

ALARA ANALYSIS 2008
Richland LLRW Facility

1.0 INTRODUCTION

The 2008 ALARA program goal of two (2) man-rem and individual exposures below 200 millirem for the year were achieved. In 2008, the total site TLD exposure increased 0.365 man-rem from that received in 2007. This was due, in part, to a increase in the amount of time required inside trench 19 for ECB placement and waste disposal , Energy Northwest Box setting and void fill project, and an increase in percentage of drum shipments, which required more time and exposure. The average exposure per box placement decreased in 2008, although the percentage of low dose packages decreases in 2008 compared to 2007.

2.0 ALARA ANALYSIS

As required by the Facility Standards Manual, Section 2.1.3, the following areas are addressed in this report:

A. TOTAL FACILITY EXPOSURE RECEIVED AND EXPOSURE RECEIVED BY JOB CLASSIFICATION

As expected, operations personnel received the majority (46 %) of the total facility exposure in 2008 (1% decrease from 2007). Operations personnel comprise approximately 60% of the facilities non-managerial radiation worker staff and perform most of physical handling of waste material. Table 1 lists total exposure by job classification and percentage of the total facility exposure.

Table 1
TLD Exposures by Job Classification

Classification	Man-Rem Received	Percentage of Total
Operators	.527	46
Radcon	.332	29
Maintenance	.114	10
Management	.172	15
Totals	1.145	100

Figure 1 "Departmental exposures" provides a graphical display of exposure by job class by month.

B. ANALYSIS OF EXPOSURES TO PERSONNEL DURING VARIOUS FACILITY OPERATIONS

1. Routine Waste Handling Operations

Approximately (27) % of the facility exposure was received during routine waste handling activities. Routine waste handling consists of offloading the waste from trailers and placement of the waste either in above ground storage or direct placement one of the disposal trenches.

When box shipments arrive, they are frequently handled twice therefore exposures for box handling are tracked in two categories. Offloading category is tracked to show exposure picked up during box offload to storage and then the boxes are handled a 2nd time for waste placement into the trench. Exposure picked up for offload is 0.070 man-rem and waste placement is 0.095 man-rem for a total of 0.168 man-rem for overall box handling. Exposure received from all waste placement including boxes was 0.370 man-rem which was higher compared to 0.168 man-rem last year due to an 82% increase in drums and a 32% increase in liners received from last year.

Table 2 summarizes the type of containers and the exposures resulting from their offloading handling.

Table 2
SRPD Exposure by Load Type

Load Type	Number Received	Percentage	Exposure (Man-Rem)	Percentage
Drums	99	41	0.025	14
Boxes	69	29	0.070	40
Liners	36	15	0.080	46
Other	35	15	0.000	0
Totals	239	100	0.175	100

"Figure 2 'Offload Exposure History'" graph compares the information and total site exposure to previous years. The "Offload Exposure History" graph is an 8-year breakdown of shipments received and average site exposure.

3. Non-Waste Handling Operations

Exposure from non-waste handling operations totaled 0.405 man-rem for 2008.

Exposures received in this category resulted from:

- Maintenance operations within the controlled area
 - Backfilling and associated surveys
 - Trench maintenance/cleanup
 - Routine surveys
 - Environmental monitoring surveillance's
 - Maintenance of the engineered barrier cell
- a) Locating and placing ECB's into trench-19 accounted for 0.115 man-rem or 28% of non-waste handling exposure. As with previous years the need for maintaining a sufficient number of empty ECBs to supply shielding while working in trench 19 was required to maintain ALARA exposures while working alongside filled ECBs and for future ECB placement.
- b) Exposure from routine package inspections account for 10 mr or 1.5% of the total facility exposure.
- c) The total non-Offloading waste handling exposure is higher than previous years. Several factors contributed to this and these include:
- Increased work in Trench 19 for ECB placements.
 - Box placement with in trenches from storage.
 - Energy Northwest Box void fill project

Table 3 compares non-offloading exposure to total facility exposure for the last five years.

