



Clean Harbors Deer Trail, LLC
108555 E. US Highway 36
Deer Trail, CO 80105

November 24, 2010

James Grice III, Licensing Lead
Radioactive Materials Unit
Hazardous Materials and Waste Management Division
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive S.
Denver, CO 80246-1530

Re: Docket number 9395 - Response to Request for Information Dated September 22, 2010 – License Renewal CO 1102-01

Mr. Grice,

Following, please find our response to your request for information on Standard Operating Procedures submitted with our renewal request for Colorado Radioactive Materials License Number Colo. 1102-01. Revised procedures are submitted in hardcopy and in electronic format in both track changes versions and finished versions.

Response to RFI #1

Radiation Protection Plan (SOP 15.RPP.01)

1. Section 4.46 of the Regulations specifies the record retention requirements for individual monitoring. For occupational doses, the requirement is to retain the records for the duration of the license. However, Section 9.1.c.iii of the SOP says the Dosimetry records will be retained for one year. Additionally, Section 9.1.g of the SOP says declarations of pregnancy will be retained for three years. Again, the requirement is to retain the records for the duration of the license. Please update the SOP to comply with the regulations.
2. Several definitions in section 10 should be edited with the proper superscript or subscript to remove any potential confusion.

CHDT response:

The Radiation Protection Plan SOP 15.RPP.01 has been modified to reflect the requirements for recordkeeping. References to specific forms have been removed. Overly conservative dose rate requirements triggering ALARA review have been modified to more realistic levels for radiation workers. Several minor changes in wording were made. The definitions in section 10 have been edited. CHDT has noticed in the past, that superscript, subscript, and symbol font terms in documents often change when viewed in different versions of MS Word and Adobe PDF. For this reason, subscripts, superscripts and Greek alphabet symbol fonts have been eliminated wherever possible. Terms have been spelled out and powers of ten are expressed as number x 10 E number. Some unnecessary terms were eliminated.

Worker Radiation Protection Records (SOP 15.RPP.03)

3. Section 4.46 of the Regulations specifies the record retention requirements for individual monitoring. For occupational doses, the requirement is to retain the records for the durations of the licenses. However, Section 5.1 of the SOP says the Dosimetry records will be retained for one year.

Additionally, Section 5.1 of the SOP says declarations of pregnancy will be retained for three years. Again, the requirement is to retain the records for the duration of the license. Please update the SOP to comply with the regulations.

CHDT response: The SOP has been updated to comply with the regulations.

Individual and Area Dosimetry (SOP 15.RPP.04)

4. Section 5.1 of the SOP states “All full time CHDT workers shall be issued and wear an individual dosimeter.” However, no indication is made for part-time workers who may be considered as radiation workers. Also, this statement would imply that all full time workers who work at CHDT, including administrative staff, would be issued a dosimeter. Please clarify which individuals will be issued a dosimeter.

CHDT response: Modifications have been made to the SOP to clarify these issues.

Estimation of Inhalation Dose (SOP 15.RPP.05)

5. Section 5.1 of the SOP states that air monitoring from around the cell will be used to calculate the concentration of uCi/ml for any airborne contamination. By using this concentration, the worker exposure may be under represented as the air sampler is running at times when no radioactive air emissions would be expected, for example in the evening or when non-radioactive waste is received. Additionally, the air sampling units are generally on top of the active cell and may not represent the actual airborne exposure for a worker in the cell. Please amend the procedure to more accurately represent the possible inhalation dose for workers.

CHDT response:

Air monitoring devices situated around the cell as well as upwind and downwind of the cell run continuously or for representative periods of time in order to best measure radioactive material released to the environment. In practice, the equipment has been problematic to use. Running the samplers for short periods of time results in insufficient loading of particulate matter such that all values measured have always matched the MDA. Running the samplers for longer periods of time leads to breakdown of the equipment. Wind and direction controls for the samplers have frequently proven inadequate to long term use in the environment necessitating unacceptably frequent maintenance. CHDT proposes to run the samplers during daylight hours only with the operations controlled by photocell sensors. This will more accurately reflect actual operating hours and worst case conditions while still providing adequate loading for analysis and alleviate sampler malfunctions. Other representative sampling periods will be designated by the RSO. Appropriate changes have been made to SOP 15.OPS.15 (Air Monitoring for Radioactive Materials) to clarify this.

