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Constellation Energy
Generation Group

May 9, 2006

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

ATTENTION: Document Control Desk

SUBJECT: R.E. Ginna Nuclear Power Plant
Docket No. 50-244

**Response to Requests for Additional Information Regarding Topics
Discussed on Conference Calls for Extended Power Uprate (EPU)**

By letters dated April 29, 2005 and July 7, 2005, as supplemented by letters dated August 15 and September 30, 2005, R.E. Ginna Nuclear Power Plant, LLC (Ginna LLC) submitted applications associated with revised Loss of Coolant Accident (LOCA) Analyses and a request for authorization to increase the maximum steady-state thermal power level at the R.E. Ginna Nuclear Power Plant from 1520 megawatts thermal (MWt) to 1775 MWt.

On February 23, 2006, the NRC staff engaged the Ginna Extended Power Uprate Project Team in discussions involving the Extended Power Uprate (EPU) Licensing Submittals. These discussions relate to the final questions in the small break LOCA and long term cooling areas. The purpose of this letter is to provide formal documentation of the responses to the verbal requests for information received in this discussion.

Our responses are contained in Attachment 1. A portion of the response to Question 3 in Attachment 1 will be provided at a later date as it contains proprietary information. All of the information in this response is non-proprietary.

The new regulatory commitments within this response are itemized in Attachment 2.

If you have any questions, please contact George Wrobel at (585) 771-3535 or george.wrobel@constellation.com.

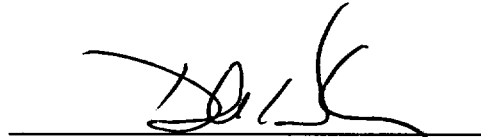
Very truly yours,

Dave A. Holm

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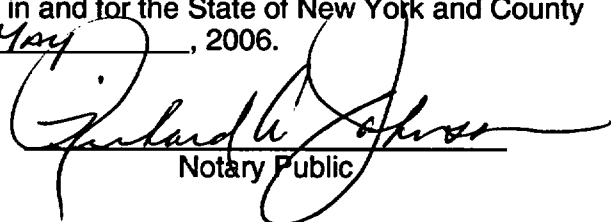
STATE OF NEW YORK :
: TO WIT:
COUNTY OF WAYNE :

I, Dave A. Holm, being duly sworn, state that I am Plant General Manager – R.E. Ginna Nuclear Power Plant, LLC (Ginna LLC), and that I am duly authorized to execute and file this response on behalf of Ginna LLC. To the best of my knowledge and belief, the statements contained in this document are true and correct. To the extent that these statements are not based on my personal knowledge, they are based upon information provided by other Ginna LLC employees and/or consultants. Such information has been reviewed in accordance with company practice and I believe it to be reliable.



Subscribed and sworn before me, a Notary Public in and for the State of New York and County of Wayne, this 9 day of May, 2006.

WITNESS my Hand and Notarial Seal:


Notary Public

My Commission Expires:

RICHARD A. JOHNSON
NOTARY PUBLIC, STATE OF NEW YORK
No. 01J06082344
QUALIFIED IN WAYNE COUNTY
MY COMMISSION EXPIRES OCT. 21, 2006

Attachments

cc: S. J. Collins, NRC
P.D. Milano, NRC
Resident Inspector, NRC (Ginna)

J. P. Spath, NYSERDA
P.D. Eddy, NYSDPS

ATTACHMENT 1
QUESTIONS AND ANSWERS RESULTING FROM A FEBRUARY 23, 2006
CONFERENCE CALL

R.E. GINNA NUCLEAR POWER PLANT
EXTENDED POWER UPRATE PROGRAM

RESPONSES TO FINAL NRC QUESTIONS #1-4

ATTACHMENT 1
QUESTIONS AND ANSWERS RESULTING FROM A FEBRUARY 23, 2006
CONFERENCE CALL

Formal questions discussed in the February 23, 2006 NRC/Ginna phone call to finalize the Ginna Small Break Loss of Coolant Accident (SBLOCA) and long term cooling concerns. (Identified as Questions 1-4)

- 1) *Staff preliminary calculations show that failure of an ADV during cooldown for the limiting 1.1 inch SBLOCA may not reduce RCS pressure sufficiently below 140 psia to initiate LPI to flush the boric acid built up in the core during the first 5.5 hrs of the event. This case is for the smallest SBLOCA that would not refill the RCS and re-establish single phase natural circulation (to flush and reduce the boric acid in the core) before 5.5 hrs post-LOCA. In this case cooldown to a pressure below 140 psia (i.e. RCS pressures of about 100 psia) is necessary to initiate LPI and flush the boric acid from the core. Licensee analyses of this limiting SBLOCA showed that 2 ADVs were used to cool down the RCS to a pressure below 140 psia within 5.5 hrs. Failure to cooldown within 1 hr would violate the analyses to show successful control of boric acid for the limiting SBLOCA. Since it is imperative that the cooldown be initiated at no later than one hour post-LOCA, the staff requests the EOPs be modified to include this necessary and vital operator action. Staff calculations show that a delay of the cooldown to 1.5 hours would violate the licensing analyses.*