Table 3
Non-Offloading Exposure Comparison
 (TLD) (SRPD W/Correction)

Year	Total Facility Exposure	Non-Offloading Exposure	Percent
2004	1.049 man-Rem	0.557 man-Rem	53
2005	0.843 man-Rem	0.340 man-Rem	40
2006	1.303 man-Rem	0.595 man-Rem	46
2007	0.780 man-Rem	0.180 man-Rem	23
2008	1.145 man-Rem	0.405 man-Rem	35

C. COMPARISON OF 2008 EXPOSURES TO PREVIOUS YEARS

Average man rem per shipment exposure was up slightly compared to 2007, but well within the normal range. There was an increase in drum shipments received in 2008 and the box shipments had a lower percentage of low dose rate packages compared to 2007.

Table 4 summarizes exposure, exposure per shipment and total shipments for the past five years.

Table 4
Five Year Offload Only Exposure Comparison (SRPD w/ no correction factor)

Year	Shipments Received	Total Off Load Exposure (Rem)	Man-Rem/Shipment
2004	105	.185	.0018
2005	96	.354	.0037
2006	96	.330	.0034
2007	128	.258	.0020
2008	83	.175	.0021

Figure 3 "Ave Site Exposure per shipment" Graph (attached) displays the data from Tables 3 and 4.

3. INTERNAL RADIATION EXPOSURE MONITORING

US Ecology Washington implements an internal monitoring program designed to provide continuity of information from initial employment to termination. This program also provides a backup for periodic assessments of an individual's radioisotope body burden. The program consists of the following element:

A. Whole Body Counts

Whole body gamma scans are performed annually for all radiation workers. The minimum sensitivity of this analysis is 2 % of the Annual Limit of Intake (ALI) for all gamma-emitting photons with energies exceeding 0.1 MeV and a probability per decay greater than 50%. All whole body count performed in CY 2008 indicated no internal intake of gamma emitters.

B. Thyroid Scan

Annual thyroid scans are performed for all radiation workers to check for radioiodines. The minimum sensitivity of this analysis is less than ten nanocuries. All thyroid scans performed in CY 2008 indicated no internal intake of radioiodine.

C. Urinalysis

All radiation workers receive a quarterly urinalysis tritium, carbon 14, gross alpha and gross beta minus potassium 40. Minimum sensitivity is less than one nanocurie per milliliter for each analysis. All urine analysis performed in CY 2008 indicated no internal intake of radionuclides.

4. PERSONNEL CONTAMINATION MONITORING

All personnel exiting the site's restricted area are required to survey (frisk) themselves before leaving the restricted area. Frisking area backgrounds are maintained at less than 300 cpm and are usually less than 100 cpm background. If contamination is detected the individual remains in the frisking area and contacts Radiation Protection Personnel, who perform additional alpha and beta contamination surveys. There were no skin or clothing contaminations in CY 2008.

5. IDENTIFICATIONS OF TRENDS

Liner shipments in 2008 are the largest single source of exposure at 46% of off-loading exposure and 12% of total facility exposure.

Figure 4 "ALARA Trends" graph (attached) displays monthly facility exposure in relation to the number of container type shipments and curies (excluding tritium) received.

Offload exposure consists of waste handling during the offload process from the vehicle to the ground, but does not include waste handling in the trench. Tracking of off-loading exposure vs. highest dose rate package in the shipment started in 1987. The results of this tracking for 2008 are:

- Forty (40) % of exposure resulted from those less than 100 mr/hr. These are virtually all our drum and box loads which account for over 70% of our shipments and a majority of our physical handling of waste.
- Thirty one (31) % resulted from the 100-500 mr/hr range.
- Zero (0) % resulted from the 500-1000 mr/hr range.
- Six (6) % resulted from the 1000-10,000 mr/hr range.
- Twenty Three (23) % resulted from the greater than 10,000 mr/hr range.

Figure 5 “Percentage of loads per dose rate” graph compares the dose verses dose rate trended data for the previous nine years.

6. PROGRAM IMPROVEMENT RECOMMENDATIONS

In 2009, changing waste streams and ECB projects will again affect site doses. Dose rates from waste and the amount of time required inside Trench 19 are expected to increase and placement of waste in trench 19 will result in new ALARA challenges.

The number of shipments has decreased slightly to a level where forecasting decreases or increases in specific areas of exposure have limited use. The 2009 ALARA Program Goal is to maintain exposures below two (2) man-rem and individual exposures below 200 millirem for calendar year 2009. In order to achieve this goal the following ALARA actions will be implemented.

