

Vice President for Research
and Graduate Studies

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2 August 2000

50-113

Marvin Mendonca
USNRC
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Dear Mr. Mendonca:

On July 27, 2000, John Williams, Director of the University of Arizona Nuclear Reactor Research Laboratory filed a notice with USNRC indicating the possible occurrence of I-131 in our Nuclear Reactor Research Laboratory run under License Number R-52. In that report, he indicated suspicion that the Radiation Control Office observations that led to his report may have been spurious. Nonetheless, he filed the report within the 24-hour period he thought was required under the circumstances while additional evaluation was conducted by the Radiation Control Office (See attachment 1).

Subsequent re-evaluation of the original data and further testing by the Radiation Control Office resulted in support of Dr. Williams suspicion that the initial results were spurious and that all parameters were within allowable limits. With this information in hand, Dr. Williams filed a request on the afternoon of July 27, 2000 withdrawing the original notification to USNRC on the morning of July 27, 2000 (See attachment 2).

I have just received a report on the full analysis of the data obtained and conclusions from the Director of Radiation Control on the University of Arizona campus. This report is enclosed for your perusal. I interpret this report to say that the initial findings were, indeed, spurious and that no individuals were in any way endangered (See attachment 3).

The University of Arizona is, of course, concerned with full compliance in such matters and in full disclosure where employee or public interests are involved. I understand from Dr. Williams that a 30-day report will need to be filed to review the incident. Meanwhile, both the President of the University and I would welcome your review of the July 27, 2000 filings on this matter with the USNRC and the July 28, 2000 report on the matter from our Radiation Control Office. It seems prudent to have an additional, external, and

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independent evaluation of the situation, even though we have absolutely no reason to believe that a significant event occurred. Would it be possible for USNRC to provide such a review for the University or to make recommendations for the conduct of such a review?

I would greatly appreciate your assistance in this regard. If you would like to talk personally on the matter, I can be reached at (520) 621-3513.

Sincerely,

A handwritten signature in black ink that reads "Richard C. Powell". The signature is written in a cursive style with a prominent initial "R".

Richard C. Powell
Vice President for Research
and Graduate Studies

Attachments

RCP:arr

DATE: July 28, 2000

TO: Richard C. Powell, Ph.D.
Vice-President for Research and
Graduate Studies

FROM: Melvin C. Young, Ph.D. 
Director

MEMORANDUM
UNIVERSITY OF ARIZONA
RADIATION CONTROL OFFICE
626-6850 VOICE
626-2583 FAX

1640 N. Vine (B/466)
PO Box 24-5101
<http://www.radcon.arizona.edu>

SUBJECT: Follow-up to USNRC Report

Executive Summary

1. It is concluded that no NRL visitor on July 18, 2000:
 - a. approached the sample storage cave.
 - b. received any measurable external dose, as documented by dosimeters and air and area monitors.
 - c. received any measurable internal dose based upon contamination survey data.
2. RCO's routine monthly survey on July 18th indicated that the NRL sample storage cave, handrails, and waste container had a low level of contamination. In my opinion, the storage cave was undoubtedly contaminated, but whether or not the other three samples represented actual surface area contamination is inconclusive. Any contamination of these areas could easily have been removed by the survey, although cross-contamination of these three samples in the survey sample envelope by the first is not impossible.
3. Re-evaluation of the NRL storage cave survey indicates that no ¹³¹I was present in the sample as first indicated by RCO.
4. RCO analysis of pre and post decontamination surveys performed by NRL on the four areas of concern on July 26th found no contamination present.
5. A complete re-survey of NRL performed by RCO and counted on July 27th indicated no contamination present for any of the 25 routine and special sample locations.
6. A general contamination survey of RCO's laboratory on July 27th found no contamination present. A more thorough survey of the detector and detector cave did reveal the presence of a small amount of ¹³¹I contamination on the surface of the detector housing.
7. Regarding NRL support,
 - a. RCO's response was timely and according to established procedure.
 - b. According to routine procedure, the NRL was notified of the contamination and advised to decontaminate prior to re-survey.
 - c. All data should be reviewed by a Health Physicist and reported to NRL only in their regulatory limit units.
 - d. Samples collected during the July 27th reactor survey were packaged individually, as will be the case for all future reactor surveys.

The information provided below is in follow-up to a report faxed to the U.S. Nuclear Regulatory Commission (USNRC) this morning at the direction of Dr. John G. Williams, Director, Nuclear Reactor Laboratory (NRL), University of Arizona.