Response;

Ginna LLC commits to incorporating a cautionary note in ES-1.2, Post LOCA Cooldown and Depressurization, to state that RCS cooldown and depressurization must be commenced within one hour of the break occurring and completed (to less than the RHR injection pressure) within 6.5 hours of the break occurring in order to assure the assumptions in the long term cooling analysis are met. These required operator response times will be validated during simulator training on small break LOCA scenarios prior to implementation of the EPU. In addition, a cautionary note will be added to ES-1.2 that, in the event the plant is not depressurized to less than the RHR injection pressure in 6.5 hours, the plant cooldown rate shall not exceed 100F/hr to assure boron will not come out of solution (e.g. if additional equipment such as the steam dumps were to become available).

ATTACHMENT 1
QUESTIONS AND ANSWERS RESULTING FROM A FEBRUARY 23, 2006
CONFERENCE CALL

- 2) *Furthermore, a failure of one of the ADVs also indicates that RCS pressure may not be able to be reduced to less than 140 psia within 5.5 hrs (i.e. the cooldown is initiated at no later than one hr post-LOCA). As such, the licensee should provide analysis of alternate depressurization options to show that should one of the ADVs fail to open, use of the pressurizer PORVs, for example, would demonstrate success. This could be demonstrated by showing actuation of the PORVs and an RCS pressure less than 140 psia before 5.5 hours post-LOCA. The staff only mentions this option as an example of a potential success path. The licensee is requested to identify the alternate means for depressurizing the plant in the event one of the ADVs fails to open and demonstrate the success through an analysis (i.e. show RCS pressure can be reduced below 140 psia prior to 5.5 hrs) of the limiting break.*

Response;

Failure of one steam generator atmospheric dump valve (ADV) will not limit RCS depressurization as indicated. Additional analysis which assumes only one ADV shows that the RCS can be brought to 120 psia in less than the 5.5 hour time frame allotted. The 120 psia RCS pressure is chosen since at that head, the RHR pump(s) will start to deliver significant flow rate. Cut-in pressure is 140 psia. This is accomplished by increasing the steaming rate for the operable ADV at an appropriate time frame to adhere to the 100°F/hr cooldown rate (but within the capacity of the ADV). As shown in Figure 2-1, RCS pressure reaches 120 psia at approximately 15,400 seconds (4.3) hours.

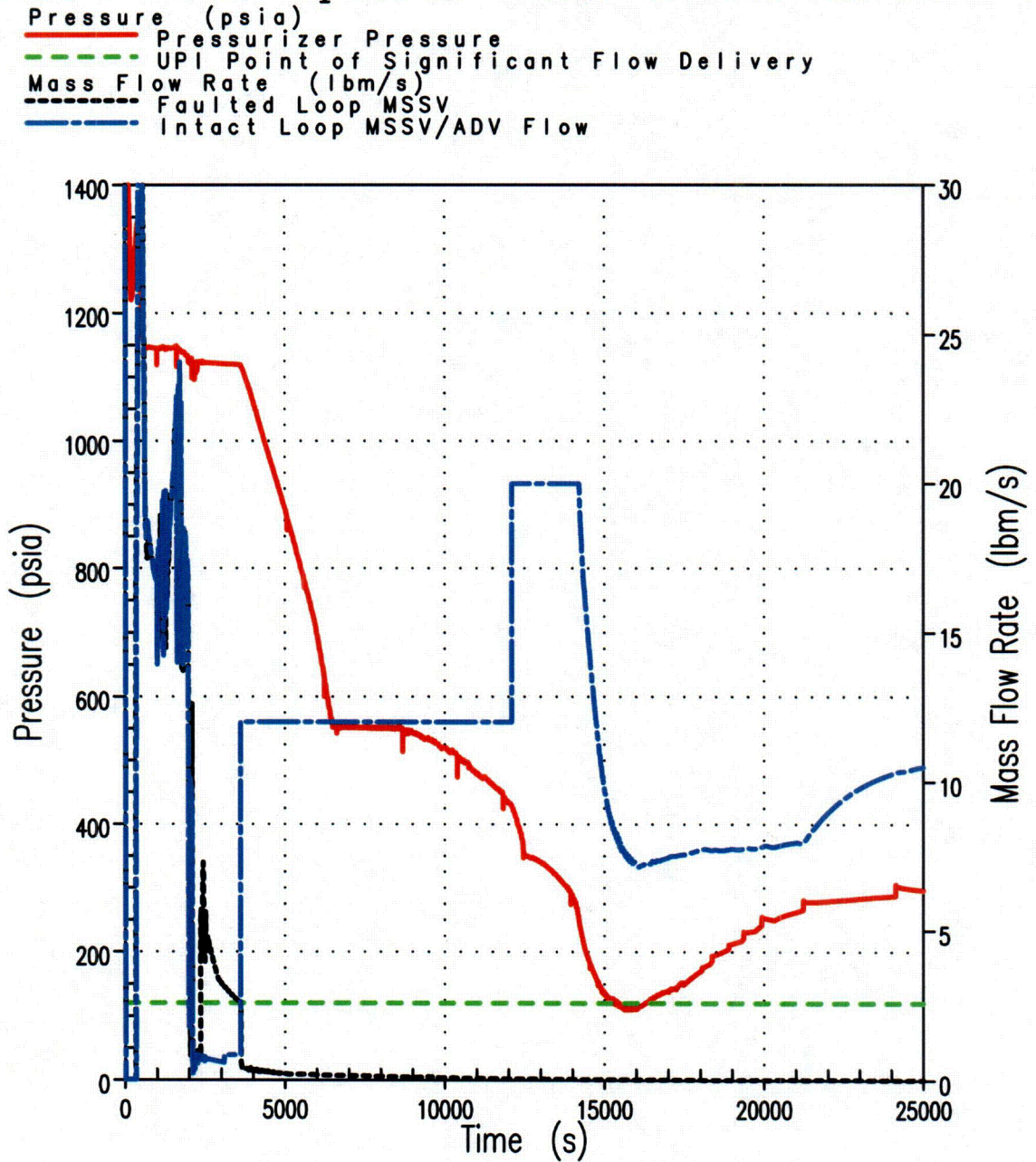
An alternative to the justification provided above, would be to use the pressurizer power operated relief valves (PORVs) to depressurize if the RCS did not respond by using the steam dump system or ADVs. To show this can be done, an additional case was executed assuming only one steam generator ADV, however, unlike the case shown in Figure 2-1, steam flow through the operable ADV was not increased at the appropriate time to maintain cooldown rate. It should be noted that in reality this would not be the case. The operations staff would continue to rely on the operable ADV for plant cooldown if the RCS still responded to changes in its steaming rate. However, for demonstration of the pressurizer PORV option, this was assumed not to occur. To show this, a time period in the single ADV case was chosen where RCS pressure/temperature did not decrease in a desired manner. Instead of increasing ADV steaming rate (which is what would actually occur), both pressurizer PORVs were opened. As shown in Figure 2-2, with the pressurizer PORVs open at 12,000 seconds (3.3 hours), the RCS reaches the point where significant UPI flow can be achieved at 17,500 seconds (4.9 hours). Figure 2-3 shows the flow rate of each of the two pressurizer PORVs.

