UNION CARBIDE CHEMICALS AND PLASTICS COMPANY INC.
P.O. Box 8361
South Charleston, WV 25303

U.S. Nuclear Regulatory Commission
Region II
101 Marietta St., N.W.
Atlanta, GA 30323

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By: JM Lodwick

Dear Sirs:

We are proposing to perform a continuing series of radioisotope studies for subsurface remediation and contamination monitoring. This work will involve the use of various liquid hydrocarbon materials. Disposal of the liquid waste from these experiments in a low level radioactive waste site would be very difficult if not impossible for several years. Our site has an EPA permitted hazardous waste incinerator[1]. We are seeking permission to dispose of these waste by burning in our hazardous waste incinerator.

The following are candidate materials for use in this study:

Chemical	EPA waste ID #
benzene	U019
1,2-dichloroethane	U077
toluene	U220
chlorobenzene	U037
tetrachloroethane	U208/U209
dichlorobenzene	U070/U071/U072
napthalene	U165
bis(2-ethylhexyl)phthalate	U028
benzo[a]pyrene	U022

The total activity of carbon 14 to be used in this study annually is 0.5 mCi. The waste generated will be of the following estimated annual amounts:

Physical Form	Volume	Activity
dry	4 cu ft	0.075 mCi
liquid (aqueous)	10 gal.	0.015 mCi
liquid (organic)	5 gal	0.05 mCi
scint. vials	15 gal.	0.05 mCi

[1]The incinerator has permit number WVD 060682291 issued by the State of West Virginia Dept. of Natural Resources and the Air Pollution Control Commission.

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The incinerator stack gas flow rate is about 8,300 actual cubic feet (ACF) per minute at 90° F. Saturated Flow. The stack height is 17 feet and its exit diameter is 1.93 feet. The exhaust gases are water scrubbed at the rate of 200 gallons per minute. The water goes to the industrial side of the South Charleston (WV) Waste Treatment Works. Ash from the burning is removed from the incinerator about four times per year. Materials in glass containers up to one quart are placed directly into the incinerator, container and all. Larger volumes of liquid are air aspirated into the burning chamber.

The incinerator can be operated 8 hours per day, 5 days per week, 52 weeks per year. Down time for maintenance and repair is estimated at less than 10%. The operating time is 1.12 E 05[2] minutes per year and the total volume of air & exhaust gases exiting the incinerator is 9.30 E 08 ACF/yr = 2.63 E 13 ml/yr. If all carbon-14 from organic waste liquid and scintillation cocktails (0.1 mCi) were burned and averaged over a year, the average concentration would be 3.80 E-12 μCi/ml which is well below the permissible level (1 E-06 μCi/ml) cited in 10CFR20 Appendix B, Table 2. Fifteen gallons of liquid scintillation cocktail (density assumed to be 1.0g/ml) containing 0.05 mCi of C-14 would have an average concentration of 8.80 E-04 μCi/g. The permissible concentration cited in 10CFR20.306(a) is 5 E-02 μCi/g.

If all of the carbon-14 is scrubbed out and exits through the waste water from the incinerator (200 gal/min=7.07 E 11 ml/mo) and all 0.1 mCi is incinerated in one month, the average concentration would be 14 E-11 μCi/ml which is well below the permissible level of 2 E-02 μCi/ml.

Incinerator Operators will be given training on radiation safety for carbon-14 handlers, handling procedures and spill response. Bulk waste materials will be accumulated in reusable plastic carboys. Prior to incineration, the total activity in the carboy will be determined by liquid scintillation counting. When practical materials such as liquid scintillation vials & cocktail will be accumulated in quart bottles. Quart containers can be placed directly into the incinerator. Larger containers of liquid are aspirated into the incinerator. A Radiation Safety Technician will coordinate waste disposal with laboratory personnel and the incinerator operators. All waste containers will be checked for external surface contamination before being taken from the laboratory where generated. All waste containers will be labeled "Radioactive Material"and will list the chemical form,

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[2]The exponential notation 1.15 E 05 = 1.15 x 10^5 is used in this letter.

quantity and type of radioisotope contained there in. Waste will be picked up in the laboratory by a Radiation Safety Technician who will take the waste to the incinerator and stay with it until it has been burned. Materials left unburned at the end of the work day will be returned to the laboratory for security purposes. Acceptable levels of contamination are specified in the "Technical Center Radiological Control Manual, Revised July 1989".

