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ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 161408

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No.:
Effluents and Emissions Monitoring	T Plant Engineering	N/A
5. Proj./Prog./Dept./Div.:	**6. Cog. Engr.:**	**7. Purchase Order No.:**
Air Permits/SW/T Plant/87400	L.T. Blackford	N/A
8. Originator Remarks:		**9. Equip./Component No.:**
Transmittal for approval and issue of WHC-SD-ER-218, Rev. 0; "The 291-T-1 Exhaust Stack National Emissions Standards for Hazardous Air Pollutants Compliance Plan Report".		N/A
		10. System/Bldg./Facility: Emissions/221-T/T Plant
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		13. Permit/Permit Application No.: N/A
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15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Impact Level	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	WHC-SD-WM-ER-218		0	The 291-T-1 Compliance Plan Report	2E	1	1	

16. KEY

Impact Level (F)	Reason for Transmittal (G)	Disposition (H) & (I)
1, 2, 3, or 4 (see MRP 5.43)	1. Approval 4. Review 2. Release 5. Post-Review 3. Information 6. Dist. (Receipt Acknow. Required)	1. Approved 4. Reviewed no/comment 2. Approved w/comment 5. Reviewed w/comment 3. Disapproved w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Impact Level for required signatures)

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.
1	1	Cog.Eng.L.T Blackford		9-27-93	T3-28						
1	1	Cog. Mgr.R.J. Bottenus		9-27-93	T3-28						
		QA									
		Safety									
1	1	Env.L.P. Diedeker		9-28-93							
1	1	P.J. Crane		9/27/93	T3-28						

RECEIVED NOV 1993 EDMC

18.	19.	20.	21. DOE APPROVAL (if required)
Signature of EDT Originator — Date: 9-27-93	Authorized Representative for Receiving Organization — Date	R.J. BOTTENUS — Cognizant/Project Engineer's Manager — Date: 9-27-93	Ltr. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments

BD-7400-172-2 (07/91) GEF097

ORIGINAL

Date Received: 9-28-93 CW	INFORMATION RELEASE REQUEST	Reference: WHC-CM-3-4

Complete for all Types of Release

Purpose

- [ ] Speech or Presentation (Check only one suffix)
  - [ ] Full Paper
  - [ ] Summary
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- [ ] Manual
- [ ] Brochure/Flier
- [ ] Software/Database
- [ ] Controlled Document
- [X] Other

ID Number (include revision, volume, etc.): WHC-SD-WM-ER-218, Rev. 0

List attachments: N/A

Date Release Required: September 30, 1993

Title: The 219-T-I Exhaust Stack National Emissions Standards for Hazardous Air Pollutants Compliance Plan Report

Unclassified Category: UC-

Impact Level: 2E

New or novel (patentable) subject matter? [X] No [ ] Yes
If "Yes", has disclosure been submitted by WHC or other company?
[ ] No [ ] Yes Disclosure No(s).

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N/A	N/A

Date(s) of Conference or Meeting	City/State	Will proceedings be published?	Will material be handed out?
N/A	N/A	[ ] Yes [ ] No	[ ] Yes [ ] No

Title of Journal: N/A

CHECKLIST FOR SIGNATORIES

Review Required per WHC-CM-3-4	Yes	No	Reviewer - Signature Indicates Approval: Name (printed)	Signature	Date
Classification/Unclassified Controlled Nuclear Information	[ ]	[X]			
Patent - General Counsel	[X]	[ ]	S.W. Berglin	S.W. Berglin	9/28/93
Legal - General Counsel	[X]	[ ]	J.H. Dunkirk	J.H. Dunkirk	9-28-93
Applied Technology/Export Controlled Information or International Program	[ ]	[X]			
WHC Program/Project	[X]	[ ]	R.J. Bottenus	L.T. Blackford for	9-27-93
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Other Program/Project	[ ]	[X]			

Information conforms to all applicable requirements. The above information is certified to be correct.

	Yes	No
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Transmit to DOE-HQ/Office of Scientific and Technical Information	[ ]	[X]

Author/Requestor (Printed/Signature) Date: L.T. Blackford 9-27-93

Intended Audience: [ ] Internal [ ] Sponsor [X] External

Responsible Manager (Printed/Signature) Date: L.P. Diedeker 9-28-93

INFORMATION RELEASE ADMINISTRATION APPROVAL STAMP

Stamp is required before release. Release is contingent upon resolution of mandatory comments.

