



110 Irving Street, NW Washington, DC 20010

June 3, 1980

Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sirs:

The Washington Hospital Center requests a special amendment to our NRC license 08-03604-03 for the incineration of liquid scintillation counting waste (LSCW) containing low-level radioactivity. We would like the amendment to include LSCW from both the Washington Veterans Administration Medical Center and Children's Hospital National Medical Center based on the data and calculations below, the amount of radioactive material incinerated will not exceed the following daily and annual amounts:

ISOTOPE	INCINERATION LIMITS	
	Daily	Annually
H-3	2 mCi	730 mCi
C-14	1 mCi	365 mCi
I-125	.002 mCi	0.7 mCi

Our boiler plant (which serves all three hospitals) burns on the average 12,000 gallons of fuel oil per day in the summer and 24,000 gallons per day in the winter months. Each boiler operates at 1200 to 1400 degrees Fahrenheit (this will result in complete volatilization) with an average air flow of 1500 feet/min through an 80 foot tall stack.

Approximatley 14 pounds of air is theoretically required to burn one pound of fuel oil (Plenary Session Paper 106, 23rd meeting of the Health Physics Society, June 18-23, 1978). Combustion results in a 5-7% increase in gas volume corrected to standard temperature and pressure. Thus, for each pound of fuel oil burned, the stack emits:

$14 \text{ lb air} \times 454 \text{ gm/lb} \times 1 / (0.001293 \text{ gm/ml}) \times 1.05 = 5.2 \times 10^6 \text{ ml air/lb fuel}$

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RECEIVED B. L FMB
Date... JUN 19 1980
Log. June PG 9 Amend.
By..... Brown
Orig. To.....
Action Compl. 6/20/80

Applicant.....
Check No. 154427
Amount/Fee Category 246 (76)
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Date Check Rec JUN 19 1980
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At 7.5 lbs per gallon of fuel oil and 12,000 gallons/day, the average daily stack exhaust is:

$$5.2 \times 10^6 \times 7.5 \times 1.2 \times 10^4 = 4.7 \times 10^{11} \text{ ml/day}$$

Thus for example, the hospital could burn the following amounts of a single radioisotope without exceeding the NRC environmental limits at the stack mouth:

ISOTOPES	(TBL II, Col 1) NRC LIMIT	Average Permissible Limit/Day
C-14	$4.7 \times 10^{11} \times 1 \times 10^{-7} \text{ uCi/ml}$	$4.7 \times 10^4 \text{ uCi} = 47 \text{ mCi}$
H-3	$4.7 \times 10^{11} \times 2 \times 10^{-7} \text{ uCi/ml}$	$9.4 \times 10^4 \text{ uCi} = 94 \text{ mCi}$
I-125	$4.7 \times 10^{11} \times 8 \times 10^{-11} \text{ uCi/ml}$	$3.7 \times 10^1 \text{ uCi} = 37 \text{ uCi}$

Mixtures of two or more isotopes (A + B +...) shall be such that

$$\text{Amt A/Lim A} + \text{Amt B/Lim B} + \dots \sim 1$$

The three hospitals presently generate the following liquid scintillation waste (estimated concentration is 0.001 uCi/cc):

WHC	6 uCi/wk H-3	(0.3 mCi/yr)
Va	15 uCi/wk H-3 and C-14	(0.8 mCi/yr)
Children's	4 uCi/wk H-3 and C-14	(0.2 mCi/yr)

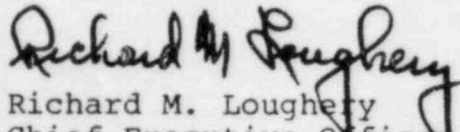
Attached is a map of the area surrounding the incinerator stack. The vicinity to the north and around to the east is primarily park, Soldier's Home, Catholic University, Va Hospital and Trinity College complex. From east to south is primarily single family residential and cemeteries. From south to west is Children's Hospital, the reservoir, Howard University and single family residential. The west to north area is primarily park and single family residential. The prevailing winds are from the west.

Also attached is a proposed instruction sheet that will be incorporated into our radiation safety guide and posted in each area where liquid scintillation counting is performed.

Mr. Ralph Sanderson from D.C. Department of Environmental Services has assured us that an amendment to our NRC license to incinerate LSCW containing low-level radioactivity will not be in conflict with the D.C. regulations.

If you need further information please contact our Radiation Safety Officer, Mr. Kenneth D. Williams (541-6496).

Sincerely yours,


Richard M. Loughery
Chief Executive Officer

cc: Chairman, Radiation Safety Committee
Radiation Safety Officer
Administrator, VA Medical Center
Administrator, CHNMC



0.5 MILE

STACK

WIND

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Collection, Transport & Handling of Liquid Scintillation Waste

1. All liquid scintillation counting waste (LSCW) containing radioactive iodine-125, carbon-14 or tritium will be collected and incinerated on a weekly basis.
2. The transfer of LSCW from the counting vials into a storage and/or transport container shall be done in an exhaust hood. The transfer system should contain a particulate filter and should be designed to minimize spillage and radioactive contamination possibilities. The storage/transfer container shall be one that is suitable for xylene and toluene (many plastics will not properly contain these chemicals).
3. The vials and caps should be left in the hood overnight to evaporate any remaining liquid. They can then be transferred to a designated dry waste compactor.
4. When the storage/transfer container is full, (or prior to incineration) take a 10 cc aliquot and determine the concentration of H-3 and C-14 in the container. Record both the concentration (uCi/ml) and the volume of liquid to be incinerated.
5. The LSCW transport container must be one that will contain the liquid even in the event of a minor accident such as dropping the container (plastic bottle, glass bottle inside a metal or plastic holder, etc).
6. The LSCW will be transferred into a designated 12,000 gallon fuel oil supply tank. The fuel tank is below ground with a ground level access plate covering the filling pipe and cap. The transfer system should be designed to minimize spillage and radioactive contamination possibilities.