CHDT agrees that airborne monitoring devices outside that landfill may not be ideal for estimation of inhalation dose for workers inside the landfill. For this reason, CHDT has been conducting lapel sampler monitoring inside the landfill this year. At this time, optimal sampling time periods and sample methods are not known. Preliminary measurements indicate that 40 hour week lapel sample events provide inadequate loading to measure. CHDT is also considering semi-stationary particulate samplers inside the landfill or semi-stationary direct measuring samplers inside the landfill. SOPs 15.RPP.05, and 15.OPS.15 (Air Monitoring for Radioactive Materials) have been modified to require air monitoring in the landfill and use of those monitoring results in calculation of dose. Types of sampling equipment and sample time periods will be designated by the RSO.

ALARA (SOP 15.RPP.07)

6. Section 5.0 of the SOP states that an ALARA review will be conducted if a fixed or removable contamination survey exceeds ten times the free release values. Please clarify why this was the limit chosen to perform a review of the program.

CHDT response:

The value of ten times the free release values was arbitrarily chosen. CHDT's operational history has shown that little or no removable contamination has normally been detected in routine operations and that free release limits are almost always met without any decontamination, so ten times higher removable values would indicate a significant deviation.

In addition, upon further consideration of this SOP and to be consistent with worker exposure requirements for radiation workers as defined in the revised RPP, several changes were made. Values of annual worker exposure that would trigger an ALARA review were raised as previous limits were unreasonable low for radiation workers. Values of exposure rates that would trigger an ALARA review were raised to more reasonable levels for radiation workers. Fixed contamination levels that would trigger an ALARA review were removed from the SOP because they are unnecessary and inappropriate.

Radiation Work Permits (SOP 15.RPP.08)

7. It is not clear in this SOP when a radiation work permit would be applicable. For instance, the SOP says a radiation work permit would be applicable in the areas with airborne radioactivity. However, most waste disposal operations at CHDT would have the possibility of airborne radioactivity and it would appear most operations would require a radiation work permit. Please clarify the instances and at what action levels a radiation work permit would be appropriate.

CHDT response:

Given the limits of materials accepted by CHDT, it is highly unlikely that any special event would yield external radiation exposures to workers in exceedence of limits. This trigger for a radiation work plan based on exposure rates has been removed from the SOP.

Airborne Radioactivity in this SOP has been modified to High Airborne Radioactivity and defined according to CO regulation. While it is highly unlikely that workplace conditions and CHDT waste acceptance criteria would ever yield High Airborne Radioactivity concentrations, CHDT has provided a procedure for work permits in case some special activity such as internal cleaning and decontamination of dusty process equipment made it necessary. The CHDT RSO would also have the ability to require a Radiation work permit, if in his professional judgment, unusual radiation hazards might be encountered. The SOP has been modified to clarify this.

High Airborne Radioactivity as referenced in this SOP applies only to levels defined as an Airborne radioactivity area, 6 CCR 1007-1, Rules and Regulations Pertaining to Radiation Control, Part 1, Section 1.2, Definitions:

"Airborne radioactivity area" means a room, enclosure, or area in which airborne radioactive materials exist in concentrations:

- (1) In excess of the derived air concentrations (DACs) specified in Appendix 4B, Table 4B1, or
- (2) To such a degree that an individual present in the area without respiratory protective equipment could exceed, during the hours an individual is present in a week, an intake of 0.6 percent of the annual limit on intake (ALI) or 12 DAC hours"

In the absence of real time air monitoring, the airborne radioactivity concentration can be estimated using re-suspension factors and removable contamination levels.

Radioactive Materials Acceptance (SOP 15.WAC.01)

8. In section 5.2 of the SOP, the activity levels for the radium-226 and the lead-210 appear to be conflicting. As described in the Proposed Changes to the Radiation Protection Program, the basis for

lowering the radium-226 level to 222 pCi/g is because “Ra-226 will always be close to being in equilibrium with its 8 progeny...” Setting the level for lead-210 at 666 pCi/g seems to be directly conflicting with this statement. It would be appropriate to consider having a radium-226 limit at 400 pCi/g (based off the 5 progeny between radium-226 and lead-210) and a lead-210 limit at 666 pCi/g (based off the 3 progeny between lead-210 and lead-206) or to have a radium-226 and lead-210 limit at 222 pCi/g based off the 9 progeny between radium-226 and lead-206.

