Colorado Department of Public Health and Environment  
Radioactive Materials License 1102-01  
Renewal Application

Renewal Application and Technical Basis,  
Attachments A, B, C, D, E, F, G, H, I, J, K, L

March 31, 2015

Clean Harbors Deer Trail, LLC  
108555 East Highway 36  
Deer Trail, CO 80105-9611
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Attachment E – Technical Basis Document for Groundwater Sampling Modifications
Attachment F – Technical Basis Document for Alternate Analysis Technique
Attachment G – New SOP and Technical Basis for Exposure-Based Acceptance Criteria
Attachment H – Staffing and Key Personnel
Attachment I – Radiation Detection Instruments
Attachment J – Financial Assurance Warranty
Attachment K – Corporate Environmental Health and Safety Commitment
1.0 INTRODUCTION

This package of documents is intended to serve as the license renewal application for Radioactive Materials License 1102-1 for the Clean Harbors Deer Trail, LLC (CHDT) facility located near Last Chance, Colorado. License 1102-1 was originally issued by the Radiation Program of the Hazardous Materials and Waste Management Division of the Colorado Department of Public Health and Environment (CDPHE) in December, 2005. The application for license renewal was submitted in June 2010, and the license was renewed as Amendment No. 11 on December 20, 2010. On October 23, 2012, Amendment No. 12 was issued, reflecting an inflation adjustment to the financial surety amount documented in the 2011 Annual Report. On December 21, 2012, Amendment No. 13 was issued, incorporating a revision of standard operating procedure 15.WAC.01. The scope of the License remains unchanged, but procedures were modified and upgraded to take into account site experience and new additional procedures were added. The expiration date of the renewed License 1102-1 is December 31, 2015, and pursuant to Colorado Code of Regulations (CCR) 6 CCR 1007-1, Part 14.13.1, the renewal request must be filed one year prior to expiration. Clean Harbors requested a 90-day extension which was granted by CDPHE. The date of submission of the renewal request at Clean Harbors’ is set as March 31, 2015.

In November 2012, the Adams County Board of Commissioners issued an Amended Certificate of Designation (CD) authorizing the safe disposal of NORM and TENORM waste. This CD specifies additional oversight of the Deer Trail disposal facility. This oversight is separate from that performed by CDPHE to administer the radioactive material license.

The initial license application and subsequent 2010 renewal application followed the requirements of 6 CCR 1007-1 Parts 14.5 through 14.10. As the majority of the technical basis for suitability of the site for acceptance of radioactive materials is unchanged, much of the original application and subsequent 2010 renewal application is still relevant and applicable and is referenced in this License Renewal Application. This application summarizes the operations of the CHDT facility under License 1102-1 since its issue and presents the proposed changes in scope, procedures, and technical basis that are now appropriate with operational history and data to warrant such changes. This License Renewal Application is organized as follows:

- Section 1 – Introduction
- Section 2 – Summary of Site Operations Under License 1102-1
- Section 3 – Proposed Changes to License Scope
- Section 4 – Proposed Changes to Radiation Protection Program
- Section 5 – Compliance with Regulatory Requirements
- Section 6 – Conclusions
- Section 7 - References
- Attachment A – Form OR-RH-12
- Attachment B – Landfill Cell Documentation
- Attachment C – Revised CHDT Radiation Protection Plan and Procedures
- Attachment D – New SOP and Technical Basis for Oil Production Pipe
- Attachment E – Technical Basis Document for Groundwater Sampling Modifications
- Attachment F – Technical Basis Document for Alternate Analysis Technique
- Attachment G – New SOP and Technical Basis for Exposure-Based Acceptance Criteria
- Attachment H – Staffing and Key Personnel
- Attachment I – Radiation Detection Instruments
- Attachment J – Financial Assurance Warranty
- Attachment K – Corporate Environmental Health and Safety Commitment
2.0 SUMMARY OF SITE OPERATIONS UNDER LICENSE 1102-1

The Annual Reports, required per License Condition 41, provide a year-by-year summary of operations under License 1102-1. Executive summaries of the yearly Annual Reports from 2010 through 2013 have been included with this License Renewal Application as Attachment L. The reports in their entirety are included only on the CD version of this License Renewal Application due to their voluminous nature.

2.1 Waste Characteristics and Disposal Activities 2010 - 2014

Shipments of radioactive materials for disposal began in December of 2006 and continued through 2009 as described in the previous license application. For the period 2010-2014, Initial shipments of radioactive materials for disposal were received in January 2010 and continued through December 2014. Figures for 2014 are not yet available. Table 2-1 presents a summary of the wastes received under License 1102-1 from January 2010 through December 2013.

Of the 93,650.10 tons of radioactive materials disposed at CHDT during its 2010-2013 operations under License 1102-1, approximately 84 percent originated from three remediation projects: 38 percent originated from the Cyprus Amax Vanadium Mill Tailings project in Telluride, CO, approximately 12 percent originated from the CCS Midstream and Crude Processing Inc. projects in North Dakota, and approximately 34 percent originated from Tervita Corporation project in Alexander, North Dakota.

All radioactive materials have been disposed in Cell 3 at CHDT, which was constructed in 2006. Cell 3 was permitted by CDPHE in 2006; the approval letter is included in Attachment B. The disposal area for radiologically impacted materials is surveyed after the placement of the daily cover to assure proper cover. No maintenance activities were required for the secure cell itself except for routine removal of leachate water collected in the sump of the cell in order to prevent leachate headspace from exceeding regulatory limits. Cell 4 was constructed during 2014-2015 and the Construction Quality Assurance document was submitted for approval in March 2015 and is included by reference. Cell 4 was built according to a previously approved cell design plan in the RCRA permit. The capacity of Cell 4 is 491,840 cubic yards. When Cell 4 has received approval, CHDT intends to apply for use of this unit for disposal of waste subject to the license.

### TABLE 2-1. OPERATIONAL DISPOSAL HISTORY, 2010 TO 2013

<table>
<thead>
<tr>
<th>Generator</th>
<th>Total (tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2010</strong></td>
<td></td>
</tr>
<tr>
<td>In Compact</td>
<td></td>
</tr>
<tr>
<td>Cyprus Amax Minerals, NORM Vanadium Mill Tailings, Telluride, CO</td>
<td>35,671.22</td>
</tr>
<tr>
<td>Blake Street Partnership, Denver, CO - Radium Processing Waste</td>
<td>0.22</td>
</tr>
<tr>
<td>Generator</td>
<td>Total (tons)</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td><strong>Out of Compact</strong></td>
<td></td>
</tr>
<tr>
<td>CCS Midstream TENORM from Oil Processing, ND</td>
<td>4,790.14</td>
</tr>
<tr>
<td>Praxair, Inc., NORM Thorium Grinding Media, NY</td>
<td>23.56</td>
</tr>
<tr>
<td>Chevron Moxa LBU Tank TENORM from Oil Production, WY</td>
<td>2.11</td>
</tr>
<tr>
<td>OMYA, Inc., Lead Soil with TENORM Grinding Media, VT</td>
<td>0.68</td>
</tr>
<tr>
<td>TENORM/RCRA Water Filters, Denbury Onshore, MS</td>
<td>1.88</td>
</tr>
<tr>
<td>Raytheon, NORM Thorium Contaminated Soil and Debris, KS</td>
<td>28.52</td>
</tr>
<tr>
<td>Celanese Chemical, TENORM Water Scale and Debris, TX</td>
<td>76.71</td>
</tr>
<tr>
<td>ConocoPhillips, NORM Sludge, TX</td>
<td>8.50</td>
</tr>
<tr>
<td>ConocoPhillips, NORM PPE, TX</td>
<td>3.05</td>
</tr>
<tr>
<td><strong>Total for 2010</strong></td>
<td>40,606.59</td>
</tr>
<tr>
<td><strong>2011</strong></td>
<td></td>
</tr>
<tr>
<td><strong>In Compact</strong></td>
<td></td>
</tr>
<tr>
<td>Mohave Generating Station, Laughlin, NV - Coal Slurry Pipe/Scale/Debris/Soil</td>
<td>95.60</td>
</tr>
<tr>
<td>Meadows Water Treatment Plant, Castle Rock, CO - Green Sand from drinking water treatment</td>
<td>130.60</td>
</tr>
<tr>
<td>Southwest Water Company, Golden, CO - Green Sand from drinking water treatment</td>
<td>1.40</td>
</tr>
<tr>
<td>Ray Waterman Water Treatment Plant, Castle Rock, CO - Spent Green Sand and filter gravel</td>
<td>3.75</td>
</tr>
<tr>
<td><strong>Out of Compact</strong></td>
<td></td>
</tr>
<tr>
<td>Crude Processing Inc./ CCS Midstream TENORM from Oil Processing, North Dakota</td>
<td>6,300.48</td>
</tr>
<tr>
<td>Northrup Grumman System Corp., Rolling Meadows, IL - Optics with debris containing thorium</td>
<td>0.24</td>
</tr>
<tr>
<td>ONEOK Hydrocarbon LP, Bushton, KS - Spent natural gas dessicant</td>
<td>43.77</td>
</tr>
<tr>
<td>ONEOK Hydrocarbon LP, McPherson, KS - Refractory brick</td>
<td>1.39</td>
</tr>
<tr>
<td><strong>Total for 2011</strong></td>
<td>6,577.23</td>
</tr>
<tr>
<td><strong>2012</strong></td>
<td></td>
</tr>
<tr>
<td><strong>In Compact</strong></td>
<td></td>
</tr>
<tr>
<td>Redhill Forest POMWACA, Fairplay, CO – NORM impacted soil from water treatment plant clean-up</td>
<td>282.14</td>
</tr>
<tr>
<td>U.S. Navy DRI Site, Aurora, CO - NORM impacted soil from former Air Force Base</td>
<td>2.76</td>
</tr>
<tr>
<td>Colorado Springs Utilities, Colorado Springs, CO - NORM/TENORM water treatment filter media</td>
<td>29.24</td>
</tr>
<tr>
<td>PSCO-Comanche Station, Pueblo, CO - Junk circuit breakers</td>
<td>30.13</td>
</tr>
<tr>
<td>Mojave Generating Station, Laughlin, NV - TENORM scale (from Coal Slurry Pipeline)</td>
<td>1.40</td>
</tr>
<tr>
<td><strong>Out of Compact</strong></td>
<td></td>
</tr>
<tr>
<td>Tervita Corporation, Alexander, ND - TENORM Filter Cake from oil processing</td>
<td>19,678.56</td>
</tr>
<tr>
<td>AFRPA Western Region, McClellan, CA - Contaminated soil from former Air Force Base</td>
<td>3,239.41</td>
</tr>
</tbody>
</table>
### Operational Total, 2010 to 2013

<table>
<thead>
<tr>
<th>Generator</th>
<th>Total (tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honeywell, Geismar, LA - NORM fluorogypsum pipe scale</td>
<td>153.22</td>
</tr>
<tr>
<td>U.S. DOE for RMOTC, Casper, WY - NORM impacted polyethylene debris</td>
<td>20.28</td>
</tr>
<tr>
<td>ONEOK Hydrocarbon LP, Bushton, KS - Refractory brick</td>
<td>1.69</td>
</tr>
<tr>
<td>EOG Resources, Stanley, ND - TENORM filter socks</td>
<td>38.28</td>
</tr>
<tr>
<td>Duratherm, Inc., San Leon, TX - NORM/TENORM desorber solids</td>
<td>100.77</td>
</tr>
<tr>
<td>Denbury Onshore, LLC., Ruth, MS - TENORM waste water filters</td>
<td>1.66</td>
</tr>
<tr>
<td>OWL, LLC., Culbertson, MT - TENORM filter socks from petroleum production</td>
<td>8.94</td>
</tr>
<tr>
<td>Total for 2012</td>
<td>23,588.48</td>
</tr>
</tbody>
</table>

