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**Area Monitoring Dosimeter
Program for the Pacific
Northwest National Laboratory:
Results for CY 1995**

S. R. Bivins
G. A. Stoetzel

May 1996

Prepared for
the U.S. Department of Energy
Contract DE-AC06-76RLO 1830

Pacific Northwest National Laboratory
Operated for the U.S. Department of Energy
by Battelle



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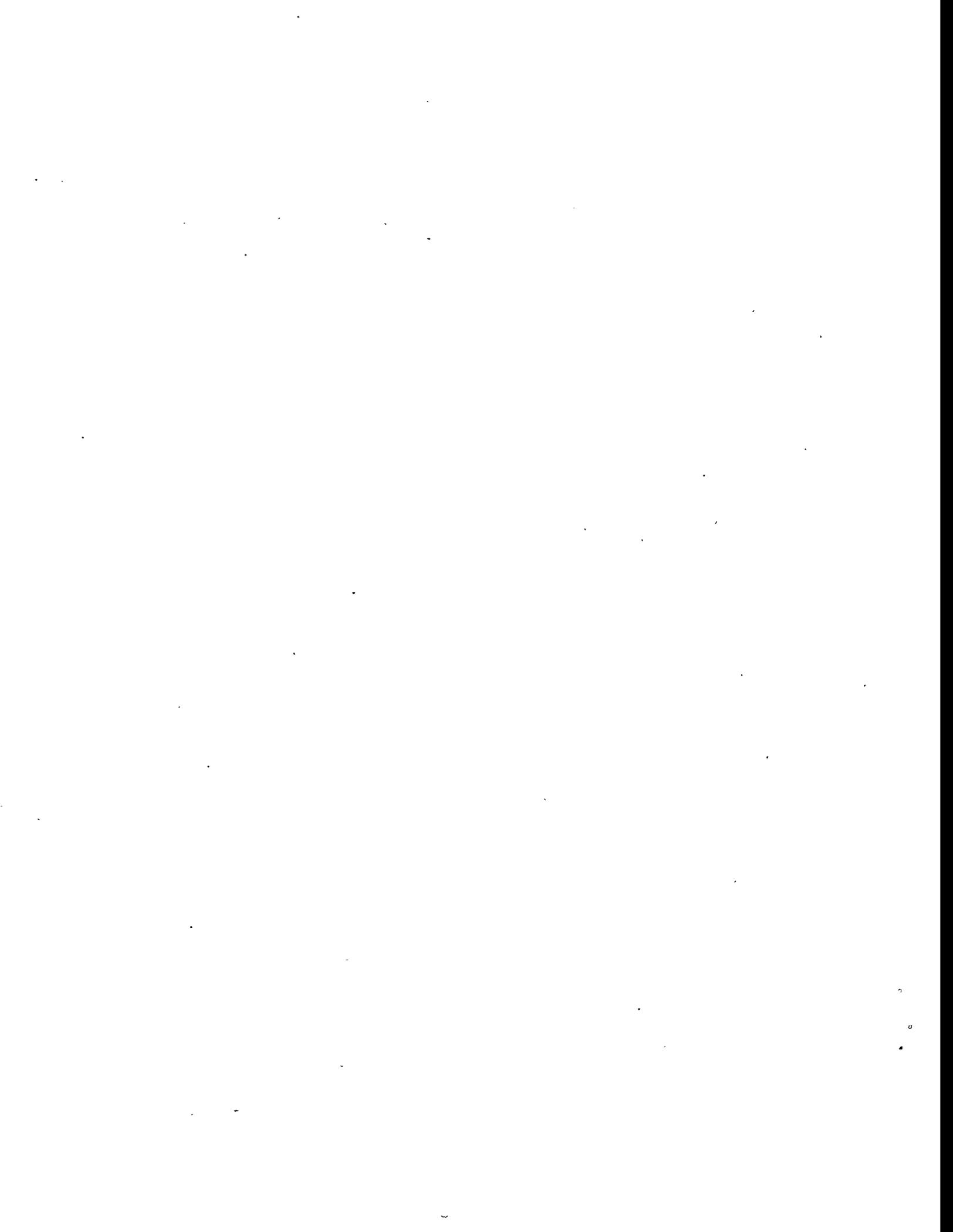
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Pacific Northwest National Laboratory
Richland, Washington 99352



Summary

In January 1993, Pacific Northwest National Laboratory (PNNL) established an area monitoring dosimeter program in accordance with Article 514 of the Department of Energy (DOE) Radiological Control Manual (RCM)(DOE 1994). The purpose of the program was to minimize the number of areas requiring issuance of personnel dosimeters and to demonstrate that doses outside Radiological Buffer Areas are negligible. In accordance with 10 CFR Part 835.402 (a) (1)-(3) and Article 511.1 of the RCM, personnel dosimetry shall be provided to 1) radiological workers who are likely to receive at least 100 mrem annually and 2) declared pregnant workers, minors, and members of the public who are likely to receive at least 50 mrem annually. Program results for calendar years 1993 and 1994 (Bivins and Stoetzel 1996) confirmed that personnel dosimetry was not needed for individuals located in areas monitored by the program.

A total of 116 area TLDs were placed in PNNL facilities during CY 1995. The TLDs were exchanged and analyzed quarterly. All routine area monitoring TLD results were less than 50 mrem annually after correcting for worker occupancy. The results support the conclusion that personnel dosimeters are not necessary for staff, declared pregnant workers, minors, or members of the public in these monitored areas.

