Approved by:		
	General Manager	Radiation Safety Officer

STANDARD OPERATING PROCEDURE

15.OPS.03

OPERATION OF PORTABLE GAMMA SPECTROSCOPY UNIT

1.0 OBJECTIVE

To define general and specific methods and procedures for the operation of the Exploranium portable gamma spectroscopy unit to identify radionuclides in waste received at the Clean Harbors Deer Trail (CHDT) landfill or other job sites.

2.0 SCOPE

This standard operating procedure (SOP) applies to all activities associated with the use of the Exploranium GR-135 portable gamma spectroscopy unit and associated software. It does not apply to any other gamma spectroscopy system.

3.0 POLICY

Qualitative confirmation measurements using the portable gamma spectroscopy system will be performed on all incoming shipments of radioactive materials prior to disposal to confirm the presence of naturally occurring radionuclides. Measurements will also verify that radionuclides from other sources are not present within the disposed materials. Use of the portable gamma spectroscopy unit does not replace the collection of confirmation samples.

4.0 RESPONSIBILITIES

Responsibilities of the CHDT Radiation Safety Officer (RSO), management, and staff are defined in the CHDT *Radiation Protection Plan* (DR.RPP.01).

5.0 GENERAL SURVEY METHODS

5.1 Instrument Description

The Exploranium GR-135 Identifier is a sodium-iodide (NaI) based detector with a multi-channel analyzer (MCA) to allow for identification and quantification of gamma energies. The unit also contains a Geiger Mueller (GM) tube for measurements of high exposure rates. The unit contains a digital display which can allow the user to view collected spectra. The detector is also used with the IdentiView software. The units utilize a docking station for computer connectivity, stabilization checks, and battery recharging.

5.2 Operating Procedure

The Exploranium GR-135 Identifier (hand held gamma spectrometer) shall be used by trained CHDT staff to determine the relative contribution of radionuclides in waste received at the CHDT landfill. Unless otherwise directed by the CHDT RSO or designee, the measurements shall not be used to establish personnel dose rates. Measurements shall be taken where the

exposure rate is less than 2 mR/hour. When using the GR-135 spectrometer, the following procedure shall be used:

- Verify that the GR-135 Identifier is seated in the charger with the display reading "SYSTEM READY."
- Verify that the battery icon in the upper right corner of the display indicates the battery is at least ½ charged.
- Remove the GR-135 Identifier from the charger and place in the tripod at a height of 6 feet, at the midpoint of the waste shipment. The unit may be placed on the exterior of the trailer if a suitable location exists.
- The GR-135 Identifier will be in the "SEARCH" mode.
  - Note that if the GR-135 is to be transported to another location, then it shall be shut down for transport and turned on again at the desired location. To turn off the GR-135 Identifier, push the thumb lever to the "OFF" position AND hold it there until the unit reads "TURNING OFF" AND counts down 3-2-1 AND the screen goes blank, then reverse the lever.
  - To turn on the GR-135 Identifier, push the thumb lever to "ON" for 2 seconds, then release. The GR-135 should be in the "SEARCH" mode. If this does not occur, discontinue use and contact the CHDT RSO.
- In "SEARCH" mode, the GR-135 Identifier will display the current dose rate in µR/hour in the bottom left corner of the display.
- The GR-135 will alarm when the dose rate increases above the initial level measured at the time the GR-135 was turned on.
- To characterize the type of material in a radioactive source, push the thumb lever to "ON" for approximately 2 seconds and release.
- The GR-135 will count for a 10-minute interval, as displayed on the left lower portion of the display.
  - If the box in the upper right portion of the display reads "OK," then allow the GR-135 to count until count is complete and the GR-135 beeps. The GR-135 will either display "NO NUCLIDES Detected" or display a list of radionuclides detected in the sample. The GR-135 will display a text message "SPECTRUM STORED AS #XX" at the bottom of the display window.
  - If the box in the upper right portion of the display reads "MOVE CLOSER," THEN move the GR-135 closer to the source of radiation being characterized until the display reads "OK." If the unit is in contact with the sample or source, disregard this message.
  - If the box in the upper right portion of the display reads "MOVE AWAY," THEN move the GR-135 farther away from the source being characterized until the display reads "OK."

- Note that sometimes the radiation levels are too low to register in a ten minute sample period, and the unit will show "NO NUCLIDES FOUND." In some cases, increasing the sample analysis time will improve the analysis. If this occurs, or if a longer count time is wanted, push the thumb level to "OFF" and release it to obtain a longer sample count time.
- To count a different sample, press the thumb lever momentarily to 'OFF," which will switch the unit to the "SEARCH" mode. Repeat the above steps to count a new spectrum.

- When finished, place the GR-135 into the Docking Station.

5.3 Downloading and Saving Spectrum Files

Unless otherwise directed by the CHDT RSO or designee, download each spectrum immediately following collection using the following steps.

- On a computer with the IdentiView software installed, open the software. The computer will display download progress and count down the number of spectra remaining to be downloaded. The computer will display a box with the words "DO YOU WANT TO SAVE THE DATA?"
- Under a filename, input the data in YYYYMMDD format, followed by up to 30 characters and spaces of additional text to help identify the recorded spectrum.
- Click on the Save box.
- The computer will prompt "DATA STORED DO YOU WANT TO ERASE THE GR-135 MEMORY;" select "YES." The computer will prompt, "ARE YOU SURE?" Select "YES."
- The spectral data may be viewed, if desired. When finished, shut down the program by double clicking on the red "X" in the upper right hand corner of the Identiview software window. When finished, keep the GR-135 in the charger to charge the batteries and stabilize the unit.

6.0 STANDARDS AND CRITERIA

The unit will self-stabilize while in the docking station, so no quality control is required. The unit does require annual calibration by the manufacturer.

7.0 REFERENCES

Exploranium, Inc., 2005. *GR-135B, The Identifier System Manual*, Revision 1.0, Part Number 87417-1, June.