

# CATEGORY 1

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   Transportation, Dept. of

SUBJECT: Requests exemption from packaging requirements of  
49CFR173.427(B)(1) & surface contaminated object limits of  
49CFR173.403 for shipment of two SGs from St Lucie Unit 1.  
Plan & calculation encl also.

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Associate Administrator for Hazardous Materials Safety  
Research and Special Programs Administration  
U.S. Department of Transportation  
400 7<sup>th</sup> Street, SW  
Washington, D.C. 20590-0001

June 19, 1997  
L-97-166

Attention: Exemptions, DHM-31

**SUBJECT: EXEMPTION REQUEST FROM THE PACKAGING REQUIREMENTS OF 49 CFR 173.427(B)(1) AND THE SURFACE CONTAMINATED OBJECT LIMITS OF 49 CFR 173.403 FOR THE SHIPMENT OF TWO STEAM GENERATORS FROM ST. LUCIE UNIT 1.**

Florida Power & Light, (FP&L), requests an exemption from the subject regulations for the shipment of two Steam Generators from St. Lucie Unit 1 to the Chem-Nuclear Systems (CNS) Low-Level Radioactive Waste Management Facility in Barnwell, South Carolina. These will be one-time shipments, and will be performed in a controlled manner as described in the information provided as an attachment to this letter. The transportation of these steam generators is expected to begin on or after October 20, 1997, and be completed within one year.

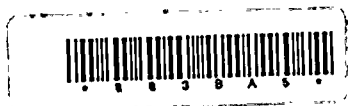
Specifically, FPL requests an exemption from the packaging requirements for a surface contaminated object ("SCO") in 49 CFR 173.427, and from the SCO limits in 49 CFR 173.403, in order to facilitate the one-time, controlled shipment of two steam generators from St. Lucie Unit 1 to Chem-Nuclear Systems Low-Level Radioactive Waste Management Facility in Barnwell, South Carolina. This exemption would allow the steam generators to be classified as SCOs and transported as unpackaged under a transportation plan that provides an equivalent level of safety to the packages and procedures specified in the Department of Transportation's regulations.

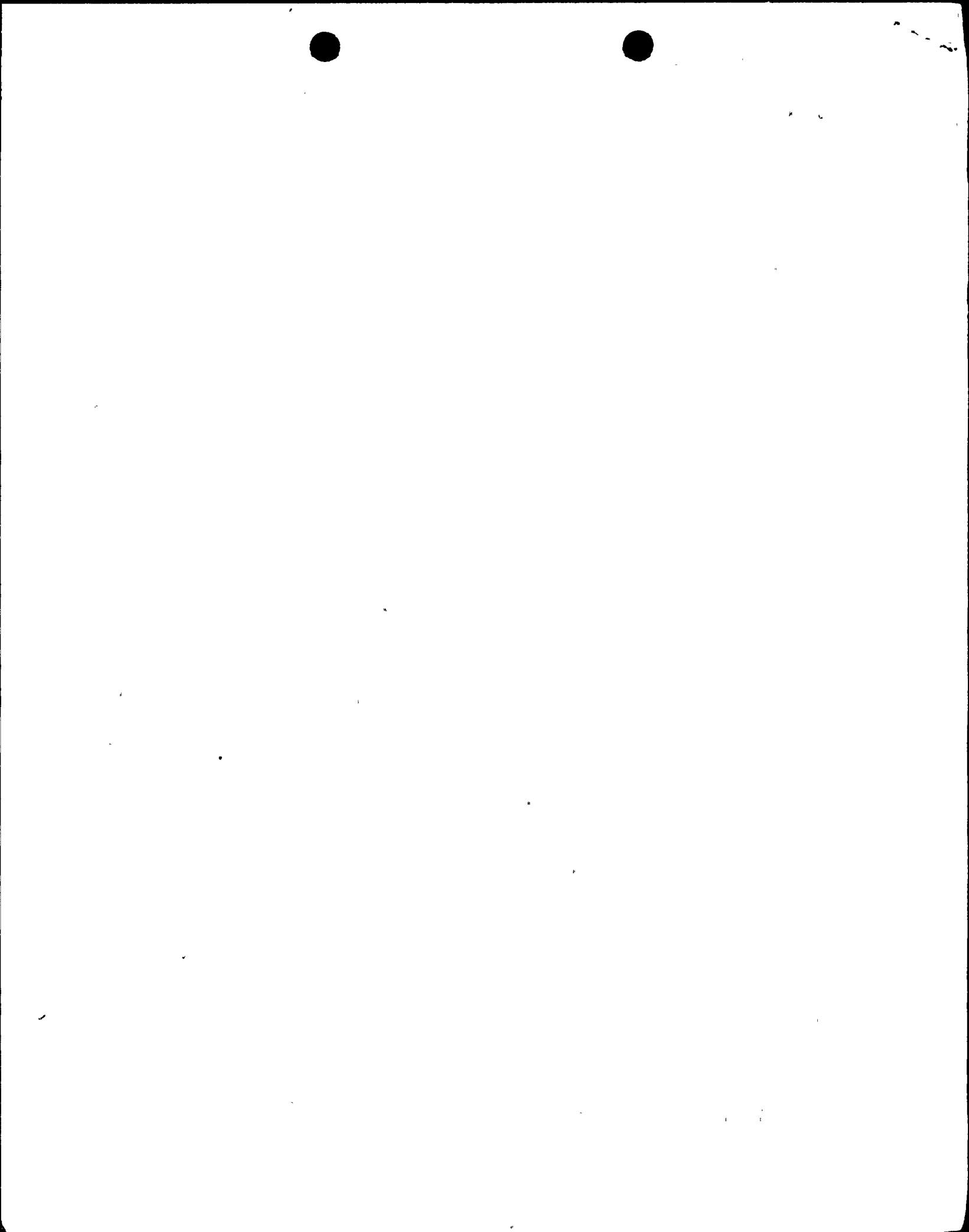
The existing SCO packaging requirements were not developed to accommodate very large, nuclear-grade components such as steam generators. Under these circumstances, the rugged, sealed, steel shell of the steam generators provides protection equivalent to the SCO packaging requirements. An exemption from the limits in the SCO definition is sought because, while analysis shows that these limits are met in the straight tube sections of the steam generators, it is possible they could be slightly exceeded in some other interior surfaces.

