



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

Renewal Application and Technical Basis
Including Various Attachments

December 1, 2022

**Clean Harbors Deer Trail, LLC
108555 East Highway 36
Deer Trail, CO 80105-9611**

TABLE OF CONTENTS

1.0 INTRODUCTION.....	8
2.0 SUMMARY OF SITE OPERATIONS UNDER LICENSE 1102-1.....	10
2.1 WASTE CHARACTERISTICS AND DISPOSAL ACTIVITIES.....	10
TABLE 2-1. OPERATIONAL DISPOSAL HISTORY, 2010 TO 2013	10
2.2 ENVIRONMENTAL MONITORING.....	20
2.2.1 Air Particulate Monitoring	21
TABLE 2-2. SUMMARY OF AMBIENT AIR CONCENTRATIONS	21
2.2.2 Groundwater Monitoring.....	23
2.2.3 Radon Monitoring.....	23
TABLE 2-3A. SUMMARY OF RADON MONITORING RESULTS 2010.....	23
TABLE 2-3B. SUMMARY OF RADON MONITORING RESULTS REVISED PROGRAM	ERROR! BOOKMARK NOT DEFINED.
2.2.4 Environmental Dosimetry	23
TABLE 2-4A. SUMMARY OF AVERAGE ENVIRONMENTAL DOSE RATE 2010.....	24
TABLE 2-4B. SUMMARY OF AVERAGE ENVIRONMENTAL DOSE RATE REVISED PROGRAM	ERROR! BOOKMARK NOT DEFINED.
2.3 EVALUATION OF PUBLIC DOSE.....	24
TABLE 2-5. SUMMARY OF CALCULATED PUBLIC DOSE	25
TABLE 2-6. PUBLIC DOSE DUE TO REGULATED WASTE DISPOSAL *	25
2.4 OCCUPATIONAL DOSE AND ALARA.....	26
TABLE 2-7. SUMMARY OF OCCUPATIONAL DOSE	26
2.5 SITE DECOMMISSIONING WARRANTY	26
FIGURE 2-1. AIR MONITORING STATION A – ALPHA EMITTERS	27
FIGURE 2-2. AIR MONITORING STATION B – ALPHA EMITTERS	28
FIGURE 2-3. AIR MONITORING STATION C – ALPHA EMITTERS	30
FIGURE 2-4. AIR MONITORING STATION D – ALPHA EMITTERS	31
FIGURE 2-5. RADON MONITORING DATA – CELL LOCATIONS.....	ERROR! BOOKMARK NOT DEFINED.
FIGURE 2-6A. RADON MONITORING DATA – OTHER FACILITY LOCATIONS 2010.....	32
FIGURE 2-6B. RADON MONITORING DATA – OTHER FACILITY LOCATIONS REVISED PROGRAM	ERROR! BOOKMARK NOT DEFINED.
FIGURE 2-7. ENVIRONMENTAL DOSIMETRY DATA – CELL LOCATIONS.....	ERROR! BOOKMARK NOT DEFINED.
FIGURE 2-8. ENVIRONMENTAL DOSIMETRY DATA – EXTERIOR LOCATIONS	33
FIGURE 2-9. ENVIRONMENTAL DOSIMETRY DATA – INTERIOR LOCATIONS.....	34

3.0	PROPOSED CHANGES TO LICENSE SCOPE	35
4.0	PROPOSED CHANGES TO RADIATION PROTECTION PROGRAM.....	36
4.1	PROCEDURE ORGANIZATION AND FORMAT.....	36
4.1.1	<i>Proposed Change.....</i>	36
TABLE 4-1. STANDARD OPERATING PROCEDURES FOR CHDT RADIATION PROTECTION PROGRAM.....		36
4.2	ADDITIONAL PROCEDURES	37
4.2.1	<i>Proposed Change.....</i>	<i>Error! Bookmark not defined.</i>
TABLE 4-2. NEW STANDARD OPERATING PROCEDURES FOR CHDT RADIATION PROTECTION PROGRAM.....		38
4.2.2	<i>Basis for Change.....</i>	<i>Error! Bookmark not defined.</i>
4.3	REVISIONS TO EXISTING PROCEDURES.....	38
4.3.1	15.RPP.01 Radiation Protection Plan	38
4.3.2	15.RPP.02 Radiation Protection Training.....	38
4.3.3	15.RPP.03 Worker Protection Records	<i>Error! Bookmark not defined.</i>
4.3.4	15.RPP.04 Individual and Area Dosimetry	38
4.3.5	15.RPP.05 Estimating Inhalation Doses.....	38
4.3.6	15.RPP.06 Emergency Response	38
4.3.7	15.RPP.07 ALARA	38
4.3.8	15.RPP.08 Radiation Work Permits	38
4.3.9	15.RPP.09 Personal Protective Equipment	38
4.3.10	15.RPP.10 Determination of Prior Occupational Dose.....	38
4.3.11	15.WAC.01 Radioactive Materials Acceptance	39
4.3.12	15.WAC.02 Waste Tracking.....	39
4.3.13	15.OPS.01 Landfill Operations.....	39
4.3.14	15.OPS.02 Contamination Control During Waste Treatment Activities.....	39
4.3.15	15.OPS.03 Operation of Portable Gamma Spectroscopy Unit	39
4.3.16	15.OPS.04 Operation of Alpha-Beta Smear Counter.....	39
4.3.17	15.OPS.05 Operation of Gate Monitor Detectors.....	39
4.3.18	15.OPS.06 Operation of Digital Waste Monitor	40
4.3.19	15.OPS.07 Operation of Exposure/Dose Rate Meters	40
4.3.20	15.OPS.08 Operation of Alpha-Beta Scintillation Detectors.....	40
4.3.21	15.OPS.09 Operation of Geiger Mueller Pancake Probe.....	40
4.3.22	15.OPS.10 Operation of Gamma Scintillation Detectors	40
4.3.23	15.OPS.11 Routine Contamination Surveys.....	40
4.3.24	15.OPS.12 Personnel Contamination Surveys.....	40
4.3.25	15.OPS.13 Equipment Surveys.....	40

4.3.26	15.OPS.14 Spill Surveys.....	40
4.3.27	15.OPS.15 Air Monitoring for Radioactive Materials	40
4.3.28	15.OPS.16 Groundwater Monitoring.....	41
4.3.29	15.OPS.17 Volumetric and Material Handling.....	41
4.3.30	15.OPS.18 Decontamination of Surfaces and Equipment.....	41
4.3.31	15.OPS.19 Decontamination of Personnel	41
4.3.32	15.OPS.20 Handling of Liquids	41
4.3.33	15.OPS.21 Package Receipt Surveys	41
4.3.34	15.OPS.22 Exposure Rate Acceptance of Potential TENORM.....	41
5.0	COMPLIANCE WITH REGULATORY REQUIREMENTS.....	42
5.1	PART 3, LICENSING OF RADIOACTIVE MATERIAL.....	42
5.1.1	RH 3.8 Specific Licenses.....	42
5.1.2	RH 3.9 General Requirements for the Issuance of Specific Licenses	42
5.1.3	RH 3.10 Additional Requirements of Issuance of Specific Licenses for Use of Unsealed Radioactive Material 43	
5.1.4	RH 3.11 Special Requirements for Specific Licenses of Broad Scope	43
5.2	PART 4, STANDARDS FOR PROTECTION AGAINST RADIATION	43
5.2.1	RH 4.7 Compliance with Requirements for Summation of External and Internal Doses	43
5.2.2	RH 4.8 Determination of External Dose from Airborne Radioactive Material	43
5.2.3	RH 4.9 Determination of Internal Exposure.....	44
5.2.4	RH 4.10 Determination of Prior Occupational Dose	44
5.2.5	RH 4.11 Planned Special Exposures	44
5.2.6	RH 4.12 Occupational Dose Limits for Minors	44
5.2.7	RH 4.13 Dose Equivalent to an Embryo/Fetus	44
5.2.8	RH 4.14 Dose limits for Individual Members of the Public	44
5.2.9	RH 4.15 Compliance with Dose Limits for Individual Members of the Public.....	44
5.2.10	RH 4.16 Testing for Leakage or Contamination of Sealed Sources	44
5.2.11	RH 4.17 Surveys and Monitoring General.....	44
5.2.12	RH 4.18 Conditions Requiring Individual Monitoring of External or Occupational Dose.....	44
5.2.13	RH 4.19 Control of Access to High Radiation Areas, RH 4.20, 4.21	44
5.2.14	RH 4.25 Security of Stored Sources of Radiation	44
5.2.15	RH 4.22 Use of Process or Other Engineering Controls, RH 4.23, Use of Other Controls.....	45
5.2.16	RH 4.24 Use of Individual Respiratory Protection Equipment	45
5.2.17	RH 4.26 Control of Sources of Radiation not in Storage.....	45
5.2.18	RH 4.27 Caution Sign	45
5.2.19	RH 4.28 Posting Requirements	45
5.2.20	RH 4.29 Exceptions to Posting Requirements.....	45

5.2.21	<i>RH 4.30 Labeling Containers and Radiation Machines</i>	45
5.2.22	<i>RH 4.31 Exemptions to Labeling Requirements</i>	45
5.2.23	<i>RH 4.32 Procedures for Receiving and Opening Packages</i>	46
5.2.24	<i>RH 4.33 Waste Disposal General Requirements</i>	46
5.2.25	<i>RH 4.34 Method of Obtaining Approval of Proposed Disposal Procedure</i>	46
5.2.26	<i>RH 4.35 Disposal by Release into Sanitary Sewerage</i>	46
5.2.27	<i>RH 4.36 Treatment or Disposal by Incineration</i>	46
5.2.28	<i>RH 4.37 Disposal of Specific Wastes</i>	46
5.2.29	<i>RH 4.38 Transfer for Disposal and Manifests</i>	46
5.2.30	<i>RH 4.39 Compliance with Environmental and Health Protection Regulations</i>	46
5.2.31	<i>RH 4.40 Records General Provisions</i>	46
5.2.32	<i>RH 4.51 Reports</i>	46
5.3	PART 14, LICENSING REQUIREMENTS FOR LAND DISPOSAL OF LOW-LEVEL RADIOACTIVE WASTE, GENERAL, TECHNICAL, INSTITUTIONAL, AND FINANCIAL INFORMATION	47
5.3.1	<i>RH 14.6 - General Information</i>	47
5.3.2	<i>RH 14.7 – Specific Technical Information</i>	48
5.3.3	<i>RH 14.8 – Technical Analyses</i>	50
5.3.4	<i>RH 14.9 – Institutional Information</i>	50
5.3.5	<i>RH 14.10 – Financial Information</i>	51
5.4	PART 14, LICENSING REQUIREMENTS FOR LAND DISPOSAL OF LOW-LEVEL RADIOACTIVE WASTE, PERFORMANCE OBJECTIVES	51
5.4.1	<i>RH 14.19 – Protection of the General Population from Release of Radioactivity</i>	51
5.4.2	<i>RH 14.20 – Protection of Individuals from Inadvertent Intrusion</i>	51
5.4.3	<i>RH 14.21 – Protection of Individuals during Operations</i>	51
5.4.4	<i>RH 14.22 – Stability of the Disposal Site after Closure</i>	51
5.5	PART 14, LICENSING REQUIREMENTS FOR LAND DISPOSAL OF LOW-LEVEL RADIOACTIVE WASTE, TECHNICAL REQUIREMENTS FOR LAND DISPOSAL FACILITIES	52
5.5.1	<i>RH 14.23 – Disposal Site Suitability Requirements for Land Disposal</i>	52
5.5.2	<i>RH 14.24 – Disposal Site Design for Land Disposal</i>	52
5.5.3	<i>RH 14.25 – Land Disposal Facility Operation and Disposal Site Closure</i>	52
5.5.4	<i>RH 14.26 – Environmental Monitoring</i>	52
5.5.5	<i>RH 14.27 – Alternative Requirements for Design and Operations</i>	52
5.5.6	<i>RH 14.28 – Institutional Requirements</i>	52
5.5.7	<i>RH 14.29 – Alternative Requirements for Waste Classification and Characteristics</i>	52
5.5.8	<i>RH 14.30 – Applicant Qualifications and Assurances</i>	52
5.5.9	<i>RH 14.31 – Funding for Disposal Site Closure and Stabilization</i>	52
5.5.10	<i>RH 14.32 – Financial Assurances for Institutional Controls</i>	52

