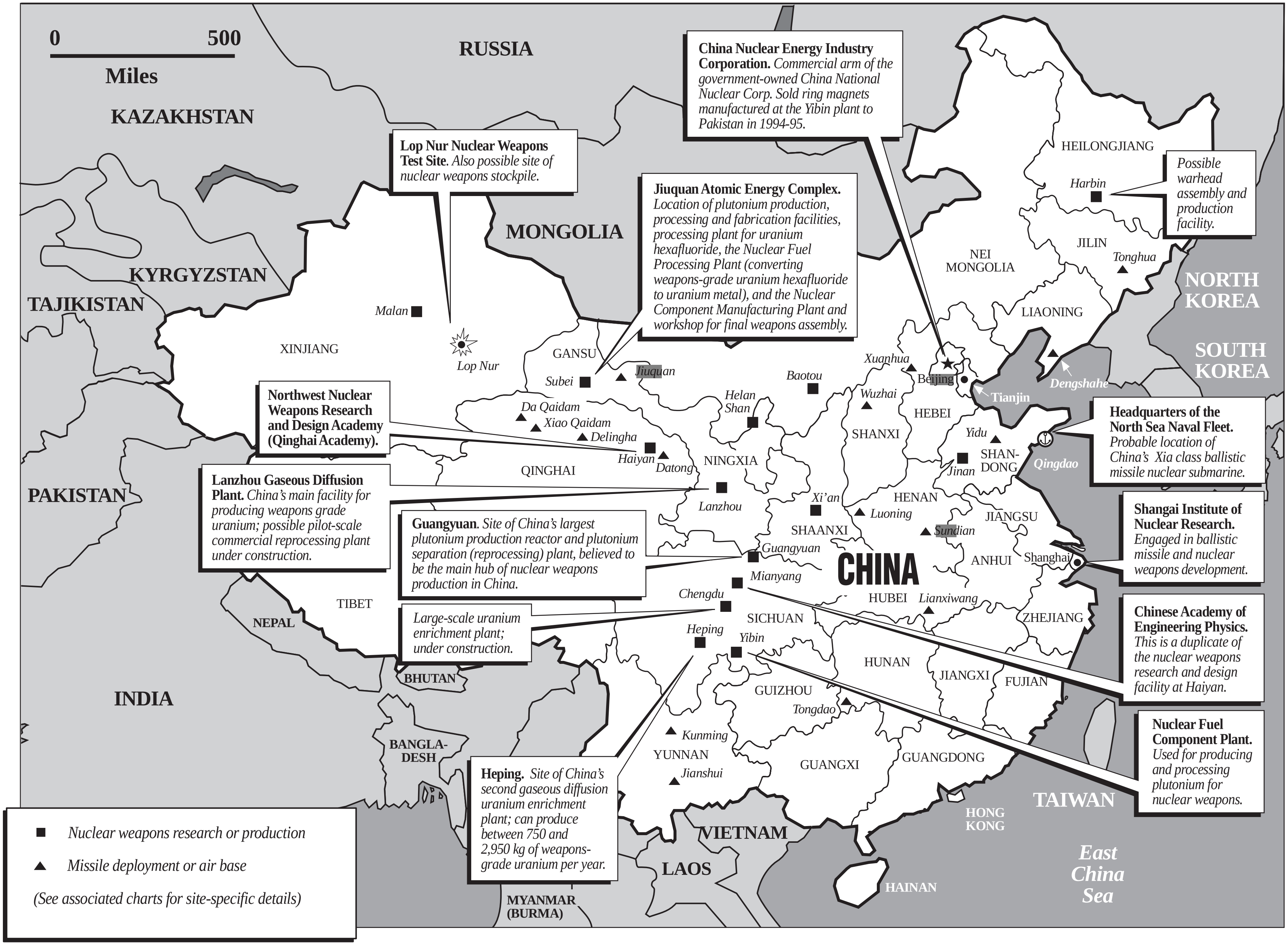
China:

Map and Charts



Carnegie Endowment for International Peace, *Tracking Nuclear Proliferation*, 1998

SOURCES: Robert S. Norris et al., Nuclear Weapons Databook, Natural Resources Defense Council, March 1994; and "Datafile: China," *Nuclear Engineering International*, October 1993, pp. 16-22.

