Attachment 1

DUKE POWER COMPANY

MCGuire Nuclear Station

Proposed Technical Specification Revision

Deletion of Upper Head Injection System

Attachment 1

Technical Specification Revisions

The required revisions to the McGuire Nuclear Station Technical Specifications associated with the deactivation of the Upper Head Injection (UHI) System are provided via the attached pages and the brief discussions of each revision given below:

<u>3/4.4.6 - Reactor Coolant System Leakage</u>

The deletion of the UHI System will involve capping of the reactor vessel upper head penetrations as close as practicable to the upper head. Associated piping and valves are thus removed from the Reactor Coolant System and leakage verification is no longer applicable for the UHI related equipment in Table 3.4-1.

<u>3/4.5.1.1 - ECCS, Cold Leg Injection</u>

The nitrogen cover pressure will be increased to a minimum value of 585 psig in order to enhance cold leg injection water delivery during LOCA scenerios. Other specifications related to the accumulators remain unchanged.

<u>3/4.5.1.2 - ECCS, Upper Head Injection</u>

The specifications associated with the maintenance of the UHI System within specified tolerances will be deleted.

<u>3/4.6.1 - Primary Containment</u>

Table 3.6-1 will be revised to reflect the sealing of UHI related containment penetrations.

<u>3/4.6.3 - Containment Isolation Valves</u>

Table 3.6-2 will be revised to reflect the removal of containment isolation valves associated with UHI containment penetrations.

<u>3/4.7.8 - Snubbers</u>

The tables provide in Section 3/4.7.8 which describe the types and quantity of snubbers utilized in various systems will be revised via a future submittal to reflect deletion of the UHI System.

<u>3/4.8.4 - Electrical Equipment Protective Devices</u>

Table 3.8-1a and 3.8-1b will be revised to reflect the deletion of the UHI System and related containment penetration conductor overcurrent protective devices.

TABLE 3.4-1

REACTOR COOLANT SYSTEM PRESSURE ISOLATION VALVES

VALVE NUMBER	FUNCTION
MC-1562-2.0	
NI60	Accumulator Discharge
NI71	Accumulator Discharge
NI59	Accumulator Discharge
NI70	Accumulator Discharge
MC-1562-2.1	
NI82	Accumulator Discharge
NI94	Accumulator Discharge
NI81	Accumulator Discharge
NI93	Accumulator Discharge
MC-1562-3.0	
NI134	Safety Injection (Hot Leg)
NI159	Safety Injection (Hot Leg)
NI156	Safety Injection (Hot Leg)
NI128	Safety Injection (Hot Leg)
NI124	Safety Injection (Hot Leg)
NI160	Safety Injection (Hot Leg)
NI157	Safety Injection (Hot Leg)
NI126	Safety Injection (Hot Leg)
NI129	Safety Injection (Hot Leg)
NI125	Safety Injection (Hot Leg)
MC-1562-3.1	
NI165	Safety Injection/Residual Heat Removal (Cold Leg)
NI167	Safety Injection/Residual Heat Removal (Cold Leg)
NI169	Safety Injection/Residual Heat Removal (Cold Leg)
NI171	Safety Injection/Residual Heat Removal (Cold Leg)
NI175	Safety Injection/Residual Heat Removal (Cold Leg)
NI176	Safety Injection/Residual Heat Removal (Cold Leg)
NI180	Safety Injection/Residual Heat Removal (Cold Leg)
NI181	Safety Injection/Residual Heat Removal (Cold Leg)
MC-1562-4.0 (Note 1)	
NI250	Upper Head Injection
NI251	Upper Head Injection
NI252	Upper Head Injection
NI253	Upper Head Injection
NI249	Upper Head Injection
NI248	Upper Head Injection
MC-1561-1.0	
ND1B*	Residual Heat Removal
ND2A*	Residual Heat Removal

*Testing per Specification 4.4.6.2.2d not applicable due to positive indication of valve position in Control Room.

Note 1: Upon the deactivation of the UHI System by removal of related components and piping and modifications to the Cold Leg Accumulators, this specification is no longer applicable.

3/4.5.1 ACCUMULATORS

COLD LEG INJECTION

LIMITING CONDITION FOR OPERATION

3.5.1.1 Each cold leg injection accumulator shall be OPERABLE with:

a. The isolation valve open,

b. A contained borated water volume of between 8022 and 8256 gallons,

c. A boron concentration of between 1900 and 2100 ppm,

d. 1. WITH UHI INSTALLED: A nitrogen cover-pressure of between 430 and 484 psig, ~~and~~
2. WITH UHI REMOVED: A nitrogen cover-pressure of between 585 and 639 psig

e. A water level and pressure channel OPERABLE.

APPLICABILITY: MODES 1, 2, and 3*.

ACTION:

a. With one cold leg injection accumulator inoperable, except as a result of a closed isolation valve, restore the inoperable accumulator to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

b. With one cold leg injection accumulator inoperable due to the isolation valve being closed, either immediately open the isolation valve or be in at least HOT STANDBY within 1 hour and in HOT SHUTDOWN within the following 12 hours.

SURVEILLANCE REQUIREMENTS

4.5.1.1.1 Each cold leg injection accumulator shall be demonstrated OPERABLE:

a. At least once per 12 hours by:

1) Verifying the contained borated water volume and nitrogen cover-pressure in the tanks, and

2) Verifying that each cold leg injection accumulator isolation valve is open.

*Pressurizer pressure above 1000 psig.

UPPER HEAD INJECTION

LIMITING CONDITION FOR OPERATION

3.5.1.2 Each Upper Head Injection Accumulator System shall be OPERABLE with:

a. The isolation valves open,

b. The water-filled accumulator containing a minimum of 1850 cubic feet of borated water having a concentration of between 1900 and 2100 ppm of boron, and

c. The nitrogen bearing accumulator pressurized to between 1206 and 1264 psig.

