UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 E. LAMAR BLVD.
ARLINGTON, TX 76011-4511

March 25, 2014

Mr. John J. Miller, Radiation Safety Officer
International Isotopes, Inc.
4137 Commerce Circle
Idaho Falls, ID 83401

SUBJECT: NRC INSPECTION REPORT 040-09058/13-001 AND NOTICE OF VIOLATION

Dear Mr. Miller:

This refers to the U.S. Nuclear Regulatory Commission (NRC) inspection conducted on December 19, 2013, at your facility in Idaho Falls, Idaho. This inspection was an examination of activities conducted under NRC Materials License SUB-1587 as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel.

The preliminary inspection findings were presented to you at the conclusion of the onsite inspection. The final inspection results were presented to you by telephone on March 13, 2014, after the NRC had concluded its enforcement review of the inspection findings. The enclosed report presents the results of this inspection.

Based on the results of this inspection, the NRC has determined that two Severity Level IV violations of NRC requirements occurred. The first violation involves your failure to submit an updated decommissioning cost estimate to the NRC at an interval not to exceed three years. The second violation involves your failure to adequately survey Building 1359 prior to releasing the structure for unrestricted use. These violations were evaluated in accordance with the NRC Enforcement Policy included on the NRC's Web site at www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html. The violations are cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding them are described in detail in the subject inspection report.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The guidance in NRC Information Notice 96-28, "Suggested Guidance Relating to Development and Implementation of Corrective Action," may be helpful. You can find the Information Notice on the NRC website at: https://www.nrc.gov/reading-rm/doc-collections/gen-comm/info-notices/1996/in96028.html. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice and Procedure," a copy of this letter, its enclosure, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/ reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Should you have any questions concerning this inspection, please contact Dr. Robert Evans, Senior Health Physicist, at 817-200-1234 or the undersigned at 817-200-1191.

Sincerely,

/RA/

D. Blair Spitzberg, Ph.D., Chief
Repository and Spent Fuel Safety Branch
Division of Nuclear Materials Safety

Docket: 040-09058
License: SUB-1587

Enclosures:
1. Notice of Violation
2. NRC Inspection Report 040-09058/13-001

cc w/encls: M. Dietrich, Idaho Department
of Environmental Quality

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice and Procedure," a copy of this letter, its enclosure, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/ reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

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Docket: 040-09058
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cc w/encls: M. Dietrich, Idaho Department
of Environmental Quality

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NOTICE OF VIOLATION

International Isotopes, Inc.
Idaho Falls, Idaho

Docket No. 040-09058
License No. SUB-1587

During a U.S. Nuclear Regulatory Commission (NRC) inspection conducted on December 19, 2013, two violations of NRC requirements were identified. In accordance with the NRC Enforcement Policy, the violations are listed below:

A. License Condition 18 states that the licensee must submit for NRC review an updated cost estimate for decommissioning at intervals not to exceed three years.

Contrary to the above, as of December 19, 2013, International Isotopes, Inc. had not submitted an updated cost estimate for decommissioning for NRC review at an interval not to exceed three years. In particular, the last decommissioning cost estimate dated May 1, 2010, was submitted to the NRC by licensee letter dated June 30, 2010. The updated decommissioning cost estimate was due to be submitted for NRC review by June 30, 2013. As of December 19, 2013, an interval in excess of three years, the licensee still had not submitted an updated cost estimate for decommissioning.

This is a Severity Level IV violation. (Section 6.3)

B. Regulation 10 CFR 20.1501(a) requires that each licensee shall make or cause to be made, surveys of areas, including the subsurface, that —
(1) May be necessary for the licensee to comply with the regulations in this part; and
(2) Are reasonable under the circumstances to evaluate--
(i) The magnitude and extent of radiation levels; and
(ii) Concentrations or quantities of residual radioactivity; and
(iii) The potential radiological hazards of the radiation levels and residual radioactivity detected.