- ALARA techniques and requirements will continue to be discussed periodically during safety meetings.
- Techniques for trench ECB placement and disposal that reduce the amount of physical handling will continue to be evaluated and implemented as appropriate.
- ALARA planning and work controls will continue to be implemented on high dose rate tasks such as cask handling or any task with dose rates > 50 mr/hr to minimize exposure from higher dose rate tasks.
- Individual and collective doses will be tracked. If individual or collective doses approach 75% of the above goals, the Radiation Safety Committee will evaluate trends to identify possible additional methods to minimize radiation exposure.

In conclusion, US Ecology Washington will continue to take a proactive approach to maintaining radiation exposure ALARA.

FIGURE 1 DEPARTMENTAL EXPOSURE 2008

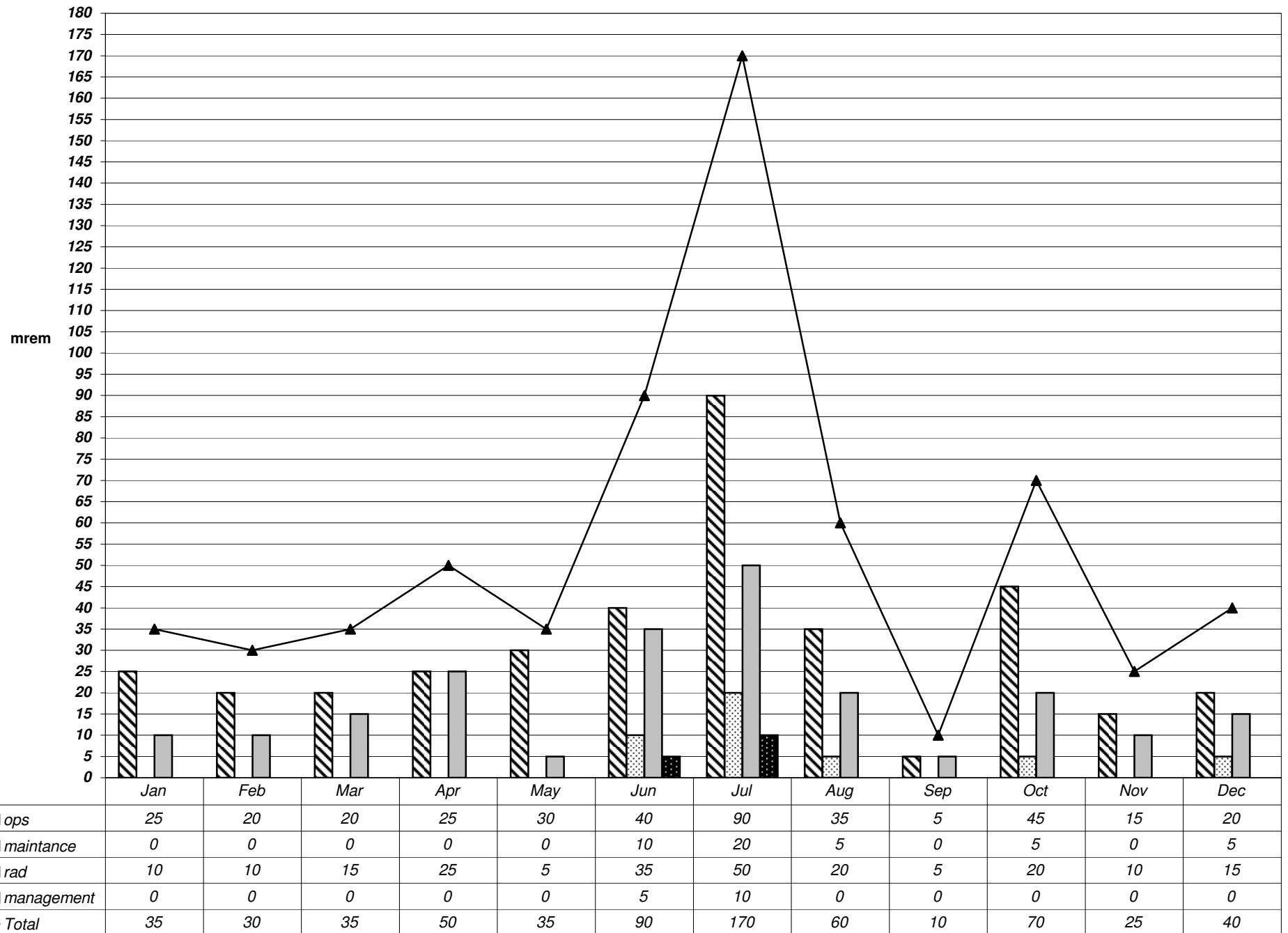
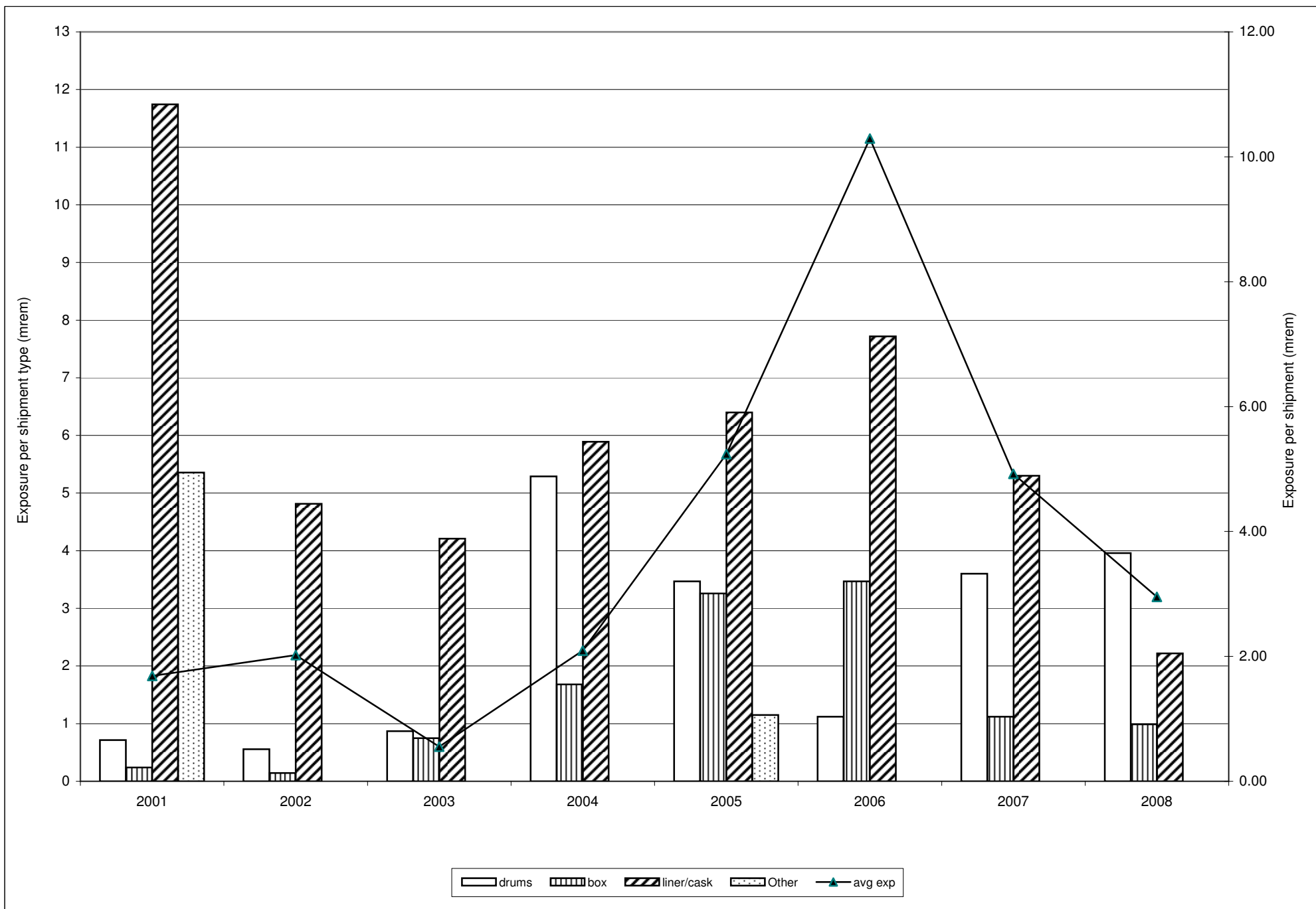
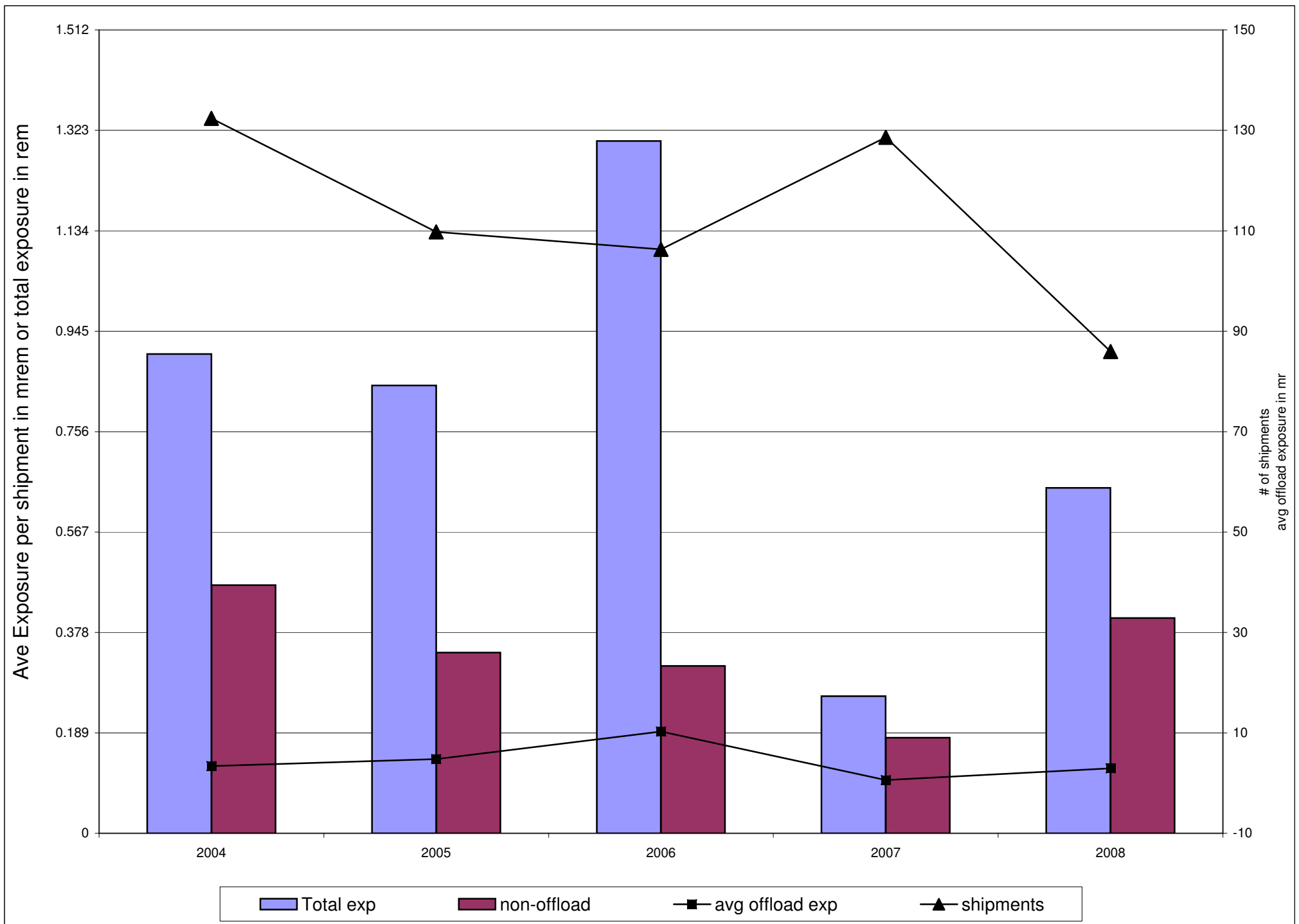