5.5.11	<i>RH 14.33 – Maintenance of Records, Reports, and Transfers</i>	53
5.5.12	<i>RH 14.34 – Tests on Land Disposal Facilities</i>	53
5.5.13	<i>RH 14.35 – Agency Inspections of Land Disposal Facilities</i>	53
6.0	CONCLUSIONS	54
7.0	REFERENCES	55
8.0	ATTACHMENT A – FORM OR-RH-12	56
9.0	ATTACHMENT B – CELL 3 APPROVAL DOCUMENTATION	57
10.0	ATTACHMENT C - REVISED CHDT RADIATION PROTECTION PLAN AND PROCEDURES 58	
11.0	ATTACHMENT D – TECHNICAL BASIS DOCUMENT FOR PIPE SCALE WASTE ACCEPTANCE	59
12.0	ATTACHMENT E - TECHNICAL BASIS DOCUMENT FOR GROUNDWATER SAMPLING MODIFICATIONS	60
13.0	ATTACHMENT F – TECHNICAL BASIS DOCUMENT FOR ALTERNATE ANALYSIS TECHNIQUE	61
14.0	ATTACHMENT G – TECHNICAL BASIS FOR EXPOSURE-BASED ACCEPTANCE CRITERIA 62	
15.0	ATTACHMENT H – STAFFING AND KEY PERSONNEL	63
16.0	ATTACHMENT I - RADIATION DETECTION INSTRUMENTS	64
17.0	ATTACHMENT J – FINANCIAL ASSURANCE WARRANTY	65
18.0	ATTACHMENT K – CORPORATE ENVIRONMENTAL HEALTH AND SAFETY COMMITMENT	66
19.0	ATTACHMENT L – CHDT ANNUAL REPORT FOR 2017	67
20.0	ATTACHMENT L – CHDT ANNUAL REPORT FOR 2018	68
21.0	ATTACHMENT L – CHDT ANNUAL REPORT FOR 2019	69
22.0	ATTACHMENT L – CHDT ANNUAL REPORT FOR 2020	70

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 in Deer Trail, 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. License CO 1102-01 is currently on amendment 15 with an expiration date of December 31, 2023.

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 and 2015 renewal applications followed the requirements of 6 CCR 1007-1 Parts 14.5 through 14.10. The majority of the technical basis for suitability of the site for acceptance of radioactive materials remains unchanged.

This initial volume will serve to summarize the operations of the CHDT facility under License 1102-1 since its issue and present the proposed changes in scope, procedures, and technical basis that are now appropriate with operational history and data to warrant such changes. This volume (**Volume 1**) 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 – Cell 3 Approval Documentation
- Attachment C – Revised CHDT Radiation Protection Plan and Procedures
- Attachment D - Technical Basis Document for Pipe Scale Waste Acceptance
- Attachment E – Technical Basis Document for Groundwater Sampling Modifications
- Attachment F – Technical Basis Document for Alternate Analysis Technique
- Attachment G – Technical Basis Document for Exposure Based Acceptance Criteria
- Attachment H – Staffing and Key Personnel

- Attachment I – Radiation Detection Instruments
- Attachment J –Financial Assurance Warranty
- Attachment K – Corporate Environment, Health and Safety Commitment
- Attachment L - CHDT Annual Reports for 2010, 2011, 2012, and 2013

2.0 SUMMARY OF SITE OPERATIONS UNDER LICENSE 1102-1

The Annual Reports, required per License Condition 15(J), provide a year-by-year summary of operations under License 1102-1. The yearly Annual Reports from 2014 through 2021 have been included with this volume as Attachment L.

2.1 Waste Characteristics and Disposal Activities

Of the 73,077.64 tons of radioactive materials disposed at CHDT during its 2014-2021 operations under License 1102-1, approximately 79 percent originated from two projects: 62 percent was soil and debris which originated in the US EPA Region 5 c/o SulTRAC JV project in Ottawa, IL, and approximately 17 percent was mining related soil, overburden, or debris which originated in the USEPA/Grants Mineral Belt Sites project in New Mexico. Over 39 percent of all disposed materials originated from the Rocky Mountain Low Level Radioactive Waste Compact states of Colorado, New Mexico, and Nevada.

The largest out-of-compact waste stream was the soil and debris (CNON/NORM), containing ²²⁶Ra from the US EPA Region 5 c/o SulTRAC JV project in Ottawa, IL.

All radioactive materials have been disposed in Cell 4 at CHDT, which was constructed in 2014 and 2015. Cell 4 was permitted by CDPHE in 2015. 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.

TABLE 2-1. OPERATIONAL DISPOSAL HISTORY, 2014 TO 2021

Generator		Total (tons)
2014		
<i>In Compact</i>		
Freeport-McMoRan - Henderson	CO	225.99
EOG Resources, Inc.	CO	3.65
Stonegate Village Metropolitan Dist.	CO	32.02
City of Aurora	CO	531.91
Project X Restoration Site	CO	5.05
Project X Restoration Site	CO	0.08
USEPA/Grants Mineral Belt Sites	NM	3244.53
Town of Swink	CO	7.81
Ralston Water Treatment Plant	CO	1358.11
City of Englewood	CO	1474.26
The Buncher Company	PA	0.37

<i>Out of Compact</i>		
Honeywell	LA	89.20
Whiting Oil & Gas Corporation	ND	2.10
OWL, LLC	SD	350.99
The Buncher Company	PA	0.37
Total for 2014		7326.44
2015		
<i>In Compact</i>		
Aurora City of	CO	1171.65
Aurora, City of Griswald WWTP	CO	780.22
Big Mac Plant	CO	6.51
Chevron MidContinent Business Unit	CO	5.40
Freeport-McMoRan - Henderson Mill	CO	39.47
Freeport-McMoRan - Henderson Mine	CO	21.57
Hidden Valley Municipal Water Company	CO	2.63
Ralston Water Treatment Plant	CO	906.68
Ray Waterman Water Treatment Plant	CO	165.33
Redhill Forest Property	CO	10.34
Schlumberger	CO	575.69
Spurgeon Water Treatment Plant	CO	424.16
US Army	NM	1.34
US Army	CO	1.34
USEPA Region 8 Laboratory	CO	0.0025
USEPA/Grants Mineral Belt Sites	NM	7475.18
<i>Out of Compact</i>		
Glenn Springs Holdings Inc	KS	3562.03
Honeywell	LA	98.07
Jacam Manufacturing 2013, LLC	KS	0.80
Oneok Hydrocarbon, L.P.	KS	2.51
Owl Inc	ND	19.90
Owl Inc	ND	92.22
Owl Inc	ND	162.66
QCER at Spletstoser 34-8 SWD	ND	10.94
Secure Energy Services	ND	294.81
Southern Star Central Gas	KS	0.85
Southern Star Central Gas PL	MO	0.54
US EPA Region 5 c/o SulTRAC JV	IL	13423.05
Total for 2015		29255.89
2016		
<i>In Compact</i>		
Eureka Water Company	CO	7.47

Fairmont Water Treatment Plant	CO	3.61
FMI Henderson Mill	CO	18.23
FMI Henderson Mine	CO	5.23
Griswold Water Treatment Plant	CO	801.75
Ray Waterman WTP	CO	310.84
Water Remediation Technology LLC	CO	12.25
<i>Out of Compact</i>		
Cargill Corn Milling No. Amer.	IA	34.63
Cargill Corn Milling No. Amer.	IA	0.65
EOG Resources	WY	17.88
GE Transportation	PA	21.27
GE Water & Process Tech.	WA	0.75
General Electric Engine Svcs	OH	1.08
Gerresheimer Glass	NJ	1.11
Honeywell	LA	45.22
Lufkin Foundry Manufacturing	TX	15
Secure Energy Services	ND	318.1
Tervita Corporation	ND	56.53
Trans Canada	KS	0.43
Trans Canada	KS	0.03
US EPA Region 5 c/o SulTRAC JV	IL	25013.68
Welch Allyn Incorporated	NY	20.84
Total for 2016		26706.58
2017		
<i>In Compact</i>		
Aurora, City of Griswald WWTP	CO	629.37
Colorado Dept of Public Health & Environment	CO	157.45
Colorado Springs Utilities	CO	38.74
Colorado Springs Utilities	CO	28.37
EL Paso Nat Gas - Deming	NM	0.6
El Paso Natural Gas Co., Caprock - Valve 2	NM	0.11
El Paso Natural Gas Co., Florida Station	NM	1.65
El Paso Natural Gas Co., Lordsburg Station	NM	1.66
Englewood City of	CO	786.47
EPA Region 6 / Marquez Mine Area Site	NM	1446.04
Freeport-McMoRan - Henderson Mill	CO	23.05
Pine Brook Water District	CO	174.78
Redhill Forest POMWACA	CO	6.2
Town of Castle Rock	CO	3.99
TransColorado Gas Transmission Company LLC	CO	0.19
UPRR WTP WINTER PARK PROJECT SITE	CO	10.34

Water Remediation Technology LLC	CO	43.78
Wemlinger Water Treatment Plant	CO	546.9
<i>Out of Compact</i>		
Actavis Laboratories FL Inc	FL	12.87
Cargill	IA	6.92
Clean Harbors Environmental Services Inc	MA	145.03
El Paso Natural Gas Co. El Paso Station	TX	0.21
El Paso Natural Gas Co., Hueco Station	TX	0.77
El Paso Natural Gas Co., L30116 Panoma Receiver	TX	0.09
Elg Utica Alloys	NY	10.25
ExxonMobil US Production	WY	0.32
Honeywell	LA	15.97
Jacam Manufacturing 2013, LLC	KS	0.53
Lufkin Foundry Manufacturing	TX	18.25
Oneok Hydrocarbon, L.P.	KS	1.61
PPG Industries Inc (Silica Plant)	LA	40.93
Secure Energy Services	ND	583.61
US EPA Region 5 c/o SulTRAC JV	IL	480.1
Welch Allyn Incorporated	NY	42.6
Total for 2017		5259.75
2018		
<i>In Compact</i>		
Aurora, City of Griswald WWTP	CO	997.44
Binney Water Treatment Plant	CO	154.38
Centennial Water and Sanitation District	CO	38.2
Colorado Dept of Public Health & Environment	CO	407.54
Colorado Interstate Gas	CO	0.51
Colorado Interstate Gas	CO	0.17
Colorado Interstate Gas	CO	0.236
Colorado School of Mines	CO	0.26
Denver City and County of	CO	1161.37
Denver City and County of	CO	622.03
El Paso Natural Gas Co., Bluewater Station	NM	0.095
Noble Midstream Services	CO	2.08
Pine Brook Water District	CO	58.53
Ralston Water Treatment Plant	CO	76.14
Rockies Express Pipeline LLC	CO	0.2
Turkey Canon Ranch Water District	CO	1.887
UPRR WTP WINTER PARK PROJECT SITE	CO	252.425
UPRR WTP WINTER PARK SITE	CO	70.42
Water Remediation Technology LLC	CO	46.28