It should be noted in this time frame, that time rate of change of RCS pressure is slow in a relative term. This is because the operable steam generator ADV and pressurizer PORVs are either under or close to critical flow conditions. This further reinforces the argument that no abrupt depressurization events can occur through either the steam generator ADVs or pressurizer PORVs thus RCS temperature remains high, promoting a very high boric acid solubility limit. In addition, a cautionary note will be added to ES-1.2 that, in the event the plant is not depressurized to less than the RHR injection pressure in 6.5 hours, the plant cooldown rate shall not exceed 100F/hr to assure boron will not come out of solution (e.g. if additional equipment such as the steam dumps should become available).

ATTACHMENT 1
QUESTIONS AND ANSWERS RESULTING FROM A FEBRUARY 23, 2006
CONFERENCE CALL

Figure 2-1

RGE 1.1 Inch Eq Break Cooldown with One SG ADV

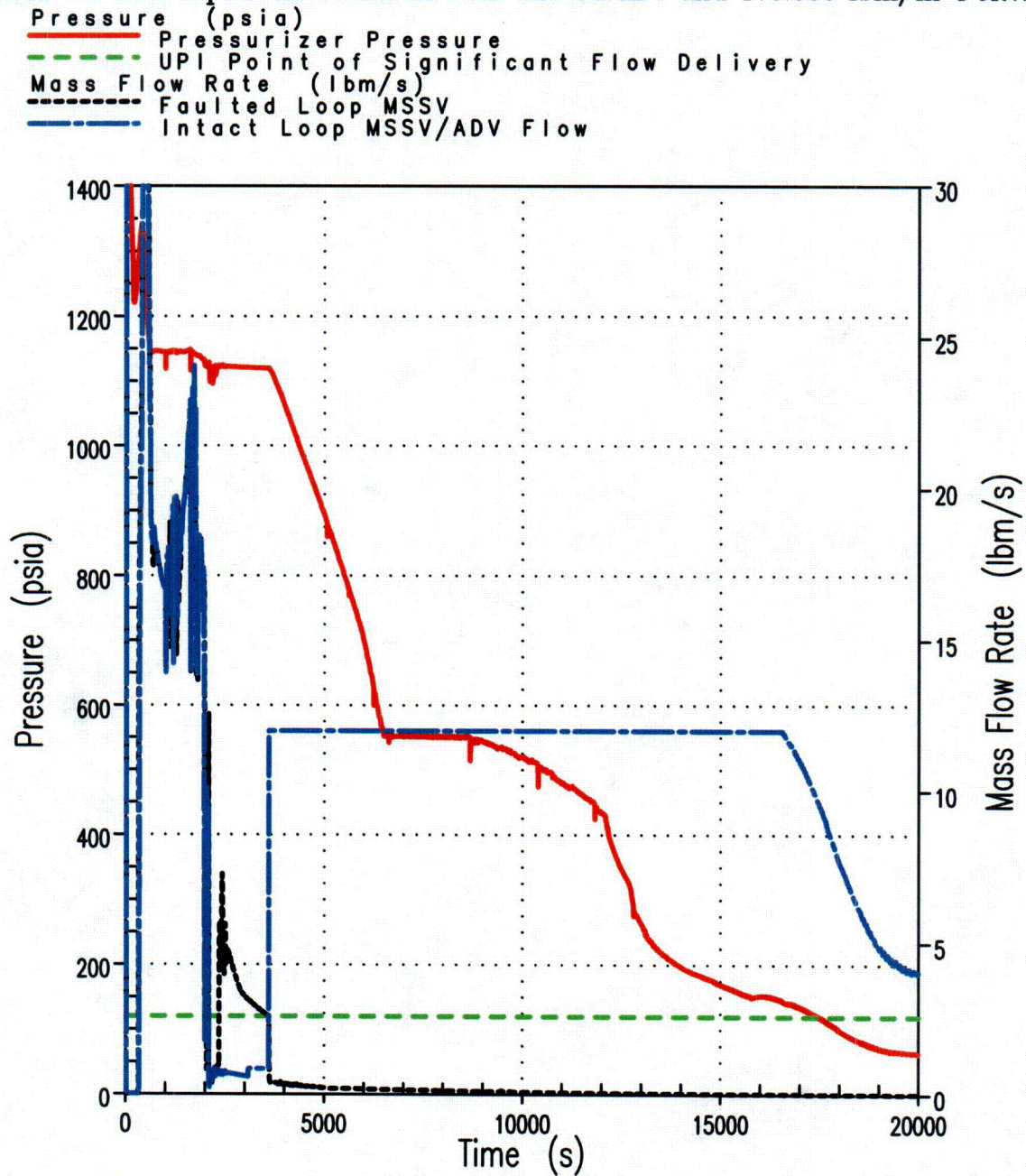


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ATTACHMENT 1
QUESTIONS AND ANSWERS RESULTING FROM A FEBRUARY 23, 2006
CONFERENCE CALL

Figure 2-2

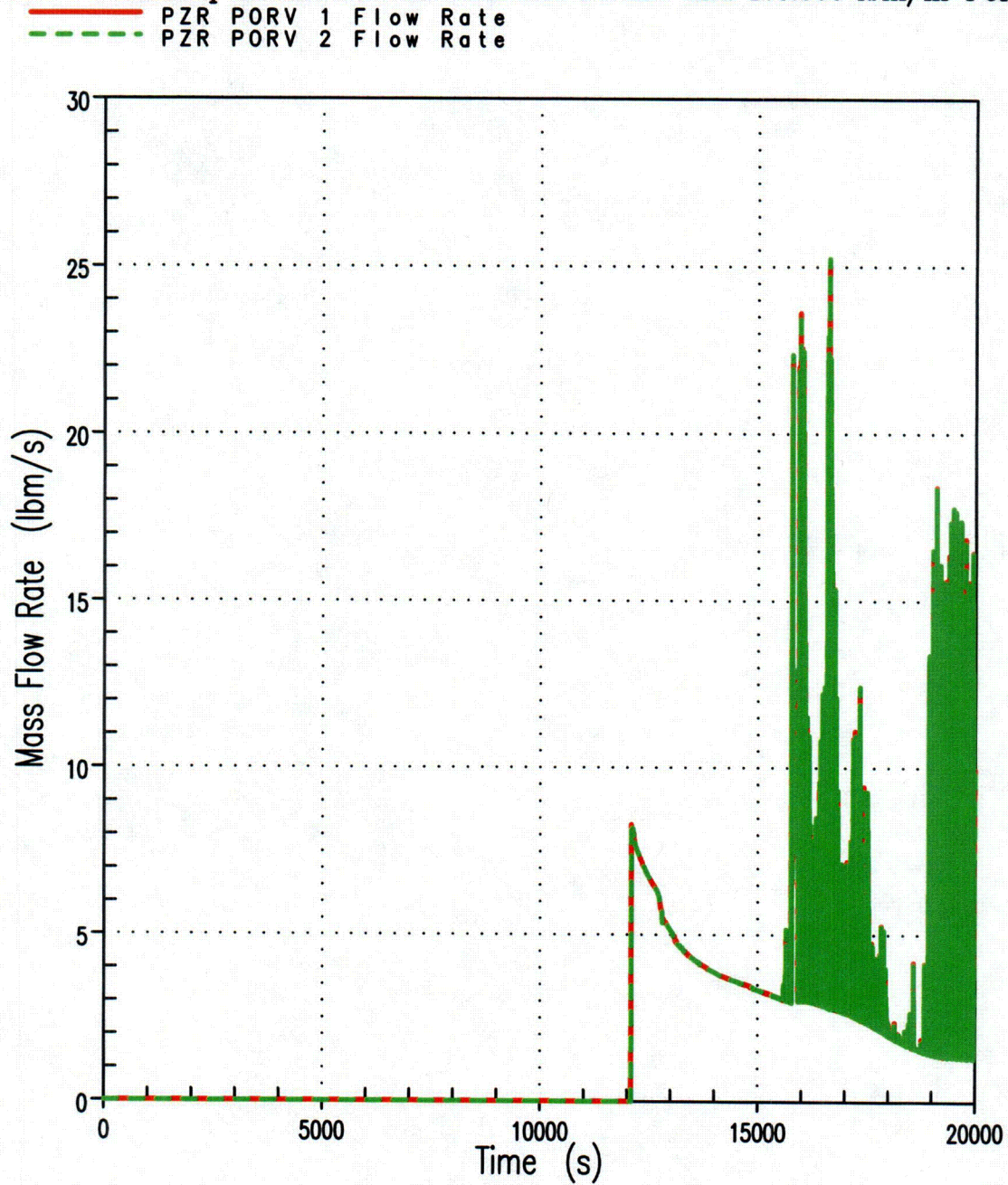
RGE 1.1 Inch Eq Break Cooldown with One SG ADV and 179,000 lbm/hr PORVs