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1.0 Introduction

The Department of Energy (DOE) Radiological Control Manual (RCM)(DOE 1994), first issued in 1992, establishes practices for radiological control activities at DOE facilities. Article 514 of the RCM discusses the establishment and maintenance of a comprehensive area dosimeter monitoring program to minimize the number of areas requiring issuance of personnel dosimeters and to demonstrate that doses outside of Radiological Buffer Areas are negligible. As discussed in Article 514, area monitoring dosimeters

- shall be used to record and document radiation levels in routinely occupied areas adjacent to areas where radiation or operations with radiation exist (not applicable when the radiation arises solely from low-energy beta sources such as ^{14}C or ^3H)
- should be used in Radiologically Controlled Areas to supplement existing monitoring programs and to provide data in the event of an emergency
- should be used to support dosimetry investigations where personnel express concern about their work environment and exposure to ionizing radiation.

In January 1993, Pacific Northwest National Laboratory (PNNL)^(a) established an area monitoring thermoluminescent dosimeter (TLD) program in accordance with Article 514 of the RCM. The program was conducted as outlined by Bivins^(b) during calendar years 1993 (CY 1993) and 1994 (CY 1994). The program is now implemented according to RCP-5.1.04, "Area Monitoring TLD Program," issued in PNL-MA-26, *PNL Radiological Control Implementing Procedures*, in November 1995. Data from the program were also used to support the PNNL As Low As Reasonably Achievable (ALARA) program. The materials and methods used in collecting area monitoring TLD data and program results for CY 1995 are presented in this report.

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- (a) The Pacific Northwest National Laboratory is operated for the U.S. Department of Energy by Battelle under Contract DE-AC06-76RLO 1830. Battelle also owns and operates private facilities near the Hanford Site.
- (b) Bivins, S.R. February 24, 1993. Letter Report to D.P. Higby entitled "Area Monitoring Dosimeter." Pacific Northwest National Laboratory, Richland, Washington.

2.0 Materials and Methods

This section provides information on the type of TLDs used in the program, how they were located in the field, and frequency of exchange. Derivation of the investigation level, which triggers an evaluation into the potential cause of a reading, is also provided. Finally, a description of the quality control program initiated during CY 1995 is provided.

2.1 Description of Area TLDs

The Hanford Basic TLD was used as the dosimeter for this program during the first and second quarter of 1995. The TLD was accredited by the DOE Laboratory Accreditation Program (DOELAP) and consisted of a single TLD-700 chip suspended in a plastic card made of gray Noryl[®] thermoplastic resin through the use of Teflon[®] films. The TLDs were read for deep dose and were corrected for naturally occurring environmental radiation. Additional information on TLD processing, calibration, and the dose algorithm used in determining doses can be found in Appendix A and in PNL-MA-568, *Hanford External Dosimetry Program Manual* (October 1989 issue).

Starting the third quarter of CY 1995, the area TLDs were changed to the Hanford Standard Dosimeter. This TLD has also been accredited by DOELAP and is known commercially as a Harshaw 8825 dosimeter. The TLD contains TLD-700 chips in positions one, two, and three and a TLD-600 chip in position four. The chips have thicknesses of 0.38 mm (100 mg/cm²) in positions one, two, and four, and 0.15 mm (40 mg/cm²) in position three. The TLD holder is constructed of black plastic with the following filtration: 1) position one - 1000 mg/cm² ABS and PTFE plastic, 2) position two - 242 mg/cm² ABS plastic and 91 mg/cm² copper, 3) position 3 - 8 mg/cm² Teflon[®] and 9 mg/cm² mylar, and 4) position four - 240 mg/cm² ABS plastic and 463 mg/cm² tin. The area TLDs were read for shallow dose, deep dose, neutron dose, and eye dose. Only deep dose readings are discussed in this report. A brief description of TLD processing, calibration, and the dose algorithm used in determining doses can be found in Appendix B. A more detailed description of the TLD and processing system can be found in PNL-MA-568 (October 1994 issue).

2.2 Placement of Area TLDs

Area TLDs were placed in the following PNNL facilities (DOE-owned, DOE-leased, and Battelle private):

- all 300 Area PNNL facilities where staff worked at least eight hours per month
- all PNNL facilities where staff conducted radiological work (i.e., had a current Radiological Work Permit)

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- all PNNL facilities that were located within 15 m (~50 ft) of another facility (including those of other Hanford Site contractors) containing a radiological area (indoors or outdoors).

TLDs positioned as discussed above are referred to as "routine" area TLDs in this report. Area TLDs were also positioned in facilities as approved by the Radiological Control organization for special situations such as ALARA evaluations. In this report, these are referred to as "special" area TLDs.

A list of routine and special area TLD locations is included as Appendix C. The number of area TLDs in each facility was determined according to the following criteria:

- at least one area TLD per facility
- one additional area TLD for every 25 staff members for facilities that require area TLDs but do not contain a Radiologically Controlled Area or a radiological area
- one additional area TLD for every 15 staff members for facilities that require area TLDs and contain a Radiologically Controlled Area or a radiological area.

Additional area TLDs were positioned as determined by the Radiological Control organization.