CHINA Chart 1: Nuclear Weapons Systems[a]

TYPE	OPERATING PARAMETERS (km/kg)	NUMBER OF WEAPONS/ LOCATIONS	COMMENTS
LAND-BASED MISSILES			
Dong Feng-3 (3A)/CSS-2	DF-3: 2,650/2,150 DF-3A: 2,800/2,150 Warhead: 3.3 MT	Total: 38+ Yidu, Jianshui, around Kunming, Tonghua, Dengshahe, Datong, Lianxiwang.[b]	First indigenously produced missile. Extended range DF-3A produced in late 1980s. In 1988, 30 conventionally armed DF-3s sold to Saudi Arabia.
Dong Feng-4/CSS-3	4,750/2,200 Warhead: 3.3 MT	Total: 10+ Xiao Qaidam, Da Qaidam, Delingha (cave-based); Tongdao, Sundian (silo-based).	China's first missile capable of striking Moscow.
Dong Feng 5 (5A)/CSS-4	DF-5: 12,000/3,200 DF-5A: 13,000/3,200 Warhead: 4-5 MT	Total: 7-18[c] Luoning Province (2 silos), Xuanhua. Others possibly deployed as war reserves at Jiuquan and Wuzhai Centers.	China's first and only deployed intercontinental ballistic missile (ICBM); identical airframe to CSS-2 space launch vehicles.
Dong Feng-21 (21A)/CSS-5	DF-21: 1,700/600 DF-21A: 1,800/600 Warhead: 200-300 Kt	Total: 30+ Tonghua, Jianshui, and Lianxiwang.	China's first road-mobile, solid-fuel missile; will replace the DF-3 (CSS-2), perhaps by 2002.
Dong Feng-25	1,700/2,000	Under development.[d]	Solid-fuel, road-mobile.
Dong Feng-31	8,000/700 Warhead: 100-200 Kt	Under development.	Solid-fuel, road-mobile ICBM. Tested May 1995, deployment planned around 2000.
Dong Feng-41	12,000/800	Under development.	May have multiple warheads.
SUBMARINE-LAUNCHED BALLISTIC MISSILES (SLBMs)			
Julang-1/CSS-N-3	1,700/600 Warhead: 200-300 Kt	Total: 12 Deployed on one Daqingyu (Xia) class nuclear submarine likely based at North Sea Naval Fleet in Qingdao.	China's first SLBM; solid-fuel; sea-based version of DF-21.
Julang-2	8,000/700 Warhead: 100-200 Kt	Under development. The new Type 094 nuclear submarine is expected to be in service by 2005 and carry 16 JL-2 missiles.	A sea-based version of the DF-31; would allow China's submarines to target the United States for the first time from locations near Chinese coast.[e]
TACTICAL MISSILES			
Dong Feng-15/CSS-6	600/500 nuclear-capable	Total: ? Jiangxi and Fujian Provinces.	Solid-fuel, road-mobile; M-9 export.
Dong Feng-11/CSS-7	280/800 nuclear-capable	Total: ?	Solid-fuel, road-mobile; M-11 export; supplied to Pakistan.
CSS-X[f]	300+/?	Under development.	Improved CSS-7.

Explanation of Terms:

Dong Feng	=	''East Wind''
Julang	=	''Giant Wave''
CSS	=	U.S. designation for ''Chinese Surface-to-Surface''
CSS-N	=	U.S. designation for ''Chinese Surface-to-Surface Naval''
?	=	Uncertain
MT	=	megaton
Kt	=	kiloton

NOTES (China Chart 1)

[a]Principal sources: International Institute for Strategic Studies, *The Military Balance 1997/98* (London: Oxford University Press for IISS, 1997) p. 176; Robert Norris, Andrew Burrows, and Richard Fieldhouse, *Nuclear Weapons Databook Volume V: British, French and Chinese Nuclear Weapons* (Washington, DC: Natural Resources Defense Council, 1994); Robert Norris and Willam Arkin, ''Nuclear Notebook,'' *Bulletin of the Atomic Scientists*, November/December 1996, p. 67; John Wilson Lewis and Hua Di, ''China's Ballistic Missile Program: Technologies, Strategies and Goals,'' *International Security*, Fall 1992; Bill Gertz, ''New Chinese Missile Target All of East Asia,'' *Washington Times*, July 10, 1997; and David Shambaugh, ''China's Military: Real or Paper Tiger,'' *Washington Quarterly*, Spring 1996, pp. 19-36.

[b]These facilities were listed in a secret report by the National Air Intelligence Center, which detailed Chinese IRBM deployments, as reported by Gertz, ''New Chinese Missile,'' op. cit.

