UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
Rochester Gas and Electric Corporation	)	Docket No. 50-244
(R.E. Ginna Nuclear Power Plant)	)	

APPLICATION FOR AMENDMENT TO OPERATING LICENSE

Pursuant to Section 50.90 of the regulations of the U.S. Nuclear Regulatory Commission (the "Commission"), Rochester Gas and Electric Corporation ("RG&E"), holder of Facility Operating License No. DPR-18, hereby requests that the Improved Technical Specifications set forth in Appendix A to that license be amended. This request for change in Improved Technical Specifications is to revise the description of the fuel rod cladding material (Specification 4.2.1) and to update the list of references provided in Specification 5.6.5. This change reflects improvements in fuel assembly material being installed at Ginna Station during the 1999 Refueling Outage and beyond.

A description of the amendment request, necessary background information, justification of the requested changes, and environmental impact considerations determination are provided in Attachment I. A safety evaluation with respect to the changes is provided as Attachment II. The no significant hazards consideration evaluation is provided as Attachment III. A marked up copy of the current Ginna Station Improved Technical Specifications which shows the requested changes is set forth in Attachment IV. The proposed revised Improved Technical Specifications are provided in Attachment V.

The evaluation set forth in Attachments I, II, and III demonstrate that the proposed changes do not involve a significant change in the types or a significant increase in the amounts of effluents or any change in the authorized power level of the facility. The proposed changes also do not involve a significant hazards consideration.

WHEREFORE, Applicant respectfully requests that Appendix A to Facility Operating License No. DPR-18 be amended in the form attached hereto as Attachment V.

Rochester Gas and Electric Corporation

By Robert C. Mecredy
Robert C. Mecredy
Vice President
Nuclear Operations Group

Subscribed and sworn to before me
on this 24th day of November, 1998

Christina K Sardou
Notary Public

CHRISTINA K. SARDOU
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Commission Expires October 19, 2000

Attachment I
R.E. Ginna Nuclear Power Plant

LICENSE AMENDMENT REQUEST
FUEL ASSEMBLY MATERIAL CHANGE

This attachment provides a description of the amendment request and necessary justification for the proposed changes. The attachment is divided into five sections as follows. Section A identifies all changes to the current Ginna Station Improved Technical Specifications while Section B provides the background and history associated with the changes being requested. Section C provides detailed justification for the proposed changes. An environmental impact consideration of the requested changes is provided in Section D. Section E lists all references used in Attachments I, II, and III.

A. DESCRIPTION OF AMENDMENT REQUEST

This License Amendment Request (LAR) proposes to revise Ginna Station Improved Technical Specifications to reflect a new fuel cladding description. The change is summarized below and shown in Attachments IV and V.

1. Specification 4.2.1, Fuel Assemblies

    i. The Design Features description will be revised in order to allow for the insertion of fuel rods clad with ZIRLO alloy in the Cycle 28 fuel assemblies and subsequent cycles. The specification is also being revised to clarify the requirements for the use of approved materials and methods.

2. Specification 5.6.5, Core Operating Limits Report (COLR)

    i. Item b, the reference listing of previously reviewed and approved analytical methods used to determine the core operating limits will be revised. New references have been added for the Loss of Coolant Accident (LOCA) Evaluation Models. These references are NRC approved topicals which describe the methodology used to support the analysis for the Heat Flux Hot Channel Factor in the Core Operating Limits Report as a consequence of using the ZIRLO material. Changes have also been made to update and clarify the reference list.

B. BACKGROUND

1. Introduction

Rochester Gas and Electric (RG&E) plans to insert Westinghouse fuel assemblies containing fuel rods, guide thimbles and instrumentation tubes fabricated with the advanced zirconium alloy material ZIRLO into the R. E. Ginna Nuclear Power Plant (Ginna) Cycle 28 core and beyond. ZIRLO alloy is used to obtain additional operational benefit from the alloy's improved corrosion resistance and dimensional stability under irradiation. RG&E made the transition to Westinghouse 14x14 Optimized Fuel Assembly (OFA) in Ginna in Cycle 14 as described in the submittal to the NRC dated December 20, 1983 and as approved by the NRC in the letter dated May 1, 1984. Ginna is currently operating in its 14th cycle with Westinghouse OFA fuel.