Survey means an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation. When appropriate, such an evaluation includes a physical survey of the location of radioactive material and measurements or calculations of levels of radiation, or concentrations or quantities of radioactive material present.

Contrary to the above, as of June 25, 2013, the licensee did not make or cause to be made surveys that were necessary to comply with 10 CFR 20.1402, a regulation which limits the radiological criteria for unrestricted use after decommissioning of facilities. Specifically, the licensee decommissioned and surveyed Building 1359 in May 2013 and subsequently released the building for unrestricted use. However, the licensee did not correctly analyze the survey data, data that was submitted to the NRC by letter dated June 25, 2013. Because the licensee incorrectly surveyed the building, it *could have* released the building for unrestricted use without meeting the radiological criteria for unrestricted use after decommissioning.

This is a Severity Level IV violation. (Section 6.7)

Pursuant to the provisions of 10 CFR 2.201, International Isotopes Inc., is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN:

Document Control Desk, Washington, DC 20555-0001, with a copy to the Regional Administrator, Region IV, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level; (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken; and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Your response will be made available electronically for public inspection in the NRC Public Document Room or in the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy or proprietary information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information).

In accordance with 10 CFR 19.11, you may be required to post this Notice within 2 working days of receipt.

Dated this 25th day of March 2014

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket:	040-09058
License:	SUB-1587
Report:	040-09058/13-001
Licensee:	International Isotopes, Inc.
Location:	4137 Commerce Circle Idaho Falls, ID 83401
Date:	December 19, 2013
Inspector:	Robert Evans, Ph.D., P.E., C.H.P., Senior Health Physicist Repository and Spent Fuel Safety Branch
Approved by:	D. Blair Spitzberg, Ph.D., Chief Repository and Spent Fuel Safety Branch Division of Nuclear Materials Safety
Attachment:	Supplemental Inspection Information

Enclosure 2

EXECUTIVE SUMMARY

International Isotopes, Inc.
U.S. Nuclear Regulatory Commission (NRC) Inspection Report 040-09058/13-001

This inspection was a routine, announced inspection of activities being conducted at the International Isotopes Inc. site in Idaho Falls, Idaho. The inspection included a confirmatory survey of Building 1359. The inspector concluded that the licensee was conducting site activities in accordance with regulatory and license requirements, with two exceptions.

Industrial/Academic/Research Programs

- The licensee implemented a radiation safety program in accordance with license and regulatory requirements. (Section 1.2.a)

- The licensee was maintaining compliance with various license conditions related to source material with foreign obligations, material security and reporting, and toxic gas security. (Section 1.2.b)

- The licensee's failure to submit an updated decommissioning cost estimate to the NRC within three years was identified as a violation of the license. (Section 1.2.b)

Closeout Inspection and Survey

- The licensee's failure to make or cause to be made surveys to assure compliance with the radiological criteria for unrestricted use of a site specified in 10 CFR 20.1402 was identified as a violation of regulations. (Section 2.2.a)

- The licensee's revised final status survey results indicate that Building 1359 met the radiological criteria for unrestricted use as specified in 10 CFR Part 20, subpart E, based on the licensee's proposed release criterion. However, at the conclusion of the inspection, the NRC had not approved the licensee's proposed release criterion. (Section 2.2.a)

- The inspector conducted a confirmatory survey of Building 1359. The survey included measurement of ambient gamma radiation and surface contamination levels. The confirmatory survey results meet the licensee's proposed release criterion, suggesting that the licensee had adequately decommissioned and final surveyed the building, and the building could be released for unrestricted use. (Section 2.2.b)

Report Details

Summary of Site Status

International Isotopes, Inc. (the licensee) submitted an application to the NRC by letter dated April 18, 2005, for possession and use of source material. The licensee planned to use uranium in the form of depleted uranium tetrafluoride (DUF_4) to produce fluorine gas. The licensee planned to conduct operations using licensed material in Building 1359 located in Idaho Falls, Idaho. Wastes were expected to be shipped for disposal at a commercial waste disposal facility. The NRC subsequently issued Materials License SUB-1587 to the licensee on October 25, 2005, for possession of 6,000 kilograms of uranium.

