EPIP 1.7
MINOR
Revision 4
08-15-84

CORE DAMAGE ESTIMATION PROCEDURE

1.0 PURPOSE

This procedure will be used to implement the Westinghouse Owner's Group Core Damage Assessment Methodology. This methodology provides the primary means of estimating core damage through the measurement of fission product concentrations in the reactor coolant system and containment. Also used to verify the extent of core damage are the auxiliary indicators of core exit thermocouple temperatures, reactor vessel water level, containment radiation monitors, and containment hydrogen concentrations.

2.0 REFERENCE

Westinghouse Owner's Group Post-Accident Core Damage Assessment Methodology

3.0 RESPONSIBILITY

This procedure is normally to be carried out by the Radwaste Technical Support Coordinator. However, the Core Physics Coordinator may be directed by the Emergency Support Manager to complete this procedure. There is no specified time frame in which this methodology should be carried out; rather, it will be performed whenever needed and appropriate. Implementation of the methodology shall not interfere with the overall response to the emergency.

4.0 PRECAUTIONS

4.1 If fuel damage or loss of reactor coolant system integrity has occurred, some or all of the following would be present:

4.1.1 The letdown radiation monitor (1RE-109) or the failed fuel radiation monitor (2RE-109) may be unusually high or offscale.

4.1.2 The containment radiation monitors (1RE-211 & 1RE-212 or 2RE-211 & 2RE-212) may be unusually high or offscale.

4.1.3 The containment area monitors (1RE-102 & 1RE-107 or 2RE-102 & 2RE-107) may be unusually high or offscale.

4.2 Health Physics procedures and requirements must be followed when applicable, i.e., when entering a high radiation area.

4.3 The user should use as many indicators as possible to differentiate between the various core damage states. Because of overlapping values of release and potential simultaneous conditions of core damage, overtemperature, and/or core melt, considerable judgement needs to be applied.

5.0 INITIAL CONDITIONS

5.1 Applicable portions of EPIP 1.2, "Plant Status," are completed.

5.2 A reactor coolant sample has been taken and analyzed by implementing EPIP 7.3.2, "Post-Accident Sampling & Analysis of Potentially High Level Reactor Coolant."

5.3 A containment atmosphere sample has been taken and analyzed by implementing EPIP 7.3.3, "Post-Accident Sampling of Containment Atmosphere."

5.4 The Westinghouse Owner's Group (WOG) Post-Accident Core Damage Assessment Methodology is available for use. Copies of the WOG methodology are located in Nuclear Engineering office, Room 381, Public Service Building in Milwaukee and in the technical support center.

6.0 PLANT-SPECIFIC DIFFERENCES FROM THE WOG METHODOLOGY

6.1 Pressure & Temperature Adjustments

The specific activities of the containment air sample recorded on EPIP-31 are referenced to actual containment pressure and temperature conditions. Therefore, the optional adjustment in the WOG methodology is not required for the PBNP containment sample. The reactor coolant system activities recorded on EPIP-30 are in units of μCi/cc. Therefore, a temperature adjustment is required for the reactor coolant system volume and estimated safety injection volume only if the reactor coolant system temperature or containment sump temperature, respectively, are greater than 200°F. Use Steps 6.1.1 through 6.1.5 on Pages 30 and 31 from the WOG methodology to calculate the total liquid volume.

Volume Estimation

6.1.1 Containment volume $\approx 1 \times 10^6$ ft^3 = 2.83×10^{10} cc

6.1.2 Estimated safety injection volume (ESIV)

Available safety injection dilution sources are:

Accumulators:	2 at 8,000 gallons each	_____
RWST's:	275,000 gallons	_____
BAST's:	1 of 3 at 5,000 gallons each	_____
Spray Additive Tanks:	2,574 gallons	_____
	Total ESIV:	_____gal.

Convert ESIV units to cc's:

ESIV(cc) = ESIV(gal) X 0.1556 ft^3/gal X 28.3 X 10^3 cc/ft^3

6.1.3 Assume RCS volume = 6,040 ft^3

= 1.71 X 10^8 cc

6.1.4 If sump temperature or RCS temperature are greater than 200°F, temperature adjust the volumes using Page 31 of WOG methodology. Ensure the volumes are in units of cubic centimeters (cc).

$$\text{ESIV(adjusted) or RCS(adjusted)} = (\text{ESIV or RCS}) \times \frac{\rho}{\rho STP}$$

Where: $\frac{\rho}{\rho STP}$ = water density ratio (WOG Page 31)

6.1.5 Total liquid volume = ESIV(adjusted) + RCS(adjusted)

= _____cc + _____cc

Total liquid volume = _____cc

7.0 CORE DAMAGE ASSESSMENT

Perform an assessment of core damage by implementing the WOG Core Damage Assessment Methodology incorporating the plant specific differences listed in Section 6 of this procedure. Implementation of the WOG methodology will provide an estimation of core damage in several categories: No clad damage, 0-50% clad damage, 50-100% clad damage, 0-50% fuel pellet overtemperature, 50-100% fuel pellet overtemperature, 0-50% fuel melt, and 50-100% fuel melt.