LA-UR-04-0505

Approved for public release;
distribution is unlimited.

Title: An EPA Alternative Method Approval Request for Performance-Testing Tritium Stack Sampling Systems

Author(s): Fuehne, David P.

Submitted to: Health Physics Society Mid-Year Meeting &
2004 Rad-NESHAP National Meeting

Feb 8-11, 2004
Augusta, Georgia

An EPA Alternative Method Approval Request
for Performance-Testing Tritium Stack Sampling Systems

This document details LANL's application to EPA Region 6 for approval of a Rad-NESHAPs alternative method. This alternative method would allow LANL to use its periodic performance test of tritium sampling systems in lieu of performing visual inspections on these sampling systems. At EPA request, a separate application was drafted for each stack at which this alternative method would be used. Supplemental information was later provided for one stack. The EPA granted approval via a single memo in December 2003.

This document contains six sections.

1) Memo RRES-MAQ:03-254, "Request for EPA Approval: Alternative method to Perform Inspections on Tritium-Emitting Stack TA-55-0004-16," David Fuehne (LANL) to George Brozowski, EPA Region 6, October 9, 2003.

2) Memo RRES-MAQ:03-255, "Request for EPA Approval: Alternative method to Perform Inspections on Tritium-Emitting Stack TA-21-0209-01," David Fuehne (LANL) to George Brozowski, EPA Region 6, October 9, 2003.

3) Memo RRES-MAQ:03-256, "Request for EPA Approval: Alternative method to Perform Inspections on Tritium-Emitting Stack TA-21-0155-05," David Fuehne (LANL) to George Brozowski, EPA Region 6, October 9, 2003.

4) Memo RRES-MAQ:03-257, "Request for EPA Approval: Alternative method to Perform Inspections on Tritium-Emitting Stack TA-16-0205-04," David Fuehne (LANL) to George Brozowski, EPA Region 6, October 9, 2003.

5) Memo RRES-MAQ:03-279, "Tritium Sampling System Performance Test at TA-21-209 Exhaust Stack-01," David Fuehne (LANL) to George Brozowski, EPA Region 6, November 3, 2003. This is supplemental information for document #3, above.

6) Memo from George Brozowski, EPA Region 6, to David Fuehne, dated December 4, 2003. "National Emission Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61, Subparts A and H, Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities." This document provides approval from the EPA for the applications above.

Risk Reduction & Environmental Stewardship Division
Meteorology & Air Quality Group
PO Box 1663, MS J978
Los Alamos, New Mexico 87545
(505) 665-8855/Fax: (505) 665-8858

Date: October 9, 2003
Refer to: RRES-MAQ:03-254

Mr. George P. Brozowski
1445 Ross Avenue (6 PDT)
Suite 1200
Dallas, TX 75202

Subject: Request for EPA Approval: Alternative Method to Perform Inspections on Tritium-Emitting Stack TA-55-0004-16

Dear Mr. Brozowski:

This memo is a request for approval for an alternative method for stack sampling system inspections for the tritium sampling system at Technical Area (TA-) 55, Building 4, Exhaust Stack 16. The request is for LANL's periodic tritium sampling system performance test to be approved to take the place of the visual inspection required under the revised Rad-NESHAP regulations.

This stack is equipped with both a particulate sampling system and a tritium sampling system; the methods discussed here apply only to the tritium sampling system. The particulate sampling system will be visually inspected as required under the revised Rad-NESHAP regulations.

Background

Los Alamos National Laboratory (LANL) has certain radioactive emission stacks which are considered "tritium stacks," from which tritium is emitted in quantities that exceed the 0.1 millirem per year continuous monitoring threshold, and for which tritium makes up at least 10% of the potential effective dose equivalent to an off-site receptor. These stacks are continuously sampled with a "bubbler" which measures the amounts of tritiated water vapor and elemental tritium that is released from the stack. A series of collection vials filled with ethylene glycol and a high-temperature catalyst allows complete collection and differentiation of the different chemical forms of tritium.

New maintenance and inspections requirements were imposed as part of the recent revision to 40 CFR 61, Subpart H and the associated quality assurance requirements in Appendix B, Method 114. The goal of these requirements is to ensure the stack sampling system is in adequate working condition to obtain a representative sample of the stack air stream.

