

SAFETY EVALUATION REPORT
LICENSE AMENDMENT APPLICATION
INTERNATIONAL ISOTOPES INC.
IDAHO FALLS, IDAHO

DATE: August 2, 2007

DOCKET NO.: 40-9058

LICENSE NO.: SUB-1587

FACILITY: International Isotopes Inc.
4137 Commerce Circle
Idaho Falls, ID 83401

TECHNICAL REVIEWERS: Michael Raddatz, Rex Wescott, James Downs, Edward Johannemann III, and Roberto Torres

PROJECT MANAGER: Michael Raddatz

SUMMARY AND CONCLUSIONS

By letter dated January 19, 2007, International Isotopes Inc. (I³) submitted a request for an amendment to its source materials license. The U.S. Nuclear Regulatory Commission (NRC) staff conducted an initial review of the application and requested additional information on February 15, 2007. I³ addressed the staff's concerns in a response by letter dated March 13, 2007, and in a followup e-mails dated May 29, 2007, and June 12, 2007.

As *Code of Federal Regulations* 10 CFR Part 40 specifies only general requirements to protect health and minimize danger to life and property, the applicable portions of NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," issued March 2002, were used to evaluate the safety and environmental aspects of this license amendment application. Although I³ is regulated under the provisions of Part 40, to perform a complete review, one that adequately evaluates the risk to public health and safety from operations at the facility, the staff has determined that this is the most appropriate guide. Further, the staff recently utilized the guidance provided by NUREG-1520 in the review of a license renewal for Honeywell Metropolis Works, another facility regulated under the provisions of 10 CFR Part 40.

The staff also reviewed the decommissioning funding plan (DFP) in accordance with Volume 3, "Financial Assurance, Recordkeeping, and Timeliness—Final Report," of NUREG-1757, "Consolidated NMSS Decommissioning Guidance," issued September 2003. This safety evaluation report (SER) describes the basis for the approval of the license amendment.

The current and proposed activities associated with this amendment adequately protect the health and safety of the workers, the public, and the environment. The staff recommends approval of the amendment request.

DISCUSSION

GENERAL INFORMATION

License History and Background

On April 18, 2005, the NRC issued a source materials license to I³ for its Idaho Falls, ID facility (single process/storage building at 1359 Commerce Way). The license is under Title 10, Part 40, "Domestic Licensing of Source Material," of the *Code of Federal Regulations* (10 CFR Part 40) and authorizes possession and use of depleted uranium (DU) in the form of Uranium Tetrafluoride (UF₄), Uranium Oxide (U₃O₈), and uranium dioxide (UO₂) in an amount that will not exceed **[Security-Related Information - Withheld Under 10 CFR 2.390]**. I³ proposed to use Depleted Uranium Tetrafluoride (DUF₄) as a source of fluorine for the production of Germanium Tetrafluoride (GeF₄) and other fluorine compounds. To accomplish this, the NRC licensed I³ to receive and store up to **[Security-Related Information - Withheld Under 10 CFR 2.390]** of DUF₄ at any one time with an additional **[Security-Related Information - Withheld Under 10 CFR 2.390]** of DUF₄ in process equipment.

The GeF₄ process develops high-purity gases for the semiconductor industry. I³ owns the rights to an exclusive patent for the reaction of DUF₄ to form gases such as GeF₄, silicon tetrafluoride, boron trifluoride, and tungsten hexafluoride.

In September 2001, prior to the issuance of the Part 40 license, the company began Part 30 licensed operations at its Idaho Falls facility under NRC License No. 11-27680-01. Under the Part 30 license I³ primarily manufactures and distributes various high quality radiochemicals for medical, industrial, or research applications. These products are tailored for individual customer needs and packaged per customer requirements. The list of available isotopes includes;

Cobalt-60 (Co-60)
Cobalt-57 (Co-57)
Cesium-137 (Cs-137)

Iodine-131 (I-131)
Sodium-22 (Na-22)
Barium-133 (Ba-133)

License Amendment Application

The amendment application for the Part 40 license was dated January 19, 2007, and contained five specific requests:

