

# PERSONAL EXPOSURE INVESTIGATIONS AND REPORTING

## PURPOSE

This procedure specifies the requirements and responsibilities for conducting, documenting and reporting investigations of actual or suspected radiation exposures to individuals that exceed specific investigation levels, and for timely reporting of any doses that exceed regulatory limits.

## POLICY

The University is committed to maintaining all radiation doses to levels that are as low as reasonably achievable (ALARA). One method for accomplishing the ALARA goal is to investigate situations and incidents that lead to unusual exposures, even if no regulatory limit is exceeded. To assure that unexpected radiation exposures are evaluated, investigation levels are established well below the dose limits.

For external exposures, the investigation level (IL) is based on the expected (normal) exposure for a category or specific group of radiation users. Values of the IL for doses to the body or to the extremities for various groups are listed in the table on the following page.

For internal exposures, the IL is 0.05 ALI per single intake or per calendar quarter. Annual intakes exceeding 0.1 ALI for all nuclides combined shall be included in the calculation of total effective dose equivalent for purposes of determining compliance with annual dose limits and reporting requirements.

Potential intakes due to personal contamination or injury involving radioactive materials shall be investigated regardless of the actual radiation dose.

Any radiation dose to an individual that exceeds the annual dose limit shall be investigated and reported to the regulatory agency. If the dose is received as the result of a single event, it shall be reported either immediately or within 24 hours, depending on the magnitude of the dose. The RSO directs the investigation, evaluates the results and submits the report to the regulatory agency. The exposed individual shall provide information regarding

the circumstances of the exposure. The responsible user must be informed of the exposure and of any subsequent restrictions that may need to be imposed on the individual.

## PROCEDURES

The RSO shall ensure that the monthly dosimetry reports are reviewed to determine whether any reported doses exceed an investigation level. The RSO shall also ensure that any reported overexposure is investigated promptly and reported, if necessary. Investigations of external exposures shall be recorded on the "EXTERNAL - EXPOSURE (ALARA) INVESTIGATION REPORT" (RPR 46A). Investigations of internal exposures shall be recorded on the "INTERNAL EXPOSURE (ALARA) INVESTIGATION REPORT" (RPR 46B).

For each overexposure requiring a report to the regulatory agency, a signed, written statement shall be submitted by the exposed individual describing the circumstances that led to the exposure, and the measures that will be taken to prevent recurrence. An accurate and complete response is important, since all or part of this statement may be sent to the regulatory agency.

For doses below the reportable level, the Radiation Analyst or Dosimetrist may obtain the relevant information by telephone. The questionnaire on the back of RPR 46A may be used as a guide to ensure that all necessary information is obtained.

Dosimeter readings shall be accepted as valid and shall not be changed on the permanent record unless there is a complete, written description of the circumstances that produced an invalid dosimeter exposure, and the report is signed by the exposed individual, the responsible user and the RSO.

The original Investigation Report and all attachments shall be filed in the personal dosimetry record for the individual. A copy of the report shall be provided to the exposed individual.

**REFERENCES**

Utah Division of Radiation Control, *Utah Radiation Control Rules, Standards for Protection Against Radiation*, R313-15.

**REPORTING LEVELS and DEADLINES**  
(Effective dose equivalent in rem)

	<u>Immediately</u>	<u>24 Hours</u>	<u>30 Days</u>
<b>Total Body:</b>	25 rem/event	5 rem/event	5 rem/year
<b>Eye:</b>	75 rem/event	15 rem/event	15 rem/year
<b>Skin or Extremities:</b>	250 rem/event	50 rem/event	50 rem/year
<b>Any Other Single Organ:</b>	Not applicable	Not applicable	50 rem/year

**INVESTIGATION LEVELS - ALARA**  
(Effective dose equivalent in mrem)

	<b>External Dose to Body * (Collar &amp; Body Badges)</b>	<b>External Dose to Extremities (Ring Badge)</b>	<b>Intake by Any Route (Bioassay)</b>
<b>Cardiac Catheterization or other Special Procedures:</b>	300 mrem/month*	NA	NA
<b>Diagnostic Radiology:</b>	100 mrem/month*	NA	NA
<b>Nuclear Medicine:</b>	100 mrem/month	500 mrem/month	0.05ALI per event or per quarter
<b>Cyclotron:</b>	100 mrem/month	2,500 mrem/month	“
<b>Radiopharmacy:</b>	100 mrem/month	2,500 mrem/month	“
<b>All Others:</b>	50 mrem/monitoring period	500 mrem/monitoring period	“

\* When a lead-impregnated protective apron is worn, and two badges are worn — one at the collar outside the apron and the other under the apron at the waist, the effective dose is calculated as the sum of 4% of the deep dose equivalent recorded by the collar badge plus 150% of the deep dose equivalent recorded by the body badge worn at the waist.

