U.S. Department of Energy
Hanford Site

July 9,2021

21-ECD-002009

Mr. John Martell, Manager
Radioactive Air Emissions Section
Washington State Department of Health
309 Bradley Blvd., Suite 201
Richland, Washington 99352

Dear Mr. Martell:

U.S. DEPARTMENT OF ENERGY SUBMITTAL OF ANALYTICAL LABORATORY ANNUAL POSSESSION QUANTITY TRACKING STRATEGY

References:

1. WDOH letter from J. Martell to B. T. Vance, DOE, "Re: Approval of Notice of Construction (NOC) 1331," AIR 18-807/NOC 1331, dated August 22, 2018.

2. WDOH letter from J. Martell to K. W. Smith, DOE, "Re: Approval of Notice of Construction (NOC) 1045 for the Hanford Tank Waste Treatment and Immobilization Plant (WTP)," AIR 17-412/NOC 1045, dated April 24, 2017.

3. WDOH letter from J. Martell to K. W. Smith, DOE, "Re: Approval of Notice of Construction (NOC) 1044 for the Hanford Tank Waste Treatment and Immobilization Plant (WTP)," AIR 17-408/NOC 1044, dated April 24, 2017.

References 1, 2, and 3, provided Washington State Department of Health (WDOH) authorized construction of radioactive air emission units for the Analytical Laboratory. Condition 35 in each license requires the U.S. Department of Energy to provide to WDOH for approval a proposal for tracking the Annual Possession Quantity (APQ) for each emission unit prior to receipt of radioactive material by the facility.

Attached is the Laboratory Ventilation APQ Inventory Tracking Strategy for Direct-Feed Low-Activity Waste Operations to fulfill this requirement.

If you have any questions, please contact me, or your staff may contact Glyn D. Trenchard, Acting Assistant Manager for Safety and Environment, on (509) 373-4016.

Sincerely,

BENTON HARP
Digitally signed by BENTON HARP
Date: 2021.07.09 08:45:54 -07'00'

Brian T. Vance
Manager

ECD:BRT

Attachment:
Laboratory Ventilation APQ Inventory Tracking Strategy for Direct-Feed Low-Activity Waste Operations

cc w/attach:
L. M. Bauder, Ecology
M. J. Demiter, HMIS
G. L. Laws, WDOH
C. D. Mathey, WDOH
Administrative Record
BNI Correspondence
Environmental Portal, G3-35

cc w/o attach:
J. Bell, NPT
J. Buck, Wanapum
L. Contreras, YN
S. Davis, BNI
R. Ferri, YN
B. Haggard, BNI
J. M. McAuley, EPA (Region 10, Seattle)
M. Murphy, CTUIR
B. Walker, BNI

Attachment
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Laboratory Ventilation Annual Possession Quantity Inventory Tracking Strategy
for Direct-Feed Low-Activity Waste Operations

4 pages including cover sheet

Lab Ventilation Annual Possession Quantity Inventory Tracking Strategy for DFLAW Operations

Annual Lab Ventilation Systems Possession Quantity Process Overview

- The Analytical Laboratory (Lab) will process radioactive samples from the Concentrate Receipt Vessel (CRV), Melter Feed Preparation Vessel (MFPV), Effluent Management Facility (EMF), and various Radioactive Liquid Waste Disposal Systems (RLD). Each incoming radioactive sample will be measured for alpha, beta, and gamma activity except sealed samples being packaged for analysis in another laboratory (e.g., proprietary EMF stack samples). These sealed samples not opened within the Lab will not be included in the WTP Lab Annual Possession Quantity (APQ).
- Proposed APQ permit limits originate in the three draft Contingent Operating Licenses (CCN 322600, CCN 322647, and CCN 322648).
- The current APQ is a summation of the samples in the Lab, the RLD, and all radioactive samples received by the Lab, except those not analyzed but only packaged for external analyses (e.g., EMF stack samples) throughout the year. Any activity removed via RLD transfers or sample disposal are not subtracted except at the annual APQ reset.
- Notification to the Washington State Depart of Health (WDOH) is required when an APQ sum reaches 90% of the permitted limit.
- No radioactive sample processing occurs in the C2V ventilated zones; all samples are sealed. The limit for the C2V System was established assuming the maximum allowable surface contamination. Only new surface contamination data is to be used for the C2V APQ log. Fixed contamination from prior events will not be carried over at the annual APQ reset.
- Radioactive sample processing in the C3V/C5V ventilated zones must stop once the APQ limit is reached in a given year unless a variance has been received from WDOH due to the previous 90% notifications.
- APQ data must be entered into the running total log within 24 hours of the alpha, beta, or gamma sample reporting for each sample.
- For the purpose of the APQ, all alpha radiation is to be assumed to originate from a 241-Am decay.
- For the purpose of the APQ, all beta radiation is to be assumed to originate from a 90-Sr decay.
- For the purpose of the APQ, all gamma radiation is to be assumed to originate from a 137-Cs decay.
- 222-Ra is not included in the APQ alpha radiation totals.