As general information:

1. The Radiation Control Office (RCO) routinely counts all reactor wipe survey samples, with an appropriate number of background and standard samples, in a Packard Model 2550TR Liquid Scintillation Counter (LSC) System for 20 minutes each. This type of analysis results in raw data expressed as counts per minute (cpm). When adjusted for natural background radiation, detection efficiency and area surveyed, data are reported as 'dpm/100 cm²', which refers to (radioactive) disintegrations/minute per 100 square centimeters of surface area sampled. The University's internal action level is 100 dpm/100 cm², 10% of the 1,000 dpm/100 cm² limit for acceptable surface contamination levels for areas for unrestricted use as established by the USNRC in Regulatory Guide 1.86.
2. The most restrictive annual dose limit for the general public is 25 mRem/year, with no distinction being made for minors.
3. It is not uncommon for our counting systems to be in use when new samples are received; thus newly received routine samples are not counted immediately upon receipt. This is a common and accepted practice and does affect the data, except that very short half-lived radionuclides might have decayed away. And with shorter half-lives, the dose concerns are negligible.

The RCO conducted a routine monthly survey of the NRL on July 18, 2000. Counting of the July 18, 2000 reactor survey samples (23) began at 0928 hrs on Friday, July 21, 2000. Thus, counting of the routine monthly reactor survey samples concluded Friday evening.

The following Monday, July 24th, the sample data were reviewed, and four samples were identified as having slightly elevated count rates. These samples were from two handrails around the reactor pool, a sample storage cave (area constructed out of lead bricks), and the top of the radioactive waste container. The highest result was 2,584 cpm for the sample storage cave, with this level converting to 3,824 dpm/100 cm². Data for the other three samples ranged from 201 to 298 dpm/100 cm², all exceeding our internal action level. According to routine procedure, the four samples were re-counted for confirmation. These sample re-counts did not conclude until Monday evening.

On Tuesday, July 25th, it was determined that the re-count data confirmed the original observation, and, since the Health Physicist who normally reviews this data was on vacation, the Radiation Control Specialist doing the work informed Mr. Harry Doane, Reactor Supervisor, of the situation and provided raw count data. (It is noted that raw data should always be converted into regulatory limit units prior to making decisions and that the matter should have been referred to another Health Physicist.)

On Wednesday, July 26th, according to standard procedure and at the request of Dr. Williams, the sample with the highest activity, as counted on the LSC, was counted on a Gamma Spectrometry System in an attempt to identify the specific radionuclide present.

Review of this initial data indicated that iodine-131 (^{131}I) was present. This information caused Dr. Williams significant concern, since one possible explanation for the presence of ^{131}I was a leaking reactor fuel element and since visitors had toured the NRL on the day of the survey. However, his concern was only conveyed to Dr. Ellen Hochheiser in RCO by e-mail at 5:47 PM Wednesday evening (not received until midday Thursday due to her being out ill) and by a phone call to me at 7:00 AM Thursday morning. I then met Dr. Williams at the RCO at 7:30 AM and reviewed the situation with him. I indicated to him by shortly after 8:00 AM that I saw no cause for reporting the situation to the USNRC based upon available information, i.e. that:

1. I believed the identification of ^{131}I to be erroneous,
2. the contamination levels for areas other than the storage cave, if real, were insufficient to produce measurable personnel dose, and
3. Dr. Williams assurance that none of the visitors were anywhere close to the storage cave during their tour of the NRL.

During a thorough review of all the data later that morning (Thursday), it was noted that background subtraction of the gamma spectrum was not done. When completed, it was clear that:

1. there was indeed a small amount of contamination present in the storage cave sample,
2. there was no ^{131}I contamination in the reactor survey sample, and
3. the peaks noted were, at that point, unidentifiable.

The latter conclusion was based on the fact that the ^{131}I peak observed in the initial data was removed by background subtraction. This caused suspicion that the RCO detector cave might be contaminated.

On Wednesday, July 26th, Mr. Doane performed a decontamination of the four areas of concern and performed a wipe survey both before and after the decontamination. Counting of those samples on NRL's Gamma Spectroscopy System showed no detectable contamination present.

On Thursday, July 27th, RCO performed a complete reactor survey plus two additional storage cave samples; our analysis of these samples indicated no contamination found for any of the 25 locations. Mr. Doane's July 26th samples were also counted by LSC with no contamination found for any of the four areas of concern. It should be noted that during any contamination survey, it is very easy to either miss contamination actually present if the problem is isolated to only one or more droplets (by then dry) or to remove the contamination totally or in part as a result of collecting the wipe sample.

A general contamination survey of RCO's laboratory on July 27th found no contamination present. A more thorough survey of the detector and detector cave revealed the presence of a small amount of ^{131}I contamination on the surface of the detector housing. The detector was decontaminated and re-surveyed. A new background spectrum was collected which had nothing above background in the ^{131}I region.

Memorandum to Richard C. Powell, Ph.D., dated July 28, 2000

Over the last 24 years, it has not been particularly unusual for the NRL's sample storage cave and sample irradiation ports to have small levels of contamination. This has not been the case in recent years due to lower use frequency of the reactor, and the intensive efforts of Mr. Doane to keep the problem areas clean.