[c]Recent press reports refer variously to 13 and 17-18 as the number of ICBMs known to be deployed by China. The most specific such report claims to be based on a new CIA report that is said to give 13 as the number of DF-5 (CSS-4) ICBMs aimed at the United States, and another 5 aimed elsewhere. See Bill Gertz, ''China Targets Nukes at U.S.: CIA Missile Report Contradicts Clinton,'' *Washington Times*, May 1, 1998, p. A1. Since this report has not been confirmed publicly by U.S. officials, the chart information here, which is based on public sources, provides the estimate of 7-18, acknowledging uncertainty about the number of deployed Chinese ICBMs. The lower bound of the range used in strategic arms negotiations to decide whether a ballistic missile is an ICBM is 5,500 km. China currently deploys only one type, the DF-5, with a demonstrated range above that limit.

[d]According to one missile expert, China has abandoned the DF-25 program, although this has not been confirmed by other sources. Eric Arnett, ''Chinese Blow Cold on East Wind Missile Plan,'' *Jane's Defence Weekly*, December 4, 1996, p. 3. Interestingly, a recent Pentagon report on China's military does not mention the DF-25 in its examination of current and projected Chinese ballistic missile capabilities. Department of Defense, *Selected Military Capabilities of the People's Republic of China*, Report to Congress Pursuant to Section 1305 of the FY97 National Defense Authorization Act, April 2, 1997, pp. 3-4.

[e]*World Submarine Challenges 1997*, Office of Naval Intelligence, February 1997, p. 22.

[f]Department of Defense, *Selected Military Capabilities of the PRC*, op. cit., p. 3.

CHINA Chart 2: Nuclear Weapons–Related Sites of Proliferation Concern[a]

NAME/LOCATION OF FACILITY	TYPE/STATUS
NUCLEAR WEAPONS COMPLEX[b]	
Northwest Nuclear Technology Institute, in the Scientific Research District outside Malan, Xinjiang	Archive on nuclear explosions, warfare, and weapons research and design; associated with testing at Lop Nur.
Jiuquan Atomic Energy Complex (Plant 404), Subei, Gansu	Fabrication of fissile materials into bomb cores, and final weapons assembly.
Northwest Institute of Nuclear Technology, Xi'an, Shaanxi	Diagnostic support for nuclear test program.
Lop Nur Nuclear Weapons Test Base, Xinjiang	Nuclear weapons test site and possible nuclear weapons stockpile.
Chinese Academy of Engineering Physics (CAEP), Mianyang, Sichuan	Nuclear weapons research, design, and technology complex; called the "Los Alamos of China," 11 institutes, 8 located in Mianyang.[c]
Institute 905 of CAEP, outside Mianyang	Ordnance engineering lab for non-nuclear components of nuclear weapons; "the Chinese Sandia."[d]
Institute of Applied Physics and Computational Mathematics, Beijing	Conducts research on nuclear warhead design computations for CAEP.
Shanghai Institute of Nuclear Research, Shanghai, Zhejiang	Engaged in tomography, tests solid missile propellants, explosives, and detonation packages for nuclear weapons.
Fudan University, Shanghai, Zhejiang	Engaged in tomography, tests solid missile propellants, explosives, and detonation packages for nuclear weapons.
Harbin, Heilongjiang	Possible warhead assembly and production site.
Plant 821, Guangyuan, Sichuan	Nuclear weapon assembly facility.
PLUTONIUM PRODUCTION REACTORS	
Plant 821 Guangyuan, Sichuan	LWGR, nat. U, 1,000 MW; operational. Largest plutonium producing reactor in China.
Jiuquan Atomic Energy Complex (Plant 404), Subei, Gansu	LWGR, nat. U, 400-500 MW; operational.
RESEARCH REACTORS	
HFETR Nuclear Power Institute of China, Chengdu, Sichuan	Tank, LW; HEU (90%), 125 MWt; operational.
HFETR critical Nuclear Power Institute of China, Chengdu, Sichuan	Critical assembly, LW; HEU (90%), 0 MWt; operational.
MJTR Nuclear Power Institute of China, Chengdu, Sichuan	Pool, LW; HEU (90%), 5 MWt; operational.
MNSR IAE China Institute for Atomic Energy, Tuoli, near Beijing	Tank in pool, LW; HEU (90%), .027 MWt; operational.
MNSR-SD Shandong Geology Bureau, Jinan, Shandong	Tank in pool, LW; HEU (90%), .027 MWt; operational.
MNSR-SZ Shenzhen University, Guangdong	Tank in pool, LW; HEU (90%), .027 MWt; operational.
Zero Power Fast Critical Reactor Southwest Research Institute, Chengdu, Sichuan	Critical fast; HEU (90%), 0 MWt; operational.

