WASHINGTON STATE UNIVERSITY REACTOR LICENSE NO. R-76 DOCKET NO. 50-27

Response to Request for Additional Information of November 20, 2007, Intended to Provide Necessary Additional Information and Clarification of Amendment Request for Amended Facility Operating License No. R-76

REDACTED VERSION

SECURITY-RELATED INFORMATION REMOVED

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Nuclear Radiation Center

WASHINGTON STATE

December 14, 2007

United States Nuclear Regulatory Commission Document Control Desk Washington D.C. 20555-0001

Docket Number 50-27 Facility License Number R-76

This letter is written as a response to the Request for Additional Information (RAI) of November 20, 2007, sent by the U.S. Nuclear Regulatory Commission to Washington State University. The answer to the RAI is intended to provide the necessary additional information and clarification of an amendment request for Amended Facility Operating License Number R-76, which was submitted to the U.S. NRC by Washington State University on August 15, 2007.

The RAI included two questions. The questions are reproduced below, along with the respective responses.

U.S. NRC Questions

- 1. Page I of your Safety Analysis titled, "Issue/Release Summary" states that the Safety Analysis of GA is Proprietary Information. If the report is proprietary, please have the owner of the information follow the regulations in 10 CFR 2.390 to request withholding the document as proprietary. If the Safety Analysis is not proprietary, please submit documentation to that effect.
- 2. Please confirm the additional amount of low-enriched uranium-235 that will be needed for the conversion of the reactor in addition to the 10.0 kilograms you are currently authorized to possess.

Washington State University Response to Question 1

Most of the Safety Analysis Report was written by General Atomics (GA), with some input by Washington State University. It is standard procedure for GA to adopt a default position that all reports generated by GA are, or contain proprietary information. However, the Safety Analysis Report for conversion of the Washington State University TRIGA reactor does not contain proprietary information.

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Attached to this Response are three documents, generated by GA, confirming that the Safety Analysis Report does not contain GA proprietary information. The documents are:

1. A memorandum, ARV:021:07, from Anthony Veca (of GA) to Donald Wall (of WSU), dated 5 September, 2007

- 2. A revised Issue/Release Summary Page for the Safety Analysis Report
- 3. A memorandum, ARV:030:07, from Anthony Veca to Donald Wall, dated 30 November, 2007

The 5 September, 2007 memorandum is a cover letter stating that there is no GA proprietary information in the Safety Analysis Report. The memorandum accompanies the revised Issue/Release Summary Page for the Safety Analysis Report. The revised Issue/Release Summary Page is intended to be the governing cover sheet for the Safety Analysis Report, and accordingly, the checked box at the bottom of the document page indicates that there is no GA proprietary information in the Safety Analysis Report. The 30 November 2007 memorandum confirms that both the 5 September 2007 memorandum and the revised Issue/Release Summary Page are intended to communicate that there is no proprietary information in the Safety Analysis Report. The 5 September 2007 and the 30 November 2007 memorandums are signed by Anthony Veca of General Atomics. Mr. Veca has signature authority to declare that the Safety Analysis Report does not include General Atomics proprietary information.

There is no Washington State University proprietary information contained in the Safety Analysis Report.

Washington State University Response to Question 2

Washington State University is currently authorized to possess ten kilograms of uranium-235, at enrichment levels less than twenty percent (LEU). The letter of August 15, 2007 sent by Washington State University to the U.S. NRC requested that the possession limit be increased from ten to twenty-five kilograms of uranium-235 of less than twenty percent enrichment—an increase of fifteen kilograms.

The WSU reactor was converted from an MTR fueled reactor to a TRIGA reactor in 1967. The 1967 core was standard TRIGA fuel that was entirely 8.5/20 LEU (8.5 percent uranium by weight at 20 percent enrichment). As part of the Fuel Life Improvement Program (FLIP), a partial core conversion was performed in 1976, by replacing some of the standard 8.5/20 TRIGA fuel with HEU fuel. The fuel assemblies that were removed for the 1976 conversion have been retained in storage at WSU, and are still available for use. A recent inspection (November 2007) using an underwater camera system shows that the fuel assemblies that were removed in 1976 do not exhibit signs of problems, such as pitting, cladding deterioration or physical damage, and appear to be fit for use. As a result, at the time of this writing (December 2007) WSU intends to retain possession of the 8.5/20 TRIGA LEU fuel from the 1967 conversion, unless further inspection of burnup records and the physical condition of the fuel indicates that the fuel is no longer fit for use.

