June 4, 2002

MEMORANDUM TO: Chairman Meserve
Commissioner Dicus
Commissioner Diaz
Commissioner McGaffigan
Commissioner Merrifield

FROM: Janice Dunn Lee, Director ***/RA/***
Office of International Programs

SUBJECT: VISIT OF CHINA CAEA VICE CHAIRMAN XU, YUMING
FRIDAY, JUNE 7, 2002

Mr. Xu, Yuming, Vice Chairman, China Atomic Energy Authority (CAEA), will visit NRC on Friday, June 7, 2002. The purpose of the visit is to meet with the Chairman and available Commissioners to introduce himself, to brief on China's nuclear energy plans, to inquire about the future of nuclear energy in the U.S., to inquire about the regulatory environment for new plant construction, and to inquire about NRC's regulatory reaction to the 9/11 attacks. Vice Chairman Xu will also tour the Emergency Operations Center.

Vice Chairman Xu's visit is supported by the Department of State, and sponsored by Westinghouse.

Attached are the meeting schedule, biographical information, country summary, and talking points for use during the visit.

Attachments:
1. Vice Chairman's NRC Schedule
2. Biographical Information
3. Country Summary
4. Background Information on the China Atomic Energy Authority
5. Background Information and Talking Points

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Attachment 1

VISIT TO NRC OF
MR. XU, YUMING
VICE CHAIRMAN
CHINA ATOMIC ENERGY AUTHORITY

June 7, 2002

SCHEDULE:

2:00 p.m.	Courtesy call on Chairman Meserve
2:30 p.m.	Courtesy call on Commissioner Dicus
3:00 p.m.	Courtesy call on Commissioner McGaffigan
3:45 p.m.	Tour of the Emergency Operations Center

BIOGRAPHICAL INFORMATION:
(Attachment 2)

PREVIOUS CONTACT WITH THE COMMISSION:
This is Mr. Xu's first visit to the NRC.

ACCOMPANYING PERSONS:
Mr. Nan, Bin, Director of Nuclear Power, CAEA
Mr. Feng, Yi, Director, Division of Nuclear Emergency, CAEA
Mr. Huang Wei, Second Secretary, PRC Embassy
Mr. Gavin Liu, President, Westinghouse Electric (Asia)
Mr. Don Miller, Manager, China Projects, Nuclear Plant Projects, Westinghouse

DISCUSSION TOPICS TO BE RAISED:
Mr. Xu will brief on China's nuclear energy plans, inquire about the future of nuclear energy in the U.S. and inquire about the regulatory environment for new plant construction.

Attachment 2

Biography on Xu, Yuming
Vice Chairman
China Atomic Energy Authority

Mr. Xu is 58 (born July 20, 1943), and a native of Shanghai. He graduated with a Masters Degree in 1968, and undergraduate degree in 1965, from Nuclear Chemical Engineering Department, East China Chemical Engineering Institute in Shanghai.

1998 - present	Vice Chairman, China Atomic Energy Authority (CAEA)
1996 - 1998	Director General, Bureau of Science & Technology, China National Nuclear Corporation (CNNC)
1994 - 1996	Deputy Director General, Bureau of Science & Technology, China National Nuclear Corporation (CNNC)
1994	Vice President, Beijing Institute of Nuclear Engineering (BINE)
1968 - 1993	Technician, Engineer, Senior Engineer (Professorship), Deputy Director, Director of Reactor Structure Design Department

Mr. Xu is Director of the Board, China Natural Science Foundation
Executive Director of the Board, China Nuclear Society

Attachment 3

CHINA COUNTRY PROFILE

NUCLEAR PROGRAM

In 2001, China's economy remained strong and continued growth is expected for many more years. As China's economy grows, so does its need for electrical power. Some of the "Special Economic Zones" enjoyed double-digit growth that was only held back because of a lack of electricity. The government has made the development of independent energy production a national priority along with strengthening and integrating the national grid. By 2010, the government plans project an installed nuclear capacity of 20 million kilowatts connected to an integrated national grid.

Nuclear Power

China's current nuclear power program is based on a mix of indigenously designed and imported pressurized water reactors. Future plans will call for a standardization of plant design.