#### 2013

**In Compact**

- FMI, Empire, CO - TENORM contaminated pipe and debris: 592.89 tons
- City of Aurora, Aurora, CO - NORM Wastewater Sludge: 1,962.31 tons
- Stonegate Village Metro., Byers, CO - TENORM non-infectious bio-solids: 28.50 tons

**Out of Compact**

- Tervita Corporation, Alexander, ND - TENORM filter cake, oil processing cont. Ra\textsuperscript{226} & Ra\textsuperscript{228}: 12,307.14 tons
- OWL, LLC., Culbertson, MT - TENORM filter cake: 7,333.94 tons
- OWL, LLC., Culbertson, MT - TENORM filter socks from petroleum production: 241.19 tons
- Honeywell, Geismar, LA - NORM fluorogypsum pipe scale: 156.46 tons
- Raytheon, Wichita, KS - Soil and incidental debris with NORM & TENORM: 29.89 tons
- Raytheon, Wichita, KS - Soil and incidental debris with NORM & TENORM: 72.43 tons
- Clean Harbors, Cleveland, OH - NORM/TENORM waste from drilling mud contains Ra\textsuperscript{226}: 13.37 tons
- Duratherm, San Leon, TX - Desorber Solids: 38.35 tons
- Duratherm, San Leon, TX - Desorber Solids: 48.64 tons
- EOG Resources, Stanley, ND - NORM filter socks: 28.61 tons
- ICL Performance Products, Carteret, NJ - NORM Phosphogypsum Block: 7.91 tons
- Whiting Oil & Gas, Dickinson, ND - NORM filter socks: 10.80 tons
- Air Liquide Industrial US, Wake Forest, NC - Non-Contact Cooling Water: 5.37 tons
- Total for 2013: 22,877.80 tons

#### 2.2 Environmental Monitoring

Environmental monitoring at CHDT has been performed in four areas. Air particulates, groundwater, radon, and environmental dose rates have been collected from 2010 to the present to evaluate impacts from radioactive materials brought onsite. A discussion of each type of monitoring is presented in the subsections below. Potential radioactive contaminants present in liquid or airborne particulate forms are monitored for the potential impact to offsite property and
personnel. Results of the air monitoring program are compared directly to the limits for airborne effluents listed in Table 4B2, Column 2 of Appendix 4B of 6 Colorado Code of Regulations (CCR) 1007-1 Part 4, Standards for Protection Against Radiation. Routine monthly clean area survey results did not indicate any release of radioactive materials to unrestricted surface areas.

2.2.1 Air Particulate Monitoring

Airborne effluents are monitored in accordance with the CHDT SOP 15.OPS.15, Air Monitoring for Radioactive Materials. Airborne effluents are monitored utilizing four fixed monitoring stations located at the facility. Filters are collected monthly and sent off-site for analyses. The reported activities from the filter analyses are used along with the sample collection time and recorded flow rates to calculate airborne concentration levels for the month.

Air monitoring is performed at four locations at the CHDT facility. After collection, the air filters are allowed to decay for a minimum period of 21 days, and are then counted onsite for gross alpha and beta radiation. The filters are then sent to an offsite analytical laboratory for gross alpha, gross beta, isotopic uranium, isotopic thorium, and Ra\textsuperscript{226} analyses. Results (or the analytical minimum detection limit as a surrogate for non-detected results) are used with the collection time and average pump flow rates to determine an average air concentration for each analyte.

The air data are summarized in Table 2-2. Table 2-2 presents a summary of the calculated air concentrations, along with the air effluent limits per Table 4B2, Column 2 of Appendix 4B of 6 Colorado Code of Regulations (CCR) 1007-1 Part 4, Standards for Protection Against Radiation. The time-series graphs of the air concentrations from alpha emitters (including gross alpha) are presented in Figures 2-1 through 2-4.

During the operational period 2010-2013, there were no cases where the effluent limits were exceeded for a given month.

**TABLE 2-2. SUMMARY OF AMBIENT AIR CONCENTRATIONS**

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Count</th>
<th>Average</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Median</th>
<th>Air Effluent Limit</th>
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<td>Gross Alpha (µCi/ml)</td>
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<td>Gross Beta (µCi/ml)</td>
<td>48</td>
<td>3.05E-14</td>
<td>2.98E-14</td>
<td>3.30E-16</td>
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<td>Th-232 (µCi/ml)</td>
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<td>5.64E-16</td>
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<td>Th-230 (µCi/ml)</td>
<td>48</td>
<td>2.67E-16</td>
<td>3.02E-16</td>
<td>0.00E+00</td>
<td>1.55E-15</td>
<td>1.74E-16</td>
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</tr>
<tr>
<td>Th-228 (µCi/ml)</td>
<td>48</td>
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<td>1.26E-16</td>
<td>0.00E+00</td>
<td>7.25E-16</td>
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<td>2.00E-14</td>
</tr>
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<td>U-238 (µCi/ml)</td>
<td>48</td>
<td>6.48E-17</td>
<td>1.12E-16</td>
<td>-6.40E-18</td>
<td>6.82E-16</td>
<td>2.83E-17</td>
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<td>U-235 (µCi/ml)</td>
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<td>1.32E-17</td>
<td>2.78E-17</td>
<td>-1.00E-17</td>
<td>1.21E-16</td>
<td>0.00E+00</td>
<td>6.00E-14</td>
</tr>
<tr>
<td>Analysis</td>
<td>Count</td>
<td>Average</td>
<td>Standard Deviation</td>
<td>Minimum</td>
<td>Maximum</td>
<td>Median</td>
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<td>--------------------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
<td>-------------------</td>
</tr>
<tr>
<td>U-234 (µCi/ml)</td>
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<td>4.61E-17</td>
<td>-4.48E-18</td>
<td>1.75E-16</td>
<td>3.24E-17</td>
<td>5.00E-14</td>
</tr>
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<td>Ra-226 (µCi/ml)</td>
<td>48</td>
<td>2.72E-16</td>
<td>5.27E-16</td>
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<td>3.25E-15</td>
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**Station B**

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<th>Count</th>
<th>Average</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Median</th>
<th>Air Effluent Limit</th>
</tr>
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<tr>
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<td>5.34E-15</td>
<td>8.07E-17</td>
<td>3.79E-14</td>
<td>1.06E-15</td>
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<td></td>
</tr>
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<td>5.27E-14</td>
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<td>3.75E-13</td>
<td>1.83E-14</td>
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</tr>
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<td>48</td>
<td>4.32E-17</td>
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</tr>
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<td>Th-230 (µCi/ml)</td>
<td>48</td>
<td>4.44E-16</td>
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<td>0.00E+00</td>
<td>1.66E-14</td>
<td>8.04E-17</td>
<td>2.00E-14</td>
</tr>
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<td>48</td>
<td>8.09E-17</td>
<td>1.93E-16</td>
<td>0.00E+00</td>
<td>1.25E-15</td>
<td>3.18E-17</td>
<td>2.00E-14</td>
</tr>
<tr>
<td>U-238 (µCi/ml)</td>
<td>48</td>
<td>4.21E-17</td>
<td>1.09E-16</td>
<td>0.00E+00</td>
<td>7.53E-16</td>
<td>2.09E-17</td>
<td>6.00E-14</td>
</tr>
<tr>
<td>U-235 (µCi/ml)</td>
<td>48</td>
<td>1.12E-17</td>
<td>3.75E-17</td>
<td>-1.05E-17</td>
<td>2.51E-16</td>
<td>0.00E+00</td>
<td>6.00E-14</td>
</tr>
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<td>U-234 (µCi/ml)</td>
<td>48</td>
<td>3.23E-17</td>
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<td>5.02E-16</td>
<td>1.88E-17</td>
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</tr>
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<td>Ra-226 (µCi/ml)</td>
<td>48</td>
<td>1.92E-16</td>
<td>8.07E-16</td>
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<td>5.65E-15</td>
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<td>9.00E-13</td>
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**Station C**

<table>
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<th>Gross Alpha (µCi/ml)</th>
<th>Count</th>
<th>Average</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Median</th>
<th>Air Effluent Limit</th>
</tr>
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<tr>
<td>48</td>
<td>1.94E-15</td>
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<td>2.93E-16</td>
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<td></td>
</tr>
<tr>
<td>Gross Beta (µCi/ml)</td>
<td>48</td>
<td>2.72E-14</td>
<td>3.93E-14</td>
<td>1.21E-14</td>
<td>2.82E-13</td>
<td>1.97E-14</td>
<td></td>
</tr>
<tr>
<td>Th-232 (µCi/ml)</td>
<td>48</td>
<td>5.61E-17</td>
<td>7.20E-17</td>
<td>-5.17E-19</td>
<td>4.76E-16</td>
<td>3.99E-17</td>
<td>4.00E-15</td>
</tr>
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<td>48</td>
<td>2.23E-16</td>
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<td>1.50E-16</td>
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<td>48</td>
<td>7.45E-17</td>
<td>8.92E-17</td>
<td>-9.63E-17</td>
<td>4.76E-16</td>
<td>6.04E-17</td>
<td>2.00E-14</td>
</tr>
<tr>
<td>U-238 (µCi/ml)</td>
<td>48</td>
<td>6.20E-17</td>
<td>9.26E-17</td>
<td>-9.63E-17</td>
<td>5.95E-16</td>
<td>5.02E-17</td>
<td>6.00E-14</td>
</tr>
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<td>U-235 (µCi/ml)</td>
<td>48</td>
<td>1.14E-17</td>
<td>2.99E-17</td>
<td>-3.17E-17</td>
<td>1.79E-16</td>
<td>0.00E+00</td>
<td>6.00E-14</td>
</tr>
<tr>
<td>U-234 (µCi/ml)</td>
<td>48</td>
<td>6.21E-17</td>
<td>7.57E-17</td>
<td>0.00E+00</td>
<td>4.24E-16</td>
<td>3.64E-17</td>
<td>5.00E-14</td>
</tr>
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<td>Ra-226 (µCi/ml)</td>
<td>48</td>
<td>2.40E-16</td>
<td>4.18E-16</td>
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<td>2.68E-15</td>
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**Station D**

<table>
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<th>Gross Alpha (µCi/ml)</th>
<th>Count</th>
<th>Average</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Median</th>
<th>Air Effluent Limit</th>
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<td>48</td>
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<td>7.29E-16</td>
<td>7.46E-17</td>
<td>3.24E-15</td>
<td>8.39E-16</td>
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<td></td>
</tr>
<tr>
<td>Gross Beta (µCi/ml)</td>
<td>48</td>
<td>1.69E-14</td>
<td>1.14E-14</td>
<td>8.73E-16</td>
<td>7.43E-14</td>
<td>1.49E-14</td>
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</tr>
<tr>
<td>Th-232 (µCi/ml)</td>
<td>48</td>
<td>5.05E-17</td>
<td>7.07E-17</td>
<td>-2.38E-18</td>
<td>2.84E-16</td>
<td>2.82E-17</td>
<td>4.00E-15</td>
</tr>
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<td>Th-230 (µCi/ml)</td>
<td>48</td>
<td>1.99E-16</td>
<td>2.77E-16</td>
<td>-7.56E-19</td>
<td>1.34E-15</td>
<td>1.18E-16</td>
<td>2.00E-14</td>
</tr>
<tr>
<td>Th-228 (µCi/ml)</td>
<td>48</td>
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<td>1.91E-16</td>
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<td>1.05E-15</td>
<td>4.71E-17</td>
<td>2.00E-14</td>
</tr>
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<td>4.55E-17</td>
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</tr>
<tr>
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<td>0.00E+00</td>
<td>6.00E-14</td>
</tr>
<tr>
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<td>4.85E-17</td>
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<td>2.85E-16</td>
<td>3.92E-17</td>
<td>5.00E-14</td>
</tr>
<tr>
<td>Ra-226 (µCi/ml)</td>
<td>48</td>
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<td>1.40E-15</td>
<td>1.11E-16</td>
<td>9.00E-13</td>
</tr>
</tbody>
</table>
2.2.2 Groundwater Monitoring

Groundwater monitoring for radionuclides and other water quality parameters is conducted quarterly and is reported to CDPHE in both the License 1102-1, Annual Reports, and as part of the RCRA Permit reporting requirements. Due to the quantity of data involved, groundwater monitoring is not summarized here; the reader is referred to the Annual Reports in Attachment L of this License Renewal Application.