APPLICABILITY: WITH UHI INSTALLED: MODES 1, 2 and 3.*
WITH UHI REMOVED: Specification is not applicable.

ACTION:

a. With the Upper Head Injection Accumulator System inoperable, except as a result of a closed isolation valve(s), restore the Upper Head Injection Accumulator System to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

b. With the Upper Head Injection Accumulator System inoperable due to the isolation valve(s) being closed, either immediately open the isolation valve(s) or be in HOT STANDBY within 1 hour and be in HOT SHUTDOWN within the next 12 hours.

SURVEILLANCE REQUIREMENTS

4.5.1.2 Each Upper Head Injection Accumulator System shall be demonstrated OPERABLE:

a. At least once per 12 hours by:

1) Verifying the contained borated water volume and nitrogen pressure in the accumulators, and

2) Verifying that each accumulator isolation valve is open.

*Pressurizer Pressure above 1900 psig.

TABLE 3.6-1

SECONDARY CONTAINMENT BYPASS LEAKAGE PATHS

PENETRATION NUMBER	SERVICE	RELEASE LOCATION	TEST TYPE
M216	Pressurizer Relief Tank Makeup	Auxiliary Building	Type C
M212	Nitrogen to Pressurizer Relief Tank	Auxiliary Building	Type C
M259	Reactor Makeup Water Tank to NV System	Auxiliary Building	Type C
M373	Ice Condenser Glycol In	Auxiliary Building	Type C
M372	Ice Condenser Glycol Out	Auxiliary Building	Type C
M330	Nitrogen to Accumulators	Auxiliary Building	Type C
M321	Safety Injection Test Line	Auxiliary Building	Type C
M348	Upper Head Injection Test Line	Auxiliary Building	Type C Note 1
M374	Containment Floor Sump Incore Instrument Sump Discharge	Auxiliary Building	Type C
M360	Reactor Coolant Drain Tank Gas Space to Waste Gas System	Auxiliary Building	Type C
M375	Reactor Coolant Drain Tank Heat Exchanger Discharge	Auxiliary Building	Type C
M356	Equipment Decontamination	Auxiliary Building	Type C
M235	Pressurizer Sample	Auxiliary Building	Type C
M309	Reactor Coolant Hot Leg Sample	Auxiliary Building	Type C
M322	Component Cooling to Component Cooling Drain Tank	Auxiliary Building	Type C

Note 1: Upon the deactivation of the UHI System by removal of related components and piping and modifications to the Cold Leg Accumulators, this

TABLE 3.6-2 (Continued)

CONTAINMENT ISOLATION VALVES

VALVE NUMBER		FUNCTION	MAXIMUM ISOLATION TIME (SEC)
1. Phase "A" Isolation (continued)			
NI-96B		Test HDR Outside Containment Isolation	≤10
NI-120B		Safety Injection Pump to Accumulator Fill Line Isolation	≤10
NI-122B		Hot Leg Injection Check NI124, NI128 Test Isolation	≤10
NI-255B		UHI Check Valve Test Line Isolation	≤10
NI-258A		UHI Check Valve Test Line Isolation	≤10
NI-264B	Note 1	UHI Check Valve Test Line Isolation	≤10
NI-266A		UHI Check Valve Test Line Isolation	≤10
NI-267A		UHI Check Valve Test Line Isolation	≤10
NM-3A		Pressurizer Liquid Sample Line Inside Containment Isolation	≤15
NM-6A		Pressurizer Steam Sample Line Inside Containment Isolation	≤15
NM-7B		Pressurizer Sample Header Outside Containment Isolation	≤15
NM-22A		NC Hot Leg #1 Sample Line Inside Containment Isolation	≤15
NM-25A		NC Hot Leg #4 Sample Line Inside Containment Isolation	≤15
NM-26B		NC Hot Legs Sample Hdr. Outside Containment Isolation	≤15
NM-72B		NI Accumulator A Sample Line Inside Containment Isolation	≤15
NM-75B		NI Accumulator B Sample Line Inside Containment Isolation	≤15
NM-78B		NI Accumulator C Sample Line Inside Containment Isolation	≤15
NM-81B		NI Accumulator D Sample Line Inside Containment Isolation	≤15
NM-82A		NI Accumulator Sample Hdr. Outside Containment Isolation	≤15
NM-187A#		SG A Upper Shell Sample Containment Isolation Inside	≤15
NM-190A#		SG A Blowdown Line Sample Containment Isolation Inside	≤15
NM-191B#		SG A Sample Hdr. Containment Isolation Outside	≤15
NM-197B#		SG B Upper Shell Sample Containment Isolation Inside	≤15
NM-200B#		SG B Blowdown Line Sample Containment Isolation Inside	≤15
NM-201A#		SG B Sample Hdr. Containment Isolation Inside	≤15
NM-207A#		SG C Upper Shell Sample Containment Isolation Inside	≤15
NM-210A#		SG C Blowdown Line Sample Containment Isolation Inside	≤15
NM-211B#		SG C Sample Hdr. Containment Isolation Outside	≤15
NM-217B#		SG D Upper Shell Sample Containment Isolation Inside	≤15
NM-220B#		SG D Blowdown Line Sample Containment Isolation Inside	≤15

Note 1: Upon the deactivation of the UHI System by removal of related components and piping and modifications to the Cold Leg Accumulators, this specifi-

TABLE 3.8-1a (Continued)

