

STANDARD OPERATING PROCEDURE

SOP No.: OQC-0307
Revision No.: 4
Date Revised: 01/06/06

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CATEGORY: OPERATION QUALITY CONTROL
TITLE: OPERATION AND HANDLING OF ELECTRON CAPTURE DETECTORS

1 PURPOSE:

1.1 The procedures for the safe operation and handling of an Electron Capture Detector (ECD) in the analysis of environmental samples.

2 RESPONSIBILITY:

2.1 Any laboratory personnel involved analyzing samples on a Gas Chromatograph (GC) equipped with an ECD are to be trained in the proper handling and use.

3 SAMPLE COLLECTION, PRESERVATION AND HANDLING:

3.1 Sample collection is performed by the CECOM Directorate for Safety in accordance to NRC regulation.

4 REFERENCES:

- 4.1 Information for General Licensees for Hewlett-Packard Electron Capture Detectors, Hewlett-Packard, 1997.
- 4.2 The Micro-Cell Electron Capture Detector Operating Manual, Hewlett-Packard, 1996.
- 4.3 Ionizing Radiation Protection Program, CECOM Regulation 385-18, 21 June 1996.

5 SUMMARY:

5.1 The GC is required to be operated in an environmentally controlled room to prevent damage and erratic responses/results. Personnel working with this instrument are required to wear laboratory coats, shatter proof glasses and protective gloves. Review "Chemical Hygiene Plan" and "Handling of Methylene Chloride" for specific requirements. Personnel operating this equipment are also required to participate in Hazards Communications training, participate in at least 8 hours of on the job training (specifically for this instrument and detector system) with the area supervisor and show proficiency in operation.

6 DEFENITIONS:

6.1 NRC-Nuclear Regulatory Commission.

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| Prepared By: _____ | Date: 1-6-06 |
| Laboratory Director: _____ | Date: 1-6-06 |
| QA/QC Manager: _____ | Date: 1/6/06 |

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6.2 CECOM-Communications-Electronics Command

7 SAFETY:

7.1 Engineering Controls: The Ni 63 source is shielded and cannot be disassembled, there is an inlet and exhaust only. The maximum detector temperature is 400 deg. C and the ECD must not be heated above these limits. This limit is built into the HP 5890 and HP 6890 GC's temperature control system. If a malfunction should occur and the temperature of the ECD should rise to 425 deg. C, the instrument's control system will turn off all thermal zones. Pressure within the instrument is regulated via electronic flow controllers and the pressure at the tank with a 2 stage, stainless steel regulator.

7.2 Procedural Controls.

7.2.1 Assure that the instrument is properly configured for the analysis about to be performed.

7.2.2 Frequently monitor the ECD pulse signal, temperature and pressure gauges.

7.2.3 Perform the NRC required wiped testing as prescribed in the general license provisions. The casing, inlet and exhaust must be tested every six months. If the test results exceed 0.005 mCi, the ECD must be taken out of service and the proper authorities notified.

8 PROCEDURES:

8.1 All incidents involving the ECD are to be reported to the CECOM Safety Office **within 1 hour** and the general license holder (Hewlett Packard) **within five working days**. An "incident" is any occurrence involving radioactive material that has caused or may cause:

8.1.1 Exposure to dangerous levels of radiation.

8.1.2 Release of dangerous amounts of radioactive materials.

8.1.3 Loss of working time because of radiation hazard.

8.1.4 Damage to property.

8.2 The following is a listing of criteria to aid in recognizing possible incidents and other failures.

8.2.1 **High Wipe** – If the leak test results exceed 0.005 mCi, a notification of failure must be reported.

8.2.2 **Temperature Runaway** – A failure in the temperature control circuits could cause the heating of the detectors to exceed their limits. If this should occur, this must be reported.

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- 8.2.3 **Physical Damage** – If the ECD is involved in a fire, flood, or any other event that may cause harm to the ECD, this must be reported.
- 8.2.4 **Modification of the ECD** – Changes to the ECD, including drilling, welding, soldering, sawing, or other operations, are prohibited under a General License. If this occurs, it must be reported.
- 8.2.5 **Breakage of the ECD** – If the inlet fitting or vent tube of the ECD should brake off, take the ECD out of service immediately, and report this failure to appropriate agency.
- 8.2.6 **Lost ECD** – If you should lose, misplace, accidentally dispose of an ECD, or if an ECD gets lost in shipping, it must be reported.

8.3 Emergency Contacts:

- 5.3.1 Fire Department 911
- 5.3.2 First Aid 911
- 5.3.3 Police 911
- 5.3.4 Health Physics 29723 / 73112
- 5.3.5 SAI work control 21122
- 5.3.6 Hewlett-Packard Attn: Radiation Safety Officer
2850 Centerville Road
Wilmington, DE
19808-1610