**RPR 46A. EXTERNAL EXPOSURE (ALARA) INVESTIGATION REPORT**

Name: \_\_\_\_\_ Soc. Sec. No.: \_\_\_\_\_ UNID: \_\_\_\_\_

Work Location: \_\_\_\_\_ Phone: \_\_\_\_\_

Responsible User: \_\_\_\_\_ Department: \_\_\_\_\_

**REASON FOR INVESTIGATION:** Dosimeter reading for the period: \_\_\_\_\_

Badge #: \_\_\_\_\_ Series: \_\_\_\_\_ Collar Badge \_\_\_\_\_ Body/Belly Badge \_\_\_\_\_ Finger (Ring) \_\_\_\_\_

Reported dose - Shallow: \_\_\_\_\_ mrem \_\_\_\_\_ mrem \_\_\_\_\_ mrem

Reported dose - Deep: C: \_\_\_\_\_ mrem B: \_\_\_\_\_ mrem

Effective dose (if leaded apron was worn) = 0.04C + 1.5B = \_\_\_\_\_ mrem

Report received by: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Additional information dated \_\_\_\_\_  attached  on reverse side

**RESULTS OF INVESTIGATION:** (see Questionnaire on back of this form)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Employee interviewed by: \_\_\_\_\_ Date: \_\_\_\_\_

Employee statement attached?  Yes  No Date: \_\_\_\_\_

Invalid dosimeter reading(s) verified by: \_\_\_\_\_ Date: \_\_\_\_\_

Additional information dated \_\_\_\_\_  attached  on reverse side

**RECOMMENDATIONS TO PREVENT RECURRENCE:** \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Additional information dated \_\_\_\_\_  attached  on reverse side

**NOTIFY UDRC (and NRC if Reactor involved); check category:**

IMMEDIATE NOTIFICATION IF REPORTED OR POTENTIAL DOSE EXCEEDS 5 x ANNUAL LIMIT

NOTIFICATION WITHIN 24 HOURS IF REPORTED OR POTENTIAL DOSE EXCEEDS ANNUAL LIMIT

Initial notification by: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

WRITTEN REPORT REQUIRED WITHIN 30 DAYS FOR ANY DOSE THAT EXCEEDS ANY LIMIT.

Enter a reminder in "To Do" list on Rad Health Network calendar.

**WRITTEN REPORT, if required, within 30 days:**

Reported by: \_\_\_\_\_ Date: \_\_\_\_\_

## EXTERNAL EXPOSURE INVESTIGATION QUESTIONNAIRE

For all investigations of high dosimeter readings:

1. Where did you work during the exposure period? Hospital, clinic, building, room, hood/bench, etc., or any other information which would help to determine the source of exposure, and whether it is valid.
2. What type and number of procedures did you perform during the monitoring period? How much time was spent on these procedures? (The details of the procedures are not so important as a reliable estimate of your potential exposure.)
3. Where on your person is your badge worn, i.e. collar, apron, sleeve, right hand, left hand and which finger?
4. Where is your dosimeter kept when not being worn? Was it ever taken out of the lab area by you or anyone else? Could anyone else have used it or exposed it to a radiation source?
5. What type of personal protective apparel did you wear, i.e. lab coat, lead apron, thyroid collar, goggles, gloves?

For radioisotope users:

6. Did you use shielding? (when and where it was necessary). Was it the proper type of shielding for the nuclide being used? Could the exposure have been caused by another individual, e.g. someone working near you, a sample placed near you or in a drawer?

For Cardiologists:

7. Was the mobile ceiling shield used during all procedures? If not, how often and for how long did you need to bypass the mobile shield in order to perform a procedure?
8. Do you use the X-ray equipment in such a way that the angle of the primary beam is not perpendicular to the patient? If so, how do you ensure that your distance from the primary beam is maintained?
9. Is it possible that you could have leaned over the patient and exposed the badge to the primary beam? If so, how many times could this have happened; estimate the amount of time the badge could have been exposed to the primary beam.

# RPR 46B. INTERNAL EXPOSURE (ALARA) INVESTIGATION REPORT

Name: \_\_\_\_\_ Soc. Sec. No.: \_\_\_\_\_ UNID: \_\_\_\_\_

Work Location: \_\_\_\_\_ Phone: \_\_\_\_\_

Responsible User: \_\_\_\_\_ Department: \_\_\_\_\_

## REASON FOR INVESTIGATION:

Personal contamination or injury Date: \_\_\_\_\_

Abnormal Urinalysis  Abnormal Thyroid Count Date: \_\_\_\_\_

Additional information dated \_\_\_\_\_  attached  on reverse side

Investigation initiated by: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

## NOTIFY UBRC (and NRC if Reactor involved); check category:

IMMEDIATE NOTIFICATION IF REPORTED OR POTENTIAL DOSE EXCEEDS 5 x ANNUAL LIMIT

NOTIFICATION WITHIN 24 HOURS IF REPORTED OR POTENTIAL DOSE EXCEEDS ANNUAL LIMIT

Initial notification by: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

WRITTEN REPORT REQUIRED WITHIN 30 DAYS FOR ANY DOSE THAT EXCEEDS ANY LIMIT.

Enter a reminder in "To Do" list on Rad Health Network calendar.

## RESULTS OF INVESTIGATION: (description of event, cause, etc.)

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Employee interviewed by: \_\_\_\_\_ Date: \_\_\_\_\_

Employee statement attached?  Yes  No Date: \_\_\_\_\_

Intake of radioactive material - Estimated: \_\_\_\_\_ ALI; Verified: \_\_\_\_\_ ALI

Intake verified by: \_\_\_\_\_ Date: \_\_\_\_\_

Additional information dated \_\_\_\_\_  attached  on reverse side

## RECOMMENDATIONS TO PREVENT RECURRENCE: \_\_\_\_\_

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Additional information dated \_\_\_\_\_  attached  on reverse side

## WRITTEN REPORT, if required, within 30 days:

Reported by: \_\_\_\_\_ Date: \_\_\_\_\_

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