



DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

National Institutes of Health
Bethesda, Maryland 20205
Building : 21
Room : 110
(301) 496- 2254

November 20, 1985

Nuclear Regulatory Commission, Region I
Nuclear Materials Section B
631 Park Avenue
King of Prussia, PA 19406

Ref: License No. 19-00296-10

Dear Sir or Ms:

This is a request to amend the National Institutes of Health License No. 19-00296-10 regarding the management of liquid radioactive wastes with respect to disposal by release to the sanitary sewerage system.

The increase in the amount of liquid radioactive waste being generated by the biomedical research program at NIH, combined with our desire to minimize as much as is feasible the volume of low-level radioactive waste that is sent for disposal to radioactive waste burial sites in accordance with the NRC directive, has necessitated this request for more flexibility in our waste management procedures. In essence we wish to change our procedures to ones that are supported by a more scientific and technical rationale and that are in compliance with 10 CFR 20.

Of imminent concern is our current inability to release liquid radioactive waste from our waste retention tanks to the sanitary sewerage system because the measured concentrations of radionuclides in the waste exceed our self-imposed procedural concentration limits as detailed in our application for renewal and associated correspondence leading to Amendment No. 42 of License No. 19-00296-10, dated August 11, 1981. Our procedural limits are much more restrictive than those allowed pursuant to 10 CFR 20 for other licensees, and in the past we were able to meet our more restrictive limits. However, our retention tanks are full, and we must release to the sanitary sewerage system very soon so that we can properly manage newly-generated liquid radioactive waste.

Two changes are requested, as follows:

1. Rather than the detailed procedures outlined in our application for renewal dated February 27, 1980, and related correspondence dated November 7, 1980, we propose to manage liquid radioactive waste, in particular with regard to disposal by release to the sanitary sewerage system, in full compliance with 10 CFR 20.303(a), 20.303(b)(1), and 20.303(c).

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2. Increase our annual total curie limit for disposal by release to the sanitary sewerage system to 40 curies, rather than our current eight curies per year limit.

In support of the increase to a 40-curie annual limit, the following technical rationale is provided:

Based on Washington Suburban Sanitary Commission records, the annual water usage by NIH in 1984 was 2.251×10^{12} ml./year. Adjusting for the 10% of water used that does not enter the sanitary sewerage system (water used for cooling towers), the calculated annual volume of sewage is as follows:

$$90\% \times 2.251 \times 10^{12} \text{ ml./year} = \underline{2.026 \times 10^{12} \text{ ml./year.}}$$

The following table indicates the composition by radionuclide as a percentage of the total activity in liquid waste collected and analyzed during the period of January through October 1985 (10 months):

	<u>RADIONUCLIDE</u>	<u>PERCENTAGE OF TOTAL ACTIVITY IN LIQUID WASTE</u>	<u>AVERAGE ANNUAL FRACTIONAL MPC (40 Ci. Total Release)</u>
1.	H-3	43.48%	0.000086
2.	P-32	19.23%	0.007593
3.	I-131	10.13%	0.033333
4.	S-35	9.70%	0.000958
5.	I-125	9.30%	0.045903
6.	C-14	6.66%	0.000066
7.	Ca-45	0.62%	0.000408
8.	Cr-51	0.35%	0.000001
9.	Fe-59	0.24%	0.000024
10.	In-111	0.08%	0.000176
11.	Cl-36	0.06%	0.000006
12.	Rb-86	<u>0.05%</u>	<u>0.000005</u>
	Subtotal:	99.90%	0.088559 (8.86%)

The residual 1/1000 or 0.1% of the total activity in liquid radioactive waste during this period was comprised of small activity amounts of the following radionuclides, in decreasing order of their activities:

OTHER RADIONUCLIDES

13. Se-75	26. Zn-65
14. Na-22	27. Co-58
15. Tc-99m	28. Cd-109
16. Mn-54	29. Tb-160
17. Pb-210	30. Mo-99
18. Co-57	31. Gd-153
19. Fe-55	32. Bi-210
20. Tc-99	
21. Ga-67	
22. Pt-195m	
23. Cu-64	
24. U-238	
25. Th-228	

Assuming the 40-curie total activity per year release limit, and a radionuclide composition as indicated in the table, the fractional MPCs based on the annual sewage flow can be calculated, as shown in the last column. The sum of the fractional MPCs indicates the degree of compliance with regulatory requirements on an annual average basis. Thus, if we were to dispose of liquid radioactive wastes to the sanitary sewerage system at the 40-curie per year limit, and with the typical distribution of activity by radionuclide as indicated, the annual average combined fractional MPC would be only 0.0886 or 8.86% of the regulatory concentration limit, which might be considered to be in the realm of "ALARA".

Lest there be concern with the 1/1000 or 0.1% of the total activity that is contributed by the "Other Radionuclides", the following is presented:

$$0.1\% \text{ of } 40 \text{ curies} = 0.04 \text{ curies/year of "Other Radionuclides"}.$$

Assuming that the 0.04 curies is all Pb-210, the "other radionuclide" having the lowest MPC, the contribution to the sum of the fractional MPCs would be 0.0049, or an additional 0.49%.

As an extremely incredible example of the conservatism in a 40-curie per year total activity limit, it is assumed that 40 curies of I-125 (the radionuclide in the list of 12 having the lowest MPC) are released to the NIH sanitary sewerage system during the year. The fractional MPC on an annual average basis would be 0.494 or 49.4% of the regulatory concentration limit.

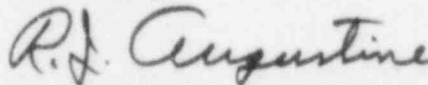
In summary, it is requested that License No. 19-00296-10 be amended in the following manner:

1. Delete the liquid radioactive waste management detailed procedures as committed to in the application and related correspondence leading to Amendment No. 42, and replace with our commitment to manage liquid radioactive wastes, in regard to disposal by release to the sanitary sewerage system, in full compliance with 10 CFR 20.303(a), 20.303(b)(1), and 20.303(c).
2. Allow a maximum of 40 curies per year, combined total activity in liquid radioactive waste, to be disposed by release to the sanitary sewerage system.

Because of our imminent need to release liquid wastes from our retention tanks, your expedited consideration of this request would be appreciated. A telephone call advising me of approval, if granted, pending written confirmation of an amendment, would assist the NIH greatly.

Please contact me if additional or clarifying information is required.

Sincerely,



R.J. Augustine, Ph.D.
Radiation Safety Officer, NIH

cc: Dr. Jacob Robbins, Chairman
NIH Radiation Safety Committee
Dr. W. Emmett Barkley, Director
NIH Division of Safety