DISTRIBUTION:
DN 50-320
NRC PDR
Local PDR
DCS
TMI Site r/f
TMI HQ r/f
BJSnyder
TCPoindexter
WDTravers
MMasnik
RWeller
PJGrant
JAThomas
RCook
LChandler
ACRS (16)
HRDenton
I&E (3)
M-Town Office

NRC/TMI-84-069
September 19, 1984

Docket No. 50-320

Mr. F. R. Standerfer
Vice President/Director, TMI-2
GPU Nuclear Corporation
P. O. Box 480
Middletown, PA 17057

Dear Mr. Standerfer:

Subject: Makeup and Purification Demineralizer Cesium Elution

References: (a) Letter from J. J. Barton to B. J. Snyder, 4410-84-L-0094, dated July 19, 1984
(b) Letter from F. R. Standerfer to B. J. Snyder, 4410-84-L-0136, dated August 29, 1984

This letter is in response to references (a) and (b) in which GPU Nuclear Corporation forwarded both a safety evaluation and an addendum describing the proposed process for chemically eluting the cesium activity from the resin in the makeup and purification demineralizers. Your safety evaluation addressed the process design and operation to elute activity from the resin to the neutralizer tanks, radiological controls for the process, radiolytic gas generation, process interfaces with other plant systems, and consequences of postulated leaks from the systems.

The staff reviewed your initial safety evaluation (reference a) and determined that clarification of several items was needed. These items were discussed in a meeting with your technical staff on August 21, 1984. Your addendum (reference b) addressed those items needing further written clarification as well as improvements in the design and operation of the system that had not been finalized when the original safety evaluation was submitted.

Based on our safety evaluation, which is attached, we have concluded that your proposed process can be carried out with reasonable assurance that the process will not present an unacceptable risk to the health and safety of the public and site workers. Additionally, the potential environmental effects from the elution process fall within the scope of conditions previously considered in the PEIS.

8410010023 840919
PDR ADOCK 05000320
P PDR

OFFICE ➤						
SURNAME ➤						
DATE ➤						

The TMIPO staff therefore approves your proposed process for elution of the cesium activity from the makeup and purification resin. Pursuant to Technical Specification 6.8.2 we require the submittal of the detailed operating procedures for NRC review and approval before implementation.

Sincerely,

ORIGINAL SIGNED BY:
William D. Travers

William D. Travers
Deputy Program Director
TMI Program Office

Attachment: as stated

cc: T. Dennitt
R. Rogan
S. Levin
R. Freemerman
J. Byrne
Service Distribution List

OFFICE	TMI:PO	DTP:PO	TMI:PO				
SURNAME	JAThomas:wa	P.Grant	WDTravers				
DATE	9/19/84	9/19/84	9/ /84				

ATTACHMENT

PROCESS DESCRIPTION

The system for elution of the cesium activity from the two, 90 cubic feet stainless steel demineralizers consists of a supply of processed water, a chemical mix tank for batch additions of dilution water and elution solutions to the demineralizers via the demineralizer operational outlet lines, an eductor and transfer pump for pumping the solutions out of the demineralizer, a 20 micron particulate filter, pipe and hose to transfer the solutions and eluted activity to the neutralizer tanks, and instrumentation to monitor and control the process. Throughout the elution process the demineralizer vessel gas spaces will be vented to the waste gas system. Processed water mixed with elution chemicals (sodium hydroxide, boric acid and anion resin for organic residue scavaging) will be added in 200 gallon batches to the demineralizers via the chemical addition tank. Chemical concentrations will be successively adjusted in each batch to achieve the desired activity concentration in the eluent stream. The solution will be pumped from the demineralizer by a transfer pump or an eductor system supplied by processed water. The eluent will be passed through a sintered metal filter to remove any resin fines or fuel debris and then transferred to the neutralizer tanks for sampling/analysis and subsequent processing through the submerged demineralizer system (SDS).

