

Decision Analysis for the Renewal of  
The Clean Harbors Deer Trail Facility  
Radioactive Materials License  
(#1102-01)

By the  
Colorado Department of Public Health and Environment

December 10, 2010

## **Executive Summary**

The Colorado Department of Public Health and Environment has determined that Clean Harbors is qualified by reason of training, experience, equipment, and resources to have Radioactive Materials License 1102-01 renewed for the disposal of wastes containing or contaminated with limited concentrations of naturally occurring radioactive materials. This decision analysis outlines the basis for this determination.

### **Background**

Clean Harbors Deer Trail, LLC (commonly referred to as the Deer Trail Facility) is an existing hazardous waste management facility that provides treatment, storage, and disposal services for a variety of hazardous and non-hazardous wastes from a variety of industries. The facility was first permitted for hazardous wastes by the Colorado Department of Public Health and Environment (the Department) under the authority of the Colorado Hazardous Waste Act (CHWA) in April 1987 and began accepting waste in July 1991. Additionally, the facility has been issued Radioactive Materials License 1102-01 in December 2005 to accept limited concentrations of naturally occurring radioactive materials (NORM) and technologically enhanced naturally occurring radioactive materials (TENORM). The facility began accepting NORM and TENORM waste in January 2007.

### **Location**

The Deer Trail facility is on the north side of Highway 36, approximately 70 miles east of Denver, in Adams County, Colorado. Clean Harbors owns approximately 5,760 acres, of which approximately 325 acres comprise the operating Deer Trail facility. The site is situated in the southeast corner of Adams County, and borders Washington County on the east and Arapahoe County on the south (see attachment 1).

The hazardous waste site was selected in the early 1980's through an extensive technical process that utilized data from statewide studies conducted by the Colorado Geological Survey and others. This portion of the eastern plains of Colorado was considered a prime location for disposal of hazardous or radioactive materials due to the climate, geology and remoteness.

### **License Decision**

The Clean Harbors license authorizes disposal of wastes containing or contaminated with naturally occurring radionuclides with a maximum concentration of 2000 pCi/g. In addition, the specific radium-226 maximum concentration is limited to 222 pCi/g. The license also prohibits the acceptance of waste that is greater than 0.05% by weight uranium and/or thorium.

The license regulates the acceptance and operational aspects of all radioactive materials received at the site. License conditions (LCs) are established to address specific authorizations

and conditions for operations, closure and post-closure. Additionally, all wastes received at the site must comply with the CHWA permit conditions for analysis, treatment and disposal.

The Radioactive Materials License is based on the license renewal application dated May 31, 2010 and supporting documents which includes all the information submitted during the original license application. The Department has also specifically requested additional information related to the application, and Clean Harbor's responses to these requests have been used in this license decision.

### **Public Process**

A public meeting was held by Clean Harbors on October 21, 2010 at Woodlin School in Washington County. Clean Harbors summarized the materials which have been accepted through October 2010 and detailed the changes which are requested in the license renewal. No questions were raised by the members of the public who attended the public meeting.

### **Regulatory Context**

The Department regulates radioactive materials under the *Radiation Control Act*, [25 CRS 11], and the *Colorado Rules and Regulations Pertaining to Radiation Control* [6CCR 1007-1]. Colorado is an Agreement State, and as such its radiation program is modeled after, but goes beyond, the scope of the U.S. Nuclear Regulatory Commission program, which does not regulate NORM or TENORM. Colorado has broad authority over all forms of radioactivity, including NORM and TENORM, and this authority is not limited to waste disposal or management, but includes possession and use of radioactive materials.

The statutes allow the Department the discretion to regulate NORM and TENORM materials as either radioactive materials or solid waste. [CRS 25-11-201(1)(c)] The Department has historically made the disposal decisions for NORM and TENORM materials on a case-by-case basis considering the characteristics and volume of the materials and the design, siting and operating parameters of the disposal site. This assessment is usually included in a risk assessment for the activity. Clean Harbors has performed a risk assessment for the receipt of NORM, TENORM and Denver Radium Streets materials at the Deer Trail facility.

Nationally, the Low-Level Radioactive Waste Policy Act established a mechanism for states to join together into regional compacts and create regional disposal sites for their low-level radioactive wastes (LLRW), and prevent LLRW from being imported from states outside their compact. Colorado became part of the Rocky Mountain Low-Level Radioactive Waste Compact (RM Compact) with Nevada and New Mexico in 1983. The enabling statute for the RM Compact was unique in the inclusion of "wastes from mining, milling, smelting or similar processing of ores and mineral-bearing material" for radium. This allowed the NORM and TENORM materials included in the Denver Radium Superfund Sites to be considered low-level waste under the RM Compact rules, and to be subject to their jurisdiction. Thus, RM Compact

approval is required for export of the waste for disposal outside of the compact states and RM Compact designation as a regional facility is required for a disposal site within the Compact states. As required by the Compact rules, Colorado requested and received designation of the Deer Trail facility for radium processing residues in June 2005.

The management and disposal of hazardous wastes is regulated in Colorado under the Colorado Hazardous Waste Act (CHWA), which implements the federal Resource Conservation and Recovery Act (RCRA). The Deer Trail facility has a permit under CHWA for management and disposal of hazardous wastes. Clean Harbors requested the ability to accept limited NORM and TENORM materials at the Deer Trail facility under their CHWA permit. Historically, the Department has allowed NORM and TENORM materials to be disposed as solid waste at solid waste facilities on a case-by-case basis. However, the inclusion of Denver Radium waste triggered the requirement for RM Compact approval and a radioactive materials license.

As part of the original review of the radioactive materials license application, the Department reviewed modifications to the CHWA hazardous waste permit to allow acceptance of NORM and TENORM materials. In addition, Clean Harbors has agreed to implement operating procedures that do not distinguish the regulatory status of any given material. For example, all material will be tracked and documented throughout the facility in the same way, regardless of whether it is hazardous waste, radioactive waste or a mixture of both.

The Department reviewed the CHWA siting, design and operating criteria for the facility and additional information developed by Clean Harbors to meet Radiation Control Act requirements. Potential conflicts between the hazardous waste and radiation regulations were addressed through license authorizations, operating procedure modifications or explicit exemptions.

### **Adequacy of the License Application in Addressing the Requirements of the Colorado Regulations**

There are two primary sections of the Regulations that must be met for the Department to issue a specific license to authorize the disposal of radioactive material: Parts 3 and 14. The Clean Harbors radioactive materials license renewal application has been evaluated against the requirements in Parts 3 and 14. In most cases, Clean Harbors has provided operating procedures and other supporting documents to establish a radiation protection program capable of operating in compliance with health and safety related requirements of the Regulations for the limited authorizations granted in Item 10 of the license. In some cases, the Department has granted a specific exemption to a requirement where it is allowed by the regulations when Clean Harbors has demonstrated equivalent protection. These exemptions are summarized below and are discussed in section VIII of the decision analysis.

**Table of Exemptions Granted**

Regulatory Requirement	Citation	Exemption Made to Allow...	Exemption Authorized By...
Only wastes containing radioactive materials will be disposed at the site	14.25.1.11	Co-mingling of hazardous and radioactive wastes	14.27
Design, operation and closure of the facility shall ensure protection of any individual inadvertently intruding into the disposal site after institutional controls are removed	14.20	The cap design was not changed to accommodate the intruder scenario	1.5.1
Financial assurance must be in a form described in 3.9.5.4	3.9	Insurance to be used as the method of financial assurance	1.5.1
Land on which the facility is sited must be owned by the Federal or State Government	14.28.1	Clean Harbors to own the land	1.5.1, Part 11

**Proposed Changes Not Accepted**

There were two proposed changes to the License not approved by the Department. The first were changes to the Groundwater Protection Plan. The second was the approval for accepting pipe scale waste as an approved waste stream. The rejection of these changes is discussed in Part X of the decision analysis.

**Changes to the Radioactive Materials License**

Several changes were made to the License during the renewal process. Most of these changes are ancillary in nature and will not affect the operations of the Deer Trail Facility. No changes were made to the types of waste allowed to be disposed. These changes are discussed in Part XI of the decision analysis.

## Glossary

“CHWA” means Colorado Hazardous Waste Act

“The Department” means The Colorado Department of Public Health and Environment.

“mR” means millirem and is a unit of absorbed radiation dose. Rem is the special unit of any of the quantities expressed as dose equivalent. The dose equivalent in rem is equal to the absorbed dose in rad multiplied by the quality factor. The rad is also a unit of absorbed dose. One rad is equal to an absorbed dose of 100 ergs per gram. One millirem (mR) =  $1 \times 10^{-3}$  Rem (R).

"Naturally occurring radioactive material" (NORM) means any nuclide that is radioactive in its natural physical state and is not manufactured. "Naturally occurring radioactive material" does not include source material, special nuclear material, or by-products of fossil fuel combustion, including but not limited to bottom ash, fly ash, and flue-gas emission by-products.

