CHAPTER 10

DOSE RECORDS

INTRODUCTION

We are re required to keep detailed records of all radiation doses you receive at Point Lepreau G.S., and this is a logical place to introduce you to Dose Records. Chapters 6 and 7 dealt with external dose measurements and protection against external exposure. Chapters 8 and 9 dealt with internal dose measurements and contamination control, i.e., protection against internal exposure.

In this chapter, we'll discuss how the data from the external and internal dosimetry measurements are handled and interpreted. Although Health Physics takes care of all the dose records of everyone who has ever worked in the station, we want you to know how the system works so that you can understand the dose information that is routinely posted in the station.

DOSIMETRY INFORMATION FORM

You use the DIF to communicate with the Health Physics Dose Records system. An example is shown on the next page. You use it

1. To report if you've lost, found, or damaged your TLD.
2. To report neutron dose and to report that you have assigned a neutron-insensitive TLD to someone.
3. To report PAD information. (Do you remember the problems caused by a drill or grinder? See page 169.) If Health Physics finds a significant difference between your TLD and PAD results, they'll tell you.
4. To request special services (like when you exceed your DCP – more on this later).

EXTERNAL DOSES

External dose measurements are obtained from TLDs (badges and extremity TLDs), PADs, and neutron measurements.

TLD Badge Data

TLD badges are worn for a one-month period, which is called a **Monitoring Period.** A new period starts on the last day of the month. On that day, at around 6 – 7 p.m., we replace all TLD badges with new ones. For example, if you are now wearing a badge with a white stripe on it (as shown on page 163), we are in a "white" period. At the end of this Monitoring Period, Security will replace the white badges with blue ones. The reason for the white/blue colour code is to identify easily those badges that are being used in the wrong period.

00001

DOSIMETRY INFORMATION FORM

Énergie NB Power

POINT LEPREAU GENERATING STATION

Form#1255 REV. 2001-04

This form is used to transmit information to Health Physics regarding personnel dosimetry.

DATE	TIME	COMPLETED BY	BADGE
01-04-20	11:30	J.M. GREEN	#999

EMPLOYEE NAME	BADGE #	WORK GROUP	NB POWER SUPERVISOR
R.S. HOLD	998	MM	A.K.A. BOSSMAN

☐ TLD LOST	TLD FOUND BY	HEALTH PHYSICS / SECURITY SERIAL # OF NEW TLD	
☐ TLD FOUND	LOCATION	WHITE	BLUE
☐ TLD DAMAGED	COMMENTS	PAD DOSE _____mSv	
☑ NEUTRON DOSIMETRY	WORK LOCATION: PHT PUMP #2	STAY TIME: 0.5 h	
	NEUTRON DOSE RATE: 0.6 mSv/h	PAD READING: 0.22 mSv	
	NEUTRON INSENSITIVE TLD ISSUED TO ORANGE WORKER / VISITOR ☐ YES ☐ NO		
	WCA TLD# 3203087	NEUTRON METER DOSE 0.3 mSv	
☐ PAD DOSIMETRY	☐ PAD READING HIGH ☐ PAD READING ERROR MESSAGE ☐ WORKING WITH DRILL / GRINDER ☐ PAD DAMAGED / LOST ☐ OTHER		
☐ BODY COUNT	☐ ROUTINE COUNT SHOWING ACTIVITY ☐ SUSPECTED INTAKE COMMENTS		
☐ OTHER / ADDITIONAL COMMENTS			

Refer to DIF#

Body Count _____ mSv	Deep 0.24 mSv	Shallow 0.24 mSv	Neutron 0.30 mSv

☐ TLD # entered by ☐ Labels ☐ No further action required

Health Physics Assistant Homer Simpson

Dose Records Approval fen

DISTRIBUTION Original to Dose Records File ☐ Employee ☐ Work Group Supervisor ☐ Other

Fig. 10.1. Dosimetry Information Form (Neutron Dose Assignment)

We send the exposed TLD badges to our Fredericton Health Physics Lab for processing by the automatic TLD reader. Its operation was explained on page 164.

The output from the reader is fed to our computer, which generates a file (see Techie box) that can be accessed by the Health Physics staff at the station. After the TLD results are checked for accuracy, the **Monitoring Period Dose Report** is generated (more on this later).

Each TL element may read slightly high or low, because of small variations in the amount of sensitive material in each element. You can either buy badges that have been pre-selected to give very good results (expensive!), or you can assign individual calibration factors to each element when you first put the badge in service, and then let the computer do the sums. That's what we do.

Neutron Doses

Please review the section on "Neutron Response" on pages 164 - 165. As explained there, neutron dose is assigned from the integrator reading of the neutron survey meter. You *must* send this information to Health Physics via a DIF; otherwise, it may not get into your dose records. If you have received any neutron dose, you fill out the DIF and drop it in the Health Physics out-basket in the Work Control Area. Fig. 10.1 opposite shows a typical example for neutron dose in the NEUTRON DOSIMETRY section. Health Physics will make sure that the neutron dose is added to your dose records.

Extremity Doses

Whenever any extremity TLDs have been worn, they are read out on the manual TLD reader in the station Health Physics Lab. The lab computer generates a report of doses (in mSv) for all extremity TLDs that were worn. The report is posted on the Dose Display Boards in the corridors outside the Main Control Room and outside the Health Physics Lab. The report lists everyone who has had extremity TLD results for the current period. It gives the results for the last set of extremity TLDs worn, and the highest extremity dose plus shallow dose for the year.