<i>Out of Compact</i>		
Actavis Laboratories FL Inc	FL	5.88
El Paso Natural Gas Co. El Paso Station	TX	2.2
El Paso Natural Gas Co., - Guadalupe Station	TX	5.91
El Paso Natural Gas Co., Hueco Station	TX	0.36
El Paso Natural Gas Corp., Cornudas Station	TX	2.925
El Paso Natural Gas Corp., Cornudas Station	TX	14.04
FDL Operating, LLC.	WY	57.74
Hess Corporation	ND	18.41
Jacam Manufacturing 2013, LLC	KS	0.541
Johns Manville	KS	14.75
Mid-Continent Fractionation & Storage LLC	KS	111.84
Phelps Dodge El Paso Operations	TX	5.12
Phillips 66 Company	WA	9.77
Secure Energy Services USA LLC	ND	5.21
Secure Energy Services USA LLC	ND	475.28
Tennessee Gas Pipeline	MA	0.151
Tennessee Gas Pipeline	MA	0.319
Tennessee Gas Pipeline	MA	0.027
Tennessee Gas Pipeline	MA	0.08
Tennessee Gas Pipeline	MA	0.428
Tennessee Gas Pipeline	MA	0.42
Tennessee Gas Pipeline	MA	0.033
Tennessee Gas Pipeline	MA	1.224
Tennessee Gas Pipeline	MA	0.157
Tennessee Gas Pipeline	MA	0.084
Tennessee Gas Pipeline	MA	0.629
Tennessee Gas Pipeline	MA	1.2
Tennessee Gas Pipeline	MA	0.21
Tennessee Gas Pipeline	MA	0.879
Tennessee Gas Pipeline	MA	0.137
Tennessee Gas Pipeline	NY	0.959
Tennessee Gas Pipeline	MA	0.419
Tennessee Gas Pipeline Station	NY	0.504
Tennessee Gas Pipeline Station	NY	0.124
Tennessee Gas Pipeline Station 321	PA	0.49
Welch Allyn Incorporated	NY	34.51
Total for 2018		4663.153
2019		
<i>In Compact</i>		
Anadarko (Fort Lupton Compressor)	CO	283.43

ANADARKO PETROLEUM CORPORATION	CO	212.81
Blue Mountain Water District	CO	7.64
Cheyenne Plains Gas Pipeline Company, LLC - Yuma	CO	0.13
Colorado Dept of Public Health & Environment	CO	187.31
Colorado Interstate Gas	CO	0.56
Colorado Interstate Gas	CO	0.82
Colorado Interstate Gas	CO	13.18
Colorado Interstate Gas - Fort Lupton	CO	0.17
Colorado Interstate Gas - Fort Morgan Storage	CO	7.15
Colorado Interstate Gas - Young Storage	CO	1.47
Colorado Interstate Gas Company, LLC	CO	4.59
Colorado Interstate Gas Company, LLC	CO	4.38
Colorado Interstate Gas Company, LLC	CO	0.17
Colorado Interstate Gas Company, LLC	CO	3.46
Colorado Interstate Gas Company, LLC	CO	0.04
Colorado Springs Utilities	CO	8.56
Denver City and County of	CO	715.53
El Paso Natural Gas Co., Florida Station	NM	1.27
El Paso Natural Gas Co., Jal, Line 3026	NM	0.25
El Paso Natural Gas Co., Lincoln Station	NM	1.28
El Paso Natural Gas Co., Line 1300	NM	14.21
El Paso Natural Gas Co., San Juan, L1218	NM	2.53
Kim CS	CO	0.10
Kinder Morgan / NGPL CS 167	NM	0.50
PDC Energy	CO	0.15
Sulzer Pumps- Rocky Mountain Service Center	CO	0.22
Sulzer Pumps- Rocky Mountain Service Center	CO	0.22
Suncor Energy (Usa) Inc	CO	225.02
Town of Castle Rock	CO	24.88
UPRR WTP WINTER PARK SITE	CO	296.38
Water Remediation Technology LLC	CO	30.21
<i>Out of Compact</i>		
Abraxas Petroleum Corporation	WY	1.50
Actavis Laboratories FL Inc	FL	34.24
BP Exploration Alaska Prudhoe Bay	AK	1.43
Caterpillar	MO	2.25
Cembell Industries Inc	LA	15.44
El Paso Natural Gas Co. El Paso Station	TX	1.50
El Paso Natural Gas Co., Plains Station	TX	7.28
El Paso Natural Gas Co., Wenden Station, L1100	AZ	8.22
El Paso Natural Gas Corp., Cornudas Station	TX	1.50

Enable Midstream - Bergstrom	ND	0.48
Enable Midstream - Bergstrom	ND	0.04
Enerplus	ND	18.30
Halliburton	ND	0.53
Hess Bakken Investments LLC	ND	3.50
Honeywell	LA	44.13
Life Technologies Corp	NY	4.06
Marathon Oil Company	ND	13.56
Mid-Continent Fractionation & Storage LLC	KS	51.03
Minnesota Power	MN	1.65
Motiva Enterprises LLC	TX	38.70
Oneok Hydrocarbon, L.P.	KS	2.91
Owl Inc	MT	159.91
PAR Hawaii Refining LLC	HI	0.08
Phillips 66	NJ	22.75
Rohm & Haas	KY	26.07
Safety-Kleen Systems, Inc.	TX	2.10
Secure Energy Services USA LLC	ND	392.58
Slawson Companies Van Hook 1-9 SWD	ND	31.30
Slawson Companies Van Hook 1-9 SWD	ND	461.83
Solvay USA Inc	GA	0.46
Sturm Ruger & Co.	AZ	0.56
Tennessee Gas Pipeline	MA	0.10
Tennessee Gas Pipeline	MA	0.27
Tennessee Gas Pipeline	MA	0.10
Tennessee Gas Pipeline	MA	0.17
Tennessee Gas Pipeline	MA	0.19
Tennessee Gas Pipeline	MA	0.0040
Tennessee Gas Pipeline	NY	0.68
Tennessee Gas Pipeline	NY	0.35
Tennessee Gas Pipeline Company	NY	0.09
Tennessee Gas Pipeline Company	NJ	0.68
Tennessee Gas Pipeline Station	NJ	2.77
West River Pumps	ND	0.50
Whiting Oil & Gas Corporation	ND	1.50
Total for 2019		3405.86
2020		
<i>In Compact</i>		
Ames Construction	CO	4.83
Anadarko (Fort Lupton Compressor)	CO	247.08
Anadarko Petroleum Corporation	CO	45.71

Anadarko Petroleum Corporation	CO	12.97
Aragon Iron & Metal	CO	9.61
Colorado Dept of Public Health & Environment	CO	145.05
Colorado Interstate Gas	CO	0.89
Colorado Interstate Gas	CO	0.16
Colorado Interstate Gas	CO	0.63
Colorado Interstate Gas	CO	0.36
Colorado Interstate Gas	CO	0.22
Colorado Interstate Gas	CO	0.73
Colorado Interstate Gas - Fort Lupton	CO	0.61
Colorado Interstate Gas - Fort Morgan Storage	CO	5.85
Colorado Interstate Gas - Young Storage	CO	0.15
Colorado Interstate Gas Company, LLC	CO	0.22
Colorado Interstate Gas Company, LLC	CO	1.11
Colorado Interstate Gas Company, LLC Picketwire	CO	0.33
EL Paso Nat Gas - Deming	NM	0.25
El Paso Natural Gas Co - Grants Line 1301	NM	4.80
El Paso Natural Gas Co., Guadalupe Station	NM	2.76
El Paso Natural Gas Co., Lordsburg Station	NM	1.27
El Paso Natural Gas Co., San Juan, L1218	NM	0.83
El Paso Natural Gas Co., San Juan, L1218	NM	0.10
El Paso Natural Gas Laguna Station	NM	0.35
El Paso Natural Gas Transwestern Meter Station	NM	0.70
Freeport-McMoRan - Henderson Mill	CO	68.50
Freeport-McMoRan - Henderson Mine	CO	15.55
Sulzer Pumps- Rocky Mountain Service Center	CO	0.15
Suncor Energy (Usa) Inc	CO	269.43
Town of Castle Rock	CO	34.27
Town of Monument	CO	3.77
TransColorado Gas Transmission Company, LLC	CO	0.11
UPRR WTP WINTER PARK SITE	CO	62.23
Water Remediation Technology LLC	CO	31.42
Western Midstream	CO	0.89
Western Midstream	CO	0.34
Western Midstream Partners, LP	CO	0.46
<i>Out of Compact</i>		
Actavis Laboratories FL Inc	FL	37.47
Aera Energy - Belridge	CA	21.56
ATK Space Systems LLC	UT	1.59
BNN North Dakota, LLC	ND	274.15
BP Cherry Point Refinery	WA	0.28

Buckshot Gas Processing	WY	3.37
Caterpillar	MO	1.00
Colorado Interstate Gas	WY	0.04
Colorado Interstate Gas	WY	2.73
Colorado Interstate Gas	WY	2.05
Colorado Interstate Gas, LLC	WY	1.02
EL Paso Nat Gas - Bakersfield	CA	0.21
EL Paso Nat Gas - Bakersfield	CA	0.18
EL Paso Nat Gas- P/L Dist	AZ	0.40
El Paso Natural Gas Co. El Paso Station	TX	0.91
El Paso Natural Gas Co., Flagstaff Station	AZ	3.60
El Paso Natural Gas Co., Flagstaff Station	AZ	0.13
El Paso Natural Gas Co., Hueco Station	TX	0.56
El Paso Natural Gas Co., LLC Dumas	TX	0.42
El Paso Natural Gas Co., LLC Indian Creek L1194	TX	0.08
El Paso Natural Gas Co., LLC North Phoenix	AZ	0.10
El Paso Natural Gas Co., LLC Plum Creek	TX	0.38
El Paso Natural Gas Co., Mojave Station	AZ	0.60
El Paso Natural Gas Co., Williams Station	AZ	0.38
El Paso Natural Gas Corp., Cornudas Station	TX	0.75
El Paso Natural Gas Corp., Cornudas Station	TX	1.77
ExxonMobil	TX	12.23
Freeport-McMoRan- Bagdad	AZ	5.30
Freeport-McMoRan Oil & Gas	CA	2.23
Freeport-McMoRan Oil & Gas	CA	10.98
Kiewit Mining Group	UT	498.93
Kinder Morgan	KS	0.68
Kinder Morgan	KS	1.02
Kinder Morgan	KS	0.13
Lotus LLC	TX	73.69
Marathon Pipe Line LLC	OK	0.71
McKenzie Energy Partners	ND	6.26
Mojave Pipeline Co., LLC - Daggett Station	CA	0.30
Motiva Enterprises LLC	TX	20.89
Natural Gas Pipeline of America, LLC County Rd Rcv	TX	0.05
Owl Inc	MT	389.58
Richmond Auto Parts Tech Inc	KY	6.11
Secure Energy Services USA LLC	ND	162.68
Shale Oilfield Services	ND	17.72
Tervita Corporation	ND	321.89
Thermaladyne LLC	LA	48.55