2.2.3 Radon Monitoring

Radon monitoring is performed quarterly at CHDT at ten locations throughout the facility using alpha track RadTrak detectors from Landauer, Inc. The license renewal was approved by CDPHE on December 20, 2010. In 2011 programs were revised to include approved measurement locations that vary slightly from 2010. Therefore, we have separated the data from 2010 and the revised program (2011-2013) in the tables below. Table 2-3A and 2-3B presents a summary of the reported radon concentrations in units of picocuries per liter (pCi/l). Figures 2-5, 2-6A, and 2-6B present time-series graphs of the radon data grouped by location – immediately adjacent to the Cell 3, and all other locations. There were no results over the monitoring period (2010-2013) at CHDT that exceeded the EPA residential limit of 4 pCi/l. The average for each location is below the EPA limit. Based on these results, site activities are not impacting radon levels throughout the facility.

### TABLE 2-3A. SUMMARY OF RADON MONITORING RESULTS 2010

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of Measurements</th>
<th>Average (pCi/l)</th>
<th>Standard Deviation (pCi/l)</th>
<th>Minimum (pCi/l)</th>
<th>Maximum (pCi/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Air Sampler (B)</td>
<td>4</td>
<td>0.775</td>
<td>0.2872281</td>
<td>0.4</td>
<td>1</td>
</tr>
<tr>
<td>North Air Sampler (A)</td>
<td>4</td>
<td>0.65</td>
<td>0.2516611</td>
<td>0.3</td>
<td>0.9</td>
</tr>
<tr>
<td>Cell 3 - South</td>
<td>4</td>
<td>0.88</td>
<td>0.32</td>
<td>0.4</td>
<td>1.1</td>
</tr>
<tr>
<td>Cell 3 - East</td>
<td>4</td>
<td>1</td>
<td>0.24</td>
<td>0.8</td>
<td>1.3</td>
</tr>
<tr>
<td>Cell 3 - North</td>
<td>4</td>
<td>0.98</td>
<td>0.31</td>
<td>0.7</td>
<td>1.4</td>
</tr>
<tr>
<td>Cell 3 - West</td>
<td>4</td>
<td>0.73</td>
<td>0.42</td>
<td>0.3</td>
<td>1.3</td>
</tr>
<tr>
<td>Central Air Sampler - East</td>
<td>4</td>
<td>1.08</td>
<td>0.25</td>
<td>0.8</td>
<td>1.4</td>
</tr>
<tr>
<td>Central Air Sampler - West</td>
<td>4</td>
<td>0.98</td>
<td>0.22</td>
<td>0.7</td>
<td>1.2</td>
</tr>
<tr>
<td>Treatment Bldg</td>
<td>4</td>
<td>0.3</td>
<td>0</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Lunch Room</td>
<td>4</td>
<td>0.35</td>
<td>0.06</td>
<td>0.3</td>
<td>0.4</td>
</tr>
</tbody>
</table>
TABLE 2-3B. SUMMARY OF RADON MONITORING RESULTS REVISED PROGRAM

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of Measurements</th>
<th>Average (pCi/l)</th>
<th>Standard Deviation (pCi/l)</th>
<th>Minimum (pCi/l)</th>
<th>Maximum (pCi/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disposal Cell A</td>
<td>12</td>
<td>0.93</td>
<td>0.52</td>
<td>0</td>
<td>1.7</td>
</tr>
<tr>
<td>Disposal Cell B</td>
<td>12</td>
<td>1</td>
<td>0.4</td>
<td>0.4</td>
<td>1.6</td>
</tr>
<tr>
<td>Treatment Bldg. North</td>
<td>12</td>
<td>0.52</td>
<td>0.29</td>
<td>0.3</td>
<td>1</td>
</tr>
<tr>
<td>Treatment Bldg. South</td>
<td>12</td>
<td>0.48</td>
<td>0.27</td>
<td>0.3</td>
<td>1</td>
</tr>
<tr>
<td>South Air Sampler (B)</td>
<td>12</td>
<td>1.08</td>
<td>0.4</td>
<td>0.3</td>
<td>1.9</td>
</tr>
<tr>
<td>North Air Sampler (A)</td>
<td>12</td>
<td>0.97</td>
<td>0.41</td>
<td>0.5</td>
<td>1.7</td>
</tr>
<tr>
<td>North Perimeter Fence</td>
<td>12</td>
<td>0.9</td>
<td>0.29</td>
<td>0.3</td>
<td>1.4</td>
</tr>
<tr>
<td>East Perimeter Fence</td>
<td>12</td>
<td>0.98</td>
<td>0.33</td>
<td>0.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Gate 8</td>
<td>12</td>
<td>0.95</td>
<td>0.28</td>
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<td>1.4</td>
</tr>
<tr>
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<td>12</td>
<td>0.93</td>
<td>0.36</td>
<td>0.5</td>
<td>1.7</td>
</tr>
</tbody>
</table>

2.2.4 Environmental Dosimetry

Environmental dose rates are measured quarterly at CHDT using long-term thermoluminescent dosimeters at 16 locations throughout the facility. Average dose rates in units of microrem per hour (µrem/hr) are summarized in Tables 2-4A and 2-4B. The last column of each table shows the average net dose rate determined by subtracting the control dosimeter (background) from each location dosimeter.

TABLE 2-4A. SUMMARY OF AVERAGE ENVIRONMENTAL DOSE RATE 2010

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of Measurements</th>
<th>Average (µrem/hr)</th>
<th>Standard Deviation (µrem/hr)</th>
<th>Minimum (µrem/hr)</th>
<th>Maximum (µrem/hr)</th>
<th>Average Net Dose Rate (µrem/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>4</td>
<td>20.30</td>
<td>1.28</td>
<td>19.31</td>
<td>22.13</td>
<td>----</td>
</tr>
<tr>
<td>Admin Bldg</td>
<td>4</td>
<td>19.65</td>
<td>3.12</td>
<td>17.18</td>
<td>23.98</td>
<td>0</td>
</tr>
<tr>
<td>Scale</td>
<td>4</td>
<td>17.14</td>
<td>1.32</td>
<td>15.32</td>
<td>18.47</td>
<td>0</td>
</tr>
<tr>
<td>Cell 3 - South</td>
<td>4</td>
<td>18.18</td>
<td>0.65</td>
<td>17.45</td>
<td>18.80</td>
<td>0</td>
</tr>
<tr>
<td>Cell 3 - East</td>
<td>4</td>
<td>18.18</td>
<td>1.03</td>
<td>17.27</td>
<td>19.44</td>
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</tr>
<tr>
<td>Cell 3 - North</td>
<td>4</td>
<td>17.63</td>
<td>1.69</td>
<td>15.97</td>
<td>19.91</td>
<td>0</td>
</tr>
<tr>
<td>Cell 3 - West</td>
<td>4</td>
<td>17.65</td>
<td>0.63</td>
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<td>0</td>
</tr>
<tr>
<td>East Gate</td>
<td>4</td>
<td>17.69</td>
<td>0.91</td>
<td>16.67</td>
<td>18.84</td>
<td>0</td>
</tr>
<tr>
<td>Lunch Room</td>
<td>4</td>
<td>18.33</td>
<td>0.70</td>
<td>17.31</td>
<td>18.89</td>
<td>0</td>
</tr>
<tr>
<td>Laboratory</td>
<td>4</td>
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<td>1.01</td>
<td>16.44</td>
<td>18.75</td>
<td>0</td>
</tr>
<tr>
<td>Maintenance</td>
<td>4</td>
<td>21.08</td>
<td>3.26</td>
<td>18.29</td>
<td>25.79</td>
<td>1.68</td>
</tr>
<tr>
<td>Location</td>
<td>Number of Measurements</td>
<td>Average (µrem/hr)</td>
<td>Standard Deviation (µrem/hr)</td>
<td>Minimum (µrem/hr)</td>
<td>Maximum (µrem/hr)</td>
<td>Average Net Dose Rate (µrem/hr)</td>
</tr>
<tr>
<td>--------------------</td>
<td>------------------------</td>
<td>-------------------</td>
<td>-------------------------------</td>
<td>-------------------</td>
<td>-------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Treatment Bldg</td>
<td>4</td>
<td>17.72</td>
<td>1.49</td>
<td>16.11</td>
<td>19.63</td>
<td>0</td>
</tr>
<tr>
<td>Haul Road</td>
<td>4</td>
<td>18.34</td>
<td>1.38</td>
<td>17.18</td>
<td>20.32</td>
<td>0</td>
</tr>
<tr>
<td>South Air Sampler</td>
<td>4</td>
<td>18.07</td>
<td>1.76</td>
<td>15.88</td>
<td>20.09</td>
<td>0</td>
</tr>
<tr>
<td>Central Air Sampler</td>
<td>4</td>
<td>18.75</td>
<td>0.96</td>
<td>17.73</td>
<td>19.68</td>
<td>0</td>
</tr>
<tr>
<td>North Air Sampler</td>
<td>4</td>
<td>16.41</td>
<td>0.88</td>
<td>15.65</td>
<td>17.64</td>
<td>0</td>
</tr>
</tbody>
</table>

