AIR MONITORING PLAN FOR THE REMEDIATION OF THE 316-4 WASTE SITE

1.0 INTRODUCTION

The remediation of the 316-4 waste site has the potential-to-emit radionuclides. This activity is being conducted under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* document *Hanford Site 300 Area Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1* (EPA 2013), in accordance with the *Remedial Design Report/Remedial Action Work Plan for the 300 Area* (300 Area RDR/RAWP) (DOE/RL-2001-47) and the *Remedial Design Report/Remedial Action Work Plan for 300-FF-2 Soils* (300-FF-2 RDR/RAWP) (DOE/RL-2014-13-ADD1). This air monitoring plan is an addendum to the 300 Area RDR/RAWP and 300-FF-2 RDR/RAWP (when issued). Quantification of radioactive emissions, implementing best available radionuclide control technology (BARCT), and air monitoring have been identified as substantive requirements (i.e., applicable or relevant and appropriate requirements) for this remedial action. A BARCT compliance demonstration is determined by the regulatory agency on a case-by-case basis. These substantive requirements are according to *Washington Administrative Code* (WAC) 246-247-040, "Radiation Protection – Air Emissions." This air monitoring plan presents compliance with WAC 246-247-040 requirements.

The 316-4 waste site was a liquid waste disposal crib used for the disposal of uranium-contaminated waste from the 321 Building. The crib consisted of two bottomless tanks buried 3 m (10 ft) below grade resting on a gravel base. A waste influent line to the tanks started 0.6 m (2 ft) above the bottom of one of the tanks and extended at an angle above the tank top to grade level. A vent riser extended from the top of the same tank 2.4 m (8 ft) above grade. The tanks were 0.6 m (2 ft) apart, with a stainless steel overflow pipe connecting them just below the top of each tank.

Remediation of the 316-4 waste site began in 2004 and included removal of the crib structures and 5,784 m^3 (204,262 ft^3) of soil. The excavation of the waste site was suspended in March 2005 when it was found that the contamination extended to the boundaries of the 618-10 Burial Ground. The deepest part of the excavation was 9.4 m (31 ft) below grade. The excavation was backfilled in July 2005 with 4,221 m^3 (149,065 ft^3) of clean fill. A drawing depicting the excavation design for the 316-4 is included in Figure 1.

2.0 PLANNED ACTIVITIES – REMEDIATION

General remedial action operations include removing overburden and clean fill, as well as stockpiling, excavating, sampling, sorting, stockpiling, treating (if necessary), containerizing, loading, backfilling, and transporting of materials from the site. Materials will include chemically and/or radiologically contaminated soil. Also included are test pitting, trenching, and other activities that may be performed prior to or during remediation to further characterize the buried waste and/or determine the limits of the waste site.

Excavated material will be sent primarily to the Environmental Restoration Disposal Facility (ERDF) for disposal. On a case-by-case basis, other U.S. Environmental Protection Agency-approved disposal facilities may be used based on the specific waste stream designation.

2.1 SOIL EXCAVATION

Standard construction equipment will be used for excavation, sorting, loading, and hauling. The loading of contaminated material into waste containers may result in soil spilled on the waste containers and/or haul trucks. Haul trucks with loaded containers will enter a survey area where they will be screened to detect exterior contamination and decontaminated, as necessary. Waste containers and/or haul trucks will be decontaminated by conventional means such as brushing or wiping. Decontaminated trucks and containers will then proceed to the container transfer area where the transportation subcontractor will pick up the containers for transport to the ERDF.

2.2 ANOMALY PROCESSING

Although anomalies are not anticipated to be encountered, if anomalies (e.g., bottles, unknown waste items) are discovered they will be segregated and treated, if necessary, prior to disposal. A separate waste treatment plan would be prepared, as necessary, to ensure compliant disposal of any anomalous waste discovered.

