U.S. Department of Energy
Office of River Protection
P.O. Box 450, MSIN H6-60
Richland, Washington 99352

0070694

AUG 24 2006

06-ESQ-119

Mr. A. W. Conklin, Head
Air Emissions and Defense
Waste Section
Washington State
Department of Health
P.O. Box 47827
Olympia, Washington 98504

Dear Mr. Conklin:

COMPLETION OF WASHINGTON STATE DEPARTMENT OF HEALTH (WDOH) NOTICE OF VIOLATION (NOV) AND COMPLIANCE ORDER, ORDER NUMBER 2

References:
1. WDOH letter from A. W. Conklin to K. A. Klein, RL, and R. J. Schepens, ORP, "Notice of Violation and Compliance Order," AIR 05-1103, dated November 17, 2005.
2. WDOH letter from A. W. Conklin to R. J. Schepens, ORP, AIR 06-110, dated January 19, 2006.
3. ORP letter from R. J. Schepens to A. W. Conklin, WDOH, "Completion of the State of Washington Department of Health (WDOH), Notice of Violation (NOV) and Compliance Order, Order Number 2," 06-ED-022, dated March 15, 2006.
4. CH2M HILL letter from M. S. Spears to T. Z. Smith, ORP, "Completion of Washington State Department of Health Notice of Violation and Compliance Order, Order Number 2," CH2M-0600486, dated March 1, 2006.

The WDOH, in Reference 1, issued an NOV and Compliance Order to the U.S. Department of Energy concerning the designation of the 222-S Laboratory main ventilation system, 296-S-21, as a minor emission point. The WDOH issued 17 Findings and 3 Orders. The purpose of this letter is to provide closure information to Compliance Order Number 2, which states:

> "Within 60 days of receipt of this Notice of Violation and Compliance Order, perform an assessment of the 296-S-21 monitoring system to determine what actions are necessary to bring the monitoring system into compliance with requirements of WAC 246-247-075. Within the same time frame, provide a schedule, for review and approval by DOH, for completing any necessary upgrades."

The WDOH granted an extension to the required due date (Reference 2), thereby changing the required response date to March 31, 2006. Subsequent discussions occurred with WDOH staff to present the stack assessment progress and to propose a compliance schedule. The proposed compliance schedule was submitted with Reference 3. The proposed schedule requires completion of system performance testing and identification of necessary modifications to WDOH by September 1, 2006.

Based on a review of the system performance testing conducted by the Pacific Northwest National Laboratory, it was determined that no modifications are required to either the 296-S-21 stack or its monitoring or sampling system to achieve compliance with WAS-246-247-075. A computer modeling analysis, using the DEPOSITION software, confirmed greater than 50 percent transportation of 10-μm aerodynamic diameter particles from the sample point to the sample collector, as required by regulation.

A summary of the system's performance testing is included as Attachment 1. An update to the compliance assessment matrix, initially provided with Reference 3, is included as Attachment 2.

In addition, please note to the WDOH that "The annual inspections of the nozzle for deposits and of the sample transport line for leaks will be accomplished by November 17, 2006. Conducting these inspections was deferred pending a determination if modifications were required to the sampling system."

If you have any questions, please contact me, or your staff may contact Dennis W. Bowser, Environmental Division, (509) 373-2566.

Sincerely,

Roy J. Schepens, Manager
Office of River Protection

ESQ:DWB

Attachments: (2)

cc: See page 3

cc w/attachs:
L. E. Borneman, CH2M HILL
O. S. Wang, Ecology
N. A. Homan, FHI
J. Martell, WDOH Richland Office (2 copies)
Administrative Record
BNI Correspondence
CH2M HILL Correspondence
Environmental Portal, LMSI

cc w/o attachs:
B. G. Erlandson, BNI
P. C. Miller, CH2M HILL
M. S. Spears, CH2M HILL
J. Cox, CTUIR
S. Harris, CTUIR
B. Becker-Khaleel, Ecology
S. L. Dahl, Ecology
J. L. Hensley, Ecology
J. A. Bates, FHI
G. Bohnee, NPT
K. Niles, Oregon Energy
M. F. Jarvis, RL
R. Jim, YN