PROCESS DESIGN FEATURES

Laboratory analysis of solid and liquid samples from both demineralizers indicate the highest expected activity levels in the liquid phases presently in the vessel is 2700 uCi/cc. The initial batch addition to the demineralizers will consist of about 200 gallons of processed water without any additional elution chemicals. This will dilute the liquid phase to about 1350 uCi/cc. The process equipment and transfer piping is shielded to provide a maximum radiation level of 2.5 millirem per hour at the system control panel with a process stream containing a maximum activity level of 70 uCi/cc. The system control panel is located in the Hayes Gas Analyzer room on the Auxiliary Building 305 ft. elevation. The initial batches of high activity water will be drawn from the demineralizers at a rate of .25 gpm by an eductor supplied by 5 gpm of processed water. Since no significant removal of cesium from the resin is expected in the first batch, the 20:1 dilution of the liquid phase by the eductor will yield an effluent activity of no more than 70 uCi/cc. During subsequent batches, the chemical additions and dilution flow will be adjusted and procedurally controlled to achieve a cesium removal rate from the resin that will yield activity levels of no more than 70 uCi/cc in the diluted eluent stream. Instrumentation will be provided to monitor the area radiation levels in the process operating areas. Additionally, process radiation monitors will be provided to measure radiation levels from the process piping. These monitors will be procedurally controlled and calibrated to allow correlation of observed dose rates to the activity concentrations of the process stream. If higher than expected activity levels are seen in the eluent stream, the eductor suction can be throttled to provide greater dilution by the eductor and additional processed water can be injected further downstream to achieve a total dilution rate of 50:1. Process flow meters are

installed to monitor system flow rates and level instrumentation has been installed to indicate water level in the demineralizer vessels. In addition, the eductor suction hoses enter the demineralizers through the normal resin fill connections and terminate above the resin beds and will thus preclude lowering vessel water level below the resin. Water addition and removal from the demineralizers will be procedurally controlled and logged to maintain records of system inventory. Thus, suitable instrumentation and procedural controls are provided to assure adequate monitoring and control of the system during the elution process.

The eluent stream is expected to have a nearly neutral pH (6.0-8.0) and has been determined to be compatible with all components, including the process piping and the neutralizer tanks. Thus, no adverse corrosion environment is expected.

The processing system has been designed and will be procedurally controlled during operation to assure double valve isolation from interconnecting radioactive waste and reactor coolant processing systems. The staff has determined that sufficient design features with instrumentation and controls to assure no intersystem leakages could contaminate the reactor coolant processing systems with high activity water or cause boron dilution in the reactor coolant system.

COMBUSTIBLE GAS GENERATION

Radiolytic generation of hydrogen gas in the demineralizer with the highest cesium loading has been measured to be less than 1.4 liters per day. The low generation rate in conjunction with continuous venting of the demineralizers to the waste gas system precludes buildup of combustible gas concentrations. Instrumentation is provided to monitor pressure in the vessels and thus would provide early detection of any gas buildup in the event of waste gas system failure. Additionally, all cubicle spaces and control stations will be well ventilated to prevent accumulation of combustible gases in the unlikely event of system leakage.

CRITICALITY

Non destructive assay studies of the makeup and purification demineralizers indicate a total of no more than 4 kg of fuel debris in the vessel. The minimum critical mass for the expected range of fuel enrichment is greater than 70 kg, therefore, no criticality potential exists.

RADIOLOGICAL AND ENVIRONMENTAL CONSIDERATIONS

The staff has reviewed all radiological controls and determined that adequate monitors and controls exist to assure acceptable radiation levels in all accessible areas during normal operations. Except for the pre-operation installation and alignment, operation of the elution process will be carried out behind shield walls at the system control panel where radiation levels are expected to be about 2.5 manrem/hr. A training program will be conducted for all operators involved with the process to assure their familiarity with the system, its instrumentation, its operating principles, and expected radiological conditions.

The staff has determined that the most probable leakage pathway could result in releases of relatively high activity water from the system to various locations in the auxiliary building cubicles. The system, however, has been located such that radiation monitors and periodic visual inspections would quickly detect any system leaks. Suitable personnel access controls will prevent undue radiation hazards to workers in the event of leaks. System leakage will be contained within existing plant drainage sumps, precluding adverse environmental impacts. Any airborne activity that might be generated from liquid leakage or gas space venting will be controlled and processed through the normal Auxiliary Building HVAC filters and monitors prior to discharge.