2.3 RADIOLOGICAL DETERMINATION

Characterization of the soil will take place to ensure the waste meets the ERDF acceptance criteria. All characterization activities will be conducted in accordance with the *300 Area Remedial Action Sampling and Analysis Plan* (DOE/RL-2001-48).

3.0 AIRBORNE SOURCE INFORMATION

There is a potential for radioactive airborne emissions resulting from the 316-4 remediation activities. The primary radiological constituent of concern at the waste sites is uranium. Other isotopes may be encountered; however, it is expected that dose estimates provided below are conservative and represent the upper bound of what will actually be found.

4.0 INVENTORY

The radionuclide annual possession quantities and subsequent potential emission calculations for the 316-4 waste site are summarized in Table 1. The waste site will consist of contaminated soil; it is assumed that the inventory for this material is in the form of particulates (soil). Consistent with WAC 246-247, the particulate form of the inventory, for calculation purposes, is assumed to be a soil matrix, and a release fraction of 1E-03 is applied. In addition, it is assumed that 0.1% of the particulate inventory will be picked up through high-efficiency particulate air (HEPA)-filtered vacuums (e.g., removing contaminated dirt from vehicles, assisting with decontamination

of vehicles). A release fraction of 1 is applied to the HEPA vacuum inventory. It is assumed that all remediation activities will occur in 1 year.

The CAP88-PC model was used to determine the total effective dose equivalent (TEDE), or annual unabated offsite dose for trench remediation. The potential-to-emit (curies per year) were the input for the computer model, and the model generated the annual unabated dose. The CAP88-PC model summary and synopsis are presented in *Radiological Inventory and Total Effective Dose Equivalent for the 316-4 Waste Site* (0600X-CA-V0188). The TEDE to the hypothetical maximally exposed offsite individual (MEI) for remediation is 8.23E-04 mrem/yr. The MEI is located at the Energy Northwest warehouse building on the Energy Northwest site, which is located 4,601 m (15,095 ft) to the north.

5.0 BEST AVAILABLE RADIONUCLIDE CONTROL TECHNOLOGY

The following is the BARCT, to be implemented during the 316-4 waste site remedial action.

- Water will be applied during excavation, container loading, stockpiling, and backfilling processes to minimize airborne releases. Only the amount necessary to control airborne releases will be used so as to minimize the potential for downward migration of mobile contaminants.

- Soil fixatives will be applied to any contaminated soils and debris that is disturbed during remediation and at the end of the shift regardless of forecasted wind speeds. If a soil fixative has already been applied and the soil will remain undisturbed, further use of fixatives will not be needed. The fixatives or other controls may not be applied when the contaminated soils are frozen, or if it is raining, snowing, or other freezing precipitation is falling at the end of work operations.

- The haul trucks will be covered to contain materials while in transit to ERDF.

- A vacuum cleaner will be used, when needed, and equipped with HEPA filters, which are considered BARCT for radioactive emissions at the Hanford Site. HEPA filters are efficiency tested upon installation and on an annual basis thereafter. HEPA filters must be demonstrated to have a 99.95% removal efficiency.

- Additional measures for controlling small debris in waste piles may be prudent based on waste site conditions as determined by project personnel. Additional measures that may be used are as follows: (1) apply a thin layer of contaminated soil from the same waste site (that is free of debris) on the surface and follow normal fixative applications, (2) apply a thin layer of uncontaminated soil on the surface and follow normal fixative applications, (3) apply bonded fiber fixative, and (4) cover the area containing small debris that is easily resuspended with a tarp or other appropriate material.

6.0 MONITORING – GENERAL

The 300 Area RDR/RAWP (DOE/RL-2001-47) and the 300-FF-2 RDR/RAWP, (DOE/RL-2014-13-ADD1) Sections 3.4.6 and 3.3.5, respectively, notes the following:

> "The substantive requirements applicable to radioactive air emissions resulting from remediation activities and to quantify potential emissions, monitor the emissions, and identify and employ best available radionuclide control technology. Exemption from these requirements may be requested if the potential-to-emit for the activity or emission unit would result in a total effective dose equivalent of less than 0.1 mrem/yr."