Tuboscope Zero Road	WY	10.88
Wyoming Interstate Company	WY	0.75
Wyoming Interstate Company	WY	0.12
Wyoming Interstate Company LLC	WY	0.15
Total for 2020		2922.19
2021		
<i>In Compact</i>		
Ames Construction	CO	38.94
Anadarko Petroleum Corporation	CO	3.5
Anadarko Petroleum Corporation	CO	2.42
Colorado Dept of Public Health & Environment	CO	90.44
Colorado Interstate Gas	CO	0.93
Colorado Interstate Gas	CO	0.28
Colorado Interstate Gas - Fort Morgan Storage	CO	7.02
Colorado Interstate Gas - Young Storage	CO	2.18
Colorado Interstate Gas Company, LLC	CO	0.15
Colorado Interstate Gas Company, LLC	CO	1.41
Colorado Interstate Gas Company, LLC	CO	1.06
Colorado Interstate Gas Latigo Plant	CO	7.54
Colorado Springs Utilities	CO	1.76
DCP Midstream Wattenberg Pipeline	CO	0.13
Donala Water and Sanitation District	CO	3
El Paso Natural Gas Co., LLC.	NM	2.86
Freeport-McMoRan - Henderson Mill	CO	8.57
Miller Water Treatment Plant	CO	10.33
Noble Midstream Services Wells Ranch CGF	CO	0.43
PDC Energy	CO	7.71
Pueblo West Metropolitan District	CO	54.19
Suncor Energy (Usa) Inc	CO	384.77
Town of Castle Rock	CO	276.08
Water Remediation Technology LLC	CO	46.48
Water Remediation Technology LLC	CO	8.39
Western Midstream	CO	118.76
Western Midstream	CO	61.63
Western Midstream	CO	0.08
Western Midstream	CO	7.75
Western Midstream	CO	18.3
Western Midstream Partners, LP	CO	314.85
Western Midstream Partners, LP	CO	1.12
<i>Out of Compact</i>		
Actavis Laboratories FL Inc	FL	6.96

Bakken Disposals, LLC	ND	186.56
BP Cherry Point Refinery	WA	0.4
Buckshot Gas Processing	WY	1.03
Caterpillar	MO	1.03
Colorado Interstate Gas Company, LLC	WY	2.54
Conoco Lost Creek Compressor Station	WY	3
Conoco Lost Creek Compressor Station	WY	0.15
El Paso Natural Gas Co., Flagstaff Station	AZ	0.2
El Paso Natural Gas Co., Flagstaff Station	AZ	1.12
El Paso Natural Gas Co., LLC	AZ	0.13
El Paso Natural Gas Co., LLC.	AZ	0.13
El Paso Natural Gas Co., LLC.	TX	0.2
El Paso Natural Gas Co., LLC.	AZ	0.25
El Paso Natural Gas Co., LLC.	AZ	0.25
El Paso Natural Gas Co., LLC.	AZ	2.87
El Paso Natural Gas Co., Williams Station	AZ	0.25
EOG Resources	WY	17.36
EOG Resources	OK	20.31
Gatx Rail 21000 - Cleaning	CA	0.13
John Deere Des Moines Works	IA	27.43
Johns Manville	KS	5.51
Keene FST	ND	3.97
Lotus LLC	TX	8.23
National Oilwell Varco - Casper, WY	WY	62.48
Natural Gas Pipeline Company of America, LLC	KS	1.05
Natural Gas Pipeline Company of America, LLC	KS	0.1
Natural Gas Pipeline Company of America, LLC	OK	1.58
Natural Gas Pipeline Company of America, LLC.	KS	1.05
Natural Gas Pipeline of America, LLC Fritch CS 111	TX	2.5
Owl Inc	MT	303.39
Secure Energy Services USA LLC	ND	11.72
Secure Energy Services USA LLC	ND	9.8
Secure Energy Services USA LLC	ND	11.72
Tuboscope Zero Road	WY	2
Total for 2021		2180.46

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 2014 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 were collected monthly and sent off-site for analyses, however starting in mid-2018 air filters were collected on a quarterly basis. 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 or quarter.

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 radium-226 analyses. 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 which are located after section 2.5.

During the operational period 2014-2021, there were no cases where the effluent limits were exceeded for a given month.

TABLE 2-2. SUMMARY OF AMBIENT AIR CONCENTRATIONS

Analysis	Count	Average	Standard Deviation	Minimum	Maximum	Median	Air Effluent Limit
Station A							
Gross Alpha (uCi/ml)	69	1.06E-15	8.51E-16	1.42E-16	5.93E-15	8.58E-16	
Gross Beta (uCi/ml)	69	1.37E-14	5.33E-15	3.26E-15	2.54E-14	1.39E-14	
Th-232 (uCi/ml)	69	3.33E-17	5.02E-17	-7.41E-17	2.79E-16	1.88E-17	4.00E-15
Th-230 (uCi/ml)	69	1.18E-16	1.04E-16	8.38E-18	5.37E-16	1.03E-16	2.00E-14
Th-228 (uCi/ml)	69	8.49E-17	7.81E-17	-1.09E-18	3.82E-16	5.84E-17	2.00E-14
U-238 (uCi/ml)	69	4.43E-17	4.53E-17	-2.04E-18	2.28E-16	2.91E-17	6.00E-14

U-235 (uCi/ml)	69	5.30E-18	9.39E-18	-7.86E-18	4.07E-17	3.36E-18	6.00E-14
U-234 (uCi/ml)	69	5.00E-17	5.25E-17	-5.00E-18	2.55E-16	3.18E-17	5.00E-14
Ra-226 (uCi/ml)	69	3.55E-16	2.13E-15	-4.39E-17	1.78E-14	7.38E-17	9.00E-13
Analysis	Count	Average	Standard Deviation	Minimum	Maximum	Median	Air Effluent Limit
Station B							
Gross Alpha (uCi/ml)	69	1.14E-15	1.13E-15	3.74E-17	6.30E-15	8.24E-16	
Gross Beta (uCi/ml)	69	1.41E-14	8.04E-15	1.94E-17	4.65E-14	1.37E-14	
Th-232 (uCi/ml)	69	1.88E-17	1.60E-17	-2.75E-17	7.39E-17	8.18E-16	4.00E-15
Th-230 (uCi/ml)	69	8.37E-17	6.39E-17	-6.83E-18	3.39E-16	7.75E-17	2.00E-14
Th-228 (uCi/ml)	69	5.72E-17	4.26E-17	-2.98E-17	1.99E-16	4.65E-17	2.00E-14
U-238 (uCi/ml)	69	2.76E-17	2.30E-17	3.68E-18	1.67E-16	2.43E-17	6.00E-14
U-235 (uCi/ml)	69	7.35E-18	1.37E-17	-1.39E-17	5.14E-17	4.17E-18	6.00E-14
U-234 (uCi/ml)	69	3.24E-17	2.79E-17	-7.53E-18	1.66E-16	2.48E-17	5.00E-14
Ra-226 (uCi/ml)	69	9.65E-17	3.46E-16	-1.11E-16	2.88E-15	4.76E-17	9.00E-13
Analysis	Count	Average	Standard Deviation	Minimum	Maximum	Median	Air Effluent Limit
Station C							
Gross Alpha (uCi/ml)	69	1.07E-15	8.75E-16	1.24E-16	4.51E-15	8.01E-16	
Gross Beta (uCi/ml)	69	1.51E-14	1.27E-14	2.57E-15	1.09E-13	1.34E-14	
Th-232 (uCi/ml)	69	3.36E-17	4.37E-17	-4.91E-19	3.33E-16	2.27E-17	4.00E-15
Th-230 (uCi/ml)	69	1.24E-16	1.46E-16	4.77E-18	1.08E-15	9.22E-17	2.00E-14
Th-228 (uCi/ml)	69	8.54E-17	8.14E-17	-1.43E-17	4.54E-16	6.15E-17	2.00E-14
U-238 (uCi/ml)	69	3.64E-17	4.59E-17	-9.89E-18	3.24E-16	2.47E-17	6.00E-14
U-235 (uCi/ml)	69	9.59E-18	1.40E-17	-1.53E-17	5.99E-17	6.47E-18	6.00E-14
U-234 (uCi/ml)	69	4.97E-17	6.73E-17	-2.14E-17	5.13E-16	3.57E-17	5.00E-14
Ra-226 (uCi/ml)	69	1.55E-16	6.56E-16	-1.20E-17	5.48E-15	6.30E-17	9.00E-13
Analysis	Count	Average	Standard Deviation	Minimum	Maximum	Median	Air Effluent Limit
Station D							
Gross Alpha (uCi/ml)	69	9.97E-16	7.94E-16	1.41E-16	3.57E-15	6.95E-16	
Gross Beta (uCi/ml)	69	1.39E-14	5.58E-15	3.72E-15	3.45E-14	1.39E-14	
Th-232 (uCi/ml)	69	3.11E-17	2.50E-17	3.37E-18	1.66E-16	2.81E-17	4.00E-15
Th-230 (uCi/ml)	69	1.85E-16	4.70E-16	-1.07E-17	3.02E-15	9.09E-17	2.00E-14
Th-228 (uCi/ml)	69	7.11E-17	6.36E-17	-2.73E-17	3.47E-16	5.65E-17	2.00E-14
U-238 (uCi/ml)	69	3.62E-17	2.62E-17	-6.52E-19	1.36E-16	2.89E-17	6.00E-14
U-235 (uCi/ml)	69	9.04E-18	1.51E-17	-1.13E-17	9.69E-17	6.88E-18	6.00E-14
U-234 (uCi/ml)	69	2.20E-03	1.83E-02	-2.21E-18	1.52E-01	3.54E-17	5.00E-14
Ra-226 (uCi/ml)	69	3.39E-16	2.15E-15	-2.66E-17	1.79E-14	5.53E-17	9.00E-13

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 Volume.

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. Table 2-3 presents a summary of the reported radon concentrations in units of picocuries per liter (pCi/l). Figure 2-5 presents a time-series graph of the radon data. There were no results over the monitoring period (2014-2021) 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 2-3. SUMMARY OF RADON MONITORING RESULTS

Location	Number of Measurements	Average (pCi/l)	Standard Deviation (pCi/l)	Minimum (pCi/l)	Maximum (pCi/l)
Disposal Cell A	31	0.49	0.28	0.19	1.3
Disposal Cell B	31	0.49	0.28	0.19	1.2
Treatment Bldg. North	31	0.33	0.09	0.16	0.59
Treatment Bldg. South	31	0.31	0.09	0.1	0.54
South Air Sampler (B)	31	0.49	0.30	0.19	1.3
North Air Sampler (A)	31	0.56	0.39	0.2	1.5
North Perimeter Fence	30	0.52	0.36	0.16	1.6
East Perimeter Fence	31	0.55	0.32	0.19	1.4
Gate 8	31	0.45	0.21	0.1	0.9
West Perimeter Fence	31	0.50	0.27	0.2	1.2

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 ($\mu\text{rem/hr}$) are summarized in Table 2-4. The last column of each table shows the average net dose rate determined by subtracting the control dosimeter (background) from each location dosimeter. The negative results indicate that the location dosimeters are often less than the

control dosimeter. The control dosimeter is stored in the laboratory building and is likely affected by construction materials to a greater extent than those dosimeters at other locations.