CHINA Chart 2 (cont'd.)

NAME/LOCATION OF FACILITY	TYPE/STATUS
HWRR-II China Institute for Atomic Energy, Tuoli, near Beijing	Heavy water; LEU (3%), 15 MWt; operational. Under IAEA safeguards.
SPR IAE China Institute for Atomic Energy, Tuoli, near Beijing	Pool, LW; LEU (10%), 3.5 MWt; operational.
SPRR-300 Southwest Research Institute, Chengdu, Sichuan	Pool, LW; LEU (10%), 3.7 MWt; operational.
Tsinghua Pool Institute of Nuclear Energy Technology, Tsinghua University, Beijing	Pool, two cores, LW; LEU (10%), 2.8 MWt; operational.
PPR Pulsing Reactor Nuclear Power Institute of China, Chengdu, Sichuan	Pool, HEU (20%), 1 MWt; operational.
URANIUM ENRICHMENT	
Heping Uranium Enrichment Plant, Heping, Sichuan	Gaseous diffusion plant: estimated to produce 750-2950 kg HEU/year[e]; operational.
Lanzhou Nuclear Fuel Complex, Lanzhou, Gansu	Gaseous diffusion plant: estimated to produce at least 150-330 kg HEU/year[f]; operational.[g]
Lanzhou Nuclear Fuel Complex, Lanzhou, Gansu	Gaseous diffusion plant: new cascade under construction, for LEU export.[h]
China Institute of Atomic Energy, Tuoli, near Beijing	Laboratory-scale gaseous diffusion: developed enrichment process later installed at Lanzhou.
Russian-supplied centrifuge enrichment plant, Chengdu, Sichuan[i]	Large-scale centrifuge enrichment facility; under construction;[j] capacity: 200,000 SWU/yr.
PLUTONIUM REPROCESSING[k]	
Jiuquan Atomic Energy Complex (Plant 404), Subei, Gansu	Large-scale reprocessing plant, capacity: 300-400kg Pu/yr, and pilot reprocessing plant (both use PUREX method); and Nuclear Fuel Processing Plant for refining plutonium into weapons-usable metals.
Plant 821, Guangyuan, Sichuan	China's largest plutonium separation facility, capacity: 300-400 kg Pu/yr.
Nuclear Fuel Component Plant (Plant 812), Yibin, Sichuan	Plutonium fuel rod fabrication, and plutonium production and processing for nuclear weapons; operating.
Lanzhou Nuclear Fuel Complex, Lanzhou, Gansu	Pilot spent fuel reprocessing plant, nominal capacity of 100 kg/heavy metal per day; under construction, completion in 2000.[l]
URANIUM PROCESSING	
Nuclear Fuel Component Plant (202), Baotou, Nei Mongolia province	Fuel rod fabrication; operating.
Nuclear Fuel Component Plant (Plant 812), Yibin, Sichuan	Fuel rod fabrication; operating.
Jiuquan Atomic Energy Complex, (Plant 404), Subei, Gansu	Nuclear Fuel Processing Plant: Converts enriched UF_6 to UF_4 for shaping into metal; operational.

CHINA Chart 2 (cont'd.)

NAME/LOCATION OF FACILITY	TYPE/STATUS
TRITIUM, LITHIUM DEUTERIDE, AND BERYLLIUM	
Ningxia Non-Ferrous Metal Research Institute (Plant 905), Helan Shan, Ningxia	China's main research and production site for beryllium.
Nuclear Fuel Component Plant (Plant 202), Baotou, Nei Mongolia	Tritium, Li-6 deuterium production; operational.
Nuclear Fuel Element Plant (Plant 812), Yibin, Sichuan	Probable production of tritium and Li-6 deuterium.