UNIT 1 CONTAINMENT PENETRATION CONDUCTOR OVERCURRENT PROTECTIVE DEVICES

DEVICE NUMBER & LOCATION	TRIP SETPOINT OR CONT. RATING (AMPERES)	RESPONSE TIME (SECONDS)	SYSTEM POWERED
2. 600 VAC-MCC (Continued)			
1EMXA-2 2B			
Primary Bkr	20	45 @ 60A	N2 to Prt Cont Isol Inside Vlv 1NC54A
Backup Fuse	20	N.A.	
1EMXA-2 2C			
Primary Bkr	20	45 @ 60A	RCP Mtg Brg Oil Fill Isol Vlv 1NC196A
Backup Fuse	20	N.A.	
1EMXA-2 3A			
Primary Bkr	30	45 @ 90A	Accumulator 1A Disch Isol Vlv 1NI54A
Backup Fuse	30	N.A.	
1EMXA-2 3B			
Primary Bkr	30	45 @ 90A	Accumulator 1C Disch Isol Vlv 1NI76A
Backup Fuse	30	N.A.	
1EMXA-2 3C			
Primary Bkr	20	45 @ 60A	Test Hdr Inside Cont Isol Vlv 1NI95A
Backup Fuse	20	N.A.	
1EMXA-2 4A Note 1			
Primary Bkr	20	45 @ 60A	UHI Check Vlv Test Line Isol Vlv 1NI266A
Backup Fuse	20	N.A.	

NOTE 1: Upon the deactivation of the UHI System by removal of related components and piping and modifications to the Cold Leg Accumulators, this specification is no longer applicable.

TABLE 3.8-1a (Continued)

UNIT 1 CONTAINMENT PENETRATION CONDUCTOR OVERCURRENT PROTECTIVE DEVICES

DEVICE NUMBER & LOCATION	TRIP SETPOINT OR CONT. RATING (AMPERES)	RESPONSE TIME (SECONDS)	SYSTEM POWERED
2. 600 VAC-MCC (Continued)			
1EMXA-2 4B Note 1			
Primary Bkr	20	45 @ 60A	UHI Check Vlv Test Line Isol Vlv 1NI267A
Backup Fuse	20	N.A.	
1EMXA-2 4C			
Primary Bkr	20	45 @ 60A	Accum 1A Vent to 1NC34 for Blkout Vlv 1NI430A
Backup Fuse	20	N.A.	
1EMXA-5 1B			
Primary Bkr	20	45 @ 60A	Pzr Steam Sample Line Inside Cont Isol Vlv 1NM3A
Backup Fuse	20	N.A.	
1EMXA-5 2B			
Primary Bkr	20	45 @ 60A	Pzr Steam Sample Line Inside Cont Isol Vlv 1NM6A
Backup Fuse	20	N.A.	
1EMXA-5 3B			
Primary Bkr	20	45 @ 60A	NC Hotleg 1A Sample Line Cont Isol Vlv 1NM22A
Backup Fuse	20	N.A.	
1EMXA-5 2D			
Primary Bkr	20	45 @ 60A	NC Hotleg 1D Sample Line Cont Isol Vlv 1NM25A
Backup Fuse	20	N.A.	
1EMXA-2 7A			
Primary Bkr	20	45 @ 60A	SG 1A Upper Shell Sample Cont Isol Vlv 1NM187A
Backup Fuse	20	N.A.	

NOTE 1: Upon the deactivation of the UHI System by removal of related components and piping and modifications to the Cold Leg Accumulators, this specification is no longer applicable.

TABLE 3.8-1b (Continued)

UNIT 2 CONTAINMENT PENETRATION CONDUCTOR OVERCURRENT PROTECTIVE DEVICES

DEVICE NUMBER & LOCATION	TRIP SETPOINT OR CONT. RATING (AMPERES)	RESPONSE TIME (SECONDS)	SYSTEM POWERED
2. 600 VAC-MCC (Continued)			
2EMXA-2 4B			
Primary Bkr — Note 1	20	45 @ 60A	UHI Check Vlv Test Line Isol
Backup Fuse	20	N.A.	Vlv 2NI267A
2EMXA-2 4C			
Primary Bkr	20	45 @ 60A	Accum 2A Vent to 2NC34 for
Backup Fuse	20	N.A.	Blkout Vlv 2NI430A
2EMXA-5 1B			
Primary Bkr	20	45 @ 60A	Pzr Steam Sample Line Inside
Backup Fuse	20	N.A.	Cont Isol Vlv 2NM3A
2EMXA-5 2C			
Primary Bkr	20	45 @ 60A	Pzr Steam Sample Line Inside
Backup Fuse	20	N.A.	Cont Isol Vlv 2NM6A
2EMXA-5 3B			
Primary Bkr	20	45 @ 60A	NC Hotleg 2A Sample Line Cont
Backup Fuse	20	N.A.	Isol Vlv 2NM22A
2EMXA-5 2D			
Primary Bkr	20	45 @ 60A	NC Hotleg 2D Sample Line Cont
Backup Fuse	20	N.A.	Isol Vlv 2NM25A
2EMXA-2 7A			
Primary Bkr	20	45 @ 60A	SG 2A Upper Shell Sample Cont
Backup Fuse	20	N.A.	Isol Valve 2NM187A

NOTE 1: Upon the deactivation of the UHI System by removal of related components and piping

TABLE 3.8-1b (Continued)

UNIT 2 CONTAINMENT PENETRATION CONDUCTOR OVERCURRENT PROTECTIVE DEVICES

DEVICE NUMBER & LOCATION	TRIP SETPOINT OR CONT. RATING (AMPERES)	RESPONSE TIME (SECONDS)	SYSTEM POWERED
2. 600 VAC-MCC (Continued)			
2EMXA-2 2B			
Primary Bkr	20	45 @ 60A	N2 to Prt Cont Isol Inside
Backup Fuse	20	N.A.	Vlv 2NC54A
2EMXA-2 2C			
Primary Bkr	20	45 @ 60A	RCP Mtg Brg Oil Fill Isol
Backup Fuse	20	N.A.	Vlv 2NC196A
2EMXA-2 3A			
Primary Bkr	30	45 @ 90A	Accumulator 2A Disch Isol
Backup Fuse	30	N.A.	Vlv 2NI54A
2EMXA-2 3B			
Primary Bkr	30	45 @ 90A	Accumulator 2C Disch Isol
Backup Fuse	30	N.A.	Vlv 2NI76A
2EMXA-2 3C			
Primary Bkr	20	45 @ 60A	Test Hdr Inside Cont Isol
Backup Fuse	20	N.A.	Vlv 2NI95A
2EMXA-2 4A Note 1			
Primary Bkr	20	45 @ 60A	UHI Check Vlv Test Line Isol
Backup Fuse	20	N.A.	Vlv 2NI266A

NOTE 1: Upon the deactivation of the UHI System by removal of related components and piping and modifications to the Cold Leg Accumulators, this specification is no longer applicable.

