# ENCLOSURE 7

## SUMMARY OF CALCULATIONS

**Dominion Energy Nuclear Connecticut, Inc. (DENC)**

**Virginia Electric and Power Company**
**(Dominion Energy Virginia)**

**Millstone Power Station Units 1, 2 and 3 and ISFSI**
**North Anna Power Station Units 1 and 2 and ISFSI**
**Surry Power Station Units 1 and 2 and ISFSI**

# SUMMARY OF CALCULATIONS

## General:

One of the goals of the EAL reanalysis effort was to apply consistent practices and methods among the Dominion fleet plants and to define common response criteria across the fleet for certain EAL initiating conditions (i.e., fuel clad degradation and fuel barrier failure criteria, RCS sample dose rates and sample line dose rates).

Uncertainties in the proposed methodologies are similar to anticipated and acceptable uncertainties known to exist in most radiological assessment methods and techniques in support of emergency response. The primary variables used in the reanalysis of dose rate EAL thresholds response are: (1) source term, (2) shielding geometry, and (3) source volume. New calculated EAL values are based on expected plant conditions. For instance, core isotopic release fractions are based on realistic recommendations from NUREG 1228,"Source Term Estimation during Incident Response to Severe Nuclear Power Plant Accidents," October 1988, rather than conservative and bounding design basis guidance of NUREG 1465,"Accident Source Terms for Light-Water Nuclear Power Plants", dated February 1995. Equilibrium coolant concentrations are taken from calculations of Technical Specification RCS Coolant Activity applicable to the fuel clad degradation initiating condition criteria. RCS volumes are updated to assume hot full-power conditions. Single dose rate response thresholds are used wherever applicable across all Fleet plants. Common fleet EAL values for similar category thresholds are deemed important to enhance familiarity between facilities/units to reduce the potential for human error. Calculation summaries have been provided in this enclosure that contain additional information for critical calculations used in our EAL reanalysis.

The basis for the gaseous Unusual Event IC and associated thresholds has been revised to correspond to any unplanned release of gaseous effluent radioactivity to the environment that will result in greater than 1 mrem TEDE. This Unusual Event gaseous release criterion is being used consistently across all operating nuclear units at Dominion Energy nuclear stations at Millstone, North Anna and Surry. The reason this alternative criterion is required is due to the fact that when calculating the NOUE thresholds for liquid and gaseous effluent pathways following the NEI 99-01 guidance of two times the site specific release limit, two gaseous vent pathways at Surry and North Anna resulted in thresholds that actually exceeded the next higher 10 mrem TEDE 'ALERT' threshold limit. The other gaseous release pathways analyzed across the Fleet did not show this incongruent relationship. What they did show is NOUE values in the range of 1 mrem TEDE when applying the guidance recommendation of two times the site specific release limit. To maintain consistency across the Fleet and reduce confusion and human error potential, a single Initiating Condition (IC) definition for gaseous releases at the NOUE level is being proposed. This alternative NOUE definition is set at 1 mrem TEDE, a factor of ten lower than the ALERT threshold; similar

to the factors of ten between each of the three higher classification levels. The 1 mrem TEDE criterion provides a logical and consistent escalation from the NOUE to ALERT levels and is justified by the fact that most of the gaseous effluent pathways analyzed resulted in dose in the range of 1 mrem TEDE following NEI 99-01 guidance.

Classification thresholds within Table R-1 of the EAL matrices were generated using the MIDAS dose assessment code. Inputs to MIDAS use most prevalent meteorological data and expected release point parameters. Most prevalent meteorology represents conditions that would most likely exist (based on the most prevalent stability class and average wind speed within that stability class). Dispersion based on most prevalent meteorology differs from that assumed in the ODCM which uses annual average meteorology. Dispersion based on actual meteorological conditions at the time of the emergency (most prevalent) can be 10 – 20 times higher than the annual average dispersion prescribed for use in an ODCM. Assumptions of one-hour decay since shutdown and a one-hour release duration are applied. Mitigating reduction mechanisms (e.g., decay, sprays, filters) input into MIDAS for each accident type determined the radiological release source term consistent with the guidance provided in NUREG-1228.

Dose rate values specified in Tables F-2, F-3 and F-4 of the EAL matrices were developed using a method to minimize error (+/-) for the threshold value within defined time (decay) periods. Time periods were chosen to fit monitor response (fast changes in response early following reactor shutdown are broken up into smaller time periods to better approximate expected change). Values were chosen within each time period to minimize error (<50%) from the highest to lowest response within each time range.

# ATTACHMENT 1

## CALCULATIONS FOR GASEOUS EFFLUENT RADIATION MONITOR THRESHOLDS

- Calculation RP-18-08, "MPS1 Abnormal Rad Release Gaseous EAL Thresholds Based on NEI 99-01, Revision 6"
- Calculation RP-18-02, "MPS2 Abnormal Rad Release Gaseous EAL Thresholds Based on NEI 99-01, Revision 6"
- Calculation RP-18-03, "MPS3 Abnormal Rad Release Gaseous EAL Thresholds Based on NEI 99-01, Revision 6"
- Calculation RP-08-22, "North Anna Abnormal Rad Release Gaseous EAL Thresholds Based on NEI 99-01, Revision 6"
- Calculation RP-18-01, "Surry Abnormal Rad Release Gaseous EAL Thresholds Based on NEI 99-01, Revision 6"

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