

6/12/97 RIDS Event OUT  
SP04

Event Reporting Handbook

**EVENT REPORT COVER PAGE**

**AGREEMENT STATE**

**EVENT REPORT NO. \_\_\_\_-\_\_\_\_-\_\_\_\_**

**DATE: June 12, 1997**

**TO:**

Deputy Director  
Office of State Programs

**SUBJECT: OVERSXPOSURE READING ON TLD BADGE FOR  
4TH QTR. 1996, EVENT AT U. OF KANSAS MEDICAL  
CENTER, KANSAS CITY, KS**

**STATE: KANSAS**

**Signature and Title:**

Vick L. Cooper, Chief  
Radiation Control Program  
Bureau of Air and Radiation  
Management

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SP-E-9

# The University of Kansas Medical Center

Medical Center Safety Office

4 February 1997

Vic Cooper  
Bureau of Air and Radiation  
Department of Health and Environment  
Topeka, Kansas 66620

COPY

RE: Overexposure Reading on Research Employee TLD Badge for 4<sup>th</sup> Quarter 1996

Dear Mr. Cooper:

This letter is a follow-up to a telephone conversation I had with you last week during which I reported a reading on a research employee's TLD badge of 30.01 rem for the DDE and 66.17 rem for the LDE and the SDE. As I stated in the telephone conversation, I did not believe that this was an occupational dose. Further investigation has resulted in the following findings:

- Individual works in a research lab which is authorized for  $^{32}\text{P}$ ,  $^{35}\text{S}$ , and  $^3\text{H}$ .
- The maximum activity at any one time of  $^{32}\text{P}$  is 500 uCi; with individual vials containing no more than 250 uCi/20 ul.
- The activity used at any one time is 125 uCi or less.
- The individual was not in the laboratory during October and December
- Since the individual is pregnant she had not been working with the stock product but had worked occasionally with the end product of the experiment.
- Her husband had inadvertently used her badge while cleaning up a contaminated centrifuge.
- The quarter DDEs for other laboratory personnel were minimal.

A report from Landauer, the supplier of the TLD badge, has been requested regarding the processing of this TLD badge. Verbal reports indicate that they had no problems during processing.

The investigation is continuing. This individual has left the employment of KU Medical Center. 31 January was her last day.

A follow-up report will be submitted. If you have any questions or recommendations, please let me know.

Sincerely,

*Ruth Schukman-Dakotas*  
Ruth Schukman-Dakotas, Director

c: Radiation Safety Committee  
Dr. Sarras

# The University of Kansas Medical Center

Medical Center Safety Office

4 February 1997

Vic Cooper  
Bureau of Air and Radiation  
Department of Health and Environment  
Topeka, Kansas 66620

COPY

RE: Overexposure of Radiology Employee

Dear Mr. Cooper:

This letter is a follow-up to a telephone conversation I had with you several weeks ago during which I reported an occupational overexposure of a Radiology technologist. His monthly exposures are summarized and compared with other technologists' annual exposures in Tables 1 and 2. An investigation was conducted resulting in the following findings:

- The individual works in special procedures.
- The workload in special procedures has increased a total of 50% over the past two years with an increase of 35% for just 1996.
- The individual does not rotate out of special procedures.
- The individual in the past was usually the "floating" technologist and moved between rooms, however, over this past year has been spending more time as the "scrub" technologist working near the x-ray table.
- The individual had been notified 7 times over this past year that his exposures exceeded the ALARA investigational levels for his position and was reminded to implement the radiation protection practices of time and distance.
- The individual is 6'5" tall and may be leaning over the x-ray table just enough to occasionally place his upper torso into the edge of the beam.
- His height may also lead to higher exposures than other special procedure technologists since his head and shoulders may not experience as much of the shielding effect of standing behind other individuals in the room.

Corrective actions implemented in Radiology to ensure that such an overexposure will not occur again are:

- An additional technologist has been hired because of the increased work load.
- The individual will rotate out of special procedures periodically.

Corrective actions implemented in Radiation Safety to ensure that such an overexposure will not occur again are:

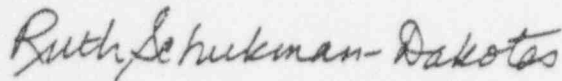
University of Kansas Medical Center  
Overexposure Report 2/4/97

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- An additional investigational level of 1.25 rem/quarter has been added to the ALARA program. Any employee exceeding this exposure level will be notified; the radiation safety staff will conduct an investigation and recommend corrective actions to reduce the individual's exposure to radiation.
- Department administrative staff will be notified each month of all individuals who have exceeded the ALARA investigational levels.

The individual's monthly exposure levels will be monitored closely during the first part of 1997 to verify that the corrective actions have been effective. If you need additional information please let me know.

Sincerely,



Ruth Schukman-Dakotas, Director

c: Radiation Safety Committee  
Tim Salmen, Radiology  
Nhiep Nguyen, Safety Office

# The University of Kansas Medical Center

Medical Center Safety Office

8 May 1997

Vic Cooper  
Bureau of Air and Radiation  
Department of Health and Environment  
Topeka, Kansas 66620

**RE: 30 Rem Exposure on TLD**

Dear Mr. Cooper:

Pursuant to the investigation conducted over the past 3 months into the 30 rem dose on a TLD badge issued to an employee working in a laboratory, I am submitting this letter to summarize the findings and conclusions.

