SIEMENS

February 2, 1998
JBE:98:023

Director, Office of Nuclear Material Safety & Safeguards
U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Subject: MERF Amendment Request

Ref.: Letter, J.B. Edgar to M.F. Weber, "NRC RAI (TAC No. L30896), dated September 3, 1997

Based on the information submitted in the referenced letter and several conversations among members of the Licensing Branch and Siemens Power Corporation (SPC) personnel, SPC is providing the attached information regarding its planned storage of hydrogen peroxide used in the MERF process. Note that, while we provided information on alcohol rags, we do not intend to process them until we have further data on any possible reactions with nitric acid.

If you have questions or require further information, please call me on 509-375-8663.

Very truly yours,

James B. Edgar
Staff Engineer, Licensing

/pg

Enclosure

cc: NRC Region IV, WCFO - C. Hooker
WDOH - L. Wainhouse

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EMXN

Siemens Power Corporation

Nuclear Division
Engineering & Manufacturing

2101 Horn Rapids Road
P.O. Box 130
Richland, WA 99352-0130

Tel: (509) 375-8100
Fax: (509) 375-8402

TOPRP

Storage Temperature of Hydrogen Peroxide

Siemens Power Corporation (SPC) has worked directly with Degussa Corporation (the manufacturer of the hydrogen peroxide to be used in the MERF project) regarding the safety concerns that the Nuclear Regulatory Commission (NRC) has with respect to storage temperatures for 55-gallon drums of 30% hydrogen peroxide.

MSDS guidelines indicate that storage temperatures should not exceed 100°F. Based on this area's weather history, we can expect only 10-15 days per year that exceed this temperature. Calculations show that at an ambient temperature of 116°F (maximum temperature recorded in last 5 years) and an average daily temperature of 85°F, the temperature of the peroxide solution will not exceed 100° F.

The boiler, also located in the Raw Material Storage Area where the hydrogen peroxide is stored, exhausts outside. It has been calculated that the boiler itself, when operating, will increase the storage area temperature by approximately 17°F. Because the boiler will only be in operation approximately one hour per day, the heat load added to the storage area will only be for a short time and would not add significantly to the temperature of the peroxide. Also, this calculation assumes no heat loss from the walls of the enclosure which makes the projected conditions even more conservative.

The consequence for storage of peroxide at higher temperatures is a higher decomposition rate. Hydrogen peroxide decomposes into water and oxygen. These products are not hazardous by themselves; however, the gaseous oxygen that is evolved during decomposition can support combustion in the unlikely event of a fire. At 100°F, the decomposition rate of 30% hydrogen peroxide is 70 g/day. At 120°F, the decomposition rate increases to 117 g/day. Based on the fact that 2 moles of peroxide are required to release 1 mole of oxygen, this increase represents only 21.8 g/day of additional oxygen at the higher temperature. This would support combustion of only 4 grams of combustible material and there will be no combustible materials (cardboard, wood, rags, etc.) stored in the Raw Material Storage Area.

Each drum of hydrogen peroxide is vented to allow the escape of oxygen from the container into the Raw Material Storage Area. This prevents the drum from pressurizing. The storage area is well ventilated (8 air changes/hr) to remove this and any undesirable gas from the area.

Degussa indicates that very few situations have been documented where drums of peroxide have been adversely affected by storage temperature. Even their own storage tanks experience temperatures greater than 100°F with only slight decomposition over several weeks. They did not feel that our storage conditions were a problem.

Alcohol Rags

Alcohol rags typically contain 10-50% alcohol. The rags are not saturated, i.e., there is no free standing liquid in any of the drums containing such rags. Each drum will be grounded when opened and the use of power tools will not be allowed for removing the drum ring. After opening, each drum will be filled with water to eliminate the flammability/ignitability concern. The drum contents will be dumped onto the sorting table; the liquid will be

pumped to a holding tank and the rags will be loaded into laundry bags for uranium leaching and extraction in the washer extractor. A pre-rinse step with water will be done to further remove alcohol from the rags prior to leaching. After the pre-rinse step, 3M nitric acid will be added to the washer extractor to leach the uranium from the waste matrix. The concentrations of alcohol and nitric acid at this point are 0.17% and 14.5%, respectively.

SPC does not feel that the proposed method to process the alcohol rags poses a safety problem. However, SPC will provide documentation and/or evidence to verify this and will apply for a separate amendment for processing alcohol rags at that time.