2. History

Westinghouse has developed a zirconium based alloy, known as ZIRLO, to enhance fuel reliability and achieve extended burnup. This alloy provides significant improvement in fuel rod, guide thimble tube, instrumentation tube and mid-span grid corrosion resistance and dimensional stability under irradiation. ZIRLO corrosion resistance has been evaluated in long-term, out-of-reactor tests over a wide range of temperatures. Additional tests have also been conducted in lithiated water environments.

The improved corrosion resistance of ZIRLO cladding under irradiation has also been demonstrated in reactor tests. Beginning in the early 1970s in the BR-3 Test Reactor Demonstration Program, fuel rods containing cladding fabricated from ZIRLO alloy were irradiated at linear power levels of up to 17 kW/ft to rod average burnups of 68 GWD/MTU (peak pellet burnups of approximately 80 GWD/MTU). Post-irradiation examinations have demonstrated that ZIRLO alloy exhibited a reduction in corrosion rate and improved dimensional stability as compared to Zircaloy-4 rods having similar power histories, which were irradiated as controls in the same assemblies.

Full-length ZIRLO rods were fabricated for a second demonstration program at the North Anna Unit 1 commercial reactor, with operation beginning in June 1987. The first post-irradiation examination of the assemblies was completed after 18 months of irradiation to a rod average burnup of over 21 GWD/MTU (complete in February 1989). Visual and dimensional inspection during refueling showed no abnormalities.

A conditional licensing approval for the use of this advanced alloy for cladding in two demonstration fuel assemblies for the North Anna Unit 1 reactor core was given in a NRC letter dated May 13, 1987. The NRC granted an exemption (reference 5) from the provisions of 10 CFR 50.46, 10 CFR 50.44 and 10 CFR 51.52 with respect to the use of the North Anna demonstration fuel assemblies with the advanced cladding material, ZIRLO. The information required to support the licensing basis for the implementation of the ZIRLO clad fuel rods in Ginna is given in References 3 and 6. These fuel assemblies will be utilized in Ginna, beginning with Cycle 28, which is scheduled to start in March of 1999.

3. Hardware Modifications

No other hardware changes other than those described above are required as a result of this Improved Technical Specification change.

C. JUSTIFICATION OF CHANGES

This section provides the justification for all changes described in Section A above and shown on Attachment IV. The justifications are organized based on whether the change is: more restrictive (M), less restrictive (L), administrative (A), or the requirement is relocated (R). The justifications listed below are also referenced in the technical specification(s) which are affected (see Attachment IV).

C.1 <u>Administrative</u>

1. Administrative Controls Section 5.6.5.b contains a reference list of previously NRC approved analytical methods used to determine core operating limits. This list will be updated as follows:

    1. WCAP-9272-P-A: remains applicable.

    2. WCAP-9220-P-A: no longer applicable, superseded by existing References 6, 7, 8, and 10, remove reference.

    3. WCAP-8385: remains applicable.

    4. WCAP-8567-P-A: no longer applicable, superseded by Reference 5, remove reference.

    5. WCAP-11397-P-A: remains applicable.

    6. WCAP-10054-P-A and WCAP-10081: remain applicable, add "A" to WCAP-10081.

7. WCAP-10924-P-A, Volume 1, Revision 1, Addenda 1, 2, 3: remains applicable.

8. WCAP-10924-P-A, Volume 2, Revision 2, and Addenda: remains applicable, specify "Addendum 1".

9. WCAP-10924-P-A, Rev. 2 and WCAP-12071: no longer applicable, superseded by Reference 8, remove.

10. WCAP-10924-P, Volume 1, Rev. 1, Addendum 4: remains applicable, add "A" to the designator and revise the date to "March 1991".

The changes to references 6, 8, and 10 are administrative in nature since the referenced documents have been previously reviewed and approved by the NRC. The changes only clarify the specific documents being referenced and do not cause any technical impact. The removal of references 2, 4, and 9 is being performed since these documents are no longer used for Ginna Station. Any analytical methods specified in these documents is addressed by an existing COLR reference such that there is no technical change.

