OREGON HEALTH & SCIENCE UNIVERSITY

RADIATION SAFETY
OPERATING PROCEDURE
1803

RADIONUCLIDE DRAIN DISPOSAL

I. PURPOSE:

This procedure describes a method of determining the activity of liquid waste which is disposed of via the drain. It also describes the steps for reporting drain disposal to the Radiation Safety Office (RSO).

II. DISCUSSION:

In order to ensure that all drain disposal limits throughout the University are not exceeded, limits have been placed on the amounts of radioactivity that may be disposed of down the drain on a per license basis. Before drain disposing of radionuclides, calculate the activity and check the disposal limit(s) for the nuclide(s).

This procedure is applicable to all who are authorized to use a sink drain for disposing of radionuclides.

III. EQUIPMENT:

A. Pipetter & tips
B. Container
C. Liquid scintillation vials, cocktail
D. Liquid scintillation counter (LSC)
E. Calculator
F. Lab coat
G. Protective gloves/eyewear
H. Drain disposal form

IV. PRECAUTIONS:

A. **ONLY WATER SOLUBLE LIQUIDS MAY BE DISPOSED OF DOWN THE DRAIN.**

B. Wear protective clothing and eyewear when handling radioactive materials.

C. Only sinks designated as Ahot@ sinks on the radioactive material license may be used for drain disposals. The sink area must be labeled with Aradioactive material@ tape.

V. PROCEDURE

A. Estimation of Radioactivity Prior to Drain Disposal

1. Sampling and counting a radioactive aqueous liquid
   a. Collect and record the volume of radioactive aqueous liquid in a suitable container.
   b. Aliquot one milliliter (or other appropriate volume) of liquid and pipette into an LSC vial, fill with cocktail and place into a liquid scintillation counter.
   c. Using the appropriate LSC channel(s), obtain the number of counts per minute.
2. Calculating total activity
   a. Convert cpm to disintegrations per minute (dpm).

      dpm = cpm / Efficiency

      Note: Efficiency will vary depending on radionuclide and instrument settings.

   b. Calculate total activity by multiplying dpm/ml by total volume, then convert to µCi.

      µCi = total dpm / 2.22 x 10^6 dpm/µCi

   c. Check sink disposal limits in the OHSU regulations, record the date, activity, radionuclide and initials on the sink disposal log and dispose of accordingly.

3. Example:
   500 milliliters of aqueous liquid have been collected after washing some ^{32}P blots. One milliliter has been pipetted into a vial. The vial has been filled with cocktail and loaded into an LSC. The resulting counts are 75,000 counts per minute.

   a. Convert cpm to dpm:

      75,000 cpm / 95% (Efficiency of counter for ^{32}P)

      75,000 / 0.95 = 78, 947 dpm/ml

      78947dpm/ml x 500ml = 3.95 x 10^7 dpm in the container.

   b. Change dpm to microcuries:

      3.95 x 10^7 dpm / 2.22 x 10^6 dpm/µCi = <u>17.79 µCi</u>

NOTE: All documentation must be retained in the laboratory for at least 2 years.

B. Drain Disposal by AAveraging method@

1. Perform above procedure at least 3 times on same protocol. The same initial activity

must be used each time.

2. When similar values are obtained for these LSC readings, take the average of the calculated activity.
3. Use this value for subsequent drain disposals for that protocol.
4. This value should be updated when a significant number of people have left the laboratory and/or the protocol changes.
5. This average should also be updated approximately every 3 years.