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April 20, 2010

MEMORANDUM TO: Bruce S. Mallet
Deputy Executive Director for Reactor
and Preparedness Programs
Office of the Executive Director for Operations

Margaret M. Doane, Director
Office of International Programs

FROM: Michael R. Johnson, Director
Office of New Reactors

SUBJECT: FOREIGN TRIP REPORT ON UNITED STATES NUCLEAR
REGULATORY COMMISSION STAFF VISIT TO CHINA FOR
MEETINGS WITH THE NATIONAL NUCLEAR SAFETY
ADMINISTRATION OF CHINA AND VISITS TO AP1000
MANUFACTURING AND CONSTRUCTION SITES

From March 14, 2010, through March 21, 2010, Michael Johnson, Jennifer Uhle, Mark Kowal, and Cindy Rosales-Cooper visited China in order to advance cooperation with the Chinese nuclear regulatory organization, and to visit AP1000 manufacturing and construction sites. Mr. Joseph Sepulveda, Office for Environment, Science, Technology and Health, U.S. Embassy, Beijing, accompanied the delegation for the entirety of the trip.

The primary purposes of this trip were: (1) to reinforce cooperation with the National Nuclear safety administration (NNSA) in the areas of construction and vendor inspection, and high temperature gas cooled reactor technology; (2) to reach mutual agreement on a path forward for highlighting U.S.-China cooperation on nuclear safety at the 2010 U.S.-China Strategic and Economic Dialogues; (3) to determine the dates of the 2010 NRC-NNSA Steering Committee Meeting; (4) to inform and advance cooperation with the National Energy Administration (NEA) on Emergency Preparedness for new reactors; (5) to observe fabrication of AP1000 components at the Shanghai Electric Equipment Manufacturing facility; (6) to observe ongoing construction activities of the Westinghouse AP1000 reactor at the Sanmen Nuclear Power Station; and (7) to provide training to NNSA staff on NRC systems analysis codes. The delegation met each of its established objectives. Details and insights are provided in the attached Trip Report.

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Additionally, new items for future cooperation were identified through the discussions with NNSA and NEA. These include technical staff training and qualification programs, emergency preparedness, and knowledge transfer regarding the AP1000 shield building design. The delegation was also informed by the licensee for the Sanmen Nuclear power plant that they would like to begin discussions with NRC regarding Inspection Tests Analyses and Acceptance Criteria (ITAAC) prioritization and inspection. (b)(4)

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(b)(4) The NRC staff currently on rotation at the Shanghai Regional Office and Sanmen are initiating efforts to facilitate NNSA's understanding of NRC's construction inspection and ITAAC verification programs.

The enclosed trip report will likely be of interest to the Commission.

Enclosures:

1. NRC Final Trip Report
2. Draft Meeting Minutes
3. Handouts

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(b)(4)
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NRO-002

OFFICE	NRO/DCIP/CTSB:BC	IP/ICAB*	RES/DSA:D*	NRO:D
NAME	MKowal	CRosales-Cooper	JUhle	MJohnson
DATE	04/16/2010	04/19/2010	04/19/2010	04/20/2010

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NRC Final Trip Report

Subject

Meetings with Chinese regulatory organizations, and visits to AP1000 manufacturing and construction sites.

Travel Dates, Countries and Organizations Visited

March 14, 2010, through March 21, 2010. Beijing, Shanghai, Ningbo, and Sanmen, China. China National Nuclear Safety Administration (NNSA), Westinghouse Electric Company (Beijing Office), China National Energy Administration (NEA), Shanghai Electric Equipment Manufacturing Co., CNNC Sanmen Nuclear Power Company.

Author/Title/Agency Affiliation

Michael Johnson, Director, NRO, Jennifer Uhle, Director, RES/DSA, Mark Kowal, Branch Chief, NRO/DCIP/CTSB, Cindy Rosales-Cooper, China Desk Officer, OIP. The delegation was accompanied by Mr. Joseph Sepulveda, Second Secretary, Environment, Science, Technology and Health, United States Embassy (Beijing), for the duration of the trip.

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(b)(5)

Background/Purpose

The primary purposes of this trip were: (1) to advance cooperation with NNSA in the areas of construction and vendor inspection, and high temperature gas cooled reactor (HTGR) technology; (2) to reach mutual agreement on a path forward for highlighting U.S.-China cooperation on nuclear safety at the 2010 U.S.-China Strategic and Economic Dialogues (S&ED); (3) to determine the dates of the 2010 NRC-NNSA Steering Committee Meeting; (4) to inform and advance cooperation with NEA on emergency preparedness for new reactors; (5) to observe fabrication of reactor vessel and internals, steam generator, pressurizer and control rod drive mechanisms at the Shanghai Electric Equipment Manufacturing facility; (6) to observe ongoing construction activities of the Westinghouse AP1000 reactor at the Sanmen Nuclear Power Station; and (7) to provide training to NNSA staff on NRC systems analysis codes.