“pCi” means picoCurie and is a unit of quantity of radioactivity. One Curie (Ci) is that quantity of radioactive material which decays at the rate of  $3.7 \times 10^{10}$  transformations a second. One picoCurie (pCi) =  $1 \times 10^{-12}$  Curie (Ci).

“The Regulations” means the Colorado *Rules and Regulations Pertaining to Radiation Control* [6CCR 1007-1].

"Source material" means material, in any physical or chemical form, including ores, that contain by weight one-twentieth of 1 percent (0.05 percent) or more of uranium, thorium or any combination thereof. Source material does not include special nuclear material.

"Special nuclear material" means: (1) Plutonium, uranium-233, uranium enriched in the isotope 233 or in the isotope 235, and any other material that the U.S. Nuclear Regulatory Commission, pursuant to the provisions of Section 51 of the Atomic Energy Act of 1954, as amended, determines to be special nuclear material, but does not include source material; or (2) Any material artificially enriched by any of the foregoing but does not include source material.

"Technologically enhanced naturally occurring radioactive material" (TENORM) means naturally occurring radioactive material whose radionuclide concentrations are increased by or as a result of past or present human practices. TENORM does not include: (a) Background radiation or the natural radioactivity of rocks or soils; (b) "Byproduct material" or "source material," as defined by Colorado statute or rule; or (c) Enriched or depleted uranium as defined by Colorado or federal statute or rule.

“UMTRA” means Uranium Mill Tailings Radiation Control Act

## **I. Background**

Clean Harbors Deer Trail, LLC (commonly referred to as the Deer Trail Facility) is an existing hazardous waste management facility that provides treatment, storage, and disposal services for a variety of hazardous and non-hazardous wastes from a variety of industries. The facility was first permitted for hazardous wastes by the Colorado Department of Public Health and Environment (the Department) under the authority of the Colorado Hazardous Waste Act (CHWA) in April 1987 and began accepting waste in July 1991. Additionally, the facility has been issued Radioactive Materials License 1102-01 in December 2005 to accept limited concentrations of naturally occurring radioactive materials (NORM) and technologically enhanced naturally occurring radioactive materials (TENORM). The facility began accepting NORM and TENORM waste in January 2007.

As a land disposal site, it has been specifically designed to accept and dispose of hazardous waste in a manner that will protect the environment and prevent exposure to people who may live near the site now and in the future. Waste is analyzed at the on-site laboratory before and after acceptance to determine the type and level of treatment needed before burial in the disposal cells. Samples of incoming waste are also periodically tested to ensure the radioactive waste stream continues to meet the requirements set forth in Item 10 of the license.

The facility's CHWA permit requires ground water monitoring and management and treatment of storm water, and establishes protocols for discontinuing disposal of waste at certain wind speeds to minimize any contamination moving off the site. In addition, other permit and operating requirements are in place to protect workers and comply with all state and federal regulations.

Clean Harbors submitted an application dated January 31, 2005 for a radioactive materials license to receive NORM and TENORM materials that are defined as low-level radioactive waste from a regulatory perspective, but have similar physical, chemical and radiological properties as NORM and TENORM. This included such materials as the waste materials, primarily soils and street rubble, being removed from certain streets in Denver that are part of the Denver Radium Superfund Site and possibly NORM or TENORM materials from licensed facilities such as filters from drinking water treatment plants. The renewal application dated May 31, 2010 did not request any changes to the types of waste acceptable for disposal at the facility.

## **II. Purpose of the Decision Analysis**

The decision analysis accompanies the issuance of a license and provides a written analysis of the basis of the decision. The decision analysis serves to:

1. summarize the Department's evaluation of the applicant's qualifications to use the radioactive material for the purpose requested in a manner that minimizes danger to public health and safety and property;
2. document that the application has been thoroughly reviewed by the Department;
3. identify requirements for regulations addressed in the proposed license conditions; and,
4. present notice to members of the public on the final decision made by the Department.

### **III. Location and Setting**

The Deer Trail facility is on the north side of Highway 36, approximately 70 miles east of Denver, in Adams County, Colorado. Clean Harbors owns approximately 5,760 acres, of which approximately 325 acres comprise the operating Deer Trail facility. The site is situated in the southeast corner of Adams County, and borders Washington County on the east and Arapahoe County on the south (see attachment 1).

The hazardous waste site was selected in the early 1980's through an extensive technical process that utilized data from statewide studies conducted by the Colorado Geological Survey and others. This portion of the eastern plains of Colorado was considered a prime location for disposal of hazardous or radioactive materials due to the climate, geology and remoteness. Extensive documentation from these studies was used in the selection of the hazardous waste site using criteria originally developed by the Nuclear Regulatory Commission (NRC) for siting low-level radioactive waste sites. An involved and controversial public process accompanied the site selection and original hazardous waste permitting process. The location criteria important to radioactive material licensing for this site were also scrutinized during the initial hazardous permitting process. (Clean Harbors, Radioactive Materials License Renewal Application, Volume 2, May 31, 2010)

#### **Site Geology and Hydrology**

The site is relatively flat and located on a topographic rise within an area characterized by broadly rolling topography. The site is situated on the Pierre Shale Formation, which is estimated to be 4,300 feet thick in the facility vicinity. The Pierre shale is a gray to black, silty, fossiliferous, marine shale of Cretaceous age, which acts as an aquaclude (impermeable to groundwater) and has minimal groundwater flow. Elevations at the site range from 4,800 feet to 4,910 feet above mean sea level. The climate of the eastern plains is semi-arid, characterized by cold winters, hot summer days and cool nights, abundant sunshine, and low but variable precipitation. The facility is drained by a tributary to Beaver Creek to the east and Wetzel Creek to the west. Beaver and Wetzel Creeks, which are ephemeral in nature, are composed of highly erodable clay-loam soils. Several surrounding landowners live on their properties and are able to obtain limited, poor quality groundwater from near-surface and

alluvial aquifers, and water for agricultural use from collected surface water. (Clean Harbors, Radioactive Materials License Application, Section 2, May 31, 2010)

### **Land Use**

The Deer Trail facility is on former non-irrigated farmland. The surrounding property is used for unirrigated production of dry land wheat, sunflowers, and grasslands for grazing cattle. There are no residential areas, industrial areas, schools, colleges, hospitals, convalescent homes, or day care centers within a 1-mile radius of the operational portion of the facility. The site is located approximately 7 miles west of the community of Last Chance (population 15), and is approximately 27 miles east of Byers, 60 miles north of Limon, and 60 miles south of Fort Morgan. The nearest occupied residence is approximately 0.5 miles east of the southeast corner of the property boundary. (Clean Harbors, Radioactive Materials License Application, Section 2, May 31, 2010)

### **Operations**

The facility has operated as a RCRA Subtitle C hazardous waste treatment and disposal facility since 1991 and plans to continue in that capacity. The facility has a total estimated capacity for approximately 2.74 million cubic yards of materials to be disposed in seven discrete cells. Cell one and two are closed with no radioactive materials disposed into either cell. Cell three is the current active cell has approximately 307,000 cubic yards of capacity left. All radioactive waste received at the facility at this point has been disposed in cell three.

## **IV. License Decision**

The Department has determined that Clean Harbors is qualified by reason of training, experience, equipment and resources to be issued a radioactive materials license that will allow disposal of wastes containing or contaminated with naturally occurring radionuclides with a maximum concentration of 2000 pCi/g. In addition, the specific radium-226 maximum concentration is limited to 222 pCi/g. The license prohibits the acceptance of waste that is greater than 0.05% by weight uranium and/or thorium.

The majority of proposed changes to the Radioactive Materials License are based on changes to the Clean Harbors Deer Trail Standard Operating Procedures. No additional waste streams were approved during the license renewal process (see Part X of this document in regards to the proposed Pipe Scale waste stream outlined in proposed SOP 15.WAC.03). See section XII for more details to the changes to the Standard Operating Procedures.

The license regulates the acceptance and operational aspects of all radioactive materials received at the site. Additionally, all wastes received at the site must comply with the CHWA permit conditions for analysis, treatment and disposal. License conditions (LCs) are established to address specific authorizations and conditions for operations, closure and post-closure:

### **Authorizations**

- Clean Harbors is authorized to receive, possess, analyze, store, process, and dispose of waste materials containing naturally occurring radioactive material (NORM) and technologically enhanced naturally occurring radioactive material (TENORM). The specific radionuclides are limited to K-40 and all the radionuclides in the decay series for U-238, U-235 and Th-232. The summed activity of all radionuclides per gram contained in such waste materials shall not exceed 2000 pCi (74 Bq). Additionally, the Ra-226 activity per gram shall not exceed 222 pCi (8.214 Bq). The physical form of the material includes but is not limited to soils, sludges, process residues, resins, and filters that are compatible with the design and operational criteria outlined in the CHWA permit. (LC 10.A)
- In addition to the limits established in LC 10.A the total uranium and thorium content shall be less than 0.05% by weight (500 µg per gram) of the materials received for disposal. (LC 10.B)
- In addition to the limits established in LC 10.A and 10.B, the licensee shall limit the total of all waste materials containing radioactive material to a total volume not to exceed 480,240 cubic yards. This authorization includes the volume of the current waste disposal cell (Cell 3). As the facility expands past Cell 3, the license will require an amendment to allow for more volume.