ATTACHMENT 1
QUESTIONS AND ANSWERS RESULTING FROM A FEBRUARY 23, 2006
CONFERENCE CALL

Figure 2-3

RGE 1.1 Inch Eq Break Cooldown with One SG ADV and 179,000 lbm/hr PORVs



ATTACHMENT 1
QUESTIONS AND ANSWERS RESULTING FROM A FEBRUARY 23, 2006
CONFERENCE CALL

- 3) *Following an SBLOCA, the switch to recirculation needs to be performed. For those breaks where RCS pressure remains above the shutoff head of the LPI pump, a switch to recirculation results in a termination of HPSI for 10 -15 minutes, when the alignment is performed. At the request of the staff, analyses submitted by the licensee showed that for a range of small breaks, this interruption in ECC injection demonstrated that no core uncover occurred for a range of small breaks where RCS pressure remained above 140 psia. The staff notes that the analysis considered only breaks on the bottom of the discharge leg. Because of the unique ECC design for Ginna, the staff requests that licensee consider breaks on the side and top of the discharge leg. With the break on the side or top of the discharge leg, the loop seal region (suction leg piping) will contain large amounts of liquid, which will increase the loop pressure drop following an SBLOCA. This condition is expected to occur late following an SBLOCA when the recirculation alignment would be expected to be performed. With the break on the bottom of the discharge leg, recovery of the core during the long term shows that large amounts of liquid are contained in the upper plenum and hot leg regions late following an SBLOCA. As such, an interruption in the injection would not boil-off the large amounts of liquid present in the system for this break location to cause the core to uncover again. If the break is on the side or top of the discharge leg, water trapped in the loop seals create a larger steam pressure in the upper plenum (to drive the core decay steaming rate through the loop) depressing the two-phase level to near the top of the core. The core is expected to remain covered in this condition; however, less liquid is present above the core. The concern is that an interruption in ECC flow could cause the core to re-uncover and heat-up, since the lesser liquid inventory above the break may not be sufficient during the ECC interruption to preclude heat-up and excessive clad temperatures during the re-alignment. The licensee needs to perform an analysis of breaks on the top and side of the discharge leg to show that core uncover and excessive temperatures do not occur for these particular break locations. This issue surfaces during the EPU review because the Ginna NSSS has loop seals (suction leg piping) with a bottom elevation that is well below the top elevation of the core.*

Response;

Ginna LLC is confident that the time to align high head recirculation in a small break LOCA scenario is less than ten (10) minutes and will revise ES-1.3, Transfer to Cold Leg Recirculation, to further shorten the time during which high head injection will be stopped. The alignment evolution would likely occur more than one hour into the event. This would provide operators time to prepare for and brief the evolution. Training has and will continue to emphasize the need to minimize the time when injection is secured. The alignment evolution involves three sets of valves (RWST outlet valves, SI pump recirculation valves and RHR to SI pump suction valves), all operated remotely from the control room. Each set of valves takes less than one minute to operate. After the valves are repositioned, an SI pump is started. A realistic estimate for the time to accomplish the alignment evolution is less than five minutes. The ten minute time frame assumed in the analysis is bounding for the expected duration, with margin. The time to align high head recirculation will be validated as being less than ten (10) minutes during simulator training on small break LOCA scenarios prior to implementation of the EPU.

Ginna LLC will reply to the second portion of this question, that portion regarding the impact of break elevation on the analysis, at a later date as it involves proprietary information.