C2V Ventilation System APQ Calculation

Annual Limit:

90-Sr (total beta) activity: 1.37E-05 Ci

241-Am (total alpha) activity: 2.37E-07 Ci

WDOH notification is required should APQ summation reach:

90-Sr (total beta) activity notification limit: 1.23E-05 Ci

241-Am (total alpha) activity notification limit: 2.13E-07 Ci

APQ Methodology:

1. At the beginning of each year, report any non-fixed beta or alpha surface contamination in the zones ventilated by the C2V system as 90-Sr or 241-Am, respectively.
2. For any newly contaminated surfaces, determine the specific alpha and beta contamination levels (dpm/area) before decontamination and multiply the specific activity by the size of the contaminated area.
3. Add the alpha and beta activity calculated above to the C2V APQ as follows:
    a. Using the measured alpha activity (in disintegrations per minute) for each contamination zone, divide by 2.22E-12 to obtain the activity in curies. Add this value to the APQ log as curies of 241-Am.
    b. Using the measured beta activity (in disintegrations per minute) for each contamination zone and divide by 2.22E-12 to obtain the activity in curies. Add this value to the APQ log as curies of 90-Sr.
4. Continue adding these values should additional contamination events occur in to the APQ lab C2V ventilated rooms throughout each year.
5. Activity removed from the Lab through decontamination of C2V ventilated surfaces cannot be removed from the APQ total except at the beginning of each year
6. Notify WDOH should either the 90-Sr or 241-Am APQ total reach 90% of the limits listed above

C3V / C5V Ventilation System APQ Calculation

Annual Limit:

90-Sr (total beta) activity: 2.59E-02 Ci

99-Tc (beta activity) activity: 2.87E-02 Ci

241-Am (total alpha) activity: 8.92E-04 Ci

137-Cs (total gamma) activity: 1.36E-03 Ci

WDOH notification is required should APQ summation reach 90% of the allowable values* as shown below:

90-Sr (total beta) activity notification limit: 2.33E-02 Ci

99-Tc (beta) activity notification limit: 2.33E-02 Ci *

241-Am (total alpha) activity notification limit: 8.03E-04 Ci

137-Cs (total gamma) activity notification limit: 1.22E-03 Ci

1. At the beginning of each year, begin the APQ log using the samples currently in the Lab and the Lab RLD with all alpha activity assigned to 241-Am, beta activity assigned to 90-Sr (and 99-Tc as appropriate), and gamma activity assigned to Cs-137. Include any non-fixed alpha, beta, or gamma surface contamination it these totals.
2. Add the alpha, beta, gamma, and 99-Tc activity for each sample received in the Lab for analysis as follows:
    a. Using the measured total alpha activity (in disintegrations per minute) for each sample and divide by 2.22E-12 to obtain the activity in curies. Add this value to the APQ log as curies of 241-Am.
    b. Using the measured total beta activity (in disintegrations per minute) for each sample and divide by 2.22E-12 to obtain the activity in curies. Add this value to the APQ log as curies of 90-Sr.
    c. Using the measured total gamma activity (in disintegrations per minute) for each sample and divide by 2.22E-12 to obtain the activity in curies. Add this value to the APQ log as curies of 137-Cs.
    d. Using the measured 99-Tc activity (in disintegrations per minute) for each sample and divide by 2.22E-12 to obtain the activity in curies. Add this value to the APQ log as curies of 99-Tc.
3. Continue adding these values as each new sample received to the APQ Lab throughout each year.
4. Activity removed from the Lab through transfers from the RLD vessel cannot be removed from the APQ total except at the beginning of each year.
5. Notify WDOH should either the 90-Sr (or 99-Tc), 137-Cs, or 241-Am APQ total reach 90% of the limits listed above.

*Because 99-Tc is a beta emitter, the allowable 99-Tc limit should not exceed the total beta limit. As such, the WDOH reporting limit for 99-Tc is assigned the same value as the total beta (90-Sr) reporting limit in this strategy.