Each area TLD was positioned facing the potential source of exposure. If the potential source of exposure was from within the facility, then the area TLD was placed on the wall opposite the potential source. If the potential source of exposure was located outside the facility, then the area TLD was placed inside of the exterior wall facing the potential source. The TLDs were placed 1 to 2 m (3 to 6 ft) from the floor, depending on whether staff in the area would be standing or seated.

Each area TLD was identified with an attached bar code label containing a facility ID (e.g., 337 LOC.5) and a TLD identification number beginning with the letter "A" to denote an area TLD followed by a four-digit number (e.g., A3014).

2.3 Frequency of Area TLD Exchange

All area TLDs were scheduled to be exchanged and analyzed on a quarterly schedule. The area monitoring TLD procedure allows for a facility manager to request a special exchange for any TLD in his/her facility. The Radiological Control Manager may also request a special exchange for area TLDs in any facility. Any area TLD changed out was immediately replaced with another area TLD unless the area TLD location was being discontinued.

2.4 Data Review

Any area TLD result greater than 40 mrem in a quarter was investigated. This action level was established to ensure that an individual would not likely receive greater than 50 mrem annually (the trigger level for requiring personnel dosimetry for declared pregnant workers, minors, and members of the public). The investigation level of 40 mrem per quarter was derived by dividing the 50 mrem annual limit by four and adjusting for worker occupancy. The area TLDs were exposed for

approximately 8736 h annually; individual occupancy was assumed to be 2000 h (8 h/d, 5 d/wk, and 50 wk/yr). Therefore, the occupancy-corrected quarterly limit is as follows:

$$\text{Quarterly limit} = (50 \text{ mrem}/4)(8760 \text{ h}/2000 \text{ h}) = 55 \text{ mrem}$$

The 55-mrem calculated quarterly limit was reduced to 40 mrem to allow for such factors as processing time, processing errors, the potential for individuals to be present more than 2000 h annually, and the potential for maximum exposure rates occurring during occupancy hours.

2.5 Quality Control TLDs

During the second quarter of 1995, five TLDs were exposed to ¹³⁷Cs radiation at known levels (30, 50, 150, 300, and 500 mrem). The uncertainty in these exposures was $\pm 3.4\%$. The exposures were performed by Health Protection staff in the 318 Building. After the exposures, the TLDs were stored in a shielded storage box in 3760 TRL 3 and returned with the other area TLDs for the second quarter. The quality control TLDs were labeled in the same manner as other area TLDs so that processing personnel could not identify them as quality control dosimeters. The quality control TLDs were Hanford Basic TLDs, the same as the other area TLDs used during the second quarter.

3.0 Results and Discussion

Table 3.1 summarizes area monitoring TLD results for CY 1995. Quarterly area monitoring TLD results are grouped into dose ranges (i.e., ≤ 10 mrem; > 10 mrem but < 40 mrem; ≥ 40 mrem). Five locations had quarterly area monitoring TLD results for routine locations exceeded the quarterly investigation level of 40 mrem; however, none of these locations had potential personnel exposures of 50 mrem after considering worker occupancy. The results support the conclusion that personnel dosimeters are not necessary for staff in the areas monitored by the area TLDs.

Table 3.1. Summary of Area Monitoring TLD Results

	CY 1995
Routine Area TLDs	
• Number of Area TLD Locations	116
• Total Number of Area TLDs Analyzed ^(a)	427
• Area TLD Results by Dose Range	
≤ 10 mrem	402
> 10 mrem but < 40 mrem	20
≥ 40 mrem ^(b)	7
Special Area TLDs	
• Number of Area TLD Locations	34
• Total Number of Area TLDs Analyzed ^(c)	46
• Area TLD Results by Dose Range	
≤ 10 mrem	22
> 10 mrem but < 40 mrem	8
≥ 40 mrem	16
<p>(a) The total does not equal 464 (four times the number of TLD locations) because locations were started and terminated at various times throughout the year, and several samples were lost.</p> <p>(b) The quarterly investigation level was 40 mrem.</p> <p>(c) The total does not equal 136 (four times the number of TLD locations) because locations were started and terminated at various times throughout the year.</p>	

Individual area monitoring TLD results for each quarter as well as annual totals are presented in Appendix D. The results in Appendix D are not corrected for worker occupancy. Assuming workers to be present 2000 h/yr, results should be multiplied by 0.23 to correct for worker occupancy.

3.1 Routine Area TLD Results

Quarterly area monitoring TLD results for facilities located outside of the 300 Area (622R, 747A Trl, ESB, LSL-II, PSL, RTL, 1944 Saint, 2400 Stevens, and ALE) all were in the ≤ 10 mrem range. The 20 quarterly results for the year in the " > 10 mrem but < 40 mrem" range and the 7 quarterly results ≥ 40 mrem were from locations in the 300 Area. Reviews were performed on the five locations with at least one quarterly area TLD result ≥ 40 mrem. These reviews are summarized below.