PAD Results

We use your PAD results under two conditions:

1. If you have lost or damaged your TLD, we will use the PAD results for that time.
2. If the TLD result for the monitoring period is less than 0.20 mSv and the PAD results add up to more than 0.05 mSv in the same period, we'll use the PAD data.

INTERNAL DOSES

Tritium

In Chapter 8 we outlined how the computer processes urine sample data. Please read that stuff again while I go and grab a coffee... OK, you'll have realised that every time you give a sample, the computer crunches the numbers and stores the doses.

Whole Body Counter

Any result from a whole-body count will also be added to your dose records. It will be calculated as weighted dose ($H_W = H_T w_T$, see page 113). You'll be informed via a DIF (see the section on BODY COUNT) of a non-zero dose assignment.

MONITORING PERIOD DOSE REPORT

Once the TLD data from the Fredericton lab have been received and checked, the Monitoring Period Dose Report (MPDR) can be generated. Fig. 10.2 summarises the inputs used by the computer as described above.

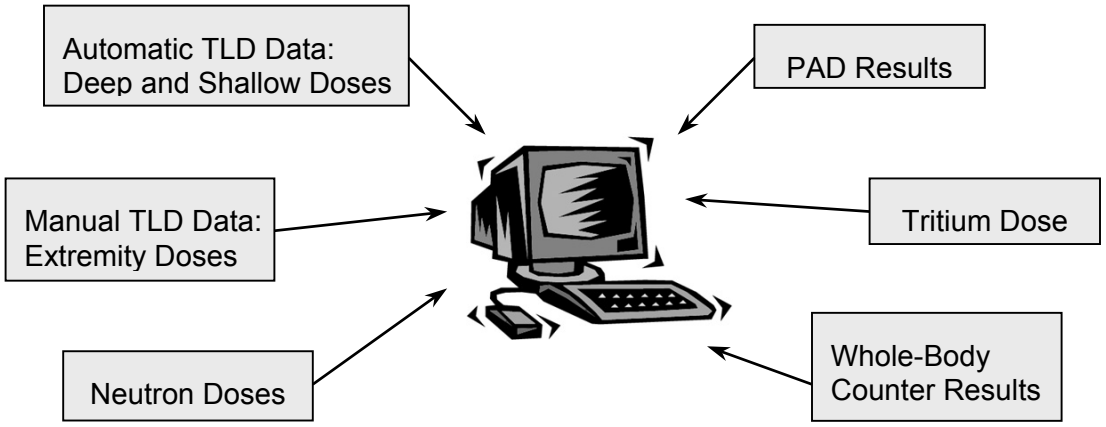

Fig. 10.2. Inputs Needed for the MPDR

The MPDR is posted on the two Dose Display Boards mentioned before. It is also available by Work Group on the Intranet. Fig. 10.3 shows part of MPDR for the period that ended on March 31, 2001. I know that Wayne Avery won't mind if we use his data to explain what it all means.

`Badge #`

Wayne's TLD badge number is **`0355.`**

`Work Group`

`HP` means Wayne is in the Health Physics group.

`Crew`

When he works, Wayne works days, so this field is blank.

2001-04-09 11:02 Period: 2001-03-01 TO 2001-03-31 Page 002

All Dose Reported in mSv

Name	Badge	WG Crew	Period Whole Body			Year Whole Body			Shallow		Extremity
Attached Staff *			Int	Ext	Total	Int	Ext	Total	Period	Year	Year
Abbott,Kathy L	0528	AS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Abedin,Joynal	*0320	NR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acott,Roy A	0100	TC	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01
Adzua,Timothy S	*0414	NR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Agnew,David G	*1248	NR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ahearn,E Peter	0101	FH	0.00	0.19	0.19	0.00	0.19	0.19	0.19	0.19	0.19
Ahmed,Fariduddin	*0375	NR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aikens,John W	*1026	NR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Akkerman,Bentley O	0822	OP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Albert,J Gerard	0939	MM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Allain,Joseph C	*0968	NR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Allen,Jennifer L	0928	HP	0.00	0.00	0.00	0.00	0.06	0.06	0.00	0.06	0.06
Allen,Stuart R	*0909	TN	0.00	0.00	0.00	0.02	0.18	0.20	0.00	0.20	8.51
Alward,D Douglas	0103	NR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anghelidis,Nicolae	*0356	NR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arbeau,Carol CM	0204	AS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arongaus,Jacques	0324	EI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arsenault,Carl J	0838	SE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arsenault,Leonard J	*0996	MM	0.18	0.00	0.18	0.18	0.00	0.18	0.18	0.18	0.18
Arseneau,Bernice M	1058	CU A	0.35	0.00	0.35	0.64	0.00	0.64	0.35	0.64	0.64
Arseneau,Danial P	*0998	TN	0.00	0.14	0.14	0.00	0.14	0.14	0.14	0.14	0.14
Arseneau,Joseph L	*0826	TN	0.04	4.26	4.30	0.04	4.26	4.30	4.30	4.30	4.30
Arseneault,Edmond J	0310	MM	0.05	0.48	0.53	0.05	0.48	0.53	0.53	0.53	0.53
Arseneault,Marcel J	*0172	AD	0.07	0.00	0.07	0.07	0.00	0.07	0.07	0.07	0.07
Attoe,Walter J F	0750	OP D	0.01	0.00	0.01	0.07	0.06	0.13	0.01	0.13	0.13
Aucoin,Gisele M	*0147	NR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Avery,Wayne D	0355	HP	0.26	1.35	1.61	0.26	1.46	1.72	1.61	1.72	1.72
Babineau,Gerald J	0106	TN	0.00	0.05	0.05	0.00	0.05	0.05	0.05	0.05	0.05

Fig. 10.3. Monitoring Period Dose Report

Period Whole Body

The **Int** column lists Wayne's tritium dose as assessed from urine samples given in this period (March). If any dose from internal sources measured by the whole-body counter had been assigned in this period, it would have been included in the **0.26 mSv** shown here. Also, Wayne would have been told of this on his copy of the DIF.