CHDT Response:

These limits for Lead-210 would only apply when it and its two progeny are the only radionuclides present. This situation frequently occurs during natural gas production and processing operations. Radon, generated in the ground by the decay of radium, is carried along with natural gas to the surface. Due to the short half lives of radon-222 and its first five progeny, the first long lived radionuclide is lead-210. Lead-210 ends up being deposited on gas filters, and in pipes and valves, and in pipeline condensate. Since the source of the lead-210 is a gas, radium would not be carried with the gas and would not be present. In actual wastes, there will usually be some other radionuclides present in small quantities that may be carried in water droplets transported with the gas, but in general lead-210 may be tremendously elevated. When other radionuclides are present, the sum of the fractions of their individual limits will be used to evaluate total activity.

Section 6.3 states “lead-210 analysis in pCi/g will be required in waste where lead-210 is the only parent radionuclide...” If CHDT requests to have the lead-210 limit at 666 pCi/g, samples which test higher than 222 pCi/g should have additional testing to ensure radium-226 levels are not exceeded.

CHDT Response:

All samples will be tested for Ra-226. The SOP has been re-written to clarify this point. The previous version was intended to state that additional analysis for lead-210 may be required, but that statement has been removed as superfluous.

9. The Department disagrees with the removal of performance of gamma spectroscopy for pre-acceptance samples. As described in the Proposed Changes to the Radiation Protection Program, the basis of change indicates the test has been removed because the samples do not emit enough radiation to be distinguished from background levels. However, as stated in Appendix D of this SOP, “Gamma spectrum analysis can also provide insurance against the presence of manmade radionuclides.” A non-detect results has value for the confirmatory pre-acceptance sample. Please amend the SOP to include gamma spectroscopy to the pre-acceptance sample.

CHDT Response:

The previous SOP intended to remove testing of pre-acceptance samples *using the portable gamma spectrometer*. This was done because the procedure had not proven practical. While the portable spectrometers are capable of identifying radionuclides in waste shipments (truckloads and barrels), most pre-acceptance samples (500g size) that CHDT has evaluated do not exhibit enough radiation to evaluate due to their small size. The SOP has also been modified to clarify several other issues. Pre-acceptance samples will be required for all wastes unless otherwise approved by CDPHE or when other approved SOPs’ provide alternate methods (SOP 15.WAC.03 Radium Scale). Gamma spectroscopy using laboratory instruments and methods will be performed on all pre-acceptance samples. Due to this and other changes in the SOP, CHDT proposes to eliminate Part 8 of the SOP, Random Sample Program. CHDT has several years experience with this program and it has not produced useful data in reasonable time frames. CHDT has only had one waste stream that did not meet specifications. This would have been prevented with pre-acceptance sampling and analysis as required by the new SOP. CHDT will utilize several alternate means to ensure compliance with license limits: 1.) Pre-acceptance sampling; 2.) Annual re-sampling and recertification for ongoing waste will ensure that wastes have not changed; 3.)

Exposure rate surveys at container surfaces will alert us to high or anomalous radiation levels; 4.) Portable gamma spectrometers will be used to screen all wastes for non-profiled or manmade radionuclides; 5.) Smear surveys of waste containers with elevated readings will indicate higher than normal activity. CHDT historically has found few or no smears above MDA. CHDT currently uses MDA levels as our action levels (20 dpm/100cm² alpha and 125 dpm/100cm² beta with 1 minute count time).

Waste Tracking (SOP 15.WAC.02)

10. Attachment 1 is the Uniform Waste Manifest. This attachment should be updated to the most recent revision of the manifest.

CHDR Response: The SOP has been revised to include the most recent revision of the manifest. The SOP was also edited to update and simplify the language. It should be noted that Clean Harbors tracks all waste material from cradle to grave on an internet based waste tracking system and this remains the primary method of tracking waste.

Radiation Survey of Materials with Radium Scale (SOP 15.WAC.03)

11. The average exposure rates listed in the SOP appear to be contradictory to the maximum exposure rate listed for waste acceptance set forth in SOP 15.OPS.05 Operation of the Gate Monitor Detectors. Please reconcile the differences between the exposure rates determined for pipe acceptance and the exposure rates for facility waste acceptance.