- TLD ID# A3017 was located in Room 9 (RCT Office) of the 327 Building. This area TLD was positioned in the field during the third quarter. Total measured dose for the third and fourth quarters was 75 mrem, 48 mrem of which was received during the fourth quarter. When corrected for worker occupancy, doses are projected at below the 50 mrem annual dose requiring personnel dosimetry for a declared pregnant worker, a minor, or a member of the public.
- TLD ID# A3026 was located in 324 Building Trailer #1. Total measured dose for the year was 85 mrem; the second and third quarter readings (40 mrem and 36 mrem, respectively) contributed approximately 90% of the total. When corrected for worker occupancy, doses are projected at below the 50 mrem annual dose requiring personnel dosimetry for a declared pregnant worker, a minor, or a member of the public.
- TLD ID# A3048 was located on the lunch room's bulletin board in 3720 Building. Total measured dose for the year was 180 mrem; results for three quarters exceeded the 40 mrem investigation level. The total measured dose for CY 1993 was 30 mrem and, for CY 1994, was 120 mrem. The increase in measured dose for CY 1994 and 1995 was attributed to increased work with radioactive materials in a glovebox in an adjacent room. When corrected for worker occupancy, doses are projected at below the 50 mrem annual dose requiring personnel dosimetry for a declared pregnant worker, a minor, or a member of the public.
- TLD ID# A3062 was located in Room 5 of 325 Building on a pipe above the north door. Total measured dose for the year was 58 mrem, with a reading of 46 mrem during the third quarter. A review of historic data for CY 1993 and CY 1994 showed typical readings of 10 mrem or less per quarter. The third quarter reading for this year appears to be an outlier and no further investigation was conducted.
- TLD ID# A3072 was located in the electrician's office in 329 Building. Total measured dose for the year was 48 mrem, with a reading of 40 mrem during the second quarter. A review of historic data for CY 1993 and CY 1994 showed typical readings of 10 mrem or less per quarter. The second quarter reading for this year appears to be an outlier and no further investigation was conducted.

3.2 Special Area TLD Results

A total of 34 special area TLD locations were identified for CY 1995. These special locations were requested by line management or Radiological Control to better define radiological conditions in the workplace for ALARA considerations. The review of special area TLD results is summarized below.

- During the fourth quarter of CY 1994, 18 special area TLDs were located in rooms within the 100 corridor of 325 Building. The 100 corridor is located within the facility's Radiologically Controlled Area. These area TLDs were left in the field through the end of the first quarter of CY 1995. The area TLDs located in Rooms 118 and 119 (A2211 and A2212) had readings of 120 mrem and 210 mrem, respectively. Projecting these readings for the period of a year and adjusting for occupancy, it is possible that a worker who spent 2000 h a year at this location could receive a dose of 55 mrem (Rm 118) or 97 mrem (Rm 119). Workers who routinely occupy these offices have personnel TLDs.
- An area TLD (A3104) has been located in Room 504 of the 325 Building since CY 1993. Quarterly TLD results through the second quarter of 1995 ranged from 100 to 490 mrem. Results for the third and fourth quarters of CY 1995 increased to 1143 mrem and 1080 mrem, respectively. Increased work activities in A Cell were the cause of this increase. As noted by Bivins and Stoetzel (1996), no workers are located in this area for extended time periods. In April 1996, the posting of this room was changed from a Radiologically Controlled Area to Radiological Buffer Area. Bivins and Stoetzel erroneously reported that the posting of the room was changed to a Radiological Buffer Area during CY 1995.
- During the third and fourth quarter of CY 1995, 5 special area TLDs were positioned at selected locations within the Radiologically Controlled Area and Radiological Buffer Area in the 324 Building. Results were below the 40 mrem investigation level.
- During the fourth quarter of 1995, one area TLD (A3139) was located in Room 116 within the 100 corridor of 325 Building. This area is a Radiologically Controlled Area. The area TLD result was 0 mrem.
- During the third and fourth quarter of CY 1995, 6 special area TLDs were positioned at selected locations within the Radiological Buffer Area in 3708 Building. Results ranged from 0 to 392 mrem per quarter. Line management used the results for ALARA planning.
- TLD ID# A3153 was located in the temporary change room in 327 Building. The location was within a Radiological Buffer Area. The TLD was initiated during the third quarter of CY 1995 and had readings of 96 mrem (third quarter) and 47 mrem (fourth quarter).

3.3 Quality Control Sample Results

Quality control TLD results are presented in Table 3.2.

Table 3.2 Quality Control TLD Results

TLD ID#	TLD Location	Known Exposure Level (mrem) ^(a)	Area TLD Reading (mrem)	% Difference
A3123	324, LOC.8	30	20	-33.3
A3124	324, LOC.9	50	50	0
A3125	324, LOC.10	150	160	6.7
A3126	324, LOC.11	300	290	-3.3
A3127	324, LOC.12	500	540	8.0

(a) Uncertainties in exposures were $\pm 3.4\%$.

Two factors may have contributed to differences in the readings, particularly for the TLD #A3123 exposed to 30 mrem:

- Rounding errors - Dose values for the Hanford Basic TLD are reported to the nearest multiple of 10; therefore, a measured reading of 24 mrem will be reported as 20 mrem and could contribute to the differences noted. The new area TLD (i.e., Hanford Standard TLD), used starting in the third quarter of CY 1995, is read to the nearest integer and will eliminate potential rounding errors.
- Background subtraction - As mentioned above, the quality control TLDs were placed in a shielded box after exposures and returned with other area TLDs for the second quarter. The dose algorithm for the Hanford Basic TLD subtracts out an average background value for the Hanford Site (15 mrem/quarter); therefore, by shielding the quality control TLDs background radiation levels were subtracted out twice. Future quality control TLDs will not be placed in a shielded box but instead located in a facility that historically has shown no impact from radiological work.