Operating Units: 3 units (supplying 1+% of the electrical base):

- Qinshan-I, 310MWe, PWR: Chinese design and construction, with foreign parts on the primary side; commissioned 1991
- Daya Bay, two 910 MWe PWRs, constructed by Framatome of France, commissioned 1993-94
- Ling Ao-I, Unit One, 1000MWe PWR (Framatome)

Under Construction: 8 units (when completed, nuclear will supply 3% of the electrical base)

- Qinshan-II, two 600MWe PWRs, (domestic design, unit 1 has started hot testing)
- Qinshan-III, two 600MWe CANDUs (units will begin testing in 2003)
- Ling Ao-I, Unit Two, 1000MWe PWRs, (Framatome) (operation in 2003)
- Tianwan, two 1000MWe VVERs (Russian design, 35% complete)

Planned Units: 4 units

- Ling Ao-II, two 1000 MWe PWRs
- Sanmen-1, two 1000 MWe PWRs
- Qinshan IV, two units (MWe TBD)

The Institute for Nuclear Engineering Technology (INET) has developed a 10 MW gas-cooled, pebble bed reactor (PBMR). Using technology developed by the Germans, and purchasing its used fuel fabrication equipment, INET began operation of its test reactor in December 2000. Following evaluation of its operation, a secondary side of the reactor will be added in several years.

Nuclear Fuel Cycle

The Chinese operate a complete fuel cycle, including the manufacture of fuel assemblies for its domestic PWRs (initially, it will import its CANDU fuel from Canada). Their fuel assembly program was built with technical assistance and components from France.

The China National Nuclear Corporation (CNNC) is responsible for nuclear waste management, including the siting, construction and operation of repositories under regulation by the National Nuclear Safety Administration (NNSA). The NNSA is under the State Environmental Protection Administration (SEPA) that also reviews and approves environmental impact studies. Local environmental authorities will be responsible for the environmental monitoring of the repositories.

Waste Management

High-Level Waste

The Lanzhou Nuclear Fuel Complex is China's national spent fuel management center. The ultimate plan calls for all LWR spent fuel to be reprocessed, vitrified and then the waste deposited in deep geological formations.

Note: Requests by NRC to visit China's waste sites have not been approved (frequently, defense waste facilities are located at or near civilian sites).

The current spent fuel disposal program calls for on-site pool storage for 15-20 years before the fuel elements are shipped to the Lanzhou site. Most of China's reactor sites will have to re-rack their spent fuel pools. The operators of the Daya Bay Station decided on a different approach. In January 2001, they signed a contract of intent with the China National Nuclear Corporation (CNNC) to ship two casks of spent fuel a month to the Lanzhou site. Initially the 3,000 mile trip will be made using trucks until a rail line can be constructed. By doing this, the Daya Bay Station will not need to re-rack their spent fuel pools. (During the EDO's April 2002 trip to China, Daya Bay representatives mentioned that negotiations with the CNNC had stalled over increased projected costs.)

Low-Level Waste

The principle of "regional disposal" is followed in China for LLW. Like for HLW, the CNNC is responsible for site selection, construction and operation of each repository site, and the NNSA for its regulation. There are 21 local LLW storage facilities for solid waste in China. Germany has assisted China with LLW technology.

Research and Development

Although China has opened many doors to the outside world, there is still a strong emphasis on self-reliance coupled with incorporating international advances and experience. A technical isolation also exists. The nuclear program is supported by more than 80 technical design and

manufacturing organizations located all over China. The principal players include: Beijing Institute for Nuclear Energy (BINE), China Institute for Atomic Energy (CIAE), Shanghai Institute for Nuclear Research and Engineering, and the Nuclear Power Institute of China. The equipment at many of these institutes is very old (many times it is Russian equipment that is now more than 30 years old).

Nuclear Regulatory Structure

National Nuclear Safety Administration (NNSA) is responsible for the licensing of research, power reactors, fuel cycle, and waste facilities. When the People's Congress approved the reorganization of the central government, NNSA was removed from the administration by the State Science and Technological Commission and reorganized under the State Environmental Protection Administration (SEPA). They still operate with independence (the Director General can report directly to the Premier on safety matters). The SEPA is a powerful organization with increasing responsibilities as China addresses its serious environmental issues. The NNSA has only a small staff of approximately 100 technical professionals to cover its many responsibilities. Compared to other regulatory bodies, its ratio of staff is below the international norm. To assist in its regulatory review, the NNSA relies on the Nuclear Safety Center (NSC) and other design and engineering institutions in China. This staffing shortage is considered serious by the NNSA, but they have been unsuccessful in obtaining relief from the central government committee.

