OELD
R. Bevan

ACRS(10)
P. O'Connor

D. Eisenhut
D. Verrelli

J. Hegner
Gray

B. Siegel

Docket Nos. 50-237/249
50-254/265

DEC 15 1981

Mr. L. DelGeorge
Director of Nuclear Licensing
Commonwealth Edison Company
P. O. Box 767
Chicago, Illinois 60690

Dear Mr. DelGeorge:

Subject: NUREG-0737, Item II.K.3.44 - Evaluation of Anticipated Transients Combined with Single Failure

Re: Dresden Station Units 2 and 3, and Quad Cities Units 1 and 2

You endorsed the BWR Owners Group position regarding NUREG-0737, Item II.K.3.44 - Evaluation of Anticipated Transients Combined with Single Failure, in your letter dated December 15, 1980. As identified in Generic Letter No. 81-32, dated August 7, 1981, the staff has completed its review of the BWR Owners Group Report dated December 29, 1980 pertaining to this item. Enclosed is a copy of the staff's evaluation of the BWR Owners Group response to this item which was found to be acceptable on a generic basis.

Generic Letter No. 81-32 also requested that you provide verification that the assumptions and initial conditions used in the generic analyses are representative for your plants. Since your response dated October 22, 1981 provided this assurance, we consider Item II.K.3.44 complete for Dresden Station Units 2 and 3, and Quad Cities Units 1 and 2.

Original Signed by
T. A. Ippolito
Thomas A. Ippolito, Chief
Operating Reactors Branch #2
Division of Licensing

Enclosure:
As stated

cc w/enclosures
See next page

Distribution: Docket File J. Heltemes, AEOD I&E(3) NRC PDR
NSIC Local PDR S. Norris TERA ORB#2 Reading

OFFICE	ORB#2	ORB#2	ORB#2	ORB#2	ORB#5	ORB#5	ORB#2	
SURNAME	SNorris	JHegner	RBevan	BSiegel	PO'Connor	TWambach	TIppolito	
DATE	12/4 /81	12/15/81	12/15 /81	12/15/81	12/15/81	12/15/81	12/15/81	

Mr. L. DelGeorge

cc
Isham, Lincoln & Beale
Counselors at Law
One First National Plaza, 42nd Floor
Chicago, Illinois 60603

Mr. B. B. Stephenson
Plant Superintendent
Dresden Nuclear Power Station
Rural Route #1
Morris, Illinois 60450

Dr. Richard F. Foster
P.O. Box 4263
Sunriver, Oregon 97701

U. S. Nuclear Regulatory Commission
Resident Inspectors Office
Dresden Station
RR #1
Morris, Illinois 60450

Mary Jo Murray
Assistant Attorney General
Environmental Control Division
188 W. Randolph Street
Suite 2315
Chicago, Illinois 60601

Morris Public Library
604 Liberty Street
Morris, Illinois 60451

Chairman
Board of Supervisors of
Grundy County
Grundy County Courthouse
Morris, Illinois 60450

John F. Wolf, Esquire
3409 Shepherd Street
Chevy Chase, Maryland 20015

Dr. Linda W. Little
500 Hermitage Drive
Raleigh, North Carolina 27612

Illinois Department of Nuclear Safety
1035 Outer Park Drive, 5th Floor
Springfield, Illinois 62704

U. S. Environmental Protection Agency
Federal Activities Branch
Region V Office
ATTN: Regional Radiation Representative
230 South Dearborn Street
Chicago, Illinois 60604

Dr. Forrest J. Remick
305 East Hamilton Avenue
State College, Pennsylvania 16801

The Honorable Tom Corcoran
United States House of Representatives
Washington, D. C. 20515

Mr. Philip Steptoe
Isham, Lincoln & Beale
Counselors at Law
One First National Plaza, 42nd Floor
Chicago, Illinois 60603

Mr. Douglas Scott
Plant Superintendent
Dresden Nuclear Power Station
Rural Route #1
Morris, Illinois 60450

Mr. D. R. Stichnoth
President
Iowa-Illinois Gas and
Electric Company
206 East Second Avenue
Davenport, Iowa 52801

Mr. Nick Kalivianakas
Plant Superintendent
Quad Cities Nuclear Power Station
22710 - 206th Avenue North
Cordova, Illinois 61242

Moline Public Library
504 - 17th Street
Moline, Illinois 61265

Mr. L. DelGeorge

cc:

Susan N. Sekuler
Assistant Attorney General
Environmental Control Division
188 W. Randolph Street
Suite 2315
Chicago, Illinois 60601

Resident Inspector
U.S. Nuclear Regulatory Commission
22712 206th Avenue N.
Cordova, Illinois 61242

James L. Kelley, Chairman
Atomic Safety & Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dr. Peter A. Morris
Atomic Safety & Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Enclosure

Evaluation of BWR Owners' Group Generic Response to Item II.K.3.44 of NUREG-0737, "Evaluation of Anticipated Transients With Single Failure to Verify no Fuel Failure"

Position

For anticipated transients combined with the worst single failure and assuming proper operator actions, licensees should demonstrate that the core remains covered or provide analysis to show that no significant fuel damage results from core uncovery. Transients which result in a stuck-open relief valve should be included in this category.