**ATTACHMENT 1
QUESTIONS AND ANSWERS RESULTING FROM A FEBRUARY 23, 2006
CONFERENCE CALL**

- 4) *Staff transient calculations show that precipitation occurs at about 4.5 hrs compared to the 6 hr and 13 minute precipitation time for the limiting LBLOCAs. The staff calculations utilized the same data the licensee utilized in the 6 plus hour calculated precipitation time. This precipitation timing difference needs to be resolved before final approval of the power uprate. It is noted that the staff model is a transient calculation that balances the loop pressure drop with the hydrostatic fluid balance between the downcomer and inner vessel region (including a detailed drift-flux model to compute the time varying mixture volume in the inner vessel). This model has been previously benchmarked against low pressure level swell data and was utilized in the AP1000 and Waterford EPU safety analysis reviews.*

Follow-up by email from Len Ward to Dave Fink on March 17, 2006.

My earlier precipitation time relative to your calc is due to the assumption that boiling in the core begins at the start of reflood. Since you delay boiling for the first 24 minutes your concentrations are much lower, and precipitation is much delayed. I calc a precipitation time of 6 hrs 15 minutes your assumption; this reproduces your calc for the LBLOCA. I do not agree with your assumption that the ECCS will terminate all boiling for the first 24 minutes following an LB LOCA; the vessel walls are 500 - 600 F and the core will contain large amounts of stored energy at the start of reflood. I would suggest you repeat your calc without this assumption. If you allow the core to boil at the start of reflood, you should expect to reach the precipitation limit of about 29.2 wt% at about 4.5 hrs. Can you recommend the realignment of HPSI at 4 hours? This is consistent with most of CE NSSS designs as they have switch times in the 4 hr time period at the higher power level or EPU conditions.

Response;

Ginna LLC does not assume boiling will not begin until 25 minutes after the break. Rather, we assume the injected SI provides sufficient core dilution flow even though there is boiling in the core. Since cold leg injection will not be terminated earlier than 24 minutes, that becomes our start time for the concentration calculation.

During the injection phase, with both cold leg high head (SI) flow and upper plenum injection (UPI) (RHR) flow, the liquid level in the core rises rapidly to the point where the liquid finds its way out the break. To demonstrate this we looked at a WCOBRA/TRAC run that modeled a hot leg break for the injection phase after a LOCA. The WCOBRA/TRAC core hydraulic model consists of four core channels each divided into 15 axial cells. The four core channels represent the hot assembly, two average power regions, and a low power (core periphery) region. For the purpose of this demonstration analysis, the data from the hot assembly and average power regions are combined and referred to as the 'high power channels' and the low power region is referred to as the 'low power channel.' The following observations were made;

1. From the beginning of reflood onward, there is significant liquid flow out the hot leg break (Figure 4-1).
2. After 100 seconds, UPI water travels down into the low power, outer core regions. At the same time there is significant upward flow in the center, high power core region (Figure 4-2). This indicates sufficient circulation such that the core and upper plenum are well mixed. These core flow patterns are consistent with those observed in the CCTF Core-II large scale tests (Runs 076 and 072) summarized in Reference 4-1.

ATTACHMENT 1
QUESTIONS AND ANSWERS RESULTING FROM A FEBRUARY 23, 2006
CONFERENCE CALL

3. With two high head pumps injecting in the cold leg, at 600 seconds, the safety injection flow to the cold leg is approximately two times the net core boiloff rate (Figure 4-3).

Because there are high amounts of liquid flow out the break, and because the core and upper plenum regions are well mixed, there is no potential for significant boric acid buildup in the core during the injection phase following a LOCA. Cold leg injected flow is much greater than boil-off during this time and this will also promote core dilution by forcing flow into the core region from the lower plenum. It is worth noting that the UPI/core region circulating flow patterns would occur with or without cold leg safety injection and as such the at-issue hot leg break boric acid buildup scenario would not seem to be credible.

In addition, although operators have adequate time by procedure to implement switchover sooner, there is the potential to challenge the available NPSH for the RHR pumps if the required switchover time is shortened unnecessarily. Ginna LLC therefore recommends maintaining the maximum allowed switchover time at 5.5 hours after securing SI for the large break scenario.

References:

- 4-1. Report by MPR Associates, Inc., CCFT-II Research Information Report For Tests Related To Upper Plenum Injection (UPI), MPR 933, March 1987.