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A001

Representatives from FP&L and CNS met with members of the Department of Transportation (DOT) and Nuclear Regulatory Commission (NRC) staff on April 3, 1997 to discuss this project. During this meeting DOT and NRC was presented with an overview of the upcoming steam generator transportation effort. DOT and NRC representatives referenced the NRC Generic Letter 96-07, which was jointly issued by DOT and NRC to provide interim guidance to those

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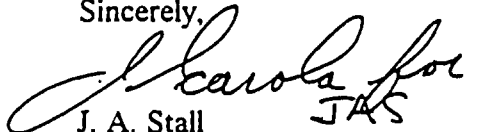


desiring to transport steam generators. They also discussed their experience with the exemptions granted for transport of the steam generators owned by Public Service Electric & Gas in 1996.

Accompanying this letter are a series of attachments that provide all supporting information for this exemption request. Attachment 1 is the compliance matrix that addresses the requirements of 49 CFR 107 for an exemption request. Other attachments provide detailed engineering analyses, drawings, and operational plans and procedures supporting the steam generator transportation effort. Two bound copies and one unbound copy (for copying) is being sent for your use.

If you have any questions concerning this request, please contact our project engineer, Mr. Russell Gouldy (561) 467-7470, or Mr. Ron Gross our Engineering Manager at (561) 467-7682.

Sincerely,

  
J. A. Stall  
Vice President, St. Lucie Plant

VP-PSL-059

cc: John Bender, Chem-Nuclear Systems  
USNRC Document Desk, Docket 50-335  
Regional Administrator, USNRC, Region II  
NRC Resident Inspector, St. Lucie Plant

Attachments:

1. Compliance Matrix.
2. CNS Plan PL-CNSI-97-004, "Transportation and Emergency Response Plan for St. Lucie Unit 1 Steam Generator Project, Project No. 46621."
3. Steam Generator Drawings
4. Transport Structural Analyses of St. Lucie Unit 1 Steam Generators.
5. St. Lucie Unit 1 Steam Generator Transportation General Arrangement Drawings.
6. Preliminary Waste Characterization of St. Lucie Unit 1 Steam Generators.
7. Evaluation of Residual Water in St. Lucie Unit 1 Steam Generators.