### **Operations**

- The proposed radioactive materials are physically similar to wastes already being accepted by the facility, and are constrained in the types and amounts of radioactivity to be accepted. Existing facilities and practices will be utilized along with enhanced training, equipment, and procedures to address radiological hazards.
- Clean Harbors is required to maintain the Department-approved Radiation Protection Plan and the associated Standard Operating Procedures. The elements of the radiation protection plan are designed to protect workers, the public and the environment from undue radiation exposure. Clean Harbors is required to perform monitoring and maintain records as required by the Regulations.

### **Closure**

- Design of the landfill caps meet current RCRA requirements to prevent infiltration of water and to minimize erosion. A final cap will be constructed over the RCRA caps at closure to meet radon emission standards if necessary.

### Sources of Information

- The original radioactive materials license is based on the license application dated January 31, 2005 and supporting documents.
- The renewal of the radioactive materials license is based on the license application dated May 31, 2010 and supporting documents.
- The Department has also specifically requested additional information related to the application, as follows, and Clean Harbor's responses to these requests have been used in this license decision:
  - 11/24/10 letter re: Request for Information dated September 22, 2010
  - 12/03/10 e-mail re: changes to Radioactive Materials Acceptance SOP (15.WAC.01)

### V. Public Process

A public meeting was held by Clean Harbors on October 21, 2010 at Woodlin School in Washington County. During the public meeting, Clean Harbors summarized the RCRA Subtitle C permit renewal and the Radioactive Materials License Renewal. The summary for the Radioactive Materials License Renewal included the amount of waste disposed at the Deer Trail facility through 2009 and the estimated total for 2010; a summary of the environmental monitoring from 2006 – 2009; the requested changes for the scope of the license (none); a summary of the modifications and additions to the Clean Harbors standard operating procedures; and proposed changes to the groundwater monitoring program.

Of those who attended the public meeting, no questions were raised by the members of the public in regards to the Radioactive Materials License Renewal.

### VI. Regulatory Context

The Department regulates radioactive materials under the *Radiation Control Act*, [25 CRS 11], and the *Colorado Rules and Regulations Pertaining to Radiation Control* [6CCR 1007-1]. Colorado is an Agreement State, and as such its radiation program is modeled after, but goes beyond, the scope of the U.S. Nuclear Regulatory Commission program, which does not regulate NORM or TENORM. The EPA has federal jurisdiction over TENORM, but has chosen to not promulgate specific regulations yet for these wastes. Colorado has broad authority over all forms of radioactivity, including NORM and TENORM, and this authority is not limited to waste disposal or management, but includes possession and use of radioactive materials.

Colorado determines the degree of regulation for radioactive materials based on the degree of health or environmental risk. The authority is found in the *Radiation Control Act*, CRS 25-11-101 et seq. The Act is divided into three parts. TENORM is addressed in Part 1; yet the definition of TENORM is actually found in a subsection of Part 2, which mostly addresses high

level waste and regulation of direct disposal at uranium mills. But for the location of the definition, TENORM is regulated under Part 1 of the Act.

The statutes allow the Department the discretion to regulate NORM and TENORM materials as either radioactive materials or solid waste. [CRS 25-11-201(1)(c)] The Department has historically made the disposal decisions for NORM and TENORM materials on a case-by-case basis considering the characteristics and volume of the materials and the design, siting and operating parameters of the disposal site. This assessment is usually included in a risk assessment for the activity. Clean Harbors has performed a risk assessment for the receipt of NORM, TENORM and Denver Radium Streets materials at the Deer Trail facility.

### **Rocky Mountain Low-Level Radioactive Waste Compact**

Nationally, the Low-Level Radioactive Waste Policy Act established a mechanism for states to join together into regional compacts and create regional disposal sites for their low-level radioactive wastes (LLRW), and prevent LLRW from being imported from states outside their compact. Colorado became part of the Rocky Mountain Low-Level Radioactive Waste Compact (RM Compact) with Nevada and New Mexico in 1983. The enabling statute for the RM Compact was unique in the inclusion of “wastes from mining, milling, smelting or similar processing of ores and mineral-bearing material” for radium. This resulted in the radium processing materials at the Denver Radium Superfund Sites to be considered low-level waste under the RM Compact rules, and to be subject to their jurisdiction. Thus, RM Compact approval is required for export of the waste for disposal outside of the compact states and RM Compact designation as a regional facility is required for a disposal site within the Compact states.

As required by the Compact rules, Colorado requested designation of the Deer Trail facility for radium processing residues. On June 8, 2005, the RM Compact Board approved limited designation of the Clean Harbors Deer Trail facility as a regional disposal site for radium processing wastes, contingent on receiving a Radioactive Materials License from the Department. This designation allows radium-processing wastes from the RM Compact states to be disposed at the Clean Harbors Deer Trail facility, and requires RM Compact Board approval for radium processing waste from the RM Compact states to be sent to any other facility. The only radium processing waste identified at this time is from the Denver Radium Superfund site. The RM Compact Board also agreed that existing contracts for disposal of Denver Radium wastes could continue to be honored, which allows current contracts for Denver Radium Streets materials and for Shattuck materials to be honored. Denver Radium Superfund waste was last received in 2007 and the City and County of Denver Radioactive Materials License for this waste was terminated in February, 2008.

### **Colorado Hazardous Waste Act**

The management and disposal of hazardous wastes is regulated in Colorado under the Colorado Hazardous Waste Act (CHWA), which implements the federal Resource Conservation and Recovery Act (RCRA). The Deer Trail facility has a permit under CHWA for management and disposal of hazardous wastes. The design, siting and management criteria for hazardous waste treatment and disposal are similar, if not identical, to the requirements for low levels of radioactive wastes. Based on these similarities, several hazardous waste facilities across the country have been allowed to accept NORM and TENORM materials.

Clean Harbors requested the ability to accept limited NORM and TENORM materials at the Deer Trail facility under their CHWA permit. Historically, the Department has allowed NORM and TENORM materials to be disposed as solid waste at solid waste facilities on a case-by-case basis. However, the inclusion of Denver Radium waste triggered the requirement for RM Compact approval and a radioactive materials license.

Concurrent with the review of the original radioactive materials license application, the Department has reviewed modifications to the CHWA permit to allow acceptance of NORM and TENORM materials. In addition, Clean Harbors has agreed to implement operating procedures that do not distinguish the regulatory status of any given material. For example, all material will be tracked and documented throughout the facility in the same way, regardless of whether it is hazardous waste, radioactive waste or a mixture of both.

The Department reviewed the CHWA siting, design and operating criteria for the facility and additional information developed by Clean Harbors to meet RCA requirements. Potential conflicts between the regulations were addressed through license authorizations, operating procedure modifications or explicit exemptions.

## **VII. Adequacy of the License Application in Addressing the Requirements of the Colorado Regulations**

This section outlines the requirements of Colorado's regulations, relevant to this decision analysis, which must be met for the Department to issue a specific license to authorize the use of radioactive material. There are two primary sections of the radiation regulations that are germane to this decision: Parts 3 and 14. Part 3 addresses licensing, and Part 14 addresses disposal of low-level radioactive waste. The Clean Harbors radioactive materials license application has been evaluated against the requirements in Parts 3 and 14. In most cases, Clean Harbors has provided operating procedures and other supporting documents to establish a radiation protection program capable of operating in compliance with health and safety related requirements of the Regulations for the limited authorizations granted in Item 10 of the license. In some cases, the Department has granted a specific exemption to a requirement where it is allowed by the regulations and Clean Harbors has demonstrated equivalent protection. The technical requirements are discussed below.

### **Adequate Protection of Public Health and Safety**

Section 14.11.1 of the Regulations requires that the Department find that the issuance of the license will not constitute an unreasonable risk to the health and safety of the public. Section 3.9.3 has a similar requirement. Environmental monitoring during the years 2007 through 2009 have shown that previous operations at Deer Trail Facility have not constituted an unreasonable risk to the health and safety of the public.

