

APR 18 1990

MEMORANDUM: Steven A. Varga, Director
Division of Reactor Project-I/II
Office of Nuclear Reactor Regulations

Gary M. Holahan, Acting Director
Division of Reactor Project-III/IV/V & Special Projects
Office of Nuclear Reactor Regulations

FROM: Thomas M. Novak, Director
Division of Safety Programs
Office for Analysis and Evaluation
of Operational Data

SUBJECT: SWELLING AND CRACKING IN HAFNIUM CONTROL RODS

Enclosed is AEOD/E90-04 on the above subject. Hafnium was introduced as a neutron absorber for use in control rods in 1980. It was meant to be used in addition to carbon tetraboride (B4C) as a replacement for silver-indium-cadmium (Ag-In-Cd). Hafnium control rods were introduced as original equipment in several later PWRs. They have experienced swelling and cracking as determined by several licensees using eddy current testing. Of the 14 plants licensed to use hafnium rods, six have replaced or will replace them, two never installed them, four have recently or may soon install them, and two are continuing to use them. Analyses by Westinghouse of the effects of swelling of control rods predict that neither physical interference with insertion nor mechanical resistance which would increase rod drop time will be of a large enough magnitude to invalidate FSAR safety analysis conclusions. Eddy current test results to date have upheld these analyses.

Given the limited examinations to date, it would be prudent to continue to require all plants licensed to use hafnium control rods to perform NDE of these rods to determine the extent if any of cracking, swelling, and wear.

Original signed by

Thomas M. Novak, Director
Division of Safety Programs
Office for Analysis and Evaluation
of Operational Data

Enclosure: As stated

cc w/enclosure:

S. Sands, NRR
P. Shemanski, NRR
T. Alexion, NRR
D. Queener, NOAC

M. Malloy, NRR
D. Jaffe, NRR
R. Becker, NRR
J. Wheelock, INPO

G. Dick, NRR
J. B. Hopkins, NRR
D. Pickett, NRR
H. Faulkner, IP

Distribution:

PDR

Central File

ROAB R/F

DSP R/F

MWegner

MChirama1

JRosenthal

EJordan

DRoss

TNovak

LSpessard

SRubin

GZech

KBlack

RSavio, ACRS

MTaylor, EDO

KRaglin, TTC

PBaranowsky, NRR

MWilliams

See Previous Concurrences*

ROAB:DSP:AEOD*

MWegner:mmk/as

3/26/90

ROAB:DSP:AEOD*

MChirama1

3/26/90

C:ROAB:DSP:AEOD*

JRosenthal

3/ /90

D:DSP:AEOD

TNovak

4/17/90

NRC FILE CENTER COPY

AEOD
111
4/17/90
AEOD

2004250151 200418
PDR ORG NEXT
PDC

MEMORANDUM: Steven A. Varga, Director
Division of Reactor Project-I/II
Office of Nuclear Reactor Regulations

Gary M. Holahan, Acting Director
Division of Reactor Project-III/IV/V & Special Projects
Office of Nuclear Reactor Regulations

FROM: Thomas M. Novak, Director
Division of Safety Programs
Office for Analysis and Evaluation
of Operational Data

SUBJECT: SWELLING AND CRACKING IN HAFNIUM CONTROL RODS

Enclosed is AEOD/E90-04 on the above subject. Hafnium was introduced as a neutron absorber for use in control rods in 1980. It was meant to be used in addition to carbon tetraboride (B4C) as a replacement for silver-indium-cadmium (Ag-In-Cd). Hafnium control rods were introduced as original equipment in several later PWRs. They have experienced swelling and cracking as determined by several licensees using eddy current testing. Of the 14 plants licensed to use hafnium rods, six have replaced or will replace them, two never installed them, four have recently or may soon install them, and two are continuing to use them. Analyses of the effects of swelling of control rods predict that neither physical interference with insertion nor mechanical resistance which would increase rod drop time will be of a large enough magnitude to invalidate FSAR safety analysis conclusions. Eddy current test results to date have upheld these analyses.