Attachment 1
06-ESQ-119

Summary of the System Performance Testing of 296-S-21 Stack

Summary of the System Performance Testing of 296-S-21 Stack

Tests were performed to assess the suitability of the location of the air sampling probe on the 296-S-21 stack according to the criteria of ANSI N13.1-1999, "Sampling and Monitoring Releases of Airborne Radioactive Substances from the Stacks and Ducts of Nuclear Facilities." Pacific Northwest National Laboratory conducted most tests on a 3.67:1 scale model of the stack. CH2M HILL Hanford Group, Inc. also performed some limited confirmatory tests on the actual stack. The tests assessed the capability of the air-monitoring probe to extract a sample representative of the effluent stream. The tests were conducted for the practical combinations of operating fans and addressed:

1. Angular Flow - The purpose is to determine whether the velocity vector is aligned with the sampling nozzle. The average yaw angle relative to the nozzle axis should not be more than 20 degrees. The measured values ranged from 5 to 11 degrees on the scale model and 10 to 12 degrees on the actual stack, meeting the requirements of ANSI N13.1-1999.

2. Uniform Air Velocity - The gas momentum across the stack cross section where the sample is extracted should be well mixed or uniform. The uniformity is expressed as the variability of the measurements about the mean, the coefficient of variance (COV). The lower the COV value, the more uniform the velocity. The acceptance criterion is that the COV of the air velocity must be $\leq$20% across the center two-thirds of the area of the stack. At the location simulating the sampling probe, the measured values ranged form 4 to 11%. Measurements were also made both on the actual stack and on the scale model at test ports 1.5 stack diameters upstream of the sampling probe. The results ranged from 6 to 8% COV on the actual stack and 11 to 13% COV on the scale model. The scale model results were slightly higher than the actual stack, which suggests that the test results on the scale model are more conservative.

3. Uniform Concentration of Tracer Gases - A uniform contaminant concentration in the sampling plane enables the extraction of samples that represent the true concentration. This was first tested using a tracer gas to represent gaseous effluents. The fan is a good mixer, so injecting the tracer downstream of the fans provides worst-case results. The acceptance criteria are that: 1) the COV of the measured tracer gas concentration is $\leq$20% across the center two-thirds of the sampling plane; and 2) at no point in the sampling plane does the concentration vary from the mean by >30%. The results on the scale model at the point simulating the sampling probe ranged from 0.3 to 6% COV, and the maximum single point deviation from the mean was -10%, meeting the requirements of ANSI N13.1-1999.

4. Uniform Concentration of Tracer Particles - Uniformity in contaminant concentration at the sampling probe was further demonstrated using tracer particles large enough to exhibit inertial effects. Particles of 10-μm aerodynamic diameter were used. The acceptance criterion is that the COV of particle concentration is $\leq$20% across the center two-thirds of the sampling plane. The scale model results ranged from 2 to 9%, meeting the requirements of ANSI N13.1-1999.

Based on these tests, the location of the air sampling probe on the 296-S-21 stack meets the requirements of the ANSI N13.1-1999 standard and no physical modifications are required.

Attachment 2
06-ESQ-119

Update to the American National Standards Institute N13.1-1999 Maintenance, Calibration, and Field Check Requirements Matrix

	ANSI N13.1	ANSI Requirement	Minimum Frequency	Drawing or Procedure	PM/S #	Cost for development	Comments
1	6.2.2.1	Cleaning of thermal anemomter elements.	As required	N/A	N/A		No installed stack flow devices will be used. Flow rates are established by procedure.
2	6.2.2.2	Inspect pitot tubes for contaminant deposits.	Annually	N/A	N/A		No installed stack flow devices will be used. Flow rates are established by procedure.
3	6.2.2.2	Inspect pitot tube systems for leaks.	Annually	N/A	N/A		No installed stack flow devices will be used. Flow rates are established by procedure.
4	6.3.4.5	Inspect sharp-edged nozzles for damage.	Annually or after maintenance	N/A	N/A		Shrouded probe.
5	6.3.4.8	Check nozzles for alignment, presence of deposits, or other potentially degrading factors.	Annually	*Under development*	*2S-105579*		Shrouded probe will be inspected annually, *with first inspection completed by November 17, 2006*.
6	6.4.6	Check transport lines of HEPA-filtered applications to determine if cleaning is required.	Annually	*Part of nozzle check for deposits*	*2S-105579*		If nothing is found on probe then this would not need to be performed. Add to procedure in item 5 to cover this.
7	6.4.6	Clean transport lines when deposits are visible.	Visible deposits for HEPA filter applications	*Part of nozzle check for deposits*	*2S-105579*		If nothing is found on probe then this would not need to be performed. Add to procedure in item 5 to cover this.
8	6.9	Inspect or test sample transport system for leaks. Visually inspect to ensure proper connections.	Annually	*Under development*	*2S-105579*		*Conduct leak check in conjuntion with remove of sample nozzle for inspection, with first check completed by November 17, 2006.*

