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,	)	
Unit No. 1)	)	

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 Provisional Operating License No. DPR-18, hereby requests that the Technical Specifications set forth in Appendix A to that license be amended. This request for a change in Technical Specifications is submitted as a result of analysis performed in designing Ginna fuel cycle 10. The new fuel being loaded in Cycle 10 includes four mixed oxide fuel assemblies.

The proposed technical specification change is set forth in Attachment A to this Application. A safety evaluation is set forth in Attachment B. This evaluation also demonstrates that the proposed change does 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. Justification for classification of the amendment pursuant to 10 C.F.R. Section 170.22 is included as Attachment C. A check for the appropriate fee accompanies this Application. Attachment D presents the Research, Demonstration, and Development Aspects of Proposed Use of Mixed Oxide Fuel Assemblies.

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

Rochester Gas and Electric Corporation

By L.D. White, Jr.

L.D. White, Jr.
Vice President,
Electric and Steam Production

Subscribed and sworn to before me on this 14TH day of December 1979.

Gary L. Reiss

GARY L. REISS
NOTARY PUBLIC, State of N.Y. Monroe Co.
My Commission Expires March 30, 1981

27231

12/26/79

NOTE TO: Mike Collins & Don Lanham, DSB (016)

FROM: Reba Diggs, License Fee Management Branch, ADM

SUBJECT: PROCESSING LETTERS WITH CHECKS RECEIVED DIRECTLY BY THE LICENSE FEE MANAGEMENT BRANCH

Please process the enclosed letter under the applicable docket and give the following distribution under code M008:

Original of ltr to Regulatory Docket File
Action Cy w/check to W. O. Miller, LFMB (L-233)
3 cys to applicable Branch of DOR or DPM
1 to LPDR
1 to PDR

I am retaining the check and the following information is for your records.

Check No.: 086765
Amount: $12,300—
Date: 12-12-79
Ltr. Date: 12-20-79
Applicant: Rochester Gas & Elec
Docket No: 50-244
Plant: Ginna 1

Thanks!

Sharon L. Custer
Reba M. Diggs for
License Fee Management Branch
Office of Administration

Attachment A

1. Replace page 5.3-1 with the enclosed replacement page.

5.3 Reactor Design Features

5.3.1 Reactor Core

a. The reactor core contains approximately 48 metric tons of uranium in the form of slightly enriched uranium dioxide pellets. The pellets are encapsulated in Zircaloy 4 tubing to form fuel rods. The reactor core is made up of 121 fuel assemblies. Each fuel assembly contains 179 fuel rods.(1)

b. The average enrichment of the initial core is a nominal 2.90 weight per cent of U-235. Three fuel enrichments are used in the initial core. The highest enrichment is a nominal 3.48 weight per cent of U-235.(2)

c. Reload fuel shall be similar in design to the initial core. The enrichment of reload fuel will be no more than 3.5 weight per cent of U-235 or its equivalent in terms of reactivity.

d. Burnable poison rods are incorporated in the initial core. There are 528 poison rods in the form of 8 and 12-rod clusters, which are located in vacant rod cluster control guide tubes.(3) The burnable poison rods consist of borated pyrex glass clad with stainless steel.(4)

e. There are 29 full-length RCC assemblies and 4 partial-length RCC assemblies in the reactor core. The full-

PROPOSED

Attachment B

The R. E. Ginna Nuclear Plant will be refueled in March 1980. The reload will consist of 36 fresh fuel assemblies, 32 of which will be supplied by Exxon Nuclear Corporation and 4 of which will be supplied by Westinghouse Electric Corporation. The balance of the core load, 85 previously exposed assemblies, is comprised of 13 Region 9 assemblies fabricated by Westinghouse and 72 assemblies fabricated by Exxon. The 32 fresh Exxon assemblies have an enrichment of 3.45 w/o while the 4 fresh Westinghouse assemblies are mixed oxide assemblies designed to be equivalent to a 3.10 w/o uranium oxide assembly.

The fuel rod and fuel assembly designs of the Exxon assemblies are identical to previous reloads, including the Cycle 8 reload which was reviewed and approved by the NRC in license amendment 19, dated May 1, 1978. The fuel rod and fuel assembly design of the Westinghouse mixed oxide fuel assemblies is described in the enclosed report, "Fuel and LOCA Evaluation of R. E. Ginna Mixed Oxide Fuel Assemblies". As described in that report, the assembly mechanical design is identical to the Westinghouse assemblies previously employed, including Region 9 fuel. Thus, compatibility between these Westinghouse assemblies and the Exxon fuel is assured and has been approved by the NRC in amendment 19.

