



JOHN G. CESARE, JR.  
Director  
Nuclear Licensing

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U. S. Nuclear Regulatory Commission  
Mail Station P1-137  
Washington, D. C. 20555

Attention: Document Control Desk

Gentlemen:

SUBJECT: Grand Gulf Nuclear Station  
Unit 1  
Docket No. 50-416  
License No. 1PF-29  
Containment Purge Program -  
Response to NRC Staff Requests  
AECM-88/0214

System Energy Resources, Inc. (SERI) submitted in letter AECM-87/0250, dated December 31, 1987 the Cycle 2 Containment Purge Monitoring Report for Grand Gulf Nuclear Station (GGNS). By letter dated August 9, 1988 (MAEC-88/0218), the NRC staff requested additional information regarding the GGNS long term containment purge criteria.

The attachments to this letter are SERI's response to the NRC staff's request. SERI's response incorporates the NRC staff guidance provided in an October 25, 1988 telephone conference call between SERI and the NRC staff.

Attachment 1 provides a discussion of proposed revisions to the GGNS Unit 1 long term containment purge criteria and a marked up version of the containment purge system Technical Specification. The marked up pages reflect the incorporation of the GGNS Unit 1 long term containment purge criteria into the Technical Specifications. The proposed marked up pages are not intended at this time as a formal request to change the GGNS Technical Specifications. These changes are provided for NRC staff information and to facilitate further discussions. A formal Technical Specification amendment request will be submitted to the NRC within 120 days following completion of the NRC staff review of the GGNS Unit 1 long term containment purge criteria.

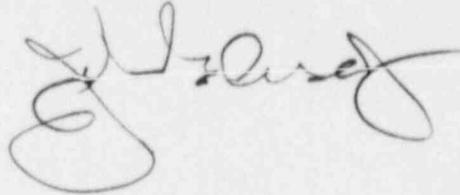
Attachment 2 provides additional information requested by the NRC staff concerning the reasons why the containment purge system was used each time during GGNS Cycle 2.

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Please advise if additional information is required.

Yours truly,



JGC:jjb  
Attachments

cc: Mr. T. H. Cloninger (w/a)  
Mr. R. B. McGehee (w/a)  
Mr. N. S. Reynolds (w/a)  
Mr. H. L. Thomas (w/o)  
Mr. H. O. Christensen (w/a)

Mr. Malcolm L. Ernst (w/a)  
Acting Regional Administrator  
U. S. Nuclear Regulatory Commission  
Region II  
101 Marietta St., N. W., Suite 2900  
Atlanta, Georgia 30323

Mr. L. L. Kintner, Project Manager (w/a)  
Office of Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
Mail Stop 14B20  
Washington, D.C. 20555

### NRC REQUEST

The original objective for the monitoring program was to develop a basis for long term purge criteria, and the existing (TS) were intended to be used only until this program is complete. Because the generated data base shows that only 1% of the TS allowable purge time is required, your proposal to maintain the current TS limit is inappropriate. Therefore, you are requested to send a revised purge program with accompanying Technical Specifications that more adequately reflects the findings of containment purge data obtained during Cycle 2 operation.

### RESPONSE

The Mark III Containment is unique when compared to earlier BWR containment designs in that a large portion of the reactor coolant carrying support systems are located inside the primary containment. Although desirable from an accident release containment view point, this design requires frequent access to containment during power operation for surveillances, maintenance and other routine activities that require containment access.

On March 15, 1982 in letter AECM-82/0028, SERI provided the NRC an assessment of the radiological doses expected for personnel requiring entry into the containment and proposed guidelines for the use of the containment purge in order to limit personnel dose.

This assessment was based on expected coolant leakage into the containment atmosphere and design values for reactor coolant fission product concentrations based on BWR operating experience.

As discussed in the March 15, 1982 letter, SERI proposed use of the Containment Ventilation and Filtration System in one of two modes for purging the containment atmosphere, namely, a low volume purge (LVP) and a high volume purge (HVP) mode. The LVP (500 cfm) uses single supply and exhaust penetrations (6" nominal diameter) and is designed primarily to provide a constant source of fresh air for the comfort and protection of personnel required to perform work in the containment during plant operation. The HVP is rated at a maximum of 6000 cfm and also utilizes single supply and exhaust penetrations (20" nominal diameter).

Usage of the high volume purge mode is currently limited in Operational Conditions 1, 2 and 3 to 1000 hours per 365 days by GGNS Technical Specification 3.6.1.9. Technical Specification 3.6.1.9 also prohibits the use of both the HVP and the LVP at the same time.

In light of the containment purge data obtained during Cycle 2 operation, as documented in letter AECM-87/0250 dated December 31, 1987, the following paragraphs describe the proposed long term containment purge program for GGNS Unit 1.