4.0 Conclusions

The area monitoring TLD program for CY 1995 was a useful tool in determining exposure trends in work areas located outside radiological areas. All routine area monitoring TLD results were less than 50 mrem annually after correcting for worker occupancy. The results support the conclusion that personnel dosimeters are not required for staff in these monitored areas.

5.0 References

Bivins, S. R. and G. A. Stoetzel. 1996. *Area Monitoring Dosimeter Program for the Pacific Northwest National Laboratory: Results for CY 1993 and CY 1994*. PNNL-11088, March 1996, Pacific Northwest National Laboratory, Richland, Washington.

U.S. Department of Energy (DOE). 1994. *Radiological Control Manual*. DOE/EH-0256T, Rev. 1, Washington, D.C.

Appendix A

Hanford Basic TLD - Processing, Calibration, and Dose Assessment

Appendix A

Hanford Basic TLD - Processing, Calibration, and Dose Assessment

Processing

Area TLDs were annealed at 80°C for 16 h before being issued to improve long-term consistency between TLDs. They were cleaned in two ultrasonic cleaning baths before processing to remove oils and mineral deposits that might affect the readout process. After cleaning, TLDs were annealed for 30 min at 80°C to ensure that they were dry and to volatilize any residues.

Area TLD processing (readout) was done using the Hanford automated reader system. The system heater was maintained at ~300°C. Glow curves were recorded for all TLDs processed.

Calibration

Area TLDs were calibrated using sources that were traceable to the National Institute of Standards and Technology (NIST). The primary calibration was the deep dose from an on-phantom ¹³⁷Cs exposure.

Dose Assessment

The contribution to the area TLD from naturally occurring environmental radiation was determined using the following equation:

$$\text{ENV.FAC} = \frac{0.18 (1 - e^{-[0.00078(Y1)])}}{0.00078}$$

where ENV.FAC = environmental dose based on the number of days elapsed between previous and current dosimeter processing

0.18 = the expected dose in mrem/d from environmental radiation in the Hanford environs

Y1 = the number of days between the previous and current TLD processing

0.00078 = a factor to compensate for the fade of the thermoluminescent signal.

The deep dose for area TLDs was calculated as follows:

$$\text{Dose} = \frac{C_o * (R - 2TA) * \text{RSF} * \text{CSF}}{\text{PSF}} - \text{ENV.FAC}$$

where

C_o = the conversion factor for converting chip response to mrem for area TLD

R = raw chip count before any adjustments

2TA = the average for the basic background control dosimeters

RSF = the reader sensitivity factor

CSF = the chip sensitivity factor for position 1 for the reader

PSF = the position sensitivity factor for position 1 for the reader

ENV.FAC = environmental dose based on the number of days elapsed between previous and current dosimeter processing.

For the area TLDs, the shallow dose is set equal to the deep dose.

Appendix B

Hanford Standard TLD - Processing, Calibration, and Dose Assessment

Appendix B

Hanford Standard TLD - Processing, Calibration, and Dose Assessment

Processing

Harshaw 8800 series automated reader systems were used to process the area TLDs. Automated processing steps included:

- Pre-issue reader annealings, in which each dosimeter card is processed through the automated reader systems to remove any remaining residual signal from past occupational exposure or environmental background radiation. Each dosimeter card is annealed at 80°C for 16 h before being issued.
- Reader processing, in which the reader heats all chips simultaneously at a rate of 25°C/sec until a maximum temperature of 300°C is obtained.
- Glow-curve recording, in which the glow curve is recorded for all dosimeters and stored for a period of approximately 2 yr.

Calibration

Area TLDs were calibrated using sources that were traceable to the National Institute of Standards and Technology (NIST). The primary calibration was the deep dose from an on-phantom ¹³⁷Cs exposure.

Dose Assessment

The contribution to the area TLD from naturally occurring environmental radiation was determined using the following equation:

$$E_i = G_i (FD - BD)$$

where: E_i = estimated environmental background for chip i (⁶⁰Co mR-equivalent)
 G_i = background growth rate (mR/d)
FD = field cycle days (days between previous and current processing date)
BD = blank days (mean days between previous and current processing for blank cards).

The adjusted chip readings are calculated using the following equation:

$$D_i = \frac{X_i - B_i - E_i}{(RRF_i * F_i)}$$

where: D_i = adjusted chip reading for chip i (^{137}C rem-equivalent)
 X_i = calibrated chip reading for chip i (^{60}Co mR-equivalent)
 B_i = mean calibrated chip i reading from blank cards (^{60}Co mR-equivalent)
 E_i = estimated environmental background for chip i (^{60}Co mR-equivalent)
 RRF_i = ^{137}Cs relative response factor (RRF) for chip i (mR/rem)
 F_i = fade factor for chip i.

Area TLD readings were provided for shallow dose, deep dose, neutron dose, and eye dose. Only deep dose results were included for discussion in this report.

