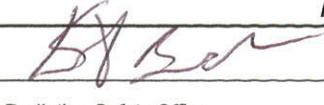


Approved by:		
	General Manager	Radiation Safety Officer

**STANDARD OPERATING PROCEDURE**  
**15.RPP.04**  
**INDIVIDUAL AND AREA DOSIMETRY**

**1.0 OBJECTIVE**

To describe the procedures for conducting individual and area dosimetry for worker and environmental exposures associated with the Clean Harbors Deer Trail (CHDT) landfill.

**2.0 SCOPE**

This standard operating procedure (SOP) applies to CHDT workers who may be exposed to radioactive materials and for identified areas within and in the immediate area around the CHDT landfill.

**3.0 POLICY**

Individual and area dosimetry shall be performed to verify that radiation doses to CHDT workers and members of the public are maintained as low as reasonably achievable (ALARA), with an ALARA total effective dose equivalent (TEDE) goal of 25 millirem per year (mrem/yr). All full-time CHDT staff that have undergone the radiation safety training are considered to be radiation workers and are subject to the occupational dose limit of 5,000 mrem/yr per 10 CFR 20.1201.

**4.0 RESPONSIBILITIES**

Responsibilities of the CHDT Radiation Safety Officer (RSO), CHDT management, and other Clean Harbors staff are defined in the Radiation Protection Plan (SOP 15.RPP.01).

**5.0 INDIVIDUAL DOSIMETRY PROGRAM**

**5.1 Dosimeter Issue**

All full-time CHDT workers shall be issued and wear an individual dosimeter. Any visitors or contractors that are routinely exposed to radioactive materials at CHDT may also be issued dosimeters at the discretion of the CHDT RSO or designee. Dosimeters are issued to only one person and shall not be shared. The individual dosimeters shall be worn at the location on the body likely to receive the highest dose, consistent with manufacturer specifications, which is typically on the chest area or between the waist and the neck, underneath the outside layer of PPE, if worn. Lost or damaged dosimeters shall be reported to the CHDT RSO as soon as possible. Persons who have lost or damaged their dosimeters shall be required to provide documentation of work activities and radiation exposures as necessary for the CHDT RSO to assess doses. Individual dosimeters shall be issued only to personnel formally instructed in their use, and those dosimeters shall be worn only by those to whom the dosimeters were issued.

In addition, dosimeters shall not be:

- Removed from the CHDT facility;
- Deceptively exposed;
  - Employees shall notify the Deer Trail RSO immediately upon learning of possible deceptive exposures of dosimeters.
  - Intentional deceptive exposures of dosimeters are forbidden and may result in reprimands or termination of employment.
- Stored near radiation sources;
- Exposed to high heat, chemical or physical insults, or washed in a washing machine; or,
- Worn during or after medical administration of radioactive materials (thyroid ablation therapy, cardiac stress tests, diagnostic nuclear medicine tests, etc.) until approved by the CHDT RSO.

## **5.2 Changes in Worker Job Status**

If a worker's job status changes, the CHDT RSO shall:

- Remove the employee from the individual dosimeter program if the employee has terminated employment or if the employee's job has changed such that the worker is no longer in the proximity of radioactive materials.
- Add an employee to the individual dosimeter program if the employee's job has changed such that the worker will now be working in the proximity of radioactive materials.

## **5.3 Non-occupational Radiation Doses**

Dosimeter users:

- Are responsible for ensuring that dosimeters are not exposed to non-occupational sources of radiation (e.g., medical or security x-ray devices, therapeutic medical sources, or radiation from medical radionuclides injected into the body).
- Shall notify the CHDT RSO prior to receiving medical injections of radionuclides.
- Shall notify the CHDT RSO if their dosimeter is exposed to non-occupational radiation sources.

The CHDT RSO shall:

- Determine a course of action that shall prevent exposure of an individual dosimeter and problems with personnel surveys for employees who report receiving medical injections of radionuclides.
- Will investigate the cause of the exposure from non-occupational sources and determine the corrections that are necessary for recording the employee's radiation dose.