The licensee commenced with pilot plant operations in January 2006. The first NRC inspection was conducted in June 2006. At that time, the licensee possessed about 15 pounds of source material for production of small quantities of fluorine gas.

In January 2007, the licensee requested an amendment to the license to allow possession of uranium at a warehouse located across the street from Building 1359. The licensee had constructed this warehouse in 2006, and the licensee wanted to store excess DUF_4 at this location, in part, to reduce the amount of uranium to be possessed in Building 1359 from 6,000 kilograms to 25 kilograms. If approved by the NRC, this change would reduce the financial assurance requirements for the building. The licensee also requested changes to the ventilation system and removal of the licensed limit on gaseous fluorine compounds in the building. The NRC requested additional information, and the licensee responded to this request with additional details in March 2007. The NRC subsequently amended the license on July 27, 2007.

The NRC conducted the second inspection of the licensee in July 2008. At that time, the licensee possessed about 1,139 kilograms of source and waste material. The licensee was still conducting pilot plant operations and adjusting operations as necessary to improve the fluorine gas production process. Most of the licensed material was being stored at the warehouse, and the licensee was maintaining the 25-kilogram limit for source material in Building 1359.

By letter dated December 20, 2010, the licensee notified the NRC that it had received two shipments of DUF_4 containing trace quantities of transuranic isotopes. (The licensee is not authorized to possess transuranics under License SUB-1587.) The licensee accepted the first shipment without question, in part, because the shipper's declaration did not mention that the DUF_4 material contained transuranics. The licensee discovered the problem when the second shipper's declaration mentioned the presence of transuranics in the shipped material. In response, the licensee confirmed that it had not processed any of the material containing transuranics, and the licensee returned the DUF_4 material to the supplier in January 2011. The licensee issued a corrective action report, and the licensee elected to no longer accept DUF_4 material from this supplier. By letter dated January 13, 2011, the NRC notified the licensee that its corrective actions were appropriate. During this inspection, the NRC inspector confirmed that the licensee had returned all material containing trace quantities of transuranics to the supplier.

By letter dated June 25, 2013, the licensee notified the NRC that it had discontinued pilot plant operations in Building 1359. The licensee requested that the NRC amend the license to remove the building from the license and to convert the license to a possession and storage only license. The licensee notified the NRC that it had moved all licensed material and contaminated equipment to the warehouse. As part of the license amendment package, the licensee also submitted a decommissioning plan and final status survey report for Building 1359, after the completion of decommissioning activities. In response to NRC comments, the licensee submitted an updated final status survey report to the NRC for review in mid-February 2014.

The decommissioning plan states that the licensee conducted research and development activities at Building 1359 from January 2006 through December 2012. The licensee conducted 87 test runs using 53 kilograms of source material to produce fluorine gas. The licensee stated that depleted uranium was handled only in glove boxes and fume hoods, and no spills or contamination events occurred outside of these enclosed spaces.

The licensee decommissioned the building in early May 2013, and the licensee conducted the final status survey in mid-May 2013. The licensee subsequently free-released the building at risk. At the time of the December 2013 inspection, a company that manufactured printing equipment was occupying the building.

By letter dated October 21, 2013, the NRC asked the licensee for an alternate schedule for completing the decommissioning process, as required by 10 CFR 40.42(i). By letter dated November 4, 2013, the licensee provided a proposed schedule for completion of decommissioning. The licensee plans to transfer all remaining DUF_4 material in storage to a different license (SUB-1011) and dispose of all waste material at an authorized low-level waste disposal site. The licensee planned to complete these activities by June 2016. The licensee does not plan to free-release the warehouse in the near future because it will continue to contain radioactive material under NRC Materials License No. 11-27680-01. At the conclusion of the onsite inspection, the licensee's amendment request and alternate schedule request were still being reviewed by the NRC.