Ash from the incinerator will be monitored for C-14 contamination by taking three representative samples of the ash and counting them in the Low Beta-2 counter. If the ash is contaminated it will be held for disposal as low level radioactive waste. A sample of ash will be counted prior to the first incineration of contaminated waste for reference. All carbon-14 is expected to be converted to CO_2 and to leave the incinerator as exhaust gases.

Nonflammable aqueous solutions will be collected in plastic carboys measured for activity and will be released to the sanitary sewer according to the terms specified in 10CFR20.303. Liquid not meeting these criteria will be solidified and held as dry solid waste. If this should occur the guidance of the operator of the Appalachian States Regional Low Level Radioactive Waste Disposal Site will be sought on best methods for solidification of aqueous waste.

An exhaust gas sample will be extracted during the incineration of radioisotopes and run through our Triton air monitor. A liquid trap will collect condensables in the sample line. The condensate will be measured and counted and added to the results of the Triton air monitor to produce a measure of the concentration of C-14 in the exhaust. The water from the incinerator will be sampled continuously during the burn and for sometime afterwards. This sample will be counted to obtain an estimate of the average concentration of C-14 in the waste water from the incinerator.

Solid waste will be kept to a minimum, compacted and stored on site until a satisfactory approved method of disposal can be obtained. Where possible, waste will be checked for contamination and if none is found, will be disposed of in the general trash. It is acknowledged that we may have to store solid waste on site until the Appalachian States Regional Low Level Radioactive Waste Disposal Site is operational in the late 1990's.

Radiation monitoring will be performed using a liquid scintillation counter which is to be purchased, a Beckman Low Beta-2 gas flow proportional counter and an Eberline E-520 survey meter with an HP-190A probe (~10% efficiency C-14).

Laboratory personnel will be responsible for monitoring their work area for contamination and keeping it at minimal levels. Radiation Safety Personnel will monitor the hall outside the lab for contamination monthly or more frequently as required.

Unless specified otherwise in this letter, the procedures describe in the "Technical Center Radiological Control Manual, Revised July 1989" will be followed.

The anticipated exhaust concentrations calculated here are 1 E-06 to 1-E09 less than the permitted level. Since this is an R&D activity, the quantity of radioisotopes needed for successful experiments may change. I am therefore requesting permission to dispose of up to ten times the quantity of radioisotopes specified in the body of this letter to provide a little lee way for the uncertainties of a research project.

A check in the amount of $500 to cover the amendment fee is enclosed.

If you have any questions about this you may call me at (304) 747-5314.

Yours truly,

Michael L. Green
Rad. Safety Officer
Lic.No. 47-00260-02

PROCEDURE FOR MONITORING THE TECHNICAL CENTER EPA INCINERATOR FOR C-14 OR H-3

STACK EFFLUENT

The Johnson Laboratories Triton 955B will be checked out and connected to one of the existing sample taps on the exhaust stack. A chart recorder will record the output of the Triton. The Triton pumps, at a constant preset rate, a sample of gas through a large ion chamber.

The instrument will be calibrated with the existing cylinder of H-3 calibration gas.

A condensate trap will be installed at a low point in the sample line.

The instrument will be started prior to the first rad. waste injection into the incinerator and operate continuously until 15 min after the last injection or when the output returns to background levels. The total time the Triton sampled the stack will be noted.

The output of the instrument will be integrated to estimate the total quantity of radioisotope. The volume of condensate will be measured and a sample will be analysed with a liquid scintillation counter. This activity will be added to the results of the Triton analysis. The total quantity of radioisotope in the stack gas and the average concentration for that day will be calculated.

Scrubber Water

A low sample rate pump will continuously pull a sample from the waste scrubber water stream during the burning of radioactive waste. The sampling will continue until 15 minutes after the last injection of rad. waste. The time of sampling and average flow rate of the waste stream will be noted. A sample of the collected water will be analysed for radioisotope contamination in a liquid scintillation counter. The total quantity of radioisotope in the waste water stream and the average concentration for the day will be calculated. These results will be reported to the UCC&P Technical Center Environmental Protection Department (511 EPD), The UCC&P So. Charleston Plant EPD and the South Charleston Waste Treatment Works.