The core loading pattern and analysis has been performed by Exxon. The nuclear design and an assessment of the plant transients analyses are described in the enclosed Exxon report, "R. E. Ginna Nuclear Plant Cycle 10 Safety Analysis Report with Mixed Oxide Assemblies."

The Exxon report demonstrates that all transients are bounded by the previous reference analysis. The reference analysis, "Plant Transient Analysis for the R. E. Ginna Unit No. 1 Nuclear Power Plant" XN-NF-77-40, Rev. 1, dated July 3, 1979 is enclosed for NRC information. Revision 1 incorporated a change in the Cycle 9 boron worth and demonstrated that previously approved margins were not decreased.

The core analysis has been performed with the mixed oxide composition which exists at the time of plant startup. It has been recognized and carefully considered that the composition of the material changes from the time of initial reprocessing to time of use, including the decay of Pu^{241} to Am^{241}. It is of interest to compare the Pu loading at the beginning of Cycle 10 with the Pu currently in the reactor. The four mixed oxide fuel assemblies have approximately 47.2 kg of Pu. At the end of Cycle 9, the total Pu inventory in the reactor will be approximately 285 kg. At the beginning of Cycle 10, the Pu inventory of the 117 uranium assemblies in the reactor will be approximately 170 kg. Thus, it can be seen that the standard "all uranium core" has a significant quantity of Pu and that the addition of the four mixed oxide assemblies attributes about 29% of the total Pu loading at the beginning of Cycle 10. Hence, it is the fact that the Pu is fabricated into four discrete assemblies rather than the total quantity which is of significance.

The report prepared by Exxon addresses all transients which may be limiting except the evaluation of the loss of coolant accident (LOCA). The LOCA evaluation has been performed by

Westinghouse and is presented in the Westinghouse report, "Fuel and LOCA Evaluation of R. E. Ginna Mixed Oxide Fuel Assemblies". By comparison, it is concluded that the results for the mixed oxide fuel assemblies will be bounded by results previously obtained for Westinghouse uranium assemblies. When it is noted that the mixed oxide fuel assemblies will be located on the core periphery for their first fuel cycle and will operate at an assembly power which is below core average power and substantially below licensed relative power, it becomes apparent that significant margin to the limits of 10CFR50.46 is being afforded for these assemblies.

Upon receipt at Ginna Station the mixed oxide fuel assemblies will be unloaded from the shipping containers, inspected for shipping damage and inserted into storage locations in the spent fuel pool pending loading into the core. An analysis has, therefore, been performed to assure that the spent fuel pool evaluation previously performed remains valid. The only difference from the previous analysis, which was submitted on January 30, 1976 with NRC approval issued with license amendment 11 dated November 15, 1976 is the neutronics evaluation. Therefore, the attached report, prepared by Pickard, Lowe and Garrick, Inc. (PLG) and entitled "Addendum to Criticality Analyses for the Ginna Nuclear Plant Fuel Storage Racks to Address the Storage of Mixed Oxide Fuel Assemblies" is provided. The analysis, which has been performed with the same models and assumptions as the initial analysis, which was also performed by PLG, demonstrates that the results for mixed oxide fuel assemblies are bounded by the previously approved results for uranium assemblies. The resultant

multiplication factor, including additional uncertainties which have been applied due to the mixed oxide fuel, is below the plant Technical Specification limit of 0.90 and well below 0.95.

The effect of the insertion of four mixed oxide fuel assemblies on the previously performed environmental impact assessments has been reviewed. This review has included occupational exposure, offsite impact as a result of normal operation, and offsite impact as a result of postulated accidents. There is a slight increase in the occupational exposure as a result of the fuel receipt inspection which is performed at Ginna. The four fuel assemblies have been estimated by Westinghouse to have a contact dose rate of approximately 100 mr/hr. Inspections typically involve two people and 30 minutes per assembly. In addition, handling will require an average of 2 people for 1 hour per assembly. Thus, one arrives at a total occupational exposure of 1.2 person-rem assuming contact. Inasmuch as all exposure will not be contact exposure, the actual occupational exposure is expected to be below the 1.2 person-rem. This may be compared with 551 person rem per year average actually experienced at Ginna between 1970 and 1978 and an average of 371 person-rem per year for 1977 and 1978. Once the mixed oxide fuel is in the spent fuel pool, the incremental exposure is insignificant due to the substantial shielding provided by the water in the pool. Thus, the impact on occupational exposures is small.