3/4.5 EMERGENCY CORE COOLING SYSTEMS

BASES

3/4.5.1 ACCUMULATORS

Cold Leg

The OPERABILITY of each Reactor Coolant System (RCS) accumulator ensures that a sufficient volume of borated water will be immediately forced into the reactor core through each of the cold legs in the event the RCS pressure falls below the pressure of the accumulators. This initial surge of water into the core provides the initial cooling mechanism during large RCS pipe ruptures.

The limits on accumulator volume, boron concentration and pressure ensure that the assumptions used for accumulator injection in the safety analysis are met.

The accumulator power operated isolation valves are considered to be "operating bypasses" in the context of IEEE Std. 279-1971, which requires that bypasses of a protective function be removed automatically whenever permissive conditions are not met. In addition, as these accumulator isolation valves fail to meet single failure criteria, removal of power to the valves is required.

The limits for operation with an accumulator inoperable for any reason except an isolation valve closed minimizes the time exposure of the plant to a LOCA event occurring concurrent with failure of an additional accumulator which may result in unacceptable peak cladding temperatures. If a closed isolation valve cannot be immediately opened, the full capability of one accumulator is not available and prompt action is required to place the reactor in a mode where this capability is not required.

3/4.5.2 and 3/4.5.3 ECCS SUBSYSTEMS

The OPERABILITY of two independent ECCS subsystems ensures that sufficient emergency core cooling capability will be available in the event of a LOCA assuming the loss of one subsystem through any single failure consideration. Either subsystem operating in conjunction with the accumulators is capable of supplying sufficient core cooling to limit the peak cladding temperatures within acceptable limits for all postulated break sizes ranging from the double ended break of the largest RCS cold leg pipe downward. In addition, each ECCS subsystem provides long-term core cooling capability in the recirculation mode during the accident recovery period.

With the RCS temperature below 350°F, one OPERABLE ECCS subsystem is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the limited core cooling requirements.

Attachment 2

Justification & Safety Analysis

Introduction

The Upper Head Injection System (UHI) was added to the Emergency Core Cooling System (ECCS) of the McGuire Nuclear Station during initial licensing in order to regain operating flexibility lost due to the impact of the Ice Condenser Containment design upon the 10CFR50.46 Appendix K ECCS Evaluation Model analyses. Ice Condenser design results in a reduced containment back pressure during a design basis loss of coolant accident decreasing the amount of steam that can be vented from the Reactor Coolant System (RCS) to the containment during a large break loss of coolant accident. The ECCS analysis results therefore require more limiting restrictions on normal plant operations in order to satisfy Appendix K requirements for the Ice Condenser design than is required for dry containments. In order to ensure the operating limits were adequate to allow load follow operation, the UHI System and associated plant modifications were added to the McGuire units to supplement the conventional Westinghouse ECCS.

The development of improved analytical models combined with the numerous operational and design problems related to the UHI System at McGuire have led to the decision to proceed with the deactivation of UHI accumulators, associated components and piping. Due to the complexity and rigid requirements placed upon its performance, the UHI System has introduced concerns regarding appropriate water volume delivery, nitrogen injection into the Reactor Coolant System, fluid mixing behavior, and concerns of the increased number of plant mode changes involved with UHI problems and their resolution. In addition, the plant operational performance has been impacted by the UHI related problems. Meanwhile, the ability to model and predict plant behavior during a loss of coolant accident has improved significantly since the decision was made to install the UHI System at McGuire. Core power peaking factor limits which provide adquate operating flexibility may be justified without the UHI System using evaluation model improvements which are either approved or soon to be approved by the NRC.

In order to determine the feasibility of the deletion of the UHI System, a scoping study was performed to determine the McGuire response to a Double-Ended Cold Leg Guillotine (DECLG) break assuming values for specific parameters. The UHI System was assumed deactivated, but the vessel internals associated with UHI plants were modeled and provided a benefit in plant performance during the LOCA transient simulated. The Cold Leg Accumulator cover pressure was raised to 600 psia (a typical 4 loop Westinghouse plant value). The resistance factor applied to the Cold Leg Accumulator Discharge piping was reduced to reflect the planned removal of the flow orifice. (This orifice had been part of the original design to compliment the performance of the UHI System.) The BART core reflood flow and heat transfer methodology was utilized with the REFLOOD thermal-hydraulics code. The scoping study analyzed the 0.6 DECLG break

and resulted in a peak clad temperature of 1960°F with a corresponding core peaking factor (F_Q) of 2.20. Figures 1, 2, and 3 provide the results of the scoping study in graphical form and also provide an indication of the benefit of the UHI related internals in comparison to the standard Westinghouse design.

The proposed Technical Specification revisions included herein include those presently identified as being required once approval to delete UHI is granted and the system is removed during a refueling outage. NRC is requested to initiate the review of the technical scope of work planned, and to approve deletion of UHI. Upon completion of the analysis described herein, it is expected that the existing value of $F_Q(z)$ will be confirmed to be valid.