- (1) I³ sought to relocate the bulk storage and handling of DU to a new powder-handling room to be located in the newly constructed 4137 Commerce Circle warehouse building. This warehouse is located approximately 450 feet from the existing 1359 Commerce Way process building. I³ also proposed to limit the total amount of DU at any one time to **[Security-Related Information - Withheld Under 10 CFR 2.390]**(in process equipment) at the 1359 Commerce Way process building while maintaining the current total possession limit of **[Security-Related Information - Withheld Under 10 CFR 2.390]** of uranium at their facility (process building and warehouse building combined);

- (2) I³ sought approval to alter the Hydrogen Fluoride (HF) exhaust ventilation system design at the 1359 Commerce Way process building, to use a stack/scrubber system that has an integral sump for scrubber solution;
- (3) I³ requested that the DU glove box exhaust at the 1359 Commerce Way process building will now travel through high-efficiency particulate air (HEPA) filters, and then into the HF ventilation system to be exhausted outside the building;
- (4) I³ requested that staff approve single, updated financial assurance mechanism, and DFP, consolidating the fluorine extraction process licensed under 10 CFR Part 40 with its NRC 10 CFR Part 30 license, 11-27680-01; and
- (5) I³ requested the removal of the current license's **[Security-Related Information - Withheld Under 10 CFR 2.390]** limit on gaseous fluorine compounds.

Regulatory Requirements

The regulatory basis for the technical review are general in nature and require that contents of an application demonstrate that, as required by 10 CFR 40.31(j) and 10 CFR 40.32(c) the changes proposed by the licensee to the facility will adequately protect public health and safety, and minimize danger to life and property. The review of the Decommissioning Funding Plan (DFP) was governed by 10 CFR 40.36, "Financial Assurance and Recordkeeping for Decommissioning," which states that each DFP must contain a cost estimate for decommissioning and a description of the method of assuring that sufficient funds for decommissioning will be available. Licensees must adjust their cost estimates at intervals not to exceed three years. The DFP must also contain: (1) a certification by the licensee that financial assurance for decommissioning has been provided in the amount of the cost estimate for decommissioning, and (2) a signed original of the financial instrument obtained to satisfy the requirements of this section.

The following describes the NRC staff's review of the specific amendment requests.

Regulatory Acceptance Criteria

As 10 CFR Part 40 specifies only general requirements to protect health and minimize danger to life and property, the applicable portions of NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," issued March 2002, were used to evaluate the safety and environmental aspects of the license application. The staff recently utilized the guidance provided by NUREG-1520 in the review of a license renewal for Honeywell Metropolis Works, another facility regulated under the provisions of 10 CFR Part 40. The staff reviewed the decommissioning funding submission using the guidance contained in Volume 3 of NUREG-1757 to meet the requirements of 10 CFR 40.36(d).

Staff Review and Analysis of Amendment Request 1

Request to relocate the bulk storage and handling of DU to a new warehouse with a powder-handling room

The licensee has proposed re-locating the bulk storage and handling operations of the DUF₄ to

a warehouse building located within the same industrial park as the existing 1359 Commerce Way process building. The fluorine extraction process will remain within the 1359 Commerce Way process building, however, instead of the bulk storage of DUF_4 also being there, it will take place at a new warehouse located at 4137 Commerce Circle. In the 4137 Commerce Circle warehouse building, the DUF_4 will be transferred into smaller containers (less than 25 kg), and then moved between the buildings via hand carry using a small garden style cart. It is anticipated that the transfer between buildings will take less than 2 minutes.

In evaluating the hazard of the storage, repackaging, and transfer of DUF_4 at the 4137 Commerce Circle warehouse building, the staff considered the physical makeup of DUF_4 . It is a solid, composed of agglomerating particles with a texture similar to baking soda. It is non-volatile, non-hygroscopic, and only slightly soluble in water. Even after exposure to water, UF_4 only very slowly dissolves and undergoes hydrolysis. After exposure to sufficient moisture, it will eventually form several possible uranium compounds and HF. Although not as stable as the uranium oxides, it has a very low reactivity to normal environmental conditions. These facts support the staff conclusion that in the event a container was dropped, and the confinement of that container was breached, the DUF_4 would not become a significant hazard to the public, it could be easily recovered, and the area where the spill took place could be decontaminated with conventional methods. To further minimize exposure risks, a drum hood with HEPA filtered exhaust is utilized in the 4137 Commerce Circle warehouse building.