CHDT Response: Exposure rates in this SOP and maximum exposure rates in SOP 15.OPS.05 derive from different dose rate models of different wastes and differing geometries. This model utilizes modeling of dose rates at the surface of pipes containing radium scale, whereas SOP 15.OPS.05 is based upon soil-like waste containing radium in dump trailer conveyances measured at approximately 20 inches away from the vehicle. Review of SOP 15.OPS.05 and experience with utilization of this SOP has forced us to come to the conclusion that the procedure is not reliable due to variations in geometry of vehicles and waste containers, variations in waste radionuclides, and variations in waste density. Survey of exposure rates at this distance from a conveyance is also not reliable and repeatable. We find that the maximum exposure rates in 15.OPS.05 are overly conservative and were originally based upon performing work at CHDT without monitored, trained radiation workers. CHDT proposes that when dose rate monitoring is necessary for waste acceptance purposes, it be done at fixed distances from the surface of the waste so that measurements are reliable and repeatable. CHDT also contends that single measurements of dose rate are not repeatable or reliable and that dose rate measurements should be taken at various points around the exteriors of conveyances or around individual waste containers. CHDT proposes that the gate monitors in SOP 15.OPS.05 be utilized for their original purpose: to screen for lost sources and other unauthorized radioactivity in all RCRA and solid waste shipments. All NORM/TENORM shipments are surveyed for dose rate at the surface of the containers with other more reliable instruments during the inbound package survey and this will continue to be done. Modeling of individual waste types and geometries may be done to establish dose rate boundaries for waste acceptance. SOP 15.OPS.05 has been modified accordingly and utilization of the gate monitors in this procedure has been removed.

12. The SOP describes using a Ludlum Model 19 MicroR Meter for determining the exposure rates for waste acceptance. The Ludlum meter is appropriate for determining an exposure rate; however, it would also be appropriate to perform some type of isotopic determination to ensure that a.) activity limits for licensed materials do not exceed the licensed limits and b.) no other isotopic contamination is present on the pipe materials. Please update the procedure to include some type of gamma spectroscopy to ensure compliance with the licensed limits of radioactive materials.

CHDT Response: CHDT is in agreement with the need to perform isotopic determination at CHDT. This step was inadvertently left out of the procedure. The procedure has been modified accordingly to include it. Isotopic determination at the waste generating site is not being required due to the general non-availability of suitable instruments to waste generators. Additional review of this SOP has lead CHDT to the view that requiring the Ludlum Model 19 MicroR Meter is too specific. The API study cited in the Technical Basis Document utilized a sodium iodide detector. Any calibrated exposure rate meter utilizing a sodium iodide detector should be able to produce adequate and repeatable measurements consistent with the Technical Basis Document. CHDT currently has six different models of instrument that are all capable of this. CHDT proposes to substitute “calibrated exposure rate meter” for “Ludlum Model 19 MicroR Meter” in each place that it occurs in the procedure. This is consistent with the Technical Basis Document as what is being modeled is exposure rate, not instrument specific response. The make, model number, serial number and calibration date are already required information for the field surveys and CHDT surveys. Suitability of instruments utilized in the procedure will be overseen by the CHDT RSO.

Contamination Control During Waste Treatment Activities (SOP 15.OPS.02)

13. Table 2 in the SOP describes the DOT non-fixed surface contamination limits. The limits listed in the fifth column, the maximum permissible limit for empty packaging, is the limit for allowable internal contamination (49 CFR 173.428(d)). However, the SOP is not clear in this distinction. Please update the SOP to eliminate any possible confusion between the maximum permissible contamination limits for external packaging and internal packages.

CHDT Response: Review of this SOP leads us to contend that DOT contamination limits are not relevant to waste treatment activities and do not belong in this SOP. Table 2 has been removed. DOT contamination limits are expressed in SOPs 15.OPS.13 (Equipment and Vehicle Release Surveys), and SOP 15.OPS.21 (Package Receipt Surveys) and this table (appropriately modified) will continue to reside there.

14. Having the internal package release limits for an excepted package – empty package in Table 2 would imply packages or materials are shipped in that manner. If any packages are being sent as an excepted package – empty package, please include in the procedure how the other requirements of 49 CFR 173.428 are being met.

