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March 14, 1985

ØCANØ38508

Director of Nuclear Reactor Regulation
ATTN: Mr. J. F. Stolz, Chief
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Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Director of Nuclear Reactor Regulation
ATTN: Mr. James R. Miller, Chief
Operating Reactors Branch #3
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Arkansas Nuclear One - Units 1 & 2
Docket Nos. 50-313 and 50-368
License Nos. DPR-51 and NPF-6
NUREG-0737 Item II.B.3, Methodology
for Estimating Core Damage

Gentlemen:

In our letter of February 28, 1985 (ØCANØ28513) we submitted a methodology for estimating core damage based upon post accident sampling system readings. In the submittal the attachments to the methodology were inadvertently omitted. Attached are the omitted pages.

Very truly yours,

J. Ted Enos
Manager, Licensing

JTE:MCS:ds

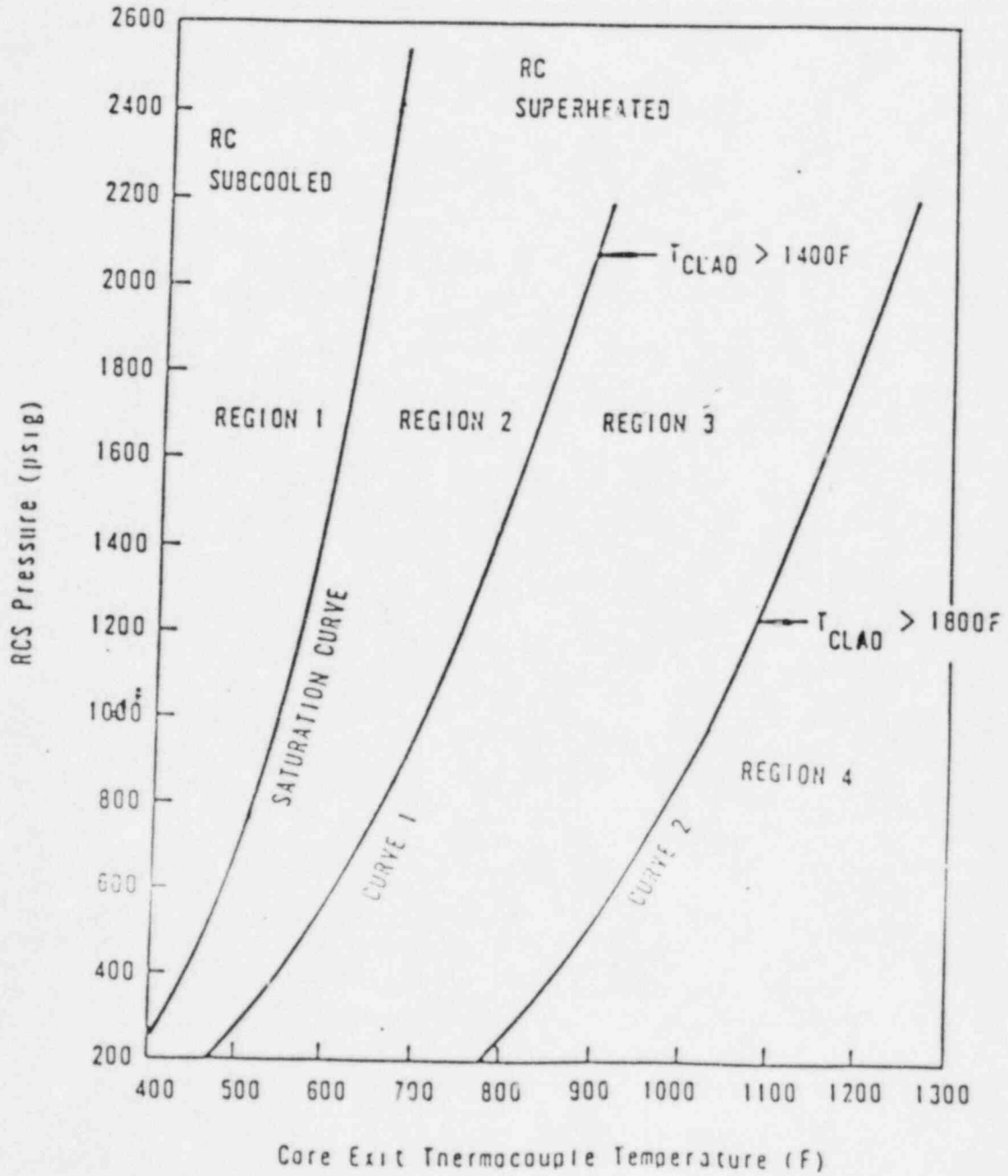
Attachment

A046
1/1

ATTACHMENT A

PLANT MANUAL SECTION:	PROCEDURE/WORK PLAN TITLE:	NO:
ARKANSAS NUCLEAR ONE	PAGE	
	REVISION DATE	
	CHANGE DATE	

CORE EXIT THERMOCOUPLE TEMPERATURE FOR INADEQUATE CORE COOLING



The following discussion of Attachment A is provided to assist in determining which of the four major fuel conditions may exist. It should be noted the use of Attachment A in this method may not be consistent with its use in other methods or procedures.

Region 1:

The RCS is subcooled and core damage is not likely to occur.

Region 2:

ICC conditions exist since the RCS is superheated. For the purpose of this method, about mid-way through region 2 is the onset of cladding failures (approx. 1100°F).

Region 3:

Very serious ICC conditions exist. In the technical bases for Attachment A, region 3 represents the onset of hydrogen production (by cladding oxidation) and cladding failures. As defined is section C of the method, fuel pellet overheat typically begins around 1600°F cladding failure - about mid-way through region 3.

Region 4:

The rate of hydrogen production has significantly increased over that of region 3. In the technical bases, this region is considered the cladding oxidation region. More important to this method is the increase in fuel centerline temperatures due to the lack of adequate heat transfer from the rod. The reduced heat transfer results from the lack of coolant against the rods as well as the insulating effect of the outer layer of oxide. Cladding embrittlement is likely to occur and some fuel centerline temperatures above the UO_2 melting point will likely exist.

For the purpose of this method, fuel pellet overheating and fuel pellet melting occur in region 4. If the point is just into region 4, then an estimate of fuel pellet overheating is appropriate. If the point is well into region 4, then an estimate of fuel pellet melting is appropriate.