TABLE 2-4. SUMMARY OF AVERAGE ENVIRONMENTAL DOSE RATE

Location	Number of Measurements	Average ($\mu\text{rem/hr}$)	Standard Deviation ($\mu\text{rem/hr}$)	Minimum ($\mu\text{rem/hr}$)	Maximum ($\mu\text{rem/hr}$)	Average Net Dose Rate ($\mu\text{rem/hr}$)
Control	32	45.02	6.25	31.80	57.10	N/A
Admin Bldg.	32	46.90	6.56	40.50	67.00	3.78
Scale	32	42.72	4.99	35.70	52.10	-2.30
West Fence	32	46.62	6.32	37.90	63.90	1.60
Gate 8	32	45.43	5.78	36.10	65.30	0.41
East Fence	32	46.18	5.38	36.40	58.50	1.17
North Fence	32	46.80	5.76	37.60	60.10	1.78
Gate 4	32	45.60	5.70	37.40	58.30	0.58
Lunch Room	32	44.83	5.72	37.20	58.00	-0.38
Laboratory	32	39.99	4.69	31.80	52.30	-4.90
Sample Bay	32	44.44	5.93	35.30	58.60	-0.58
Maintenance	32	44.78	5.04	36.70	56.10	-0.23
Treatment Bldg.	32	41.03	4.31	34.80	54.60	-3.91
Haul Road	32	47.03	6.16	34.20	63.30	2.00
South Air Sampler	32	44.60	5.68	34.10	59.00	-0.42
Disposal Cell	32	44.80	9.37	30.00	77.10	-0.23
North Air Sampler	32	44.31	5.38	34.80	58.30	-0.71

Time-series graphs of environmental dose results are presented in Figures 2-6 through 2-7, grouped by 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 2-5. SUMMARY OF CALCULATED PUBLIC DOSE

Year	Maximum Calculated Dose (mrem/yr)	Dose to Nearest Resident (mrem/yr)
2014	4.59E-05	2.0E-05
2015	5.35E-05	2.3E-05
2016	1.67E-04	8.9E-05
2017	2.97E-05	1.6E-05
2018	3.15E-05	1.7E-05
2019	2.38E-05	1.3E-05
2020	2.72E-04	1.4E-04
2021	4.83E-05	2.6E-05

TABLE 2-6. PUBLIC DOSE DUE TO REGULATED WASTE DISPOSAL*

Calendar Year	Offsite Public Dose (mrem/year)
2014	6.5x10 ⁻⁶
2015	3.0x10 ⁻⁵
2016	1.9x10 ⁻⁵
2017	6.5x10 ⁻⁶
2018	1.8x10 ⁻⁶
2019	1.8x10 ⁻⁶
2020	5.3x10 ⁻⁶
2021	3.6x10 ⁻⁶

**modeled using RESRAD-Offsite, the software that Adams County required*

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 2-7. SUMMARY OF OCCUPATIONAL DOSE

Year	Annual CEDE (mrem)	Maximum DDE (mrem)	Maximum TEDE (mrem)
2014	4.05	0	4.05
2015	4.63	2	6.63
2016	9.87	0	9.87
2017	3.38	1	4.38
2018	5.67	0	5.67
2019	3.67	3	6.67
2020	3.40	2	5.40
2021	0.67	7	7.67

2.5 Site Decommissioning Warranty

The latest Decommissioning (Closure) and Long Term Care (Post Closure) insurance certifications cost basis for the Clean Harbors Deer Trail, LLC facility is shown below.

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

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

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

FIGURE 2-1. AIR MONITORING STATION A – ALPHA EMITTERS

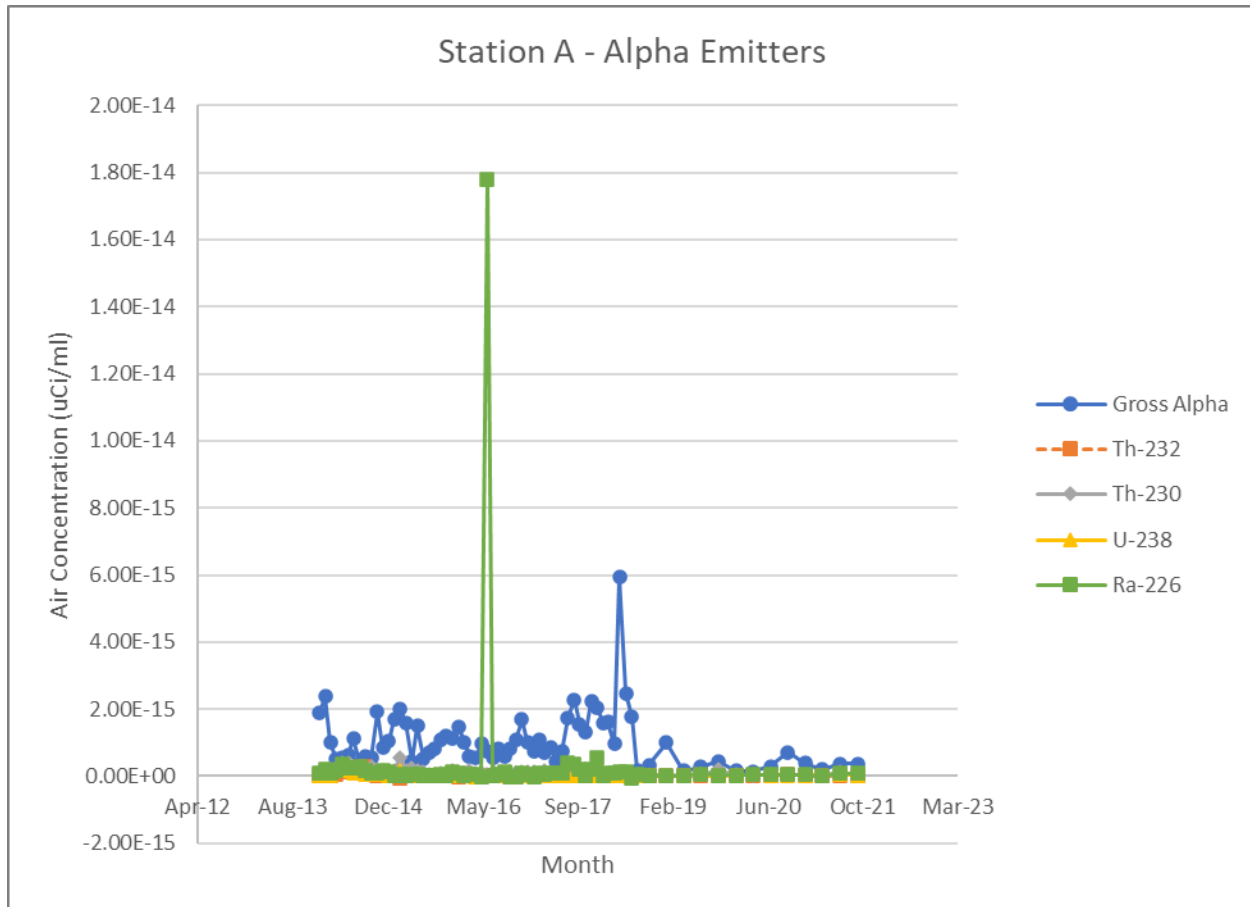
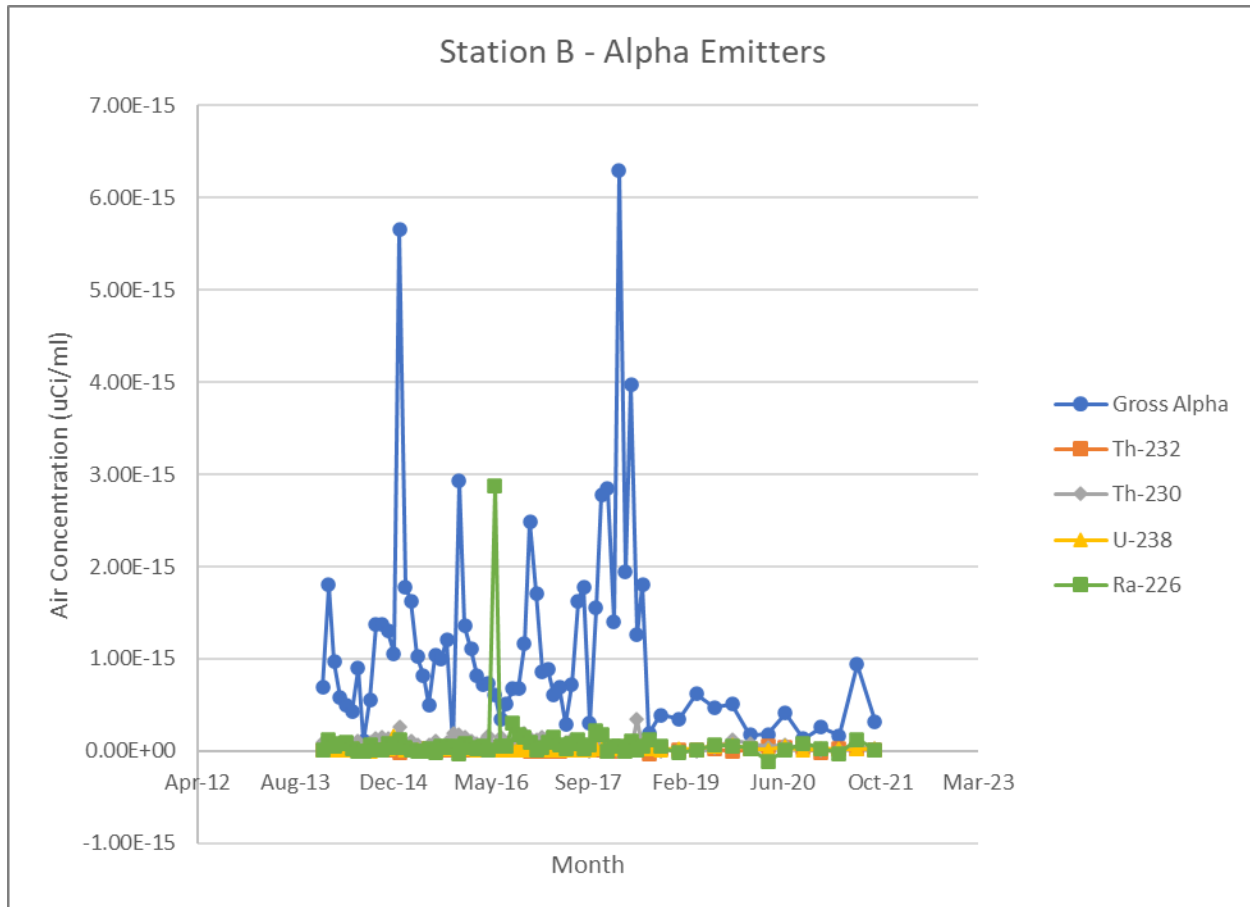