## Overview

The following attachments provide the basis for the exemption request to ship the St. Lucie Unit 1 Steam Generators from Hutchinson Island, Florida to the Chem-Nuclear Systems Low-Level Radioactive Waste Management Facility located at Barnwell, South Carolina. The steam generators will be transported in a controlled manner via barge to the Savannah River Site in South Carolina, then over road from the Savannah River Site to Barnwell, South Carolina. The A and B Steam Generators will be transported separately with the first steam generator leaving the St. Lucie site in late 1997 and the second steam generator leaving in early 1998. The transport process should take approximately one month for each steam generator.

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Attachment 1  
Compliance Matrix

## ATTACHMENT 1 - COMPLIANCE MATRIX

EXEMPTION REQUEST FROM THE PACKAGING REQUIREMENTS OF 49 CFR 173.427(B)(1) AND THE SURFACE CONTAMINATED OBJECT LIMITS OF 49 CFR 173.403 FOR THE SHIPMENT OF TWO STEAM GENERATORS FROM ST. LUCIE UNIT

1.

This document provides the basis of the exemption request for the transportation of the St. Lucie Unit 1 Steam Generators. In the following text, the regulation concerning the exemption request is cited, and the applicant's response is provided in indented italics following the respective regulation. Supporting information is provided in other documents also provided as an attachment to this exemption submittal.

### TITLE 49--TRANSPORTATION

#### CHAPTER I--RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

##### Subpart B--Exemptions

Source: Amdt. 107-38, 61 FR 21095, May 9, 1996, unless otherwise noted.

##### Sec. 107.101 Purpose and scope.

This subpart prescribes procedures for the issuance, modification and termination of exemptions from requirements of this subchapter, subchapter C of this chapter, or regulations issued under chapter 51 of 49 U.S.C.

##### Sec. 107.105 Application for exemption.

(a) General. Each application for an exemption or modification of an exemption must--  
(1) Be submitted in duplicate and, for timely consideration, at least 120 days before the requested effective date to: Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration, U.S. Department of Transportation, 400 7th Street, SW, Washington, DC 20590-0001. Attention: Exemptions, DHM-31;

*This application is being submitted on or before June 20, 1997, approximately 120 days prior to the desired issuance date of October 20, 1997. Two copies are provided to the address as stated.*

(2) State the name, street and mailing addresses, and telephone number of the applicant; if the applicant is not an individual, state the name, street and mailing addresses, and telephone number of an individual designated as an agent of the applicant for all purposes related to the application;

*Applicant*  
*Florida Power & Light Company*  
*St. Lucie Unit 1*  
*6501 S. Ocean Drive*  
*Jensen Beach, Florida 34957*

*Agent*  
*Mr. Bruce Somers*  
*Florida Power & Light Company*  
*St. Lucie Unit 1*  
*6501 S. Ocean Drive*  
*Jensen Beach, Florida 34957*

(3) If the applicant is not a resident of the United States, a designation of agent for service in accordance with Sec. 107.7 of this part; and

*The applicant a United States Corporation and the agent is a resident of the United States.*

(4) For a manufacturing exemption, a statement of the name and street address of each facility where manufacturing under the exemption will occur.

*Not applicable. A manufacturing exemption is not requested.*

(b) Confidential treatment. To request confidential treatment for information contained in the application, the applicant shall comply with Sec. 107.5(a).

*Not applicable. No confidential treatment is requested.*

(c) Description of exemption proposal. The application must include the following information that is relevant to the exemption proposal:

(1) A citation of the specific regulation from which the applicant seeks relief;

*Regulatory Requirements:*  
*49 CFR 173.403 - Definitions*  
*For purposes of this subpart—*



... *Surface Contaminated Object (SCO)* means a solid object which is not itself radioactive but which has Class 7 (radioactive) material distributed on any of its surfaces. ....

49 CFR 173.427 – Transport requirements for low specific activity (LSA) Class 7 (radioactive) materials and surface contaminated objects (SCO).

... (b) Except as provided in paragraph (c) of this section, LSA material and SCO must be packaged as follows:

(1) In an industrial package (IP-1, IP-2 or IP-3; Sec. 173.411), subject to the limitations of Table 8; ....

**Exemption Request:**

NRC Generic Letter 96-07, "Interim Guidance on Transportation of Steam Generators," provides NRC and DOT guidance on the application of existing radioactive material transportation requirements to the transportation of steam generators. This letter indicates that these steam generators are best characterized within the scope of the regulations as SCO, as they are solid, non-radioactive objects with radioactive material distributed on its surfaces. As such, SCO material is required to be transported in packaging meeting DOT's industrial packaging definitions in 49 CFR 173.411.