During the December 2013 inspection, the licensee continued to store DUF_4 material and waste material at the warehouse. The inspector confirmed that the licensee possessed uranium in quantities below the licensed limit. The licensee also was storing two potentially contaminated glove boxes, one fume hood, and ventilation ductwork at the warehouse. These components were removed from Building 1359 during May 2013, prior to performance of the final status survey. The licensee plans to dispose of the waste uranium material and equipment of no value about August 2014, although the licensee was considering its options for disposal of all uranium in storage at the same time.

At the time of the inspection, the licensee continued to staff the president/chief operating officer and the radiation safety officer positions with qualified individuals. The various fluorine production positions were no longer staffed. Any work associated with the source material license was conducted by site staff on a part-time, as-needed basis.

1 Industrial/Academic/Research Programs (87126)

1.1 Inspection Scope

The inspector reviewed licensed activities to determine if these activities were being conducted safely and in accordance with license and regulatory requirements.

1.2 Observations and Findings

a. Implementation of Radiation Safety Program

The inspector reviewed the licensee's implementation of its radiation protection program for the source material license. The licensee's program included internal and external exposure monitoring, air sampling, contamination surveys, training of employees, control of instrumentation, and annual program reviews.

The licensee conducted internal and external exposure monitoring for site workers. External exposures were monitored using dosimeters, and internal exposures were monitored through collection of bioassays and air samples. Some of the workers using source material were also assigned to other projects involving byproduct NRC Materials License No. 11-27680-01; therefore, these individuals received occupational exposures not related to the source materials license.

The inspector reviewed the licensee's exposure records for 2008-2013. The licensee estimated that the highest annual whole body dose was 0.014 roentgen equivalent man (rem) during operations, with a regulatory limit of 5 rem. The records also suggest that no individual received a measurable exposure to source material during cleanup and decommissioning of Building 1359 during May 2013. The inspector noted that the maximum worker exposure during 2008-2013 was 0.685 rem from all work activities, including work conducted under the byproduct material license. In summary, all occupational exposures remained below the regulatory limit of 5 rem per year.

In the license application, referenced in Condition 10 of the license, the licensee committed to conduct internal exposure monitoring as necessary to determine the extent of internal exposure to uranium compounds. The licensee conducted bioassay sampling from 2006-2010, but discontinued sampling at the end of 2010. The licensee's records indicate that no operational samples exceeded the laboratory minimum detectable concentrations, although one baseline sample for an incoming worker slightly exceeded the minimum detectable concentration in 2008. The licensee chose to discontinue bioassay sampling of workers in 2010, as allowed by 10 CFR 20.1502, because: (1) no sample result indicated that an uptake had occurred; (2) all source material was being handled within enclosed spaces (fume hoods or glove boxes); (3) no air sample result revealed radioactivity above background levels; and (4) the licensee handled only small quantities of uranium during pilot plant operations.

The licensee collected air samples to measure airborne uranium contamination. The licensee monitored the stack ventilation system continuously; while the licensee collected intermittent samples using a continuous air monitor as well as grab samples. The licensee's records indicate that no sample result was distinguishable from background during operations involving depleted uranium.

The licensee conducted alpha contamination surveys from 2006-2012. The licensee started with weekly sampling, followed by monthly, quarterly, and as-needed sampling based on sample results. (The license does not specify a frequency for these samples.) Several samples in the production room exceeded the action level in 2007, but these samples were attributed to naturally occurring radioactive material. According to the radiation safety officer, subsequent sample results were found to be at background levels, and no operational event occurred that could have explained the elevated

samples. The licensee stated that contamination involving licensed material was never identified outside of glove boxes or fume hoods used to handle depleted uranium.

The licensee maintained instrumentation to monitor for contamination including friskers for surface surveys, probes for measuring swipe samples, and air samplers for monitoring airborne contamination. The licensee maintained the instrumentation with routine calibrations and functional checks.