Conclusions are presented at the beginning of this report as an executive summary.

If you have any questions or require additional information, please call me at (520) 626-5777.

pc: Thomas J. Hixon, PhD
Daniel Silvain, MS, DABR
Ellen Hochheiser, PhD, CHP
Morton E. Wacks, PhD, Chair, Reactor Committee
Raina Maier, PhD, Chair, University Radiation Safety Committee
Aubrey V. Godwin, Arizona Radiation Regulatory Agency

FACILITY LICENSE R-52**Report, possibly spurious, of I-131 contamination**

July 27, 2000

Description of the Occurrence

On the afternoon of July 18, 2000, a routine contamination survey was performed at the Nuclear Reactor Laboratory (NRL), University of Arizona by staff of the Radiation Control Office (RCO). On July 26, at approximately 0845, the Reactor Supervisor received word that four out of 30 wipe samples showed contamination, with the highest count rate about 1100 counts per minute. Subsequently, he was told that I-131 (8-day half life) was identified by gamma spectrometry.

Immediate surveys of the Reactor Laboratory and reviews of records showed no confirmatory evidence, which should have been found if the reported contamination was genuine.

Contamination of the samples while in RCO custody is suspected, and this possibility is being investigated.

On the morning of 18 July a group of 20 visitors, members of the public, was present for about one hour in the morning. One half of the visitors, mostly school children grades 6 to 9, carried pocket dosimeters, which showed no exposure. The continuous air monitor showed no indication. The area monitors showed no indication. Finally, no indication of I-131 could be found in the laboratory yesterday, even though no clean-up had been attempted.

The report we received from RCO is at the moment considered to be spurious. This report is transmitted within 24 hours of our receiving that report, however, in case it proves to have some foundation. Investigation is in any case needed of how this occurred, and of why the report we received from RCO was not timely.

J. G. Williams, Reactor Laboratory Director
University of Arizona

Date: 27 July 2000

To: Attention of Marvin Mendonca,
By Telefax, (301) 415 1032,
USNRC,
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738.

From: John G. Williams, Reactor Laboratory Director,
Engineering Building 20,
University of Arizona,
Tucson, AZ 85721-0020
Voice: (520) 621 9729
Fax: (520) 621 8096



Cc: NRC Operations Center
Fax, (301) 816 5151
Dr. T. Hixon, Associate V. P. for Research, Research Integrity Officer
Fax, (520) 621 7507

Re: Today's previous report: withdrawn.

This telegraphic report is submitted via telefax, for recording on our License Docket. A written report concerning related matters will follow within 30 days.

FACILITY LICENSE R-52

**Withdrawn: previous report, dated today, entitled,
"Report, possibly spurious, of I-131 contamination"**

July 27, 2000

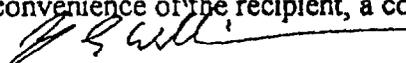
Investigation of information that formed the basis for my previous report, dated today, has led to the conclusion that there exists no credible evidence of any violation of 10CFR20 at this facility or of any other basis for an immediate report in accordance with our Technical Specification. In particular no exposure or contamination of any person has occurred. Therefore, the previous report is withdrawn.

The basis for this conclusion, briefly, is as follows:

- The Radiation Control Office has reason to believe that the gamma spectrometer used to identify I-131 may have been previously contaminated with I-131.
- I-131 is not an isotope in use in the Reactor Laboratory. It is present in the reactor fuel elements, but could not have leaked from them without causing other indications that were not present.
- The liquid scintillation counts were incorrectly reported by an inexperienced analyst (though experienced in operating the equipment).
- At low counting levels, the techniques used to obtain the liquid scintillation counts may be sensitive to spurious effects such as static electricity.
- Even if accurate, the count rates reported would not credibly lead to the possibility of exposures above 10CFR20 limits.
- The absence of indications from Reactor Laboratory instruments, as reported previously, cannot be explained if there were any reactivity released from the reactor. Channel checks of those instruments had been performed on the day in question (7/18/00), and their calibrations were current.
- In addition to the absence of air monitor indication and area monitor indication, the reactor pool water monitoring system showed no indication.
- Further wipe samples of the locations occupied by visitors on 7/18/00, showed no indications of activity above background, and other wipes from areas not accessible to visitors showed no significant indications.

As stated in the original report, the reasons for the reporting of possibly spurious data, also after an apparently undue delay, require investigation. The results will be reported in writing to the NRC within 30 days, as an "observed inadequacy in the implementation of administrative or procedural controls," (Tech. Specs. 6.7.c.4).

For convenience of the recipient, a copy of the original report, now withdrawn, follows.


J. G. Williams, Nuclear Reactor Laboratory Director
University of Arizona

Report, possibly spurious, of I-131 contamination

July 27, 2000

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J. G. Williams, Reactor Laboratory Director
University of Arizona