The enclosed report entitled, "Radiological Impact of Mixed Oxide Fuel Assemblies", addresses effluents from normal operation and from postulated accidents. It is demonstrated that operation with four mixed oxide fuel assemblies has only a small effect on

plant releases and that all Technical Specification and regulatory limits continue to be met.

As described in the Westinghouse report, the fuel in the form of rods is in storage at Westinghouse facilities. The rods will be loaded into the assembly skeletons at Exxon Nuclear facilities using Westinghouse fabricated skeletons and employing Westinghouse acceptance criteria for all fuel assembly manufacturing parameters. Exxon is performing this task because of the physical incapability of the Westinghouse facility to lift the completed fuel assembly upright for quality control and assurance checks. All shipping until the fuel assemblies arrive at Ginna is the responsibility of others and Rochester Gas and Electric is not seeking any approvals for this aspect of the program. Final shipping following fuel exposure is not expected for several years following final discharge, or at least until the mid to late 1980s, due to the uncertainty surrounding that aspect of the fuel cycle. Shipping will be accomplished in accordance with the then applicable regulations. No approvals are being requested at this time.

The evaluations described above and in the enclosures have addressed all aspects of the demonstration program to load four mixed oxide fuel assemblies into the reactor beginning with Cycle 10 operation. The evaluations included fuel rod design, fuel assembly design, core design, plant transients evaluation, LOCA, fuel assembly storage, transportation, and environmental impact. The conclusion is that the insertion of four mixed oxide fuel assemblies, while serving as a demonstration program to reduce

the uncertainties surrounding the use of mixed oxide fuel in general and in the Ginna reactor in particular, has a very small effect on overall plant performance and impacts. It has been demonstrated that the insertion of four mixed oxide fuel assemblies does not adversely affect public health and safety.

Attachment C

The proposed amendment is deemed to be within Class IV of 10 CFR §170.22 since it involves a single complex issue: the acceptability of the use of mixed oxide fuel assemblies in the Ginna reactor. This classification is in accord with the Commission's practice of classifying reload applications in Class IV. An environmental appraisal has been prepared which demonstrates that the proposed action will not have a significant environmental impact. The proposed amendment will not required ACRS review or preparation of an environmental impact statement. Accordingly, a check for the fee of $12,300 is enclosed.

Attachment D

RESEARCH, DEMONSTRATION AND DEVELOPMENT
ASPECTS OF PROPOSED USE OF
MIXED OXIDE FUEL ASSEMBLIES

Background

The proposed insertion of four mixed oxide fuel assemblies into the Ginna reactor is the culmination of a Research, Demonstration, and Development ("RDD") program that was actively initiated over six years ago. RG&E acquired the material as part of an equivalent materials option under its reprocessing agreement with Nuclear Fuel Services, Inc. ("NFS"). Under this option, RG&E could require NFS to provide uranium and plutonium of equivalent value to that contained in spent fuel if NFS could not reprocess spent fuel from Ginna on the schedule requested. Following shipment of the initial core of spent fuel (121 assemblies) from Ginna in early 1973, RG&E received uranium and sufficient plutonium for the fabrication of four mixed oxide fuel assemblies. The plutonium was delivered to Westinghouse in the summer of 1973, and fuel rods for four assemblies were fabricated by Westinghouse in 1974 and placed in storage.

In early 1974, RG&E initiated a program to insert four mixed oxide fuel assemblies into the core during the 1975 refueling outage. As part of the program, Westinghouse prepared an evaluation of the total capability of the Ginna reactor to utilize mixed oxide fuel. The study provided a band of recycle capability that was dependent on core management and cycle burnup.

In late 1974, all efforts directed toward using mixed oxide fuel in a 1975 reload were deferred due to the perceived need to concentrate on other licensing efforts then in progress. A decision was made to design an additional four fuel assemblies, with the goal of inserting eight assemblies in the Ginna reactor at the 1976 refueling outage. The material required for the additional assemblies was to have been imported. The informal reaction of the NRC Staff to our proposed program of eight mixed oxide fuel assemblies was negative. In addition, there was a substantial possibility of opposition to the plan to import the additional material through New York City. As a result, the decision was made to cancel the proposed import and further to postpone the mixed oxide RDD project.