The **Ext** column indicates **1.35 mSv** of deep dose. If Wayne had received any neutron dose in this period, it would be included in the 1.35 mSv. If there was no neutron dose, the 1.35 mSv represents gamma dose measured by the TLD.

Total is merely the sum of **Int** and **Ext**, i.e., 0.26 + 1.35 = **1.61 mSv**.

Year Whole Body

Since everybody's year starts on January1, the results given in these three columns are the totals from January 1 until March 31 for this MPDR. You can see that Wayne got most of his dose in March — he only got 0.11 mSv total in January and February. This is entirely reasonable, because we were shut down in March, and that's when Wayne would do his thing.

Shallow Dose

Listed here is the shallow dose that has been measured in this Monitoring Period, as well as the totals for the current year. Included in the shallow dose are the shallow TLD, neutron, and tritium dose results determined by urine bioassay. In Wayne's case, you can tell that he received no extra shallow dose above his deep dose.

Testing has shown that our TLDs under-respond to low-energy beta fields. To allow for this, we apply a fudge factor if we think you received a significant beta dose. If your shallow dose exceeds the deep dose by 20% and by 0.20 mSv, we assume that you worked in a beta field. The difference between the deep and shallow readings is multiplied by 1.5 and added to your TLD deep reading to give the shallow dose. Otherwise, shallow = deep.

Extremity

Extremity TLDs are read out on the manual TLD reader in the station Health Physics Lab, and the results are posted separately. The MPDR lists only the total for the year. Listed in the **Year** column is the highest of the total extremity doses recorded in this year for the left hand or right hand (or left or right foot, if applicable). For instance, if Wayne had worn extremity TLDs on two occasions, and the results were

Left hand: 1.20, 1.60 (total = 2.80 mSv),
Right hand: 0.70, 1.90 (total = 2.60 mSv),

then the highest extremity dose (2.80 mSv) would be the one that applies. Shallow dose is added to the extremity dose to give a total that is listed in the **Year** column.

It is obvious from Wayne's records that he received no extremity dose as measured by extremity TLDs, since the shallow dose is identical to the extremity dose. Does anyone listed on this report have any extremity dose? How much?

BIOASSAY UPDATE REPORT

The MPDR gives you fresh information every month. This is not really good enough for dose control purposes, because you will want to know where you stand every day rather than just at the end of the month. For external radiation, the daily PAD and neutron doses will give you a good idea of where you stand, but of course it tells you nothing about the internal dose from tritium that you have received since the last Monitoring Period ended.

Every time you give a urine sample, we update your internal tritium dose you have received in the current monitoring period. We get this information to you in **Bioassay Update Reports (BUR)** which are posted every day (Monday to Friday) on the Dose Display Boards. They are also available by Work Group on the Intranet.

Fig 10.4 shows the BUR of April 10 in the monitoring period following the one of Fig. 10.3. The MPDR and the BUR should list the same people, regardless of whether new urine sample data are available or not. If you compare them carefully, you'll see that three people are missing from the BUR. All that means is that they were no longer working at PLGS on April 10. All were attached staff (indicated by *), and they were here for the shutdown work we did in March.

Let us use Wayne Avery's data again to see what it all means

`Badge and WG`

Badge number and work group are listed as on the MPDR.

`Qual`

This lists the current radiation protection qualification. Wayne must have impressed us on his last requalification course. Not surprising, since he teaches it.

`Sample Freq. (days)`

The sample frequency for on-site workers is either 7 or 28 days. It is 7 days for shift workers and Fuel Handling, and 28 days for the rest of you. Regardless of this, you should always give a sample after a tritium exposure. If you receive tritium exposure routinely, your sample frequency is 7 days.

`Last Sample Date mm.dd`

Wayne gave his last sample on April 09.

`Dose Commit.`

The committed dose is the infinity dose from your last sample. It is the dose that you will still get over the next several weeks, even if you pick up no more tritium. We described this in Chapter 8. We calculate it by knowing that a tritium concentration in the last urine sample of 1 MBq/L will give an infinity dose of 0.84 mSv. Now would be a good time to review pages 242 – 246.

By checking this column each time you give a sample, you can tell if your tritium level is increasing or going down. Wayne has **`0.03 mSv`** to come. This figure of 0.03 mSv is *not* entered into Wayne's Dose Records, but it is used to work out the Dose Check Point. More on this later.