The staff found no relationship between the proposed quantity of DUF_4 in the 1359 Commerce Way process building, and the consequence of a release of fluorine gas. I³ indicated in its March 13, 2007, submission that their intent of the maximum **[Security-Related Information - Withheld Under 10 CFR 2.390]** DUF_4 limitation was to aid in the response of an emergency or accident at the 1359 Commerce Way process building.

To facilitate emergency response, I³ states that it has conducted facility tours with the Idaho Falls Fire Department (IFFD), Hazardous Materials response (HazMat) team. I³ has stated that it intends to continue to work and communicate with the IFFD HazMat team so that there is a clear understanding of the risks associated with responding to an emergency at its facility. To further reduce risk from fire, combustible materials will remain safely separated from stored DUF_4 and all process equipment. While the DUF_4 stored in the facility cannot be disregarded, ensuring that only a small amount of material is maintained within the 1359 Commerce Way process building, coupled with the proper level of radiological training, should minimize the possibility of significant risk that may be posed by the DUF_4 . The maximum **[Security-Related Information - Withheld Under 10 CFR 2.390]** DU limitation at the 1359 Commerce Way process building also replaces statements within the original application that its total possession limit of **[Security-Related Information - Withheld Under 10 CFR 2.390]** within the process equipment¹. The total possession limit of **[Security-Related Information - Withheld Under 10 CFR 2.390]** of uranium in any chemical or physical form remains in effect for the licensee.

Finding

Based on the discussion above, the staff believes that the licensee has adequately described how the DUF_4 will be stored, handled, and transferred between the buildings. Because the two

¹ All process equipment is located at the 1359 Commerce Way building

buildings are located within the same industrial park, the new location does not increase risk and provides adequate protection of public health and safety. Therefore, the re-location of the bulk storage at the 4137 Commerce Circle warehouse building is acceptable. The staff also finds that the request to limit the total amount of DUF₄ to a maximum of **[Security-Related Information - Withheld Under 10 CFR 2.390]** within the 1359 Commerce Way process building provides adequate protection of public health and safety. Therefore, the license will be amended as follows:

LC- 9. The authorized place of use shall be the licensee's buildings located at 4137 Commerce Circle and 1359 Commerce Way, Idaho Falls, Idaho 83401.

LC-21 The amount of DUF₄, to be present within building located at 1359 Commerce Way Idaho Falls, Idaho 83401, will be limited to a maximum of **[Security-Related Information - Withheld Under 10 CFR 2.390]** at any one time.

Staff Review and Analysis of Amendment Requests 2 & 3

To alter the HF exhaust ventilation system design to use a stack/scrubber system that has an integral sump for scrubber solution and to allow the DUF₄ glove box exhaust to travel through HEPA filters and then into the HF ventilation system to be exhausted outside the building.

As discussed above, DUF₄, before entering the conversion process, is not very reactive. Personnel are required to be trained in the use of protective clothing, respiratory protection, and the safe handling of the material to minimize the spread of contamination. Therefore, human error during re-packaging and transfer operations from the 4137 Commerce Circle warehouse building to the 1359 Commerce Way process building are unlikely to cause a significant release. When reviewing operations at the 1359 Commerce Way process building, staff considered failure of the new HEPA filters or the Stack Scrubber system, and found that although their failure is possible, due to the passive engineering design of these devices, it is unlikely.

Therefore, fire provides the only credible and significant dispersal mechanism for radioactive materials and/or hazardous chemicals into the atmosphere from operations at either the 4137 Commerce Circle warehouse building or the 1359 Commerce Way process building. The staff focused on ensuring that any changes considered the effects those changes would have on both the likelihood and consequences of the credible fire. The review of this area generated a Request for Additional Information (RAI). The RAI, dated February 15, 2007, focused on potential changes to the fire protection system, materials of construction, and operation of both the HEPA filters and scrubber system. The NRC received the response from I³ on March 13, 2007.