	ANSI N13.1	ANSI Requirement	Minimum Frequency	Drawing or Procedure	PM/S #	Cost for development	Comments
9	7.5.1	Check mass flow meters of sampling systems with a secondary or transfer standard.	Quarterly	N/A	N/A		Stack sampling equipment does not employ a mass flow meter. Flow meter and flow totalizer are currently calibrated every 6 months.
10	7.5.1	Check sampling flow rate through critical flow venturis	Start of each sampling period	N/A	N/A		No venturis.
11	7.5.1	Inspect rotameters of sampling systems for presence of foreign matter.	Start of each sampling period	S-BW-004	N/A		Radcon task performed bi-weekly during sample filter replacement.
12	7.5.2	Check response of stack flow rate systems.	Quarterly	N/A	N/A		No installed stack flow measurement devices. Flows are determined by procedure and measurements are accomplished quarterly.
13	7.6.1	Calibration of flow meters of sampling systems.	Annually	2S18061 2S18064	2S-00298 2S-00299		Air sample flow meter and flow totalizer currently calibrated every six months.
14	7.6.2	Calibration of effluent flow measurement devices.	Annually	N/A	N/A		No installed stack flow measurement devices. Flows are determined by procedure and measurements are accomplished quarterly.
15	7.6.3	Calibration of timing devices.	Annually	N/A	2S-105463		Timing device currently calibrated every 6 months to verify accuracy.

	ANSI N13.1 Reference	ANSI Requirement	Drawing or Procedure	PM/S #	Cost for development	Comments
1	6.4.1 and 6.5	Total transport of 10µm AD particles and vaporous contaminants shall be >50% from the free stream to the collector/analyzer	*RPP-CALC-30326*			*DEPOSITION run confirmed > 50 % transport to collector*
2	6.3.2	Sample nozzle inlet shall have a transmission ratio between 80% and 130% for 10µm AD particles (criterion particle size may be larger as stated in the referenced clauses)				Nozzle characteristics verified by previous testing.
3	6.3.2	Sample nozzle shall have an aspiration ratio that does not exceed 150% for 10µm AD particles (criterion particle size may be larger as stated in the referenced clauses)				Nozzle characteristics verified by previous testing.
4	5.2.2.2	Characteristics of a suitable sampling location are:				
4a		Sampling location coefficient of variation over the central 2/3 area of the cross section is within +/-20% for 10µm AD particle, gaseous tracer, and gas velocity	*PNNL Report on ASSESSMENT OF THE 296-S-21 STACK*			*Coefficent of variation over central 2/3 area is 4-11% at sampling location.*
4b		flow angle <20 degrees relative to the long axis of the stack and nozzle inlet	*PNNL Report on ASSESSMENT OF THE 296-S-21 STACK*			*Flow angle of 5-11degrees on model and 10-12 degrees on actual stack.*