FIGURE 2-2. AIR MONITORING STATION B – ALPHA EMITTERS



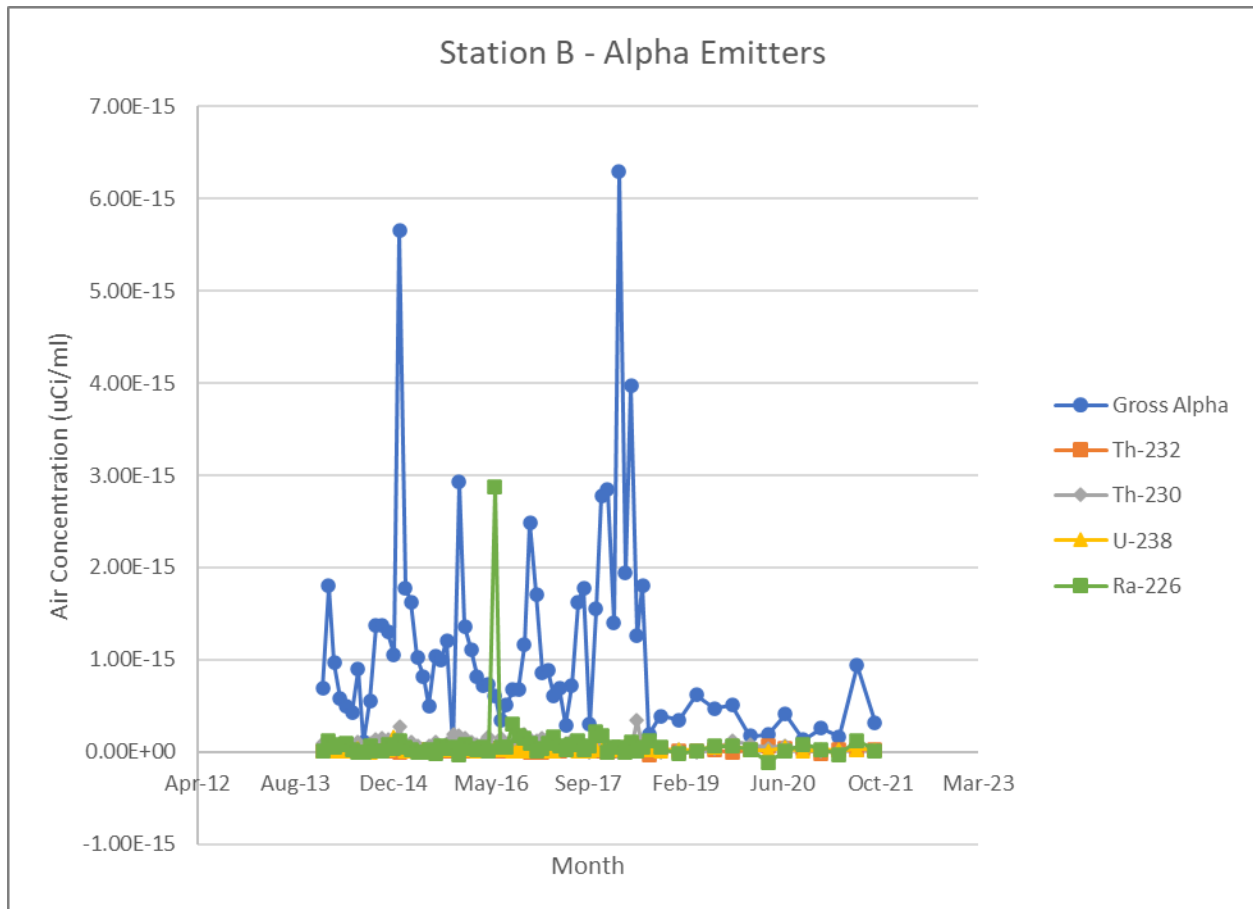


FIGURE 2-3. AIR MONITORING STATION C – ALPHA EMITTERS

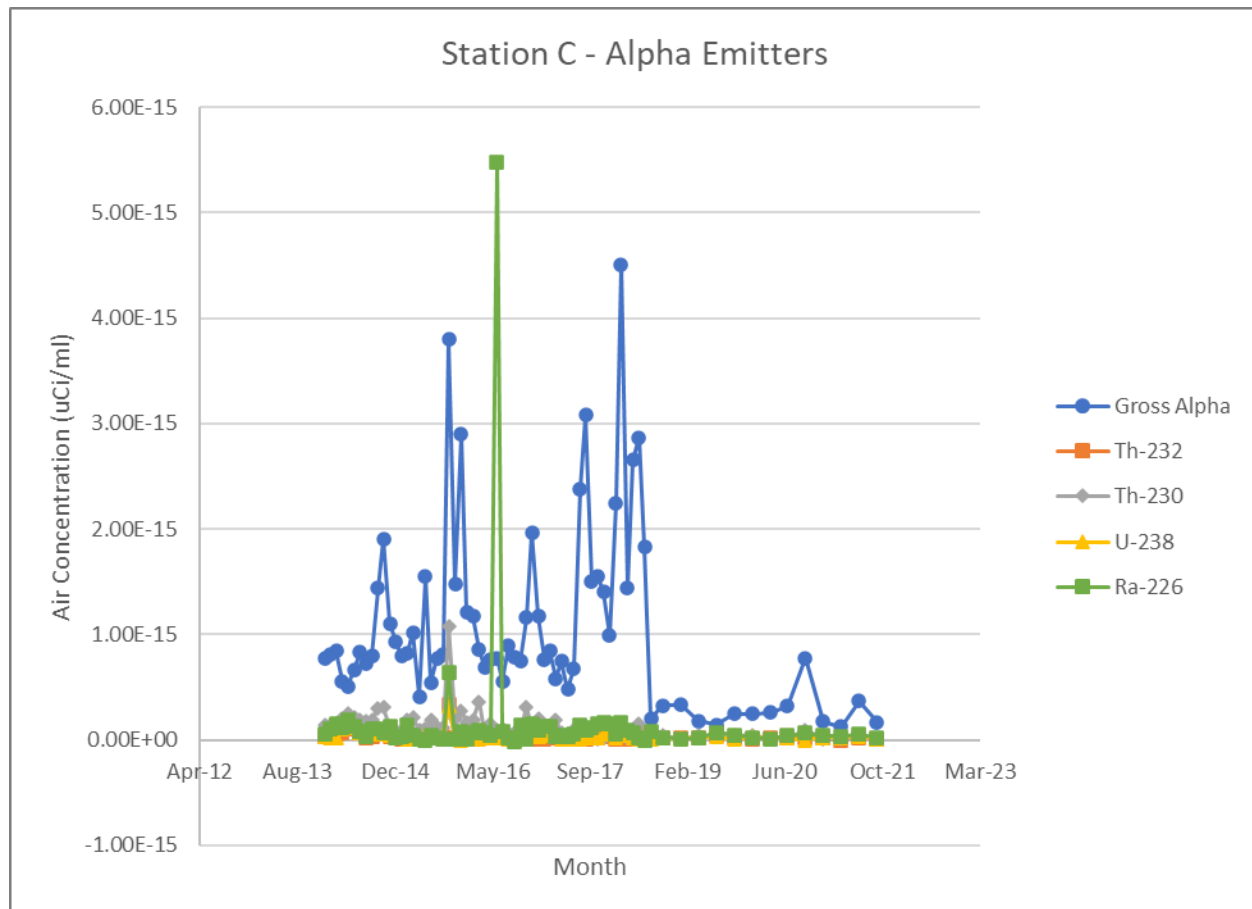


FIGURE 2-4. AIR MONITORING STATION D – ALPHA EMITTERS

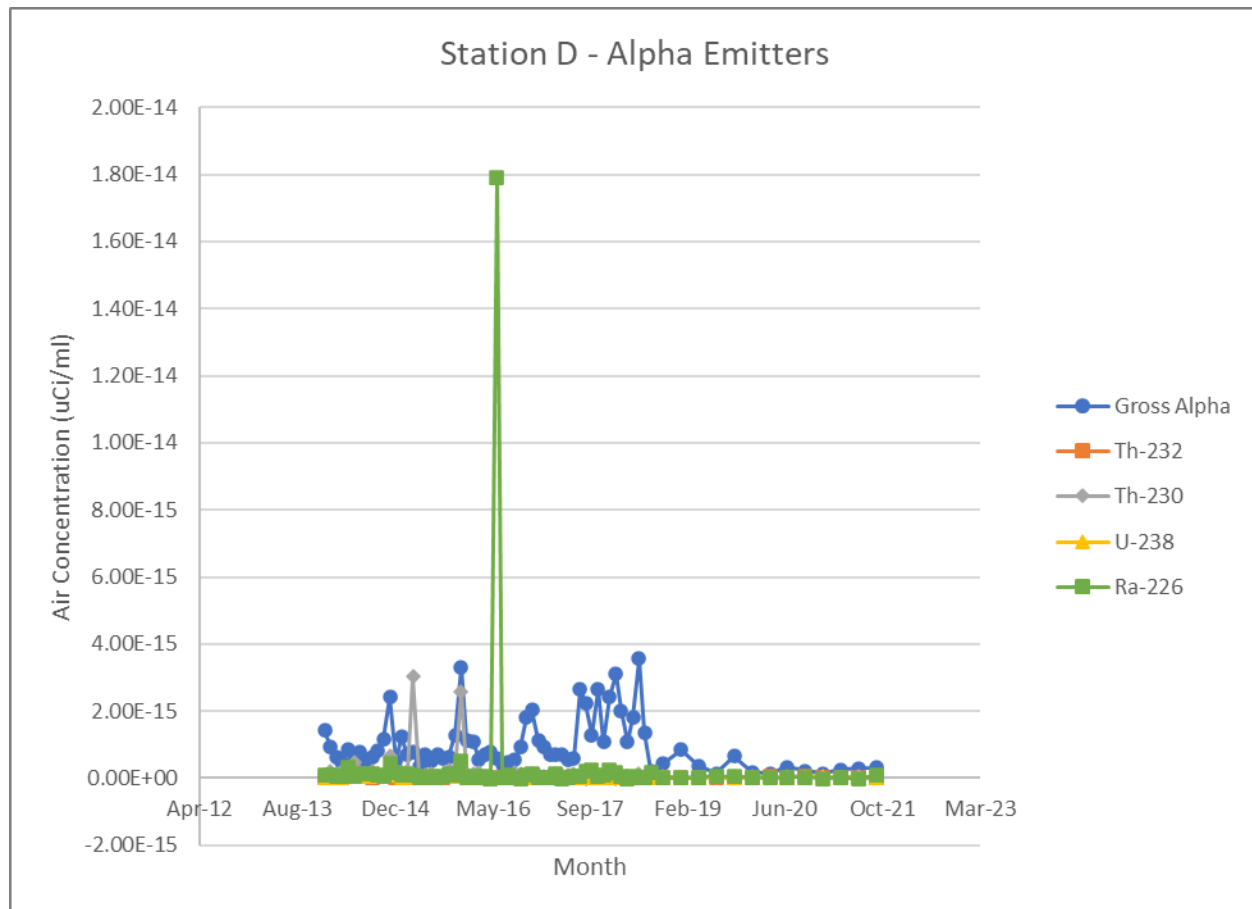


FIGURE 2-5. RADON MONITORING DATA

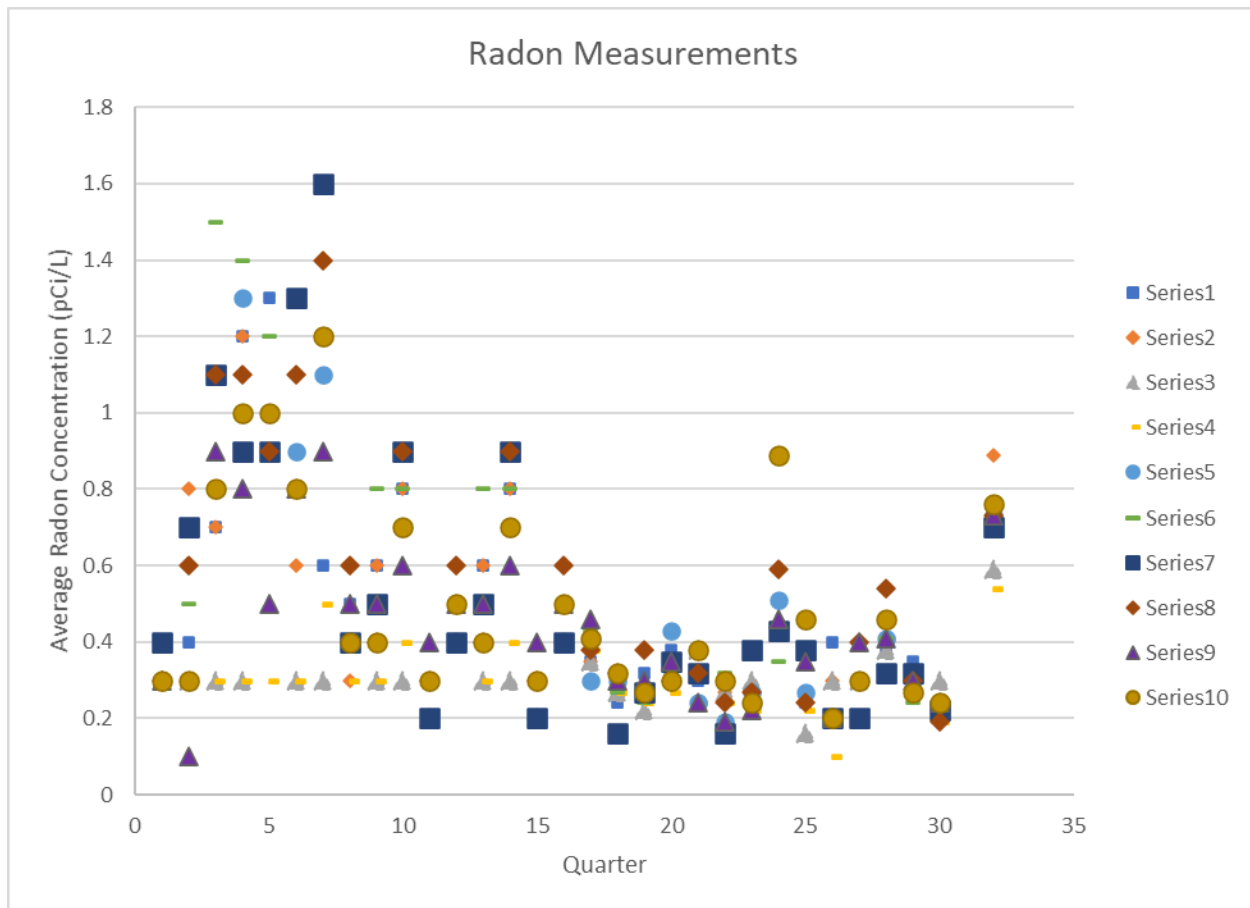


FIGURE 2-6. ENVIRONMENTAL DOSIMETRY DATA – EXTERIOR LOCATIONS