CHDT Response: Table 2 has been removed from this SOP. Procedures for meeting the requirements of 49CFR 173.428 have been added to SOP 15.OPS.13 (Equipment and Vehicle Release Surveys).

15. Section 6.3 of the SOP says the treatment basin and the loading area adjacent to it will be surveyed daily when in use and decontaminated when necessary with the daily wash requirement removed as noted in the Proposed Changes. However, SOP 15.OPS.20 states in section 5.2.1 that the unloading area is washed daily. Please reconcile the procedures so they are not conflicting.

CHDT Response: SOP 15.OPS.20, section 5.2 has been modified to require the vehicle unloading area to be surveyed daily when in use and decontaminated when necessary so that the procedures do not conflict.

16. The diagram provided in Figure 1 shows more detail than the previous SOP revision; however, there are no radiological areas designated on the map. Please include the radiological areas for the treatment building outline in Figure 1.

Areas are designated on an as needed basis per section 6.0. While the entire building is permanently posted, individual areas inside will be de-posted after survey, decontamination (if needed) and release.

Additional minor changes were made to SOP 15.OPS.02 in order to streamline it and to remove overly specific language.

Operation of Alpha-Beta Counter (SOP 15.OPS.04)

17. Table 2 in the SOP describes the DOT non-fixed surface contamination limits. The limits listed in the fifth column, the maximum permissible limit for empty packaging, is the limit for allowable internal contamination (49 CFR 173.428(d)). However, the SOP is not clear in this distinction. Please update the SOP to eliminate any possible confusion between the maximum permissible contamination limits for external packaging and internal packages.

CHDT Response: Review of this SOP has lead CHDT to the opinion that surface contamination limits are most appropriately defined in the SOP's governing surveys at the facility: SOP 15.OPS.11, Routine Surveys; SOP 15.OPS.12, Personnel Surveys; SOP 15.OPS.13, vehicle and equipment release surveys; SOP 15.OPS.14, Spill Surveys; and 15.OPS.21, Package Receipt Surveys. The scope of this SOP, 15.OPS.04 should be the operation of the Alpha-Beta counter, quality control of the analysis and calculation of instrument MDA. Accordingly, contamination limits have been removed from this SOP and the DOT limit question will be answered in reference to SOP 15.OPS.13 – Equipment and Vehicle Release Surveys. In addition, the scope and policy sections of this SOP have been rewritten to reflect this.

Operation of Gate Monitor Detectors (SOP 15.OPS.05)

18. The limits set forth in section 6.2 for rejected wastes (10 uR/hr) do not agree with the limits set forth in section 3.0 (16 uR/hr). Please reconcile the differences between the activity limits set forth for wastes not classified as radioactive.

CHDT response: this has been corrected.

19. Section 6.2 of the SOP describes four steps to take for non-radioactive shipments which scan above the set level for incoming waste. However, additional steps, such as contacting the Department to obtain a special DOT permit, should be added to the procedure.

CHDT response: The steps to be undertaken if nonconforming waste is detected by the gate monitors have been modified. CHDT will perform detailed radiation surveys and attempt to reconcile the radiation discrepancies. CHDT will consult with CDPHE Radiation Management Unit regarding special DOT permits for waste rejections if needed.

CHDT has, in consultation with the Department, greatly modified this procedure. Gate monitor use at CHDT originated with its historical use at CHDT as a safety feature to monitor RCRA waste for lost radioactive sources and other non-conforming radioactivity. As part of the RCRA permitting process, background at CHDT was determined to have an average value of 16 microR/hr. The RCRA permit regards this dose rate limit as an acceptance criteria for RCRA hazardous waste and solid waste accepted under the permit.

During the 2004-2005 permitting and licensing process for acceptance of NORM and TENORM waste at CHDT, the original petition was to accept NORM and TENORM materials under the RCRA permit without a Radioactive Materials License. CHDT workers were to be considered members of the general public and would not be radiation workers. Theoretical dose rate modeling by Kennedy, et, al, showed that the waste proposed for acceptance should not expose CHDT workers at greater doses of radiation than members of the general public are permitted. Mr. Kennedy based this model on response of the gate monitors to soil-like waste containing up to 400 pCi/g Ra-226 utilizing the gate monitors at CHDT in their existing configuration and geometry.

