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Statement of Work for Analytical Services Provided to Westinghouse Hanford Company by the Pacific Northwest National Laboratory Analytical Chemistry Laboratory

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Document Title: **STATEMENT OF WORK FOR ANALYTICAL SERVICES PROVIDED TO WHC BY PNNL's ANALYTICAL CHEMISTRY LABORATORY SUPPORTING RADIOACTIVE AIRBORNE EMISSIONS MEASUREMENT**

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1.0 PURPOSE

The purpose of this Statement of Work (SOW) is to establish laboratory analytical criteria and requirements associated with radioactive airborne emissions measurements. The criteria and requirements in this document apply to airborne emissions measurement activities funded by WHC managed facilities in the 300 and 400 Areas.

2.0 REQUIREMENTS

2.1 Regulatory Requirements

In accordance with Clean Air Act requirements (40 CFR 61.93 and WAC 246-247), owners and operators of radioactive airborne emissions units are required to implement a quality assurance program for radioactive airborne emissions measurement activities. In accordance with these requirements, WHC has developed a Quality Assurance Project Plan (WHC-EP-0528-2) which documents the quality assurance activities associated with data collection and reporting of radioactive airborne emissions measurements. Included in WHC-EP-0528-2 are requirements for the following:

* Air and Water Services (AWS) shall prepare a SOW for WHC's radioactive airborne emissions measurement program

* AWS shall identify analytical criteria and detection limits for laboratory radioanalytical services.

This document fulfills the above stated requirements.

2.2 Contracted Analytical Laboratory

Analytical services for the radioactive airborne emissions measurement program for WHC managed facilities in the 300 and 400 Areas are to be provided by Pacific Northwest National Laboratory's (PNNL's) Analytical Chemistry Laboratory.

2.3 Variances to the SOW

Variances to this SOW must be documented by PNNL and approved or acknowledged by AWS.

3.0 REGULATORY REPORTING REQUIREMENTS

The sample data, resulting from the radioactive airborne emissions measurement program for WHC managed facilities in the 300 and 400 Areas, supports a number of regulatory reporting requirements. A description of the required reports which this program supports is provided below.

3.1 Radionuclide Air Emissions Report

This report (prepared by AWS) documents Hanford Site radioactive airborne emissions measurements results. Within this report, emissions measurements are used to estimate the annual effective dose equivalent (EDE) received by the hypothetical off-site highest receptor. This report complies with the reporting requirements of Washington Administrative Code (WAC) 246-247, "Radiation Protection-Air Emissions," and the Code of Federal Regulations (CFR) Title 40, Protection of the Environment, Part 61, "National Emissions Standards for Hazardous Air Pollutants," Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities."

3.2 Annual Environmental Releases Report

This annual report (prepared by AWS) fulfills effluent discharge reporting requirements of DOE Order 5400.1 and DOE Order 5484.1. This report summarizes the degree to which emissions of regulated substances (i.e radioactive airborne emissions) from Hanford Site facilities comply with applicable regulatory limits.

3.3 Hanford Site Environmental Report

This report is compiled and published annually by PNNL for RL to comply with the requirements of DOE Order 5400.1.

3.4 Effluent Information System/Onsite Discharge Information System

This report is transmitted electronically (by AWS) to Idaho National Engineering Laboratory (INEL) in Idaho Falls, Idaho for inclusion in the Department of Energy's (DOE's) Effluent Information System/Onsite Discharge Information System (EIS/ODIS) database. This report complies with the requirements of DOE Order 5484.1 and DOE Order 5400.1.

4.0 ANALYTICAL LABORATORY SERVICES AND DATA QUALITY OBJECTIVES

4.1 Required Analytical and Data Handling Services

PNNL's Analytical Chemistry Laboratory shall provide the following analytical and data handling services.

4.1.1 Analytical services shall meet the analytical requirements listed in Tables 1-4.

4.1.2 PNNL shall implement a Quality Assurance (QA) Program which meets the applicable requirements of 40 CFR Part 61, Appendix B, Method 114, Section 4.0.

4.1.3 Quality control test results and laboratory intercomparison scores shall be provided to WHC upon request; the tests shall include accuracy, precision, and background.

4.1.4 PNNL shall participate in the DOE-Inter-Laboratory Quality Assurance Program coordinated by the DOE Environmental Measurements Laboratory, NY, NY, as applicable for requested analyses.

4.1.5 Upon request, WHC shall be permitted to review and approve the QA program.

4.1.6 Weekly particulate samples for the 340 Tank Vent Stack (340-NT-EX) shall be saved and composited for quarterly specific radionuclide analyses. The composited samples shall be analyzed for Pu-239,240, Pu-238, Pu-242, Am-241, and Cs-137 in accordance with 40 CFR Part 61, Appendix B, Method 114 (see Table 3.1).

