ENCLOSURE 2

INTERIM PROCEDURE FOR CORE DAMAGE ASSESSMENT
Watts Bar Nuclear Plant

1. Record the plant parameters requested in table 2. These should be recorded as close as possible to the time at which the radiological samples are obtained from the Postaccident Sampling System (PASS).

2. Obtain and analyze the following samples for fission product specific activity using the procedures for PASS operation:

   Reactor Coolant Sample
   Containment Sump Sample
   Containment Atmosphere Sample

   Table 3 is provided as a worksheet.

3. Correct the measured containment atmosphere sample specific activity to standard temperature and pressure, if necessary, using the following equation:

   Specific Activity = Specific Activity x (T/P) x 0.0299

   where T is the sample temperature in ^{o}R (^{o}F + 460) and P is the sample pressure in lb/in^2a (lb/in^2g + 14.4). Table 4 is provided as a worksheet.

4. Calculate the total quantity of fission products released from the core. Table 5 is provided as a worksheet.

   4.1.1 If the water level in the rector vessel indicates that the vessel is full, the quantity of fission products in the reactor coolant is calculated by the following equation: A_{rcs} (Ci) = A_ox 3.56 x 10^2 where A_o is the corrected specific activity of the reactor coolant sample in uCi/cc.

   4.1.2 If the water levels in the reactor vessel and pressurizer recorded in step 1 (table 2) indicates that a steam void is present in the reactor vessel, then the quantity of fission products found in the reactor coolant is again calculated by step 4.1.1. This will overestimate the actual quantity released. Therefore, this sample should be repeated when the void has been removed from the reactor vessel.

   4.1.3 If the water level in the reactor vessel recorded in step 1 (table 2) is below the low end capability of the indicator, it is not possible to determine the quantity of fission products in the reactor coolant system.

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4.2 The quantity of fission products in the sump is calculated by the following equation: A_{sump} (Ci) = A_o x sump volume x 10^{-6} where A_o is the corrected specific activity of the sump water sample in uCi/cc and the sump volume is determined from the value recorded in step 1 (table 2) using figure 1.

4.3 The quantity of fission products in the containment atmosphere is calculated by the following equation. A_{air} (Ci) = A_o x (T/P) x 1.051 x 10^{+3} where A_o is the corrected specific activity of the containment atmosphere sample in uCi/cc, T is the containment atmosphere temperature in °R (°F + 460), and P is the containment atmosphere pressure in lb/in^2a (lb/in^2g + 14.4).

4.4 The total quantity of fission products available for release to the environment is equal to the sum of the values for each sample location.

5. The total quantity of fission products available for release to the environment obtained in step 4.4 is compared to the source inventory. This is done by dividing the two values and multiplying by 100 to obtain the percent of core inventory released. Table 6 is provided as a worksheet.

6. The conclusion on core damage is made using the results of step 5 and comparing them to the definitions of fuel damage in table 1. The procedure is anticipated to yield a combination of one or more of the 10 categories defined in table 1. These categories may exist simultaneously.

TABLE 1

Radiological Characteristics of Categories of Fuel Damage

NRC Category of Fuel Damage	Characteristic Isotope	Release of Characteristic Isotope Expressed as a Percent of Core Inventory
1. No fuel damage	I 131	Less than 1
2. Initial Cladding Failure	Kr 87, Xe 131m, Xe 133, I 131, I 132, I 133, I 135	Less than 10
3. Intermediate Cladding Failure		10 to 50
4. Major Cladding Failure		Over 50
5. Initial Fuel Pellet Overheating	Cs 134, Te 129 Te 132	Less than 10
6. Intermediate Fuel Pellet Overheating		10 to 50
7. Major Fuel Pellet Overheating		Over 50
8. Fuel Pellet Melt	Ba 140, La 140, La 142, Pr 144	Less than 10
9. Intermediate Fuel Pellet Melt		10 to 50
10. Major Fuel Pellet Melt		Over 50

TABLE 2

Reactor Coolant System:

Pressure	_____	lb/in^2a
Temperature	_____	^oF
Reactor Vessel Level	_____	%
Pressurizer Level	_____	%

Containment Building:

Atmosphere Pressure	_____	lb/in^2a
Atmosphere Temperature	_____	^oF
Sump Level	_____	%

Time of Reactor Shutdown:

Date _____

Time _____

Time Data Recorded

Date _____

Time _____

TABLE 3

Record of Sample Specific Activity

Sample Type (circle appropriate one): Reactor Coolant Containment Sump Containment Atmosphere

Time of Analysis: _____

Time Data Recorded: _____

Sample Temperature, °F: _____

Sample Pressure, lb/in^2g: _____

Sample Activity, uCi/cc (decay corrected):

Kr 87	_____
Xe 131m	_____
Xe 133	_____
I 131	_____
I 132	_____
I 133	_____
I 135	_____
Cs 134	_____
Te 129	_____
Te 132	_____
Ba 140	_____
La 140	_____
La 142	_____
Pr 144	_____

TABLE 4

Record of Containment Sample Atmosphere Sample Temperature Correction

Time of Analysis: _____

Sample Temperature: _____ °F + 460 = _____

Sample Pressure, lb/in^2a: _____

Correction Factor: T/P x 0.0299 = _____

Isotope	Measured Activity Attachment 2 uCi/cc	X	Correction Factor	=	Corrected Specific Activity, uCi/cc
Kr 87					
Xe 131m					
Xe 133					
I 131					
I 132					
I 133					
I 135					
Cs 134					
Te 129					
Te 132					
Ba 140					
La 140					
La 142					
Pr 144					