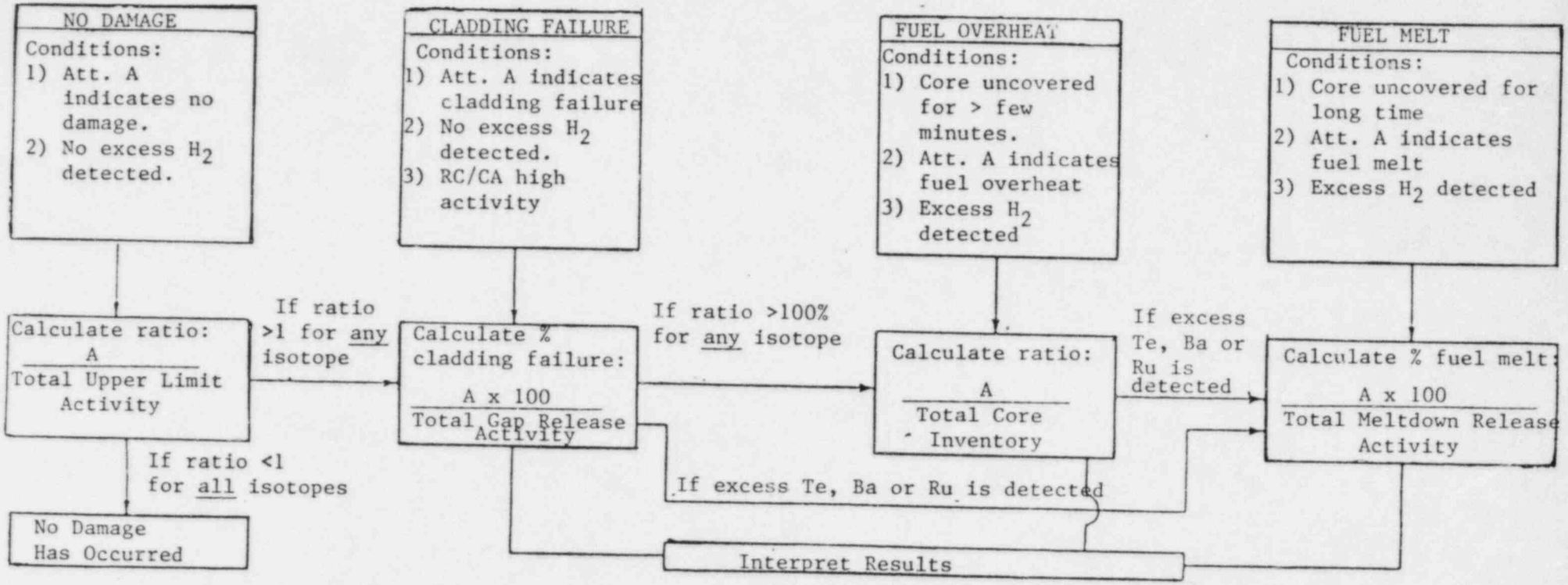
RELEASE FRACTIONS

	Gap Release[a]			Meltdown Release			Oxidation Release			Vaporization Release		
	Nominal	Lower Limit	Upper Limit	Nominal	Lower Limit	Upper Limit	Nominal	Lower Limit	Upper Limit	Nominal	Lower Limit	Upper Limit
Noble Gases (Xe, Kr)	0.030	0.010	0.12	0.873	0.483	0.970	0.087	0.078	0.097	0.010	0.010	0.010
Halogens (I, Br)	0.017	0.001	0.20	0.885	0.492	0.983	0.088	0.078	0.098	0.010	0.010	0.010
Alkali Metals (Cs, Rb)	0.050	0.004	0.30	0.760	0.380	0.855	---	---	---	0.190	0.190	0.190
Tellurium Group (Te, Se, Sb)	0.0001	3×10^{-7}	0.04	0.150	0.05	0.250	0.510	0.340	0.680	0.340	0.340	0.340
Noble Metals (Ru,Rh,Pd,Mo,Tc)	---	---	---	0.030	0.01	0.10	0.873	0.776	0.970	0.005	0.001	0.024
Alkaline Earths (Sr, Ba)	1×10^{-6}	3×10^{-9}	0.0004	0.100	0.02	0.20	---	---	---	0.009	0.002	0.045
Rare Earths (Y,La,Ce,Nd,Pr, Eu,Pm,Sm,Np,Pu)	---	---	---	0.003	0.001	0.01	---	---	---	0.010	0.002	0.050
Refractories (Zr, Nb)	---	---	---	0.003	0.001	0.01	---	---	---	---	---	---

[a] Note: Recent values of the gap release measured at Oak Ridge National Laboratory ([redacted]) are significantly lower. For the stable and long-lived members of the chemical groups they report 0.0127 for the noble gases, 0.00053 for the halogens, and 0.00023 for the alkali metals.

ATTACHMENT B

FLOW CHART FOR INTERPRETATION



ATTACHMENT D

Upper Limit Normal Operating Activities
(Based on 1% Failed Fuel)

Isotope	Activity (Ci) ANO-1	ANO-2
Kr-85m	344	473
Kr-87	192	254
Kr-88	618	821
Xe-131m	458	475
Xe-133	55,647	67,410
I-131	733	783
I-133	870	1,067
I-135	618	494
Te-132	111*	111
Ba-140	15	2
Ru-103	2*	2
Cs-136	174	11
Cs-137	5,954	311
Cs-138	169	214

*ANO-1 values not available.