- **Air Particulate Monitoring:** the Deer Trail Facility has performed continuous air particulate monitoring samples during operations. These samples are analyzed and compared to air effluent release limits as designated in Part 4 of the Regulations. There have been a total of two instances where air effluent release limits were exceeded in the three years of sampling. These two instances were in the same month of sampling (September 2009). Clean Harbors Deer Trail performed an investigation and found contamination on the blank sample included with the analysis. Samples after those months returned to approximate median values.
- **Radon Monitoring:** the Deer Trail Facility has performed continuous radon monitoring at the site. These samples are analyzed and compared to the EPA recommended residential limit of 4 pCi/liter. There have been a total of three instances at different sampling areas where the site has exceeded this recommended limit. Samples after those months returned to approximate median values.
- **Environmental Dosimetry:** the Deer Trail Facility has performed dosimetry measurements for various areas at the site, including at the active disposal cell, at air sampler locations, and at buildings at the site. None of the results of the environmental dosimetry sampling indicate a dose to the public is being received.
- **Groundwater Monitoring:** the Deer Trail Facility has performed groundwater monitoring at various wells which monitor potential releases of radioactive materials to the environment. Results of the groundwater monitoring do not indicate operations at the facility are contributing to levels of radiation above naturally occurring background levels.

After evaluating the environmental monitoring results of the facility, it is the Department's determination that issuing the license will not constitute an unreasonable risk to the health and safety of the public.

### **Training and Experience**

Section 14.11.2 of the Regulations requires that the applicant be qualified by reason of training and experience to carry out the disposal operations requested in a manner that protects health and minimizes danger to life or property. Based on qualifications submitted by Clean Harbors, the Department has approved a Radiation Safety Officer (RSO) for the facility. The RSO is

responsible for ensuring that all employees have read, understand, and comply with the procedures and conditions in the Radiation Protection Plan. The license requires, in License Condition 11.C, the Radiation Safety Officer to be on-site as sufficient to ensure protection of workers and compliance with the license and the Rules and Regulations.

License Condition 11.A lists individuals who have been designated as authorized users and have been trained to oversee the management of radioactive materials. One or more of these authorized users must be physically present at all times when radioactive materials are being received, used, handled, processed, disposed or analyzed. Additionally, for the authorizations granted in Item 10 of the license, the Department has reviewed and approved a training program for radiation safety, which Clean Harbors has administered to staff who will be managing radioactive materials. No Deer Trail employee will be allowed to work unsupervised with radioactive materials until they complete appropriate radiation safety training.

### **Protection of the General Population**

Section 14.11.3 of the Regulations requires the applicant's proposed disposal site, disposal design, land disposal facility operations, including equipment, facilities, and procedures, disposal site closure, and post-closure institutional control to be adequate to protect the public health and safety in that they provide reasonable assurance that the general population will be protected from releases of radioactivity to the general environment in ground water, surface water, air, soil, plants, or animals that 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. Reasonable effort should be made to maintain releases of radioactivity in effluents to the general environment as low as is reasonably achievable.

The Deer Trail Facility has evaluated the potential public dose based on the wastes received over the course of a year and using the EPA CAP88PC radiological risk software. Two doses are calculated by Clean Harbors – the closest resident to the Facility (3500 meters to the north of the Facility) and the hypothetical closest possible resident to the Facility (1500 meters to the east of the Facility). For the years 2007 through 2009, the calculated public dose is several orders of magnitude below the allowable dose limit.

The Deer Trail Facility has also maintained a dosimetry program for the employees working at the site. For the years 2007 through 2009, the highest annual dose received to any employee has been less than 25 millirems.

This data shows with reasonable assurance that the facility can be operated and closed in a manner that ensures that no member of the public will receive an annual organ dose exceeding 25 millirem while the facility operates under the limited authorizations granted in Item 10 the license.

### **Inadvertent Intrusion**

Section 14.11.4 of the Regulations requires the applicant's proposed disposal site, disposal site design, land disposal facility operations, including equipment, facilities, and procedures, disposal site closure, and post-closure institutional control to be adequate to protect the public health and safety in that they will provide reasonable assurance that individuals are protected from 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. Based on the facility design and other conditions, an exemption to this requirement is being granted under the authority of section 1.5.1. A discussion of this exemption is included in section VIII of this document.

### **Protection of Workers and the Environment**

Section 14.11.5 of the Regulations requires the applicant's proposed land disposal facility operations, including equipment, facilities, and procedures, to be adequate to protect the public health and safety in that they will provide reasonable assurance that the standards for radiation protection set out in Part 4 of these regulations will be met. Section 3.9.2 contains a similar requirement.

The licensee has provided information supporting the position that the site facilities as designed for treatment and disposal of hazardous wastes under RCRA are adequate to provide protection to the environment from any additional hazards presented by the radioactivity in the materials. In addition, numerous license conditions are in place to maintain oversight of the operations at the facility to protect workers and the public. Equipment used at the facility include the waste treatment facility, which also has sophisticated air monitoring and filtering equipment; specially designed disposal cells that meet current state of the industry requirements, and environmental and groundwater monitoring systems.

The Deer Trail Facility has maintained a dosimetry program for the employees working at the site. For the years 2007 through 2009, the highest annual dose received to any employee has been less than 25 millirems. This dose is much lower than the 5 rem annual limit for occupationally exposed workers listed in Part 4. The Department has approved a Radiation Protection Plan and Operating Procedures for management of the specific radioactive materials listed in Item 10 of the license, the goal of which is to monitor and demonstrate that the facility maintains compliance with the radiation protection standards of Part 4 of the Regulations.

Licensee compliance with license conditions will be monitored by the Department through periodic audits and site visits, review and approval of procedures, review of the required Annual Report and compliance inspections. Changes to procedures, designs, and plans require Department approval, which will assist in maintaining protection of workers, the public, and the environment.

## **Environmental Requirements**

The Regulations require submittal of information, including an environmental report, to assist the Department in evaluation of short-term and long-term impacts of the project and activities so that the Department can weigh environmental benefits against environmental costs. The Deer Trail Facility has submitted an annual report to the Department for each year since the license was originally approved. The reports consist of particulate air monitoring data, groundwater monitoring data, radon monitoring data, and dose to members of the public calculation.

Environmental impacts have been reviewed numerous times under the RCRA requirements for the facility. Additional considerations due to the addition of the specific radioactive materials authorized in Item 10 of the license have been addressed through the requirements for baseline monitoring, and adding radiological constituents to the existing monitoring program. A performance assessment of the facility relative to long-term releases of radioactivity was provided in the application and show that the site is protective of the environment and the public. Numerous provisions in the license and plans are in place to maintain monitoring through measurements and sampling of the environment, and for safe closure of the facility. An annual report is also required that summarizes emissions from the site, volumes disposed, estimated doses, planned activities, and an evaluation of warranties to assure funding is available to maintain environmental protection post-closure, or if the company should fail.

Reviews of hazardous waste and radioactive waste operations have not shown negative impacts to the environment from past and current activities. Surface waters are managed on-site, there is no discharge of surface waters. Groundwater is over 4,000 feet below the site, and is not impacted by site operations, nor is it anticipated that it will be, due to the nature of the Pierre Shale as an aquitard. Due to the limitations on authorizations, physical and chemical form of the proposed radionuclides, the Department has determined that the addition of the specific radionuclides authorized in Item 10 of the license will not negatively affect the environment.

Long-term impacts from licensed activities are not significantly different than from those associated with treatment and disposal of hazardous wastes. Detailed closure and post-closure plans are in place.

## **Long-term stability**

Section 14.11.6 of the Regulations requires that the applicant's proposed disposal site, disposal site design, land disposal facility operations, disposal site closure, and post-closure institutional control must be adequate to protect the public health and safety in that they will provide reasonable assurance that long-term stability of the disposed waste and the disposal site will be

achieved and will eliminate to the extent practicable the need for ongoing active maintenance of the disposal site following closure.

The design criteria outlined in the CHWA regulations, and employed at the Deer Trail Facility, ensure that the principal design features of the landfill cells provide long-term isolation of disposed waste under normal, abnormal and accident conditions. These criteria address features to minimize the need for long-term care (active maintenance) and improve the site's natural characteristics to protect public health and safety (Clean Harbors, Volume 2 of License Application, Section 3.2).

Additionally, License Condition 15.G requires that prior to closure of each landfill cell. Clean Harbors shall submit an analysis of the adequacy of the cap design to the Department for approval. The cap design must provide reasonable assurance of control of radiological hazards to be effective for 1,000 years, to the extent reasonably achievable, and in any case, for at least 200 years. Additionally, the cap design must be sufficient such that the release of Radon-222 does not exceed 20 pCi per square meter per second averaged over the surface area of the cell. This analysis shall include radon flux measurements and an analysis of the amount and concentration of radon producing materials disposed in the cell.