## 5.4 Quarterly Dosimeter Exchange

Dosimeter badges will be exchanged quarterly. Employees shall return used dosimeters to the CHDT RSO promptly after receiving replacement dosimeters at the beginning of a new wear period. The CHDT RSO shall:

- Be responsible for establishing a program for dosimeter exchange, processing (consistent with the manufacturer's specifications), and recording and reporting of the results.
- Ensure dosimeters are exchanged on a quarterly basis, unless the CHDT RSO or his designee determines a change in exchange frequency is warranted to ensure radiation doses to workers and the public are maintained ALARA.
- Verify that all dosimeters are exchanged and either note that dosimeters are in good condition or note the damage if they are not.
- Note the actual date of dosimeter exchange.
- Verify that all dosimeter results are recorded in a spreadsheet.
- Modify the quarterly doses to include potential inhalation doses, as estimated using the CHDT DR 15.RPP.05, *Estimating Inhalation Doses*.
- Develop and report all dose results to the employees on an annual basis.
- Serve as the CHDT point of contact for individual dosimetry issues.
- Ensure that individual worker doses are recorded, by quarter and annually using the form in Attachment 1 (or equivalent), and maintained in their personnel file.
- Ensure that the doses to declared pregnant workers are tracked on the dosimetry forms in Attachments 1 and 2 (or equivalent) and maintained at levels not to exceed 100 mrem during the pregnancy, plus ALARA.
- Ensure that a corporate record of worker doses, by quarter and annually, including doses to declared pregnant workers, is developed using the form in Attachment 2 (or equivalent) consistent with the CHDT records management procedures.
- Ensure that individual doses are reported to the Department using the form in Attachment 3 (or equivalent) consistent with the CHDT records management procedures.

## 5.5 Data Evaluation

The RSO shall review all dosimetry records on a quarterly and annual basis and shall:

- Perform a dosimetry investigation if a worker's dosimeter cannot be read, is lost, has an anomalous result, or equals or exceeds an administrative control level of 5 millirem in any quarter.
- Re-assign the work duties for individual workers whose quarterly radiation dose equals or exceeds 5 millirem in any two consecutive quarters to reduce their exposure to radioactive materials.

- Monitor annual worker radiation doses against the ALARA goal and take appropriate measures, such as modifying job assignments or specific work procedures, when this goal is challenged.

## **5.6 Record Requests**

Any person who handles or disposes of radioactive materials on behalf of CHDT may request a copy of his or her dosimetry records at any time. These records are maintained by and are available from the CHDT RSO upon written request. All contact with the dosimetry service provider is to be made through the CHDT RSO.

## **5.7 Employment Termination Dose Report**

After termination of employment, a dose report (termination report) shall be provided to all persons who received doses exceeding 20% of the 25 mrem/y ALARA goal in the applicable reporting period. This report shall be provided using the latest copy of Attachment 1 (or equivalent) found in the employee's personnel file, updated to show doses through the date of employment termination.

## **6.0 AREA DOSIMETRY PROGRAM**

### **6.1 Program Requirements**

Dose rates shall be measured quarterly or more frequently, as determined by the CHDT RSO, using special-issue dosimeters in locations:

- Where workers are routinely in the proximity of bulk radioactive materials such as the weight station and disposal cell,
- Where it is unlikely that radioactive materials would be present such as the change room, lunch room, and maintenance areas, and
- Remote from radioactive materials that will record the ambient background.

### **6.2 Responsibilities**

The CHDT RSO shall:

- Determine the number and location of the area dosimeters in and around the CHDT landfill and provide a facility map indicating the location of each area dosimeter.
- Ensure that each identified location has at least one area dosimeter.
- Maintain a map of the location of each dosimeter.
- Ensure that area dosimeters are placed 1 to 1.5 meters (40 to 60 inches) above the ground or floor level.
- Provide protection for area dosimeters against heat, moisture, and direct sunlight.
- Exchange the dosimeters, consistent with the exchange procedures for employees, on a quarterly or other basis, as determined by the CHDT RSO.
- Maintain records for each area dosimeter location in a dosimetry spreadsheet.

- Note any special conditions including tampering, damage, or loss of dosimeter, in the records.
- Investigate any missing or damaged dosimeters.
- Resolve anomalous data, and track and trend data for routine annual and other special reports, as required.
- Serve as the point of contact for area dosimetry issues. Ensure that a corporate record of area radiation doses, by quarter and annually, is developed using the form provided as Attachment 4 (or equivalent) and maintained consistent with SOP 15.RPP.03, *Worker Protection Records*.