The inspector confirmed that the licensee conducted refresher training during 2010-2012. This training was provided to workers assigned to the source material license. At the time of the inspection, no worker was specifically assigned to the source material license, but the licensee continued to train workers under its byproduct material license.

The inspector examined the licensee's annual radiation protection program audits for 2010-2013. Several deficiencies were identified during the audits, including discovery of a missed As Low As Reasonably Achievable committee meeting. In summary, the licensee conducted the annual program reviews in compliance with regulatory requirements.

b. Implementation of License Conditions

The inspector reviewed the status of several license conditions. To begin with, License Condition Nos. 12 and 13 provide the requirements for possessing source material with foreign obligations. The licensee stated that it had no source material in its possession with foreign obligations. Further, License Condition No. 14 provides the reporting requirements if there is an unlawful theft or diversion of source material. The licensee stated that there had been no attempted thefts or diversions of source material.

License Condition No. 18 states that the licensee must submit for NRC review an updated cost estimate for decommissioning at intervals not to exceed three years. The last cost estimate was dated May 1, 2010, and was submitted to the NRC by letter dated June 30, 2010. At the conclusion of the onsite inspection, approximately six months after the updated decommissioning cost estimate was due, the licensee still had not submitted the cost estimate to the NRC. The licensee's failure to submit an updated decommissioning cost estimate to the NRC within three years was identified as a violation of the license (VIO 040-09058/1301-01).

Finally, License Condition No. 19 requires the licensee to maintain a site security plan for the control of toxic gases produced during facility operations. By letter dated June 25, 2013, the licensee notified the NRC that it had discontinued operations in Building 1359, and it no longer possessed any toxic gases including fluorine at the facility. The licensee requested removal of this condition from the license. During site tours, the inspector did not observe any containers of toxic gases in storage at the facility. The NRC is currently reviewing the licensee's request to remove Condition No. 19 from the license.

1.3 Conclusions

The licensee implemented a radiation safety program in accordance with license and regulatory requirements. The licensee was maintaining compliance with various license conditions related to source material with foreign obligations, material security and

reporting, and toxic gas security. The licensee's failure to submit an updated decommissioning cost estimate to the NRC within three years was identified as a violation of the license.

2 Closeout Inspection and Survey (83890)

2.1 Inspection Scope

The inspector reviewed the licensee's decommissioning activities to determine if these activities were being conducted in accordance with the decommissioning plan and to verify if the site had been decontaminated to acceptable radiological levels for unrestricted use.

2.2 Observations and Findings

a. Review of Decommissioning Plan and Final Status Survey Report

By letter dated June 25, 2013, the licensee submitted an amendment request to remove Building 1359 as an authorized place of use from License SUB-1587. In the same letter, the licensee submitted a decommissioning plan dated February 18, 2013, and a final status survey report dated June 25, 2013. The licensee conducted building decommissioning and the final status survey in May 2013, prior to submitting the decommissioning plan to the NRC. During the inspection, the inspector became aware that the licensee had released Building 1359 for unrestricted use. At the time of the inspection, an industrial company unrelated to the licensee was occupying the building and was conducting manufacturing operations.

The inspector reviewed the licensee's proposed decommissioning plan, final status survey report, and decommissioning activities for compliance with regulatory requirements. Regulation 10 CFR 40.42(d) states, in part, that within 60 days of the licensee's decision to permanently cease principal activities in any separate building or outdoor area, the licensee shall provide notification to the NRC in writing. The licensee permanently discontinued operations in Building 1359 in December 2012, and the licensee notified the NRC of its decision by email dated January 17, 2013. After consultation with the NRC's program office, the inspector concluded that the licensee's email met the regulatory reporting requirement.