Appendix C

Locations of Area Monitoring TLDs

Appendix C

Locations of Area Monitoring TLDs

TLD ID #	BLDG	Location ID #	Description of Location
		Routine TLDs	
A-3000	303-J	LOC. 1	Lunch room, west wall, bulletin board
A-3001	305-B	LOC. 1	Main entrance, hallway, bulletin board
A-3002	3760	TRL. 1	Bulletin board, corridor
A-3003	3760	TRL. 3	Bulletin board, corridor
A-3004	350	LOC. 1	Bulletin board in copy area
A-3005	350	LOC. 2	Inside Room 156
A-3006	3718-A	LOC. 1	Main office
A-3007	3718-B	LOC. 1	Above phone on north wall
A-3008	3731-A	LOC. 1	Bulletin board in lunchroom
A-3009	3760	LOC. 1	Lobby
A-3010	3760	LOC. 2	Second floor corridor on bulletin board
A-3011	3760	LOC. 3	Second floor - copy room
A-3012	3762	LOC. 1	First floor near fire extinguisher sign
A-3013	3762	LOC. 2	Second floor in copy room
A-3014	3762	LOC. 3	Bulletin board in Room 214
A-3015	3764	LOC. 1	Main entrance - bulletin board in corridor
A-3016	3764	LOC. 2	Second floor - bulletin board at top of stairs
A-3017	306-W (1st Quarter)	TRL. 2	South end, bulletin board
	327 (3rd, 4th Quarters)	LOC. 3	Rm 9 (RCT Office)
A-3019	306-W	TRL. 5	South end, bulletin board
A-3020	306-W	TRL. 6	West hallway
A-3021	318	TRL. 2	Main entrance, bulletin board, corridor

TLD ID #	BLDG	Location ID #	Description of Location
A-3022	318	TRL. 4	Bulletin board on the north wall (main entrance)
A-3023	318	TRL. 5	Bulletin board
A-3024	320	NE TRL	South door
A-3026	324	TRL. 1	Bulletin board in corridor
A-3027	324	TRL. 2	Bulletin board in corridor
A-3028	326	TRL. 1	Bulletin board, center corridor
A-3029	326	TRL. 2	Bulletin board, center corridor
A-3030	329	TRL. 1	Southwest entrance - north wall
A-3031	329	TRL. 2	Inside of Room 2
A-3032	3765	TRL. 1	Bulletin board in main entrance
A-3033	3765	TRL. 2	Main entrance - bulletin board in corridor
A-3034	306-W	LOC. 1	Main entrance on first bulletin board
A-3035	306-W	LOC. 2	Second floor - bulletin board in Room 223
A-3036	306-W	LOC. 3	Second floor - bulletin board near copy machine
A-3037	314	LOC. 1	Hallway near rear entrance across from Room 5
A-3038	314	LOC. 2	East-west hallway across from Room 17
A-3039	318	LOC. 1	Front lobby
A-3040	318	LOC. 2	Main corridor of second floor
A-3041	318	LOC. 3	Main corridor outside instrument receiving
A-3042	320	LOC. 1	Lobby
A-3043	320	LOC. 2	Down west stairs through south door - Room B62
A-3044	331	LOC. 1	First floor lobby on east wall
A-3045	331	LOC. 2	Second floor hallway on bulletin board outside of Room 25
A-3046	331	LOC. 3	Third floor hallway on bulletin board outside of Room 66
A-3047	3720	LOC. 1	North and south corridor across from Room 221
A-3048	3720	LOC. 2	Bulletin board in lunchroom
A-3049	3730	LOC. 1	Main entrance, bulletin board, east wall
A-3050	3745	LOC. 1	Counting Laboratory bulletin board
A-3051	3745-A	LOC. 1	Bulletin board on west wall
A-3052	3745-B	LOC. 1	Bulletin board in main entrance
A-3053	3746	LOC. 1	Last office on left as one enters (Room 3)
A-3054	3746-A	LOC. 1	Main corridor outside of Room 14
A-3055	3708	LOC. 1	Corridor
A-3056	324	LOC. 1	Bulletin board outside of lunchroom
A-3057	324	LOC. 2	Second floor, in corridor outside of Room 218
A-3058	324	LOC. 3	Second floor, in corridor outside of Room 208

TLD ID #	BLDG	Location ID #	Description of Location
A-3059	324	LOC. 4	Second floor, inside of Room 279
A-3060	324	LOC. 5	Inside Room 185
A-3061	325	LOC. 1	Main lobby near north door
A-3062	325	LOC. 2	Mezzanine, Room 5, pipe above north door
A-3063	325	LOC. 3	Second floor by elevator
A-3064	326	LOC. 1	Lobby
A-3065	326	LOC. 2	First floor - in front of exit door to basement
A-3066	326	LOC. 3	First floor - in corridor across from Room 48-B
A-3067	326	LOC. 4	Second floor - lunchroom bulletin board
A-3068	326	LOC. 5	Second floor - corridor near Room 40-C
A-3069	327	LOC. 1	Lobby
A-3070	327	LOC. 2	Secretary's office
A-3071	329	LOC. 1	Lobby
A-3072	329	LOC. 2	Electrician's office
A-3073	336-1	LOC.1	New lobby near fire alarm
A-3074	329	LOC. 4	North-south hallway (Room 2)
A-3075	329	LOC. 5	North-south hallway (Room 5C-1)
A-3076	3760	TRL. 2	Bulletin board - corridor
A-3077	329	TRL. 4	Bulletin board - corridor
A-3078	329	TRL. 5	Bulletin board - corridor
A-3079	329	TRL. 6	Bulletin board - corridor
A-3080	337	LOC. 1	First floor (basement) - south
A-3081	337	LOC. 2	First floor (basement) - north
A-3082	337	LOC. 3	Second floor (south) above drinking fountain
A-3083	337	LOC. 4	Second floor (north) above drinking fountain
A-3084	337	LOC. 5	Third floor (south) on picture board
A-3085	337	LOC. 6	Third floor (north) above drinking fountain
A-3086	622-R	LOC. 1	Corridor by weather station room
A-3087	622-R	LOC. 2	Exit sign in front of men's room
A-3088	747-A	LOC. 1	Bulletin board on west wall by scale
A-3089	747-A	TRL. 1, LOC. 1	Bulletin board by south door
A-3091	ESB	LOC. 1	Inside of Room 14
A-3092	ESB	LOC. 2	Entry way to Room 31
A-3093	LSL-II	LOC. 1	Lunchroom
A-3094	LSL-II	LOC. 2	Corridor outside of Lab 1404