2001-04-10 13:43 Period: 2001-04-01 TO 2001-04-30 Page 002

All Dose in mSv DCP Rounded to Nearest 0.1 mSv

Name	Badge	WG	Crew	Qual	Sample Freq. (days)	Last Sample Date mm-dd	Dose Commit.	Dose Since 2001-03-31 Int	PAD	Neut	Dose Check Point	Message
Attached Staff *											# Fixed Limit	
Abbott,Kathy L	528	AS		ORANGE	28	03-06	0.00	0.00	0.00	0.00	NON-NEW	Sample OVERDUE
Acott,Roy A	100	TC		GREEN	28	04-03	0.00	0.00	0.00	0.00	10.0	
Adzua,Timothy S *	414	NR		ORANGE	28	03-22	0.00	0.00	0.00	0.00	2.0	Sample OVERDUE
Agnew,David G *	1248	NR		ORANGE	28	03-28	0.00	0.00	0.00	0.00	NON-NEW	
Ahearn,E Peter	101	FH		GREEN	7	04-02	0.02	0.01	0.04	0.00	9.9	Sample Req'd
Ahmed,Fariduddin *	375	NR		ORANGE	28	07-25	0.00	0.00	0.00	0.00	2.0	Sample OVERDUE
Aikens,John W *	1026	NR		ORANGE	28	03-14	0.00	0.00	0.00	0.00	7.5	Sample for PAD
Akkerman,Bentley O	822	OP		GREEN	28	04-09	0.00	0.00	0.00	0.00	10.0	
Albert,J Gerard	939	MM		ORANGE	28	03-26	0.00	0.00	0.00	0.00	10.0	Sample for PAD
Allain,Joseph C *	968	NR		ORANGE	28	01-24	0.00	0.00	0.00	0.00	2.0	Sample OVERDUE
Allen,Jennifer L	928	HP		GREEN	28	03-28	0.00	0.00	0.00	0.00	10.0	
Alward,D Douglas	103	NR		GREEN	28	03-15	0.00	0.00	0.00	0.00	10.0	Sample for PAD
Anghelidis,Nicolae *	356	NR		ORANGE	28	04-03	0.00	0.00	0.00	0.00	10.0	
Arbeau,Carol CM	204	AS		ORANGE	28	03-27	0.00	0.00	0.00	0.00	NON-NEW	Sample for PAD
Arongaus,Jacques	324	EI		GREEN	7	04-03	0.02	0.01	0.02	0.00	10.0	Sample Req'd
Arsenault,Carl J	838	SE		ORANGE	28	03-23	0.00	0.00	0.00	0.00	10.0	Sample for PAD
Arseneau,Bernice M	1058	CU	A	GREEN	7	04-06	0.36	0.13	0.00	0.00	9.4	
Arseneau,Danial P *	998	TN		ORANGE	28	04-09	0.00	0.00	0.01	0.00	4.9	
Arseneau,Joseph L *	826	TN		ORANGE	7	03-24	0.06	0.00	0.00	0.00	2.8	Sample OVERDUE
Arseneault,Edmond J	310	MM		GREEN	7	04-02	0.02	0.03	0.00	0.00	9.7	Sample Req'd
Arseneault,Marcel J *	172	AD		ORANGE	7	04-04	0.05	0.06	0.00	0.00	9.9	
Attoe,Walter J F	750	OP	D	GREEN	7	04-05	0.02	0.01	0.03	0.00	9.9	
Aucoin,Gisele M *	147	NR		ORANGE	28	02-22	0.00	0.00	0.00	0.00	0.5	Sample OVERDUE
Avery,Wayne D	355	HP		GREEN	7	04-09	0.03	0.06	0.02	0.00	9.1	
Babineau,Gerald J	106	TN		GREEN	28	04-02	0.00	0.00	0.01	0.00	10.0	
Babkirk,Edward A	820	OP	D	GREEN	7	04-06	0.00	0.00	0.00	0.00	10.0	
Backa,John F	646	EI		GREEN	7	04-06	0.02	0.01	0.00	0.00	9.9	

Fig. 10.4. Bioassay Update Report

Dose Since 2001-03-31

Int. This is the tritium dose assigned to Wayne from March 31 (the end of the previous Monitoring Period) to the date of his last sample. In Wayne's case, this is **0.06 mSv**. How this calculation is done was explained in pages 245 - 246. You read that bit, right?

PAD In the current Monitoring Period, Wayne has received a total **0.02 mSv** PAD dose. The PAD Readers are linked to the HP computer, which keeps track of this.

Neut. Wayne has received no neutron dose in the current Monitoring Period.

Dose Check Point

We'll describe the Dose Check Point last.

Message

Unless it says **Sample Req'd, Sample OVERDUE**, or **Sample for PAD**, this space will normally be blank. Table 10.1 gives the criteria for printing BUR Messages. The computer has all bioassay data on file, and it generates messages automatically as required. There are no messages for Wayne, because he follows the rules.

TABLE 10.1. CRITERIA FOR BUR MESSAGES

Criterion	*Message and Update Time*		
	Sample Required	*Sample OVERDUE*	*Sample for PAD*
Committed dose below 0.01 mSv	28 d	35 d	
Committed dose of 0.01 mSv or more	7 d	14 d	
Committed dose of 1.00 mSv or more	1 d	2 d	
We have coded a check into the PAD Readers to prevent anyone from getting a PAD if they are overdue for a urine sample or if they haven't given a sample in the past 14 days. The procedures require a "before exposure" sample if you are going to be exposed to tritium and if you haven't given a sample in the past week. Recognising that operations people are off for 10 days at a time, we coded the PAD requirement for 14 days. If they are locked out because of this, they should give a sample and see Health Physics about having their "flag flipped." A program on the PAD data base menu allows us to override the lock out. The Shift Supervisor also has access to this program for back shifts.			14 d

Ed Arseneault has a "Sample Req'd" message. On what date will it change to "Sample OVERDUE" if he does nothing about it? And why does Doug Alward have a "Sample for PAD" message?

Note: A "Sample OVERDUE" message will also appear until the first sample is received for a new employee.