## Findings/Assumptions

1. The badge was issued to a woman who was 4 months pregnant at the time the 30 rem dose was reported.
2. This woman was not in the lab for 2 of the 3 month wear period.
3. This woman did not work with any of the stock solutions of radioactive material in the laboratory and only occasionally worked with the labeled end product.
4. The woman's husband did all of the work with the stock solutions of  $^{32}\text{P}$ .
5. The husband was already in Boston, Massachusetts at the time the 30 rem exposure was reported. At his current job, he is not working with radioactive materials. The woman left within a few days after the 30 rem exposure was reported to join her husband in Boston.
6. The lab inventory of P-32 was 500 uCi at the time of the incident with about 75-150 uCi being used at any one time.
7. This woman and her husband had both received radiation safety training.
8. The TLD report from Landauer indicated that all the processes on their part met their operational criteria. Per my request which included a question about the possibility of contamination, Landauer had a Certified Health Physicist (Craig Yoder) review the TLD data. I was told that the badge was not contaminated when they received it which would have been mid to late January. Craig also stated in his review that "It is remotely possible that the dose values could have resulted from a contamination event but it would be very coincidental to have the filter ratios agree with typical low energy photon exposures."
9. All other TLD badges for personnel in the same lab showed minimal exposure.
10. An initial assumption during the investigation was the possibility of an intentional exposure of the badge.



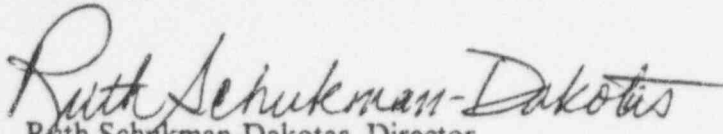
11. An attempt was made to recreate such an exposure based on the radioactive materials available in the lab. A TLD badge was exposed at 8 cm from the open mouth of a vial containing 250 uCi of P-32 with results as follows: 72 rem (DDE, SDE, and LDE) with a note that it was an irregular exposure and that the dose was arbitrarily estimated based on 50-150 PKV x-rays.
12. No one in the lab could recall any instances of animosity or ill-feelings toward this couple such that a malicious act of exposing the badge would be considered. In fact, they were well-liked.
13. Based on conversations with laboratory personnel and the principal investigator, the assumption of an intentional exposure of the TLD badge was dropped.
14. Subsequent conversations with the husband who was already in Boston, Massachusetts at the time the incident was reported, revealed the following information: On 8 November the husband caused a contamination event when he was centrifuging about 75 uCi of P-32 and neglected to include the catch tube. As soon as he recognized his error he proceeded to clean-up the contamination. Contrary to the earlier report that he used his wife's TLD badge during the clean-up, he used his TLD badge. However, he used his wife's lab coat during the clean-up because it had elastic cuffs on the sleeves and he felt this provided him better protection during the clean-up. His wife's TLD badge was in a pocket of this lab coat. After the clean-up process he checked the lab coat and his hands with the Geiger counter and did not find any contamination.
15. The husband's TLD badge for the fourth quarter 1996 showed a minimal dose.
16. Contamination surveys conducted by laboratory personnel and by radiation safety personnel within 1 and 2 weeks after the contamination event did not detect any contamination in the laboratory.
17. I subsequently talked to Craig Yoder, Landauer, and based on additional information he received from me, raised the scenario that a small spot of P-32 contamination perhaps over the plastic shielded TLD could have exposed the TLD behind the open window and behind the tin shield resulting in the 30 rem LDE and 66 rem SDE doses on the TLD badge.
18. An assumption was made that during the clean-up of the contaminated centrifuge, the husband could have inadvertently contaminated his wife's TLD badge since it was in the pocket of the lab coat he was wearing during the clean-up process.
19. A TLD badge was covered for one day with a thin sheet of plastic contaminated with 1 uCi of <sup>32</sup>P. This resulted in an dose to the badge of 47.92 rem, this being the highest observed dose of an irregular exposure. Therefore, it would have taken slightly less than a microcurie on the TLD badge to result in an exposure of 30 rem over about 5 half-lives.
20. The husband was asked to contact Joseph Ring, Ph.D., CHP, at Harvard University, on 2/20/97 and again on 3/27/97 regarding bioassays for him and his wife. Conversations with Dr. Ring indicated that he could not directly ask the couple to participate in the bioassay process but that they would have to contact him. As of this date I have received no information regarding the request for bioassays. Since it is about 12 half-lives since the contamination event, I do not feel that a bioassay at this late date would yield any useful information.

Conclusions

It is my professional opinion that this 30 rem dose was an exposure to the TLD badge from a contamination event on the TLD badge and not an exposure to the woman to whom the badge was assigned. The woman and her husband had been advised of this conclusion earlier in my conversations with them. I had been waiting for bioassay results prior to submitting this letter to close my investigation into this exposure incident.

I appreciate all of your assistance and advise regarding this investigation. If you feel that additional information is needed please let me know.

Sincerely,

  
Ruth Schukman-Dakotas, Director

c:     Radiation Safety Committee  
       Dr. Sarra  
       Rick Johnson  
       Randy Attwood