Section 4.0 above quantifies the potential emissions that may result from these remediation activities. Because the calculated unabated annual TEDE to the MEI from these activities is 8.23E-04 mrem/yr, which is less than 0.1 mrem/yr, it qualifies as a minor emissions unit that does not require continuous monitoring. Therefore, no near-field monitors are proposed for these activities. Routine radiological controls surveys will continue to be performed as part of the radiological control program for this site.

HEPA-filtered vacuums may be utilized infrequently during remediation activities. Exhaust points from HEPA filters (and any duct work, seams, or other potential release locations) will be monitored on a routine basis for potential radionuclide releases and the results recorded (e.g., post-survey results negative) during vacuuming. Any positive survey results will require appropriate maintenance on the unit to ensure that continued releases do not occur. Records of routine monitoring and necessary maintenance will be provided to regulatory staff upon request.

Characterization (e.g., test pitting and trenching, or surface soil sampling) may be conducted prior to the start of remediation or as needed to support confirmatory or risk assessment activities. Routine radiological control surveys will be performed during any characterization activities.

7.0 REFERENCES

0600X-CA-V0188, 2015, *Radiological Inventory and Total Effective Dose Equivalent for the 316-4 Waste Site,* Rev. 0, Washington Closure Hanford, Richland, Washington.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. 9601, et seq.

DOE/RL-2001-47, 2009, *Remedial Design Report/Remedial Action Work Plan for the 300 Area,* Rev. 3, U.S. Department of Energy, Richland Operation Office, Richland, Washington.

DOE/RL-2001-48, 2015, *300 Area Remedial Action Sampling and Analysis Plan*, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2014-13-ADD1, pending, *Remedial Design Report/Remedial Action Work Plan for 300-FF-2 Soils,* Rev. 0, U.S. Department of Energy, Richland Operation Office, Richland, Washington.

EPA, 2013, *Hanford Site 300 Area Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1,* U.S. Environmental Protection Agency, Region 10, Seattle, Washington, and U.S. Department of Energy, Richland Operations Office, Richland, Washington.

WAC 246-247, "Radiation Protection – Air Emissions," *Washington Administrative Code,* as amended.

Figure 1. 316-4 Excavation Design.