Regulation 40.42(g) stipulates, in part, that a decommissioning plan must be submitted if the procedures and activities necessary to carry out decommissioning of the site or separate building or outdoor area have not been previously approved by the Commission and these procedures could increase potential health and safety impacts to workers or to the public. One example provided in 10 CFR 40.42(g)(i) includes procedures that involve techniques not applied routinely during cleanup or maintenance operations. A second example, provided in 10 CFR 40.42(g)(iv), includes work procedures that could result in significantly greater releases of radioactive material to the environment than those associated with operation.

By email dated January 24, 2013, the NRC staff asked the licensee if the proposed decommissioning of Building 1359 involved any of the examples provided in 10 CFR 40.42(g). The licensee responded by email on the same day that prior approval for a decommissioning plan was not necessary, because none of the examples provided

in regulations was applicable, but the licensee would develop a decommissioning plan to support the licensing action. The licensee subsequently submitted the decommissioning plan to the NRC as part of the application request to remove the building from the license, after the decommissioning of the building had been completed.

The decommissioning work consisted primarily of removal of ventilation ductwork, ventilation filter, three fume hoods, and two glove boxes all of which had been utilized in the processing of depleted uranium in dispersible form. At the time of the inspection, these components were being stored in the warehouse, pending future decontamination, disposal, or reuse. The licensee's records indicate that some internal contamination was identified within several components, but none of the components had external contamination. The licensee conducted the work using a generic radiation work permit which provided the radiological controls for protection of workers.

The NRC inspector concluded that the removal of contaminated equipment from the building was conducted using procedures that involve techniques that could have been applied routinely during cleanup or maintenance operations. In addition, the licensee had an established program under its NRC broadscope license that included trained workers, procedures, and survey meters that were available to support the decommissioning activities.

The licensee's final status survey consisted of fixed and removable surface contamination measurements. The licensee collected background measurements within non-impacted reference areas (the utility room and concrete floors adjacent to the building roll-up doors) for comparison to the surface contamination levels within the potentially impacted areas of Building 1359. Based on the radionuclide of concern (uranium) and because operations were conducted inside of the building, the licensee did not conduct ambient gamma radiation surveys, collect media samples (paint or concrete fragments), or collect samples from outside of the building.

The licensee initially proposed a wide-range derived concentration guideline level ($DCGL_w$) of 235 disintegrations per minute per 100-square centimeters (dpm/ 100 cm^2) in the decommissioning plan. The licensee submitted an updated final status survey report to the NRC in mid-February 2014. In this revised report, the licensee proposed a $DCGL_w$ of 1,100 dpm/100 cm^2. This revised $DCGL_w$ was based on the radioactivity fractions of depleted uranium, while the original $DCGL_w$ (235 dpm/100 cm^2) was conservatively based on uranium-238 with all progeny in equilibrium.

Prior to conducting the decommissioning work, the licensee collected several radiological samples from within the ventilation system ductwork, and the sample results indicate that some of the internal surfaces were contaminated with licensed material. The highest level of contamination was identified inside the high efficiency particulate absorption (HEPA) unit, upstream of the filter itself. This sample measured 604 disintegrations per minute for a large area swipe. These survey results indicate that the ventilation system had internal contamination, but the contamination levels were below the licensee's proposed $DCGL_w$.

Using the guidance provided in NUREG-1575, Revision 1, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)," the licensee divided the building into eight survey units. The licensee collected 135 direct survey measurements and 70 swipe samples in these eight survey units. Table 8.2 from MARSSIM provides the release criterion for survey units. If the difference between the largest survey unit

measurement and the smallest reference area measurement is less than the $DCGL_w$, then the survey unit meets the release criterion. The licensee's final status survey report indicates that the highest surface measurement, minus the minimum reference area background, was 512 dpm/100 cm^2. This calculated measurement was less than half of the licensee's proposed $DCGL_w$. The licensee's proposed final status survey results indicate that the building can be free-released; although, at the end of the inspection period, the licensee's proposed decommissioning plan and final status survey reports had not been approved by the NRC.