Note: Historical data indicates that sample activity levels are typically insufficient to allow for the detection of specific radionuclides. Therefore, as a cost savings measure, gross alpha/beta measurements shall be performed on composite samples prior to performing specific analyses. If insufficient activity levels are present to allow for possible detection of the specified radionuclides, specific radionuclide analyses shall not be not performed. Conversely, specific radionuclide analyses shall be performed when gross alpha/beta activity levels are sufficient to allow for possible detection of specific radionuclides.

* The above note is not applicable for GEA specific radionuclide analyses.

4.1.7 PNNL analytical data shall meet a minimum completeness criteria of 90 percent (90 % of samples analyses for each stack shall meet the minimum requirements established in this document).

4.1.8 Analytical results shall be expressed in the units shown for the respective minimum detectable concentrations (MDC) in Tables 1-4.

4.1.9 PNNL shall transmit sample analysis results to AWS in an electronic format which can be downloaded into the Environmental Release Summary (ERS) Database. Table 5 lists parameters for reporting data via the ERS Database.

4.1.10 All raw data and analytical results shall be retained as quality assurance documents for a minimum of 5 years, as specified by 40 CFR 61, Subpart H and WAC 246-247 requirements. Upon request, WHC AWS shall be provided with access to the raw data and analytical results.

4.1.11 In the event that alpha/beta activity is detected at MDC levels or greater (see Tables 1-4), PNNL shall contact AWS for guidance on performing follow-up analyses.

Table 1
Sample and Analysis Criteria
for the 306 Facility

306 FACILITY, 306U-LAB Stack							
SAMPLE AND ANALYSIS CRITERIA							
Sample Size	Type of Analysis	Precision[a]	Accuracy[b]	Samples/yr (delivery frequency)[d]	MDC[c], µCi/cc	TT, days	Unit Price, $
nominal 2 cfm for period of collection, unless otherwise indicated	gross α and gross ß	< 20 %	See Footnote b	4 (1/qrtr)	2.0 E-15 and 1.9 E-14	14	65

[a] HASQAP (DOE/RL-94-55), Table 11-1 states that duplicate analyses should have < 20 % relative percent difference when the result is > 5 times the minimum detectable activity.

[b] Performance evaluation sample/analysis results should meet the minimum acceptability scores specified by the evaluation study.

[c] MDCs shall be as low as reasonably attainable, but shall not exceed the values specified in the table.

[d] It is possible that less than stated number of samples will be delivered for analysis.

Table 2.1
Sample and Analysis Criteria
for the 340 Facility

340 FACILITY, 340-NT-EX Stack							
SAMPLE AND ANALYSIS CRITERIA							
Sample Size	Type of Analysis	Precision[a]	Accuracy[b]	Samples/yr (delivery frequency)	MDC[c], μCi/cc	TT, days	Unit Price, $
nominal 3.1 cfm for period of collection, unless otherwise indicated	gross α and gross ß	< 20 %	See Footnote b	26 (1/2 wks)	2.0 E-15 and 1.9 E-14	14	65
	^{131}I			4 (1/qrtr)	2.1 E-13	14	35
	^{238}Pu[d]			4 (1/qrtr)	2.1 E-15	60	175
	^{242}Pu[d]			4 (1/qrtr)	2.0E-15	60	175
	^{241}Am[d]			4 (1/qrtr)	1.9E-15	60	175
	gamma spec (^{137}Cs)[d]			4 (1/qrtr)	1.9 E-14	60	35
	$^{239,240}Pu$[d]			4 (1/qrtr)	2.0 E-15	60	175

[a] HASQAP (DOE/RL-94-55), Table 11-1 states that duplicate analyses should have < 20 % relative percent difference when the result is > 5 times the minimum detectable activity.

[b] Performance evaluation sample/analysis results should meet the minimum acceptability scores specified by the evaluation study.

[c] MDCs shall be as low as reasonably attainable, but shall not exceed the values specified in the table.

[d] Sample analyses for the specified radionuclide shall be performed quarterly on a composite of the particulate samples collected during each quarter of the calendar year.

Note: Historical data indicates that sample activity levels are typically insufficient to allow for the detection of specific radionuclides. Therefore, as a cost savings measure, gross alpha/beta measurements shall be performed on composite samples prior to performing specific analyses. If insufficient activity levels are present to allow for possible detection of the specified radionuclides, specific radionuclide analyses shall not be not performed. Conversely, specific radionuclide analyses shall be performed when gross alpha/beta activity levels are sufficient to allow for possible detection of specific radionuclides.

* The above note is not applicable for GEA specific radionuclide analyses.