FIGURE 2 OFFLOAD EXPOSURE HISTORY



The exposure per shipment type is offload exposure received by site personnel for that type of shipment divided by the number of shipments received of that type. Average is total site exposure received divided by the total shipments received.

FIGURE 3 AVG SITE EXPOSURE PER SHIPMENT



Ave offload exp is total offload exposure in mrem divided by the number of shipments, Total exp is the total srd site exp in rem, non-offload is total site exposure from non-offloading operations in rem and shipments is the total shipments received

FIGURE 4 ALARA TRENDS

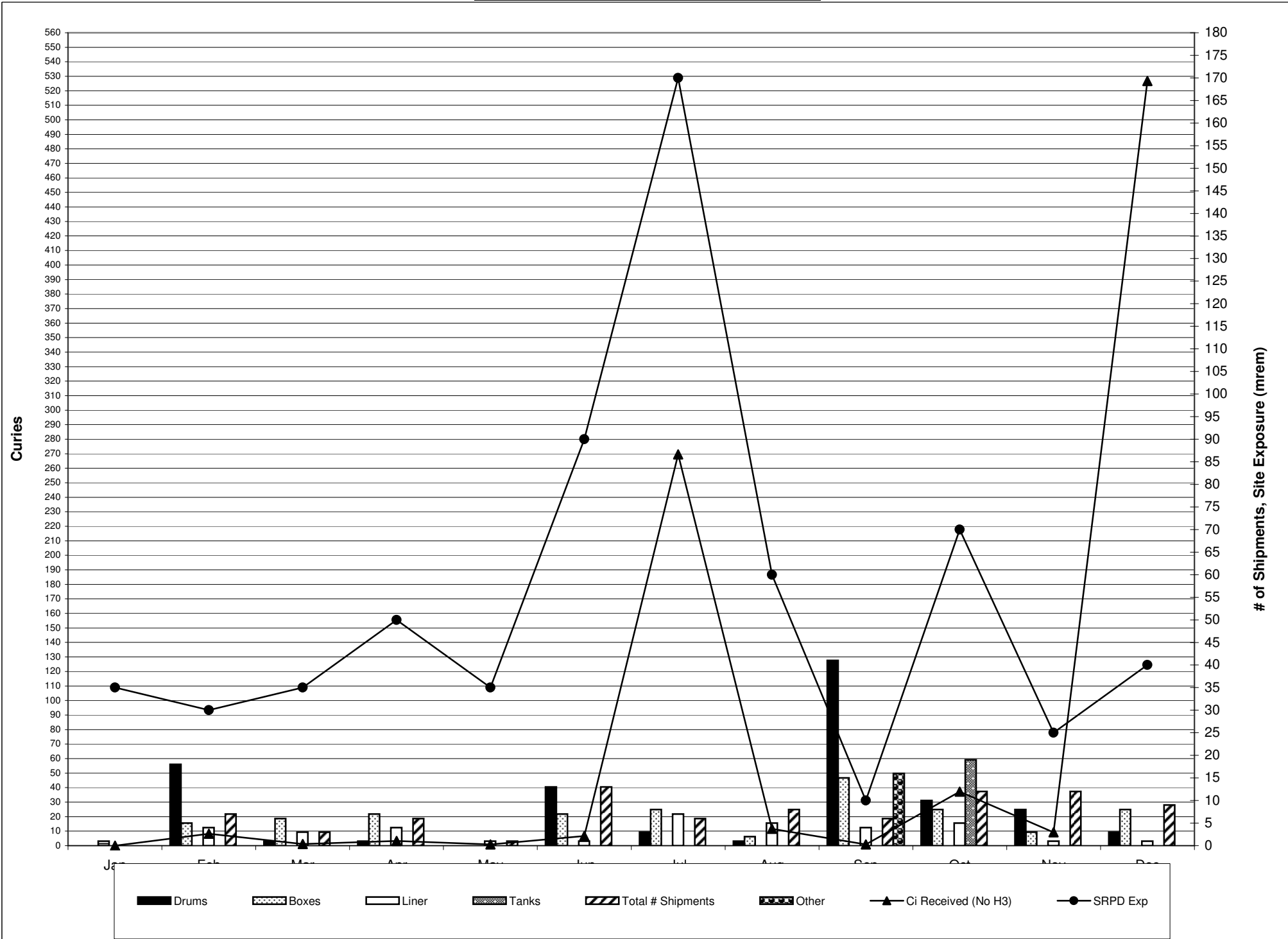


FIGURE 5 PERCENTAGE OF LOADS PER DOSE RATE