APPROVED FOR RELEASE OFFICIAL DOCUMENT CW Date 9-29-93

Date Cancelled | Date Disapproved

SUPPORTING DOCUMENT

1. Total Pages 11

2. Title
The 291-T-1 Exhaust Stack National Emissions Standard for Hazardous Air Pollutants Compliance Plan Report

3. Number
WHC-SD-WM-ER-218

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0

5. Key Words
291-T-1, 221-T, T Plant, Compliance Plan Report, NESHAPs

6. Author
Name: L.T. Blackford
Signature
Organization/Charge Code 87430/A3W4M

7. Abstract
This report documents proposed resolutions for areas of non compliance to 40 CFR 61, Subpart H as applied to the 291-T-1 exhaust stack monitoring system as committed by the WHC Compliance Plan, correspondence number 9301990B R1.

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9. Impact Level 2E

10. RELEASE STAMP

APPROVED FOR PUBLIC RELEASE 9-29-93

OFFICIAL RELEASE BY WHC
DATE SEP 29 1993
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EXECUTIVE SUMMARY

This report describes the compliance status of the 291-T-1 sampling/monitoring system under 40 Code of Federal Regulations (CFR), Part 61, Subpart H and indicates the further studies and data collection necessary to demonstrate that the system complies with the applicable standards. This report is submitted in support of, and as committed by the Westinghouse Hanford Company (WHC) Compliance Plan, 9301990B R1, submitted April 9, 1993.

The following items summarize the resolutions of this report:

- Previously, the 291-T-1 stack was designated a major stack based on data obtained from back calculations. The stack will be reassessed using the approved alternative of nondestructive assaying (NDA). This procedure is to be performed on the 291-T-1 exhaust system in October 1993, to determine stack status as major or minor. (Sections 3.1.1)

- This report supports the request from the U.S. Department of Energy, Richland Operations Office (RL) that the U.S. Environmental Protection Agency (EPA), Region 10, deem the test methods and equipment utilized in obtaining flow data on the 291-T-1 exhaust system to be equivalent to the requirements of 40 CFR 61, Subpart H. (Section 3.1.2)

- The primary exhaust system configurations for 291-T-1 provide two levels of averaged flow. However, these flows previously were not adequately documented to verify compliance with National Emission Standards for Hazardous Air Pollutants (NESHAPs). Additional administrative requirements and instrumentation modifications will be implemented by T Plant to provide a more refined, and frequent, baseline on flow data to allow for adequate determination of compliance. (Section 3.1.3)

- The 291-T-1 sample probe location does not meet requirements and the probe design does not meet the equal area weighting noted in ANSI N13.1. However, calculations confirm that fully turbulent flow conditions exist at the sampling point and therefore, the existing probe is acceptable for continued use. Results from the scheduled 291-T-1 stack monitoring system line loss study will be evaluated to verify if line losses in the sampling system contribute to a significant underestimation of stack effluent releases. Prior to conducting the line loss study, the stack sampling/monitoring cabinet will be relocated and the sampling line replaced. (Section 3.1.4)

1.0 INTRODUCTION

T Plant was constructed in the mid-1940s for the purposes of reactor fuel processing. The main building, 221-T, is a "canyon" facility with process cells wherein fuel processing activities were accomplished until the plant was shut down in 1956 with the advent of the Plutonium-Uranium Extraction Facility. T Plant then had the processing equipment removed, was renovated and returned to service in 1957 as the Hanford Site decontamination and repair facility for process equipment.

The canyon exhaust system utilizes fans exterior to the canyon building which draw air from the building interior, through the cell cover blocks and penetrations through the cell walls into the main canyon vent duct running the length of the canyon. This vent duct exits 221-T below ground at the north end of the facility and runs east for approximately 150 feet where the air is discharged via the 291-T-1 exhaust stack. Two fans in a series configuration are presently used for the canyon exhaust system.

The canyon exhaust system has evolved from an unfiltered system to the present configuration of four parallel banks of high efficiency particulate air (HEPA) filters, with each bank consisting of two stages in series.

Monitoring of the effluent stream is accomplished by a fixed continuous monitoring system which draws a representative sample from the gas stream in the stack via a sampling probe assembly. Monitoring is accomplished for beta-gamma and alpha particles as well as a record sampler.

