October 10, 2006

MEMORANDUM TO: David B. Matthews, Director
Division of New Reactor Licensing
Office of New Reactors

Elmo E. Collins, Director
Division of Inspection and Regional Support
Office of Nuclear Reactor Regulation

FROM: Larry W. Camper, Director **/KMcConnell for RA/**
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

SUBJECT: LIST OF DECOMMISSIONING LESSONS-LEARNED IN SUPPORT OF THE DEVELOPMENT OF A STANDARD REVIEW PLAN FOR NEW REACTOR LICENSING

Staff in the Division of New Reactor Licensing (DNRL) requested assistance from the Division of Waste Management and Environmental Protection (DWMEP) in the development of a standard review plan (SRP) for the licensing of new reactor facilities. Specifically, DNRL staff requested a list of high-level decommissioning lessons-learned that new applicants for a reactor license should address in order to minimize, to the extent practicable, contamination of the facility and the environment, facilitate eventual decommissioning, and minimize, to the extent practicable, the generation of radioactive waste. DWMEP staff met with your staff several times to discuss and clarify the requested input. This requested information is provided in Enclosure 1.

I would like to bring to your attention other sources of decommissioning lessons-learned. The list of lessons-learned provided in Enclosure 1 is a subset of a much larger set of decommissioning lessons-learned. DWMEP developed the list in Enclosure 1 by reviewing the lessons-learned described in other documents (Enclosure 2) and selecting those it felt were most significant, based on DWMEP decommissioning experience. Additionally, the Electric Power Research Institute (EPRI) has developed decommissioning lessons-learned. DWMEP has not reviewed those lessons-learned because they are considered proprietary information by EPRI. DWMEP staff also developed a comprehensive bibliography of documents containing decommissioning lessons-learned. The bibliography is posted on the Nuclear Regulatory Commission's public website.

CONTACT: Rafael L. Rodriguez, NMSS/DWMEP
(301) 415-0193

DWMEP has offered to review the pertinent SRP sections to ensure that incorporation of lessons-learned is consistent with the systematic approach to decommissioning of reactors we have adopted over the past several years. Your staff stated that it would accept such support.

Enclosures:
1. List of Lessons Learned to Minimize Contamination and Facilitate Decommissioning
2. List of References

DWMEP has offered to review the pertinent SRP sections to ensure that incorporation of lessons-learned is consistent with the systematic approach to decommissioning of reactors we have adopted over the past several years. Your staff stated that it would accept such support.

Enclosures:
1. List of Lessons Learned to Minimize Contamination and Facilitate Decommissioning
2. List of References

DISTRIBUTION:

DCD r/f	APersinko	RPedersen	EO'Donnell
DWMEP r/f	JShepherd	SKoenick	

ML062620355

OFFICE	DWMEP:PM	DWMEP:LA	DWMEP:SC	DWMEP:DD	DWMEP:D
NAME	RRodriguez	TMixon	APersinko	KMcConnell	KMcConnell for LWCamper
DATE	09 /19 /06	09 /19 /06	09 / 27 /06	10/6/06	10/10/06

OFFICIAL RECORD COPY

LIST OF LESSONS LEARNED THAT NEW AND EXISTING FACILITIES NEED TO ADDRESS TO MINIMIZE CONTAMINATION AND SIMPLIFY DECOMMISSIONING

Lesson	Plant Phase	Applicability relative to 10 CFR 20.1406
Licensees should adequately characterize the subsurface hydrologic characteristics of a site prior to construction to understand how potential contamination resulting from daily operation of the facility will migrate through the soil and possibly into the groundwater. After the facility is built, licensees should verify that the subsurface hydrologic characteristics (e.g., directions and flow rates of groundwater aquifers, geochemistry, etc.) remain consistent with the hydrologic profile prior to construction. If there are changes, licensees may need to evaluate those changes and address them during operations and before starting decommissioning.	Design, Construction, and Operations	Facilitates Decommissioning

Lesson	Plant Phase	Applicability relative to 10 CFR 20.1406
Licensees should incorporate design features that ensure that exposures are As Low As Reasonably Achievable (ALARA) during maintenance, component replacement, surveillance, and remote sampling near areas that typically are high-radiation and/or highly contaminated areas. Examples that might apply to the reactor vessel or steam generator area could include: - install walkways and platforms prior to operations to help reduce the amount of time needed to reach high-radiation and/or highly contaminated areas - install shield walls Other design features could include: - planned removal pathways for tanks and vessels (hatches, removal walls, collapsible systems, etc.) - permanent coatings for porous materials - isolation of radioactive waste systems - remote sensors for moisture, tank levels, etc. - closed-circuit television	Design	Minimizes contamination of the facility and the environment Facilitates Decommissioning
When designing enclosures for large pieces of equipment (e.g., steam generators, large piping, tanks, etc.), the licensee should determine how these pieces will be removed for replacement or permanently removed at the time of decommissioning. Licensees should evaluate: - size/space clearances - installation of removal roofs/walls - installation of lifting lugs - anchor points for lifts - shearable nuts and bolts - quick-disconnect components	Design	Facilitates Decommissioning