In the revised final status survey report, the licensee conducted statistical analyses of its final status survey results using the Wilcoxon Rank Sum test as recommended by MARSSIM. The licensee conducted this analysis to confirm that the number of sampling points and the measurement sensitivity was adequate for each survey unit and to confirm if each survey unit met the release criterion. The statistical tests confirmed that that the survey parameters were adequate and the survey units met the release criterion.

The NRC inspector reviewed the licensee's two proposed final status survey reports. The first report was dated June 25, 2013, and the revised report was dated February 21, 2014. The second report corrected the survey calculations and updated the $DCGL_w$. The inspector discussed these two reports with the NRC project manager and concluded that the licensee inappropriately released Building 1359 for unrestricted use because the original survey results were inaccurate. In particular, the licensee did not use the correct surface efficiency as recommended by MARSSIM. However, the licensee used these survey results to justify a decision to release Building 1359 at risk.

Regulation 10 CFR 20.1501(a) requires that each licensee shall make or cause to be made, surveys of areas, including the subsurface, that —

(1) May be necessary for the licensee to comply with the regulations in this part; and
(2) Are reasonable under the circumstances to evaluate--
    (i) The magnitude and extent of radiation levels; and
    (ii) Concentrations or quantities of residual radioactivity; and
    (iii) The potential radiological hazards of the radiation levels and residual radioactivity detected.

According to 10 CFR 20.1003, *survey* means an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation. When appropriate, such an evaluation includes a physical survey of the location of radioactive material and measurements or calculations of levels of radiation, or concentrations or quantities of radioactive material present.

Contrary to the requirements of 10 CFR 20.1501(a), the licensee did not make or cause to be made surveys to assure compliance with the requirements of 10 CFR 20.1402. Specifically, the licensee decommissioned and surveyed Building 1359 in May 2013 and subsequently released the building for unrestricted use. However, the licensee did not correctly analyze the survey data. Because the licensee incorrectly surveyed the building, it *could have* released the building for unrestricted use without meeting the radiological criteria for unrestricted use after decommissioning. The licensee's failure to adequately survey Building 1359 prior to releasing the building for unrestricted use was identified as a violation of 10 CFR 20.1501(a) requirements (VIO 040-09058/1301-02).

b. NRC Confirmatory Survey

The inspector conducted a confirmatory survey of Building 1359. The building is approximately 80 feet wide by 100 feet deep. The licensee estimated that the surveyed area was approximately 8,638 square feet, including second-floor offices and storage areas. There are no floor drains in the production area; therefore, there were no subsurface drains that had to be radiologically surveyed.

The NRC inspector measured the ambient gamma radiation levels, measured surface radioactivity at 28 locations, and collected one swipe sample for removable contamination.

The inspector measured the ambient gamma radiation levels with a Ludlum Model 18 analyzer with SPA-3 probe (NRC number 012778, calibration due date of 11/07/14). The inspector measured the ambient gamma radiation levels primarily to identify areas of elevated radiation for surface contamination sampling. With an average background measurement of 9,000 counts per minute (cpm), the ambient gamma radiation levels ranged from 8,000 cpm to 24,000 cpm. The highest measurements were identified in the southeastern corner of the building by the loading dock. This area consisted of concrete and asphalt flooring. The inspector attributed these elevated measurements to naturally occurring radioactive material in the building materials, because the licensee had not handled or used DU in these areas. The licensee did not propose decommissioning acceptance criteria for ambient gamma radiation levels; therefore, there was no release criterion for radiation levels at this site.

The inspector measured the surface contamination levels using an Eberline E-600 survey meter with SHP380AB alpha/beta probe (NRC number 063472, calibration due date of 11/13/14). The inspector measured the alpha and beta background levels in the utility room, and calculated an instrument lower limit of detection. The inspector measured the surface contamination levels at 28 discrete points throughout the building. Two alpha particulate sample results exceeded the lower limit of detection of the survey meter. Both locations were situated in the former Room 301, the area where the gas production skid was previously installed. However, the highest alpha particulate sample result, 984 dpm/100 cm^2 (with background included), remained below the licensee's proposed $DCGL_w$. The licensee could not explain why this area apparently had elevated alpha particulate radioactivity because the licensee indicated that it had not experienced any spills or contamination incidents within Building 1359. The licensee speculated that the source of the elevated measures may be potassium residue from past operations.