DOSE CHECK POINT

The Bioassay Update Report also lists the **Dose Check Point (DCP)**. The DCP is a concept to help you control your dose so that you don't exceed the annual administrative limit.

The legal dose limit is 20 mSv/year averaged over five years, with a maximum of 50 mSv allowed in one year. In NB Power, we use an administrative limit of 20 mSv/year.

Assume that you have received and are committed to 8 mSv in this ECY (see Fig. 10.5). This leaves 12 mSv available before you reach the administrative limit of 20 mSv. The DCP is *half* of the remaining available dose, i.e., 6 mSv, and 6.0 would be the value shown in the Dose Check Point column of the Bioassay Update Report.

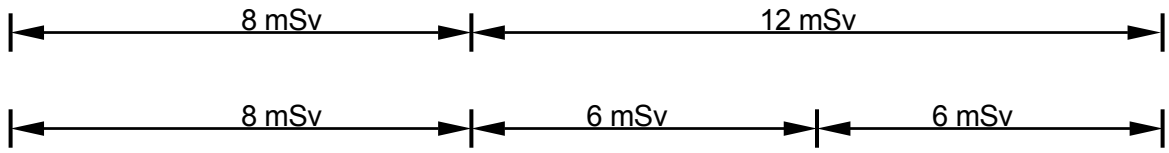

Fig. 10.5. The Dose Check Point

Let's look at Wayne's data to see how it works. The last MPDR showed his current year dose to be 1.72 mSv. His BUR shows 0.06 mSv assigned to the current period, plus a committed dose of 0.03 mSv. This total of 0.09 mSv from tritium is added to the 0.02 mSv of PAD dose to give him 0.11 mSv for the period so far. When he adds that to the 1.72 mSv received from January to March, he will get a total of 1.83 mSv. This will leave 18.17 mSv available before the 20 mSv limit is reached. Therefore, Wayne's DCP is half of 18.17 = 9.085 mSv. The computer rounds this off to one decimal figure, i.e., 9.1 mSv.

Now let's look at what would happen if your DCP were 1.0 mSv, and you have to do a job in the Reactor Building. PAD job codes have an associated minimum DCP. If your DCP is less than the minimum, the PAD Reader would give you the message "DCP too low" and would refuse to initialise your PAD. This means that you can't do that job.

Before you do any work, make sure that the total of any PAD and neutron doses not yet included on the BUR, plus any unanalysed tritium (dose-rate x time ÷ PF), plus the expected job dose, does not exceed your DCP.

You may be able to do other jobs with associated minimum DCPs, but soon you'll reach a point where you can do no **Radiation Work**.

RADIATION WORK

RADIATION WORK is any work where significant exposure to radiation or contamination may occur.

Just what does "significant exposure to radiation or contamination" mean? At PLGS, we define Radiation Work like this:

RADIATION WORK is

1. **Work with radioactive sources and materials (e.g., calibration sources, decontamination).**
2. **Work in fields above 10 μSv/h (external plus internal).**
3. **Entry to Rubber Areas and Zone 3 areas.**
4. **Any activity in which you expect to receive at least 0.1 mSv.**

You can consider the DCP to be a dose limit that must not be exceeded. The DCP for Non-NEWs (those who aren't Nuclear Energy Workers) is zero. Non-NEWs need to have a **Radiation Work Approval** form signed by Health Physics in order to do Radiation Work. We won't burden you with this procedure until you do the Applications Course. On the BUR, any Non-NEWs will have **NON-NEW** printed in the DCP column. They have a DCP = 0. They also have pink TLD badges — you can't miss them.

OCCUPATIONAL DOSE REPORT

There's more. Every year you will get an **Occupational Dose Report**. This usually consists of two pages, although Curt has managed to compress a sample to one page (Fig. 10.6). It lists:

1. Occupational dose, if any, received before you joined N.B. Power.
2. The dose received every year while you were an employee at Point Lepreau.
3. The dose received every quarter in your last year, and the total for that year.
4. Your lifetime occupational dose, if we have obtained the complete records of any dose you received outside PLGS.
5. A detailed listing of every entry made to your dose records for the last year. This includes
   (a) deep dose and shallow doses measured by your TLD or PAD,
   (b) neutron doses,
   (c) extremity TLD results,
   (d) tritium-in-urine results in Bq/L and dose assigned from them,
   (e) whole-body counter results in Bq, H_T, and H_W for each detected radionuclide.

Health Physics
REPORT
New Brunswick Power
Point Lepreau GS

OCCUPATIONAL DOSE

Rutherford, Ernest F

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Health Physics

Badge No: 666
Company: NB Power
Shift: Day Worker

Summary of Occupational Dose Data to 2000-12-31

Start	Stop	External (mSv)	Whole Body Internal (mSv)	Whole Body Total (mSv)	Shallow (mSv)	Extremity TLD (mSv) RH	LH	RF	LF
Other Employment									
	1980-03-30	3.10	4.15	7.25	7.25	0.00	0.00	0.00	0.00
Previous Years Here									
1989-01-02	1989-12-31	2.16	0.28	2.44	2.59	0.00	0.00	0.00	0.00
1990-01-01	1990-12-30	5.22	1.58	6.80	7.95	2.66	4.98	0.00	0.00
1991-12-31	1991-12-29	0.46	0.04	0.50	0.50	0.00	0.00	0.00	0.00
1998-04-01	1998-12-31	3.11	0.27	3.38	3.54	0.00	0.00	0.00	0.00
1999-01-01	1999-12-31	6.66	1.52	8.18	8.11	0.66	0.00	0.00	0.00
This Year									
2000-01-01	2000-03-31	0.00	0.03	0.03	0.03	0.00	0.00	0.00	0.00
2000-04-01	2000-06-30	0.18	0.08	0.26	0.26	0.00	0.00	0.00	0.00
2000-07-01	2000-09-30	1.33	0.42	1.75	2.04	3.16	3.19	0.00	0.00
2000-10-01	2000-12-31	0.54	0.08	0.62	0.62	2.01	5.86	0.00	0.00
	Total This Year	2.05	0.61	2.66	2.95	5.17	9.05	0.00	0.00
	Life Total	22.76	8.45	31.21	32.89				