2. Administrative Controls Section 5.6.5.b will be revised to add references to WCAP-13677-P-A and WCAP-12610-P-A for the Loss of Coolant Accident (LOCA) Evaluation Models. These references are topicals which describe the methodology used to support the analysis for the Heat Flux Hot Channel Factor in the Core Operating Limits Report with respect to the ZIRLO material. The change is a direct consequence of the changes described in section C.2 below and utilizes previously NRC approved documents.

3. Design Features Section 4.2.1 will be revised to provide clarification of the types of zirconium alloy filler rod material that have received previous NRC approval and to clarify that the application shall be NRC approved. It will also be revised to clarify that the analyses performed to verify compliance with the fuel safety design bases shall be cycle specific. These changes are considered administrative in that they clarify the NRC requirements associated with the control of reconstitution of fuel assemblies and are consistant with recent NRC approvals of similar LARs from other utilities.

C.2 Less Restrictive

1. Design Features Section 4.2.1 will be revised to include ZIRLO as an allowed cladding material for the fuel rods. The Ginna Improved Technical Specifications and COLR ensure that the plant operates in a manner that provides acceptable levels of protection for the health and safety of the public. The Technical Specifications are based upon assumptions made in the safety and accident analyses, including those relating to the core design. This ensures adequate margin to the regulated acceptance criteria for the accident analyses. Attachment II documents that the safety and accident analyses are not adversly impacted by use of ZIRLO material. Since it has been concluded that the core design parameters and assumptions utilized in the accident analyses are appropriate with consideration for the introduction of fuel rods fabricated with ZIRLO alloy, the conclusions in the Ginna UFSAR are valid. Therefore the regulated margin of safety as defined in the Bases of the Technical Specifications is not affected by the use of ZIRLO alloy in Ginna. This change is consistant with Standard Technical Specifications and has been previously approved at a number of other utilities.

There are no relocated (R) or more restrictive (M) changes associated with this LAR.

D. ENVIRONMENTAL IMPACT CONSIDERATION

RG&E has evaluated the proposed changes and determined that:

1. The changes do not involve a significant hazards consideration as documented in Attachment III;

2. The changes do not involve a significant change in the types or significant increase in the amounts of any effluents that may be released offsite since ZIRLO alloy is similar in chemical composition and has similar physical and mechanical properties as that of zircaloy and will not cause the core to operate in excess of design basis operating limits. Thus, clad integrity is maintained and the radiological consequences of accidents previously evaluated in the Ginna UFSAR have not increased; and

3. The changes do not involve a significant increase in individual or cumulative occupational radiation exposure since the impact of ZIRLO on plant radiation fields and primary coolant activity is negligible compared to that from other sources. Therefore, use of ZIRLO does not compromise the plant's continued compliance with 10 CFR 20.

Accordingly, the proposed changes meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental assessment of the proposed changes is not required.

E. REFERENCES

1. Letter from J. E. Maier (RG&E) to H. R. Denton (NRC), "Application for Amendment to OL, Westinghouse 14x14 Optimized Fuel for Cycle 14," December 20, 1983.

2. Letter from D. M. Crutchfield (NRC) to R. W. Kober (RG&E), "Use of Westinghouse Optimized Fuel Assembly (OFA) as Reload Fuel," Docket No. 50-244, Amendment No. 61 to Provisional Operating License No. DPR-18, May 1, 1984.

3. "Use of Fuel with Zirconium-Based (Other than Zircaloy) Cladding (10 CFR 50.44, 50.46, and Appendix K to Part 50)," Federal Register, Vol. 57, No. 169, Rules and Regulations, pg. 39353 and 39355, August 31, 1992.

4. "Technical Specifications, R. E. Ginna Nuclear Power Plant," Docket No. 50-244, as amended through Amendment No. 72.

5. "Safety Evaluation by the Office of Nuclear Regulation Related to Amendment No. 94 Facility Operating License No. NPF-4 Virginia Electric and Power Company Old Dominion Electric Cooperative North Anna Power Station, Unit No. 1," Docket No. 50-338, May 13, 1987.