Recently, the EPA, Region 10, issued to RL a compliance order and information request regarding radionuclides emissions cited in 40 CFR, Part 61, Subpart H, "National Emission Standards for Hazardous Air Pollutants" as applied to stack emissions on the Hanford Site. The 291-T-1 exhaust stack has been identified as one of the "major" emissions stacks on the site which are subject to the continuous monitoring of radioactive air emissions requirements in 40 CFR 61, Subpart H. An engineering study was initiated to identify compliance deficiencies in the 291-T-1 stack monitoring system and provide recommendations for corrective actions. The results of that study are presented in this report.

2.0 SCOPE

This report documents proposed resolutions for areas of noncompliance to 40 CFR 61, Subpart H as applied to the 291-T-1 exhaust stack monitoring system.

3.0 DEFICIENCIES AND RESOLUTIONS

The following sections identify the particular compliance requirements in 40 CFR 61, Subpart H for which deficiencies were identified in the 291-T-1 stack monitoring system. Each requirement is listed, the deficiency discussed, issues presented and the resolution proposed.

3.1: Title 40 CFR, Subpart H, 61.93 Emission Monitoring and Test Procedures

3.1.1: Title 40 CFR 61, Subpart H, (61.93.b.4.ii)

Discussion:

The 291-T-1 stack was determined to have the potential to emit in excess of the 0.1 mrem/yr effective dose equivalent which requires continuous emissions measurement. However, the dose determination was based on the use of back-calculation using 3000[2] times the annual release. Since resuspension from the stack could be a factor in the annual release, an alternative method for determining the potential release was proposed.

Resolution:

Currently, the EPA has approved NDA methods for determining potential releases of radionuclides. NDA is scheduled for the 291-T-1 exhaust system in October, 1993. Use of this technique should determine if the 291-T-1 stack is a "major" stack. If the NDA measurements demonstrate that the 291-T-1 stack is not a major stack, upgrades to the monitoring system are not required by regulation.

3.1.2: Title 40 CFR 61, Subpart H, (61.93.b.1.i)

Discussion:

Effluent flow rate testing currently performed by WHC on the 291-T-1 exhaust system utilizes a standard Hanford Site testing procedure. The procedure (7-GN-56) details the methods and equipment necessary for use during testing. The typical equipment used during testing is standard pitot tubes and an Air Neutronics Limited MP Series 4 Autozero Digital Micromanometer.

The compliance standard allows utilization of standard pitot tubes if they meet the specifications of Sections 2.7 and 4.2 of Part 60, Appendix A, Method 2.

The micromanometer instrument utilizes a differential capacitance transducer and internal electronics to calculate and display corrected velocity readings directly from pitot tube probes. Static and total pressure signals from pitot tube are automatically corrected by the instrument and displayed in feet per minute. The instrument is capable of resolving pressure to 0.001 inches water gauge.

Testing locations for the gas velocity readings are located in the four ducts running from the HEPA filter housings to the main outlet plenum feeding the main 56" duct to the exhaust fans. The current locations used for testing are the most viable locations due to the filter system configuration, fan placement, and radiological concerns present in the area of the exhaust system. The test ports are located approximately 7 feet downstream from the final HEPA filter stage and approximately 4 feet upstream of the entrance to the main outlet plenum. The gas velocities are determined for each traverse, averaged and converted to cubic feet per minute (CFM) for a total average gas flow.

Additionally, plugging of the test pitot tubes is not considered to be a high probability because the test location is after the double HEPA filter banks. Any plugging of the tube holes would be apparent upon calculation and review of the readings.

Resolution:

Since use of a standard pitot tube is considered acceptable and the micromanometer exceeds the requirements of the compliance standard, a finding of equivalency is requested to be granted by EPA.

3.1.3: Title 40 CFR 61, Subpart H, (61.93.b.1.iii)

Discussion:

Review of the flow rates measured for the 291-T-1 exhaust system shows that two flow rates exist for the configurations used during operation of the exhaust system. 1: One fan operational with four HEPA filter banks on line, averaging 23,000 CFM total system flow, with all restriction devices fully opened. 2: Two fans operational with four HEPA filter banks on line, averaging 42,500 CFM total system flow, with all flow restriction devices fully open.

Additional changes to these flow rates are temporary occurrences caused by external actions affecting the 221-T building air flow. Such actions typically include opening of the rail tunnel door, activation of the 221-TA supply fans, or activation and deactivation of the individual exhaust fans for maintenance purposes. However, these situations are infrequent and are typically of a short duration.