Table 2.2
Sample and Analysis Criteria
for the 340 Facility

340 FACILITY, 340-DECON Stack							
SAMPLE AND ANALYSIS CRITERIA							
Sample Size	Type of Analysis	Precision[a]	Accuracy[b]	Samples/yr (delivery frequency)	MDC[c], μCi/cc	TT, days	Unit Price, $
nominal 2 cfm for period of collection, unless otherwise indicated	gross α and gross ß	< 20 %	See Footnote b	4 (1/qrtr)	2.0 E-15 and 1.9 E-14	14	65

[a] HASQAP (DOE/RL-94-55), Table 11-1 states that duplicate analyses should have < 20 % relative percent difference when the result is > 5 times the minimum detectable activity.

[b] Performance evaluation sample/analysis results should meet the minimum acceptability scores specified by the evaluation study.

[c] MDCs shall be as low as reasonably attainable, but shall not exceed the values specified in the table.

Table 2.3
Sample and Analysis Criteria
for the 340 Facility

340 FACILITY, 340-B-BLDG Stack							
SAMPLE AND ANALYSIS CRITERIA							
Sample Size	Type of Analysis	Precision[a]	Accuracy[b]	Samples/yr (delivery frequency)	MDC[c], μCi/cc	TT, days	Unit Price, $
nominal 2 cfm for period of collection, unless otherwise indicated	gross α and gross ß	< 20 %	See Footnote b	4 (1/qrtr)	2.0 E-15 and 1.9 E-14	14	65

[a] HASQAP (DOE/RL-94-55), Table 11-1 states that duplicate analyses should have < 20 % relative percent difference when the result is > 5 times the minimum detectable activity.

[b] Performance evaluation sample/analysis results should meet the minimum acceptability scores specified by the evaluation study.

[c] MDCs shall be as low as reasonably attainable, but shall not exceed the values specified in the table.

Table 3.1
Sample and Analysis Criteria
for the FFTF

FFTF, FFTF-CB-EX Stack							
SAMPLE AND ANALYSIS CRITERIA							
Sample Size	Type of Analysis	Precision[a]	Accuracy[b]	Samples/yr (delivery frequency)[d]	MDC[c], μCi/cc	TT, days	Unit Price, $
nominal 2 cfm for period of collection, unless otherwise indicated	gross α and gross ß	< 20 %	See Footnote b	52 (1/wk)	2.0 E-15 and 1.9 E-14	14	65
	^{3}H			4*	1.5 E-9	60	500
	^{131}I			26 (1/2 wks)	2.1 E-13	14	35

* Four samples will be collected during a 4 week period (1 sample per week). The samples shall be analyzed as a batch to reduce analytical costs per sample.

a HASQAP (DOE/RL-94-55), Table 11-1 states that duplicate analyses should have < 20 % relative percent difference when the result is > 5 times the minimum detectable activity.

b Performance evaluation sample/analysis results should meet the minimum acceptability scores specified by the evaluation study.

c MDCs shall be as low as reasonably attainable, but shall not exceed the values specified in the table.

d Sample frequency may be reduced during the calendar year. A reduction in the sample frequency may result in less samples delivered to PNNL for analysis.

Table 3.2
Sample and Analysis Criteria
for the FFTF

FFTF, FFTF-RE-SB Stack							
SAMPLE AND ANALYSIS CRITERIA							
Sample Size	Type of Analysis	Precision[a]	Accuracy[b]	Samples/yr (delivery frequency)[d]	MDC[c], µCi/cc	TT, days	Unit Price, $
nominal 2 cfm for period of collection, unless otherwise indicated	gross α and gross ß	< 20 %	See Footnote b	52 (1/wk)	2.0 E-15 and 1.9 E-14	14	65
	^{131}I			26 (1/2 wks)	2.1 E-13	14	35

[a] HASQAP (DOE/RL-94-55), Table 11-1 states that duplicate analyses should have < 20 % relative percent difference when the result is > 5 times the minimum detectable activity.

[b] Performance evaluation sample/analysis results should meet the minimum acceptability scores specified by the evaluation study.

[c] MDCs shall be as low as reasonably attainable, but shall not exceed the values specified in the table.

[d] Sample frequency may be reduced during the calendar year. A reduction in the sample frequency may result in less samples delivered to PNNL for analysis.

Table 3.3
Sample and Analysis Criteria
for the FFTF

FFTF, FFTF-HT-TR Stack							
SAMPLE AND ANALYSIS CRITERIA							
Sample Size	Type of Analysis	Precision[a]	Accuracy[b]	Samples/yr (delivery frequency)[d]	MDC[c], µCi/cc	TT, days	Unit Price, $
nominal 2 cfm for period of collection, unless otherwise indicated	gross α and gross ß	< 20 %	See Footnote b	52 (1/wk)	2.0 E-15 and 1.9 E-14	14	65

[a] HASQAP (DOE/RL-94-55), Table 11-1 states that duplicate analyses should have < 20 % relative percent difference when the result is > 5 times the minimum detectable activity.