Since that time, it has been determined that CHDT workers are radiation workers whose annual exposure is limited to 5000 mR/yr. CHDT workers are trained in radiation safety and their occupational exposure is monitored. While CHDT worker dose rate limits are at 5000 mR/yr, several years of operations have demonstrated that CHDT worker dose rates should approach that of the general public. Nevertheless, exposure rate limits previously determined for the gate monitors have been deemed overly conservative for CHDT workers.

Due to the many variables in measured exposure rates such as survey distance, geometry, bulk density, individual radionuclides, container type, size, and composition, etc., CHDT contends that a one-size-fits-all-dose-rate-limit is not realistic. If exposure rate modeling is utilized for waste acceptance purposes, more waste specific and geometry specific exposure rate criteria should be used. In addition, measurements of exposure rate at CHDT should be reliable and repeatable. No single measurement should be used but surface exposure rates at multiple locations should be utilized. CHDT performs comprehensive surface dose rate surveys on all incoming radioactive material shipments as part of the package receipt survey (SOP 15.OPS.21). CHDT contends that this survey is more representative, involves more measurements, and is more repeatable than measurements for the gate monitor. For this reason, the gate monitor, while still useful as a screening tool to find lost sources and other unauthorized radioactive material, should not be part of waste acceptance criteria at CHDT. The procedure has been modified accordingly. 16 microR/hr at the gate monitor will continue to be the limit for inbound RCRA or solid waste shipments not profiled as radioactive material. 500 microR/hr will be the limit for NORM/TENORM shipments at which the RSO will be notified to check to ensure compliance with DOT regulations. The gate monitor will not be a part of normal waste acceptance procedures at CHDT as other procedures have made it superfluous. The gate monitors may be utilized at waste generating sites shipping NORM/TENORM waste to CHDT. In this case, waste-specific and survey geometry specific exposure rate criteria will be designated by the CHDT RSO. The use of exposure rate measurements for waste acceptance purposes at CHDT is detailed in SOP 15.WAC.01, Radioactive Materials Acceptance.

Operation of Exposure Rate / Dose Rate Meters (SOP 15.OPS.07)

20. Sections 2.0, 5.1.5 and 5.2.5 of this SOP make reference that the instruments described in this SOP may be used to determine worker exposure. It is worth noting that while these instruments are useful for determining an exposure rate, they should not substitute any dosimetry requirements for radiations workers.

CHDT Response: Exposure rate meters will not substitute for dosimetry. Additional review of the SOP has lead us to make several additional changes. The SOP was overly specific to the Ludlum Model 19. CHDT has a number of exposure rate instruments and the SOP was extended to different models. The SOP provided instructions and specifications for use of the Thermo/Bicron MicroRem Meter. This section was removed from the SOP since CHDT does not have any of these instruments.

Personnel Contamination Surveys (SOP 15.OPS.12)

21. In section 5.2 of this SOP, one of the bulleted items references the procedure in section 5.4. However, section 5.4 of this SOP describes Measurements of Removable Contamination. Looking at the current set of procedures and comparing them to the proposed SOP's with the renewal, section 5.4 was expanded into a separate SOP. Please update the SOP to reference the appropriate section or different procedures.

CHDT Response: Section 5.2, fifth bullet item has been revised to reference SOP 15.OPS.19 (Decontamination of Personnel).

22. Section 6.1 of the SOP states “The majority of personnel contamination surveys will be performed with the criterion of no contamination present, or no radioactivity above background.” Please specify which surveys will be limited to indistinguishable from background and, if a personnel contamination survey will have a limit above background, which surveys those are and the limits used for release.

CHDT Response: Section 6.1 has been revised. Personnel contamination survey results above background will require personnel decontamination.

Further review of the SOP has lead us to make additional changes to it. Specific instrument references were removed as CHDT has a variety of instruments that are suitable for use. Measurements of removable contamination on personnel were removed as inappropriate.

Equipment and Vehicle Release Surveys (SOP 15.OPS.13)

23. Table 2 in the SOP describes the DOT non-fixed surface contamination limits. The limits listed in the fifth column, the maximum permissible limit for empty packaging, is the limit for allowable internal contamination (49 CFR 173.428(d)). However, the SOP is not clear in this distinction. Please update the SOP to eliminate any possible confusion between the maximum permissible contamination limits for external packaging and internal packages. (From RFI Question 14) Having the internal package release limits for an excepted package – empty package in Table 2 would imply packages or materials are shipped in that manner. If any packages are being sent as an excepted package – empty package, please include in the procedure how the other requirements of 49 CFR 173.428 are being met.