NON-PROLIFERATION

China is a nuclear weapons state and therefore, not subject to the full-scope IAEA safeguards requirements of the Non-Proliferation Treaty (NPT). However, China is a signatory to the NPT (1992); and it has signed the IAEA Convention on Nuclear Safety.

The U.S. Government (DOE and NRC) has not visited China within the past decade to evaluate the implementation of physical protection in China, nor has it received a statement from China declaring that physical security measures are being provided in accordance with INFCIRC/225.

RELATIONS WITH THE NRC

Bilateral Arrangements and Agreements

The Protocol between the NRC and the State Scientific and Technological Commission of the People's Republic of China on Cooperation in Nuclear Safety Matters was originally signed in 1981 and was renewed twice. With the implementation of the US-China Agreement on the Peaceful Cooperation of the Use of Nuclear Energy on March 19, 1998, the NRC and NNSA signed an expanded Protocol on Cooperation in Nuclear Safety Matters in September 1998.

Goals

- Assist China to strengthen its regulatory program
- Continue to stress the importance of a strong, independent regulator with clear legal authority, and sufficient resources and personnel

Bilateral Objectives

Within the limits and availability of resources, and consistent with U.S. Government policies and NRC priorities, the NRC will:

- Foster an understanding of the U.S. approach to nuclear safety
- Assist in the development of sound regulatory and safety practices in China's civil nuclear program
- Exchange publicly available information on nuclear power reactor safety, radiation protection, nuclear material and waste handling and storage
- Share lessons learned from the US nuclear power program
- Offer the regulator training opportunities

Importance of Cooperation

- China's rapidly expanding nuclear power program faces many operational and regulatory challenges. The continued safe operation of China's nuclear program is important to the Pacific Rim community and where there is a growing development and dependence on nuclear energy.

Resource Impact

- Small impact on NRC resources

Coordination/No Duplication

- NRC activities with China are coordinated through OIP to maximize resources and avoid duplication
- On policy matters, NRC coordinates with the Department of State

Commission Visits

- Commissioner Merrifield visited China in March 2001

Foreign Assignees

In the past 15 years, more than 25 Chinese regulators from the NNSA have been placed at NRC on temporary assignment to learn NRC's rules and regulations from hands-on experience, and the US safety culture. In 2000 Mr. Wang Jun completed a 12-month assignment in the Office of Nuclear Regulatory Regulations working in the area of events assessment. NRC welcomes the opportunity to host a new assignee from the NNSA.

NRC Licensed Exports

On January 12, 1998, President Clinton certified to Congress that China's nuclear nonproliferation policies and practices met U.S. statutory standards. This action made it possible for NRC to license U.S. companies to export nuclear equipment and nuclear fuel to China's civilian nuclear power program. Similarly, it opened the way for DOE to authorize U.S. companies to transfer U.S. nuclear power technology (training, engineering services, etc.) to China.

NRC Licenses

Since the President's certification, NRC has issued fifteen reactor component, one byproduct, and seven source material export licenses for shipments to China. Although one application for the export of special nuclear material (LEU fuel assemblies) was submitted, it was returned to the applicant because the business did not materialize. The majority of component licenses involve equipment exported initially to companies in Canada, which incorporate it into the two CANDU power reactors in China (Qinshan III Units 1-2). One license was issued for the supply of equipment for any of the civilian power reactors in China. The source material exports have all involved natural uranium and thorium as contaminants contained in tantalite ore. The materials are for non-nuclear end uses.

In recent years, China has exported low-enriched uranium to the United States mainly to fuel fabricators for use in U.S. nuclear power plants.

DOE Technology Transfer Cases

The NRC staff review of proposed DOE technology transfers to China is proceeding pending receipt of formal assurances from the Chinese Government that any retransfer of U.S.-supplied nuclear power technology to third countries will be subject to prior approval by the U.S. Government.