## **7.0 REFERENCES**

10 CFR 20.1201. *Occupational Dose Limits for Adults*. Current Version.

**ATTACHMENT 1 – EXAMPLE ANNUAL INDIVIDUAL DOSIMETRY RECORD**

<b>Clean Harbors Deer Trail LLC ANNUAL INDIVIDUAL DOSIMETRY RECORD</b>					
Individual _____ Payroll No. _____ Year _____					
Was this individual a declared pregnant worker during the calendar year? <input type="checkbox"/> Yes <input type="checkbox"/> No					
Exchange Dates for Calendar Year _____ <sup>(a)</sup>	From/To:	From/To:	From/To:	From/To:	
Individual/ (Dosimeter No.)	1 <sup>st</sup> Quarter Dose Rate (millirem)	2 <sup>nd</sup> Quarter Dose Rate (millirem)	3 <sup>rd</sup> Quarter Dose Rate (millirem)	4 <sup>th</sup> Quarter Dose Rate (millirem)	Annual Total Dose Rate (millirem)
Exchange Dates for Calendar Year _____ <sup>(a)</sup>	From/To:	From/To:	From/To:	From/To:	
Individual/ (Dosimeter No.)	1 <sup>st</sup> Quarter Dose Rate (millirem)	2 <sup>nd</sup> Quarter Dose Rate (millirem)	3 <sup>rd</sup> Quarter Dose Rate (millirem)	4 <sup>th</sup> Quarter Dose Rate (millirem)	Annual Total Dose Rate (millirem)
(a) Enter year of employment and provide exact dates for those employees whose deployment and exchange dates differ from the company standard.					
Comments: (add additional pages, if necessary)					
For declared pregnant workers, note the duration of the pregnancy relative to the recorded quarters.					
Annual Log Completed By:			Annual Log Reviewed By:		
Name (Print) _____			Name (Print) _____		
Signature _____			Signature _____		



**ATTACHMENT 3 – EXAMPLE OCCUPATIONAL EXPOSURE RECORD REPORT  
FORM**

<b>OCCUPATIONAL EXPOSURE RECORD FOR A MONITORING PERIOD</b>					
1. NAME (LAST, FIRST, MIDDLE INITIAL)		2. IDENTIFICATION NUMBER	3. ID TYPE	4. SEX <input type="checkbox"/> MALE <input type="checkbox"/> FEMALE	5. DATE OF BIRTH (MM/DD/YY)
6. MONITORING PERIOD	7. LICENSEE OR REGISTRANT NAME Clean Harbors Environmental Services (Deer Trail RCRA Subtitle C Landfill)		8. LICENSE OR REGISTRATION NUMBER(S)	9A. <input type="checkbox"/> RECORD <input type="checkbox"/> ESTIMATE	9B. <input type="checkbox"/> ROUTINE <input type="checkbox"/> PSE
<b>INTAKES</b>				<b>DOSES in mrem</b>	
10A. RADIONUCLIDE	10B. CLASS	10C. MODE	10D. INTAKE IN $\mu$ Ci	DEEP DOSE EQUIVALENT (DDE)	11.
				EYE DOSE EQUIVALENT TO THE LENS OF THE EYE (LDE)	12.
				SHALLOW DOSE EQUIVALENT (SDE, WB)	13.
				SHALLOW DOSE EQUIVALENT, MAX EXTREMITY (SDE, ME)	14.
				COMMITTED EFFECTIVE DOSE EQUIVALENT (CEDE)	15.
				COMMITTED DOSE EQUIVALENT MAXIMALLY EXPOSED ORGAN	16.
				<b>(BLOCKS 11+15) (TEDE)</b>	17.
				<b>MAX ORGAN (BLOCKS 11+15) (TODE)</b>	18.
				19. COMMENTS	
20. SIGNATURE – LICENSEE OR REGISTRANT					21. DATE PREPARED