**TABLE 2-4B. SUMMARY OF AVERAGE ENVIRONMENTAL DOSE RATE REVISED PROGRAM**

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of Measurements</th>
<th>Average (µrem/hr)</th>
<th>Standard Deviation (µrem/hr)</th>
<th>Minimum (µrem/hr)</th>
<th>Maximum (µrem/hr)</th>
<th>Average Net Dose Rate (µrem/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>12</td>
<td>20.31</td>
<td>1.08</td>
<td>17.50</td>
<td>21.85</td>
<td>----</td>
</tr>
<tr>
<td>Admin Bldg</td>
<td>12</td>
<td>19.27</td>
<td>1.37</td>
<td>17.96</td>
<td>21.81</td>
<td>0</td>
</tr>
<tr>
<td>Scale</td>
<td>12</td>
<td>17.19</td>
<td>1.24</td>
<td>15.09</td>
<td>18.94</td>
<td>0</td>
</tr>
<tr>
<td>West Fence</td>
<td>12</td>
<td>19.17</td>
<td>1.13</td>
<td>16.67</td>
<td>20.46</td>
<td>0</td>
</tr>
<tr>
<td>Gate 8</td>
<td>12</td>
<td>18.34</td>
<td>1.43</td>
<td>16.25</td>
<td>20.28</td>
<td>0</td>
</tr>
<tr>
<td>East Fence</td>
<td>12</td>
<td>19.12</td>
<td>1.76</td>
<td>16.62</td>
<td>22.64</td>
<td>0</td>
</tr>
<tr>
<td>North Fence</td>
<td>12</td>
<td>18.65</td>
<td>1.45</td>
<td>15.79</td>
<td>21.48</td>
<td>0</td>
</tr>
<tr>
<td>Gate 4</td>
<td>12</td>
<td>17.79</td>
<td>0.87</td>
<td>16.34</td>
<td>19.03</td>
<td>0</td>
</tr>
<tr>
<td>Lunch Room</td>
<td>12</td>
<td>18.18</td>
<td>0.88</td>
<td>16.94</td>
<td>19.63</td>
<td>0</td>
</tr>
<tr>
<td>Laboratory</td>
<td>12</td>
<td>16.13</td>
<td>0.84</td>
<td>14.49</td>
<td>17.50</td>
<td>0</td>
</tr>
<tr>
<td>Sample Bay</td>
<td>12</td>
<td>18.03</td>
<td>0.95</td>
<td>16.11</td>
<td>19.49</td>
<td>0</td>
</tr>
<tr>
<td>Maintenance</td>
<td>12</td>
<td>19.05</td>
<td>0.82</td>
<td>17.31</td>
<td>20.05</td>
<td>0</td>
</tr>
<tr>
<td>Treatment Bldg</td>
<td>12</td>
<td>16.87</td>
<td>0.84</td>
<td>15.60</td>
<td>18.75</td>
<td>0</td>
</tr>
<tr>
<td>Haul Road</td>
<td>12</td>
<td>19.04</td>
<td>1.24</td>
<td>17.41</td>
<td>21.81</td>
<td>0</td>
</tr>
<tr>
<td>South Air Sampler</td>
<td>12</td>
<td>19.02</td>
<td>4.04</td>
<td>16.94</td>
<td>31.71</td>
<td>0</td>
</tr>
<tr>
<td>Disposal Cell</td>
<td>12</td>
<td>15.91</td>
<td>1.05</td>
<td>13.98</td>
<td>17.50</td>
<td>0</td>
</tr>
<tr>
<td>North Air Sampler</td>
<td>12</td>
<td>18.12</td>
<td>1.74</td>
<td>14.40</td>
<td>20.37</td>
<td>0</td>
</tr>
</tbody>
</table>

Time-series graphs of environmental dose results are presented in Figures 2-7 through 2-9, grouped by Cell locations, other exterior locations, and interior locations. The variability in the graphed results generally correlates to fluctuations in the control dosimeter, indicating that there are no significant impacts to environmental dose from site-related activities. The average dose
rates calculated from the cumulative quarterly dose are consistent with exposure rates observed with field instrumentation throughout the facility.

2.3 Evaluation of Public Dose

Public dose from activities involving radioactive materials at CHDT are evaluated with each Annual Report using data from received wastes and the EPA CAP88PC radiological risk assessment software. The nearest local residents are evaluated for potential exposure from conservative estimates of emissions from waste disposal. Annual public dose assessment results from the operational history under License 1102-1 are presented in Table 2-5 and 2-6. Table 2-6 shows the results of public dose modeling using the RESRAD-Offsite code, performed in support of the Adams County oversight. These results are a factor of three to four lower than the CAP88PC modeling results. This difference is caused by differences in receptor location, air dispersion modeling, modeled intake assumptions, and dose conversion factors. These modeling codes are many orders of magnitude below the public dose limits for the site.

<table>
<thead>
<tr>
<th>TABLE 2-5. SUMMARY OF CALCULATED PUBLIC DOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>2010</td>
</tr>
<tr>
<td>2011</td>
</tr>
<tr>
<td>2012</td>
</tr>
<tr>
<td>2013</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 2-6. PUBLIC DOSE DUE TO REGULATED WASTE DISPOSAL*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calendar Year</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>2010</td>
</tr>
<tr>
<td>2011</td>
</tr>
<tr>
<td>2012</td>
</tr>
<tr>
<td>2013</td>
</tr>
</tbody>
</table>

*modeled using RESRAD-Offsite software required by the Adams County CD

Both the calculated doses to the maximally exposed resident (located 3500 meters north of the facility) and the hypothetical closest resident (located 1500 meters east of the facility) are several orders of magnitude below the public dose limit of 25 mrem/yr. Year-to-year, public doses correlate to the relative amounts of radioactive materials disposed at CHDT, with the highest totals of disposed materials resulting in the highest calculated public dose, and the lowest total...
resulting in the lowest calculated public dose. The public dose modeling demonstrates that activities involving radioactive materials at CHDT have negligible impact on public health.

2.4 Occupational Dose and ALARA

Occupational dose for CHDT personnel is measured using TLDs and using the air monitoring data described in Section 2.2.1. Worker exposures are expected to be maintained as low as reasonably achievable (ALARA), with an ALARA dose goal of 25 mrem/yr. Results for assigned CEDE, maximum reported external deep dose equivalent (DDE), and maximum total effective dose equivalent (TEDE) are presented in Table 2-7.

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual CEDE (mrem)</th>
<th>Maximum DDE (mrem)</th>
<th>Maximum TEDE (mrem)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>0.00846</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2011</td>
<td>19</td>
<td>3</td>
<td>22</td>
</tr>
<tr>
<td>2012</td>
<td>15.7</td>
<td>1</td>
<td>16.7</td>
</tr>
<tr>
<td>2013</td>
<td>3.3</td>
<td>0</td>
<td>3.3</td>
</tr>
</tbody>
</table>

2.5 Site Decommissioning Warranty

Current Cost Models for Site Decommissioning and Long Term Care were re-evaluated as a condition of the RCRA Permit renewal of 2013 and were submitted in August 23, 2013. The cost model and evaluation covers both the RCRA Permit and License requirements as joint decommissioning is assumed as the facility is a joint use facility. This updated cost model is presented in Attachment J. Warranty amounts adjusted for inflation were found to be suitable to cover these costs.

Below and included in Attachment J, please find the latest Decommissioning (Closure) and Long Term Care (Post Closure) insurance certifications for the Clean Harbors Deer Trail, LLC facility for 2014. This report was submitted pursuant to House Bill 10-1348, Section 3.25-11-110 (5), Colorado Revised Statutes.

An evaluation of the costs concluded that the only rationale for adjustment required was based upon annual inflation as described below.

The inflated closure and post-closure costs were calculated by multiplying the current cost estimates by the annual inflation factor 1.015. This inflation factor was calculated by dividing the annual Implicit Price Deflator (IPD) for Gross National Product (GNP) for 2013 (106.570) by
the annual IPD for GNP for 2012 (105.002). These IPDs were obtained from the U.S. Department of Commerce’s Bureau of Economic Analysis.

Decommissioning Cost: $5,424,828 x 1.015 = $5,506,200

Long Term Care Cost: $5,613,214 x 1.015 = $5,697,412

**FIGURE 2-1. AIR MONITORING STATION A – ALPHA EMITTERS**
FIGURE 2-2. AIR MONITORING STATION B – ALPHA EMITTERS
FIGURE 2-3. AIR MONITORING STATION C – ALPHA EMITTERS
FIGURE 2-4. AIR MONITORING STATION D – ALPHA EMITTERS
FIGURE 2-5. RADON MONITORING DATA – CELL LOCATIONS

Radon Measurements - Cell Locations

- Cell 3 - South
- Cell 3 - East
- Cell 3 - North
- Cell 3 - West
- Disposal Cell A
- Disposal Cell B
FIGURE 2-6A. RADON MONITORING DATA – OTHER FACILITY LOCATIONS 2010

Radon Monitoring - Other Facility Locations 2010

- South Air Sampler (B)
- North Air Sampler (A)
- Central Air Sampler - East
- Central Air Sampler - West
- Treatment Bldg
- Lunch Room

Average Radon Level (pCi/L)

Quarter

Q1 - 2010  Q2 - 2010  Q3 - 2010  Q4 - 2010
FIGURE 2-6B. RADON MONITORING DATA – OTHER FACILITY LOCATIONS
REVISED PROGRAM

Radon Monitoring - Other Facility Locations 2011-2013

- Treatment Bldg. North
- Treatment Bldg. South
- South Air Sampler (B)
- North Air Sampler (A)
- North Perimeter Fence
- East Perimeter Fence
- Gato 8
- West Perimeter Fence
- Central Air Sampler - East
- Central Air Sampler - West
- Treatment Bldg
- Lunch Room
FIGURE 2-7. ENVIRONMENTAL DOSIMETRY DATA – CELL LOCATIONS
FIGURE 2-8. ENVIRONMENTAL DOSIMETRY DATA – EXTERIOR LOCATIONS

Environmental TLDs - Exterior Locations

- Control
- Scale
- West Fence
- Gate 8
- East Fence
- North Fence
- Gate 4
- Haul Road
- South Air Sampler
- North Air Sampler
- Central Air Sampler
- East Gate

Gross Exposure (µrem/hr)

Quarter

FIGURE 2-9. ENVIRONMENTAL DOSIMETRY DATA – INTERIOR LOCATIONS
3.0 PROPOSED CHANGES TO LICENSE SCOPE

There are no proposed changes to the types and quantities of acceptable materials for the Deer Trail facility. CHDT is proposing two additional methods of characterizing waste acceptance of oil field waste materials permitted under the existing License and is proposing the use of additional test methods to use with approval in the currently approved acceptance procedure. A technical basis document is also presented recommending improvements to the groundwater monitoring program for the site.
4.0 PROPOSED CHANGES TO RADIATION PROTECTION PROGRAM

4.1 Procedure Organization and Format

4.1.1 Proposed Change

The original application and radiation protection program contained fifteen standard operating procedures (SOPs). Over the course of operations an additional three SOPs have been instituted, and fifteen additional procedures as described in Section 4.3 were proposed in the last renewal application. The complete list of SOPs submitted with this application is provided in Table 4-1. The revised CHDT Radiation Protection Program and SOPs is included with this License Renewal Application as Attachment C.

**TABLE 4-1. STANDARD OPERATING PROCEDURES FOR CHDT RADIATION PROTECTION PROGRAM**

<table>
<thead>
<tr>
<th>SOP Number</th>
<th>Title</th>
<th>Previously Existed</th>
<th>New Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.RPP</td>
<td>Radiation Protection Program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.RPP.01</td>
<td>Radiation Protection Plan</td>
<td>X</td>
<td></td>
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<tr>
<td>15.RPP.02</td>
<td>Radiation Safety Training</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>15.RPP.03</td>
<td>Worker Protection Records</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>15.RPP.04</td>
<td>Individual and Area Dosimetry</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>15.RPP.05</td>
<td>Estimating Inhalation Doses</td>
<td>X</td>
<td></td>
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<tr>
<td>15.RPP.06</td>
<td>Emergency Response</td>
<td>X</td>
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</tr>
<tr>
<td>15.RPP.07</td>
<td>ALARA</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>15.RPP.08</td>
<td>Radiation Work Permits</td>
<td>X</td>
<td></td>
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<tr>
<td>15.RPP.09</td>
<td>Personal Protective Equipment</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>15.RPP.10</td>
<td>Determination of Prior Occupational Dose</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>15.WAC</td>
<td>Waste Acceptance and Analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.WAC.01</td>
<td>Radioactive Materials Acceptance</td>
<td>X&lt;sup&gt;a&lt;/sup&gt;</td>
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</tr>
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<td>15.WAC.02</td>
<td>Waste Tracking</td>
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<tr>
<td>15.WAC.03</td>
<td>Waste Acceptance of Oil Production Pipe</td>
<td>X&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>15.WAC.04</td>
<td>Oil and Gas E&amp;P NORM Waste Acceptance</td>
<td>X&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>15.OPS</td>
<td>Facility and Field Operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.OPS.01</td>
<td>Landfill Operations</td>
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<td>15.OPS.02</td>
<td>Contamination Control during Waste Treatment Activities</td>
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<tr>
<td>15.OPS.03</td>
<td>Operation of Portable Gamma Spectroscopy Unit</td>
<td>X</td>
<td></td>
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<tr>
<td>15.OPS.04</td>
<td>Operation of Alpha-Beta Smear Counter</td>
<td>X</td>
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<tr>
<td>15.OPS.05</td>
<td>Operation of Gate Monitor Detectors</td>
<td>X</td>
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</tr>
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</table>
### TABLE 4-2. NEW STANDARD OPERATING PROCEDURES FOR CHDT RADIATION PROTECTION PROGRAM