6. Davidson, S. L (Ed.), "VANTAGE + Fuel Assembly Reference Core Report," WCAP-12610-P-A, April 1995.

7. Weiner, R. A., et al., "Improved Fuel Rod Performance Models for Westinghouse Fuel Rod Design and Safety Evaluations," WCAP-10851-P-A (Proprietary), August 1988.

8. Davidson, S. L. (Ed.), et al., "Extended Burnup Evaluation of Westinghouse Fuel," WCAP-10125-P-A (Proprietary), December 1985.

9. Kersting, P. J., et al., "Assessment of Clad Flattening and Densification Power Spike Factor Elimination in Westinghouse Nuclear Fuel," WCAP-13589-A, March 1995.

10. "R. E. Ginna Nuclear Power Plant Updated Final Safety Analysis Report," Docket No. 50-244, Revision 14.

11. Spaargaren, J. S., "10 CFR 50.46 Evaluation Model Report: WCOBRA/TRAC Two-Loop Upper Plenum Injection Model Updates to Support ZIRLO™ Cladding Option," WCAP-13677-P-A, February 1994.

12. Dederer, S. I., et al., "R. E. Ginna WCOBRA/TRAC Best-Estimate Large Break Loss-of-Coolant Accident Analysis Engineering Report," WCAP-14427, May 1995.

13. Bordelon, F. M., et al., "LOCTA-IV Program: Loss-of-Coolant Transient Analysis," WCAP-8301 (Proprietary) and WCAP-8305 (Non-Proprietary), June 1974.

14. Letter from S. M. Ira (Westinghouse) to J. Widay (RG&E), "Rochester Gas and Electric Corporation, R. E. Ginna Nuclear Station, 10 CFR 50.46 Annual Notification and Reporting for 1997," RGE-98-206, February 27, 1998.

15. Davidson, S. L. (Ed.), et al., "Westinghouse Reload Safety Evaluation Methodology," WCAP-9272-P-A (Proprietary), July 1985.

16. White, D. W. and Schoff, R. R., "Small Break Loss-of-Coolant Accident Engineering Report for the R. E. Ginna Fuel Upgrade and Steam Generator Replacement," WCAP-14426, June 1995.

SAFETY EVALUATION

1.0 Previous Irradiation Experience

Fuel rods fabricated with ZIRLO cladding have been previously irradiated in a foreign reactor (BR-3 reactor) at linear power levels up to 17 kW/ft, and to rod average burnups of 68 GWD/MTU (peak pellet burnups of approximately 80 GWD/MTU) which are significantly greater than those planned for the Ginna fuel assemblies. Corrosion and hydriding data obtained on the ZIRLO cladding were compared with the reference Zircaloy-4 cladding of fuel rods irradiated as controls in the same test assemblies. Based on the irradiation results of the test assemblies in the foreign reactor, the Ginna ZIRLO cladding waterside corrosion and hydriding will be significantly less than that expected for the Zircaloy-4 clad fuel rods. The irradiation test results substantiate a lower clad irradiation growth ($\Delta L/L$) and creepdown for the ZIRLO cladding compared to Zircaloy-4 cladding.

Full-length ZIRLO rods were fabricated for a second demonstration program at the North Anna Unit 1 commercial reactor, with operation beginning in June 1987. The first post-irradiation examination of the assemblies was completed after 18 months of irradiation to a rod average burnup of over 21 GWD/MTU (complete in February 1989). Visual and dimensional inspection during refueling showed no abnormalities.

Irradiation results are considered in the design of the fuel rods with ZIRLO cladding to assure that all fuel rod design bases are satisfied for the planned irradiation life of the Ginna fuel assemblies. Table 1 lists the ZIRLO irradiation experience through 1997.

2.0 Chemical/Mechanical Properties

The chemical composition (Appendix A of Reference 6) of the fuel rods fabricated with ZIRLO alloy in the Ginna fuel assemblies is similar to Zircaloy-4 except for slight reductions in the content of Tin (Sn) and Iron (Fe), and the elimination of Chromium (Cr). ZIRLO alloy also contains a nominal amount of Niobium (Nb). These small composition changes are responsible for the improved corrosion resistance compared to standard Zircaloy-4 and improved Zircaloy-4. The physical and mechanical properties of ZIRLO alloy are better than Zircaloy-4 alloy while in the same metallurgical phase. However, the temperatures at which the metallurgical phase changes occur are different for Zircaloy-4 and ZIRLO alloys (Appendix A of Reference 6). These differences are considered in the evaluations discussed below for cladding behavior under non-LOCA and LOCA conditions. Further aspects of the ZIRLO cladding performance under LOCA conditions are given in References 6 and 11. Evaluations are performed using the NRC approved fuel rod performance model to verify that the fuel rod design bases and design criteria are met for assemblies containing ZIRLO clad fuel rods. The fuel rod design bases, criteria and models, which are affected by the use of ZIRLO cladding are described in Reference 6.