The generic letter goes on to state that it is impractical to measure the contamination level over all contaminated surfaces as required to demonstrate compliance with the SCO definition. Furthermore, the letter states that, if the shipper desires to ship the steam generators without first packaging them, an exemption should be requested from the packaging requirements for SCO material.

As a result of this guidance, we hereby request exemptions from the SCO demonstration requirements and from the packaging requirements for SCO material. Supporting information is provided in the form of attachments accompanying this request that demonstrate equivalent safety to that specified for the transportation of SCO material per existing regulations

**Summary of Applicants Request:**

The applicant requests exemptions from the packaging requirements of 49 CFR 173.427(b)(1) and approval of alternate IP-2 packaging for two steam generators. The applicant submits that the rugged shell design of these nuclear grade components, combined with the welded and bolted closure plates, structural evaluations in accordance with Sec. 173.461, and transport operation controls and restrictions offer equivalent or better safety than that required for IP-2 by sec. 173.410 and 411.

## (2) Specification of the proposed mode or modes of transportation;

*The steam generators will be transported by two primary modes, barge and heavy-haul motor vehicle transportation. The steam generators will be transported via barge from St. Lucie Site to the Savannah River Site. The steam generators will be transported via land from the Savannah River Site to the final destination. Details of the transportation are included in the transportation plan in Attachment 2.*

## (3) A detailed description of the proposed exemption (e.g., alternative packaging, test, procedure or activity) including, as appropriate, written descriptions, drawings, flow charts, plans and other supporting documents;

*Alternative Packaging of the St. Lucie Unit 1 Steam Generators:*

*The steam generators will be transported as unpackaged radioactive material. Drawings of the steam generators are provided in Attachment 3. The steam generators are approximately 749 inches long, 240 inches in maximum diameter, and weigh approximately 1,000,000 pounds. The steam generator shell is constructed of carbon steel, and is at least 3 1/4 inches thick. The steam generators are designed for an operating pressure of more than 1000 pounds per square inch.*

*The steam generators are prepared for transportation by cutting the penetrations at the primary cooling water inlet and outlet nozzles, the secondary feedwater nozzle, the secondary steam exit nozzle, and several instrumentation lines. These penetrations are sealed with welded closures that also provide shielding of the radioactive material inside. Inspection ports and manways are covered by bolted closures that are a part of the original design. The steam generators as prepared for transport are structurally evaluated in Attachment 4. Sketches depicting the orientation of the steam generator and supporting equipment are provided in Attachment 5.*

*The primary side surfaces (the interior surfaces of metal tubes inside the steam generator) of the steam generators are coated with radioactive materials deposited from reactor coolant water during the course of normal operation. The characterization of this radioactive content is provided in Attachment 6. It is assumed that the radioactive content of water potentially trapped in plugged tubes is negligible. The assessment of water remaining in plugged tubes is provided in Attachment 7. Furthermore, it is assumed that the secondary side surfaces inside the steam generator shell contain negligible quantities of radioactive material.*

*Based on the engineering evaluations performed for the alternatively packaged steam generators, the steam generators as described herein, along with the transportation plans and procedures, provide a level of safety equivalent to that of an industrial package.*

(4) A specification of the proposed duration or schedule of events for which the exemption is sought;

*The current project schedule includes an early start date for transportation activities of October 20, 1997. Each steam generator is to be transported separately, with the conclusion of the transport of the second steam generator scheduled for early 1998. Based on this schedule of events, and the uncertainties inherent in such a project, we request that the exemption be issued by October 20, 1997, and for a term of one year.*

(5) A statement outlining the applicant's basis for seeking relief from compliance with the specified regulations and, if the exemption is requested for a fixed period, a description of how compliance will be achieved at the end of that period;

*This exemption request is submitted in accordance with the information provided in NRC Generic Letter 96-07, "Interim Guidance on Transportation of Steam Generators." This generic letter is a joint effort between NRC and DOT, and provides a basis for this request. Since the transportation of each steam generator will be a one-time-only event, it is not necessary to demonstrate compliance at the end of the exemption period.*

(6) If the applicant seeks emergency processing specified in Sec. 107.117, a statement of supporting facts and reasons;

*Emergency processing of this exemption application is not requested.*

(7) Identification and description of the hazardous materials planned for transportation under the exemption;