### **Technical requirements**

Section 14.11.7 of the Regulations requires that the applicant's demonstration provide reasonable assurance that the applicable technical requirements of Part 14 will be met. These technical requirements are outlined in sections 14.23 through 14.28 and include the following:

- disposal site suitability for land disposal (14.23)
- disposal site design for near-surface disposal (14.24)
- near-surface disposal facility operation and disposal site closure (14.25.1)
- environmental monitoring (14.26)
- land ownership (14.28.1)
- institutional control (14.28.2)

The Department agrees that the Deer Trail facility, as sited and designed, meets the technical requirements of Part 14 of the Regulations. Clean Harbors submitted a report to the Department prepared by MFG, Inc. and dated July 28, 2005 that specifically discusses the suitability of the site and design for disposal of radioactive materials. The conclusions of this report are that the original studies of the site performed to obtain the CHWA permit showed that the site was ideally suited for the disposal of hazardous wastes including heavy metals and that the NORM and TENORM materials proposed for acceptance at the facility have similar characteristics to metals from the standpoint of long-term containment. Additionally, the report concludes that the liner system used at the Deer Trail facility is compatible with NORM and TENORM waste constituents and that potential migration of the radionuclide constituents associated with the NORM and TENORM constituents will be mitigated by the geochemical

characteristics of the co-disposed waste within the disposal cell as well as the underlying natural geologic materials. Finally, the report concludes that the facility design combined with the hydrologic setting of the site provide for essentially no potential for migration of NORM and TENORM constituents to groundwater. (Attachment 1 to Clean Harbors Response to Design and Suitability Comments, July 28, 2005)

Some exemptions to the technical requirements are being granted in regard to co-disposal of radioactive and hazardous wastes and land ownership. A discussion of these exemptions is included in section VIII of this document.

### **Institutional Control**

Institutional control programs control access to the disposal site following closure of the site. Section 14.11.8 requires the applicant's proposal for institutional control to provide reasonable assurance that such control will be provided for the length of time found necessary to ensure the protection of the public and the environment, protection from inadvertent intrusion and long-term stability of the disposal cells. Additionally, the proposed institutional controls must meet the requirements of section 14.28 including governmental ownership of the land, environmental monitoring, periodic surveillance and minor custodial activities.

Plans for post-closure monitoring and maintenance are detailed in the post-closure plan found in volume 6 of the license application. These plans include environmental monitoring, periodic surveillance and minor custodial activities such as mending fences and maintaining posted signs.

An exemption to the requirement for governmental land ownership is being granted under section 1.5.1 and in compliance with Part 11 of the regulations. A discussion of this exemption is included in section VIII of this document.

Additional institutional control is being implemented in the form of an environmental covenant. The Department has the authority to approve requests by any party to restrict the future use of a property using an enforceable agreement called an environmental covenant. The covenants are recorded with the deed and run with the land. They provide a legal mechanism to ensure that institutional and engineering controls are properly implemented and maintained, so that implemented remedies continue to be protective of human health and the environment for as long as any residual contamination remains a risk. (CDPHE, Senate Bill 01-145 Public Guidance Document "Environmental Covenants," March 2002) Clean Harbors and the Department agreed to terms of an environmental covenant for the Deer Trail facility originally dated January 5, 2006 and replaced March 25, 2009.

**Financial Assurance**

Section 3.9 of the Regulations requires the applicant to establish Department-approved financial assurance warranties for decommissioning and long-term care. The financial assurance requirements for radioactive waste disposal facilities are outlined in section 14.31.

Clean Harbors has met the requirements for financial assurance by revising the insurance policy previously approved by the Department for the CHWA permit. Insurance is not a form of financial assurance that is routinely used under the radioactive materials regulations. In approving insurance as the mechanism for financial assurance, the Department has determined that it provides appropriate financial protection, as discussed in section VIII.

**VIII. Exemptions from the Regulations Granted By the Department**

As noted in the preceding sections, the Department can allow exemptions from the regulations if equivalent protection is demonstrated. The Department believes that the very limited authorizations for radioactive materials granted in Item 10 of the license pose minimal risk to site workers, the environment, and to members of the public. These limitations on the authorized activities under the license form a part of the basis for granting each of the following exemptions.

**Table of Exemptions Granted**

Regulatory Requirement	Citation	Exemption Made to Allow...	Exemption Authorized By...
Only wastes containing radioactive materials will be disposed at the site	14.25.1.11	Co-mingling of hazardous and radioactive wastes	14.27
Design, operation and closure of the facility shall ensure protection of any individual inadvertently intruding into the disposal site after institutional controls are removed	14.20	The cap design was not changed to accommodate the intruder scenario	1.5.1
Financial assurance must be in a form described in 3.9.5.4	3.9	Insurance to be used as the method of financial assurance	1.5.1
Land on which the facility is sited must be owned by the Federal or State Government	14.28.1	Clean Harbors to own the land	1.5.1, Part 11

### **Co-disposal of hazardous wastes and radioactive materials**

Section 14.25.1.11 of the Regulations requires that only wastes containing or contaminated with radioactive material be disposed of at the site. Section 14.27 grants the Department the authority to authorize provisions other than those set forth in sections 14.24 through 14.26 for the segregation and disposal of wastes on a specific basis, if it finds reasonable assurance of compliance with the performance objectives of Part 14 of the Regulations.

Clean Harbors submitted a report to the Department prepared by MFG, Inc. and dated July 28, 2005 that specifically discusses the suitability of the site and design for disposal of radioactive materials. This report evaluated the hazards of co-disposal of radioactive and hazardous wastes at the Deer Trail Facility. The conclusion of this evaluation is that the stabilization of treated hazardous waste prevents intermingling of hazardous and radioactive constituents. Additionally, any intermingling of landfill leachate and waste in the landfill will not increase the mobility of radioactive constituents because of the pH of the leachate (approximately 6.0) and the presence of high carbonates.

Based on this information, the Department believes that co-disposal of hazardous and radioactive wastes will not affect compliance with the performance objectives of Part 14 of the Regulations and therefore is granting an exemption to the segregation requirements of section 14.25.1.11.

### **Inadvertent Intrusion**

As discussed above, section 14.11.4 of the Regulations requires the applicant's proposed disposal site, disposal site design, land disposal facility operations, including equipment, facilities, and procedures, disposal site closure, and post-closure institutional control to be adequate to protect the public health and safety in that they will provide reasonable assurance that individuals are protected from 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 Department has granted an exemption to the requirements of section 14.11.4 and has not required the cap design at the facility to be redesigned to meet an inadvertent intruder scenario. The Department's assessment follows the UMTRA approach, which requires controls for 1,000 years. UMTRA did not require intruder analysis on its disposal sites. Since the Colorado definition of radioactive waste is for high-activity materials, i.e., those that can cause acute effects, it is appropriate that Part 14 has the requirement, but since that is not what is being accepted, it is appropriate to waive the requirement.

Because the classification of the materials being considered for Deer Trail are only a subset of Class A waste, and are limited in their physical, chemical, and radiological properties, a graded approach was deemed appropriate. The properties of the materials are more consistent with the requirements for uranium mill tailings rather than low-level waste. Additionally, many of the requirements that need to be met for low-level waste are also required, or have similar

requirements, in the RCRA permit for the facility. Because the physical, chemical, and radiological characteristics of the proposed materials are constrained, an additional evaluation is not warranted.

### **Insurance mechanism for Financial Assurance**

Section 3.9 of the Regulations requires the applicant to establish Department-approved financial assurance warranties for decommissioning and long-term care. The financial assurance requirements for radioactive waste disposal facilities are outlined in section 14.31.

Clean Harbors has met the requirements for financial assurance by revising the insurance policy previously approved by the Department for the CHWA permit. However, insurance is not a form of financial assurance that is routinely used under the radioactive materials regulations.

Pursuant to section 14.31.7 of the Regulations we are approving Clean Harbors insurance policy. The Department has determined that the insurance policy as revised provides equivalent protection required by sections of 3.9 and 14.31.

### **Exemption to Land Ownership Requirements**

Section 14.28.1 of the Regulations requires that land disposal be permitted only on land owned by the federal or a state government. Section 1.5.1 allows the Department to grant exemptions from the requirements of the regulations. If the Department is to grant an exemption to the land ownership requirements, part 11 of the Regulations requires the applicant to demonstrate a degree of control of the site equivalent to that which would be achieved by government ownership of the site. To demonstrate this degree of control, the application must provide the following:

- financial assurance in the form of a long term care warranty (11.3.1)
- a trust agreement with the department giving the department exclusive control over the licensee's long term care funds (11.3.2)
- an institutional control program (11.3.3)
- restrictive covenants (11.3.4)
- deed annotations with the county clerk and recorder as upon closure of each landfill cell (11.3.5)
- an easement granting to the Department unlimited right to access the property (11.3.6)
- as-built drawings (11.3.7)
- after completion of decommissioning and decontamination activities, transfer records pertaining to the disposal of wastes to local governments and the Department (11.3.8)

The Department is granting an exemption under section 1.5.1 to the land ownership requirements by allowing the facility to be licensed on land owned by Clean Harbors. Clean Harbors has submitted documentation describing an adequate degree of control over the site by providing the information required in Part 11. The financial assurance, institutional control program, and restrictive covenants were required to be accepted prior to issuance of the license. The Department is exempting under section 1.5.1 the requirement for a trust agreement found in section 11.3.2 because the Department is named as the beneficiary on the insurance policy provided for long-term

care. The remaining items will be required as the facility disposes of radioactive materials and upon completion of decontamination and decommissioning of the materials upon closure.