ATTACHMENT 1
QUESTIONS AND ANSWERS RESULTING FROM A FEBRUARY 23, 2006
CONFERENCE CALL

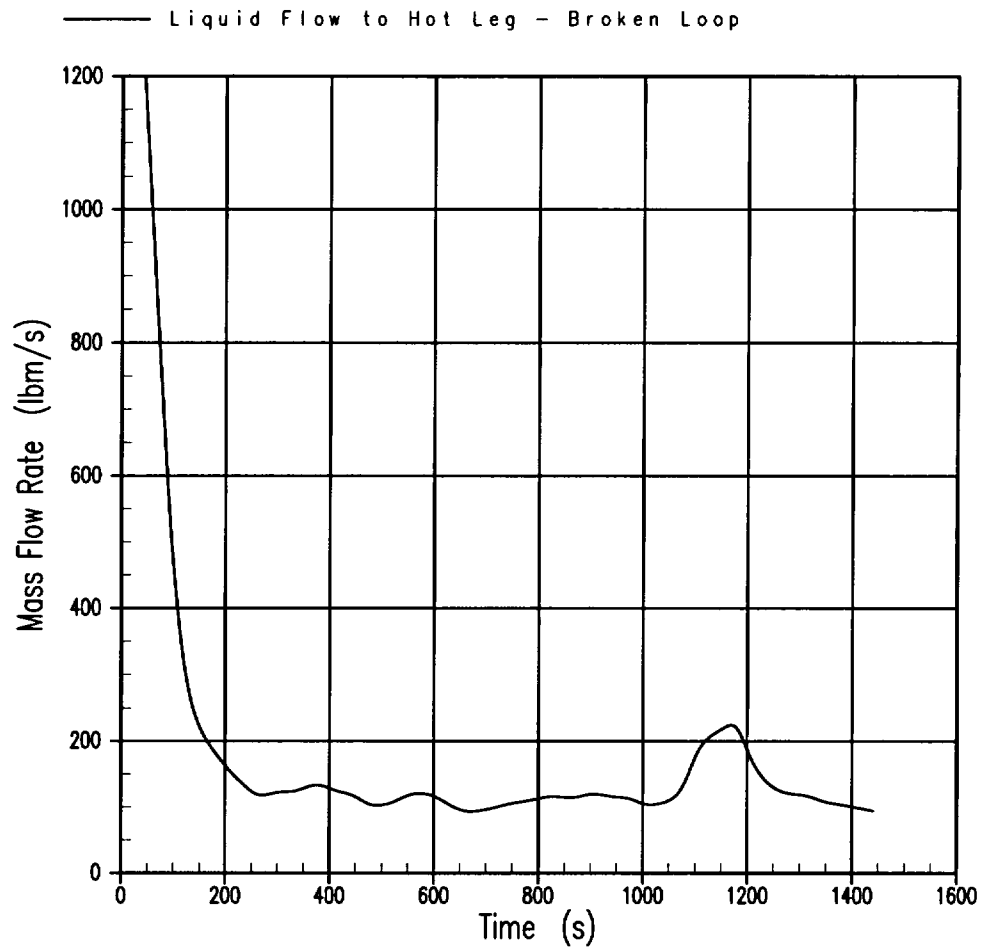


Figure 4-1 Broken Loop Hot Leg Liquid Mass Flow Rate

ATTACHMENT 1
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CONFERENCE CALL

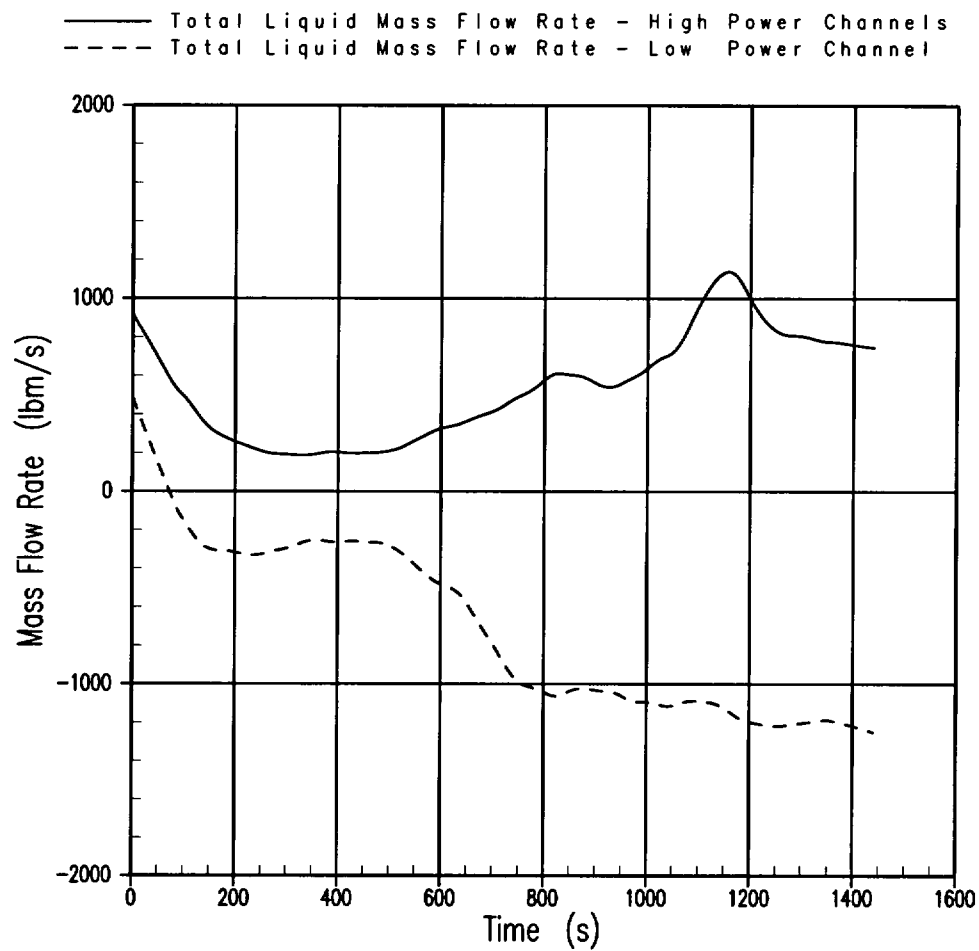


Figure 4-2 Axial Liquid Mass Flow Rate at Top of Core

ATTACHMENT 1
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CONFERENCE CALL