PLANNED ANALYSIS EFFORT

The analyses to be performed and submitted at a later date will utilize the BART and BASH computer codes. The additional benefit provided by the BASH code is expected to allow a core power peaking limit of 2.32 while continuing to meet the requirements of Appendix K. (This is above the existing Technical Specification value of 2.26).

The scoping study will be confirmed by the complete analysis of the large break LOCA showing the ECCS performance of the McGuire Nuclear units with UHI deactivated is not significantly different than other Westinghouse four loop plants when current ECCS analysis methodology (BART/BASH) is utilized and the Cold Leg Accumulators are adjusted. The units can be operated with UHI deleted at a peaking factor that will allow full power and full load follow operation while continuing to satisfy the existing conservative requirements of Appendix K.

The most significant application of the UHI System, water delivery during the blowdown phase of a LOCA involving a large break of a cold leg pipe, will be shown to be unnecessary using the existing Westinghouse approved Evaluation Model (including BART Technology) and the BASH methodology which is expected to receive NRC approval during 1985. Other transients which may result in the injection of UHI water, will also be analyzed using approved or soon to be approved methods in order to demonstrate that all safety criteria requirements remain satisfied. The spectrum of small break loss of coolant accidents will be analyzed using the NOTRUMP computer code. The Steamline Break will be analyzed using the existing methodology as described in the McGuire FSAR. Additional details of the confirmatory evaluations to be performed follow.

Large Break LOCA Analysis

The analysis of a large break LOCA transient is divided into three parts: (1) Blowdown, (2) Refill, (3) Reflood. There are three distinct transients analyzed in each phase, including the thermal-hydraulic transients in the RCS, the pressure and temperature transient within the containment, and the fuel and clad temperature transient of the hottest rod in the core. Based upon these considerations, a system of interrelated computer codes has been developed for the analysis of a LOCA.

The description of the various aspects of the LOCA analysis methodology is provided in the references. These documents describe the major phenomena modeled, the interfaces among the computer codes, and the features of the codes which ensure compliance with the acceptance criteria. The SATAN VI, LOTIC, BART, BASH, WREFLOOD, and LOCTA-IV codes which are used in the LOCA analyses are described in detail in the references. These codes are used to assess the core heat transfer and to determine if the core geometry remains amenable to cooling throughout and subsequent to blowdown, refill, and reflood phases of the LOCA. The SATAN-VI computer code analyzes the thermal-hydraulic transient in the RCS during blowdown. WREFLOOD calculates the refill phase and mass/energy releases during reflood. The BASH code is used to calculate the RCS thermal-hydraulic behavior during the reflood portion of the LOCA. The BART computer code is used to calculate fluid and heat transfer conditions in the core during reflood. The LOTIC code is used to calculate the containment pressure transient during all three phases of the LOCA analysis. Similarly, the LOCTA-IV computer code is used to compute the thermal transient of the hottest fuel rod during the three phases. Fuel parameters input to the LOCTA-IV code are taken from the most recently approved version of the PAD code.

The large break LOCA analyses to be completed in order to justify the deletion of the UHI System will include a range of Moody break discharge coefficients for a Double-Ended Cold Leg Guillotine (DECLG) break. The bases used to select the numerical values that are input to the analysis have been conservatively determined from extensive sensitivity studies (Refer to Reference 10). In addition, the requirements of Appendix K regarding specific model features are met by selecting models which provide a significant overall conservatism in the analysis. The assumptions made pertain to the conditions of the reactor and associated safety system equipment at the time that the LOCA occurs and include such items as the core peaking factors, the containment pressure, and the performance of the ECCS. Decay heat generated throughout the transient is also conservatively calculated as required by Appendix K.

Small Break LOCA Analysis

The small break LOCA analysis will be performed per the most recent SBLOCA evaluation Model as described in Reference 9. The model and associated computer code, NOTRUMP (Reference 8), are expected to be approved by the NRC in May 1985. The new Evaluation Model incorporates the requirements of NUREG-0737 Item II.K.3.30. The analysis shall be submitted at a later date and shall demonstrate that the deletion of UHI does not impact the ability of the McGuire units to satisfy all pertinent safety and regulatory requirements.

Steamline Break

A Chapter 15 Steamline Break analysis will be conducted using the LOFTRAN computer code. Statepoints will be generated and DNB design basis limits will be verified using the THINC computer code. Although DNB and possible clad perforation following a Steamline Break are not necessarily unacceptable, the analysis will demonstrate that McGuire Safety Systems are adequate to prevent DNB from occuring for any rupture assuming the UHI System has been removed while maintaining other conservative assumptions such as having the most reactive control rod stuck in the fully withdrawn position.

Containment Analysis For LOCA

The Ice Condenser shall be shown to limit the containment pressure to a value less than the design pressure of 15 psig for all reactor coolant pipe break sizes up to and including a double-ended severance. The containment peak pressure calculation will be performed using a modified version of the most recent ANS Decay Heat Standard (1.2 conservative factor is maintained). The use of this decay heat curve has been previously sumbitted and approved by the NRC. The analysis will also employ the Westinghouse 1979 Mass/Energy Release Model which includes credit for steam condensation in the cold legs by safety injection water. The 1979 Model has been previously submitted for several dry containment analyses and approval is expected in the near future.

The use of the revised decay heat standard and the 1979 Mass/Energy Release Model is not required to ensure the calculated peak pressure results are less than the design limit. The modifications are made to update the McGuire analysis with model improvements made since the initial McGuire calculations. The analysis will demonstrate that the deletion of UHI is justifiable in light of the calculated peak containment pressure remaining below the 15 psig design limit.