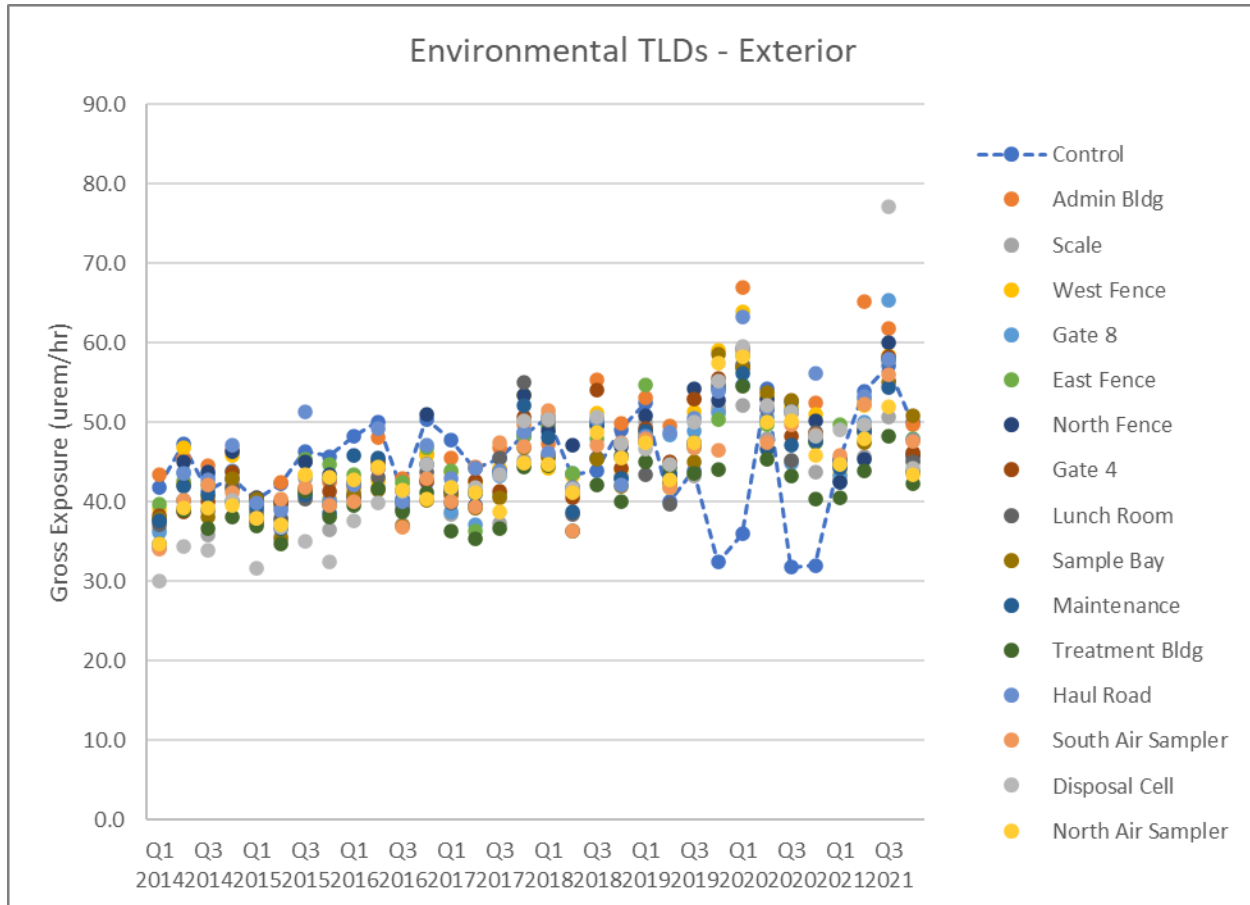
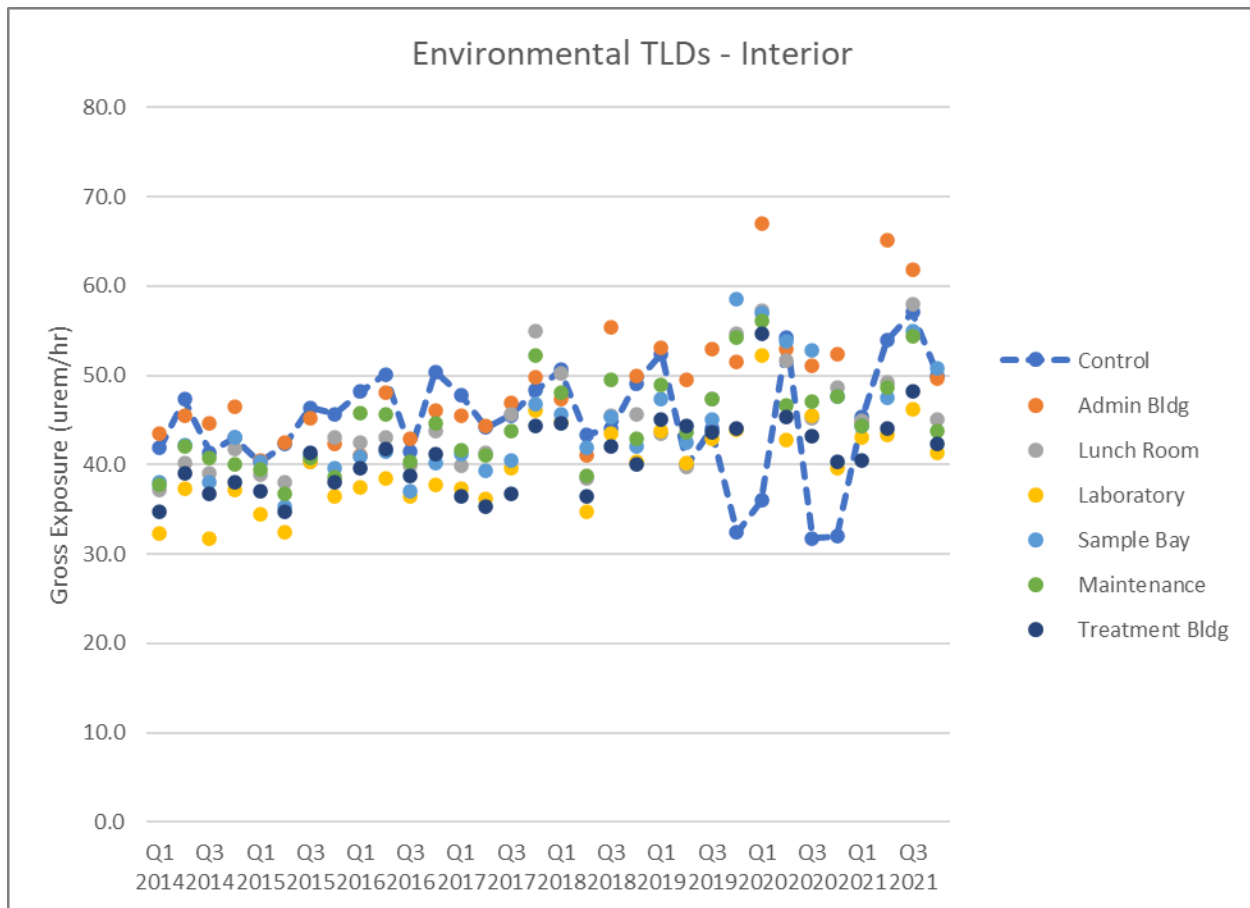


FIGURE 2-7. ENVIRONMENTAL DOSIMETRY DATA – INTERIOR LOCATIONS



3.0 PROPOSED CHANGES TO LICENSE SCOPE

This amendment request harmonizes Radium-226 (Ra-226) and Lead-210 (Pb-210) concentrations in Section 10 (A) (i) and (ii) at 6,000 pCi per gram (Ra-226) and 10,000 pCi per gram (Pb-210).