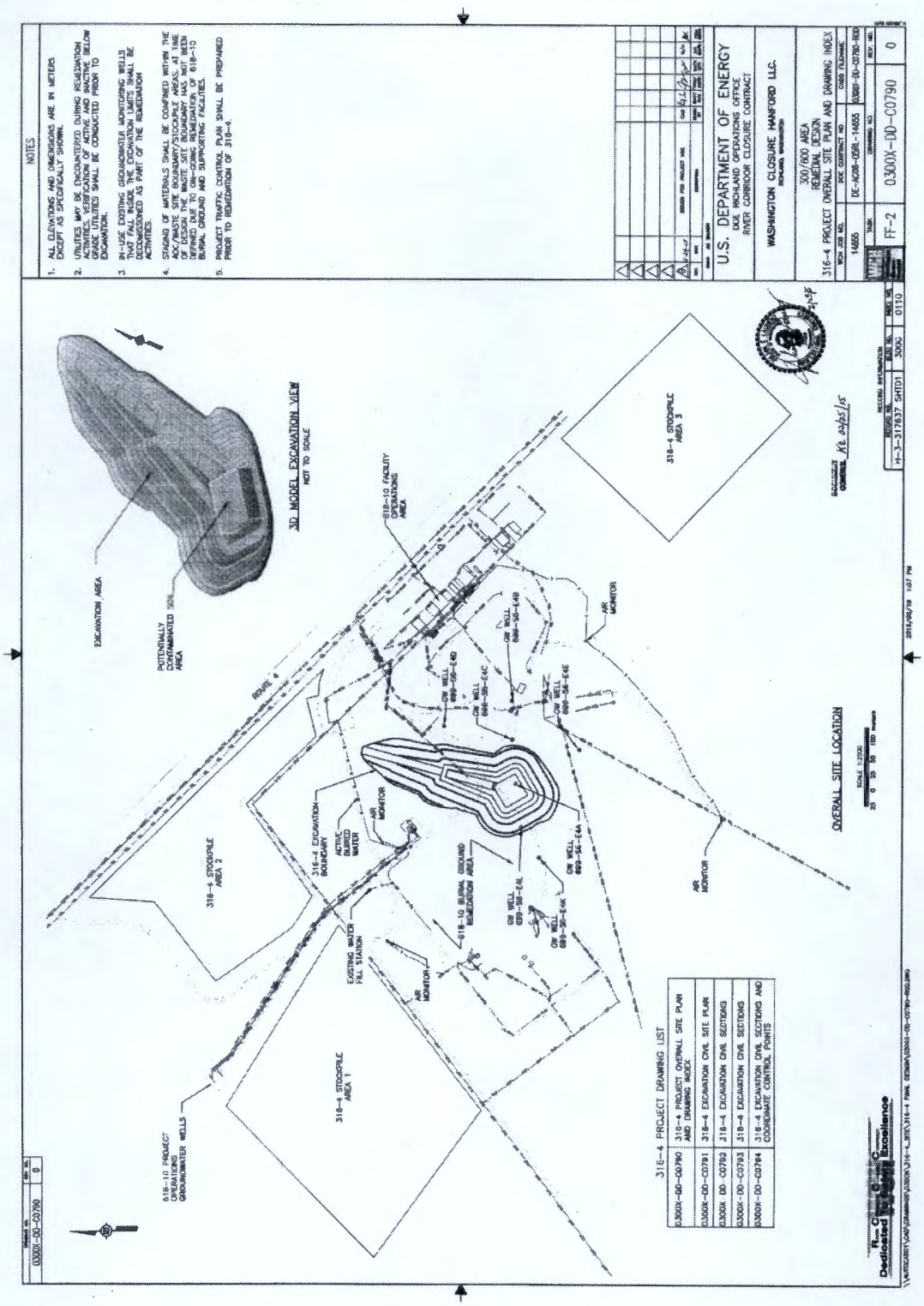

Table 1. Nuclide Effective Dose Equivalent Summary.

Nuclide	Selected Individual (mrem/y)
K-40	4.89E-06
Sr-90	8.95E-06
Y-90	2.25E-08
Cs-137	8.59E-06
Ba-137m	1.33E-07
Th-232	2.70E-06
Ra-228	0.00E+00
Ac-228	0.00E+00
Th-228	4.92E-06
Ra-224	5.14E-11
Rn-220	0.00E+00
Po-216	9.04E-14
Pb-212	7.53E-10
U-238	5.55E-04
Th-234	5.39E-08
Pa-234m	7.66E-07
Pa-234	4.20E-08
U-234	1.50E-04
Th-230	1.80E-06
Ra-226	2.82E-07
Rn-222	0.00E+00
Po-218	1.38E-14
Pb-214	3.84E-10
Bi-214	2.31E-09
At-218	0.00E+00
Pu-238	3.50E-07
Pu-239	7.11E-05
U-235	7.97E-06
Th-231	1.85E-09
Pa-231	0.00E+00
Ac-227	0.00E+00
Th-227	0.00E+00
Fr-223	0.00E+00
Am-241	5.13E-06
Np-237	7.39E-07
Pa-233	2.27E-10
U-233	0.00E+00
Th-229	0.00E+00
Ra-225	0.00E+00
TOTAL	8.23E-04

APPROVAL PAGE

Title: Air Monitoring Plan for the Remediation of the 316-4 Waste Site

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