Summary and Staff Evaluation

The intent of this requirement was to demonstrate that for a transient which could result in a stuck open relief valve (e.g., an isolation event which leads to a relief valve cycling and then sticking open), in combination with the worst single failure, the core either remains covered with water or experiences only moderate fuel damage as a result of the uncovery of fuel. There was no intent to determine how many rods might experience boiling transition as a result of the event. The area of boiling transition following transients combined with a single failure is considered in Chapter 15.0 of the Standard Review Plan as part of the normal licensing review.

The BWR Owners Group generic response to this item is given in a letter to Darrell G. Eisenhut (NRC) from D. B. Waters (BWR Owners Group), BWROG-80-12, "BWR Owners Group Evaluation of NUREG-0737 Requirements", December 29,1980. The Owners Group found that the most severe transient from the core cooling viewpoint is the loss of feedwater event; this is due to the rapid depletion of reactor coolant inventory. The worst single active component failure for the loss of feedwater transient is

failure of the high pressure coolant injection system because the high pressure coolant injection system is the largest capacity make-up (other than feedwater) available at high pressure.

For the case of loss of feedwater, failure of the high pressure injection system and one stuck open relief valve, analyses presented in Figures 3.2.1.1.5-9.4, and 3.2.1.1.5-10.4 of NEDO-24708A shown that for the plants analyzed, the reactor core isolation cooling (RCIC) system can automatically provide sufficient inventory to keep the core covered. The analyses were performed for a typical BWR/4 and a typical BWR/5 plant. This capability is not a design basis for the RCIC system, and not all plants have been analyzed to demonstrate this capability. If a plant should not have the capability, manual depressurization using the automatic depressurization system (ADS) would be used to avoid core uncovery. Manual depressurization is the proper operation action for all plants during loss of inventory conditions when the high pressure systems are unable to maintain and restore reactor vessel water level.

No analyses were presented for the specific case of loss of feedwater, loss of high pressure coolant injection and a stuck open relief valve with ADS actuation at the normal ADS level (level 1). Figures 3.2.1.1.5-25.4 and 3.2.1.1.5.-26.4 of NEDO-24708A shown that manual actuation of the ADS when the water level is 5 feet above the top of th active fuel (270 seconds for the BWR/4 and 300 seconds for the BWR/5) prevents fuel uncovery for the extreme case of loss of feedwater, loss of high pressure injection, loss of RCIC and a stuck open relief valve. Figure 3.1.1.1-51.2 of NEDO-24708A shows only a brief uncovery of the top 1 foot of fuel for an ADS blowdown (ADS initiated at level 1, approximately 2 feet above top of active fuel) with no high pressure systems available for a BWR/4-218 plant.

Test results from the two loop test apparatus (TLTA) show that fluid mixture levels in the core region are underpredicted for an ADS blowdown. In a monthly progess report, letter to Edward Halman (NRC) and P. Kalra (EPRI) from G. W. Burnetle (GE),

"BWR Blowdown/ECC Program, Contract no. NRC-04-76-215, Informal Monthly Progess Report for April 1980", May 12,1980, General Electric states," The results indicate the bundle was covered with two-phases mixture for the entire transient, while a two-phases mixture level was seen in the lower plenum and bypass after the ADS initiation at 286 seconds. The fast system depressurization due to the activation of ADS resulted in flashing and high vapor generation which led to the occurrence of the counter current flow limiting (CCFL) at the side entry orifice (SEO). This CCFL phenomenon at SEO prevents the bundle mass inventory from draining into the lower plenum and hence maintains a low void fraction mixture with nucleate boiling throughout the fuel bundle during the entire transient". Because the SAFE code, which GE uses to predict the level transient, does not include the effect of CCFL at the side entry orifice, the model underpredicts the mixture level in/above the core.

Since the calculations show that the core does not uncover for the worst transient combined with the worst single failure and a stuck open relief valve; and since test data from TLTA show the calculations to be conservative for an ADS blowdown, we find the generic responses of the BWR Owners Group to be acceptable. Individual licensees/applicants who reference the generic response to item II.K.3.44 must verify that the assumption's and initial conditions used in the analyses are applicable or are bounding for their specific plants.