TLID ID #	BLDG	Location ID #	Description of Location
A-3095	LSL-II	LOC. 3	Lab 1508
A-3096	LSL-II	LOC. 4	Lab 1419
A-3097	LSL-II	LOC. 5	Office 1224
A-3098	LSL-II	LOC. 6	Lab 1335
A-3099	PSL	LOC. 1	Bulletin board in Lab 1607
A-3100	PSL	LOC. 2	Bulletin board in Lab 1508
A-3101	PSL	LOC. 3	East entrance on secretary's desk
A-3102	PSL	LOC. 4	Bulletin board in Lab 1304
A-3103	PSL	LOC. 5	Corridor outside of Lab 315
A-3105	RTL	LOC. 1	Lab 428
A-3106	RTL	LOC. 2	Lab 328
A-3107	RTL	LOC. 3	Lab 218
A-3108	RTL	LOC. 4	Outside of Lab 132
A-3109	RTL	LOC. 5	Canteen above fire extinguisher
A-3110	RTL	LOC. 6	Bulletin board in Room 21-A
A-3111	SAINT	LOC. 1	High-bay near analytical scale
A-3113	2400	LOC. 1	Secretary's desk located in main entrance
A-3114	2400	LOC. 2	Bulletin board in entry way to Room 1414
A-3115	2400	LOC. 3	High-bay bulletin board in entry to Lab 1445
A-3116	2400	LOC. 4	Second floor on bulletin board outside of Room 2428
A-3117	ALE	LOC. 1	Room 109
A-3118	ALE	LOC. 2	Lunchroom
A-3119	3718-G	LOC. 1	North wall of warehouse office
		Special	
A-2198	325	Rm 101	
A-2199	325	Rm 102	
A-2200	325	Rm 102A	
A-2201	325	Rm 103	
A-2202	325	Rm 104	
A-2203	325	Rm 104A	
A-2204	325	Rm 105	
A-2205	325	Rm 112	
A-2206	325	Rm 112A	
A-2207	325	Rm 114	
A-2208	325	Rm 115	
A-2209	325	Rm 116	

TLD ID #	BLDG	Location ID #	Description of Location
A-2210	325	Rm 117	
A-2211	325	Rm 118	
A-2212	325	Rm 119	
A-2213	325	Rm 204	
A-2214	325	Rm 301	
A-2215	325	Rm 113	
A-3104	325	LOC.4	Rm 504
A-3121	324	LOC.6	Special location requested by 324 Bldg RCT Supervisor
A-3122	324	LOC.7	Special location requested by 324 Bldg RCT Supervisor
A-3123	324	LOC.8	Special location requested by 324 Bldg RCT Supervisor
A-3124	324	LOC.9	Special location requested by 324 Bldg RCT Supervisor
A-3125	324	LOC.10	Special location requested by 324 Bldg RCT Supervisor
A-3126	324	LOC.11	Special location requested by 324 Bldg RCT Supervisor
A-3127	324	LOC.12	Special location requested by 324 Bldg RCT Supervisor
A-3139	325	Rm 116	
A-3146	3708	LOC.1	Special location requested by 3708 line management
A-3147	3708	LOC.2	Special location requested by 3708 line management
A-3148	3708	LOC.3	Special location requested by 3708 line management
A-3149	3708	LOC.4	Special location requested by 3708 line management
A-3150	3708	LOC.5	Special location requested by 3708 line management
A-3151	3708	LOC.6	Special location requested by 3708 line management
A-3153	327	LOC.4	Temporary Change Room

Appendix D

Area Monitoring TLD Results for CY 1995

Appendix D

Area Monitoring TLD Results for CY 1995^(a)

Appendix D
Area Monitoring TLD Results for CY 1995^(a)