Abstract: Summary of Pertinent Points/Issues

The NRC delegation successfully completed its objectives with regard to reinforcing cooperation with NNSA in the areas of construction and vendor inspection. Discussions on this topic focused on several items listed in a draft Memorandum of Cooperation (MOC) agreed to during the October 2009 NRC/NNSA meeting held at the NNSA offices in Beijing. NNSA agreed to continued cooperation in the vendor inspection area with joint observations of vendor inspections in the U.S.A. and China relative to the manufacture of components for the AP1000. NNSA also agreed to continued support for a construction inspector exchange program. NRC and NNSA participants agreed that cooperation in the construction and vendor inspection areas already falls under the existing MOC for the AP1000. As such, the specific opportunities and plans for cooperation can be documented in the agreed upon meeting minutes for the March 16, 2010, meeting (See Enclosure 2), which will be signed by Mr. Michael Johnson, Director, NRO, and Mr. Liu Hua, Director General, NNSA.

ENCLOSURE 1

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(b)(5) The 2010 NRC-NNSA Steering Committee meeting will be hosted by NRC in November 2010 and is expected to include a site visit to the Palo Verde nuclear power plant.

The delegation successfully achieved its objectives with regard to informing and advancing cooperation with NEA in the area of emergency preparedness. The NRC delegation provided an overview of the history and regulations associated with emergency preparedness for existing and new reactors, and extended an invitation for NEA to attend a graded NRC exercise. The NRC delegation obtained a greater understanding of NEA's role in emergency planning (EP). The NEA agreed that cooperation in this area is possible, and will consider attending an exercise. As a result of this meeting, the NRC will also pursue cooperation in this area with NNSA.

The delegation successfully achieved its objectives with regard to observing module/component fabrication and ongoing construction of the AP1000 reactor. The delegation met with representatives and toured the Shanghai Electric Equipment Manufacturing Co. and the Sanmen AP1000 nuclear construction site. (b)(4)

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(b)(4) A key insight obtained during this visit was that NNSA is requiring that Sanmen implement combined license (COL) action items and inspections, tests, analyses and acceptance criteria (ITAAC). (b)(4)

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(b)(4) The NRC staff currently on rotation at the Shanghai Regional Office and Sanmen are initiating efforts to facilitate NNSA's understanding of NRC's construction inspection and ITAAC verification programs.

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DISCUSSION

Meeting with NNSA

During the morning of March 16, 2010, the delegation met with NNSA headquarters staff in Beijing, including Director General, Liu Hua. The NRC delegation provided overviews and discussed the construction and vendor inspection programs, plans for exchange of staff with NNSA, an update on the AP1000 shield wall issue, and cooperation on HTGR technology. Mr. Hua provided an overview of the Chinese nuclear program and its planned growth over the next 3 years. (b)(4)

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In response, the NRC delegation provided an overview of our training programs, and agreed that this is an area for possible further cooperation.

NNSA agreed to continue cooperation in the vendor inspection area with joint observations of vendor inspections in the U.S.A. and China relative to the manufacture of components for the AP1000. NNSA also agreed to continue the construction inspector exchange program, which allows the NRC to obtain important insights into the construction and inspection of the AP1000. There are currently four NNSA staff assigned at NRC headquarters and one in Region 2. Beginning on April 3, 2010, two NRC staff members began rotations at the NNSA Shanghai Regional Office and the Sanmen site.

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During the meeting, Mr. Johnson provided Mr. Liu Hua with invitation letters for the next two NNSA exchange staff who are now expected to begin their assignments on May 10, 2010, and will be assigned to NRO and RES. It was agreed that specific items for cooperation in this area will be documented in the agreed upon meeting minutes for this meeting (See Enclosure 2), which is to be signed by Mr. Michael Johnson, Director, NRO, and Mr. Liu Hua, Director General, NNSA, when finalized. The specific items for cooperation involving construction and vendor inspection were identified and agreed to during the October 2009 NRC meeting with NNSA.

During the meeting, the NRC delegation questioned the status of the AP1000 reactor coolant pump testing that was scheduled to occur in December 2009, at the Curtis Wright Electro-Mechanical Division (EMD) facility near Pittsburgh, PA. NRC staff attendance at this inspection is one item of cooperation identified during the October 2009 meeting. NNSA staff informed the NRC delegation that this testing is now scheduled for May 2010, and that they will keep the NRC informed of plans for this testing.

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NRC staff from NRO/Division of Construction Inspection & Operational Programs plan to attend these activities in May.

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NNSA would like to continue discussions with NRC regarding the status and technical findings of our review of the AP1000 shield building design.

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The NRC delegation invited NNSA to visit a reactor site in the United States as part of the November 2010 NRC-NNSA Annual Steering Committee Meeting. NNSA stated that they would have interest in visiting Palo Verde because of their plans for constructing inland reactors. The Chinese currently have plans for a second wave of AP1000 reactors with plans for two units each at three inland sites (Pengze, Dafan and Taohuaijiang).