Lesson	Plant Phase	Applicability relative to 10 CFR 20.1406
During decommissioning planning, licensees should establish adequate measurement capabilities at the facility (e.g., onsite radiological laboratories, mobile units, etc.). This approach could increase efficiency by ensuring early in the decommissioning process that site characterization measurements to establish radiological conditions in the field or onsite are accurate and reliable	Operations	Facilitates Decommissioning (i.e., the licensing process for decommissioning)
Licensees should establish onsite decontamination facilities and/or waste segregation facilities in order to manage large quantities of radioactive material/waste.	Operations and Decommissioning	Minimizes generation of radioactive waste Minimizes contamination of the facility and the environment
Licensees should establish a program to ensure adequate and complete documentation of corporate knowledge and operational events, beyond those required by NRC in 10 CFR 50.75 (g). This program can assist licensees in preparing a good historical assessment of a nuclear facility. An adequate historical assessment can help to save time and effort during decommissioning planning	Operations	Facilitates Decommissioning (i.e., planning for decommissioning)
Plant designs should minimize the use of embedded pipes, to the extent practicable, consistent with maintaining radiation doses ALARA during operations and decommissioning. Embedded pipes, especially those that are small in diameter (less than 6 inches), could complicate decommissioning activities because they can be very difficult to remove or to survey.	Design	Facilitates Decommissioning
Licensees should develop and implement a comprehensive site characterization plan before starting decommissioning activities. Comprehensive site characterization allows licensees to properly identify and quantify the amount and extent of contamination that needs to be remediated.	Operations	Facilitates Decommissioning

Lesson	Plant Phase	Applicability relative to 10 CFR 20.1406
Licensees should establish a comprehensive groundwater monitoring program beyond the normal radioactive effluent monitoring program (REMP). REMP is not intended to define and monitor on-site conditions and contamination. In addition, REMP is not adequate for future site characterization and to support dose assessments. A comprehensive groundwater monitoring program, beyond the normal REMP, will allow licensees to gather sufficient data in order for the NRC staff to fully understand the types and movement of radioactive material contamination in groundwater at the facility, as well as the extent of this contamination.	Design and Operations	Facilitates Decommissioning
Minor leaks over long periods of time can contribute to significant contamination in soil and groundwater that results in significant costs for remediation. Tanks (e.g., radioactive waste storage tanks, chemical storage tanks, etc.), spent fuel pools, and process/transfer lines should be designed to resist corrosion and minimize leaks. They should be provided with leak detection and monitoring capabilities. For example, the detection system of a spent fuel pool should be capable of detecting minor leaks from the pool. This system should have the ability to be flushed with clean water to remove small quantities of borated water, and dissolve boric acid solids resulting from minor leaks from the spent fuel pool wall and floor welds, bellows to transfer channels, and access gates areas. In addition, an operational program should be implemented throughout the life of the facility to monitor and remediate any leaks.	Design, Operations, and Decommissioning	Minimizes contamination of the facility and the environment Facilitates decommissioning
Licensees should develop a quality assurance inspection program that ensures that grouted areas have no cracks or fissures to allow fluids to bypass the floor drain and move into unmonitored areas beneath the floors and foundations. Concrete grouted connections for floor drains should be constructed such that leaks and spills on the floor will be collected in the floor drains.	Design	Minimizes contamination of the facility and the environment

Lesson	Plant Phase	Applicability relative to 10 CFR 20.1406
Licensees should develop a floor/wall expansion joint inspection procedure so that floor and wall joints are installed properly to ensure that spills and leaks on the floors do not enter unmonitored areas beneath the floors and foundations.	Design and Operations	Minimizes the generation of waste Minimizes contamination of the facility and the environment
Licensees should ensure that concrete block walls, constructed to allow removal for future maintenance, or replacement of large components, are completely sealed to prevent intrusion of radioactive materials into the block interiors. Block walls that are not connected to the ceiling are not always sealed on top, allowing contamination to enter the walls. In addition, hollow and solid block walls that are sealed by concrete, paint, or other coatings, have been found with contamination inside the walls. Contamination has been found with walls that are connected to ceilings and free-standing walls that are not physically connected to the ceilings or roofs. On properly sealed walls, the ceilings are sealed or closed so that no contamination can enter.	Design and Operations	Minimizes contamination of the facility and the environment
Licensees that conduct radiological work in onsite areas not designated for radiological work should upgrade these areas. For example, this applies to the storage of radioactive waste in areas not designated for the storage of radioactive waste. Upgrades could include, for example, increased effluent monitoring for turbine building sumps, and temporary or permanent enclosures of areas. Surveillance programs for these areas should include the monitoring of liquid and airborne effluents. Improvements to control contamination will facilitate decommissioning planning. Licensees should collect radiological information from these areas, which could be used later during decommissioning planning.	Design and Operations	Facilitates Decommissioning

LIST OF REFERENCES

1. NUREG/CR-3587: Identification and Evaluation of Facilitation Techniques for Decommissioning of Light Water Reactors; T.S. LaGuardia and J.F. Risley; June 1986

2. *U.S. Department of* Energy, and *Science Application International Corporation*, Existing Facilities and Past Practices: Lessons Learned; D. Huizenga, D. Tonkay, and K. Owens; Presented at the International Conference of the International Atomic Energy Agency on the Safety of Radioactive Waste Management - March 2000

3. *U.S. Nuclear Regulatory Commission*, Regulatory Issue Summary 2002-002: Lessons Learned Related to Recently Submitted Decommissioning Plans and License Termination Plans; January 16, 2002

4. *U.S. Nuclear Regulatory Commission*, NUREG-1757, Volumes 1 - 3: Consolidated Decommissioning Guidance; September 2003

5. *U.S. Nuclear Regulatory Commission*, Regulatory Issue Summary 2004-08: Results of the License Termination Rule Analysis; May 28, 2004

6. *U.S. Nuclear Regulatory Commission*, Practical Solutions to Difficult Decommissioning Issues - Lessons Learned; C. Craig; Presented at the Annual Meeting of American Nuclear Society - August 2005; (ADAMS Accession Number ML051510046)

7. *U.S. Nuclear Regulatory Commission*, Information Notice 2006-13: Ground-Water Contamination Due to Undetected Leakage of Radioactive Water; July 10, 2006