Current Year Details

External Dose Entries

Date	Gamma Dose (mSv)	Neutron Dose (mSv)	Beta+ Gamma Dose (mSv)	Extremity Dose (mSv) RH	LH	RF	LF
2000-01-31	0.00		0.00				
2000-02-28	0.00		0.00				
2000-03-31	0.00		0.00				
2000-04-30	0.12	0.06	0.12				
2000-05-31	0.00		0.00				
2000-06-30	0.00		0.00				
2000-07-31	0.00		0.00				
2000-08-22				2.08	2.17		
2000-08-31	0.73		0.73				
2000-09-06				1.08	1.02		
2000-09-30	0.20	0.40	0.50				
2000-10-31	0.36	0.18	0.36	2.01	5.86		
2000-11-30	0.00		0.00				
2000-12-31	0.00		0.00				

Internal Dose Entries

Urine (Tritium):

Date	Activity (Bq/L)	Dose (mSv)	Date	Activity (Bq/L)	Dose (mSv)	Date	Activity (Bq/L)	Dose (mSv)	Date	Activity (Bq/L)	Dose (mSv)
2000-01-22	0.00e+01	0.00	2000-04-07	0.00e+01	0.00	2000-08-21	0.00e+01	0.03	2000-09-28	3.62e+04	0.14
2000-02-19	2.22e+04	0.02	2000-04-09	1.22e+05	0.01	2000-08-22	4.25e+05	0.01	2000-10-29	0.00e+01	0.03
2000-03-02	0.00e+01	0.01	2000-04-21	5.13e+04	0.06	2000-09-01	2.09e+05	0.18	2000-11-01	4.51e+04	0.00
2000-03-27	0.00e+01	0.00	2000-04-24	4.11e+04	0.01	2000-09-06	1.78e+05	0.06	2000-12-03	1.35e+04	0.05

Body Count Results:

Organ	Date	Type	Isotope	Activity (Bq)	Tissue Dose Equivalent (mSv)	Weighting Factor	Effective WB Dose Equivalent (mSv)
	2000-08-22	Committed		0.00e+01	0.00	0.00	0.00
Whole Body	2000-10-31	Est.Intake	Co-60	4.51e+02			0.00
Whole Body	2000-11-01	Committed	Co-60	3.71e+02	0.00	0.00	0.00

Fig. 10.6. Occupational Dose Report

OTHER REPORTS

Apart from the four reports that we've already covered, there are other reports that we generate (see Fig. 10.7).

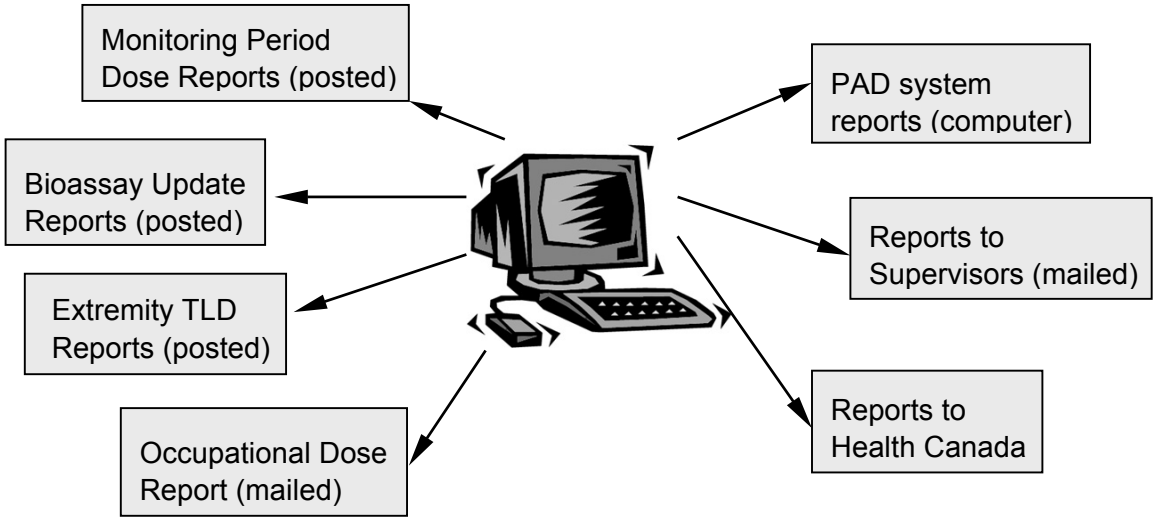


Fig. 10.7. Output From Dose Records

Read-only access to the PAD Information System is available to you on the Intranet.

Reports to Other Agencies: we are legally required to report all doses to Health Canada. This is done quarterly. We also required to report to the CNSC any unusual doses, and any dose in excess of a legal limit. A listing of dose per work group is reported to the CNSC via the Station Quarterly Report.