Westinghouse Electric Company (Beijing Office)

During the afternoon of March 16, 2010, the delegation met with representatives from the Westinghouse Beijing office. Handouts from this meeting are included in Enclosure 3. Westinghouse provided an overview of status and activities at the Sanmen and Haiyang nuclear plants, plans for additional AP1000 projects in China, and the Chinese nuclear organizational structure (Regulator through licensees). Based on discussions with NNSA during the morning meeting, the NRC delegation followed up on key topics of interest with Westinghouse to obtain

their viewpoint. Outside of Scope.

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Two key initiatives discussed during this meeting include lessons learned and job shadow programs being implemented by Westinghouse. Westinghouse stated that through their lessons learned program, they are communicating information through Westinghouse and The Shaw Group back to the U.S. This includes design, fabrication and construction related information. Westinghouse (Pittsburgh) evaluates this information and takes appropriate actions. Westinghouse outlined plans for a job shadow program that would enable key personnel at Sanmen and Haiyang stations to learn U.S. best practices by training with U.S. utility personnel at an operating nuclear plant. This program proposes to place two groups of staff including the plant manager, reactor operators, engineers and technicians (60 staff per group) at McGuire, Catawba, Seabrook, VC Summer, and Vogtle for a period of 2 months each. Group A would begin in September 2010, and Group B in January 2011.

Meeting with NEA

On March 17, 2010, the delegation met with staff from the China NEA, which is comparable to the U.S. Department of Energy (DOE). The purpose of the meeting was to inform and pursue potential cooperation in the area of EP. The delegation was interested in pursuing this given the expected growth of nuclear power in China. The delegation presented a history of EP, the current regulations for existing and new reactors, and explained the role of the U.S. DOE with respect to EP. (b)(4)

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As a result of this meeting with NEA, the NRC will also pursue cooperation in this area with NNSA. The purpose of this meeting was to solicit interest in further cooperation in this area. Representatives from NSIR will participate in any future interactions with the Chinese involving EP.

Meeting with NNSA Shanghai Region Office

On March 17, 2010, the delegation participated in a dinner meeting with Mr. Wang Zhongtang, Director, and other representatives from the NNSA Shanghai Regional Office. The Shanghai Regional Office is responsible for overseeing the AP1000 reactors under construction at Sanmen and Haiyang. Much of the discussion during this meeting focused on the plans for Mr. Jeff Jacobson (NRO) and Mr. Bradley Davis (Region 2), who began rotations to NNSA on April 3, 2010. This exchange of staff was agreed to during the October 2009 meeting with NNSA, and will allow the NRC to obtain important insights into the construction and inspection

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of the AP1000. (b)(4)
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Mr. Jacobson will be on exchange for a period of 3 weeks (2 weeks at Shanghai Regional Office, 1 week at Sanmen nuclear plant), and Mr. Davis for 3-months (2 weeks at Shanghai Regional Office, remainder at Sanmen nuclear plant).

Shanghai Electric Equipment Manufacturing Company

On March 18, 2010, the delegation toured the Shanghai Electric Equipment Manufacturing facility. (b)(4)

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CNNC Sanmen Nuclear Power Co

On March 19, 2010, the delegation toured the Sanmen Nuclear Power Plant, which is an AP1000 construction site. The site is designed for six AP1000s with the first two currently under construction. The delegation met with Jin Xiang, Chief Safety & Quality Officer for CNNC Sanmen Nuclear Power Company. Ms. Xiang provided a brief history and status of key

construction activities and issues at Sanmen. (b)(4)
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The delegation observed significant construction progress. (b)(4)
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Pending Actions/Planned Next Steps for NRC

- Document specific items for construction and vendor inspection cooperation in the March 16, 2010, NRC/NNSA meeting minutes, with endorsement through NRO Office Director signature.
- Continue discussions with NNSA regarding the status and technical findings of NRC review of the AP1000 shield building design.
- Pursue further cooperation with NNSA in the area of technical staff training and qualification programs.
- Pursue internal coordination on the proposed HTGR Agreement. Work towards signing an HTGR Agreement along the margins of the S&ED meeting to be hosted by China in Beijing in May 2010.
- Pursue cooperation in the area of emergency preparedness with NNSA.
- Pursue implementation of the provisions of the CSARP and CAMP agreements.

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Points for Commission Consideration/Items of Interest

Several NRC Commissioners have previously expressed interest in our ongoing cooperation program with NNSA. The Commission may be particularly interested in the specific plans for cooperation in the construction and vendor inspection areas, as documented in the attached meeting minutes, including ongoing exchange of staff between NNSA and NRC. Progress was made toward advancing cooperation on HTGR technology. New items for future cooperation that emerged during this trip include technical staff training and qualification programs, emergency preparedness, and knowledge transfer regarding the AP1000 shield building design.

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The NRC staff currently on rotation at the Shanghai Regional Office and Sanmen are initiating efforts to facilitate NNSA's understanding of NRC's construction inspection and ITAAC verification programs.

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