

*J. M. Knight*

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS  
WASHINGTON, D.C. 20555

December 5, 1996

NRC GENERIC LETTER 96-07: INTERIM GUIDANCE ON TRANSPORTATION OF  
STEAM GENERATORS

Addressees

All holders of operating licenses and decommissioning facilities with possession-only licenses for pressurized-water nuclear power reactors.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this letter to notify addressees that the U.S. Department of Transportation (DOT) and the NRC have agreed on how DOT and NRC transportation requirements apply to the shipping of discarded steam generators. The guidance below will help ensure that methods of shipping steam generators are both safe and practical. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate. However, suggestions contained in this generic letter are not NRC requirements; therefore, no specific action nor written response is required.

Description of Circumstances

DOT and NRC transportation regulations for shipment of radioactive materials were recently revised to be compatible with those of International Atomic Energy Agency (IAEA) Safety Series No. 6, 1985 edition. The revisions generally became effective April 1, 1996, and have changed the regulatory framework under which steam generators are shipped.

Neither the previous nor the revised IAEA, DOT, nor NRC transportation regulations specifically address the shipment of large components, including steam generators. Several power reactors, or reactors undergoing decommissioning, plan to ship discarded steam generators shortly. The following information provides interim guidance on the shipment of steam generators under the revised regulations. In addition to this action, NRC and DOT are jointly studying large component transportation issues. The shipment of steam generators and other large components may be specifically addressed in future guidance and revisions of international and domestic transportation regulations.

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Discussion

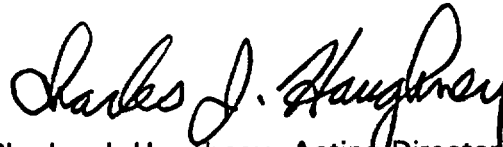
DOT and NRC have agreed that steam generators may generally be shipped under DOT procedures and requirements as outlined below:

- (1) DOT has determined that steam generators are best categorized as surface contaminated objects (SCOs). Although the *average* surface contamination level over the internals of a steam generator may be shown (through calculation, reasoned argument, and/or measurement) to meet the limits for inaccessible surfaces in the applicable SCO definition, the requirement is that the contamination be averaged over each 300 cm<sup>2</sup> (46.5 in<sup>2</sup>). It is impractical to measure the contamination level on each 300 cm<sup>2</sup> (46.5 in<sup>2</sup>) of the steam generator internals; therefore, reasoned arguments and calculations should be used. At a minimum, the following uncertainties should be accounted for in the analyses: (a) dose to curie conversions; (b) material differences and uneven crud composition/deposition in the channel head bowl, divider plate, tube sheet, and tubes; and (c) the source term identification (e.g., scaling ratios, transuranic contribution to A<sub>2</sub> total). If significant uncertainty remains concerning the distribution of deposited activity on steam generator surfaces, the licensee should obtain approval from DOT that the steam generator can be properly classified for shipment as SCO.
- (2) The maximum radiation level at 3 meters (9.84 feet) from the unshielded contents [see 49 CFR 173.427(a)(1) and 10 CFR 71.10(b)(2)] is defined as the largest measured or calculated dose rate 3 meters (9.84 feet) from any point on the outside housing of an unshielded steam generator. Materials securely fastened (e.g., welded) onto the steam generator, to seal penetrations, are considered part of the steam generator, for these purposes.
- (3) DOT has determined that the outside housing of a steam generator is considered as part of the "unshielded contents" (i.e., the dose rate is measured from the outside shell). Therefore, the entire steam generator is considered to be the radioactive material contents, and there is no "package" as defined in 49 CFR 173.403. Shippers wishing to ship an unpackaged steam generator as an SCO would, therefore, need to request that DOT grant them relief from the regulatory requirement to package SCO, given the special nature and practical considerations for steam generator shipments. The request should be made in accordance with 49 CFR Part 107, and should demonstrate that the unpackaged, sealed steam generator provides the safety equivalent to an Industrial Packaging (IP). If such relief (from the requirement that a steam generator be packaged) is not granted, then a steam generator shipped as an SCO must be shipped in an IP or Type A package, pursuant to 49 CFR 173.427.
- (4) If shipped as an SCO, a steam generator is subject to the SCO conveyance activity limit of 100 A<sub>2</sub> given in 49 CFR 173.427, Table 9.

