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U. S. Nuclear Regulatory Commission
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**SUSQUEHANNA STEAM ELECTRIC STATION
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION ON AMENDMENT REQUEST NO. 299 FOR OPERATING LICENSE NO. NPF-14 AND AMENDMENT REQUEST FOR OPERATING LICENSE NO. NPF-22: PRA QUESTIONS
PLA-6473**

**Docket Nos. 50-387
and 50-388**

Reference: 1) PPL Letter (PLA-6328) from B. T. McKinney (PPL) to NRC Document Control Desk titled "Proposed License Amendment No. 299 for Unit 1 and Proposed License Amendment No. 269 for Unit 2 for Changes to Technical Specifications 3.6.4.1 Secondary Containment and 3.6.4.3 Standby Gas Treatment System," dated March 28, 2008.

2) PPL Letter (PLA-6154) from B. T. McKinney (PPL) to NRC Document Control Desk titled "Application for Renewed Operating Licenses Numbers NPF-14 and NPF-22 Response to SAMA RAIs," dated April 12, 2007.

The purpose of this letter is to respond to questions asked during a telephone conversation held on December 22, 2008 between PPL and NRC with regard to Reference 1.

Attachment 1 contains the responses to the questions.

This supplement does not affect the no significant hazards consideration evaluation provided in the original request (Reference 1).

Any questions regarding this letter should be directed to Mr. Cornelius T. Coddington at (610) 774-4019.

A001
NRR

I declare, under penalty of perjury, that the foregoing is true and correct.

Executed on: 1/23/09

W. H. Spence

Copy: NRC Region I
Mr. R. R. Janati, DEP/BRP
Mr. F. W. Jaxheimer, NRC Sr. Resident Inspector
Mr. B. K. Vaidya, NRC Project Manager

ATTACHMENT 1 TO PLA-6473

RESPONSES TO REQUESTS FOR ADDITIONAL INFORMATION

Question 1

It is stated in Section 4.4.2 that the majority of postulated containment failures involve catastrophic containment over-pressure failures, which are also predicted to fail secondary containment, thereby rendering SGTS ineffective. Explain why use of the containment vent in accordance with SSES's plant-specific implementation of the BWROG Emergency Procedure and Severe Accident Guidelines (EP/SAGs) is not effective in reducing the overall contribution from containment over-pressure failures. The explanation may take the form of discussing the top LERF sequences and why venting does not reduce the containment failures. (The generic EP/SAGs direct containment venting irrespective of dose in order to prevent containment failure.) If this statement is the result of the SSES PRA treating containment venting in a different manner than directed in the plant-specific EP/SAGs, provide a re-characterization of: (1) severe accident containment response/failure assuming appropriate credit for containment venting (i.e., operator actions consistent with the plant-specific EP/SAGs), and (2) the effectiveness of SGTS in reducing severe accident releases/risk assuming appropriate credit for containment venting.

Response 1

The use of the primary containment vent in accordance with SSES's plant specific procedures is effective in reducing primary containment over-pressure failures. Venting of the primary containment will result in the failure of secondary containment due to the large amount of gas released. Failing secondary containment renders SGTS ineffective. Therefore, the end result is the same; when the primary containment is either failed or vented, secondary containment will fail which renders SGTS ineffective.

Comparison of PPL Emergency Procedures and BWROG EP/SAGs for Venting with Core Damage

The BWROG EP/SAGS (PC/P-4) states, "Before suppression chamber pressure reaches Primary Containment Pressure Limit A, vent the primary containment, defeating isolation interlocks and exceeding offsite radioactivity release rate limits if necessary, to control pressure below Primary Containment Pressure Limit A."

The PPL procedure states, "Before primary containment pressure reaches 65 psig, if determined appropriate, vent the primary containment, defeating isolation interlocks if necessary and using vent lineups not needed for adequate core cooling, to control pressure below 65 psig."