<table>
<thead>
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<th>SOP Number</th>
<th>Title</th>
<th>Previously Existed</th>
<th>New Procedure</th>
</tr>
</thead>
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<tr>
<td>15.OPS.06</td>
<td>Operation of Digital Waste Monitor</td>
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<tr>
<td>15.OPS.07</td>
<td>Operation of Exposure Rate/ Dose Rate Meters</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>15.OPS.08</td>
<td>Operation of Alpha-Beta Scintillation Detector</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>15.OPS.09</td>
<td>Operation of GM Pancake Probe</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>15.OPS.10</td>
<td>Operation of Gamma Scintillation Detectors</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>15.OPS.11</td>
<td>Routine Contamination Surveys</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>15.OPS.12</td>
<td>Personnel Contamination Surveys</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>15.OPS.13</td>
<td>Equipment and Vehicle Release Surveys</td>
<td>X</td>
<td></td>
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<tr>
<td>15.OPS.14</td>
<td>Spill Surveys</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>15.OPS.15</td>
<td>Air Monitoring for Radioactive Materials</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>15.OPS.16</td>
<td>Groundwater Monitoring</td>
<td>X</td>
<td>d</td>
</tr>
<tr>
<td>15.OPS.17</td>
<td>Volumetric and Material Sampling</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>15.OPS.18</td>
<td>Decontamination of Surfaces and Equipment</td>
<td>X</td>
<td></td>
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<td>15.OPS.19</td>
<td>Decontamination of Personnel</td>
<td>X</td>
<td></td>
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<tr>
<td>15.OPS.20</td>
<td>Handling of Liquids</td>
<td>X</td>
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<tr>
<td>15.OPS.21</td>
<td>Package Receipt Surveys</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

a. Technical basis for changes provided in Attachment F.
b. *Waste Acceptance of Oil Production Pipe* (and associated Technical Basis Documents, Attachment D) were submitted in a different form with 2010 Radioactive Materials License Renewal Application and has not been approved by CDPHE. The SOP was rewritten and is submitted here for reconsideration.
c. This WAC and the supporting technical basis are provided in Attachment G
d. *Analysis of the Current Groundwater Protection Monitoring Program with Recommendations for Improvement* submitted on September 10, 2013 (Attachment E), awaiting CDPHE review and comment, updated procedure will be submitted implementing agreed-upon improvements

### 4.2 Additional Procedures

#### 4.2.1 Proposed Change

The SOPs listed in Table 4-2 have been added to the CHDT radiation protection program.

**TABLE 4-2. NEW STANDARD OPERATING PROCEDURES FOR CHDT RADIATION PROTECTION PROGRAM**

<table>
<thead>
<tr>
<th>SOP Number</th>
<th>Title</th>
</tr>
</thead>
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<tr>
<td>15.WAC</td>
<td>Waste Acceptance and Analysis</td>
</tr>
<tr>
<td>15.WAC.03</td>
<td>Waste Acceptance of Oil Production Pipe</td>
</tr>
<tr>
<td>15.WAC.04</td>
<td>Oil and Gas E&amp;P NORM Waste Acceptance</td>
</tr>
</tbody>
</table>
4.2.2 Basis for Change

SOP 15.WAC.03 was developed to provide a consistent procedure for site personnel and waste generators to follow in demonstrating that waste streams consisting of radium scale containing pipe and debris meet CHDT waste acceptance criteria. The technical basis document for the procedure is included with this as Attachment D.

SOP 15.WAC.04 was developed to implement a method to evaluate shipments of oil and gas field waste to verify that the material meets radioactive material license concentration limits for disposal. NORM waste from Oil and Gas Exploration and Production is ubiquitous in the environment and stakeholder desire more efficient methods of waste characterization. CHDT believes that careful screening procedures can ensure that this waste is well within license limits. The technical basis document for the procedure in included as Attachment F.

4.3 Revisions to Existing Procedures

The revisions to existing SOPs, along with the technical basis for each revision, are addressed below, by SOP. All SOPs contain minor edits that do not change meaning and have been dated consistent with the submission of this renewal application. Only additional changes in content are discussed below.

4.3.1 15.RPP.01 Radiation Protection Plan

Proposed Change: Section 3.1 revised to reflect the worker dose ALARA goal of 25 mrem per year.

Basis for Change: Changed to be consistent with 15.RPP.07.

Proposed Change: Section 3.7 revised to reflect recording of internal exposure on an annual basis.

Basis for Change: Changed to be consistent with 15.RPP.04.

Proposed Change: Section 6.2 revised to remove annual calibration requirement for all instruments.

Basis for Change: Isotope identification instrument energy calibration is performed each time the instrument is started and periodically during use. These instruments do not require annual calibration.

4.3.2 15.RPP.02 Radiation Protection Training

Proposed Change: Section 3.0 is changed from “and” to “or” for General Employee Training and Refresher training. A “series of tests” is changed to “test”.

Basis for Change: Refresher training provides review, program changes, and updates to employees. It is unnecessary to repeat the General Employee Training for these individuals.
Proposed Change: Section 5.3, “the first part of the three-part training session required of CHDT employees” is replaced with “a radiation safety briefing.”

Basis for Change: A more appropriate briefing, specific for site visitors and contractors, has been developed, different from the initial part of employee training.

Proposed Change: Section 5.3 has been reworded to require all site visitors and contractors to be escorted by CHDT staff.

Basis for Change: This is consistent with CHDT policy and improves radiological control.

Proposed Change: Sections 6.0, 6.1, 6.2, and Attachment A, the prescriptive detail of these sections are removed to allow revision of the training on an annual basis by the RSO to incorporate areas of improvement identified through observation and evaluation.

Basis for Change: Less prescriptive content requirements allows continuous training improvement to address identified issues.

4.3.3 15.RPP.03 Worker Radiation Protection Records

Proposed Change: Section 2.0, the bullet list has been reduced to remove operational records that are not individual-specific

Basis for Change: Operational records are retained in accordance with the Radiation Protection Plan record-keeping requirements (15.RPP.01, Section 9) and need not be duplicated here.

Proposed Change: Section 3.0, the policy statement that records of regulated waste receipt, treatment, and disposal will be kept in personnel files has been dropped.

Basis for Change: Regulated waste records are retained in other onsite records systems and need not be included in personnel files.

Proposed Change: Section 5.1, bulleted detail of the records to be retained have been dropped from this SOP. The list is included in the Radiation Protection Plan (15.RPP.01, Section 9.1).

Basis for Change: There is no need to duplicate the listing of records in two locations.

Proposed Change: Section 5.2, the requirement to reference the course syllabus in the Administrative filing system has been dropped.

Basis for Change: Course syllabi are kept in the training records, specific for each training and need not be duplicated elsewhere.

4.3.4 15.RPP.04 Individual and Area Dosimetry

Proposed Change: Section 5.4, “Personnel” has been added to the first sentence to distinguish between personnel and area dosimeters.
**Basis for Change:** It is necessary to distinguish between dosimeters worn by individuals and dosimeters used to determine area radiation fields.

**Proposed Change:** Section 5.4, sixth bullet: estimation of inhalation doses has been changed to annually to be consistent with 15.RPP.05, *Estimating Inhalation Doses.*

**Basis for Change:** Annual estimation of inhalation doses is consistent with site practice and program documentation.

**Proposed Change:** Section 5.4, tenth bullet, revised to reflect the dose limits to declared pregnant employee to be no more than 500 mrem (5 mSv) during pregnancy.

**Basis for Change:** Consistent with 6 CCR1007-1 of the *Colorado Rules and Regulations Pertaining to Radiation Control*, Part 4, Section 4.13.

**Proposed Change:** Section 6.1, specification of quarterly has been dropped and the frequency of dose rate measurements will be determined by the CHDT RSO.

**Basis for Change:** Under routine conditions, area dose rates do not fluctuate to the extent that quarterly measurements are warranted. Eight years of quarterly exchanges have resulted in only negative numbers. An annual exchange will yield more realistic values.

**Proposed Change:** Section 6.2, sixth bullet, the requirement for exchange consistent with employee badge and for quarterly exchange have been removed to allow area dose rate measurement consistent as determined by the CHDT RSO.

**Basis for Change:** Under routine conditions, area dose rates do not fluctuate to the extent that quarterly measurements are warranted.

4.3.5 15.RPP.05 Estimating Inhalation Doses

**Proposed Change:** Section 2.0, the specification of inhalation dose calculation frequency has been removed from this section.

**Basis for Change:** The frequency is as determined by the CHDT RSO. Annual determination is consistent with reporting requirements and specification of a more frequent schedule is unnecessary.

**Proposed Change:** Section 5.1, second paragraph, this paragraph has been rewritten to remove the specificity on how internal workplace exposure is assigned. This allows the CHDT RSO to use assumptions appropriate for the current workplace conditions and worker assignments.

**Basis for Change:** It is appropriate to assign workplace exposure based on worker assignment, occupancy, and workplace conditions. The CHDT RSO must not be limited in the necessary assumptions.
4.3.6 15.RPP.06 Emergency Response

*Proposed Change:* No substantive changes.

*Basis for Change:* Not applicable.

4.3.7 15.RPP.07 ALARA

*Proposed Change:* Section 6.0, reference to License Condition 41 was removed.

*Basis for Change:* Statement contained a typographical error and reference to a specific license requirement is unnecessary and inconsistent with the document style used in other CHDT SOPs.

4.3.8 15.RPP.08 Radiation Work Permits

*Proposed Change:* No substantive changes.

*Basis for Change:* Not applicable.

4.3.9 15.RPP.09 Personal Protective Equipment

*Proposed Change:* No substantive changes.

*Basis for Change:* Not applicable.

4.3.10 15.RPP.10 Determination of Prior Occupational Dose

*Proposed Change:* No substantive changes.

*Basis for Change:* Not applicable.

4.3.11 15.WAC.01 Radioactive Materials Acceptance

*Proposed Change:* Section 6.0(b), first paragraph, “independently” has been removed from the first sentence and added, “Generators lab analysis results from 6.a.ii may be used to fulfill this requirement as long as they meet all facility requirements of 6.b.”

*Basis for Change:* There is no need to perform additional sampling and analysis if the generator’s samples are analyzed at a laboratory meeting the CHDT-required NELAC accreditation for the analyses performed.

*Proposed Change:* Section 6.0(b), third paragraph, CHDT proposes the use of alternate methods of analysis for Ra\(^{226}\). The appropriateness of these analyses is discussed in Appendix F. No change to the text required. These alternate methods of analysis already exist in the approved 15.WAC.01, Table 1. CHDT seeks approval of both the CDPHE and Adams County and the CDPHE CHDT requests that written approval on use of these tests.

*Basis for Change:* An alternative analytical approach that provides adequate assurance that waste received meets the license requirements will provide an expedited approach to receiving waste for disposal at CHDT. The ability to avoid the 21-day Ra\(^{226}\) decay prior to gamma spectroscopy analysis provides a benefit to all stakeholders.
Proposed Change: Section 6.e, second paragraph, text has been added to provide an alternative to annual resampling of the waste stream for the annual recertification process.

Basis for Change: Data collected during random confirmation sampling provides ongoing verification that a waste stream meets the radioactive material license requirements. Verification by the generator that the waste stream remains consistent with the characterization and completion of the NORM questionnaire will support the continued acceptance of waste under the approved waste stream.