CHDT Response:

The SOP has been revised to clarify and correct removable contamination limits. The SOP has also been revised to describe the procedures that will be utilized to ensure that empty packages are shipped in conformance with the regulations. CHDT will ensure that these requirements are being met in several ways.

The requirements include:

1. The conveyance or container must be in “exclusive use” per 49 CFR 173.427 (6). Specific instructions for maintenance of exclusive use shipment controls must be provided by the offeror to the carrier. These instructions must be included with the shipping paper information.
Requirements for exclusive use include:
 - a. Shipments must be loaded by the consignor and unloaded by the consignee from the conveyance or freight container in which originally loaded.
 - b. There may not be any loose radioactive materials in the conveyance; however, when the conveyance is the packaging, there may not be any leakage of radioactive material from the conveyance.

CHDT will meet the requirements of “a” above by not allowing a package to leave the site as a Class 7 Empty Package unless there is an exclusive use agreement in place. The CHDT RSO or designee will ensure that proper instructions are on file and carried with the shipping papers. The CHDT RSO will inform the staff that the exclusive use survey form is to be used which documents that the requirements are met.

2. The package must be marked with the appropriate UNID number.

CHDT will ensure that this requirement is met for all packages leaving the site in this condition.

3. The radiation level at the external surface must be less than or equal to 0.5mR/hr.

CHDT will perform surveys for radiation level at the package exterior to make sure this requirement is met. Survey results will be recorded on the survey form. (It must be noted that this level of radiation is above that of waste normally received at CHDT so empty packages of the waste should always be lower.)

4. Removable contamination on the external surface must be less than or equal to 220 dpm/cm².

CHDT will perform removable contamination surveys on the package exterior.

5. The package must contain no Fissile Material. (Not an issue for CHDT).
6. The packaging must be in unimpaired condition and securely closed to prevent the leakage of radioactive material under normal conditions.

CHDT technicians will verify the packaging is in unimpaired condition and securely closed.

7. The outer surface of any Uranium or Thorium in its structure must be covered... (Not an issue for CHDT)
8. Internal Contamination must be less than 100 times higher than the external limit (22,000dpm/cm²).

This limit is extraordinarily high and greatly exceeds anything CHDT has ever detected and can ever be expected to measure. CHDT will sample the interior of containers to verify that removable contamination is below the limit.

9. An "Empty" Label must be affixed to the packaging; all other labels must be removed, obliterated, or covered.

CHDT will ensure that the package is properly labeled.

10. The packaging is prepared for shipment per 49 CFR 173.422:
 - a. UNID number

CHDT will ensure that this requirement is met for all packages leaving the site in this condition.

- b. Incident reporting – incidents will be reported if necessary
- c. Reporting requirements on decontamination if there is leakage from excepted packages – this should not apply to empty containers.
- d. Training – CHDT employees will be properly trained in the requirements of shipping excepted packaging empty containers.
- e. Shipping papers must be used for hazardous substances or hazardous wastes – shipping papers will be used if needed.

Survey results will be documented on survey reports.

Air Monitoring for Radioactive Materials (SOP 15.OPS.15)

24. The SOP is very specific as to the sampling locations surrounding Cell 3. Please keep in mind when Cell 3 is sealed and Cell 4 becomes the active cell, this SOP will have to be revised as part of the license amendment.

CHDT response: CHDT agrees that this is overly specific. CHDT has revised the procedure to describe the locations in reference to the current active cell and the prevailing wind speeds and directions. Further review of the SOP made us aware of the need for some additional changes which were made to the SOP. Sampling equipment requirements were overly specific. Some of the current equipment lacks the needed

durability for long term field use and requires frequent maintenance. Changes in model and type of sampling equipment will be made in consultation with CDPHE. Air sample collection time and duration will be specified by the RSO and will be required to sample air during representative work activity for sufficient time to create adequate sample loading to measure. Air sample collection will be done during daylight hours as this will better equate with active work hours and will also allow the sampling units sufficient downtime to prevent overheating. The air sampler weekly and month inspection forms and the filter counting form were revised as well. The section on breathing zone monitoring was made less restrictive. Sample times and duration will be set by the RSO. During past operations at CHDT, specified sample time periods have not always provided sufficient quantities of material to analyze. In addition, CHDT wishes to be able to utilize a variety of breathing zone sampling equipment. In previous trials, lapel samples have not been able to collect measurable quantities of sample. Other equipment made by needed to accomplish this.