In June 1979, RG&E was informed that Westinghouse was going to close its storage facility and that the storage contract would not be renewed. This notification led RG&E to reevaluate its prior deferral of the mixed oxide RDD program and to conclude that the program should be reactivated.

Ginna RDD Program Description

To go forward with its mixed oxide RDD program, RG&E is requesting NRC concurrence for receipt and temporary storage of four mixed oxide fuel assemblies, followed by insertion of those assemblies into the Ginna reactor core and irradiation for at least three cycles of normal reactor operation.

The following RDD will be performed during operation with the four mixed oxide fuel assemblies:

1. Verification of current neutronic methodology applied to mixed oxide assemblies through comparisons of measured and predicted assembly powers (radial and axial). This is a severe test in that the calculated diffusion lengths in mixed oxide assemblies are significantly less than those of all-uranium assemblies.

2. Verification of current capabilities to calculate incore detector responses in mixed oxide assemblies relative to all-uranium assemblies.

3. Through the comparison of measured and predicted mixed oxide assembly powers, a degree of confidence can be obtained relative to the capability to predict mixed oxide assembly reactivity and migration area as a function of burnup.

4. In future cycles, the mixed oxide assemblies could be placed in rodded locations to allow comparisons of calculated and measured control rod worths for mixed oxide assemblies.

5. During each refueling outage, and following discharge, a visual examination of the four mixed oxide fuel assemblies will be performed to determine if there are any differences in those assemblies, as opposed to the all-uranium assemblies.

During the first burnup cycle, the four mixed oxide fuel assemblies will be placed in low power locations on the periphery of the core. In light of items 1 through 4, the locations have been specifically selected so that two of the four assemblies will be traversed by the incore movable detector system. This will enable RG&E to record and carefully assess the actual power distribution for those two assemblies on a regular basis. Analysis

of the measurements so recorded will be performed by both RG&E and Exxon. For Exxon, this will result in validation of existing PWR design codes by comparison with actual operating data.

The other two mixed oxide fuel assemblies will be monitored by incore thermocouples. The thermocouples will be located at the fuel assembly top nozzle, which is the exit for the water flow path, and may be used to provide additional data concerning the performance of the mixed oxide fuel assemblies.

No specific post-irradiation RDD program is being proposed at this time. However, RG&E is prepared to cooperate in the development of a program for post-irradiation examination by one or more Government entities or National laboratories.

Advantages of Ginna RDD Program

The proposed RDD program to be carried out in conjunction with the irradiation for mixed oxide fuel assemblies at Ginna is expected to produce a substantial advance in state-of-the-art knowledge concerning the performance of mixed oxide fuel in commercial nuclear reactors. The research conducted at the Southern California Edison Co. reactor San Onofre Unit No. 1 has been the only prior research concerning the use of mixed oxide fuel in a U.S. Westinghouse commercial reactor. There, four assemblies with unprepressurized zircaloy-clad fuel rods were irradiated for two fuel cycles. The use of mixed oxide fuel rods was terminated prematurely because of concern that there might be excessive fuel densification in the unprepressurized fuel rods. In addition, although the mixed oxide fuel irradiated at San Onofre was zircaloy clad, the balance of the core had stainless steel clad.

At Ginna, all the fuel in the core will be zircaloy clad. The use of zircaloy clad results in a different energy spectrum than that for stainless steel clad. Data reported at Ginna will, therefore, be more representative of what can be expected from the use of mixed oxide fuel in the majority of PWRs. In addition, the mixed oxide fuel here involved has been pressurized and fabricated with processes developed and approved following the identification of fuel densification whereas the San Onofre fuel was fabricated prior to that time. This again will produce data more representative of current reactor operations. Finally, the mixed oxide fuel assemblies at Ginna will be irradiated for at least three fuel cycles. Depending on the irradiation history of the fuel for the three cycles, one or more of the assemblies may be used for a fourth fuel cycle, thereby providing additional data. For all of these reasons, the RDD program at Ginna will provide information that is not currently available and will advance the state of the art with respect to future use of mixed oxide fuel assemblies.