The inspector collected one swipe sample in Room 301, to determine if any contamination was removable. The inspector analyzed the sample for alpha/beta /gamma contamination using a Ludlum Model 2401P survey meter (NRC number 21448G, calibration due date of 06/24/14). The swipe sample result was indistinguishable from background, suggesting that there was no removable surface contamination in this room.

The inspector measured the surface contamination levels in the southeastern portion of the building, the area where the inspector measured the elevated ambient gamma radiation levels. The surface contamination measurements in this area were below the calculated lower limit of detection for the survey meter.

Table 8.2 from MARSSIM provides the release criterion for survey units. If the difference between the largest survey unit measurement and the smallest reference area measurement is less than the $DCGL_w$, then the survey unit meets the release criterion. The inspector's lowest background measurement was 131 dpm/100 cm^2. (For comparison, the licensee's smallest reference area survey measurement was about 128 dpm/100 cm^2.) The inspector's largest measurement was 984 dpm/100 cm^2. The difference between the two was 853 dpm/ 100 cm^2, with a proposed $DCGL_w$ of 1,100 dpm/100 cm^2, meaning that the survey unit (Building 1359) meets the release criterion.

At the conclusion of the inspection period, the NRC had not approved the licensee's proposed $DCGL_w$. If the NRC rejects the proposed $DCGL_w$, the inspector's survey results will have to be compared to the $DCGL_w$ value that is approved, or the inspector's survey results will have to be statistically analyzed using the Wilcoxon Rank Sum method to determine if the survey unit (the building) meets the release criterion.

2.3 Conclusions

The licensee's failure to make or cause to be made surveys to assure compliance with the radiological criteria for unrestricted use of a site specified in 10 CFR 20.1402 was identified as a violation of regulations.

The licensee's revised final status survey results indicate that Building 1359 met the radiological criteria for unrestricted use as specified in 10 CFR Part 20, subpart E, based on the licensee's proposed release criterion. However, at the conclusion of the inspection, the NRC had not approved the licensee's proposed release criterion.

The inspector conducted a confirmatory survey of Building 1359. The survey included measurement of ambient gamma radiation and surface contamination levels. The confirmatory survey results meet the licensee's proposed release criterion, suggesting that the licensee had adequately decommissioned and final surveyed the building, and the building could be released for unrestricted use.

3 Exit Meeting

The inspector reviewed the preliminary inspection scope and findings during an exit meeting conducted at the conclusion of the onsite inspection. The inspector provided the final inspection findings to the licensee by telephone on March 13, 2014. During the inspection, the licensee did not identify any information reviewed by the inspector as proprietary.

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

S. Laflin, President/Chief Executive Officer
J. Miller, Radiation Safety Officer

INSPECTION PROCEDURES USED

IP 87126	Industrial/Academic/Research Programs
IP 83890	Closeout Inspection and Survey

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

VIO 040-09058/1301-01	VIO	Failure to submit decommissioning cost estimate to NRC
VIO 040-09058/1301-02	VIO	Failure to adequately survey Building 1359 in May 2013

Closed

None

Discussed

None

LIST OF ACRONYMS

CFR	Code of Federal Regulations
cpm	counts per minute
$DCGL_w$	wide-range derived concentration guideline level
DUF_4	depleted uranium tetraflouride
dpm/100 cm^2	disintegrations per minute per 100 square centimeters
HEPA	high efficiency particulate absorption
IP	Inspection Procedure
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
NRC	U.S. Nuclear Regulatory Commission
REM	Roentgen equivalent man
VIO	violation

Attachment