[7590-01-P]

NUCLEAR REGULATORY COMMISSION

[Docket No. 50-326; NRC-2010-0217]

Notice of Availability of Environmental Assessment and Finding of No Significant Impact for License Renewal for University of California, Irvine Nuclear Reactor Facility

AGENCY: Nuclear Regulatory Commission

ACTION: Notice of availability.

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SUPPLEMENTARY INFORMATION:

I. Introduction

The U.S. Nuclear Regulatory Commission (NRC) is considering issuance of a renewed Facility License No. R-116, to be held by the Regents of the University of California (the licensee), which would authorize continued operation of the University of California, Irvine Nuclear Reactor Facility (UCINRF), located in Irvine, Orange County, California. Therefore, as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Section 51.21, the NRC is issuing this Environmental Assessment (EA) and Finding of No Significant Impact. The renewed license will be issued following the publication of this Notice.

II. EA Summary

Identification of the Proposed Action:

The proposed action would renew Facility License No. R-116 for a period of 20 years from the date of issuance of the renewed license. The proposed action is in accordance with the licensee's application dated October 18, 1999, as supplemented by letters dated October 23, and October 31, 1999, April 24, 2000, January 27, May 17, July 14, and October 20, 2010, June 7, June 24, August 1, October 3, October 5, and December 2, 2011 (2 letters). In accordance with 10 CFR 2.109, the existing license remains in effect until the NRC takes final action on the renewal application.

Need for the Proposed Action:

The proposed action is needed to allow the continued operation of the UCINRF to routinely provide teaching opportunities, research, and services to numerous institutions for a period of 20 years.

Environmental Impacts of the Proposed Action:

The NRC has completed its safety evaluation of the proposed action to issue a renewed Facility License No. R-116 to allow continued operation of the UCINRF for a period of 20 years and concludes there is reasonable assurance that the UCINRF will continue to operate safely for the additional period of time. The details of the NRC staff safety evaluation will be provided with the renewed license that will be issued as part of the letter to the licensee approving its license renewal application. This document contains the environmental assessment of the proposed action.

The UCINRF is located on the main campus of the University of California, Irvine and is a part of Rowland Hall. The reactor is housed in the basement of the multipurpose building constructed with a structural steel frame and reinforced concrete floors acting as diaphragms in distributing loads to vertically resisting elements. The reactor area is comprised of the reactor

room, the control room, and two laboratories which total approximately 186 square meters (2000 square feet) all located in the basement of Rowland Hall. Possession of both a door key and a key card are needed to enter the facility. Rowland Hall is one of many University buildings located around a circular field. The nearest permanent residences are located approximately 280 meters (310 yards) south east of Rowland Hall. The nearest dormitories are located approximately 180 meters (200 yards) west of the reactor.

The UCINRF is a pool-type, light water moderated and cooled research reactor licensed to operate at a steady-state power level of 250 kilowatt thermal power (kW). The reactor is also licensed to operate in a pulse mode. The fuel is located at the bottom of an aluminum tank 3 meters wide by 4.6 meters long and 7.6 meters deep (10 feet wide by 15 feet long and 25 feet deep) with a volume of approximately 87,000 liters (23,000 gallons), supported by a reinforced concrete foundation. The reactor is fueled with standard low-enriched TRIGA (Training, Research, Isotope production, General Atomics) uranium fuel. A detailed description of the reactor can be found in the UCINRF Safety Analysis Report (SAR). Since the operating license was issued on November 24, 1969, facility modifications have been minor as outlined in SAR Section 1.4.

The licensee has not requested any changes to the facility design or operating conditions as part of the application for license renewal. No changes are being made in the types or quantities of effluents that may be released off site. The licensee has systems in place for controlling the release of radiological effluents and implements a radiation protection program to monitor personnel exposures and releases of radioactive effluents. As discussed in the NRC staff's safety evaluation, the systems and radiation protection program are appropriate for the types and quantities of effluents expected to be generated by continued operation of the reactor. Accordingly, there would be no increase in routine occupational or public radiation exposure as a result of license renewal. As discussed in the NRC staff safety evaluation, the proposed action will not significantly increase the probability or consequences of accidents.

Therefore, license renewal would not change the environmental impact of facility operation. The NRC staff evaluated information contained in the licensee's application, as supplemented, and data reported to the NRC by the licensee for the last ten years of operation to determine the projected radiological impact of the facility on the environment during the period of the renewed license. The NRC staff found that releases of radioactive material and personnel exposures were all well within applicable regulatory limits. Based on this evaluation, the NRC staff concludes that continued operation of the reactor would not have a significant environmental impact.