Work Group Dose

Table 10.2 shows how the total station dose is distributed over the various work groups. This is taken from the data for the years 1996 – 2000.

Contractors like Babcock & Wilcox and AECL are normally involved in high dose-rate jobs in boiler and reactor maintenance, as is Mechanical Maintenance. The Fuel Handling group does the F/M maintenance. "Others" lumps together all those work groups that don't get much dose.

TABLE 10.2. WORK GROUP DOSE

Work Group	*% of Station Dose*
Contractors	33
Fuel Handling	17
Mech. Maint.	15
Technical Unit	9
Service Maintenance	8
EI&C	5
Operations	5
Others	8

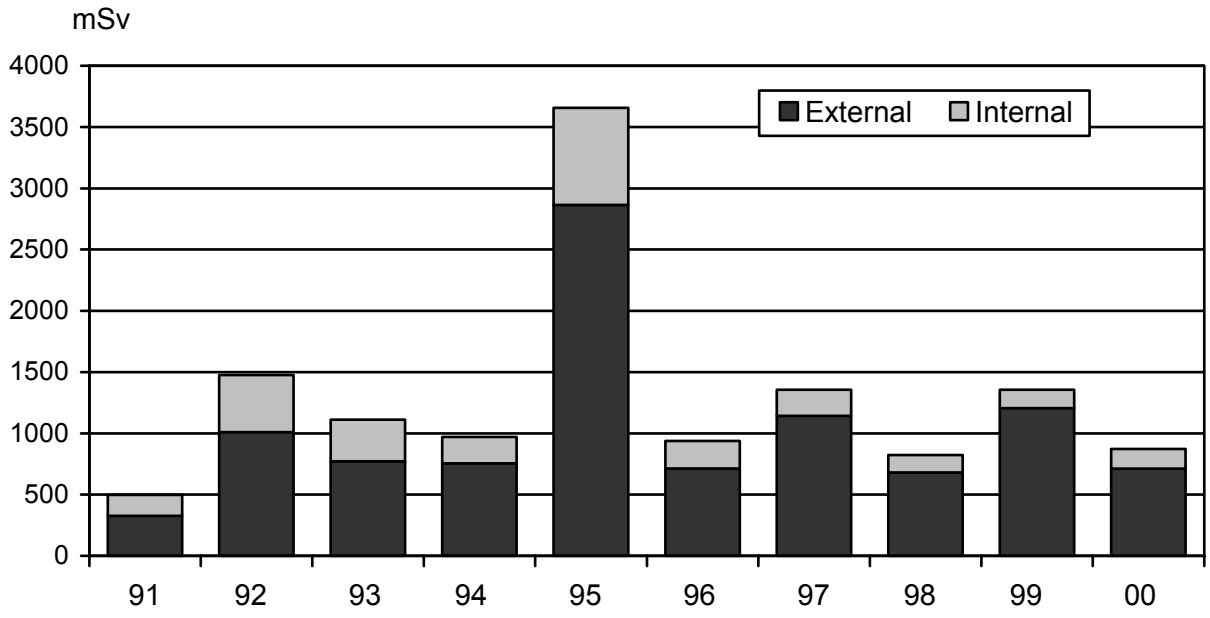


Fig. 10.8. PLGS Total Dose by Year

Fig. 10.8 shows how much dose we've used to operate and maintain the station over the last ten years. Although we strive to hold it to 1 Sv or less, we've only managed to do that for half the time. The large dose in 1995 was due to major outage work.

SUMMARY

Health Physics manages the Dose Records system.

You communicate with the Dose Records system via the DIF. In particular, you use the DIF to send neutron dose to Health Physics for input into the MPDR.

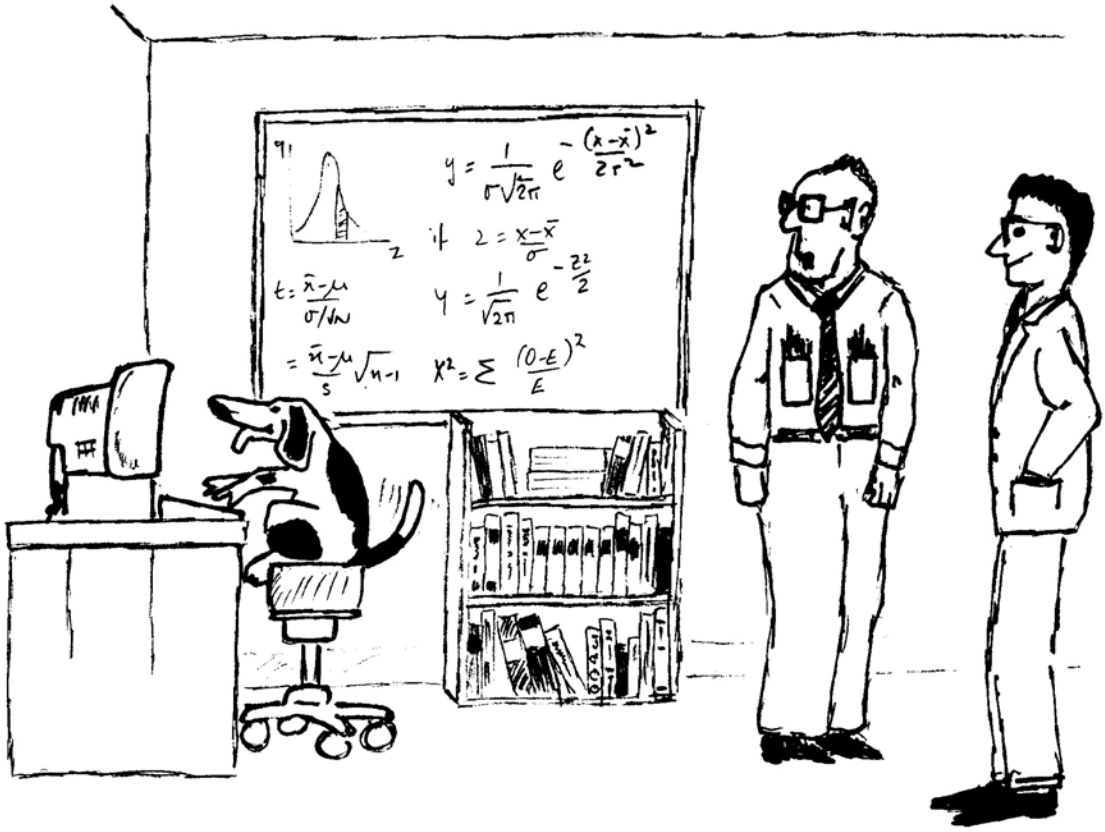
The MPDR is posted monthly; the BUR is posted daily. You are expected to be able to read and understand the information on these forms.