## **IX. Issues Raised During Public Comment**

A public meeting was held by Clean Harbors on October 21, 2010 at Woodlin School in Washington County. Clean Harbors summarized the materials which has been accepted through October 2010 and detailed the changes which are requested in the license renewal. No questions were raised by the members of the public which attended the public meeting.

## **X. Proposed Changes Not Accepted During License Renewal**

Two proposed changes to the Radioactive Materials License were not approved by the Department during the renewal period.

### **Proposed changes to the Groundwater Protection Program**

Clean Harbors proposed several changes to the Groundwater Protection Program (Standard Operating Procedure 15.OPS.16, Groundwater Monitoring, Revision 0). In summary, those changes included: 1.) reducing the number of wells in the network; 2.) reducing the monitoring frequency from quarterly to semi-annually; and 3.) changing the statistical evaluation of data from a tolerance limit to a Shewhart-CUSUM combined control chart method and use of natural-logarithm transformed data for analysis.

In response to reducing the number of wells in the network, the proposal is not approved. The wells remaining in the proposed monitoring network do not give adequate coverage of the area.

In response to reducing the monitoring frequency, the proposal is not approved. On-going operations typically have quarterly monitoring events. The proposal states that some wells in the current monitoring program may not yield representative samples due to slow recharge; however, this assertion has not been shown quantitatively. This is not an adequate reason for changing the sampling interval for the whole ground water monitoring program. Also, a slow average ground water velocity is not an adequate reason to change monitoring event frequency.

In response to changing the statistical evaluation, the Department agrees that the use of a combined Shewhart-CUSUM control chart to statistically analyze data is one of the appropriate methods. However, the proposed control chart limits are not appropriate. The stated reason for choosing this method is to reduce the occurrence of false positives; however, the proposed methodology will increase the probability of false negative errors. Also, the use of natural-logarithm transformed data is not approved based on the material presented. Intra-well data should exhibit a normal distribution over time.

The Department did not approve any proposed changes to the Groundwater Protection Program. For the Radioactive Materials License renewal, the current procedure (Groundwater

Sampling Standard Operating Procedure 15.Env.2 dated September 1, 2006) is the accepted procedure and any proposed changes shall be handled through a license amendment.

### **Proposed addition of Pipe Scale as an approved waste stream**

Clean Harbors proposed the addition of Pipe Scale as an approved waste stream to License Condition 10.A (Standard Operating Procedure 15.WAC.03, Radiation Survey of Materials with Radium Scale, Revision 1). Pipe Scale waste is waste generated primarily from oil field and natural gas production facilities. In regards to Pipe Scale, the principle contaminant to oil field pipes is Radium-226 and associated daughters and Radium-228 and associated daughters; while the principle contaminant to natural gas production facilities is Lead-210 and associated daughters. Radium-226, Radium-228, Lead-210, and all associated daughters are all isotopes allowed at the Deer Trail Facility under License Condition 10.A.

The Department did not approve the proposed addition of Pipe Scale as an approved waste stream. However, the Department is not rejecting the proposed addition of Pipe Scale as an approved waste stream. The Department needs more time to review the proposed Standard Operating Procedure and the Technical Basis Document for Pipe Scale Waste Acceptance. The proposed addition of Pipe Scale as an approved waste stream will continue to be reviewed by the Department and will be handled as a License Amendment in the future.

## **XI. Changes to Radioactive Materials License**

The following changes were made to the Clean Harbors Deer Trail Radioactive Materials License from the previous license amendment (Amendment 10) to this amendment (Amendment 11):

- The format of the license was changed from OR-RH-18 to Global Revision 3. This change was made to have the format of the License be consistent with other licenses maintained by the Department.
- The total cubic yards allowed on the license was lowered from 510,440 cubic yards to 480,240 cubic yards. This volume more accurately describes the activities at the Deer Trail facility as the original volume was to include the remaining volume of Cell 2. Cell 2 was filled and capped prior to disposal of radioactive materials. The volume was lowered to the volume of Cell 3 only.
- The requirement for reserving 16,000 cubic yards for radium processing wastes was eliminated. This volume was reserved for the Denver Streets Project which was completed in 2007. Since that clean-up was completed, it is no longer necessary to reserve volume for the waste.
- The Radium-226 concentration limit was lowered from 400 pCi/g to 222 pCi/g. This request was made by the Licensee.
- The phrase 'and as renewed' was added to the license commitment in regards to the RCRA permit. The RCRA permit is currently in the renewal process and this will accurately reflect

any potential changes to the RCRA permit and will prevent the License from referencing an out-of-date document once the renewal is complete.

- The phrase 'Specific waste streams may be exempted from this requirement by the Department on a case-by-case basis' was added to License Condition 14.F in regards to the random sampling program of incoming wastes. An exemption to the random sampling program may be appropriate for a constant, unchanging waste stream with enough historical data to prove the waste stream will not exceed the license limits. Only the Department may make the determination to eliminate the random sampling program for specific waste streams.
- The option of using isotopic analyses for Radium, Thorium, and Uranium (reported in pCi/g) was added to License Condition 14.F. Isotopic analysis may be more appropriate for some waste streams in determining the activity and ensuring compliance with the activity limits set forth in License Condition 10.A.
- The authorized users were updated as requested by the Licensee on form OR-RH-12.

## **XII. Changes to Standard Operating Procedures**

As part of the license renewal, Clean Harbors submitted their Standard Operating Procedures (SOP) for the Department to review. These SOPs are specifically tied to the license as part of License Condition 17. The following is a summary of the changes to the SOPs, any concerns the Department had which were addressed in the Response for Information (RFI) letter dated September 22, 2010, and the response by Clean Harbors:

### **SOP 15.RPP.01, Radiation Protection Plan, Revision 1**

This procedure gives the reader information about the radiation protection plan utilized by Clean Harbors at the Deer Trail Facility. This procedure had multiple changes from the previous revision, primarily formatting. In the new procedure, some information was removed from this procedure and placed in new or separate procedures listed below. Substantive changes include several positions within the organization were added to the procedure; employees are to be considered radiation workers instead of members of the public; and information about surveys and individual monitoring were added. Upon review, the Department had two issues with the procedure. The first issue was in regards to the recordkeeping requirements for dosimetry (both for workers and declared pregnancy). In response, Clean Harbors amended the procedure to accurately reflect the record keeping requirements outlined in Part 4 of the Regulations. The second issue was with formatting some of the equations and definitions found in section 10 of the procedure. In response, Clean Harbors updated the procedure to eliminate any confusion. The Department approved these changes, and **Revision 2** is the version of the procedure which is tied to the license.

**SOP 15.RPP.02, Radiation Safety Training, Revision 1**

This procedure gives the reader information about the radiation safety training requirements used by Clean Harbors. This procedure had several minor changes from the previous revision. The requirement for training was changed to requiring annual refresher training versus once every two years from the previous version. Training requirements were also added for visitors or contractors to the Deer Trail Facility. The Department had no issues with this procedure upon review.

**SOP 15.RPP.03, Worker Protection Records, Revision 1**

This procedure gives the reader information about the worker protection records retained by Clean Harbors. This procedure did not have any substantive changes from the previous revision. Upon review, the Department had one issue with the procedure. In section 5.0 of the procedure, several record keeping retention requirements did not match the Regulations. In response, Clean Harbors updated the procedure to comply with the Regulations. The Department approved these changes, and **Revision 2** is the version of the procedure which is tied to the license.

**SOP 15.RPP.04, Individual and Area Dosimetry, Revision 1**

This procedure gives the reader information about the individual and area dosimetry utilized by Clean Harbors. The new procedure added several minor changes, including information regarding potential pregnant workers and information about dose received. Additionally, the annual limit for workers matches the limit set forth in the Regulations with a 25 millirem/year ALARA goal set by Clean Harbors. Upon review, the Department had a question about who would be monitored in the dosimetry program. In response, Clean Harbors clarified the procedure to make clear which individuals working at the Deer Trail Facility would be included in the dosimetry program. The Department approved these changes, and **Revision 2** is the version of the procedure which is tied to the license.

**SOP 15.RPP.05, Estimating Inhalation Doses, Revision 1**

This procedure gives the reader information about how Clean Harbors will calculate the inhalation dose received by workers at the Deer Trail Facility. This procedure is used in conjunction with SOP 15.OPS.15, Air Monitoring for Radioactive Materials. The revised procedure updated the calculation used to convert the analytical results from filter samples to an air concentration. Upon review, the Department had one issue with the usage of air samplers around the active cell to accurately assess a worker's dose received. In response, Clean Harbors informed the Department that personal lapel air samplers have been used for the past year to more accurately represent potential worker inhalation dose.