25. Section 5.3.2 of the SOP describes how the radon monitors are to be deployed around the cell. However, by having the background locations at the stationary air sampler stations, it would appear that the background would be higher than in area farther away from the active waste cell, thereby lowering the other monitor readings. Please reconsider the placement of the background locations.

CHDT response: CHDT is in agreement that the radon monitors next to the landfill are not proper background locations. Further review of the SOP has lead us to make several modifications to the procedure. Sampling of radon next to the landfill but outside of it does not yield any usable data. Since Radon diffuses rather than being windborne, monitoring for radon at the air sample locations does not yield any useful data. CHDT contends that the intent of the program is to measure radon in work areas in order to estimate inhalation doses to workers. For this reason, Radon sampler locations have been moved as follows: 2 samplers in the active landfill cell, 2 samplers in the Treatment Building and the remaining 6 to be used to measure background radon levels – 2 at the remote air sample stations and 4 at the perimeter fence line.

Decontamination of Surfaces and Equipment (SOP 15.OPS.18)

26. Section 5.2 of the SOP should specify the steps to take if contamination limits are exceeded during decontamination of heavy equipment.

CHDT Response: Section 5.2 has been revised to include actions to be taken if contamination limits are exceeded. All of this section was revised to avoid overly specific requirements and to update them based on CHDT operational experience. Section 5.2 has been revised to cover all “equipment”

27. Section 5.3 of the SOP needs to be changed. Testing the rinse water to verify decontamination is not an effective way to determine if an item has been successfully decontaminated. Each item which is being decontaminated for future use should be checked for removable contamination. Please update the SOP to include steps which verify each item being decontaminated is clean.

CHDT Response: CHDT is in agreement. Testing of rinse-water and all of Section 5.3 of this SOP have been eliminated and any equipment decontamination will need to follow the procedures of Section 5.2.

Package Receipt Surveys (SOP 15.OPS.21)

28. Table 1 in the SOP describes the DOT non-fixed surface contamination limits. The limits listed in the fifth column, the maximum permissible limit for empty packaging, is the limit for allowable internal contamination (49 CFR 173.428(d)). However, the SOP is not clear in this distinction. Please update the SOP to eliminate any possible confusion between the maximum permissible contamination limits for external packaging and internal packages.

CHDT Response: This SOP governs only package receipt and does not cover surveys of internal packages and empty containers. Limits and procedures for surveying of empty packages per 49 CFR 173.428 are found in SOP 15.OPS.13, (Equipment and Vehicle Release Surveys). The fifth column of Table 1 in this SOP has been deleted to prevent confusion as have all references to empty packaging. The surface contamination limits listed in Table 1 were off by a factor of ten. These limits have been corrected. The detailed "pre-survey instruments checklist" of Section 5.2 was removed as it is superfluous.

During review of the SOP's listed in this RFI, it was determined that additional SOP's required modification in order to be consistent with the modifications.

Operation of Portable Gamma Spectroscopy Units (SOP 15.OPS.03)

CHDT recently gained approval from the Department to acquire a new, different gamma spectroscopy instrument for use at our facility. New instruments were needed both due to the manufacturer discontinuing support for one instrument and to improve capabilities. CHDT is in the process of purchasing a different unit to serve as back-up for, and eventual replacement of, current instruments. SOP 15.OPS.15 has been revised to be less instrument-specific to allow the use of additional instruments from different manufacturers upon evaluation, approval and purchase. Step-by-step instructions have been removed as these already exist in the respective owner's manuals, which are used during employee training for specific instruments.

Handling of Liquids Containing Radioactive Materials (SOP 15.OPS.20)

This SOP was modified to make it consistent with the procedures of SOP 15.OPS.02 (Contamination Control During Treatment Activities) as noted in the response to question 15 of the RFI.

If there are any questions regarding this submission, please contact Clyde Christman or Jack Kehoe at the Clean Harbors Deer Trail facility at 970-386-2293.



Clyde E. Christman, RRPT, Radiation Safety Officer



Jack Kehoe, MS, Facility General Manager