*The characterization of the radioactive waste material contained in the steam generators is provided in Attachment 6. This characterization is preliminary because the steam generators are still in use. The document is based on information obtained during the May 1996 refueling outage at St. Lucie Unit 1. However, the characterization document provides evidence that the final characterization of the generators is not likely to differ significantly from the preliminary evaluation.*

*A final evaluation of the radioactive materials within the steam generators will be performed prior to transportation to comply with all DOT regulatory requirements.*

(8) Description of each packaging, including specification or exemption number, as applicable, to be used in conjunction with the requested exemption;

*As previously stated, this exemption request is for the transportation of two steam generators from St. Lucie Unit 1. Each steam generator will be prepared as described in response to 49 CFR 173.107(c)(3) above.*

(9) For alternative packagings, documentation of quality assurance controls, package design, manufacture, performance test criteria, in-service performance and service-life limitations;

*FPL and its contractors, Chem-Nuclear Systems, and SGT Limited, will perform steam generator transportation activities in accordance with the requirements stated in their respective 10 CFR 50 Appendix B, QA Programs. A project specific QA Program has been developed by Chem-Nuclear System. This document identifies that the design, fabrication, hardware installation, transportation, inspection, and disposal will be conducted to the requirements of the Chem-Nuclear Systems QA Manual and respective implementing procedures. SGT Limited will be performing the welding operations and inspections to seal the package. Special processes (welding and nondestructive examination) will be accomplished to the requirements of the SGT Limited QA Manual and respective implementing procedures.*

(d) Justification of exemption proposal. The application must demonstrate that an exemption achieves a level of safety at least equal to that required by regulation, or if a required safety level does not exist, is consistent with the public interest. At a minimum, the application must provide the following:

(1) Information describing all relevant shipping and incident experience of which the applicant is aware that relates to the application;

*This exemption is justified because existing SCO packaging requirements were not developed to accommodate very large, nuclear-grade components such as steam generators. Further, evaluation of the St. Lucie steam generators, including load drop analysis, shows that the sealed, steel shell of the steam generators will act as extremely rugged, leak-tight packages that meet or provide protection equivalent of the IP-2 packaging requirements of 10 CFR 173.410 and 173.411 when transported under the controls provided in Attachment 2, "Transportation and Emergency Response Plan for St. Lucie Unit 1 Steam Generator Project, Project No. 46621." FP&L's contractor for this transportation project, Chem-Nuclear Systems, has been involved in three previous steam generator transportation projects (Millstone, Yankee Rowe, and*

*Salem). Each of these projects involved the transportation of multiple steam generators by barge, rail, and road transport modes. Chem-Nuclear Systems was involved in operational and engineering activities for each of the projects, and is intimately familiar with the issues important to safety.*

*Of these shipping campaigns, the Salem project was completed most recently, and was the first to be performed under a DOT exemption similar to that being requested in this application. The Salem steam generator transportation effort was completed without incident.*

*For all these reasons, the requested exemption is permissible pursuant to 49 U.S.C. 5117(a) because the steam generators provide a level of safety equivalent to the SCO packaging requirements.*

- (2) A statement identifying any increased risk to safety or property that may result if the exemption is granted, and a description of the measures to be taken to address that risk; and

*No increased risk is identified as a result of this request.. The structural shell of the steam generators was analyzed for postulated normal transportation events such as a one foot drop. The results of the analysis show that the stresses in the steam generator under 1-foot droop on a rigid unyielding surface [in accordance with Table 12 of 10 CFR 173.465] are within the allowable values, the cap and plug welds maintain their integrity, and the deformation at the point of impacts is such that none of the protrusions make a contact with the rigid surface. This application provides similar structural analyses for the St. Lucie Unit 1 Steam Generators.*

- (3) Either--

- (i) Substantiation, with applicable analyses, data or test results, that the proposed alternative will achieve a level of safety that is at least equal to that required by the regulation from which the exemption is sought; or

*Structural analyses are provided in Attachment 4 that demonstrate the ability of the steam generators to be transported as alternative packaging. The transportation plan provided in Attachment 2 details the special steps and operational controls that are performed that serve to provide additional safety over a typical, uncontrolled shipment of radioactive material.*

(ii) If the regulations do not establish a level of safety, an analysis that identifies each hazard, potential failure mode and the probability of its occurrence, and how the risks associated with each hazard and failure mode are controlled for the duration of an activity or life-cycle of a packaging.

*Not applicable. This application provides a basis for equivalent safety of the alternative packaging.*

Attachment 2  
Transportation Plan