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 volume as Attachment C.

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

SOP Number	Title	Previously Existed	New Procedure
15.RPP	Radiation Protection Program		
15.RPP.01	Radiation Protection Plan	X	
15.RPP.02	Radiation Safety Training	X	
15.RPP.03	Worker Protection Records	X	
15.RPP.04	Individual and Area Dosimetry	X	
15.RPP.05	Estimating Inhalation Doses	X	
15.RPP.06	Emergency Response	X	
15.RPP.07	ALARA	X	
15.RPP.08	Radiation Work Permits	X	
15.RPP.09	Personal Protective Equipment	X	
15.RPP.10	Determination of Prior Occupational Dose	X	
15.WAC	Waste Acceptance and Analysis		
15.WAC.01	Radioactive Materials Acceptance	X	
15.WAC.02	Waste Tracking	X	
15.WAC.03	Radiation Survey of Materials with Radium Scale	X	
15.WAC.04	Oil and Gas E&P NORM Waste Acceptance	X	
15.OPS	Facility and Field Operations		
15.OPS.01	Landfill Operations	X	
15.OPS.02	Contamination Control during Waste Treatment Activities	X	
15.OPS.03	Operation of Portable Gamma Spectroscopy Unit	X	
15.OPS.04	Operation of Alpha-Beta Smear Counter	X	

SOP Number	Title	Previously Existed	New Procedure
15.OPS.05	Operation of Gate Monitor Detectors	X	
15.OPS.06	Operation of Digital Waste Monitor	X	
15.OPS.07	Operation of Exposure Rate/ Dose Rate Meters	X	
15.OPS.08	Operation of Alpha-Beta Scintillation Detector	X	
15.OPS.09	Operation of GM Pancake Probe	X	
15.OPS.10	Operation of Gamma Scintillation Detectors	X	
15.OPS.11	Routine Contamination Surveys	X	
15.OPS.12	Personnel Contamination Surveys	X	
15.OPS.13	Equipment and Vehicle Release Surveys	X	
15.OPS.14	Spill Surveys	X	
15.OPS.15	Air Monitoring for Radioactive Materials	X	
15.OPS.16	Groundwater Monitoring	X	
15.OPS.17	Volumetric and Material Sampling	X	
15.OPS.18	Decontamination of Surfaces and Equipment	X	
15.OPS.19	Decontamination of Personnel	X	
15.OPS.20	Handling of Liquids	X	
15.OPS.21	Package Receipt Surveys	X	
15.OPS.22	Exposure Rate Acceptance of Potential TENORM	X	

4.2 Additional Procedures

No new procedures are proposed at this time.

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

Basis for Change: NA

4.3.2 15.RPP.02 Radiation Protection Training

Proposed Change: NA

Basis for Change: NA

4.3.3 15.RPP.04 Individual and Area Dosimetry

Proposed Change: NA

Basis for Change: NA

4.3.4 15.RPP.05 Estimating Inhalation Doses

Proposed Change: NA

Basis for Change: NA

4.3.5 15.RPP.06 Emergency Response

Proposed Change: NA

Basis for Change: NA

4.3.6 15.RPP.07 ALARA

Proposed Change: NA

Basis for Change: NA

4.3.7 15.RPP.08 Radiation Work Permits

Proposed Change: NA

Basis for Change: NA

4.3.8 15.RPP.09 Personal Protective Equipment

Proposed Change: NA

Basis for Change: NA

4.3.9 15.RPP.10 Determination of Prior Occupational Dose

Proposed Change: NA

Basis for Change: NA

4.3.10 15.WAC.01 Radioactive Materials Acceptance

Proposed Change: NA

Basis for Change: NA

4.3.11 15.WAC.02 Waste Tracking

Proposed Change: NA

Basis for Change: NA

4.3.12 15.WAC.03 Waste Acceptance of Oil Production Pipe

Proposed Change: Added “other waste” to general acceptance criteria.

Basis for Change: Lower density soils, waters, and other materials conservatively over estimate activity for comparison to acceptance criteria.

4.3.13 15.WAC.04 Oil and Gas E&P NORM Waste Acceptance

Proposed Change:

Basis for Change:

4.3.14 15.OPS.01 Landfill Operations

Proposed Change:

Basis for Change:

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

Proposed Change:

Basis for Change:

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

Proposed Change:

Basis for Change:

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

Proposed Change:

Basis for Change:

4.3.18 15.OPS.05 Operation of Gate Monitor Detectors

Proposed Change:

Basis for Change:

4.3.19 15.OPS.06 Operation of Digital Waste Monitor

Proposed Change:

Basis for Change:

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

Proposed Change:

Basis for Change:

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

Proposed Change:

Basis for Change:

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

Proposed Change:

Basis for Change:

4.3.23 15.OPS.10 Operation of Gamma Scintillation Detectors

Proposed Change:

Basis for Change:

4.3.24 15.OPS.11 Routine Contamination Surveys

Proposed Change:

Basis for Change:

4.3.25 15.OPS.12 Personnel Contamination Surveys

Proposed Change:

Basis for Change:

4.3.26 15.OPS.13 Equipment Surveys

Proposed Change:

Basis for Change:

4.3.27 15.OPS.14 Spill Surveys

Proposed Change:

Basis for Change:

4.3.28 15.OPS.15 Air Monitoring for Radioactive Materials

Proposed Change:

Basis for Change:

4.3.29 15.OPS.16 Groundwater Monitoring

Proposed Change:

Basis for Change:

4.3.30 15.OPS.17 Volumetric and Material Handling

Proposed Change:

Basis for Change:

4.3.31 15.OPS.18 Decontamination of Surfaces and Equipment

Proposed Change:

Basis for Change:

4.3.32 15.OPS.19 Decontamination of Personnel

Proposed Change:

Basis for Change:

4.3.33 15.OPS.20 Handling of Liquids

Proposed Change:

Basis for Change:

4.3.34 15.OPS.21 Package Receipt Surveys

Proposed Change:

Basis for Change:

4.3.35 15.OPS.22 Exposure Rate Acceptance of Potential TENORM

Proposed Change:

Basis for Change:

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 volume or other components of this renewal application 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

Much information in this application refers to documents in the previous License application and RFIs which are included with this renewal for convenience.

RH 3.8.8 Environmental Impact Assessment

The detailed site description and environmental impact assessment was part of the original License. Updated environmental impact is assessed yearly in the annual reports submitted to CDPHE and included in this application in Attachment K. 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 more than three years' experience in conducting radioactive materials disposal operations. 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 L.

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 application which is included in this application for convenience. CHDT procedures have been updated to incorporate improvements and experience and they have been reorganized. Additional procedures are presented with this application to improve the radiation protection program. Radiation detection instrumentation is listed in Attachment K. CHDT believes that its 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 L.

RH 3.9.11 Contingency Plans

CHDT has a contingency plan in the RCRA permit which is included in this application. 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)).

5.1.3 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.

5.1.4 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 L

.

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 state 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 state in Section 4.2 of the Radiation Protection Plan.

5.2.3 RH 4.9 Determination of Internal Exposure

CHDT's policy in compliance with this requirement is state 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 revision 0.

5.2.5 RH 4.11 Planned Special Exposures

CHDT's policy in compliance with this requirement is stated in 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 in compliance with this requirement is stated in 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 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 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 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.009 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. CHDT has not regulated sources of radioactive material at the time of License submittal,

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 for 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-I 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 section 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.

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 RML application (Volume 2).

RH 14.6.3

A description of:

The location of proposed disposal site: The required information is presented in Section 1 of the original RML application (Volume 2).

The general character of the proposed activities: The required information is presented in Section 1 of the original RML application (Volume 2).

The types and quantities of waste to be received, possessed, and disposal of: The required information is presented in Section 4 of the original RML application (Volume 2).

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 RML application (Volume 2).

The proposed facilities and equipment: The required information is presented in Section 4 of the original RML application (Volume 2).

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.

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 RML application (Volume 2).

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 RML application (Volume 2).

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 RML application (Volume 2).

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 RML application (Volume 2).

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 RML application (Volume 2).

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 RML application (Volume 2).

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 RML application (Volume 2).

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 RML application (Volume 2).

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 RML application (Volume 2).

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 RML application (Volume 2).

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 RML application (Volume 2). The updated radiation protection program is presented in this Volume 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 RML application (Volume 2). Environmental monitoring data collected during operations under License 1102-1 is summarized in Section 2.2 of this Volume.

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 RML application (Volume 2).

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.

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 RML application (Volume 2).

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 RML application (Volume 2).

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 RML application (Volume 2).

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 RML application (Volume 2).

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 (Volume 2).

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 (Volume 2).

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 (Volume 2). The current Financial Assurance Warranty can be found in Attachment L.

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 RML application (Volume 2).

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 RML application (Volume 2).

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 RML application (Volume 2). The updated radiation protection program is presented in this Volume as Attachment C.

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 RML application (Volume 2).

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 (Volume 2).

5.5.2 RH 14.24 – Disposal Site Design for Land Disposal

The required information is presented in Section 3 of the original RML application (Volume 2).

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 RML application (Volume 2).

5.5.4 RH 14.26 – Environmental Monitoring

The required information is presented in Section 4 of the original RML application (Volume 2). Environmental monitoring data collected during operations under License 1102-1 is summarized in Section 2.2 of this Volume.

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 (Volume 2).

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 four 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 RML application (Volume 2).

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 (Volume 2).

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 (Volume 2).

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 Volume, and is included in the radiation protection program SOPs provided in Attachment C of this Volume. The Annual Reports submitted to the Department under the operations of License 1102-1 are presented as Attachment L of this Volume.

5.5.12 RH 14.34 – Tests on Land Disposal Facilities

Not applicable.

5.5.13 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 120,000 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

6 CCR 1007-1. Current Version.

8.0 ATTACHMENT A – FORM OR-RH-12

9.0 ATTACHMENT B – CELL 3 APPROVAL DOCUMENTATION

10.0 ATTACHMENT C - REVISED CHDT RADIATION PROTECTION PLAN AND PROCEDURES

11.0 ATTACHMENT D – TECHNICAL BASIS DOCUMENT FOR PIPE SCALE WASTE ACCEPTANCE

12.0 ATTACHMENT E - TECHNICAL BASIS DOCUMENT FOR GROUNDWATER SAMPLING MODIFICATIONS

13.0 ATTACHMENT F – TECHNICAL BASIS DOCUMENT FOR ALTERNATE ANALYSIS TECHNIQUE

14.0 ATTACHMENT G – TECHNICAL BASIS FOR EXPOSURE-BASED ACCEPTANCE CRITERIA

15.0 ATTACHMENT H – STAFFING AND KEY PERSONNEL

16.0 ATTACHMENT I - RADIATION DETECTION INSTRUMENTS

17.0 ATTACHMENT J – FINANCIAL ASSURANCE WARRANTY

18.0 ATTACHMENT K – CORPORATE ENVIRONMENTAL HEALTH AND SAFETY COMMITMENT

19.0 ATTACHMENT L – CHDT ANNUAL REPORT FOR

20.0 ATTACHMENT L – CHDT ANNUAL REPORT FOR

21.0 ATTACHMENT L – CHDT ANNUAL REPORT FOR

22.0 ATTACHMENT L – CHDT ANNUAL REPORT FOR