Your DCP is listed on the BUR. It is equal to one half of the dose you are allowed to receive in the remainder of the year.

Radiation Work is

1. *Work with radioactive sources and materials (e.g., calibration sources, decontamination).*
2. *Work in fields above 10 μSv/h (external plus internal).*
3. *Entry to Rubber Areas and Zone 3 areas.*
4. *Any activity in which you expect to receive at least 0.1 mSv.*

Every year, you will receive an Occupational Dose Report that lists all the dosimetry inputs that were used for generating your dose records for that year.



"Nah, his dog's not that smart. He doesn't back up his files properly, he can't use a mouse, and he has trouble using INGRES."

PROBLEMS

1. In April, you were exposed as follows:

   (a) 2.40 mSv of beta radiation,
   (b) 0.30 mSv of neutron radiation,
   (c) 2.10 mSv of gamma radiation,
   (d) 0.60 mSv of tritium,
   (e) 2.00 mSv to the thyroid.

   In the MPDR for April, what would you expect to see listed for "Period Whole Body" (Int, Ext, Total) and for "Shallow Period"?

2. Assume that your own MPDR results for March are the same as those listed for Wayne Avery in Fig. 10.3. Given the results of Question 1, what would the April MPDR list for "Year Whole Body" (Int, Ext, Total) and "Shallow Year"?

3. If you had also received extremity doses in April of 3, 3, 6 mSv to the left hand and 1, 2, 7 mSv to the right hand, what will be listed in the "Extremity Year" column of the April MPDR? (The data of Questions 1 and 2 apply.)

4. Neutron doses normally add up to a few percent of the deep doses, yet there is no neutron dose listed in the BUR of Fig. 10.3. Why?

5. The method given on page 338 for assigning extremity doses will actually overestimate the true extremity dose. Can you explain why?

6. You were using the neutron meter while doing some work in the Boiler Room. At the end of the job, it indicated 0.6 mSv of neutron dose. You forgot to send Health Physics the DIF. How does the neutron dose now get into your dose records?

7. It hasn't happened yet, but probably will happen sometime: the automatic TLD reader ate your badge and failed to read it out. How do we assign deep and shallow dose for this Monitoring Period?

8. Why do you think we chose a one-month Monitoring Period rather than three months, which would certainly be less work for us?

9. Why are the committed tritium doses in the BUR not included in dose records?

10. What is the one condition for which the committed tritium dose is included in dose records?

11. Assume that the latest MPDR showed that you had deep and shallow dose of 10 mSv each for the year. Today's BUR lists for you the following:

    Dose Commit. = 0.40 mSv, Int = 0.30 mSv, PAD = 0.50 mSv, Neut = 0.20 mSv.

    What should be the value of the DCP?

12. What is the DCP for Non-NEWs?

13. When your DCP = 0, you need the approval of the Senior Health Physicist to do any Radiation Work. Give an example where he might give this approval.

14. Page 338 explains how we modify beta dose. What shallow dose would we assign in the following cases:
    (a) TLD deep = 1.00 mSv, TLD shallow = 1.15 mSv;
    (b) TLD deep = 1.00 mSv, TLD shallow = 1.30 mSv.

15. What does a "Sample for PAD" message on the BUR mean?

16. Ernie works in Fuel Handling, Marylin is a Chem Tech on shift, Mickey works in the Admin Building, and Mike works in the STOIC. What do you expect their Bioassay sampling frequencies to be?

17. (a) Ralph has a normal 28-day sampling frequency (he works in the HP Lab in Fredericton). He gave a sample on April 2. Yet his entry on the BUR of April 10 shows "Sample Required". Why?
    (b) On what date will the message change to "Sample OVERDUE", if he doesn't give a sample in the meantime?

18. Which one of the following activities is not Radiation Work?
    (a) a half-hour tour of the R/B,
    (b) a two minute entry into a Rubber Area to look at a discombobulator sprocket,
    (c) work in a general gamma field of 5 μSv/h for 90 minutes,
    (d) work in 20 μSv/h of tritium for 20 minutes using a tritium respirator,
    (e) an activity that is expected to lead to a whole-body dose of 0.3 mSv in a monthly monitoring period.

19. If your DCP = 4.5 mSv, how much dose have you received so far in this year?