Given the limited examinations to date, it would be prudent to continue to require all plants licensed to use hafnium control rods to perform NDE of these rods to determine the extent if any of cracking, swelling, and wear.

Thomas M. Novak, Director
Division of Safety Programs
Office for Analysis and Evaluation
of Operational Data

cc w/enclosure:

S. Sands, NRR
P. Shemanski, NRR
T. Alexion, NRR

M. Malloy, NRR
D. Jaffe, NRR
R. Becker, NRR

G. Dick, NRR
J. B. Hopkins, NRR
D. Pickett, NRR

Distribution:

PDR
Central File
ROAB R/F
DSP R/F
MWegner
MChiramal
JRosenthal
EJordan
DRoss
TNovak
LSpessard
SRubin
GZech
MWilliams

KBlack
RSavio, ACRS
MTaylor, EDO
Kraglin, TTC
PBaranowsky, NRR
HFAulkner, IP
JWheelock, INPO
DQueener, NOAC

*See Previous Concurrences

ROAB:DSP:AEOD*
MWegner:mmk
3/26/90

ROAB:DSP:AEOD*
MChiramal
3/26/90

C:ROAB:DSP:AEOD
JRosenthal
3/27/90

D:DSP:AEOD
TNovak
3/ /90

MEMORANDUM: Steven A. Varga, Director
Division of Reactor Project-1/II
Office of Nuclear Reactor Regulations

Gary M. Holahan, Acting Director
Division of Reactor Project-III/IV/V & Special Projects
Office of Nuclear Reactor Regulations

FROM: Thomas M. Novak, Director
Division of Safety Programs
Office for Analysis and Evaluation
of Operational Data

SUBJECT: SWELLING AND CRACKING IN HAFNIUM CONTROL RODS

Enclosed is AEOD/E90-04 on the above subject. Hafnium was introduced as a neutron absorber for use in control rods in 1980. It was meant to be used in addition to carbon tetraboride (B4C) as a replacement for silver-indium-cadmium (Ag-In-Cd). Hafnium control rods were introduced as original equipment in several later PWRs. They have experienced swelling and cracking as determined by several licensees using eddy current testing. Of the 14 plants licensed to use hafnium rods, six have replaced or will replace them, two never installed them, four have recently or may soon install them, and two are continuing to use them. Analyses of the effects of swelling of control rods postulate that neither physical interference with insertion or mechanical resistance which would increase rod drop time would be of a large enough magnitude to invalidate FSAR safety analysis conclusions. ECT findings to date have upheld these analyses. Given the limited examinations to date, it would be prudent to require all plants licensed to use hafnium control rods to perform NDE of these rods to determine the extent if any of cracking, swelling, and wear as long as they are in use in the reactor.

Thomas M. Novak, Director
Division of Safety Programs
Office for Analysis and Evaluation
of Operational Data

cc w/enclosure:

S. Sands, NRR	M. Malloy, NRR	G. Dick, NRR
P. Shemanski, NRR	D. Jaffe, NRR	J. B. Hopkins, NRR
T. Alexion, NRR	R. Becker, NRR	D. Pickett, NRR

Distribution:

PDR	EJordan	KBlack
Central File	DRoss	RSavio, ACRS
ROAB R/F	TNovak	MTaylor, EDO
DSP R/F	LSpessard	KRaglin, TTC
MWegner	SRubin	PBaranowsky, NRR
MChirama1	GZech	HFaulkner, IP
JRosenthal	MWilliams	JWheelock, INPO
		DQueener, NOAC

ROAB:DSP:AEOD

MWegner:mmk

3/24/90 *[Signature]*

ROAB:DSP:AEOD

MChirama1

3/24/90 *me*

C:ROAB:DSP:AEOD

JRosenthal

3/ /90

D:DSP:AEOD

TNovak

3/ /90