- (5) If the necessary DOT approvals are obtained, and if the requirements of 10 CFR 71.10 are otherwise met, no exemptions from NRC requirements are needed for the provisions of 10 CFR 71.10 to take effect.

NRC licensee shipments of steam generators are subject to NRC inspection for compliance with the DOT regulations, pursuant to 10 CFR 71.5. It is particularly important that each licensee maintain complete documentation of any tests or evaluations required by DOT, for complying with the conditions specified in item (3), above, for shipping steam generators as unpackaged SCO. These may include engineering evaluations of the unpackaged steam generator's ability to meet the IP or Type A package design standards and criteria, if required by DOT as a compensatory measure for permitting the unpackaged shipment. The requirements for documenting the design of IP and Type A packaging are given in 49 CFR 173.411(c) and 49 CFR 173.415, respectively.

This generic letter requires no specific action nor written response. If you have questions about this matter, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation project manager.



Charles J. Haughney, Acting Director  
Spent Fuel Project Office  
Office of Nuclear Material Safety  
and Safeguards

Technical contacts: Richard Boyle, DOT  
(202) 366-4545  
E-mail: rick.boyle@rspa.dot.gov

Earl P. Easton, NMSS  
(301) 415-8520  
E-mail: exe@nrc.gov

Attachment: List of Recently Issued NRC Generic Letters

*Attachment filed in Jacket*

**LIST OF RECENTLY ISSUED GENERIC LETTERS**

<b>Generic Letter</b>	<b>Subject</b>	<b>Date of Issuance</b>	<b>Issued To</b>
96-06	ASSURANCE OF EQUIPMENT OPERABILITY AND CONTAIN- MENT INTEGRITY DURING DESIGN-BASIS ACCIDENT CONDITIONS	11/13/96	ALL HOLDERS OF OLs FOR NPRs, EXCEPT FOR THOSE LICENSES THAT HAVE BEEN AMENDED TO POSSESSION-ONLY STATUS
96-05	PERIODIC VERIFICATION OF DESIGN-BASIS CAPABILITY OF SAFETY-RELATED MOTOR- OPERATED VALVES	09/18/96	ALL HOLDERS OF OLs (EXCEPT THOSE LICENSES THAT HAVE BEEN AMENDED TO POSSESSION-ONLY STATUS) OR CPs FOR NPRs
96-04	BORAFLEX DEGRADATION IN SPENT FUEL POOL STORAGE RACKS	06/26/96	ALL HOLDERS OF OLs FOR NPRs
95-09, SUPP. 1	MONITORING AND TRAINING OF SHIPPERS AND CARRIERS OF RADIOACTIVE MATERIALS	04/05/96	ALL U.S. NUCLEAR REGULATORY COMMISSION LICENSEES
96-03	RELOCATION OF THE PRES- SURE TEMPERATURE LIMIT CURVES AND LOW TEMPERA- TURE OVERPRESSURE PRO- TECTION SYSTEM LIMITS	01/31/96	ALL HOLDERS OF OLs OR CPs FOR NPRs
96-02	RECONSIDERATION OF NUCLEAR POWER PLANT SECURITY REQUIREMENTS ASSOCIATED WITH AN INTERNAL THREAT	01/31/96	ALL HOLDERS OF OLs OR CPs FOR NPRs

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OL = OPERATING LICENSE  
CP = CONSTRUCTION PERMIT  
NPR = NUCLEAR POWER REACTORS

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96-07.GL \*See Previous Concurrence.

OFC	SFPO*	E	SFPO*	C	SFPO*	C	NRR/DRPM*	C	OGC*	C	TEDITOR	N
NAME	RLewis:LMG		EEaston		SShankman		TMartin		ENJenson		EKraus*	
DATE	10/9/96		10/10/96		10/10/96		10/18/96		10/22/96		10/22/96	

OFC	DWM*		IMOB		SFPO*							
NAME	RJohnson		KRamsey*		CJHaughney							
DATE	10/24/96		10/24/96		11/15/96							

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OFC	DWM		IMOB	E	SFPO		SFPO					
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October ##, 1996  
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*NRC license*

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DATE	10/9/96		10/10/96		10/10/96		10/18/96		10/12/96	11/2/96
OFC	DWM		IMOB		SFPO		SFPO			
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