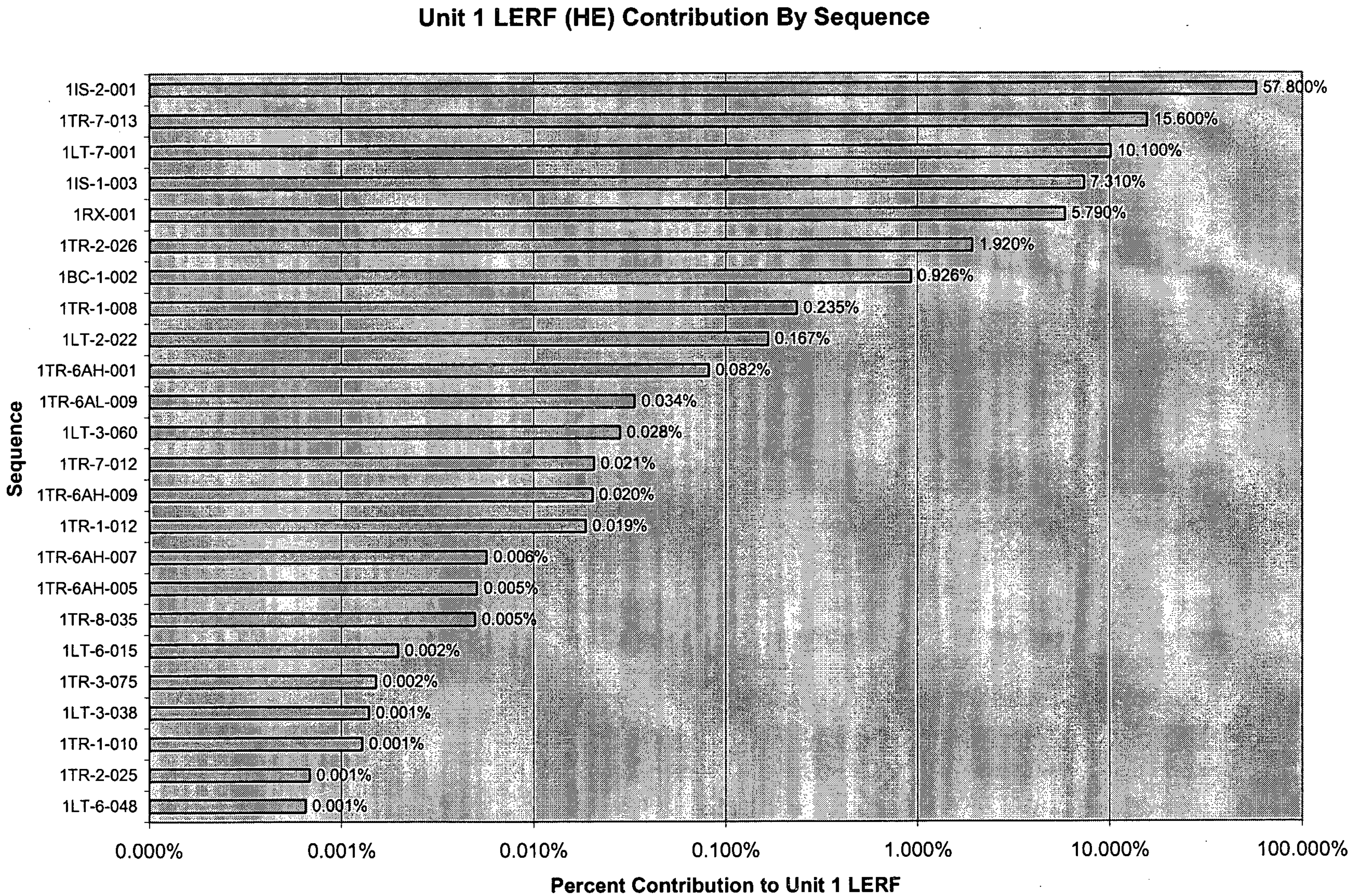
The difference between the two documents is that the PPL procedures deleted, "and exceeding offsite radioactivity release rate limits if necessary" and added "if determined appropriate." SSES venting strategy concludes that the decision to vent must be made with an awareness of the off-site consequences realized against the consequences of the venting action.

Venting Containment Prior to Core Damage

Venting primary containment can be effective in preventing core damage for certain scenarios. Core damage can be prevented by depressurizing the reactor and using low pressure makeup water to keep the core covered. The continued use of low pressure makeup depends on keeping the Automatic Depressurization System (ADS) valves open. The ADS valves are inside containment and pneumatically operated. As primary containment pressure increases, due to a failure of decay heat removal, the differential pressure between primary containment and the instrument gas, which holds the ADS valves open, decreases. This will ultimately cause the ADS valves to close. As a consequence of the ADS valves closing, the reactor re-pressurizes and its pressure exceeds the head capacity of the low pressure makeup pumps. When makeup flow ceases, the reactor will boil off water, which ultimately results in the SRVs cycling, the core being uncovered, and core damage. Thus, if low pressure water is the makeup source for the reactor and there is insufficient decay heat removal, venting primary containment allows for continued low pressure makeup operation preventing core damage.

Containment Venting Impact on Large Early Release Frequency

Given core damage has occurred, venting or not venting primary containment does very little to the Large Early Release Frequency (LERF). As seen from the bar graph and table below, 99.4% of the LERF is unaffected by primary containment venting.


