UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 15, 1998

DOCKET: 70-1257

LICENSEE: Siemens Power Corporation
Richland, WA

SUBJECT: SAFETY EVALUATION REPORT: AMENDMENT APPLICATION DATED JULY 14, 1997, OPERATIONS SCRAP WAREHOUSE

BACKGROUND

In a submittal dated July 14, 1997, Siemens Power Corporation (SPC) applied for a license amendment to add the Operations Scrap Warehouse (OSW) (Warehouse 7) to Table I-1.1 as a specific location of an authorized activity, that activity being the storage of closed and externally free-of-significant-contamination containers of product and scrap materials and the loading and unloading of such containers into and from shipping containers.

On December 1, 1997, NRC staff reiterated to SPC its position previously stated in a November 4, 1997, letter to SPC that the NRC had insufficient information to independently assess the safety of the OSW in order to approve the amendment request. In a letter dated December 3, 1997, SPC provided additional information on the OSW. On December 23, 1997, and during the week of January 5, 1998, NRC staff asked SPC staff additional questions about the OSW during telephone conversations. In letters dated December 30, 1997, and January 12, 1998, SPC provided answers to those questions.

DISCUSSION

SPC will use the OSW to store scrap and product containers which are externally free of significant contamination and to load and unload such containers into shipping containers. The OSW will be similar in construction and arrangement to other SPC warehouses used for this activity and will be located 100 feet due east of the south end of the UF_6 cylinder storage and handling facility.

SPC has been using land-sea containers for overflow storage of uranium scrap. Over the past several years, storage requirements have increased as more uranium is supplied as scrap and as SPC defines profitable scrap recovery opportunities. Presently, approximately 3,500 pails of uranium scrap occupy more than 40 land-sea containers at the facility. The OSW has been designed to store up to 7,040 pails, allowing for twice the present storage needs and for SPC to empty the land-sea containers.

The uranium will be stored only in closed steel containers. SPC will perform routine monthly surveys of stored containers as well as surveys of incoming and outgoing containers to the OSW to ensure that there has been no loss of containment. SPC will survey incoming outer shipping containers to search for contamination. The new warehouse contains no water or sewer service and no airborne discharge stacks.

The steel frame (non-combustible) structure will be 70-foot wide by 100-foot long on a 6-inch thick concrete pad, with a nominal eave height of 18 feet. Standard personnel doors will be provided at the north and south ends of the building. Two 12-foot wide standard roll-up doors will be provided at the south end of the building for fork truck access. These roll-up doors will be provided with independent radio control operators and manual and electronic controls inside the building. The rack design and layout and materials used within the building will be similar to those in other SPC warehouses. In addition, the OSW will be monitored by SPC's criticality alarm system.

The maximum dimensions of the closed containers will be 11.2798-inch outer diameter and 13.5-inch outer height. Four containers will be stored equally spaced on 25-inch by 25-inch steel pallets. The pallets will be placed on steel storage racks. Each 10-foot 6-inch long storage rack section will consist of floor storage plus four shelves. One row of eight sections runs along the length of the warehouse on either side, and four rows of seven sections run through the middle.

CRITICALITY SAFETY REVIEW

The staff has reviewed the information submitted by SPC and has performed a technical assessment of the activity associated with the use of the OSW. The containers will contain uranium compounds of up to 5 wt.% U-235.

Criticality Safety Controls

The criticality safety controls that SPC will use in the OSW are mass control of uranium (MCU), concentration control of moderators (CCM), and control of spacing from other fissile units (SPA).

SPC Accident Scenarios

SPC investigated the following credible accident scenarios: (1) overbatched mass violations, (2) overbatched moderator violations, (3) collapsed racks (with and without mass or moderator overbatching and fully flooded), and (4) spilled container contents onto the floor. SPC did not find a credible source for optimum interspersed water concentration during normal operations because there will be no water connections to the OSW and the fissile material stored in the OSW will be contained in closed steel containers. SPC performed calculations and graphed the effect of moderation and concluded that the optimum maximum moderation is 7%. SPC determined that the loss of one of the three criticality safety controls would not lead to a criticality accident. The model that SPC used included powder in containers up to the maximum outer diameter and outer height, no steel, concrete reflection at the bottom, water reflection on the top and four sides of the perimeter surrounding all six rows, and the 16-group Hansen-Roach cross-section library.