In the procedure submitted in response by Clean Harbors, an additional change was requested. Clean Harbors proposed running the air samplers around the perimeter of the active cell during daylight hours only. Since waste is covered by clean fill dirt daily at the end of operations, running the air samplers during daylight hours only will more accurately reflect potential airborne releases from waste operations. This does not affect radon airborne monitoring

as the detectors for radon work separate from the air samplers. The Department approved these changes, and **Revision 2** is the version of the procedure which is tied to the license.

**SOP 15.RPP.06, Emergency Response, Revision 0**

This is a new procedure included by Clean Harbors. This procedure gives the reader information about emergency response in regards to radioactive materials. This procedure is to be used with the Emergency Response Plan. The Department had no issues with this procedure upon review.

**SOP 15.RPP.07, ALARA, Revision 0**

This is a new procedure included by Clean Harbors. This procedure gives the reader information about the As Low As Reasonably Achievable (ALARA) program. The Department had a question about this procedure, specifically why an ALARA review would be conducted at ten times the release limit for contamination. In response, Clean Harbors clarified that the ten times limit was arbitrarily chosen as a significant deviation from normal contamination levels seen.

Clean Harbors also made some changes to the worker dose levels which trigger an ALARA review in their response. These values are well below the allowed occupational dose limit of 5,000 millirem/year. The Department approved the changes to this procedure and **Revision 1** is the version of the procedure which is tied to the license.

**SOP 15.RPP.08, Radiation Work Permits, Revision 0**

This is a new procedure included by Clean Harbors. This procedure gives the reader information about radiation work permits and when they would be applicable to work at the Deer Trail Facility. The Department had one issue with the procedure and requested clarification to when a work permit would be applicable, especially in areas with potential airborne radioactive materials. In response, Clean Harbors revised the procedure to reference areas with High Airborne Radioactivity as defined in Part 1 of the Regulations. The Department approved the changes to this procedure and **Revision 1** is the version of the procedure which is tied to the license.

**SOP 15.RPP.09, Personal Protective Equipment, Revision 0**

This is a new procedure included by Clean Harbors. This procedure gives the reader information about personal protective equipment (PPE) utilized by employees while working with radioactive materials. The Department had no issues with this procedure upon review.

**SOP 15.RPP.10, Determination of Prior Occupational Dose, Revision 0**

This is a new procedure included by Clean Harbors. This procedure gives the reader information about how Clean Harbors will determine prior occupational exposures for employees working at the Deer Trail Facility. The Department had no issues with this procedure upon review.

#### **SOP 15.WAC.01, Radioactive Materials Acceptance, Revision 4**

This procedure gives the reader information and instructions on how waste is received and accepted at the Deer Trail Facility. Major changes to this procedure include Table 1 (which is derived from the Department's Interim Policy for TENORM) and changes to the sampling program utilized for waste acceptance. Upon review, the Department had two issues with the procedure. The first was in regards to the levels of Radium-226 and Lead-210. In response, Clean Harbors clarified when the higher Lead-210 limit would be appropriate as would be the case with pipe scale contamination from natural gas production and processing. The Department agrees with the higher limit for Lead-210 in these cases; however, the limit has not been incorporated into the license at this time due to the ongoing review of SOP 15.WAC.03 (see below). Additionally, Clean Harbors has committed to test all samples for Radium-226 to ensure compliance with License Condition 10.

The second issue was in regards to testing pre-acceptance samples using gamma spectroscopy. The Department disagreed with the removal of this test. In response, Clean Harbors clarified that gamma spectroscopy was removed in regards to using the portable gamma spectrometer and confirmed that gamma spectroscopy will continue to be utilized on analytical testing of pre-acceptance samples.

One change to the procedure which was not addressed in the Request for Information letter was the removal of Gross Alpha and Gross Beta as tests for the pre-acceptance sample and random sample program. Upon further consideration, the removal of these tests is inappropriate as some isotopes not allowed under the Clean Harbors Deer Trail License may not be seen in the gamma spectroscopy analysis. Clean Harbors added these tests back to the approved revision of the License.

Clean Harbors also requested an additional change to this procedure during the response to the Request for Information. Clean Harbors proposed eliminating the random sample program for waste streams approved for disposal at the Deer Trail Facility. The Department did not agree to this change. However, for some known, recurring waste streams, it may be appropriate to have the random sample program eliminated. License Condition 14.F was updated to include that specific waste streams may be exempted from the random sample program on a case-by-case basis as determined by the Department.

**Revision 6** is the version of the procedure which is tied to the license.

#### **SOP 15.WAC.02, Waste Tracking, Revision 1**

This procedure gives the reader information on how waste is tracked at the Deer Trail Facility. There were no substantive changes from the previous revision. Upon review, the Department had one request for Clean Harbors. The Uniform Hazardous Waste Manifest provided as Attachment 1 was an outdated version. In response, Clean Harbors included the most recent copy of the Uniform Hazardous Waste Manifest as Attachment 1. The Department agreed with these changes and **Revision 2** is the version of the procedure which is tied to the license.

**SOP 15.WAC.03, Radiation Survey of Materials with Radium Scale, Revision 0**

This is a new procedure included by Clean Harbors. This procedure outlines how pipe contaminated with radium scale will be accepted as a waste stream at the Deer Trail Facility. The Department did not have adequate time to review this procedure and did not approve this procedure as part of the license renewal. However, the Department is keeping this procedure, and the technical basis document associated with it, open for further review. Any information requests, acceptance, or rejection of the procedure will be handled as license amendment.

**SOP 15.OPS.01, Landfill Operations, Revision 1**

This procedure gives the reader instructions on how operations at the landfill commence, including how waste is transported into the landfill, how to decontaminate trucks leaving the cell, how the waste is to be compacted, and proper personal protective equipment. This revision did not contain substantive changes from the previous revision. Changes included formatting changes; revising 'NORM/TENORM' to 'radioactive materials'; and covering exposed areas immediately in the case of sustained winds over 35 miles per hour instead of within two hours. The revision of the term 'NORM/TENORM' or 'regulated materials' to 'radioactive materials' is made in multiple procedures; however, only noted in the summary of this procedure. The Department had no issues with this procedure upon review.

**SOP 15.OPS.02, Contamination Control During Waste Treatment Operations, Revision 1**

This procedure gives the reader instructions on how contamination control will be maintained at the facility. This includes waste disposal into the active cell and any potential treatment of waste prior to disposal. This revision did not contain substantive changes from the previous revision. The major change included is surveying areas and decontaminating as needed versus washing areas daily. Section 7 of the procedure is new to the procedure and outlines criteria for releasing material items for unrestricted use. Upon review of the procedure, the Department addressed three issues with the procedure. Two of the issues were in regard to Table 2 found in Section 7. In response, Clean Harbors determined the values listed in Table 2 were inappropriate for this procedure and removed the table from the procedure. The third issue was in regard to the facility map for the treatment building: the previous procedure listed specific areas of radioactive materials use while the new procedure did not designate any specific areas on the map. Clean Harbors response is that areas will be marked and posted while in use, and surveyed and decontaminated prior to release. Clean Harbors also made several language changes (non-substantive) to the procedure at this time. The Department approved all these changes to the procedure and **Revision 2** is the version of the procedure which is tied to the license.

**SOP 15.OPS.03, Operation of Portable Gamma Spectroscopy Unit, Revision 1**

This procedure gives the reader instructions on how to use the portable gamma spectroscopy unit utilized at the facility. The procedure was amended during the license renewal process to include the use of a different gamma spectroscopy unit as the previous model was no longer supported by

the manufacturer. Approval of this procedure was given via the correspondence dated October 20, 2010 instead of issuing a license amendment during the renewal period. The Department approved the amended procedure as part of the license renewal and **Revision 2** is the version of the procedure which is tied to the license.

**SOP 15.OPS.04, Operation of Alpha-Beta Smear Counter, Revision 1**

This procedure gives the reader instructions on how to use the alpha/beta smear counter utilized at the facility. This revision of the procedure added how to perform the daily quality control check; changed the isotopes used for the daily quality control check; added instructions on how to perform the weekly download of data from the counter; and added a discussion on how to calculate the minimum detectable concentration. Upon review, the Department had an issue with the inclusion of Table 2, specifically in regards to the limits set forth for the maximum permissible limit for empty packaging. In response, Clean Harbors determined contamination limits were not appropriate for this specific procedure and removed the limits from this procedure. The Department approved the changes to the procedure and **Revision 2** is the version of the procedure which is tied to the license.

**SOP 15.OPS.05, Operation of Gate Monitor Detectors, Revision 1**

This procedure gives the reader instructions on how to use the gate monitor detectors utilized at the facility. The original revision of the procedure was written to attempt to make an activity determination of a load using the gate monitor detectors. Revision 1 was written with major formatting changes, but essentially the same information. Upon review, the Department had two issues. The first issue was limits listed in section 6.2 did not agree with limits in section 3.0. Clean Harbors corrected this in their response. The second issue was the possible need for Clean Harbors to contact the Department should a non-radioactive load be rejected due to alarming the gate monitor. Clean Harbors added steps to the procedure for any such possibility.