TABLE 5

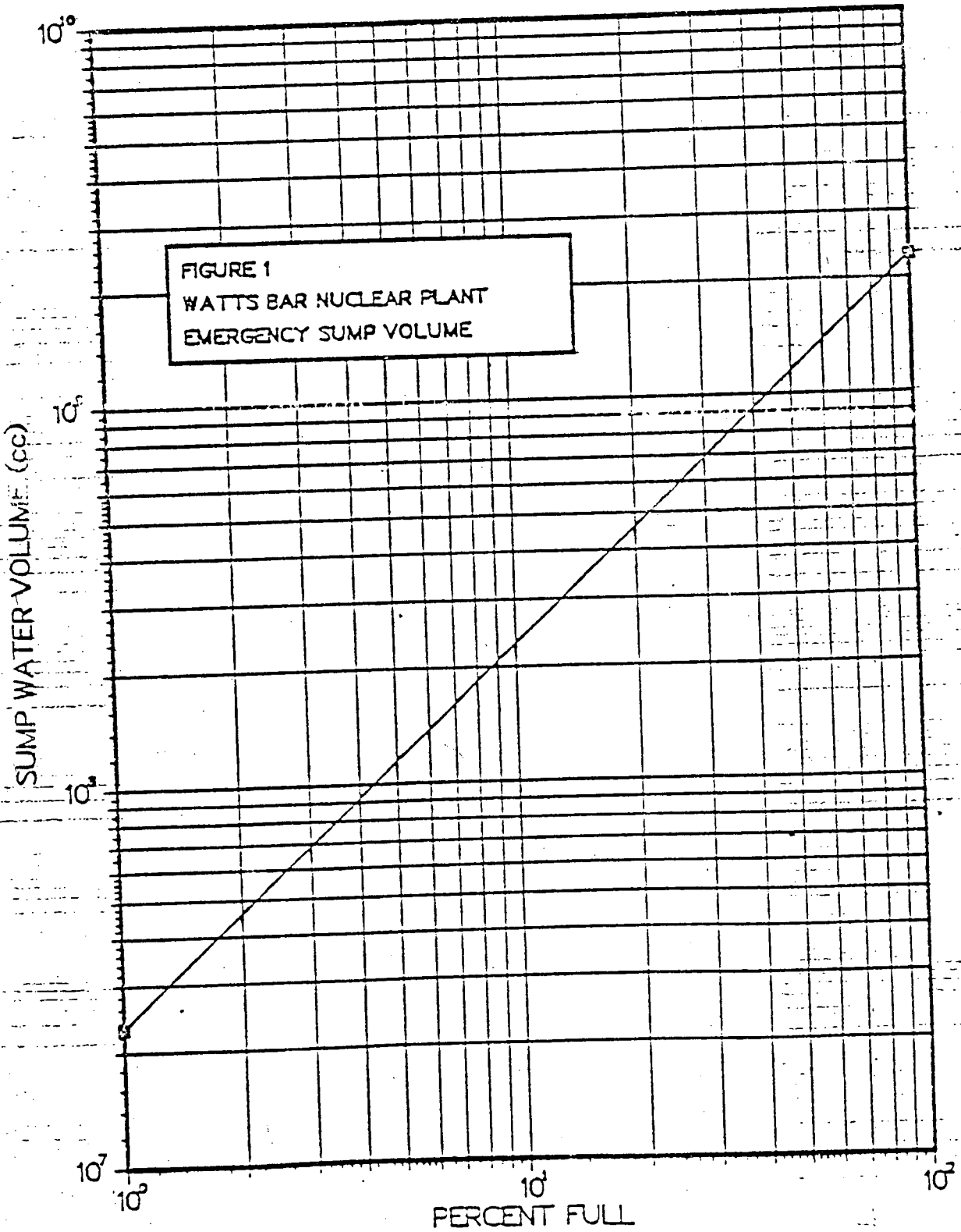
Record of Release Quantity

Isotope	Reactor Coolant Ci	+	Containment Sump Ci	+	Containment Atmosphere Ci	=	Total Ci
Kr 87							
Xe 131m							
Xe 133							
I 131							
I 132							
I 133							
I 135							
Cs 134							
Te 129							
Te 132							
Ba 140							
La 140							
La 142							
Pr 144							

TABLE 6

Record of Percent Release

Isotope	Total Quantity Available for Release (Table 6), Ci	Equilibrium Core Inventory Ci	Percent
Kr 87	_____	7.8764E+07	_____
Xe 131m	_____	1.2299E+06	_____
Xe 133	_____	2.0978E+08	_____
I 131	_____	8.7847E+07	_____
I 132	_____	1.3039E+08	_____
I 133	_____	2.0926E+08	_____
I 135	_____	1.9850E+08	_____
Cs 134	_____	1.3943E+03	_____
Te 129	_____	1.9259E+07	_____
Te 132	_____	1.2975E+08	_____
Ba 140	_____	1.9571E+08	_____
La 140	_____	1.9589E+08	_____
La 142	_____	1.8375E+08	_____
Pr 144	_____	1.6903E+08	_____

CORE DAMAGE CORRELATION

CONTAINMENT BUILDING SUMP