Containment Analysis For Steamline Break

Prior to the NRC resolution of the "Superheat" issue and approval of the Ice Condenser Model, a sensitivity study will be conducted for Mass/Energy cases where UHI is determined to impact the results. The study will be used to assess the impact of UHI removal upon the containment temperature and pressure calculations related to the Steamline Break Transient and will provide the basis for initial licensing discussions. After the NRC approval of the Mass/Energy and Ice Condenser Models (Third Quarter 1985), a complete reanalysis of Mass/Energy Release and containment integrity will be performed using the approved models to demonstrate all applicable safety and regulatory requirements remain satisfied.

Summary

The evaluations performed to date provide reasonable assurance that the full scope of reanalysis related to deletion of the UHI System will provide adequate operating flexibility while continuing to satisfy all design, safety, and regulatory requirements. Model improvements either approved or soon to be approved by the NRC which have been developed since the existing McGuire analyses were performed will be introduced in order to modernize the analytical bases for McGuire operating restrictions.

REFERENCES

1. Bordelon, F. M., Massey, H. W. and Zorden, T. A., "Westinghouse ECCS Evaluation Model - Summary", WCAP-8339, (Non-Proprietary) July 1974

2. Schwarz, W. R. "Addendum to BART-A1: A computer code for the Best Estimate Analysis of Reflood Transients", WCAP-9561, Addendum 1, (Proprietary) November 1984

3. Bordelon, F. M., et al., "SATAN-VI Program; Comprehensive Space Time Dependent Analysis of Loss of Coolant", WCAP-8320, (Proprietary) June 1974

4. Kabadi, J. N., et al., "BASH: An Integrated Core and RCS Reflood Code for Analysis of PWR Loss of Coolant Accidents", WCAP-10337, (Proprietary) July, 1983

5. Hsieh, T. and Raymond, M., "Long Term Ice Condenser Containment LOTIC code Supplement 1", WCAP-8355 Supplement 1, May 1975

6. Bordelon, F. M., et al., "LOCTA-IV Program: Loss of Coolant Transient Analysis", WCAP-8301, (Proprietary) February 1979, and WCAP-8305 (Non-Proprietary) February 1978

7. Rahe, E. P., Westinghouse Letter to Thomas, C. O., NRC, October 27, 1982, Subject: "Westinghouse Revised PAD Code Thermal Safety Model", WCAP-8720 Addendum 2 (Proprietary)

8. Myer, P. E. and Kornfilt, J., "NOTRUMP: A Nodal Transient Small Break and General Network Code", WCAP-10079, November 1982

9. Lee, N., Tauche, W. D., and Schwarz, W. R., "Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code", WCAP-10054, December 1982

10. "Westinghouse Emergency Core Cooling System - Plant Sensitivity Studies" WCAP-8356, July 1974