3.0 Impact on Radiological Analyses

Westinghouse has reviewed the changes to the Reactor Coolant System (RCS) Radiochemistry due to the use of ZIRLO cladding. The review indicated that the impact of ZIRLO on plant radiation fields and primary coolant activity is negligible compared to that from other sources. Therefore, use of ZIRLO does not compromise the plant's continued compliance with 10 CFR 20.

4.0 Neutronic Performance

The design and predicted nuclear characteristics of fuel rods with ZIRLO alloy are similar to those of the Westinghouse 14x14 OFA design. The evaluations have shown that the nuclear design bases are satisfied for fuel rods fabricated with ZIRLO alloy and that the use of ZIRLO alloy will not affect the standard nuclear design analytical models and methods to accurately describe the neutronic behavior of fuel rods with ZIRLO alloy. The safety limit characteristics of the Westinghouse 14x14 OFA fuel design are not affected for the 14x14 VANTAGE + fuel with ZIRLO clad fuel rods.

5.0 Thermal-Hydraulic Performance

The thermal-hydraulic design bases for fuel rods fabricated with ZIRLO alloy are identical to those of the Westinghouse 14x14 OFA design. Since the use of the ZIRLO alloy does not cause changes affecting the parameters which are major contributors in this area (i.e., DNB, core flow, rod bow and fuel rod census results), the design bases of the Westinghouse 14x14 OFA design remain valid for the 14x14 VANTAGE + fuel with ZIRLO clad fuel rods.

6.0 Cladding Performance Under Non-LOCA Conditions

The two non-LOCA accidents potentially affected by the use of ZIRLO clad fuel rods are the Locked Rotor/Shaft Break and Rod Cluster Conrol Assembly (RCCA) Ejection Accidents. For the Locked Rotor/Shaft Break Accident, it was determined that the ZIRLO cladding results in a very small increase in peak clad temperature (PCT). However, the effect on the metal-to-water reaction rate is negligible when compared to Zircaloy-4. A small PCT increase does not invalidate the results of the Ginna safety analysis for this event. For the RCCA Ejection Accident, the ZIRLO cladding results in a negligible benefit in both the fraction of fuel melting at the hot spot, and the fuel peak stored energy when compared to the results for Zircaloy-4. Thus, the conclusions in the Ginna UFSAR for the two affected non-LOCA accidents remain valid.

7.0 Cladding Performance Under LOCA Conditions

The Loss-Of-Coolant Accident (LOCA) analyses addressing the use of Westinghouse 14x14 OFA fuel in Ginna were performed using the UPI SECY WCOBRA/TRAC Evaluation Model (Large Break LOCA) and NOTRUMP Evaluation Model (Small Break LOCA), and the summary results of these analyses were submitted to the NRC in 1995. Modifications to those evaluation models for use in the analyses of fuel with ZIRLO cladding have been identified and reported in References 6 and 11. The modifications include changes to incorporate the effects of ZIRLO cladding specific heat, high temperature creep (swelling), burst temperature, burst strain and assembly blockage.

7.1 Evaluation Methodology

References 11 and 6 describe modifications to the UPI SECY WCOBRA/TRAC Large Break LOCA and NOTRUMP Small Break LOCA Evaluation Models, respectively, necessary to model ZIRLO clad fuel. For Ginna, these modified Evaluation Models were utilized to demonstrate continued conformance to the Acceptance Criteria of 10 CFR 50.46 for a postulated Large and Small Break LOCA with a core containing ZIRLO clad fuel.