**INSTRUCTIONS FOR COMPLETION OF THE OCCUPATIONAL EXPOSURE RECORD**

**All doses should be stated in mrem.**

<p>1. Type or print the full name of the monitored individual in the order of last name (including "Jr.," "Sr.," "III," etc), first name, middle initial (if appropriate).</p> <p>2. Enter individual's identification number, including punctuation. This number should be the 9-digit social security number if at all possible. If the individual has no social security number, enter the number from another official identification such as a passport or work permit.</p> <p>3. Enter the code for the type of identification used as shown below:</p> <table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: left;"><u>CODE</u></th> <th style="text-align: left;"><u>ID</u></th> <th style="text-align: left;"><u>TYPE</u></th> </tr> </thead> <tbody> <tr> <td>SSN</td> <td>U.S. Social Security Number</td> <td></td> </tr> <tr> <td>PPN</td> <td>Passport Number</td> <td></td> </tr> <tr> <td>CSE</td> <td>Canadian Social Insurance Number</td> <td></td> </tr> <tr> <td>WPN</td> <td>Work Permit Number</td> <td></td> </tr> <tr> <td>IND</td> <td>INDEX Identification Number</td> <td></td> </tr> <tr> <td>OTH</td> <td>Other</td> <td></td> </tr> </tbody> </table> <p>4. Check the box that denotes the sex of the individual being monitored.</p> <p>5. Enter the date of birth of the individual being monitored in the format MM/DD/YY.</p> <p>6. Enter the monitoring period for which this report is filed. The format should be MM/DD/YY – MM/DD/YY.</p> <p>7. Enter the name of the licensee or registrant (already entered).</p> <p>8. Enter the Department license or registration number.</p> <p>9A. Place an "X" in Record or Estimate. Choose "Record" if the dose data listed represent a final determination of the dose received to the best of the licensee's or registrant's knowledge. Choose "Estimate" only if the listed dose data are preliminary and will be superseded by a final determination resulting in a subsequent report. An example of such an instance would be dose data based on self-reading dosimeter results and the licensee intends to assign the record dose on the basis of TLD results that were not yet available.</p>	<u>CODE</u>	<u>ID</u>	<u>TYPE</u>	SSN	U.S. Social Security Number		PPN	Passport Number		CSE	Canadian Social Insurance Number		WPN	Work Permit Number		IND	INDEX Identification Number		OTH	Other		<p>9B. Place an "X" in either Routine or PSE. Choose "Routine" if the data represent the results of monitoring for routine exposures. Choose "PSE" if the listed dose data represents the results of monitoring of planned special exposures received during the monitoring period. If more than one PSE was received in a single year, the licensee or registrant should sum them and report the total of all PSEs.</p> <p>FOR ITEMS 10D – 18, ENTER SPECIAL UNITS OF mrem</p> <p>10A. Enter the symbol for each radionuclide that resulted in an internal exposure recorded for the individual using the format "Xx-###x," for instance, Cs-137 or Tc-99m.</p> <p>10B. Enter the lung clearance class as listed in Appendix B to Part D (D, W, Y, V, or O for other) for all intakes by inhalation.</p> <p>10C. Enter the mode of intake. For inhalation, enter "H." For absorption through the skin, enter "B." For oral ingestion, enter "G." For injection, enter "J."</p> <p>10D. Enter the intake of each radionuclide in <math>\mu\text{Ci}</math>.</p> <p>11. Enter the Deep Dose Equivalent ((DDE) to the whole body.</p> <p>12. Enter the Eye Dose Equivalent (LDE) recorded for the lens of the eye.</p> <p>13. Enter the Shallow Dose Equivalent recorded for the skin of the whole body (SDE, WB).</p> <p>14. Enter the Shallow Dose Equivalent recorded for the skin of the extremity receiving the maximum dose (SDE, ME).</p> <p>15. Enter the Committed Effective Dose Equivalent (CEDE) or "NR" for "Not Required" or "NC" for "Not Calculated."</p> <p>16. Enter the Committed Dose Equivalent (CDE) recorded for the maximally exposed organ or "NR" for "Not Required" or "NC" for "Not Calculated."</p> <p>17. Enter the total effective dose equivalent (TEDE). The TEDE is the sum of items 11 and 15.</p>	<p>18. Enter the total organ dose equivalent (TODE) for the maximally exposed organ. The TODE is the sum of items 11 and 16.</p> <p>19. Signature of the person designated to represent the licensee or registrant.</p> <p>20. Enter the date this form was prepared.</p> <p>21. COMMENTS.</p> <p>In the space provided, enter additional information that might be needed to determine compliance with limits. An example might be to enter the note that the SDE, ME was the result of exposure from a discrete hot particle. Another possibility would be to indicate that an overexposure report has been sent to the Department in reference to the exposure report.</p>
<u>CODE</u>	<u>ID</u>	<u>TYPE</u>																					
SSN	U.S. Social Security Number																						
PPN	Passport Number																						
CSE	Canadian Social Insurance Number																						
WPN	Work Permit Number																						
IND	INDEX Identification Number																						
OTH	Other																						