Approximately half of the fuel that is currently in use in the reactor is standard 8.5/20 LEU fuel, which has been in use since 1967, and the other half is HEU fuel obtained in 1976 as part of the FLIP initiative. The Department of Energy has decided to repossess the HEU fuel, but has refused to replace the 1967 LEU fuel as part of the HEU/LEU conversion. Washington State University is therefore constrained to retain as much of the 1967 fuel as may still be usable to maintain an inventory of spare 8.5/20 fuel, which could be used to replace any in-core 8.5/20 fuel that would eventually need to be replaced. It will clearly be necessary at some time in the future to obtain additional fuel at some time to replace the 1967 fuel. The inventory limit will have to be high enough to accommodate the new (manufactured in 2007) fuel that is being prepared for the HEU/LEU conversion, the 1967 fuel, and replacement fuel for the 1967 fuel.

The amount of uranium-235 in LEU fuel in the Washington State University inventory is less than the 10.0 kilogram inventory limit. The difference between the mass of uranium-235 in the WSU inventory and the ten kilogram possession limit was calculated to allow receipt of additional fresh fuel that would be required for a refueling operation. The justification for the difference between the actual inventory and the inventory limit was made on the basis that relatively long periods of time may elapse between the time that a decision is made to procure additional fuel, the time at which additional fuel could be delivered, and the time that will elapse before spent fuel can be shipped off-site. As a result, prudent planning for continuance of noninterrupted reactor operations strongly suggest the need to plan for delivery of fresh, unirradiated fuel long before the in-core fuel is consumed and shut-down for refueling operations.

Washington State University currently operates a mixed HEU/LEU core, and is proposing to convert to an entirely LEU fueled core. As a result, the LEU inventory limit will need to be increased, and the HEU possession limit may be correspondingly decreased after spent HEU fuel is shipped from WSU. Three issues of concern determined the amount of the requested inventory limit increase:

- 1. After conversion, all of the fuel for the reactor will be LEU, and the current inventory limit is too low to allow receipt of the required additional LEU fuel
- 2. WSU will retain the LEU fuel that was removed from the core in the 1976 conversion
- 3. WSU desires to have an inventory limit that is in excess of the sum of the 1967 and 2007 LEU fuel inventory to allow receipt of additional fuel that will be required for the future replacement of the 1967 fuel.

Issue 1. The current inventory limit of ten kilograms of uranium-235 in LEU fuel is sufficient to allow possession of the fuel that is currently in the WSU inventory, but is too low to allow receipt of the additional LEU fuel that is needed to replace the HEU fuel. An increase of the inventory limit is needed to allow receipt of the incoming LEU fuel that will replace the HEU fuel in the WSU reactor.

Issue 2. WSU will eventually return the HEU fuel to DOE custody. At that time WSU will possess only small amounts of HEU for use in neutron detectors, and for small-scale experimental use. The possession limit for HEU may be changed if deemed necessary by the U.S. NRC, after the spent HEU is shipped from WSU. However, since the WSU reactor will be fueled by LEU of two different types (8.5/20 and 30/20), it will be necessary to maintain a much

higher LEU uranium inventory than was previously the case because it will be necessary to maintain spare fuel assemblies of each type, i.e. 8.5/20 and 30/20, in addition to the in-core inventory.

Isssue 3. The increase of inventory limit must encompass the mass of uranium-235 that will be present in the 1967 LEU fuel that is in-core, the partially used 1967 LEU fuel that is in storage, the incoming 2007 LEU fuel, and additional fuel that will eventually replace the 1967 fuel. At present, it is uncertain when there will be a fuel shipment to replace the 1967 fuel, as the DOE has declined to replace the 1967 fuel as part of HEU/LEU conversion activities. In order to accommodate the inventory requirement for replacement of the 1967 fuel, it will be necessary to have an inventory limit that is higher than the sum of inventory contributed by the 1967 and 2007 fuels.

Timeline

The request to increase inventory limit of uranium-235 was made separately from the request to convert the WSU reactor from HEU to LEU fuel because it was anticipated that the process of obtaining approval for an inventory increase would be less time consuming than reviewing, reconciling, and approving a HEU to LEU conversion request. It is also important that the increase in permissible uranium-235 inventory take place prior to the conversion order. There are two considerations that make the issuance of the inventory limit increase take precedence. WSU uses the reactor facility on a daily basis for research and isotope production, and therefore desires to minimize shut-down time by having new fuel on-site before shutting down the reactor and removing the HEU fuel from the reactor. WSU plans to continue to operate the reactor in its current mixed core configuration as long as permissible.

Second, there is a time constraint on shipping of the new fuel; an issue over which WSU has no control. The shipping cask that will be used in the fuel transfer from the CERCA (a division of AREVA) manufacturing site at Romans sur Isère, France to the U.S. (either WSU or INL) will soon not be available for use due to impending expiration of the cask certification. As of the time of this letter, WSU hopes to be permitted to receive shipment of the new 30/20 LEU fuel at approximately the 2008.

Please contact me if there is a need to answer any further questions.

Respectfully Submitted,

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Donald Wall, Ph.D. Director Nuclear Radiation Center Washington State University

cc: Alexander Adams, Jr., Senior Project Manager