Proposed Containment Purge Program

The LVP and HVP will remain isolated during Operational Conditions 1, 2 and 3 except as needed to maintain the primary containment atmosphere within the established guidelines described below. The guidelines will be administratively controlled.

The Shift Superintendent will determine that the primary containment needs to be purged with either the LVP or HVP based on one of the following reasons:

- a) Relative Humidity > 90%
- b) Average Containment Temperature > 90°F
- c) Explosive Gas > 0% Lower Explosive Limit
- d) Oxygen Concentration < 19.5%
- e) Airborne Particulate > 25% Maximum Permissible Concentration (MPC)
- f) Radioactive Gases > 25% MPC
- g) Containment Pressure Control (< -2" WC or > 5" WC)
- h) LVP or HVP required in service to perform surveillances and for purge system maintenance, modifications or retests.

If either the LVP or HVP are needed because of high MPC, the system may be left running until the cause of the high MPC is found and corrected, even though this parameter may have dropped back below < 25% MPC. This is to prevent repeated initiation of the LVP or HVP. In all other cases, the LVP or HVP will be secured once the parameter has returned to an acceptable value.

Unrestricted containment purge using the LVP or HVP will be limited to only Operational Conditions 4 and 5.

GGNS Technical Specification 3/4.6.1.9 and its Bases are included with this Attachment and are marked up to reflect the proposed long term containment purge program. As discussed above, the HVP would no longer be restricted to 1000 hours of operation per 365 days in Operational Conditions 1, 2 and 3. By allowing the HVP to only operate to maintain the primary containment atmosphere within established guidelines or for surveillance tests or for purge system maintenance, modifications or retests which require the HVP, the HVP would only be used when needed.

## CONTAINMENT SYSTEMS

### CONTAINMENT PURGE SYSTEM

#### LIMITING CONDITION FOR OPERATION

3.6.1.9 The containment purge system supply and exhaust isolation valves shall be OPERABLE and either the 20 inch or the 6 inch purge system may be in operation; however, ~~the 20 inch purge system shall not be in operation nor shall the 20 inch valves be open for more than 1000 hours per 365 days.~~

INSERT

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2 and 3.

#### ACTION:

- a. With a containment purge system supply and/or exhaust isolation valve(s) inoperable, close the inoperable valve(s) or otherwise isolate the penetration(s) within 4 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

~~b. With the 20 inch containment purge system in operation and/or with the 20 inch supply and/or exhaust isolation valve(s) open for more than 1000 hours per 365 days, discontinue 20 inch purge system operation and close the open 20 inch valve(s) or otherwise isolate the penetration(s) within four hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.~~

- ~~b-e.~~ With a containment purge supply and/or exhaust isolation valve with resilient material seals having a measured leakage rate exceeding the limit of Surveillance Requirement 4.6.1.9.2, restore the inoperable valve(s) to OPERABLE status within 24 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

#### SURVEILLANCE REQUIREMENTS

~~4.6.1.9.1 The cumulative time that the 20 inch containment purge system has been in operation and the cumulative time that the 20 inch supply and/or exhaust isolation valves have been open during the past 365 days shall be determined at least once per 7 days.~~

~~4.6.1.9.2~~ At least once per 92 days each containment purge supply and exhaust isolation valve with resilient material seals shall be demonstrated OPERABLE by verifying that the measured leakage rate is less than or equal to  $0.01 L_a$  when pressurized to  $P_a$ .

Insert to 3.6.1.9

both the 20 inch and 6 inch purge systems shall not be in operation simultaneously. The 20 inch and 6 inch purge systems shall be used only to maintain the primary containment atmosphere within established guidelines or for surveillance tests or for purge system maintenance, modifications or retasts which require a purge system operating.

## CONTAINMENT SYSTEMS

### BASES

#### 3/4.6.1.5 FEEDWATER LEAKAGE CONTROL SYSTEM

The feedwater leakage control system consists of two independent subsystems designed to eliminate through-line leakage in the feedwater piping by pressurizing the feedwater lines to a higher pressure than the containment and drywell pressure. This ensures that no release of radioactivity through the feedwater line isolation valves will occur following a loss of all offsite power coincident with the postulated design basis loss-of-coolant accident.

#### 3/4.6.1.6 CONTAINMENT STRUCTURAL INTEGRITY

This limitation ensures that the structural integrity of the containment will be maintained comparable to the original design standards for the life of the unit. Structural integrity is required to ensure that the containment will withstand the maximum pressure of 11.5 psig in the event of a LOCA. A visual inspection in conjunction with Type A leakage tests is sufficient to demonstrate this capability.