Unit 1 LERF (HE) Contribution By Sequence
Sequence
1IS-2-001 57.800%
1TR-7-013 15.600%
1LT-7-001 10.100%
1IS-1-003 7.310%
1RX-001 5.790%
1TR-2-026 1.920%
1BC-1-002 0.926%
1TR-1-008 0.235%
1LT-2-022 0.167%
1TR-6AH-001 0.082%
1TR-6AL-009 0.034%
1LT-3-060 0.028%
1TR-7-012 0.021%
1TR-6AH-009 0.020%
1TR-1-012 0.019%
1TR-6AH-007 0.006%
1TR-6AH-005 0.005%
1TR-8-035 0.005%
1LT-6-015 0.002%
1TR-3-075 0.002%
1LT-3-038 0.001%
1TR-1-010 0.001%
1TR-2-025 0.001%
1LT-6-048 0.001%
0.000%
0.001%
0.010%
0.100%
1.000%
10.000%
100.000%
Percent Contribution to Unit 1 LERF

Cumulative Top 99.4% of LERF by Sequence

Sequence	Sequence Description	% Contribution to LERF	Cumulative % Contribution to LERF
1IS-2-001	Interfacing System LOCA for RHR Pump Suction (F008-F009) Break	57.8	57.8
1TR-7-013	Containment Failure due to Direct Containment Heating following Vessel Failure due to delayed High Pressure Boil Off	15.6	73.4
1LT-7-001	LOCA, with Containment Failure due to Primary Containment Vacuum Breakers failing to Close	10.1	83.5
1IS-1-003	Interfacing System LOCA for RHR Pump Discharge Division I	7.31	90.81
1RX-001	Containment Failure due to Excessive LOCA or Reactor Vessel Rupture	5.79	96.6
1TR-2-026	Containment Failure due to Energetic Containment Failure caused by Vessel failure due to early High Pressure Boil Off	1.92	98.52
1BC-1-002	Break Outside Containment	0.926	99.446

Question 2

Explain how paragraph 4.2.2 of the submittal is consistent with License Renewal SAMA #12 and response to RAI 1.G in Reference 2.

Response 2

Paragraph 4.2.2 discusses the effectiveness of SGTS for large releases. SGTS is a filtration system that has the capability to remove approximately 10,000 SCFM from secondary containment. The point being made is that, for releases that involve containment failure, SGTS is ineffective since the failure of containment is likely to also fail secondary containment. The failure of secondary containment will render SGTS ineffective in reducing the quantity of radionuclides released.

An important feature is that SSES has a "soft" pipe vent. Effective primary containment venting without loss of secondary containment would require an SGTS flow rate higher than 10,000 SCFM. Hence venting primary containment would exceed the capability of SGTS and rupture the vent ductwork. Since the venting flow rate exceeds the capacity of SGTS, secondary containment would pressurize and breach. However, venting primary containment would allow for a scrubbed release via wetwell venting.

SAMA #12 recognizes that given core damage, venting primary containment may not be likely using the SSES Emergency Operating Procedures, although the procedures do not prohibit venting. The SAMA evaluates crediting venting, with the benefit of scrubbing, after core damage. This SAMA also assumes the vent can be opened. The SAMA identifies all the sequences that can benefit from venting. A review of these sequences resulted in only one sequence, 1TR-6AH-001, that was a large early release sequence. This one sequence (if venting were credited) would go to a low early release. As can be seen from the bar graph, this sequence represents an insignificant, 0.082%, amount of the total LERF.

Venting primary containment is not credited in the SSES PRA after core damage. SSES has two methods of venting primary containment, using a hand switch from the control room or locally by manually turning a jack screw on a 24-inch butterfly valve. The 24-inch valve is a containment isolation valve between primary containment and SGTS. This valve is installed in "pipe" which transitions to duct work after the valve. The ductwork is predicted to fail given the containment venting flow rate, allowing a release directly to the secondary containment. If manual venting is to be performed, a hatch in the duct is opened on elevation 779' of the reactor building to direct the hot gas from primary containment away from the area in which the operator is manipulating the

24-inch valve. The manual venting can be performed without risk of exposing the operator to excessive radiation given the manual venting is performed prior to core damage. Since manual venting may not be possible given core damage due to dose concerns for the operator, remote venting from the control room may be the only choice. Venting from the control room requires the availability of instrument air and AC power. From a PRA perspective, if enough equipment or support systems have failed to cause core damage and fail containment heat removal, it is not likely that the support systems needed for remote actuation of the vent valves will be available. Therefore, although allowed by our emergency procedures, venting may not be possible given previous core damage. As a result, the PRA does not credit venting post core damage.