To determine the effects of ZIRLO cladding on the Large Break LOCA analysis results, a calculation was performed using UPI SECY WCOBRA/TRAC in which the cladding material was modeled as ZIRLO, instead of Zircaloy-4 as was modeled in the analysis of record performed in 1995. This sensitivity calculation is used as the basis for the safety assessment for ZIRLO cladding. Also, since the Ginna core contains 100 psig backfill Integral Fuel Burnable Absorbers (IFBA), an evaluation must be performed each cycle to confirm that IFBA remains non-limiting for ZIRLO cladding, as was shown previously for the Zircaloy-4 cladding. Section 7.2 summarizes the results of the Large Break LOCA assessment with ZIRLO clad fuel.

In Small Break LOCA, the hydraulic transient determines the most limiting peak clad temperature. It was judged in Reference 6 that the cladding differences between Zircaloy-4 and ZIRLO have a small effect on the core average fuel rod modeled in the NOTRUMP calculation. Since there is only a small effect on the core average fuel rod performance, the effect on the thermal-hydraulic response of the reactor coolant system would be insignificant. Therefore, only the LOCTA-IV computer code, which incorporates the code modifications described in Reference 6, was utilized for the Ginna ZIRLO cladding safety assessment. Section 7.3 summarizes the results of the Small Break LOCA assessment with ZIRLO clad fuel.

7.2 Large Break Evaluation

The Large Break LOCA analysis for 14x14 OFA fuel, as presented in the Ginna analysis performed in 1995, identifies a calculated peak clad temperature (PCT) of 2051°F for the limiting Appendix K calculation, which models the minimum time for the interruption of the safety injection and a vessel average temperature of 559°F (low T_{avg}). The results of this calculation have been updated by assessments for the effects of model changes, reported annually pursuant to the requirements of 10 CFR 50.46, and by various evaluations performed under 10 CFR 50.59. The overall Large Break LOCA PCT, including the effects of 10 CFR 50.46 assessments and other evaluations is 2097°F for the limiting low T_{avg} calculation.

An assessment of the effect of ZIRLO cladding on the Large Break LOCA was performed. A sensitivity to the low T_{avg} UPI SECY WCOBRA/TRAC calculation was performed in which the cladding was modeled as ZIRLO instead of Zircaloy-4, which is the cladding material modeled in the 1995 analysis. The results of the sensitivity show that for Ginna, the cladding material has a negligible effect on the results. Since the material properties of ZIRLO are different than those of Zircaloy-4, an evaluation was also performed to determine the effect of ZIRLO 100 psig backfill IFBAs, when compared with ZIRLO non-IFBA rods, as was done for the Zircaloy-4 cladding. It was shown that non-IFBA remains limiting for ZIRLO cladding, as was seen with the Zircaloy-4 cladding. Therefore, the effect of modeling ZIRLO clad fuel on the Large Break LOCA PCT is a 0°F change.

The overall PCT, including the effects of 10 CFR 50.46 assessments and other evaluations remains at 2097°F, which is below the 10 CFR 50.46 Acceptance Criterion of 2200°F. The maximum local metal-water reaction is less than 17 percent, and the total core metal-water reaction is less than 1.0 percent. The temperature transient is terminated at a time when core geometry is still amenable to cooling. As a result, the core temperature will continue to drop and the ability to remove decay heat generated in the fuel for an extended period of time will be provided. Therefore, the 10 CFR 50.46 Acceptance Criteria continues to be satisfied for the Ginna Large Break LOCA with ZIRLO cladding.

7.3 Small Break Evaluation

The Small Break LOCA analysis for 14x14 OFA fuel, as presented in the Ginna analysis performed in 1995, identifies a calculated peak clad temperature (PCT) of 1308°F for the limiting case, which models a 4-inch break and a vessel average temperature of 573.5°F (high T_{avg}). The results of this calculation have been updated by assessments for the effects of model changes, reported annually pursuant to the requirements of 10 CFR 50.46, and by the various evaluations performed under 10 CFR 50.59. The overall Small Break LOCA PCT, including effects of 10 CFR 50.46 assessments and other evaluations is 1333°F for the limiting 4-inch break at high T_{avg}.