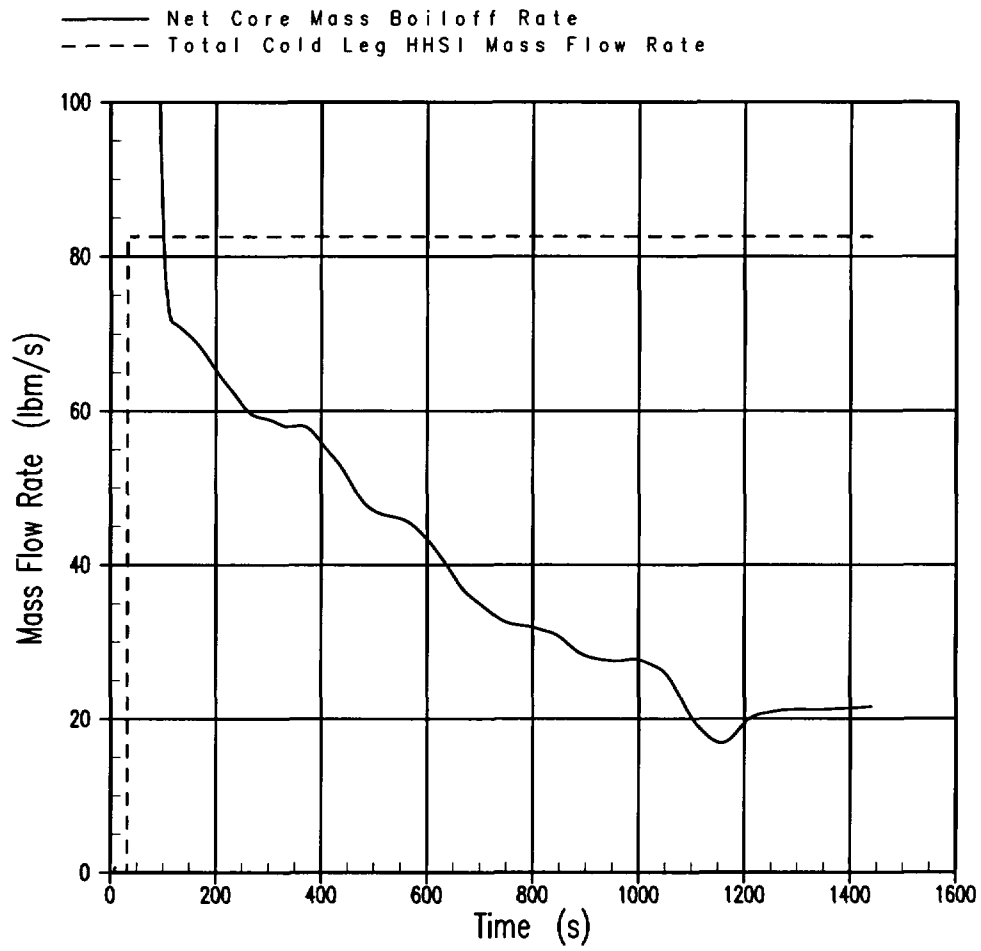


Figure 4-3 Core Boiloff Rate Compared to Cold Leg HHSI Injection Flow

ATTACHMENT 2
LIST OF REGULATORY COMMITMENTS

The following table identifies those actions committed to by R.E. Ginna Nuclear Power Plant, LLC in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

REGULATORY COMMITMENT	DUE DATE
Incorporate a cautionary note in ES-1.2, Post LOCA Cooldown and Depressurization, to state that RCS cooldown and depressurization must be commenced within one hour of the break occurring and completed (to less than the RHR injection pressure) within 6.5 hours of the break occurring in order to assure the assumptions in the long term cooling analysis are met. In addition, a cautionary note will be added to ES-1.2 that, in the event the plant is not depressurized to less than the RHR injection pressure in 6.5 hours, the plant cooldown rate shall not exceed 100F/hr to assure boron will not come out of solution (e.g. if additional equipment such as the steam dumps were to become available).	Prior to startup from the fall 2006 refueling outage.
Revise ES-1.3, Transfer to Cold Leg Recirculation, to assure that the time to align high head recirculation in a small break LOCA scenario is less than 10 minutes.	Prior to startup from the fall 2006 refueling outage.
Verify during small break LOCA training on the simulator that the time to commence depressurization is less than one hour, the plant is depressurized to less than 140 psia within 6.5 hours, and the time to align high head recirculation is less than ten (10) minutes.	Prior to startup from the fall 2006 refueling outage.