The licensee sought approval to alter the HF exhaust ventilation system design in the to utilize a stack/scrubber system that has an integral sump for scrubber solution for the process equipment located at the 1359 Commerce Way process building². The initial application

² The system is not necessary at the 4137 Commerce Circle warehouse building as the DU is only stored and repackaged not processed.

mentioned the use of a catch tank as part of the stack/scrubber system. However, driven by facility square footage limitations, the licensee purchased a stack/scrubber system that did not have a separate catch tank and all of the scrubbing solution and discharge remains in the stack/scrubber. The licensee stated that this information was provided to clarify the license and, in the opinion of NRC staff, its use does not change the safety basis of the operation. The licensee sought to allow the DUF_4 glove box exhaust to travel through HEPA filters, and then into the HF filtering and ventilation system to be exhausted outside the building as opposed to being recirculated to the occupied space.

The licensee currently exhausts the glove box through HEPA filters, and this exhaust is directed back into the 1359 Commerce Way process building. The licensee's concern was, that in the unlikely event that it had to stop the process before the reaction went to completion, it may have fluorine gas off-gassing within the glove box. The HEPA filtration system is more than adequate to prevent the release of uranium contamination into the facility, however, any fluorine gas would go right through and be exhausted into the building. To alleviate this potentially hazardous condition, the licensee is adding a chemical filter that removes residual fluorine gas immediately downstream of the glove box. The treatment media will be visible through the filter housing, and will change color as fluorine gas is absorbed. This allows the licensee to determine when the media needs to be changed. The licensee will install two fluorine gas resistant HEPA filters that will be in a parallel configuration. Either one or both of the filters can be placed on line at any one time. Therefore, from a radiological aspect, there is no change in safety basis. However, it is a safer configuration when taking into consideration the unlikely event where the off-gassing fluorine gas compounds occurs.

Findings

The staff reviewed the corporate information and detailed process descriptions contained in the updated Form 313 that accompanied the amendment request. The licensee adequately described the two buildings where the storage and processing will take place and summarized the processes in sufficient detail for the staff to understand plant operations and the material handling procedures for feed, product, and waste. A review of the Material Safety Data Sheets for UF_4 show that all that is required for the handling and storage of UF_4 is safety glasses, good ventilation, and that it should be treated as a radiation hazard. The licensee has committed to ensure that all employees receive mandatory training in the safe handling of radioactive material.

The staff finds that the changes to the plant and equipment configuration, as described in the amendment request dated January 19, 2007, are acceptable. The addition of chemical filters and re-routing of the exhaust is a passive engineering feature that does not require any action on the part of the operator and, therefore, is considered by staff to not increase risk to public health and safety even though it exhausts directly to the outside of the building.

Staff Review and Analysis of Amendment Request 4

I³ requests that staff approve a single, updated financial assurance mechanism and DFP, consolidating the fluorine extraction process licensed under 10 CFR Part 40 with its NRC 10 CFR Part 30 license.

At the end of the plant life, the licensee must submit a decommissioning plan for NRC approval.

The I³ site will then be decontaminated and decommissioned in accordance with the approved plan. However, prior to receiving a license and periodically during operation, the licensee prepares an estimate, in the form of a DFP, that will ensure that sufficient funds will be available for the decommissioning. The DFP establishes a reasonable dollar amount that needs to be available for decommissioning. The licensee must also prepare a mechanism, such as a surety bond or parent company guarantee, that provides financial assurance for those decommissioning costs.