An assessment of the effect of ZIRLO cladding on the Small Break LOCA was performed. A sensitivity to the case with the limiting 4-inch break at high T_{avg} was performed in which the rod heatup calculation was run with ZIRLO material properties, and the results compared with the original calculation performed with Zircaloy-4 cladding. The effect of the cladding material on the PCT results was negligible for Ginna, resulting in an effect of 0°F. Therefore, the overall PCT, including the effects of 10 CFR 50.46 assessments and other evaluations remains 1333°F, which is well below the 10 CFR 50.46 Acceptance Criterion of 2200°F. The maximum local metal-water reaction is less than 17 percent, and the total core metal-water reaction is less than 1.0 percent. The temperature transient is terminated at a time when core geometry is still amenable to cooling. As a result, the core temperature will continue to drop and the ability to remove decay heat generated in the fuel for an extended period of time will be provided. Therefore, the 10 CFR 50.46 Acceptance Criteria continues to be satisfied for the Ginna Small Break LOCA with ZIRLO cladding.

8.0 Conclusion

The Ginna Station Improved Technical Specifications ensure that the plant operates in a manner that provides acceptable levels of protection for the health and safety of the public. The Technical Specifications are based upon assumptions made in the safety and accident analyses, including those relating to the core design. This ensures adequate margin to the acceptance criteria for the accident analyses. Since it has been concluded that the core design parameters and assumptions utilized in the accident analyses are appropriate with consideration for the introduction of fuel rods fabricated with ZIRLO alloy, the conclusions in the Ginna UFSAR are valid. Therefore the margin of safety as defined in the bases of the Technical Specifications is not affected by the use of ZIRLO alloy in Ginna.

From the evaluation presented above, it is concluded that the use of the fuel assemblies, containing fuel rods fabricated with ZIRLO alloy, in the Ginna Cycle 28 and beyond design does not result in the acceptable safety limits for any incident being exceeded.

Table 1
ZIRLO Fuel Irradiation Experience

ZIRLO Features	Through '97		
	Number of Plants with Full Regions	Number of Assemblies (Includes LTAs)	Number of Full Regions
Cladding	30	3622	51
Guide Thimbles & Instrumentation Tubes	26	3279	46
Mid-grids / IFMs	21	2443	33

SIGNIFICANT HAZARDS CONSIDERATION EVALUATION

The proposed changes to the Ginna Station Improved Technical Specifications as identified in Attachment I Section A and justified by Section C have been evaluated with respect to 10 CFR 50.92(c) and shown not to involve a significant hazards consideration as described below. This attachment is organized based on Attachment I Section C.

Evaluation of Administrative Changes

The administrative changes discussed in Attachment I Section C.1 do not involve a significant hazards consideration as discussed below:

1. Operation of Ginna Station in accordance with the proposed changes does not involve a significant increase in the probability or consequences of an accident previously evaluated. The proposed changes revise Administrative Controls Section 5.6.5.b to update the references to NRC approved documents which support the analysis for the Heat Flux Hot Channel Factor in the Core Operating Limits Report and to provide clarification to the currently applicable methodology. It revises the Design Features Section 4.2.1 to provide clarification of the types of zirconium alloy filler rod material that have received previous NRC approval and to clarify that the application shall be NRC approved. Section 4.2.1 is revised to clarify that the analyses performed to verify compliance with the fuel safety design bases shall be cycle specific. As such, these changes are administrative in nature and do not impact initiators or analyzed events or assumed mitigation of accident or transient events. Therefore, these changes do not involve a significant increase in the probability or consequences of an accident previously analyzed.

2. Operation of Ginna Station in accordance with the proposed changes does not create the possibility of a new or different kind of accident from any accident previously evaluated. The proposed administrative changes do not affect the manner by which the plant is operated and no new equipment will be installed. The proposed administrative changes will not impose any new or different requirements. All original design and performance criteria continue to be met, and no new failure modes have been created for any system, component, or piece of equipment. Thus, these changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Operation of Ginna Station in accordance with the proposed changes does not involve a significant reduction in a margin of safety. The proposed changes will not reduce a margin of plant safety because the methodology has been shown to meet all applicable design criteria and ensure that all pertinent licensing basis acceptance criteria are met. As such, no question of safety is involved, and the changes do not involve a significant reduction in a margin of safety.