The total collective occupational dose for this operation is estimated to be four (4) person-rems which includes system installation, operator training, and operation. Because of the process water dilution, the shielding provided to the control panel, the placement of process monitors, provisions for leakage detection and containment, provisions for ventilation control, and training of operating personnel,the staff has determined that adequate ALARA considerations will be in place.

CONCLUSION

On the basis of our safety review, we conclude the proposed makeup and purification demineralizer elution process can be operated without posing a significant risk to the occupational work force or the offsite public. The potential environmental impacts are minimal and the proposed activities fall within the scope of those previously assessed in the Programmatic Environmental Impact Statement. We therefore approve the operation of the elution system subject to our approval of the associated operating procedures in accordance with Technical Specification 6.8.2.

TMI-2 SERVICE LIST

Dr. Thomas Murley
Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

John F. Wolfe, Esq., Chairman,
Administrative Judge
3409 Shepherd St.
Chevy Chase, MD. 20015

Dr. Oscar H. Paris
Administrative Judge
Atomic Safety and Licensing
Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dr. Frederick H. Shon
Administrative Judge
Atomic Safety and Licensing
Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Karin W. Carter
Assistant Attorney General
505 Executive House
P.O. Box 2357
Harrisburg, PA 17120

Dr. Judith H. Johnsrud
Environmental Coalition on
Nuclear Power
433 Orlando Ave.
State College, PA 16801

George F. Trowbridge, Esq.
Shaw, Pittman, Potts and
Trowbridge
1800 M. St., NW.
Washington, D.C. 20036

Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Atomic Safety and Licensing Appeal Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Secretary
U.S. Nuclear Regulatory Commission
ATTN: Chief, Docketing & Service Branch
Washington, D.C. 20555

Mr. Larry Hochendoner
Dauphin County Commissioner
P.O. Box 1295
Harrisburg, PA 17108-1295

John E. Minnich, Chairperson,
Dauphin County Board of Commissioners
Dauphin County Courthouse
Front and Market Streets
Harrisburg, PA 17101

Dauphin County Office of Emergency
Preparedness
Court House, Room 7
Front & Market Streets
Harrisburg, PA 17101

U.S. Environmental Protection Agency
Region III Office
ATTN: EIS Coordinator
Curtis Building (Sixth Floor)
6th & Walnut Streets
Philadelphia, PA 19106

Thomas M. Gerusky, Director
Bureau of Radiation Protection
Department of Environmental Resources
P.O. Box 2063
Harrisburg, PA 17120

David Hess
Office of Environmental Planning
Department of Environmental Resources

Willis Bixby, Site Manager
U.S. Department of Energy
P.O. Box 88
Middletown, PA 17057-0311

David J. McGoff
Division of Three Mile Island Programs
NE-23
U.S. Department of Energy
Washington, D.C. 20545

William Lochstet
104 Davey Laboratory
Pennsylvania State University
University Park, PA 16802

Randy Myers, Editorial
The Patriot
812 Market St.
Harrisburg, PA 17105

Robert B. Borsum
Babcock & Wilcox
Nuclear Power Generation Division
Suite 220
7910 Woodmount Ave.
Bethesda, MD. 20814

Michael Churchhill, Esq.
PILCOP
1315 Walnut St., Suite 1632
Philadelphia, PA 19107

Linda W. Little
5000 Hermitage DR.
Raleigh,NC 27612

Marvin I. Lewis
6504 Bradford Terrace
Philadelphia, PA 19149

Jane Lee
183 Valley Rd.
Etters,PA 17319

J.B. Liberman, Esquire
Berlack,Israels, Liberman
26 Broadway
New York, NY 10004

Walter W. Cohen, Consumer Advocate
Department of Justice
Strawberry Square, 14th Floor
Harrisburg, PA 17127

Edward O. Swartz
Board of Supervisors
Londonderry Township
RFD #1 Geyers Church Rd.
Middletown, PA 17057

Robert L. Knupp, Esquire
Assistant Solicitor
Knupp and Andrews
P.O. Box P
407 N. Front St.
Harrisburg, PA 17108

John Levin, Esquire
Pennsylvania Public Utilities Comm.
P.O. Box 3265
Harrisburg, PA 17120

Honorable Mark Cohen
512 E-E Main Capital Building
Harrisburg, PA 17120