	ANSI N13.1 Reference	ANSI Requirement	Drawing or Procedure	PM/S #	Cost for development	Comments
4c		tracer gas concentration shall not vary from the mean >30% at any point on a 40CFR 60 Appendix A Method 1 velocity mapping grid	*PNNL Report on ASSESSMENT OF THE 296-S-21 STACK*			*Maximum deviation from mean was 10%*
5	6.2.1	Effluent flow rate continuous measurement required if flow variation is >+/-20% in a year	N/A	N/A		Based on operating experience, the annual exhaust flow rate for the 296-S-21 stack, does not vary by greater than +/-20%. Normal operations maintains the system flowrate at @78,000 cfm
6	6.2.1 and 7.6.1	Effluent and sample flow rate shall be measured within +/-10%	*Effluent* 2S18061 *Sample* S-D080	2S-00298		Facility specific testing procedure will be developed. Effluent flow rate measurements shall be made using methods specified in Reference Method 2 of 40 CFR 60 Appendix A. Sample flow instrumentation calibrated within +/-10% and sample flow verified daily.
7	6.8.2 and 6.8.3	Continuous sample flow rate measurements and control required if flow rate varies >+/-20% during a sample interval. Flow control shall be within +/-15%	N/A	N/A		Based on operating experience, the annual exhaust flow rate for the 296-S-21 stack, does not vary by greater than +/-20%. Normal operations maintains the system flowrate at @78,000 cfm

	ANSI N13.1 Reference	ANSI Requirement	Drawing or Procedure	PM/S #	Cost for development	Comments
8	6.2.1. 6.8.1 and 6.8.3	Continuous measurement of effluent flow rate and continuous measurement and control of sampling flow rate (to track flow rate in stack or duct within +/-20% of a predetermined value)	N/A	N/A		Based on operating experience, the annual exhaust flow rate for the 296-S-21 stack, does not vary by greater than +/-20%. Normal operations maintains the system flowrate at @78,000 cfm
9	6.2.1	Continuous flow rate measurement unless flow rate variation is less than +/-20% during a year	N/A	N/A		Based on operating experience, the annual exhaust flow rate for the 296-S-21 stack, does not vary by greater than +/-20%.
10	7.5	Periodic inspection of nozzles, transport lines, sample and effluent flow meters shall be conducted	Nozzle/probe *procedure in development. Sample flow per* S-D080/S-BW-004	TBD		Annual inspection of probe and transport line to be established. Sample flow meter is checked daily and bi-weekly.
11	7.63	Periodic calibrations of effluent and sample flow meters, CAMs , and sample analysis instrumentation shall be conducted	2S18061	2S-00298		Sample flow meter and other stack sampler components currently calibrated every 6 months. WSCF analyzes the samples and conducts sample analysis instrument calibrations.

	ANSI Requirement	Methodology	Drawing or Procedure	Cost for development/verification	Comment
1	The average resultant angle shall be less than 20 degrees.	40CFR60, Appendix A method 1	*PNNL Report on ASSESSMENT OF THE 296-S-21 STACK*		*Flow angle of 5-11degrees on model and 10-12 degrees on actual stack.*
2	COV shall not exceed 20% over center region of the stack that encompasses at least 2/3 of the stack area *[velocity profile characteristic]*	Select traverse points from 40CFR60, Appendix A Method 1 (figure 1-2) for the center 2/3 of the area of the stack or duct. Additional points or area may be needed to adequately cover a the region.	*PNNL Report on ASSESSMENT OF THE 296-S-21 STACK*		*Coefficent of variation over central 2/3 area is 4-11% at sampling location.*
3	COV shall not exceed 20% over center region of the stack that encompasses at least 2/3 of the stack area *[gas profile characteristic]*	Select traverse points from 40CFR60, Appendix A, Method 1 (figure 1-2) for the center 2/3 of the area of the stack or duct. Additional points or area may be needed to adequately cover the region	*PNNL Report on ASSESSMENT OF THE 296-S-21 STACK*		*Coefficent of variation over central 2/3 area is 4-11% at sampling location.*
4	The maximum value of tracer gas concentration shall not exceed the mean value by more than 30% of the mean value a any point on a complete Method 1 set of velocity traverse points	Select traverse points from 40CFR60, Appendix A, Method 1 (figure 1-2) for the entire cross sectional area	*PNNL Report on ASSESSMENT OF THE 296-S-21 STACK*		*Maximum deviation from mean was 10%*
5	COV shall not exceed 20% over center region of the stack that encompasses at least 2/3 of the stack area *[particle profile]*	Select traverse points from 40CFR60, Appendix A, Method 1 (figure 1-2). Additional points or area may be needed to adequately cover the region	*PNNL Report on ASSESSMENT OF THE 296-S-21 STACK*		*Coefficent of variation over central 2/3 area is 4-11% at sampling location.*