A. Radiological Impact

Environmental Effects of Reactor Operations:

Gaseous radioactive effluents are discharged by the facility exhaust system at a volumetric flow rate of approximately 2.0 cubic meters per second (4300 cubic feet per minute) via vents located on the roof of the reactor building. Other release pathways do exist. However they are normally secured during reactor operation and have insignificant volumetric flow rates compared to the facility exhaust system. The only significant nuclide found in the gaseous effluent stream is Argon-41. Licensee calculations, based on operation, indicate that annual Argon-41 releases result in a maximum concentration of less than 1.7 E-10 microCuries per milliliter (μCi/ml) in a year over the last 10 years, which is below the limit of 1.0E-8 μCi/ml specified in 10 CFR 20, Appendix B for air effluent releases. The NRC staff performed an independent calculation and found the licensee's calculation to be reasonable. Gaseous radioactive releases reported to the NRC in the licensee's annual reports were less than two percent of the air effluent concentration limits set by 10 CFR 20, Appendix B. The potential radiation dose to a member of the general public resulting from this concentration is less than 0.01 milliSieverts (mSv) (1 millirem (mrem)) and this demonstrates compliance with the dose limit of 1 mSv (100 mrem) set by 10 CFR 20.1301. Additionally, this potential radiation dose

demonstrates compliance with the air emissions dose constraint of 0.1 mSv (10 mrem) specified in 10 CFR 20.1101(d).

The licensee disposes of radioactive liquid waste by transfer to the University's Environmental Health & Safety (EHS) department. Since 1992, the facility has had no radiological liquid effluent releases. Radioactive materials have been transferred and disposed of in accordance with the requirements of the licensee's byproduct license. Currently, there are no plans to change any operating or radiological release practices or characteristics of the reactor during the license renewal period. During the past ten years, the licensee has transferred 15 gallons of liquid waste for a total of 3.2 milliCuries for proper disposal.

The EHS department oversees the handling of solid low-level radioactive waste generated at UCINRF. The bulk of the waste consists of sample waste. Upon removal from the facility, the waste enters the EHS Radioactive Waste Handling Program. The EHS department currently retains the waste for decay in storage. According to the licensee, no spent nuclear fuel has been shipped from the site to date. To comply with the Nuclear Waste Policy Act of 1982, the licensee has entered into a contract with the U.S. Department of Energy (DOE) that provides that DOE retains title to the fuel utilized at the UCINRF and that DOE is obligated to take the fuel from the site for final disposition.

As described in past ten years of UCINRF annual reports, personnel exposures are well within the limits set by 10 CFR 20.1201, and are as low as is reasonably achievable (ALARA). Personnel exposures are usually less than 0.5 mSv (50 mrem) per year with the maximum individual receiving 1.67 mSv (167 mrem) of whole body exposure in one year. No changes in reactor operation that would lead to an increase in occupational dose are expected as a result of the proposed action.

The licensee conducts an environmental monitoring program to record and track the radiological impact of UCINRF operation on the surrounding unrestricted area. The program consists of quarterly exposure measurements at ten locations around the facility and at one

control location away from any direct influence from the reactor. The locations have been chosen to monitor the confines of the reactor facility, more remote locations on campus and an off campus location that provides background radiation level information. Over the past ten years, the monitoring program has indicated that radiation exposures at the remote monitoring locations on campus were not significantly higher than at the offsite background monitoring locations. Year-to-year trends in exposures are consistent between monitoring locations. Also, no correlation exists between total annual reactor operation and annual exposures measured at the monitoring locations. Based on the NRC staff's review of the past ten years of data, the NRC staff concludes that operation of the UCINRF does not have any significant radiological impact on the surrounding environment. No changes in reactor operation that would affect off-site radiation levels are expected as a result of the proposed action.

Environmental Effects of Accidents:

Accident scenarios are discussed in Chapter 13 of the UCINRF SAR. The maximum hypothetical accident (MHA) is the uncontrolled release of the gaseous fission products contained in the gap between the fuel and the fuel cladding in one fuel element to the reactor area and into the environment. The licensee conservatively calculated doses to facility personnel and the maximum potential dose to a member of the public. The NRC staff performed independent calculations to verify that the doses represent conservative estimates for the MHA. Occupational doses resulting from this accident would be well below 10 CFR Part 20 limit of 50 mSv (5000 mrem). Maximum doses for members of the public resulting from this accident would be well below 10 CFR Part 20 limit of 1 mSv (100 mrem). The proposed action will not increase the probability or consequences of accidents.