#### 3/4.6.1.7 CONTAINMENT INTERNAL PRESSURE

The limitations on containment-to-Auxiliary Building and Enclosure Building differential pressure ensure that the containment peak pressure of 11.5 psig does not exceed the design pressure of 15.0 psig during LOCA conditions or that the external pressure differential does not exceed the design maximum external pressure differential of 3.0 psid. The limit of -0.1 to 1.0 psid for initial containment-to-Auxiliary Building and Enclosure Building differential pressure will limit the containment pressure to 11.5 psid which is less than the design pressure and is consistent with the safety analysis.

#### 3/4.6.1.8 CONTAINMENT AVERAGE AIR TEMPERATURE

The limitation on containment average air temperature ensures that the containment peak air temperature does not exceed the design temperature of 185°F during LOCA conditions and is consistent with the safety analysis.

#### 3/4.6.1.9 CONTAINMENT PURGE SYSTEM

~~The continuous use of the containment purge lines during all operational conditions is restricted to the 6-inch purge supply and exhaust isolation valves; whereas, continuous containment purge using the 20-inch purge system is limited to only OPERATIONAL CONDITIONS 4 and 5. Intermittent use of the 20-inch purge system during OPERATIONAL CONDITIONS 1, 2 and 3 is allowed only to reduce airborne activity levels and shall not exceed 1000 hours of use per 365 days.~~

INSERT

The design of the 6-inch purge supply and exhaust isolation valves meets the requirements of Branch Technic's Position CSB 6-4, "Containment Purging During Normal Plant Operations."

Insert to Bases 3/4.6.1.9

Use of either the 6-inch or 20-inch purge system during OPERATIONAL CONDITIONS 1, 2 and 3 is allowed only to maintain the primary containment atmosphere within established guidelines to facilitate personnel access for operational, surveillance and maintenance activities; or for surveillance tests and for purge system maintenance, modifications or retests which require a containment purge system to be operating. In OPERATIONAL CONDITIONS 4 and 5, usage of either the 6-inch or 20-inch purge system is unrestricted.

NRC REQUEST

In Table 1 attached to your submittal of AECM-87/0250, you have listed purging times as follows:

13.90 hours for containment pressure relief  
10.45 hours for reducing local MPC levels  
Various time periods for surveillance

For these monitored purges, provide the containment pressures, radioactivity levels, and temperatures at the beginning and end of each purging.

RESPONSE

During the Cycle 2 time period of February 17, 1986 to November 6, 1987, both the LVP and HVP systems were maintained as normally isolated.

Use of the LVP was required on fifteen occasions during the Cycle 2 time period while in Operational Conditions 1, 2 and 3. The total duration of LVP usage was 83.8 hours or approximately 1.2% of the total applicable Cycle 2 duration. The applicable Cycle 2 duration is considered to be the time period of February 17 to November 6, 1987. The unit was shut down on November 6, 1987 for the second refueling outage.

The HVP was used four times during the applicable Cycle 2 duration. The total duration of high volume purge was 11.25 hours or 1.125% of the 1000 hours per 365 days currently allowed by Technical Specification 3.6.1.9.

Table 1 of the Attachment to AECM-87/0250 provided a summary of the low and high volume purge usage dates, run times and purpose. This Table is also included in this submittal for ease of reference.

The containment pressures, radioactivity levels, and temperatures at the beginning and end of each purge listed in Table 1 are not available. The containment pressure and temperature are recorded as required by Technical Specifications every twelve hours. The pressures and temperatures for the Table 1 purge dates are provided in Table 2 of this attachment. The containment radiation levels are measured weekly and were previously submitted for Cycle 2 in AECM-87/0250 as Figure 2 (Maximum Permissible Concentration fraction versus time).

The Table 3 provides a brief summary of why the LVP and HVP were used each time during Cycle 2.

TABLE 1  
HIGH AND LOW VOLUME CONTAINMENT PURGE  
USAGE DURING CYCLE 2  
OPERATIONAL CONDITIONS 1, 2 OR 3

<u>Date</u>	<u>Run Time (Hours)</u>	<u>Purpose</u>
3/4/87	3.50	Surveillances*
3/7/87	1.10	Maintenance*
3/17-18/87	13.90	Containment Pressure Relief*
3/30/87	5.00	Surveillances*
4/30/87	4.68	Surveillances*
5/4/87	3.75	Maintenance*
5/6/87	0.05	Maintenance Retest*
5/8/87	7.15	Surveillances*
5/12/87	1.77	Maintenance*
5/14/87	0.38	Maintenance*
5/17/87	10.45	Reduce Local MPC Levels*
5/28/87	6.83	Surveillances**
6/3/87	1.00	Surveillances**
7/11-12/87	5.87	Surveillances*
8/12/87	4.43	Surveillances*
8/13/87	0.92	Surveillances**
8/27/87	2.50	Surveillances**
9/12/87	7.20	Surveillances*
10/15/87	4.27	Surveillances*