Abbreviations:

HEU	=	highly enriched uranium
LEU	=	low-enriched uranium
nat. U	=	natural uranium
MWe	=	millions of watts of electrical output
MWt	=	millions of watts of thermal output
KWt	=	thousands of watts of thermal output

NOTES (China Chart)

[a]Principle sources for this chart: Robert S. Norris, Andrew S. Burrows, and Richard W. Fieldhouse, *Nuclear Weapons Databook V* (Boulder: Westview Press, 1994); *Nuclear Engineering International: World Nuclear Industry Handbook 1997*; "Datafile: China," *Nuclear Engineering International*, October 1993, pp. 16-22; John Wilson Lewis and Xue Litai, *China Builds the Bomb* (Stanford: Stanford University Press, 1988); David Albright, Frans Berkhout and William Walker, *Plutonium and Highly Enriched Uranium 1996: World Inventories, Capabilities and Policies* (New York: Oxford University Press for Stockholm Peace Research Institute International, 1997); International Atomic Energy Agency, *Nuclear Research Reactors in the World*, December 1995; Wisconsin Project, "Nuclear Profile: China," *Risk Report*, November 1995, pp. 3-9.

[b]In addition to the sites listed under Nuclear Weapons Complex, the following sites are engaged in nuclear research, though perhaps not explicitly weapons related: Atomic Research Center, Xinjiang; Institute of Nuclear Energy Technology (INET), Tsinghua University, Beijing; Institute of Nuclear Science and Technology, Sichuan University, Chengdu, Sichuan; Institute of Materials and Elements at the Sichuan Institute of Nuclear Power, Chengdu, Sichuan province; China Institute for Radiation Protection (CIRP), Yaiyuan, Shanxi; Beijing Nuclear Engineering R&D Academy, Beijing; and Nuclear R&D Institute, Tianjin, SE of Beijing.

[c]CAEP is an identical copy of the Northwest Nuclear Weapons Research and Design Academy in Haiyan, the original Chinese weapons design facility that has since been phased out, and the work transferred to CAEP. See Norris et al., *Nuclear Weapons Databook V*, op. cit., p. 338ff.

[d]Ibid. p. 348; and *Risk Report*, op. cit., p. 6.

[e]U.S. Defense Intelligence Agency, *Soviet and Peoples' Republic of China Nuclear Weapons Employment Policy and Strategy*, TCS-65475-72, March 1972; see discussion in Albright, Berkhout, and Walker, *1996 World Inventories*, op. cit., p. 126ff.

[f]This estimate was based on the 1972 DIA report, op. cit.; Albright et al., op. cit., speculate that Lanzhou had a capacity of approximately 24,000-53,000 SWU/yr at that time, but subsequent increases in separative membrane technology are thought to have boosted the capacity to 300,000 SWU/yr and therefore higher levels of HEU production.

[g]Chinese officials have stated that once the centrifuge enrichment plant provided by Russia is fully operational, China will close the Lanzhou gaseous diffusion plant because it is uneconomical to operate. Mark Hibbs, "With More Russian Centrifuges, China Will Close Lanzhou Plant," *Nuclear Fuel*, October 6, 1997, p. 3.

[h]In the 1992 edition of Albright, Berkhout, and Walker, *1996 World Inventories*, op. cit., the authors note that "China is building a new cascade at Lanzhou to produce low-enriched uranium that will be more suitable for export, but this facility is not expected to be completed until the mid-1990s." No further information on the status of this project has surfaced, although it is possible that with the construction of the Russian centrifuge enrichment plant coupled with Chinese statements that the Lanzhou plant will close, this project has been discontinued.

[i]There has been conflicting information as to the exact location of this facility. The most recent reports suggest that the facility is in Chengdu; see Mark Hibbs, "China Will Close Lanzhou," op. cit., and "China's Centrifuge SWU Plant Up and Running, MINATOM Says," Nuclear Fuel, January 27, 1997, p. 3. Earlier reports suggested that the facility might be located in Shaanxi province, perhaps Xi'an or Hanzhong; see Mark Hibbs, "Russian Centrifuge Plant in China to be Finished, Operating Next Year," Nuclear Fuel, September 25, 1995, p. 1. The World Nuclear Industry Handbook 1997 further suggests that the plant is at Lanzhou, alongside the original gaseous diffusion plant.

[j]The first module of the plant began operating in 1996, and the second in late September 1997. No finish date for the third and last module has been given. Hibbs, "China Will Close Lanzhou," op. cit.

[k]Additional military reprocessing facilities are thought to be located at Urumqi, Xinjiang province, and Yumen, Gansu province. "Datafile: China," *Nuclear Engineering International*, October 1993, p. 22.

[l]Mark Hibbs, "Chinese Separation Plant to Reprocess Spent HEU Fuel," *Nuclear Fuel*, January 13, 1997, p. 3, and Ann MacLachlan, "Chinese Official Outlines Plans for Complete Nuclear Fuel Cycle," *Nuclear Fuel*, April 24, 1995, p. 15.