FIGURE 1

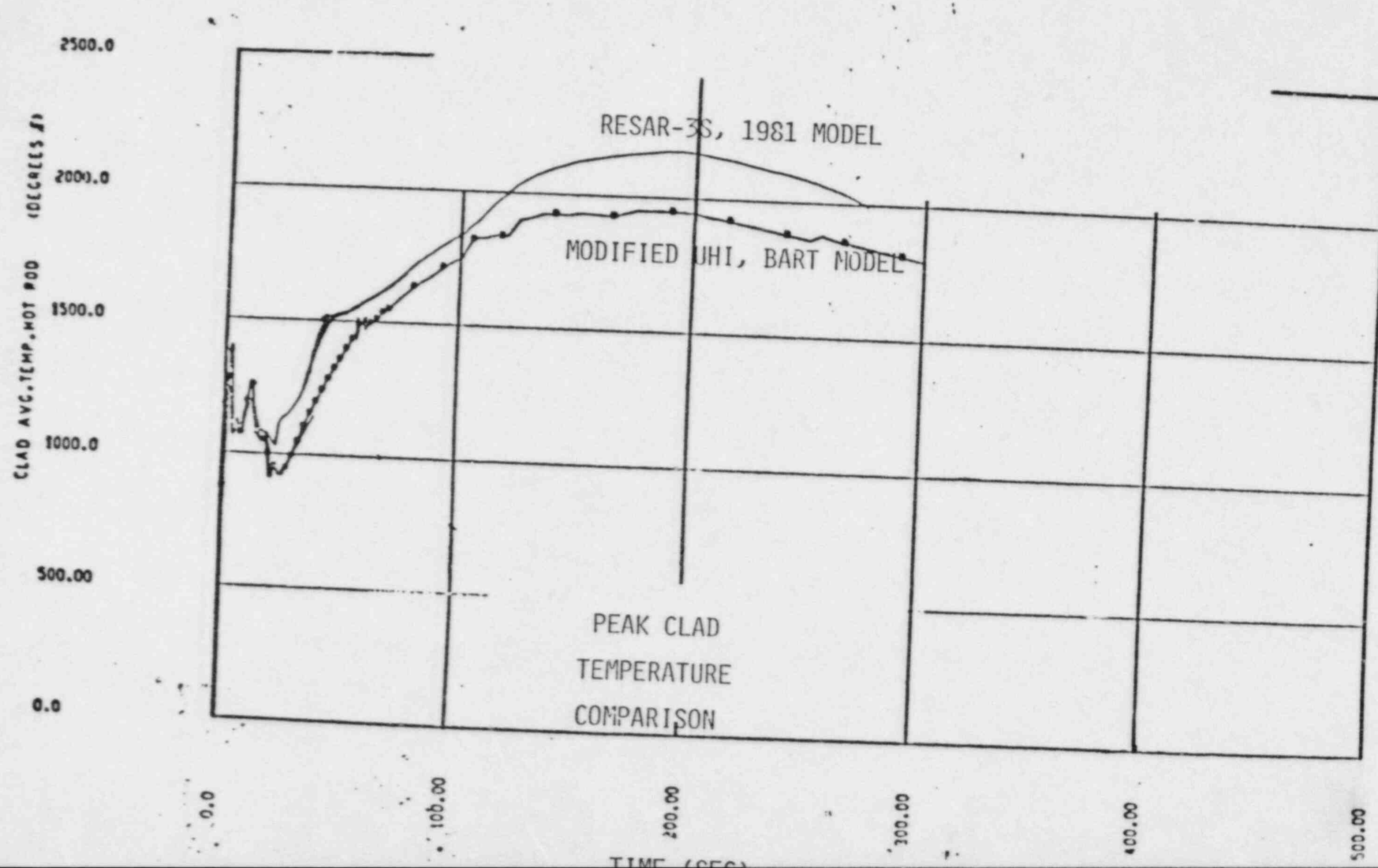

2500.0
2000.0
1500.0
1000.0
500.00
0.0
CLAD AVG.TEMP.HOT ROD (DEGREES F)
RESAR-3S, 1981 MODEL
MODIFIED UHI, BART MODEL
PEAK CLAD
TEMPERATURE
COMPARISON
0.0
100.00
200.00
300.00
400.00
500.00
TIME (SEC)

FIGURE 2

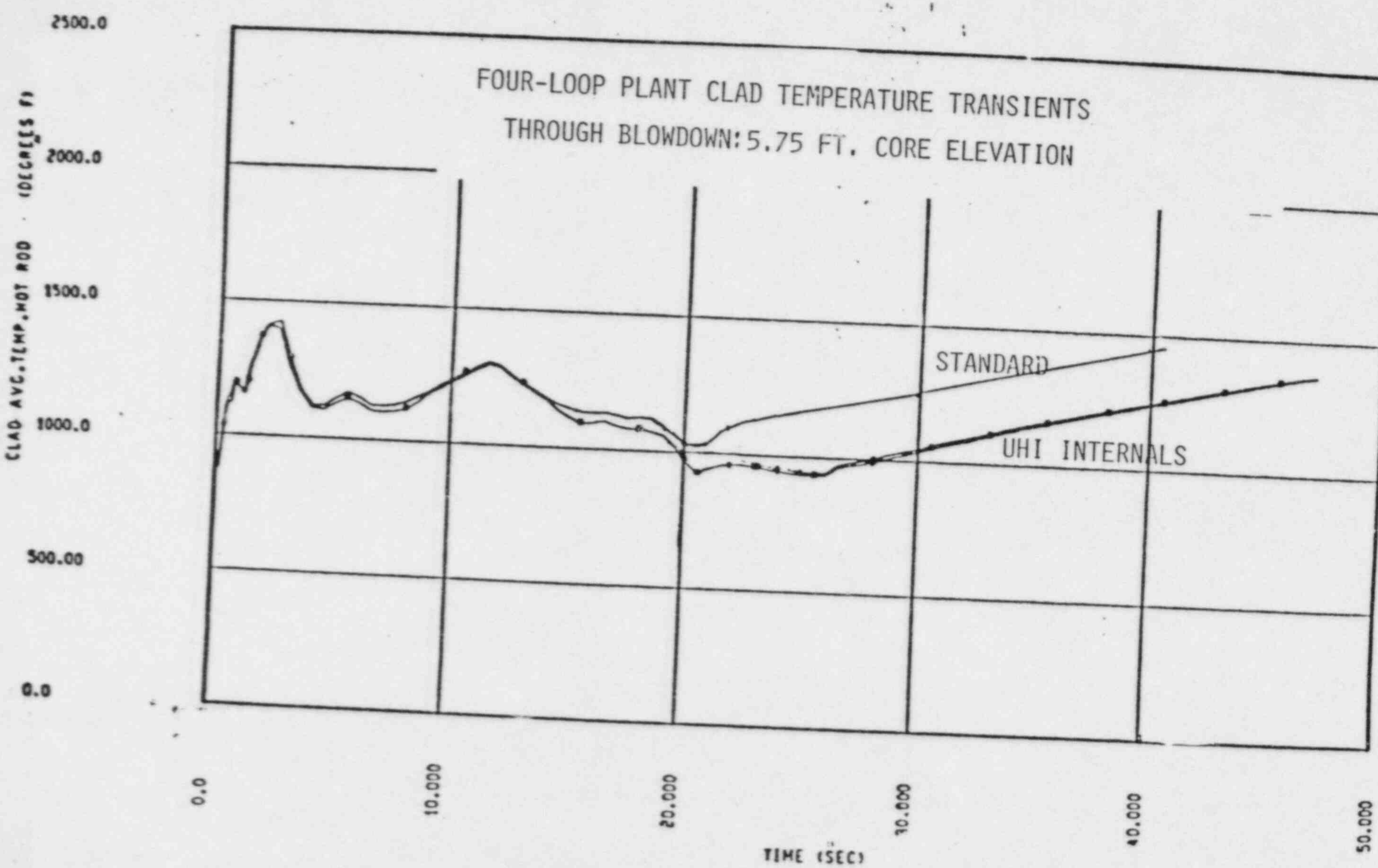
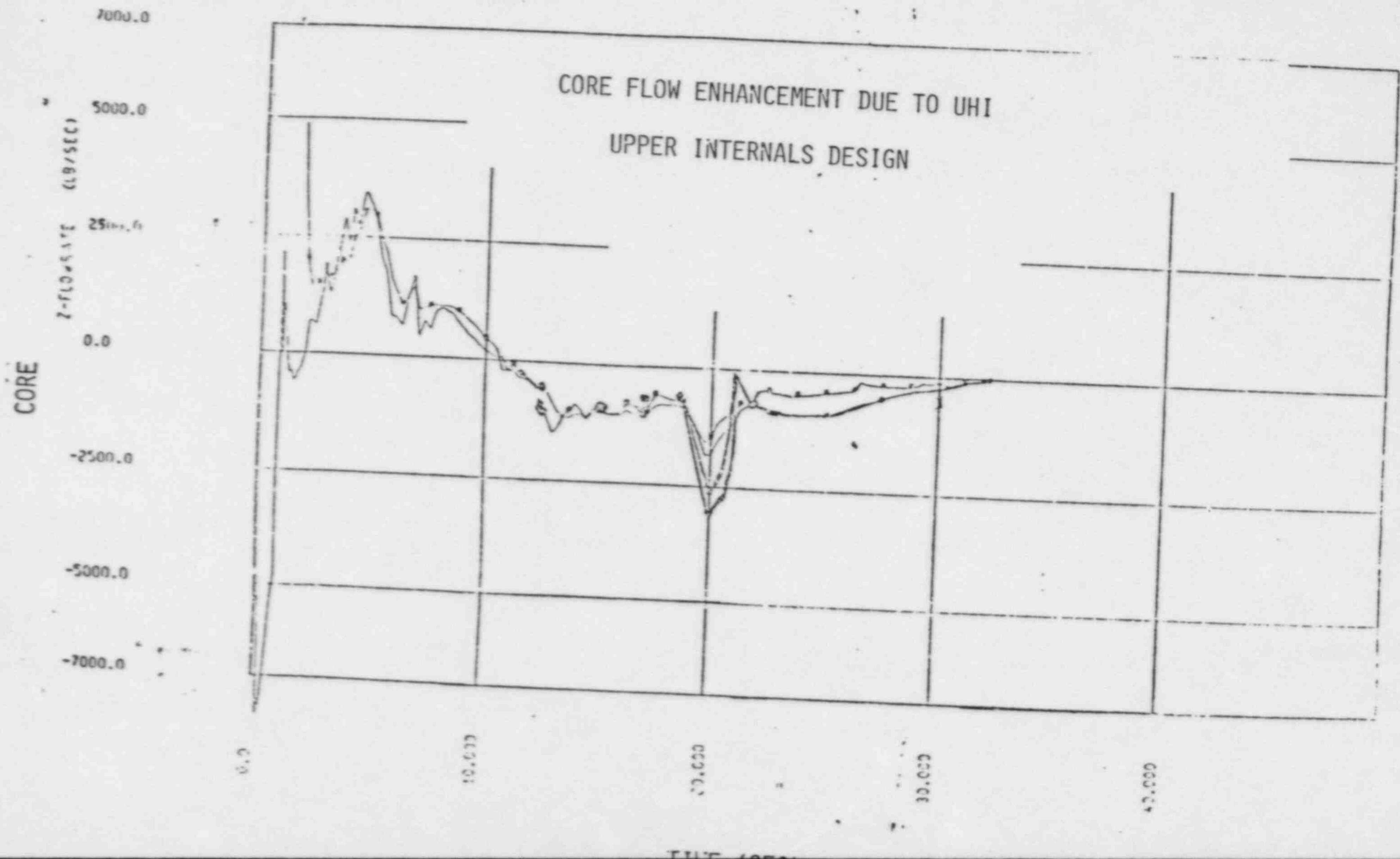