[b] Performance evaluation sample/analysis results should meet the minimum acceptability scores specified by the evaluation study.

[c] MDCs shall be as low as reasonably attainable, but shall not exceed the values specified in the table.

[d] Sample frequency may be reduced during the calendar year. A reduction in the sample frequency may result in less samples delivered to PNNL for analysis.

Table 4.1
Sample and Analysis Criteria
for the 437 Maintenance and Storage Facility (MASF)

MASF, 437-MN&ST Stack							
SAMPLE AND ANALYSIS CRITERIA							
Sample Size	Type of Analysis	Precision[a]	Accuracy[b]	Samples/yr (delivery frequency)[d]	MDC[c], µCi/cc	TT, days	Unit Price, $
nominal 2.0 cfm for period of collection, unless otherwise indicated	gross α and gross ß	< 20 %	See Footnote b	52 (1/wk)	2.0 E-15 and 1.9 E-14	14	65

[a] HASQAP (DOE/RL-94-55), Table 11-1 states that duplicate analyses should have < 20 % relative percent difference when the result is > 5 times the minimum detectable activity.

[b] Performance evaluation sample/analysis results should meet the minimum acceptability scores specified by the evaluation study.

[c] MDCs shall be as low as reasonably attainable, but shall not exceed the values specified in the table.

[d] Sample frequency may be reduced during the calendar year. A reduction in the sample frequency may result in less samples delivered to PNNL for analysis.

Table 4.2
Sample and Analysis Criteria
for the 437 Maintenance and Storage Facility (MASF)

MASF, 437-1-61 Stack							
SAMPLE AND ANALYSIS CRITERIA							
Sample Size	Type of Analysis	Precision[a]	Accuracy[b]	Samples/yr (delivery frequency)	MDC[c], µCi/cc	TT, days	Unit Price, $
nominal 2 cfm for period of collection, unless otherwise indicated	gross α and gross ß	< 20 %	See Footnote b	4	2.0 E-15 and 1.9 E-14	14	65

[a] HASQAP (DOE/RL-94-55), Table 11-1 states that duplicate analyses should have < 20 % relative percent difference when the result is > 5 times the minimum detectable activity.

[b] Performance evaluation sample/analysis results should meet the minimum acceptability scores specified by the evaluation study.

[c] MDCs shall be as low as reasonably attainable, but shall not exceed the values specified in the table.

Table 5
ERS Reporting Parameters

EDP Code	File Title	Stack Code or Stream Code	Companion Files	R/N Warning Level Factor	Reportable Radionuclides
F002	340 Vault Tank Exhaust	340-NT-EX	F602 F017	1	alpha beta
F003	306 Facility	306E-ULAB	none	1	alpha beta
F008	340 B Building	340-B-BLD	none	1	alpha beta
F009	340 Decontamination Facility	340-DECON	none	1	alpha beta
F011	FFTF Combined Exhaust	FFTF-CB-E	F018 F024	1	alpha beta
F012	FFTF Lower Reactor Service Building	FFTF-RESB	F016	1	alpha beta
F013	FFTF Reactor Heat Transport System	FFTF-HT-T	none	1	alpha beta
F014	MASF 437-MN&ST	437-MN&ST	none	1	alpha beta
F015	309 Facility PTRAEU	12632	none	1	alpha beta
F016	FFTF Lower Reactor Service Building I-131	FFTF-RESB	F012	1	I-131
F017	340 Vault Tank Exhaust I-131 Charcoal Cart	340-NT-EX	F002 F602	1	I-131
F018	FFTF Combined Exhaust I-131	FFTF-CB-E	F011 F024	1	I-131
F019	MASF 437-1-61	437-1-61	none	1	alpha beta
F602	340 Vault Tank Exhaust Quarterly, Composite	340-NT-EX	F002 F017	1	Pu-238 Pu-239,240 Pu-242 Am-241 Cs-137
F024	FFTF Combined Exhaust H-3	FFTF-CB-E	F011 F018	1	H-3

5.0 GLOSSARY

ABBREVIATIONS, ACRONYMS, AND INITIALISMS

RL	U.S. Department of Energy, Richland Operations Office
EIS/ODIS	Effluent Information System/Onsite Discharge Information System
EPA	Environmental Protection Agency
US	United States
MDC	minimum detectable concentrations
TT	turnaround time
AWS	Air and Water Services
PNNL	Pacific Northwest National Laboratory
SOW	Statement of Work
CFR	Code of Federal Regulations
WHC	Westinghouse Hanford Company
INEL	Idaho National Engineering Laboratory
QA	Quality Assurance
cfm	cubic feet per minute

6.0 DEFINITIONS

Turnaround Time - Elapsed time, in days, from when a sample is received by the laboratory until the analysis is reported to AWS.

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