B. Non-Radiological Impacts

The UCINRF core is cooled by a light water primary system consisting of the reactor pool and a heat removal system to remove heat from the reactor pool. Core cooling occurs by natural convection, with the heated coolant rising out of the core and into the bulk pool water.

The large heat sink provided by the volume of primary coolant allows several hours of full-power operation without any secondary cooling. The heat removal system transfers heat to the University chilled water system via a 258 kW (880,000 BTU/hr) heat exchanger. During operation, the chilled water system is maintained at a higher pressure than the primary system to minimize the likelihood of primary system contamination entering the secondary system, and ultimately the environment. The licensee conducts tests which would detect leakage of the heat exchanger. A minor amount of heat removal from the pool occurs due to evaporation of coolant from the pool's surface. The small amount of replacement water is provided from the portable water system of the UCINRF.

Release of thermal effluents from the UCINRF will not have a significant effect on the environment. Given that the proposed action does not involve any change in the operation of the reactor and the heat load dissipated to the environment, the NRC staff concludes that the proposed action will not have a significant impact on the environment or the local water supply.

National Environmental Policy Act (NEPA) Considerations:

The NRC has responsibilities that are derived from NEPA and from other environmental laws, which include the Endangered Species Act (ESA), Costal Zone Management Act (CZMA), National Historic Preservation Act (NHPA), Fish and Wildlife Coordination Act (FWCA), and Executive Order 12898 Environmental Justice. The following presents a brief discussion of impacts associated with these laws and other requirements.

A. Endangered Species Act

Federally-protected or State-protected listed species have not been found in the vicinity of the UCINRF. Effluents and emissions from the UCINRF have not had an impact on critical habitat.

B. Costal Zone Management Act

The UCINRF is not located within any managed coastal zones; nor would the UCINRF effluents and emissions impact any managed costal zones. The UCINRF is located

approximately 1.0 km (0.6) miles away from the boundary of the Costal Zone Management Area.

C. National Historic Preservation Act

The NHPA requires Federal agencies to consider the effects of their undertakings on historic properties. The National Register of Historic Places (NRHP) lists one historical site located approximately 6.6 km (4 miles) north of Rowland Hall, the Lighter than Airship Hangers. Given the distance between the facility and the Lighter than Airship Hangers, continued operation of the UCINRF will not impact any historical sites. Based on this information, the NRC staff finds that the potential impacts of the proposed action would have no adverse effect on historic and archaeological resources.

D. Fish and Wildlife Coordination Act

The licensee is not planning any water resource development projects, including any of the modifications relating to impounding a body of water, damming, diverting a stream or river, deepening a channel, irrigation, or altering a body of water for navigation or drainage.

E. Executive Order 12898 – Environmental Justice

The environmental justice impact analysis evaluates the potential for disproportionately high and adverse human health and environmental effects on minority and low-income populations that could result from the relicensing and the continued operation of the UCINRF. Such effects may include biological, cultural, economic, or social impacts. Minority and low-income populations are subsets of the general public residing around UCINRF, and all are exposed to the same health and environmental effects generated from activities at the UCINRF.

Minority Populations in the Vicinity of the UCINRF — According to 2000 census data, 63.8 percent of the population (approximately 13,353,000 individuals) residing within a 50-mile radius of the UCINRF identified themselves as minority individuals. The largest minority group was Hispanic or Latino (approximately 5,524,000 persons or 41.4 percent), followed by “Some other race” (approximately 3,298,000 persons or about 24.7 percent). According to the U.S.

Census Bureau, about 48.7 percent of the Orange County population identified themselves as minorities, with persons of Hispanic or Latino origin comprising the largest minority group (30.8 percent). According to census data 3-year average estimates for 2005-2007, the minority population of Orange County, as a percent of total population, had increased to 52.9 percent.

Low-Income Populations in the Vicinity of the UCINRF — According to 2000 census data, approximately 383,700 families and 2,102,000 individuals (approximately 12.5 and 15.7 percent, respectively) residing within a 50-mile radius of the UCINRF were identified as living below the Federal poverty threshold in 1999. The 1999 Federal poverty threshold was $17,029 for a family of four.

According to Census data in the 2005-2007 American Community Survey 3-Year Estimates, the median household income for the State of California was $58,361, while 13.0 percent of the state population and 9.7 percent of families were determined to be living below the Federal poverty threshold. Orange County had a higher median household income average ($71,601) and lower percentages (9.3 percent) of individuals and families (6.4 percent) living below the poverty level, respectively.