\* LVP Usage Only  
\*\* HVP Usage Only

TABLE 2  
CONTAINMENT PRESSURE AND TEMPERATURE  
FOR EACH CONTAINMENT PURGE DATE

<u>Date</u>	<u>Average Containment Pressure (PSIG)</u>	<u>Average Containment Temperature (°F)</u>
3/4/87	0.1	74
3/7/87	0.0	74
3/17/87	0.0	76
3/18/87	0.0	77
3/30/87	0.0	77
4/30/87	0.0	79
5/4/87	0.0	81
5/6/87	0.0	80
5/8/87	0.0	79
5/12/87	0.0	79
5/14/87	0.0	81
5/17/87	0.0	81
5/28/87	0.0	76
6/3/87	0.0	78
7/11/87	0.0	78
7/12/87	0.0	79
8/12/87	0.0	81
8/13/87	0.0	81
8/27/87	0.0	81
9/12/87	0.0	81
10/15/87	0.0	81

TABLE 3  
CONTAINMENT PURGE USAGE SUMMARY

On March 4, 1987, the LVP was operated for 3.50 hours to perform surveillances CH 1063 and CH 1066. These two surveillances are performed monthly in accordance with the requirements of Technical Specifications 4.11.2.1.1 and 4.11.2.1.2. Both of these surveillances, in order to be performed, require the operation of either the LVP or HVP.

On March 7, 1987, one of the containment exhaust charcoal filter trains was tested to ensure train bypass flow was within limits as required by ANSI N510-1975. This test required LVP system flow be established. LVP was in operation for 1.10 hours for this test.

LVP was used on March 17 - 18, 1987 when containment pressure exceeded the 5" water column limit. The pressure transient was due primarily to a low pressure weather system that caused a drop in atmospheric pressure; thereby, causing a differential pressure between the auxiliary building and the containment. The LVP was utilized 13.90 hours to relieve the differential pressure.

On March 30, 1987, the LVP was operated for 5.00 hours to perform surveillances CH 1063 and CH 1066.

On April 30, 1987, the LVP was operated for 4.68 hours to perform surveillances CH 1063 and CH 1066.

On May 4, 1987, the quarterly surveillance INA947 was attempted to be performed in accordance with the requirements of Technical Specification 4.3.7.12. This surveillance test in order to be performed requires either the LVP or HVP be in operation. However, the exhaust fans would not run from the control room. A maintenance work order was written to correct the problem and troubleshooting was performed. The LVP ran for 3.75 hours. A faulty relay was found and replaced on May 6, 1987 which required the LVP be operated for 0.05 hours to perform a maintenance retest.

Surveillance INA947 was attempted again on May 8, 1987 using the LVP for 7.15 hours; however, difficulty with a flow monitor prevented successful completion. A maintenance work order was written to correct the problem. On May 12, 1987 troubleshooting commenced which required the LVP be placed into operation for 1.77 hours. On May 14, 1987 the LVP was operated for 0.38 hours to allow engineering to witness the trouble. The surveillance procedure for INA947 was rewritten to correct the problem.

During May 1987 containment MPC was gradually increasing. Upon investigation it was determined a reactor water cleanup (RWCU) heat exchanger seal was leaking. In order to perform maintenance, the LVP was operated for 10.45 hours on May 17, 1987 to reduce the local MPC value in the RWCU heat exchanger cubicle and lower maintenance personnel dose exposure as low as reasonably achievable.

TABLE 3

CONTAINMENT PURGE USAGE SUMMARY (continued)

The HVP was used 6.83 hours on May 28, 1987 to perform surveillances CH 1063, CH 1066, INA947 and IND517. IND517 is a quarterly surveillance required by Technical Specification 4.3.7.12 and needs a purge system in operation for performance.

Surveillance CH 1066 was performed on June 3, 1987 using the HVP for 1.00 hour.

The LVP was operated 5.87 hours on July 11 and 12, 1987 to perform surveillances CH 1063 and CH 1066.

August 12, 1987, the LVP was operated 4.43 hours for the performance of surveillances CH 1063 and CH 1066.

Surveillance INA947 was performed on August 13, 1987 using the HVP for 0.92 hour.

The HVP operated for 2.50 hours August 27, 1987 to perform surveillance IND517.

Surveillances CH 1063 and CH 1066 were performed September 12, 1987 using the LVP for 7.20 hours.

On October 15, 1987, the LVP ran for 4.27 hours to allow performance of surveillances CH 1063 and CH 1066.