Discussion

The Licensee submitted a combined DFP dated January 19, 2007. That plan was supplemented with information contained in an e-mail dated June 12, 2007. The changes were requested, by the licensee, with the goal of providing two benefits. First by reducing the quantity of DUF₄ in the 1359 Commerce Way process building to a **[Security-Related Information - Withheld Under 10 CFR 2.390]** maximum, and when taking into consideration that the transfer of handling and packaging of UF₄ will be moved to the 4137 Commerce Circle warehouse building, this change significantly reduces the overall risk of radiological contamination to the 1359 Commerce Way process building. Second, this change allows for the efficient consolidation of the financial assurance requirements for the Part 40, SUB-1587 license with the financial assurance requirements associated with International Isotopes Inc.'s NRC Part 30 License 11-27680-01

The staff finds that there are two primary reasons that the combination of the decommissioning funding plans will result in a lower net cost for decommissioning.

First, keeping the quantity of source material handled within the 1359 Commerce Way process building at a **[Security-Related Information - Withheld Under 10 CFR 2.390]** maximum of DUF₄, and by ensuring that the material is only handled either inside a glove box or a within a fume hood, reduces the potential for radioactive contamination of the working space. These active controls, and the possession limitation on total material present, provides a basis to justify removing the clean up costs of most of the interior space when calculating an estimate for decommissioning costs. Although some of the activities that were initially planned for the 1359 Commerce Way process building will move to the newly constructed 4137 Commerce Circle warehouse building, for the purposes of calculating the surety, these changes result in a net reduction of approximately 40,000 ft² of potentially contaminated area that would have to be considered when calculating decommissioning funding.

Second, a significant savings is gained by combining the waste generator and waste manifest fees associated with waste disposal. Specifically, the Waste Disposal Cost Estimate for the SUB-1587 DFP, Rev 0, was \$61,672 and the Waste Disposal Cost Estimate for the 11-27680-01 DFP, Rev 4, was \$88,696 for a total uncombined waste disposal cost of \$150,368. Therefore, by combining the manifest and generator fees into one, the total cost drops to \$142,546.

These changes result in a net reduction of the total financial assurance, required by the licensee, of \$50,697.

Findings

The staff finds that the assumptions and the estimated total decommissioning costs in the combined plan are reasonable. License Condition 21, which limits the total amount of DUF₄ present, provides additional assurance that the 1359 Commerce Way process building is unlikely to become significantly contaminated. Therefore, the estimate is acceptable.

10 CFR 40.36(d) requires licensees to adjust the cost estimate for decommissioning at intervals not to exceed three years, however, the regulation is unclear in stating that the licensee must submit the proposed adjusted cost estimate for review. Therefore, to verify that this requirement is met, NRC is modifying License Condition 17 as follows:

LC-17 Prior to accepting licensable quantities of source material, and at intervals not to exceed three years, the licensee must submit, for NRC review, an updated cost estimate for decommissioning. After resolution of any NRC comments on the estimate, the licensee must provide to the NRC a signed original of the financial instrument reflecting an amount, in current year dollars, sufficient to cover the approved cost estimate. The regional office responsible for the 10 CFR Part 30 license will hold the original of the combined financial instrument.³

License Condition 18 is captured within License Condition 17 and will be deleted.

Staff Review and Analysis of Amendment Request 5

I³ requested the removal of the current license's [Security-Related Information - Withheld Under 10 CFR 2.390] limit on gaseous fluorine compounds.

[Security-Related Information - Withheld Under 10 CFR 2.390]

Findings

The staff finds that the replacement of the **[Security-Related Information - Withheld Under 10 CFR 2.390]** fluorine limit with a stipulation by the licensee that the 1359 Commerce Way process building is in compliance with the **[Security-Related Information - Withheld Under 10 CFR 2.390]** for the quantity of fluorine gas compounds stored, used, or produced, adequately protects public health and safety, and is, therefore, acceptable. No fluorine gas is permitted in the 4137 Commerce Circle warehouse building, however I³ is still required to demonstrate compliance of this building to the **[Security-Related Information - Withheld Under 10 CFR 2.390]** to both State and local agencies. Compliance with the IFC and IBC to State and local agencies for all buildings on their site will be verified by the NRC during routine inspections. LC-20 will be modified as follows:

LC-20 Deleted by Amendment 1

Technical Reviewers
Michael Raddatz
James Downs

³ Currently, Region IV is the responsible regional office.