Proposed Change: Section 9, requirement for at least 500 grams has been removed to be consistent with Section 8.g which recognizes the inability to collect such samples from large debris-type waste.

Basis for Change: Samples are not possible for some debris-type waste. Section 8.g provides an alternate survey method for evaluating such waste. The commitment for 500 gram samples from all waste forms cannot always be attained.

Proposed Change: Section 9.a, gross alpha/beta analysis has been removed.

Basis for Change: Gross alpha and gross beta analyses do not provide useful information with respect to assuring that radioactive material license requirements are met. The non-specificity of this analysis does little to establish the concentration of radionuclides necessary to verify the radioactive material license limits are met. The method is a drinking water test method suitable for water with “low dissolved solids”. Use of this method for solid or sludge samples requires an extraction that yields an aliquot with high dissolved solids. High solids content can result in planchets that can have high self-absorption of radiation resulting in inaccurate measurement. In order to prevent this, sample extracts require high dilution resulting in loss of precision.

The sample preparation process required by the method requires evaporation and heat drying that can result in the loss of volatile radioactive materials. Planchets are then counted using gas-flow proportional counting that is not suitable for the detection of low-energy beta emitters such as H-3 and C-14. CHDT contends that the test method is not effective for the waste and that other methods in use along with generator and site knowledge provide suitable decision making criteria.

Alpha and Beta counting of smear samples at CHDT will continue to be the basis of site contamination control.

Proposed Change: Attachment A, a new version of the Supplemental NORM Questionnaire is provided, adding an additional section, Generators Outside the Rocky Mtn. Compact Region (CO, NM, NV) Certification.
Basis for Change: This section requests additional information from out-of-compact waste generators. By providing an authorized signature, the waste generator is committing to receive back waste that cannot be accepted by CHDT, and committing to notify CHDT at least five days in advance of their initial shipment of waste. This addition does not affect CHDT’s designation or Radioactive Material License.

4.3.12 15.WAC.02 Waste Tracking

Proposed Change: No substantive changes.

Basis for Change: Not applicable.

4.3.13 15.OPS.01 Landfill Operations

Proposed Change: This Standard Operating Procedure has been completely rewritten.

Basis for Change: The original procedures were formulated prior to issue of the original license. Since issue of the original license, much experience has been gained and procedures have been improved. The original SOP was overly specific to equipment and locations and contained duplicative steps. Much extraneous explanatory wording was streamlined. The basic process and requirements remain the same. Thousands of equipment release surveys have demonstrated that landfill procedures work. Numerous clean area and haul road surveys have demonstrated that contamination is not being spread around the site. Numerous area surveys of the active landfill area have demonstrated that exposure rates in the landfill for truck drivers do not pose a risk.

4.3.14 15.OPS.02 Contamination Control During Waste Treatment Activities

Proposed Change: This SOP was rewritten in its entirety.

Basis for Change: The original procedures were formulated prior to issue of the original License. Since issue of the original license, much experience has been gained and procedures have been improved. The original SOP was overly specific to equipment and locations and contained duplicative steps. Numerous site and equipment surveys have demonstrated that waste treatment in the treatment building is protective.

4.3.15 15.OPS.03 Operation of Portable Gamma Spectroscopy Unit

Proposed Change: Section 6.0, annual calibration has been changed to in accordance with manufacturer’s recommendations.

Basis for Change: An energy calibration on portable gamma spectrometers (isotope identifiers) is performed at each startup of the unit and periodically throughout the day. The unit is not calibrated annually. The blanket requirement of annual calibration has been removed to recognize this expectation.

4.3.16 15.OPS.04 Operation of Alpha-Beta Smear Counter

Proposed Change: No substantive changes.

Basis for Change: Not applicable.
4.3.17 15.OPS.05 Operation of Gate Monitor Detectors

*Proposed Change*: No substantive changes.

*Basis for Change*: Not applicable.

4.3.18 15.OPS.06 Operation of Digital Waste Monitor

*Proposed Change*: No substantive changes.

*Basis for Change*: Not applicable.

4.3.19 15.OPS.07 Operation of Exposure/Dose Rate Meters

*Proposed Change*: No substantive changes.

*Basis for Change*: Not applicable.

4.3.20 15.OPS.08 Operation of Alpha-Beta Scintillation Detectors

*Proposed Change*: No substantive changes.

*Basis for Change*: Not applicable.

4.3.21 15.OPS.09 Operation of Geiger Mueller Pancake Probe

*Proposed Change*: Section 5.1, second paragraph, Ludlum Model 177 added to list of instruments using the GM pancake probe.

*Basis for Change*: Instrument is used at the facility.

4.3.22 15.OPS.10 Operation of Gamma Scintillation Detectors

*Proposed Change*: No substantive changes.

*Basis for Change*: Not applicable.

4.3.23 15.OPS.11 Routine Contamination Surveys

*Proposed Change*: No substantive changes.

*Basis for Change*: Not applicable.

4.3.24 15.OPS.12 Personnel Contamination Surveys

*Proposed Change*: No substantive changes.

*Basis for Change*: Not applicable.

4.3.25 15.OPS.13 Equipment Surveys

*Proposed Change*: No substantive changes.

*Basis for Change*: Not applicable.

4.3.26 15.OPS.14 Spill Surveys

*Proposed Change*: No substantive changes.
Basis for Change: Not applicable.

4.3.27 15.OPS.15 Air Monitoring for Radioactive Materials

Proposed Change: On-Site Sample Analysis (previously Section 5.1.3) was removed.

Basis for Change: The data the onsite analysis are not used and delays submission of the samples to the lab. The filters are sent to a certified laboratory for analysis and those results are used for compliance purposes.

Proposed Change: Section 5.1.3, second bullet, “or equivalent” added

Basis for Change: Some labs use different methodology nomenclature or numbering.

Proposed Change: Section 5.1.4, first bullet, reworded.

Basis for Change: This wording more accurately describes the physical actions performed.

Proposed Change: Section 5.2.4, second bullet, “or equivalent” added.

Basis for Change: Some labs use different methodology nomenclature or numbering.

Proposed Change: Section 5.3.2, Table, Treatment Building and Background (North and South) radon monitors removed from the table.

Basis for Change: These monitor results are not used in the estimation of inhalation dose.

Proposed Change: Section 6.1, has been reworded for clarity and “monthly” (ambient air samples) has been removed.

Basis for Change: Removing “monthly” removes a conflict between here and 15.RPP.05 that establishes workplace airborne concentrations on a quarterly basis.

Proposed Change: Section 7.0, reference to 49 CFR 173 is removed.

Basis for Change: This reference is not relevant to this SOP

Proposed Change: Attachment 3, Monthly Air Filter Counting Form, has been removed.

Basis for Change: This form is not used in the program.

4.3.28 15.OPS.16 Groundwater Monitoring

Note: this procedure is not changed. Analysis of the Current Groundwater Protection Monitoring Program with Recommendations for Improvement (Attachment E). On September 10, 2013, CHDT submitted this technical basis for program improvement and is awaiting CDPHE review and comment. An updated SOP, implementing agreed-upon improvements, will be prepared and submitted when comment is received.

4.3.29 15.OPS.17 Volumetric and Material Handling

Proposed Change: The use of the Exploranium gamma spectroscopy unit has been removed.
Basis for Change: Sample volume and activity are insufficient to get meaningful information from the hand-held gamma spectrometer. Survey instrumentation is used to identify external contamination.

4.3.30  15.OPS.18 Decontamination of Surfaces and Equipment

Proposed Change: No substantive changes.

Basis for Change: Not applicable.

4.3.31  15.OPS.19 Decontamination of Personnel

Proposed Change: Section 3.0, the reference to the Clean Harbors procedure has been corrected.

Basis for Change: This refers to the current Clean Harbors procedure.

4.3.32  15.OPS.20 Handling of Liquids

Proposed Change: This SOP was extensively rewritten to make it consistent with 15.OPS.02, Waste Treatment, and to remove many areas where the SOP duplicated material in other existing SOP’s.

Basis for Change: The original SOP was overly specific to equipment and locations and contained duplicative steps. Numerous site and equipment surveys have demonstrated that waste treatment in the treatment building is protective. The actual procedure remains essentially the same.

4.3.33  15.OPS.21 Package Receipt Surveys

Proposed Change: Use of the SAIC Exploranium instrument for ambient exposure rate measurement has been removed.

Basis for Change: Other instruments are better suited for exposure rate measurement and are cited in this procedure.
5.0  COMPLIANCE WITH REGULATORY REQUIREMENTS

This section provides a point-by-point discussion of compliance with the applicable State of Colorado Rules and Regulations Pertaining to Radiation Control. Where appropriate, sections of this License Renewal Application or other components have been referenced to direct the reader to the appropriate source of information.

5.1  Part 3, Licensing of Radioactive Material

5.1.1  RH 3.8 Specific Licenses

   RH 3.8.1 Filing information

   Identity of the application: The required information is presented in Form OR-RH-12, included with this application in Attachment A.

   RH 3.8.5 Incorporation by Reference

   This application makes reference to documents in the original Radioactive Material License application. This document was filed with this renewal for convenience. Other documents referenced have been submitted to the CDPHE on January 28, 2005.

   RH 3.8.8 Environmental Impact Assessment

   The detailed site description and environmental impact assessment was part of the original License Application. Updated environmental impact is assessed yearly in the annual reports submitted to CDPHE. The executive summaries of these reports are included in this application in Attachment L. The information in these reports backs up our conclusion that the environmental impact of CHDT radioactive material operations is negligible.

5.1.2  RH 3.9 General Requirements for the Issuance of Specific Licenses

   RH 3.9.1 Qualified by reason of training and experience

   CHDT personnel have suitable eight experience in conducting radioactive materials disposal operations at the Facility. All staff has been trained on the basics of radioactive materials and basic radiation safety. The staff has been trained in CHDT Operational SOP’s. Operations staff are trained and experienced in the use of radiation instruments. CHDT Key Personnel have many years of education and experience. CHDT Key personnel resumes and staff training histories are presented in Attachment H.

   RH 3.9.2 Equipment Facilities and Procedures are adequate to minimize danger to public health and safety

   CHDT facilities and control systems were described in the original License Application. CHDT procedures have been updated to incorporate improvements and experience. Additional procedures are presented with this application to improve the radiation protection program.
Radiation detection instrumentation is listed in Attachment I. CHDT equipment, facilities, and procedures are adequate to minimize danger to public health and safety.

RH 3.9.5 Department-approved financial assurance warranties

CHDT has Department-approved financial assurance warranties in place. A copy of the latest certificate can be found in Attachment J. Also presented is the most recent cost evaluation for decommissioning and post closure care submitted August 23, 2013 “Class 1 Permit modification Request, Updated Closure and Post Closure Cost Estimates”.

RH 3.9.11 Contingency Plans

CHDT has a contingency plan in the RCRA permit. A renewal application for that permit was filed with CDPHE on March 15, 2013. CHDT systems and procedures are designed to prevent the release of radioactivity from the site. Spill control survey procedures for radioactive material can be found in SOP 15.OPS.14. CHDT’s control systems and daily cover procedure prevent the release of airborne radioactive material. Effectiveness of procedures and control systems has been demonstrated by the air monitoring results that have been presented in the annual report. Due to the extremely low activity of radioactive materials disposed of at CHDT, it seems very unlikely that a release of radioactive materials would exceed 0.01 Sv (1 rem) effective dose equivalent to a person off site (RH 3.9.11.1 (1)).

RH 3.10 Additional Requirements of Issuance of Specific Licenses for Use of Unsealed Radioactive Material

RH 3.10.1 Minimize Contamination

CHDT’s updated Radiation Protection Plan and Standard Operating Procedures are designed to prevent and minimize contamination of the facility and the environment. The effectiveness of these procedures will be demonstrated and measured on an ongoing basis by the survey procedures and the environmental monitoring program.