LIST OF REGULATORY PRINCIPALS

State Environmental Protection Administration: Minister XIA, Zhenhua
National Nuclear Safety Administration: Director General: ZHAO, Chengkun
National Nuclear Safety Administration: Deputy Director Generals: LIU, Hua and ZHAO, Yimen

Attachment 4

Background Information on the China Atomic Energy Authority

Background

The China Atomic Energy Authority (CAEA) was created in 1958 as the Ministry of Second Mechanical Industry. In 1982, it was renamed the Ministry of Nuclear Industry, and in 1988 renamed again the Ministry of Energy. Following a government-wide downsizing and reorganization in the energy sector, it was organized into today's form and named the China Atomic Energy Authority.

Main Missions of CAEA

- Drafting energy development plans
- Developing policy and regulations for the peaceful uses of nuclear energy
- Developing controls on safeguards affairs and nuclear exports
- Coordinating and managing nuclear emergencies
- Coordinating international cooperation in the field of peaceful uses of nuclear energy with other countries and international organizations (including the IAEA).

Attachment 5

Background Information and Talking Points

Nuclear Power Development

Background

By 2010, the government plans call to have an installed nuclear capacity of 20 million kilowatts connected to an integrated national grid. Currently, China's nuclear fleet is a mix and match of domestic and international designs and components.

Questions

- Inquire about the future development of nuclear power in China
- Inquire about China's interest to develop a standard reactor design
- Inquire about the development of the fuel cycle
- Inquire about major R&D projects

Nuclear Safety

Background

The NNSA has a professional staff of 31 to regulate their rapidly expanding power reactor program (currently a mix of 5 different LWR designs, including: CANDU, VVER, FBR, and HTR), 15 research reactors, fuel cycle facilities, and emergency response activities. The NNSA also represents China in many international forums. The NNSA, supported by the IAEA, has identified their staffing shortage as a safety concern.

Questions

- Engage in a discussion of the importance of a strong and independent regulatory body and its contribution in building public confidence in nuclear power
- Encourage the CAEA to assist the NNSA in its efforts to increase its staffing to meet international standards

Emergency Preparedness and Response

Background

The IAEA has provided assistance with emergency preparedness and response to the Chinese regulator and utilities. Each of China's operating nuclear power stations have conducted emergency drills, and the Daya Bay NPP's drill in April 2002 for the first time included the integration of military forces with civilian forces. One of the CAEA's stated missions (Attachment 4) is "coordinating and managing affairs of nuclear emergency." The Chinese nuclear regulatory authority, the National Nuclear Safety Administration (NNSA) also assists during a nuclear emergency. In 2001, Vice Minister Song of the Chinese Environmental Protection Agency, the parent agency of NNSA, observed the Summer NPP full-scale drill. One of his impressions was the clear delegation of responsibility between the utility, federal, state and local authorities.

Questions

- Inquire about CAEA's specific responsibilities during a nuclear emergency and what coordination there is with the Chinese regulator
- Inquire about lessons learned from their drills

Nuclear Exports and Imports

Background

Chinese nuclear exports have largely been driven by economic considerations. To facilitate nuclear trade and other cooperation, China signed nuclear cooperation agreements with a number of countries in the 1980s. China joined the Zangger Committee in 1977. In June 1998, the State Council passed Decree No. 245 called "Regulations of the People's Republic of China on Export Control of Dual-Use Nuclear Products and Related Technologies." These regulations closed a major loophole in China's export control laws on nuclear items. China has emerged as a major nuclear supplier, offering a wide range of nuclear-related products and services to a broad range of countries Despite the flurry of export regulations in the late 1990s, the US government still remains skeptical that these controls will be implemented effectively. Although it is not a member of the Nuclear Suppliers Group (NSG), China claims it follows its guidelines.

China's potential nuclear exports and nuclear services include: dual-use technology, power reactors, reactor components, reprocessing technology and services, research reactors, metal alloys, spent fuel and waste services, and training services (nuclear physics, engineering and operations).

Questions

- Inquire how China regulates the export and import of nuclear-related commodities
- Inquire what agencies in China are involved in reviewing and approving nuclear export and import requests
- Assuming China complies with the export control guideline of the NSG, does China have the necessary export control regulations in place to ensure proper control over items on the NSG trigger list