Prior to 1989, flow measurements were made annually. The measurement frequency was increased to biannually until the new HEPA filtration system was installed in 1991, when the frequency was increased to quarterly. The quarterly measurements showed that the stack flow typically varies by a factor of two depending on the exhaust system operating configuration. Clearly, a more refined method is needed to provide consistently accurate flow data.

Resolution:

Administrative methods shall be implemented to provide a running record of the system configuration and operational status on a daily basis. Plant Operating Procedures (POPs) for daily surveillance of the T Plant facility will be amended to require maintenance of a daily log of the number of HEPA filter banks on line and the number of fans operating. This data, coupled with the quarterly flow measurements will provide a consistent baseline of flow data on a fairly continuous basis. In addition, the system shall be maintained in a consistent configuration with a minimum of outside disturbances to flow in the 221-T Building during the quarterly flow measurement testing. Sample flow rates will be adjusted when flow configurations are changed to ensure isokinetic sampling.

Additional efforts are also underway to modify the existing flow meter located on the main 56" duct traverse. This area is presently a radiological zone and access to the meter on a daily basis is difficult and, given safety considerations, considered an unwarranted risk. However, a modification to allow flow data to be transmitted to a remote recorder, located outside the radiological zone, is under review as part of scheduled exhaust system upgrades.

Either, or both, of the above resolutions will provide consistent flow data to demonstrate compliance with the applicable standard.

3.1.4: Title 40 CFR 61, Subpart H, (61.93.b.2.i)

Discussion:

The probe assembly for the continuous stack monitoring system in the 291-T-1 stack is at the forty foot level of the stack. This location places the probe at 6.6 average duct diameters downstream of a flow disturbance and 23 average duct diameters upstream of a disturbance. This location does not precisely conform to the current standard. Figures 1.1 and 1.3 and Table 1.2 were derived from the alternate location requirements per 40 CFR 60, Appendix A, Method 1. Figure 1.1 shows that sixteen sampling and velocity traverse points are required. The layout of these points is tabulated in Table 1.2 and shown in Figure 1.3.

The present probe is a single transverse manifold design with ten nozzles. As can be seen in the figures, the present design does not meet compliance requirements. However, Reynolds numbers calculated for the two operational stack flows indicate that the air flow is turbulent and uniform mixing is expected across the stack.

The existing 291-T-1 exhaust stack is 200 feet tall and is constructed of concrete with a brick lining. The brick lining is of concern to WHC as any disturbance of this lining may create a condition wherein the lining could be catastrophically damaged and block the exhaust duct. Installation of a probe design per Figure 1.3 would require that additional penetrations be made and would increase the risk of damaging the liner significantly. Access to the interior of the stack for installation of the probe, and/or repairs in the case of damage, is likely not possible due to the radiological and industrial safety concerns for a stack of the age and construction of 291-T-1.

Resolution:

Based on the indicated conditions of turbulent flow in the stack it is expected that uniform mixing of the effluent stream is present across the stack at the sampling point. Therefore, it is felt that the existing sampling probe assembly is acceptable for continued use in the present location and it is requested that the EPA grant approval for continued use of the existing probe assembly.

A line loss study has been commissioned by T Plant to be performed on the 291-T-1 sample/monitoring system (Reference: WHC NESHAP Compliance Plan, 9301990B R1). The study is scheduled to commence on October 29, 1993 and preparations are presently underway to support this activity. Included in this preparation is the relocation of the stack monitoring cabinet and replacement of the sample line (Reference: WHC NESHAP Compliance Plan, 9301990B R1). The documentation to complete this work has been prepared, reviewed and issued in accordance with the WHC Job Control System. This work is presently underway and is planned to be completed by October 15, 1993. The results of the study will be evaluated to verify if line losses in the sampling system contribute significantly to underestimation of stack effluent releases.

4.0 CONCLUSION

- Application of NDA, as referenced in the WHC Compliance Plan, 9301990B R1, to the 291-T-1 exhaust system will indicate whether the present designation of the stack as "major" is correct. If the results of the NDA demonstrate that the stack designation is incorrect, notification will be provided to the EPA.

- Results of the line loss study, referenced in the WHC Compliance Plan, 9301990B R1, will be evaluated to verify if line losses in the sampling system contribute significantly to an underestimation of the 291-T-1 stack effluent releases. A report documenting the results of the study will be provided to the EPA.