Impact Analysis—Potential impacts to minority and low-income populations would mostly consist of radiological effects, however radiation doses from continued operations associated with the license renewal are expected to continue at current levels, and would be well below regulatory limits.

Based on this information and the analysis of human health and environmental impacts presented in this environmental assessment, the NRC staff concludes that the proposed action would not have disproportionately high and adverse human health and environmental effects on minority and low-income populations residing in the vicinity of the UCINRF.

Environmental Impacts of the Alternatives to the Proposed Action:

As an alternative to license renewal, the NRC considered denying of the proposed action. If the NRC denied the request for license renewal, reactor operations would cease and

decommissioning would be required. The NRC staff notes that, even with a renewed license, the UCINRF will eventually require decommissioning, at which time the environmental effects of decommissioning will occur. Decommissioning will be conducted in accordance with an NRC-approved decommissioning plan which would require a separate environmental review under 10 CFR 51.21. Cessation of facility operations would reduce or eliminate radioactive effluents and emissions. However, as previously discussed in this environmental assessment, radioactive effluents and emissions from reactor operations constitute only a small fraction of the applicable regulatory limits. Therefore, the environmental impacts of license renewal and the denial of the request for license renewal would be similar. In addition, denying the request for license renewal would eliminate the benefits of teaching, research, and services provided by the UCINRF.

Alternative Use of Resources:

The proposed action does not involve the use of any different resources or significant quantities of resources beyond those previously considered in the issuance of the original Facility License R-116 to the Regents of the University of California for the UCINRF on November 24, 1969.

Agencies and Persons Consulted:

The NRC staff provided a draft of this Environmental Assessment to the California Energy Commission for review on April 7, 2010. By telephone call on May 13, 2010, the California Energy Commission acknowledged receiving this draft Environmental Assessment and had no comments.

The NRC staff also provided information about the proposed activity to the State Office of Historical Preservation for review on April 7, 2010. By letter dated April 27, 2010, the Office of Historical Preservation agreed with the NRC regarding the conclusions of the historical assessment, and otherwise had no comments.

Finding of No Significant Impact:

On the basis of the environmental assessment, the NRC concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the NRC has determined not to prepare an environmental impact statement for the proposed action.

III. Further Information

Documents related to this action, including the application for amendment and supporting documentation, are available electronically at the NRC's Electronic Reading Room at *http://www.nrc.gov/reading-rm/adams.html*. From this site, you can access the NRC's Agencywide Documents Access and Management System (ADAMS), which provides text and image files of NRC's public documents. The ADAMS accession numbers for the documents related to this notice are: October 18, 1999, ADAMS Accession No. ML083110112, as supplemented by letters dated October 23 and October 31, 1999 (ADAMS Accession Nos. ML083110488 and ML100332002, respectively), April 24, 2000 (ADAMS Accession No. ML003708602), January 27, May 17, July 14, and October 20, 2010 (ADAMS Accession Nos. ML100290365, ML101400027, ML101970039, and ML102980015, respectively), June 7, June 24, August 1, October 3, October 5, and December 2, 2011 (ADAMS Accession Nos. ML111950380, ML11188A083, ML11255A073, ML120110012, ML11290A041, ML113530010, and ML11348A104, respectively). Also see the license's annual reports 1999-2000, (ADAMS Accession No. ML003747460), 2000-2001 (ADAMS Accession No. ML012190047), 2001-2002 (ADAMS Accession No. ML022550427), 2002-2003 (ADAMS Accession No. ML032180735), 2003-2004 (ADAMS Accession No. ML042330395), 2004-2005 (ADAMS Accession No. ML052550050), 2005-2006 (ADAMS Accession No. ML062410426), 2006-2007 (ADAMS Accession No. ML072130493), 2007-2008 (ADAMS Accession No. ML082550403), 2008-2009 (ADAMS Accession No. ML092330118). If you do not have access to ADAMS or if there are problems in accessing the documents located in ADAMS, contact the NRC Public Document

Room (PDR) Reference staff at 1-800-397-4209, 301-415-4737 or by email to *pdr.resource@nrc.gov*.

These documents may also be viewed electronically on the public computers located at the NRC's Public Document Room (PDR), O 1 F21, One White Flint North, 11555 Rockville Pike Rockville, MD 20852. The PDR reproduction contractor will copy documents for a fee.

Dated at Rockville, Maryland, this 2nd day of February, 2012.

FOR THE NUCLEAR REGULATORY COMMISSION

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