FOUR-LOOP PLANT CLAD TEMPERATURE TRANSIENTS
THROUGH BLOWDOWN: 5.75 FT. CORE ELEVATION
STANDARD
UHI INTERNALS
CLAD AVG.TEMP.HOT ROD (DEGREES F)
2500.0
2000.0
1500.0
1000.0
500.00
0.0
0.0
10.000
20.000
30.000
40.000
50.000
TIME (SEC)

FIGURE 3


CORE FLOW ENHANCEMENT DUE TO UHI
UPPER INTERNALS DESIGN
CORE
5000.0
0.0
-2500.0
-5000.0
-7000.0
10.000
30.000
40.000

Attachment 3

Analysis of Significant Hazards Consideration

As required by 10 CFR 50.91, this analysis is provided concerning whether the proposed changes to the technical specifications involve significant hazards considerations, as defined by 10 CFR 50.92.

The probability of an accident previously evaluated is unaffected by the proposed amendments because the UHI System serves only to mitigate accidents after they occur and performs no function with respect to preventing accidents. The consequences of an accident previously evaluated are not increased because all applicable conservative criteria will be satisfied.

The proposed amendments would not create the possibility of a new or different type of accident, from any accident previously evaluated. NRC has previously accepted partial power operation with the UHI inoperable at McGuire (Amendment No. 37 to Facility Operating License NPF-9 and Amendment 18 to Facility Operating License NPF-17 dated October 31, 1984). Furthermore, NRC has licensed plants of similar design without UHI using computer codes similar to that utilized in support of this submittal. In fact, removal of UHI eliminates any concerns regarding improper operation of UHI.

Finally, the proposed amendments do not involve a significant reduction in a margin of safety. The principal criterion on emergency core cooling system performance for a LOCA is adherence to the peak clad temperature limit of 2200°F. The 2200°F criterion was established to provide a sufficient safety margin between gross failure condition of the fuel cladding and calculated results. Inasmuch as the peak clad temperature will be limited to ≤2200°F with or without the UHI, there is no significant reduction in the margin of safety.

The Commission has provided guidance concerning the application of standards of no significant hazard determination by providing certain examples (48 FR 1487). One of the examples of actions likely to involve no significant hazards considerations relates to a change which either may result in some increase to the probability or consequences of a previously-analyzed accident or may reduce in some way a safety margin, but where the results of the change are clearly within all acceptable criteria with respect to the system or component specified in the Standard Review Plan. Because the analysis described in the application for the proposed amendments shows that the results of the changes are clearly within the applicable acceptance criteria, the example described above can be applied to this situation.

In summation, it has been determined that the proposed deletion of the UHI system would not:

1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or

2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or

3) Involve a significant reduction in a margin of safety.

Based upon the preceding analysis, Duke Power Company concludes that the proposed amendments do not involve a significant hazards consideration.