NRC Staff Neutron Interaction Analysis

The NRC staff performed the neutron interaction analysis using KENO V.a calculations. KENO is a Monte Carlo neutronics code that can be used for calculating k_{eff} values for configurations

of special nuclear material at fuel cycle facilities. The code uses probabilistic techniques to determine the results of neutron interactions. From these results, the effective multiplication of neutrons can be computed. The 44-group cross-section library was used to take advantage of the most recent available nuclear data.

When nuclear criticality safety is based on computer code calculations, Chapter 4 of the SPC license requires the (k_{eff}+2sigma) value for normal operations to be no greater than the quantity (0.95 - calculational bias), and the (k_{eff}+2sigma) value for abnormal operations to be no greater than the quantity (0.97 - calculational bias). SPC determined the calculational bias to be 0.00151. Thus, the (k_{eff}+2sigma) value for normal operations is less than 0.948, and the (K_{eff}+2sigma) value for abnormal operations is less than 0.968. The NRC staff performed calculations assuming the appropriate conservative values of the criticality safety parameters for normal operating conditions. For abnormal operations, the NRC staff performed calculations assuming the appropriate conservative values of the criticality safety parameters for normal operating conditions and the failure of one or more of the three criticality safety controls for normal operating conditions.

A summary of both NRC and SPC staffs' results is tabulated below. Analyses of the results for both NRC and SPC calculations indicate that the most reactive abnormal operating condition for both 3 wt.% and 5 wt.% U-235 is a 13x13x13 array of pallets which represents a collapse of all the racks and subsequent redistribution of pallets into a close packed array.

	Normal Conditions		Abnormal Conditions	
	SPC	NRC	SPC	NRC
3 wt.%	0.672	0.639	0.830	0.898
5 wt.%	0.618	0.561	0.775	0.86[illegible]

The differences between the calculated values for SPC and NRC are due to (1) SPC's use of the 16-group and NRC's use of the 44-group cross-section set and (2) SPC's use of 30-cm and NRC's use of 15.4-cm of concrete for bottom reflection. Because the most reactive normal and abnormal operating conditions result in (k_{eff}+2sigma) values less than the corresponding operating limit, the staff concludes that the OSW is reasonably safe.

Part I of SPC's license requires assumed conditions of process variables to be at their credibly most reactive values. These process variables include moderation, reflection, mass, concentration, density, enrichment, heterogeneity, geometry, and spacing. The staff has concluded that SPC has assumed the credibly most reactive conditions in its analysis.

The staff has reviewed and simulated the physical layout of the OSW as proposed by SPC. Based on this review, the staff concludes that there is reasonable assurance that SPC has examined all credible control failure sequences and that a nuclear criticality will not occur by ensuring that no single failure of one of the three criticality safety controls will cause an inadvertent nuclear criticality.

Based on this review, the staff has reasonable assurance that a sufficient margin of safety exists to prevent a nuclear criticality during both normal and abnormal operating conditions.

FIRE SAFETY REVIEW

The OSW is of non-combustible construction and is located a suitable distance from, and is not an exposure fire threat to, the UF_6 cylinder storage and handling facility. The design reflects low combustible loading, and the radioactive material will be stored in closed steel containers. Heat detection and fire alarm pull stations provide fire notification to a fully-manned guard station. Exit doors are located at each end of the facility for emergency egress. Fire suppression is provided by plant personnel and the local fire department. Portable fire extinguishers are provided for incipient firefighting, and fire hydrants are located throughout the plant site. Based on the above, the staff concludes that this facility is adequately designed for fire safety.

ENVIRONMENTAL REVIEW

The staff has determined that the following conditions have been met:

1. There is no significant change in the types or significant increase in the amount of effluents that may be released offsite.

2. There is no significant increase in individual or cumulative occupational radiation exposure.

3. There is no significant construction impact.

4. There is no significant increase in the potential for or consequences from radiological accidents.

Accordingly, pursuant to 10 CFR 51.22(c)(11), neither an environmental assessment nor an environmental impact statement is warranted for this action.

CONCLUSION

The NRC staff has reviewed the proposed amendment and has determined that the addition of the OSW will have no adverse effect on the public health and safety or the environment. Therefore, the amendment is granted.

The Region IV inspection staff has no objection to this proposed amendment.

PRINCIPAL CONTRIBUTORS
Harry D. Felsher
Paul W. Lain
Susan D. Chotoo
Kimberly J. Hardin