RH 3.10.3 Minimize generation of radioactive waste

Clean Harbors company policy is to minimize generation of all waste.

RH 3.11 Special Requirements for Specific Licenses of Broad Scope

Supervision - CHDT has presented a list of authorized users who have been trained in the nature of radioactive materials, basic radiation safety and the facility SOPs. All operations will be conducted under the supervision of Key Facility Management and authorized users. Key Facility Managers have degrees in the physical sciences and/or engineering or have equivalent experience and have at documented training in radiation safety. Resumes and training history of Key Facility Management are included in Attachment H.
Administrative Controls - CHDT has administrative controls and provisions relating to procedures, record keeping, material control and accounting, and management review necessary to assure safe operations. The procedures can be found in Attachment C.

5.2 Part 4, Standards for Protection against Radiation

5.2.1 RH 4.7 Compliance with Requirements for Summation of External and Internal Doses

CHDT’s policy in compliance with this requirement is stated in Section 4.0 of the Radiation Protection Plan.

5.2.2 RH 4.8 Determination of External Dose from Airborne Radioactive Material

CHDT’s policy in compliance with this requirement is stated in Section 4.1 of the Radiation Protection Plan.

5.2.3 RH 4.9 Determination of Internal Exposure

CHDT’s policy in compliance with this requirement is stated in Section 4.2 of the Radiation Protection Plan.

5.2.4 RH 4.10 Determination of Prior Occupational Dose

The prior occupational dose will be determined for CHDT employees in accordance with the procedures of SOP 15.RPP.10.

5.2.5 RH 4.11 Planned Special Exposures

CHDT’s policy in compliance with this requirement is stated in Section 3.2 of the Radiation Protection Plan. Planned Special Exposures are unlikely given that nature of the waste materials handled by CHDT.

5.2.6 RH 4.12 Occupational Dose Limits for Minors

CHDT’s policy implementing compliance with this requirement is stated in Section 3.9 of the Radiation Protection Plan.

5.2.7 RH 4.13 Dose Equivalent to an Embryo/Fetus

CHDT’s policy in compliance with this requirement is stated in Section 3.3 of the Radiation Protection Plan.

5.2.8 RH 4.14 Dose limits for Individual Members of the Public

CHDT’s policy in compliance with this requirement is stated in the Radiation Protection Plan.
5.2.9 RH 4.15 Compliance with Dose Limits for Individual Members of the Public

CHDT’s policy in compliance with this requirement is stated in the Radiation Protection Plan. Surveys and monitoring of unrestricted and restricted areas are conducted to ensure that these limits are met.

5.2.10 RH 4.16 Testing for Leakage or Contamination of Sealed Sources

CHDT has no regulated sealed sources at this time. If sealed sources are obtained, they will be tested per the regulations.

5.2.11 RH 4.17 Surveys and Monitoring General

CHDT has detailed survey and monitoring procedures that meet the requirements of this part. See Attachment C for the Radiation Protection Plan and Procedures.

5.2.12 RH 4.18 Conditions Requiring Individual Monitoring of External or Occupational Dose

CHDT’s policy in compliance with this requirement is stated in Section 4.0 of the Radiation Protection Plan.

5.2.13 RH 4.19 Control of Access to High Radiation Areas, RH 4.20, 4.21

CHDT has no high radiation areas, and given the nature of the waste materials handled, is unlikely to have any. Nevertheless, if areas are determined to be high radiation areas, access will be controlled and the areas will be appropriately posted.

5.2.14 RH 4.25 Security of Stored Sources of Radiation

CHDT maintains a secure site that is surrounded by an 8 foot chain link fence. The facility gates are closed and secured during normal operations. Entrance is controlled by site personnel. The fenced and closed facility provides sufficient security. Bulk shipments of waste materials are normally processed and disposed of in the landfill in an expeditious manner, usually the same day. After waste is land-filled, covered, and compacted, it presents very little security risk as it would need heavy construction equipment to remove. Containerized waste may be stored while it is waiting on treatment or lab analysis. Given the very low activity of the wastes accepted at CHDT, it poses very little security risks.

5.2.15 RH 4.22 Use of Process or Other Engineering Controls, RH 4.23, Use of Other Controls

Clean Harbors Company Health and Safety Policy is to always, where possible, use Engineering Controls and Administrative Controls first in preference to Protective Equipment (PPE). Since CHDT co-disposes RCRA regulated hazardous waste along with radioactive materials, PPE is often needed to meet safety requirements for the RCRA regulated waste. Since the operations
occur together and the wastes are processed in the same disposal units using the same equipment, CHDT operators are usually required to wear PPE when working in waste handling areas. While CHDT believes that the Engineering Controls and Administrative controls that it utilizes when disposing of radioactive materials are very effective, it chooses to utilize PPE both to meet RCRA regulated waste requirements and to meet or exceed protection factors for working with radioactive materials. CHDT has chosen to utilize only full face air purifying respirators to take advantage of their higher protection factors. PPE use is detailed in SOP 15.RPP.009 Personal Protective Equipment.

5.2.16 RH 4.24 Use of Individual Respiratory Protection Equipment
See SOP 15.RPP.09 for details of CHDT Policy with regard to respiratory protections equipment and its utilization.

5.2.17 RH 4.26 Control of Sources of Radiation not in Storage
CHDT facility design and controls meet requirements of control and security. See response to 5.2.14.

5.2.18 RH 4.27 Caution Sign
“Caution Radioactive Materials” signs are and will be utilized to post any areas that require them.

5.2.19 RH 4.28 Posting Requirements
CHDT complies with regulations for posting requirements. All areas where radioactive materials are stored, treated, or disposed of are appropriately posted.

5.2.20 RH 4.29 Exceptions to Posting Requirements
N/A

5.2.21 RH 4.30 Labeling Containers and Radiation Machines
All waste containers known to contain radioactive materials will be appropriately labeled. CHDT has no radiation machines.

5.2.22 RH 4.31 Exemptions to Labeling Requirements
N/A

5.2.23 RH 4.32 Procedures for Receiving and Opening Packages
CHDT policy and procedures or receiving and opening packages are found in SOP 15.OPS.21 Package Receipt Surveys. Most waste samples containing radioactive materials sent to CHDT are exempt quantity non-DOT labeled shipments. Similarly, most waste shipments containing radioactive materials acceptable to DR under the License are either non-DOT regulated, limited
quantity, or LSA-1 shipments not requiring labels. While most of these shipments would appear
not to require package receipt surveys under Colorado Regulations (RH Part 4.32), this sections
also requires that Licensees “Monitor all packages known to contain radioactive material for
radioactive contamination and radiation levels if there is evidence of degradation of package
integrity, such as packages that are crushed, wet, or damaged”. RH 4.32.2.3). In the interest of
complying with this part, CHDT will conduct receipt surveys on all packages and waste
shipments known to contain radioactive materials.

5.2.24 RH 4.33 Waste Disposal General Requirements

CHDT will comply with regulations governing waste disposal. Waste is normally generated at
CHDT only by the sampling and processing of waste materials for disposal. Waste is normally
disposed of on site in accordance with approved SOPs.

5.2.25 RH 4.34 Method of Obtaining Approval of Proposed Disposal Procedure

CHDT will seek approval for proposed waste disposal procedures that are not covered by already
approved procedures.

5.2.26 RH 4.35 Disposal by Release into Sanitary Sewerage

N/A CHDT does not dispose of any radioactive materials into sanitary sewerage.

5.2.27 RH 4.36 Treatment or Disposal by Incineration

N/A CHDT does not dispose of any radioactive materials via incineration

5.2.28 RH 4.37 Disposal of Specific Wastes

N/A

5.2.29 RH 4.38 Transfer for Disposal and Manifests

CHDT will, if necessary comply with regulations for disposal and manifests of any waste
containing radioactive materials shipped off site.

5.2.30 RH 4.39 Compliance with Environmental and Health Protection Regulations

CHDT intends to comply with environmental and health protection regulations. This intention is
company policy and is stated in Clean Harbor’s Corporate Commitment to Environment, Health
and Safety (Attachment K).

5.2.31 RH 4.40 Records General Provisions

CHDT’s policy in compliance with this requirement is stated in the Radiation Protection Plan
and specified in SOP 15.RPP.03 Records.
5.2.32 RH 4.51 Reports

CHDT intends to make all reports required by the License and the regulations.

5.3 Part 14, Licensing Requirements for Land Disposal of Low-Level Radioactive Waste, General, Technical, Institutional, and Financial Information

5.3.1 RH 14.6 - General Information

RH 14.6.1

Identity of the application: The required information is presented in Form OR-RH-12, included with this application in Attachment A.

RH 14.6.2

Qualifications of the applicant: The past eight+ years of operational history managing radioactive materials under License 1102-1 demonstrates the capabilities of the Deer Trail facility. Additional information is presented in Section 8 of the original License Application submitted to CDPHE on January 28, 2005.

RH 14.6.3

A description of:

The location of proposed disposal site: The required information is presented in Section 1 of the original License Application. No changes are needed.

The general character of the proposed activities: The required information is presented in Section 1 of the original License Application. No changes are needed.

The types and quantities of waste to be received, possessed, and disposal of: The required information is presented in Section 4 of the original License Application. No changes are needed.

Plans for use of the land disposal facility for purposes other than disposal of wastes: The required information is presented in Section 1 of the original License Application. No changes are needed.

The proposed facilities and equipment: The required information is presented in Section 4 of the original License Application. No changes are needed except for landfill construction as discussed below under RH 14.6.4.

RH 14.6.4

Proposed schedules for construction, receipt of waste, and first emplacement of waste at the proposed land disposal facility: As the facility is currently in operation, this requirement does not apply for this renewal application. The facility was initially constructed in 1987 and was operational in 1990. Cell 3 (the current disposal cell) was constructed in 2006, and the first radioactive materials disposed were emplaced in January 2007. Cell 4 was constructed during
2014-2015 and the Construction Quality Assurance document was submitted for approval in March 2015 and is included by reference. Cell 4 was built according to a previously approved cell design plan in the RCRA permit. The capacity of Cell 4 is 491,840 cubic yards. When Cell 4 has received approval, CHDT intends to apply for use of this unit for disposal of waste subject to the license.

5.3.2 RH 14.7 – Specific Technical Information

RH 14.7.1

A description of the natural and demographic disposal site characteristics as determined by disposal site selection and characterization activities: The required information is presented in Section 2 of the original License Application. No changes are needed.

RH 14.7.2

A description of the design features of the land disposal facility and the disposal units: The required information is presented in Section 3 of the original License Application. No changes are needed.

RH 14.7.3

A description of the principal design criteria and their relationship to the performance objectives: The required information is presented in Section 3 of the original License Application. No changes are needed.

RH 14.7.4

A description of the design basis natural events or phenomena and their relationship to the principal design criteria: The required information is presented in Section 3 of the original License Application. No changes are needed.

RH 14.7.5

A description of the codes and standards which the applicant has applied to the design and which will apply to the construction of the land disposal facilities: The required information is presented in Section 3 of the original License Application. No changes are needed.

RH 14.7.6

A description of the construction and operation of the land disposal facility: The required information is presented in Sections 3 and 4 of the original License Application. No changes are needed.

RH 14.7.7

A description of the disposal site closure plan, including those design features which are intended to facilitate disposal site closure and to eliminate the need for ongoing active maintenance: The required information is presented in Section 5 of the original License
Application. The closure and post closure care costs models have been updated and can be found in Attachment J. The Closure Plan was updated for the 2013 RCRA Permit and is incorporated by reference. No additional changes are needed.