TLD ID#	TLD Location	Deep Dose (mrem)				Annual
		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	
Routine Area TLDs						
A3000	303J LOC.1	0	0	0	(b)	0
A3001	305B LOC.1	0	0	0	0	0
A3002	3760 TRL.1	0	0	0	(b)	0
A3003	3760 TRL.3	0	0	0	(b)	0
A3004	350 LOC.1	0	0	0	0	0
A3005	350 LOC.2	0	0	0	0	0
A3006	3718A LOC.1	0	0	12	9	21
A3007	3718B LOC.1	0	0	15	0	15
A3008	3731A LOC.1	0	0	0	(b)	0
A3009	3760 LOC.1	0	0	0	0	0
A3010	3760 LOC.2	0	0	0	0	0
A3011	3760 LOC.3	0	0	0	0	0
A3012	3762 LOC.1	0	0	(c)	0	0
A3013	3762 LOC.2	0	0	5	(c)	5
A3014	3762 LOC.3	0	0	(c)	5	5
A3015	3764 LOC.1	0	0	0	0	0
A3016	3764 LOC.2	0	0	0	0	0
A3017	306W TRL.2	0	(b)	(b)	(b)	0
A3017	327 LOC.3	(d)	(d)	27	48	75
A3019	306W TRL.5	0	0	(b)	(b)	0
A3020	306W TRL.6	0	(b)	(b)	(b)	0
A3021	318 TRL.2	0	0	0	(b)	0
A3022	318 TRL.4	0	0	0	(b)	0
A3023	318 TRL.5	0	0	0	(b)	0
A3024	320 NE.TRL	0	0	(b)	(b)	0
A3026	324 TRL.1	0	40	36	9	85
A3027	324 TRL.2	0	0	11	10	21
A3028	326 TRL.1	0	0	10	(b)	10
A3029	326 TRL.2	0	0	0	(b)	0
A3030	329 TRL.1	0	0	0	(b)	0

Appendix D

Area Monitoring TLD Results for CY 1995^(a)

TLD ID#	TLD Location	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual
A3031	329 TRL.2	0	0	(c)	0	0
A3032	3765 TRL.1	0	0	0	0	0
A3033	3765 TRL.2	0	0	(c)	0	0
A3034	306W LOC.1	0	0	0	0	0
A3035	306W LOC.2	0	0	0	0	0
A3036	306W LOC.3	0	0	0	0	0
A3037	314 LOC.1	0	0	0	0	0
A3038	314 LOC.2	0	0	0	0	0
A3039	318 LOC.1	0	(c)	0	0	0
A3040	318 LOC.2	0	0	0	0	0
A3041	318 LOC.3	0	0	0	0	0
A3042	320 LOC.1	0	0	0	0	0
A3043	320 LOC.2	0	0	0	0	0
A3044	331 LOC.1	0	0	0	0	0
A3045	331 LOC.2	0	0	0	0	0
A3046	331 LOC.3	0	0	0	0	0
A3047	3720 LOC.1	0	0	0	0	0
A3048	3720 LOC.2	20	60	59	41	180
A3049	3730 LOC.1	0	0	0	0	0
A3050	3745 LOC.1	0	0	0	0	0
A3051	3745A LOC.1	0	0	5	(b)	5
A3052	3745B LOC.1	0	0	0	(b)	0
A3053	3746 LOC.1	0	0	0	0	0
A3054	3746A LOC.1	0	0	0	0	0
A3055	3708 LOC.1	0	0	(b)	(b)	0
A3056	324 LOC.1	0	0	0	0	0
A3057	324 LOC.2	0	0	20	6	26
A3058	324 LOC.3	0	0	14	12	26
A3059	324 LOC.4	0	(c)	0	6	6
A3060	324 LOC.5	0	0	11	0	11
A3061	325 LOC.1	0	0	0	0	0
A3062	325 LOC.2	0	0	46	12	58
A3063	325 LOC.3	0	0	0	0	0
A3064	326 LOC.1	0	0	0	0	0

Appendix D

Area Monitoring TLD Results for CY 1995^(a)

TLD ID#	TLD Location	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual
A3065	326 LOC.2	0	0	0	0	0
A3066	326 LOC.3	0	0	0	0	0
A3067	326 LOC.4	0	0	0	0	0
A3068	326 LOC.5	0	0	0	0	0
A3069	327 LOC.1	0	0	0	0	0
A3070	327 LOC.2	0	30	28	12	70
A3071	329 LOC.1	0	0	0	0	0
A3072	329 LOC.2	0	40	8	0	48
A3073	336-1, LOC.1	30	(c)	8	0	38
A3074	329 LOC.4	0	0	0	20	20
A3075	329 LOC.5	0	0	0	0	0
A3076	3760 TRL.2	0	0	0	0	0
A3077	329 TRL.4	0	0	0	0	0
A3078	329 TRL.5	0	0	0	0	0
A3079	329 TRL.6	0	0	0	0	0
A3080	337 LOC.1	0	0	0	0	0
A3081	337 LOC.2	0	0	0	0	0
A3082	337 LOC.3	0	0	5	0	5
A3083	337 LOC.4	0	0	6	0	6
A3084	337 LOC.5	0	0	6	5	11
A3085	337 LOC.6	30	0	6	5	41
A3086	622R LOC.1	0	0	5	0	5
A3087	622R LOC.2	0	0	0	0	0
A3088	747A LOC.1	0	0	0	0	0
A3089	747A Trl LOC.1	0	0	0	0	0
A3091	ESB LOC.1	0	0	0	0	0
A3092	ESB LOC.2	0	0	0	0	0
A3093	LSL-II LOC.1	0	0	0	0	0
A3094	LSL-II LOC.2	0	0	0	0	0
A3095	LSL-II LOC.3	0	0	8	6	14
A3096	LSL-II LOC.4	0	0	0	0	0
A3097	LSL-II LOC.5	0	0	0	0	0
A3098	LSL-II LOC.6	0	0	0	0	0
A3099	PSL LOC.1	0	0	0	0	0

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