- Implementation of administrative controls to provide consistent data of the exhaust system operating configuration and/or modification of the existing flow meter will provide sufficient baseline flow data to demonstrate that the system is equivalent to the standard.

- Based on the fully turbulent flow conditions indicated by the calculated Reynolds numbers for the effluent stream, approval is requested from the EPA for continued use of the existing 291-T-1 stack sampling probe assembly.

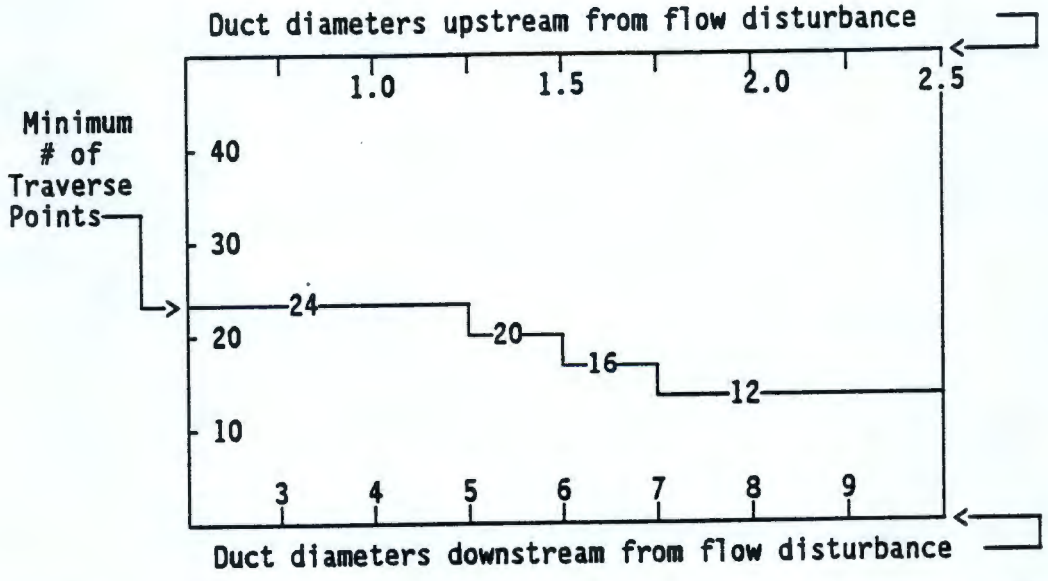

Figure 1.1. Minimum number of traverse points for particulate traverses.

TABLE 1.2:

Traverse Point	Distance % of diameter
1	93.2
2	1010.5
3	1119.4
4	1232.3
5	1367.7
6	1480.6
7	1589.5
8	1696.8

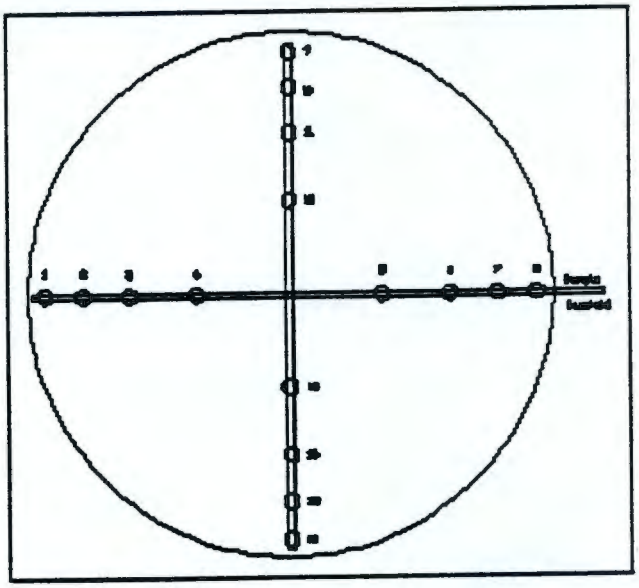

Figure 1.3:
Recommended new sample manifold for 291-T-1, circular stack cross section divided into 16 equal areas , with location of traverse points indicated.

5.0 REFERENCES

DOCUMENTS

40 CFR 60, Appendix A, Method 1: Sample and Velocity Traverse for Stationary Sources

40 CFR 60, Appendix A, Method 2: Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)

9301990B R1: Westinghouse Hanford Company Compliance Plan

PROCEDURES

7-GN-56 Air Flow Capacity and Distribution Tests

OFFSITE

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Richland Operations Office

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