In addition to addressing the issues set forth by the Department, Clean Harbors greatly revised the procedure. Instead of using the gate monitors to make an activity determination, Clean Harbors proposed using the gate monitors as a monitoring system to screen waste that is above or below DOT limits. As part of the SOP 15.OPS.21, Clean Harbors will perform a comprehensive dose rate survey on all incoming radioactive material shipments. Clean Harbors proposed changing the limit for *known* radioactive material shipments to 500 microR/hour (the DOT limit for exempt packages). The gate monitor limit for non-radioactive waste shipments will remain at 16 microR/hour. Since the limit for non-radioactive waste shipments will remain at the background level for alarm, and since all incoming radioactive material shipments will be screened using SOP 15.OPS.21, the Department feels confident that these changes will continue to ensure proper waste characterization. **Revision 2** is the version of the procedure which is tied to the license.

**SOP 15.OPS.06, Operation of Digital Waste Monitor, Revision 1**

This procedure gives the reader an understanding of the usage of the digital waste monitor used at the facility. Most of this information is captured in SOP 15.OPS.05. Clean Harbors amended this

procedure to reflect changes made to SOP 15.OPS.05. The Department approved these changes and **Revision 2** is the version of the procedure which is tied to the license.

**SOP 15.OPS.07, Operation of Exposure Rate/Dose Rate Meters, Revision 0**

This is a new procedure included by Clean Harbors. The procedure gives the reader more specific instruction on how to use an exposure rate or dose rate meter. Upon review of the procedure, the Department addressed an issue in several sections that suggested that exposure rate meters could be used in determining worker exposure. In response, Clean Harbors committed that exposure rate meters will not be used in lieu of dosimetry. The procedure was amended to more clearly make the distinction that the exposure rate meters will be used to determine radiation area instead of dose. Clean Harbors also amended the procedure to make it less specific to certain models of instruments. The Department approved all these changes and **Revision 1** is the version of the procedure which is tied to the License.

**SOP 15.OPS.08, Operation of Alpha-Beta Scintillation Detector, Revision 0**

This is a new procedure included by Clean Harbors. The procedure gives the reader more specific instruction on how to use an alpha-beta scintillation detector. The Department had no issues with this procedure upon review.

**SOP 15.OPS.09, Operation of GM Pancake Probe, Revision 0**

This is a new procedure included by Clean Harbors. The procedure gives the reader more specific instruction on the use of a Geiger-Mueller pancake probe. The Department had no issues with this procedure upon review.

**SOP 15.OPS.10, Operation of Gamma Scintillation Detectors, Revision 0**

This is a new procedure included by Clean Harbors. The procedure gives the reader more specific instruction on the use of gamma scintillation detectors. The Department had no issues with this procedure upon review.

**SOP 15.OPS.11, Routine Contamination Surveys, Revision 1**

This procedure gives the reader instruction on routine contamination surveys performed at the Deer Trail Facility. There were no substantive changes to this procedure. The procedure was updated for the reader to more easily see the survey requirements as they are in a table form versus written out in paragraph form. The Department had no issues with this procedure upon review.

**SOP 15.OPS.12, Personnel Contamination Surveys, Revision 1**

This procedure gives the reader instruction on personnel contamination surveys performed at the Deer Trail Facility. The only substantive change is that information which was previously in the procedure regarding decontamination was removed and incorporated into a new procedure (15.OPS.19, Decontamination of Personnel). Upon review, the Department had two issues with this

procedure. The first was a reference to the information which was removed had not been updated. In response, Clean Harbors updated the reference. The second issue was with a statement which indicated the majority of personnel contamination surveys will be performed with the limit of no contamination present, and the Department wanted more information about which surveys would have a higher release limit. In response, Clean Harbors removed the word 'majority' and committed that all personnel survey results above background levels will require decontamination. Clean Harbors also removed references to specific instruments in the procedure to achieve the flexibility needed for various surveys as needed. The Department approved these changes, and **Revision 2** is the version of the procedure which is tied to the license.

#### **SOP 15.OPS.13, Equipment and Vehicle Release Surveys, Revision 1**

This procedure gives the reader instruction on how to perform equipment and vehicle release surveys performed at the Deer Trail Facility. There were no substantive changes to this procedure. The Department had one issue with this procedure. The limits set forth for empty packages in Table 2 were not clear whether the limit was referring to internal or external contamination. In response, Clean Harbors clarified the contamination limits. Clean Harbors also updated the procedure to incorporate more specific instruction on how to release vehicles from the Deer Trail Facility. These additions to the procedure are based on the regulations set forth in 49 CFR – Transportation. The Department approved these changes, and **Revision 2** is the version of the procedure which is tied to the license.

#### **SOP 15.OPS.14, Spill Surveys, Revision 1**

This procedure gives the reader instruction on initial response to spills and steps to take on surveying areas after spills at the Deer Trail Facility. The procedure was updated to provide flexibility needed for spill situations while release criteria remained unchanged. The Department had no issues with this procedure upon review.

#### **SOP 15.OPS.15, Air Monitoring for Radioactive Materials, Revision 1**

This procedure gives the reader information and instruction regarding the air monitoring for radioactive materials performed at the Deer Trail Facility. This procedure was updated to include pump calibration and maintenance instructions; information about breathing zone monitoring; and information about the passive radon monitors used. Upon review, the Department had two issues. The first was in regards to having references specific to Cell 3 in the procedure. The procedure may be too specific and could cause issues with future waste operations. In response, Clean Harbors agreed and revised the procedure to reference the active cell. Clean Harbors also amended the procedure to remove some specific instrumentation used for air sampling as other types of air samplers may be more effective in the future in determining any potential air releases of radioactive materials.

The second issue was in regards to the placement of detectors utilized in determining the background for radon. In response, Clean Harbors agreed that the placement of detectors to

determine background levels was inappropriate and changed the placement of the radon monitors. The Department agreed to these changes and **Revision 2** is the version of the procedure which is tied to the license.

**SOP 15.OPS.16, Groundwater Monitoring, Revision 0**

This is a new procedure included by Clean Harbors. The procedure gives the reader more specific instruction on monitoring groundwater at the facility. The Department rejected this procedure. Clean Harbors will be required to use the groundwater monitoring procedure referenced in Amendment 10 of the License (Groundwater Sampling Standard Operating Procedure 15.Env.2 dated September 1, 2006). Any future proposed changes will be requested by Clean Harbors as an amendment to the license.

**SOP 15.OPS.17, Volumetric and Material Sampling; Revision 0**

This is a new procedure included by Clean Harbors. This procedure gives the reader instructions on how to perform volumetric and material sampling for samples taken at the Deer Trail Facility. The Department had no issues with this procedure.

**SOP 15.OPS.18, Decontamination of Surfaces and Equipment, Revision 0**

This is a new procedure included by Clean Harbors. This procedure gives the reader instructions on how to perform decontamination of surfaces and equipment at the Deer Trail Facility. Upon review, the Department had two issues with the procedure. The first was in regards to steps taken should contamination limits were exceeded during decontamination of heavy equipment. In response, Clean Harbors revised the section of the procedure to cover all equipment. The second issue was in regards to sampling rinse water to verify decontamination of items for free release. In response, Clean Harbors agreed that sampling rinse water to verify decontamination was not an accurate way to verify decontamination and eliminated testing of rinse water from the procedure. The Department agreed to these changes and **Revision 1** is the version of the procedure which is tied to the license.

**SOP 15.OPS.19, Decontamination of Personnel, Revision 0**

This is a new procedure included by Clean Harbors. This procedure gives the reader instructions on how to perform decontamination of personnel at the Deer Trail Facility. The Department had no issues with this procedure.

**SOP 15.OPS.20, Handling of Liquids, Revision 1**

This is a new procedure included by Clean Harbors. This procedure gives the reader instructions on how to handle and treat liquid waste at the Deer Trail Facility. The Department had no issues with this procedure. Clean Harbors amended this procedure based on changes to SOP 15.OPS.02 made during the Request for Information response so the procedures did not provide conflicting

information. The Department agreed to these changes and **Revision 2** is the version of the procedure which is tied to the license.

**SOP 15.OPS.21, Package Receipt Surveys, Revision 0**

This is a new procedure included by Clean Harbors. This procedure gives the reader instructions on how to receive radioactive packages at the Deer Trail Facility and how to properly survey those packages. Upon review, the Department had one issue with the procedure. The limits listed in Table 1 included maximum limits for an empty package. The limits are clear if they are for internal or external contamination limits. In response, Clean Harbors removed the limits for empty packages as this limit is not applicable to receiving packages. The Department agreed to these changes and **Revision 1** is the version of the procedure which is tied to the license.