RH 14.7.8

An identification of the known natural resources at the disposal site, whose exploitation could result in inadvertent intrusion into the waste after removal of active institutional control: The required information is presented in Section 2 of the original License Application. No changes needed.

RH 14.7.9

A description of the kind, amount, classification, and specifications of the radioactive materials proposed to be received, possessed, and disposed of at the land disposal facility: The required information is presented in Section 4 of the original License Application. The addition of Pipe Scale Waste, as described in 15.WAC.03 and the associated Technical Basis Document (Attachment D) is requested. This waste stream was originally requested in the 2010 License Renewal Application.

RH 14.7.10

A description of the quality assurance program developed and applied by the applicant for the determination of natural disposal site characteristics and for quality control during the design, construction, operation and closure of the land disposal facility and the receipt, handling, and emplacement of waste: The required information is presented in Section 9 of the original License Application. No changes needed.

RH 14.7.11

A description of the radiation safety program for control and monitoring of radioactive effluents to ensure compliance with the performance objective in RH 14.19 and occupational radiation exposure to ensure compliance with Part IV of these regulations, and to control contamination of personnel, vehicles, equipment, buildings, and the disposal site: The required information is presented in Section 7 of the original License Application. The updated radiation protection program is presented in this License Renewal Application as Attachment C.

RH 14.7.12

A description of the environmental monitoring program to provide data to evaluate potential health and environmental impacts and the plan for taking corrective measures if migration is indicated: The required information is presented in Section 4 of the original License Application. Environmental monitoring data collected during operations under License 1102-1 is summarized in Section 2.2 of this License Renewal Application. CHDT believes that the current monitoring
program along with modification proposed in this application provide suitable data to evaluated potential impacts and take corrective measures.

RH 14.7.13

A description of the administrative procedures that the applicant will apply to control activities at the land disposal facility: The required information is presented in Section 8 of the original License Application. No changes are needed.

RH 14.7.14

A description of the facility electronic recordkeeping system as required in RH 14.33: Clean Harbors has a company-wide proprietary waste tracking system that is used to track all incoming and outgoing shipments of disposed wastes. Wastes may be tracked by profile number, manifest number, sales order, and load number, and each individual load is given a unique identifier in the system. Clean Harbors is constantly striving to improve and perfect its electronic record-keeping systems and minor changes are made as needed. No changes to the basis description are needed.

5.3.3 RH 14.8 – Technical Analyses

RH 14.8.1

Pathways analyzed in demonstrating protection of the general population from release of radioactivity shall include air, soil, groundwater, surface water, plant uptake, and exhumation by burrowing animals: The required information is presented in Section 6 of the original License Application. No changes are needed.

RH 14.8.2

Analyses of the protection of individuals from inadvertent intrusion shall include demonstration that there is reasonable assurance that the waste classification and segregation requirements will be met and that adequate barriers to inadvertent intrusion will be provided: The required information is presented in Section 6 of the original License Application. No changes are needed.

RH 14.8.3

Analyses of the protection of individuals during operations shall include assessments of expected exposures due to routine operations, and likely accidents during handling, storage, and disposal of waste: The required information is presented in Section 6 of the original License Application. Ongoing monitoring and dose assessment confirms that the contentions in the original application are valid; however, it was previously determined that CHDT workers are radiation workers for the purpose of evaluation of radiation exposures and not member of the general public.
RH 14.8.4

Analyses of the long-term stability of the disposal site and the need for ongoing active maintenance after closure shall be based upon analyses of active natural processes such as erosion, mass wasting, slope failure, settlement of wastes and backfill, infiltration through covers over disposal areas and adjacent soils, and surface drainage of the disposal site: The required information is presented the response to RFI 6 of the original License Application. No changes are needed.

5.3.4 RH 14.9 – Institutional Information

RH 14.9.1

A certification by the federal or state custodial agency which owns the disposal site that the federal or state agency is prepared to accept transfer of the license when the provisions of RH 14.16 are met, and will assume responsibility for institutional control after site closure and post-closure observation and maintenance: The required information is presented in Clean Harbors’ response to CDPHE RFI No. 2, dated March 18, 2005. No changes are needed.

RH 14.9.2

Where the proposed disposal site is on land not owned by the federal or state government, the applicant shall submit evidence that arrangements have been made for assumption of ownership in fee by the federal or a state agency before the Department issues a license: The required information is presented in Clean Harbors’ response to CDPHE RFI No. 2, dated March 18, 2005. No changes are needed.

5.3.5 RH 14.10 – Financial Information

The financial information shall be sufficient to demonstrate that the financial qualifications of the applicant are adequate to carry out the activities for which the license is sought and meet other financial assurance requirements of this part: The required information is presented in Clean Harbors’ response to CDPHE RFI No. 2, dated March 18, 2005. The current Financial Assurance Warranty can be found in Section 2.2 of this application and in Attachment J. CHDT financial qualifications are evaluated annually by CDPHE and have been found suitable.

5.4 Part 14, Licensing Requirements for Land Disposal of Low-Level Radioactive Waste, Performance Objectives

5.4.1 RH 14.19 – Protection of the General Population from Release of Radioactivity

Concentrations of radioactive material which may be released to the general environment in groundwater, surface water, air, soil, plants, or animals shall not result in an annual dose exceeding an equivalent of 25 millirems (0.25 mSv) to the thyroid, and 25 millirems (0.25 mSv) to any other organ of any member of the public: The required information is presented in Section 6 of the original License Application. Environmental monitoring results over the past eight years
of activity have demonstrated that the general population is well protected from release of radioactivity. These are discussed in the application and exposure to the general public is evaluated in each annual report.

5.4.2 RH 14.20 – Protection of Individuals from Inadvertent Intrusion
Design, operation, and closure of the land disposal facility shall ensure protection of any individual inadvertently intruding into the disposal site and occupying the site or contacting the waste at any time after active institutional controls over the disposal site are removed: The required information is presented in Section 6 of the original License Application. No changes are needed.

5.4.3 RH 14.21 – Protection of Individuals during Operations
Operations at the land disposal facility shall be conducted in compliance with the standards of radiation protection set out in Part IV of these regulations, except for releases of radioactivity in effluents from the land disposal facility, which shall be governed by RH 14.19: The required information is presented in Section 7 of the original License Application. The updated radiation protection program is presented in this License Renewal Application as Attachment C. CHDT believes that the program is adequate to protect individuals during operations.

5.4.4 RH 14.22 – Stability of the Disposal Site after Closure
The disposal facility shall be sited, designed, used, operated, and closed to achieve long-term stability of the disposal site and to eliminate, to the extent practicable, the need for ongoing active maintenance of the disposal site following closure so that only maintenance, monitoring, or minor custodial care are required: The required information is presented in Section 5 of the original License Application. No changes are needed.

5.5 Part 14, Licensing Requirements for Land Disposal of Low-Level Radioactive Waste, Technical Requirements for Land Disposal Facilities

5.5.1 RH 14.23 – Disposal Site Suitability Requirements for Land Disposal
The primary emphasis in near-surface disposal site suitability is given to isolation of wastes, and to the disposal site features that ensure that the long-term performance objectives are met.

The required information is presented in Clean Harbors’ response to CDPHE RFI No. 6, dated June 7, 2005. No changes are needed.

5.5.2 RH 14.24 – Disposal Site Design for Land Disposal
The required information is presented in Section 3 of the original License Application. No changes are needed.
5.5.3 RH 14.25 – Land Disposal Facility Operation and Disposal Site Closure
The required information is presented in Section 4 of the original License Application. Closure plant and closure cost evaluations have been updated in the 2013 RCRA permit and due to the joint use of the facility cover both license and RCRA operations.

5.5.4 RH 14.26 – Environmental Monitoring
The required information is presented in Section 4 of the original License Application. Environmental monitoring data collected during operations under License 1102-1 is summarized in Section 2.2 of this License Renewal Application.

5.5.5 RH 14.27 – Alternative Requirements for Design and Operations
Not applicable.

5.5.6 RH 14.28 – Institutional Requirements
The required information is presented in Clean Harbors’ response to CDPHE RFI No. 2, dated March 18, 2005. No changes are needed.

5.5.7 RH 14.29 – Alternative Requirements for Waste Classification and Characteristics
Not applicable.

5.5.8 RH 14.30 – Applicant Qualifications and Assurances
The past eight years of operational history managing radioactive materials under License 1102-1 demonstrates the capabilities of the CHDT facility. Additional information is presented in Section 8 of the original License Application, the 2010 License Renewal Application, and this current application.

5.5.9 RH 14.31 – Funding for Disposal Site Closure and Stabilization
The required information is presented in Clean Harbors’ response to CDPHE RFI No. 2, dated March 18, 2005. No changes are needed. Funding for closure is evaluated in each annual report. Current funding measures are adequate.

5.5.10 RH 14.32 – Financial Assurances for Institutional Controls
The required information is presented in Clean Harbors’ response to CDPHE RFI No. 2, dated March 18, 2005. Decommissioning and Long Term Care Warrantees are updated annually and the latest information is presented in Attachment J.

5.5.11 RH 14.33 – Maintenance of Records, Reports, and Transfers
The required information is noted in Section 5.1.2.14 of this License Renewal Application, and is included in the radiation protection program SOPs provided in Attachment C of this License Renewal Application. Records maintenance policies meet the requirements of this part.

RH 14.34 – Tests on Land Disposal Facilities
Not applicable.

5.5.12 RH 14.35 – Agency Inspections of Land Disposal Facilities

Not applicable.
6.0 CONCLUSIONS

Since initiating radioactive materials receiving operations under License 1102-1 in January 2007, CHDT has safely handled over 129,000 tons of NORM, TENORM, and radium processing wastes. As shown in Sections 2.2 through 2.4, there have been no adverse impacts to the environment, the general public, or site personnel from site activities involving radioactive materials. In addition, the high percentage of disposed material originating from within the state demonstrates that the facility provides a unique service to the state of Colorado, as well as the other member states of the Rocky Mountain Low Level Radioactive Waste Compact (New Mexico and Nevada).
7.0 REFERENCES


Amended and Restated Certificate of Designation for Hazardous and Regulated Waste Disposal Site, Case Number: EXG2012-00002, issued by the Adams County Board of County Commissioners on November 14, 2012.


Radioactive Material License 1102-1, Amendment No. 11, signed December 20, 2010.

Radioactive Material License 1102-1, Amendment No. 12, signed October 23, 2012.

Radioactive Material License 1102-1, Amendment No. 13, signed December 21, 2012.


State-RCRA Permit, Clean Harbors Deer Trail LLC, Permit No.: CO-05-12-21-01, EPA ID No.: COD991300484, issued December 21, 2005.
ATTACHMENT A – FORM OR-RH-12
ATTACHMENT B – LANDFILL CELL DOCUMENTATION
ATTACHMENT C - REVISED CHDT RADIATION PROTECTION PLAN AND PROCEDURES
ATTACHMENT D – NEW SOP AND TECHNICAL BASIS FOR OIL PRODUCTION PIPE
ATTACHMENT E - TECHNICAL BASIS DOCUMENT FOR GROUNDWATER SAMPLING MODIFICATIONS
ATTACHMENT F – TECHNICAL BASIS DOCUMENT FOR ALTERNATE ANALYSIS TECHNIQUE
ATTACHMENT G – NEW SOP AND TECHNICAL BASIS FOR EXPOSURE-BASED ACCEPTANCE CRITERIA
ATTACHMENT I - RADIATION DETECTION INSTRUMENTS
ATTACHMENT J – FINANCIAL ASSURANCE WARRANTY
ATTACHMENT K – CORPORATE ENVIRONMENTAL HEALTH AND SAFETY COMMITMENT