Based upon the above information, it has been determined that the proposed changes to the Ginna Station Improved Technical Specifications do not involve a significant increase in the probability or consequences of an accident previously evaluated, does not create the possibility of a new or different kind of accident previously evaluated, and does not involve a significant reduction in a margin of safety. Therefore, it is concluded that the proposed changes meet the requirements of 10 CFR 50.92(c) and do not involve a significant hazards consideration.

Evaluation of Less Restrictive Changes

The less restrictive change discussed in Attachment I Section C.2 does not involve a significant hazards consideration as discussed below:

1) Operation of Ginna Station in accordance with the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated. The Westinghouse 14x14 VANTAGE + fuel assemblies containing fuel rods fabricated with ZIRLO alloy meet the same fuel assembly and fuel rod design bases as Westinghouse 14x14 OFA fuel assemblies in the other fuel regions. In addition, the 10 CFR 50.46 criteria will be applied to the fuel rods fabricated with ZIRLO alloy. The use of these fuel assemblies will not result in a change to the proposed Ginna Westinghouse 14x14 OFA reload design and safety analysis limits. The ZIRLO alloy is similar in chemical composition and has similar physical and mechanical properties as that of Zircaloy-4. Thus the cladding integrity is maintained and the structural integrity of the fuel assembly is not affected. The ZIRLO clad fuel rods improve corrosion resistance and dimensional stability. The use of ZIRLO does not impact the radiological consequences of accidents previously evaluated in the Safety Analysis. The RCS isotopic inventory is negligibly impacted, therefore changes in postulated releases from the RCS or the secondary systems are negligible. Assumptions of fuel melting in the radiological analyses are not based on the type of fuel cladding. For those accidents where fuel melting is postulated to occur (control rod ejection, locked [seized] RCP rotor), the amount of fuel undergoing melting and clad damage using ZIRLO clad is bounded by the current values used in the Safety Analysis. Therefore, the probability or consequences of an accident previously evaluated is not significantly increased.

2) Operation of Ginna Station in accordance with the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated. The Westinghouse 14x14 VANTAGE + fuel assemblies containing fuel rods fabricated with ZIRLO alloy will satisfy the same design bases as that used for Westinghouse 14x14 OFA fuel assemblies in the other fuel regions. Since the original design criteria is being met, the fuel rods fabricated with ZIRLO alloy will not be an initiator for any new accident. All design and performance criteria will continue to be met and no new single failure mechanisms have been created. In addition, the use of these fuel assemblies does not involve any alterations to plant equipment or procedures which would introduce any new or unique operational modes or accident precursors. Therefore, the possibility for a new or different kind of accident from any accident previously evaluated is not created.

3) Operation of Ginna Station in accordance with the proposed change does not involve a significant reduction in a margin of safety. The Westinghouse 14x14 VANTAGE + fuel assemblies containing fuel rods fabricated with ZIRLO alloy do not change the proposed Ginna Westinghouse 14x14 OFA reload design and safety analysis limits. The use of these fuel assemblies containing fuel rods fabricated with ZIRLO alloy will take into consideration the normal core operating conditions allowed in the Technical Specifications. For each cycle reload core, these fuel assemblies will be specifically evaluated using approved reload design methods and approved fuel rod design models and methods as specified in Technical Specifications. This will include consideration of the core physics analysis peaking factors and core average linear heat rate effects. In addition, the 10 CFR 50.46 criteria will be applied each cycle to the fuel rods fabricated with ZIRLO alloy. Analyses or evaluations will be performed each cycle to confirm that 10 CFR 50.46 will be met. Therefore, the margin of safety as defined in the Bases to the Ginna Technical Specifications is not significantly reduced.

Based upon the preceding information, it has been determined that the proposed change, amending the fuel rod clad material description to zircaloy or ZIRLO in the Technical Specifications Design Features Section 4.2.1 does not involve a significant increase in the probability or consequences of an accident previously evaluated, create the possibility of a new or different kind of accident from any accident previously evaluated, or involve a significant reduction in a margin of safety. Therefore, it is concluded that the proposed change to allow ZIRLO meets the requirements of 10 CFR 50.92(c) and does not involve a significant hazards consideration.