All of the tritium stacks at LANL are categorized as Tier II stacks.[1] This category of stacks requires inspection of the stack probe nozzle(s) and transport lines for damage, deposits, etc., and cleaning of the system if certain criteria are met. Also, a leak inspection is performed on the system to determine if there is potential for leakage into or out of the system.

At least annually, each of the LANL tritium stack sampling systems is performance-tested by releasing a known amount of tritium into the stack and comparing the emissions measured by the system with the known amount released. This performance test evaluates the sampling system in its entirety, including nozzle performance, glycol collection efficiency, sample flow rate, and effectiveness of the catalyst in the bubbler system. This system performance test provides a complete picture of the operation of the stack sampling system.

LANL has a several-year history of the results of these performance tests. The stack sampling system has been shown to perform at 90% or better for the past several years.

The performance test results are actually more useful and more thorough than the results achieved by a simple visual inspection of the sampling systems. **LANL requests that this program of tritium stack performance testing be approved to take the place of stack sampling system inspection requirements for this tritium sampling system.**

Guidance from ANSI N13.1-1999

When examining ways to meet the inspection requirements in the revised Rad-NESHAP, the guidance provided in section 6.5 of the ANSI N13.1-1999 standard states (page 41):

> "When non-reactive gases and vapors are the only species being sampled, the sampling requirements are considerably simpler than those for aerosol particles. The requirements for minimizing particle line-loss are irrelevant."

The type of source test in use at LANL is suggested in the ANSI standard as a method for "Sampling System Performance Verification" in Annex F (page 84-85). The standard states that this method ("In-place testing") can be used to verify sample transmission performance. Section F.3.2 cites examples of a similar performance tests conducted for radioiodine sampling systems, which measure gas and vapor emissions comparable to the LANL tritium stacks.

When establishing an acceptance threshold for the performance test, the ANSI standard states (also in 6.5, page 41):

> "The penetration of the gas or vapor through the complete extraction and transport system shall be documented. The minimum transport efficiency for vapor or gas samples from the free stream to the collector/analyzer should be 50%."

[1] The LANL stack categorization system is described in the "Quality Assurance Project Plan for the Rad-NESHAP Compliance Team," controlled document number RRES-MAQ-RN. The most recent revision, revision 3, was issued on May 30, 2003. It is available on the RRES-MAQ web page at:
http://www.airquality.lanl.gov/QADocs/RadNQAPP-R3.pdf

Implementation of the performance test results

For conservatism, the acceptance threshold for sampler system performance applied to LANL stacks will be set at 80%. A performance test result below this level will require a repeat of the test and investigation into causal factors. If a repeat test or the investigation indicates a problem, further inspection of the sampling system will take place.

For all tritium emissions, a performance test result less than 100% will be used as a correction factor when calculating emissions and scale the measured emissions value up accordingly. A performance test score of 100% or more will result in no change to the sampling system's measured emissions value.

Additional notes

This alternative method will only be applicable to the tritium stack sampling system mentioned in the first paragraph of this memo. Requests for approval to use this method on additional stacks with similar sampling systems will be with separate memos

Attachment A has the history of tritium performance tests for this stack in recent years.

Sincerely,

Dave Fuehne
RRES-MAQ

DF:db

Att: a/s

Cy:
Jean Dewart, RRES-MAQ, J978
Victor Martinez, RRES-MAQ, J978
Steve Fong, DOE-LAAO, A316
Karlissa Benally, DOE-LAAO, A316
Rad-NESHAP Records, Position Statements
RRES-MAQ File

ATTACHMENT A:
HISTORY OF TRITIUM SAMPLING SYSTEM PERFORMANCE TESTS
Stack ID 55000416 TA-55 BLDG-0004 ES-16
2000 - present

Stack ID	Performance Test Date	System Response Factor
55000416	02/16/2000	>100%
55000416	08/23/2000	>100%
55000416	02/26/2001	>100%
55000416	08/27/2001	>100%
55000416	02/27/2002	>100%
55000416	09/23/2002	100%
55000416	04/08/2003	>100%

Los Alamos
NATIONAL LABORATORY

Risk Reduction & Environmental Stewardship Division
Meteorology & Air Quality Group
PO Box 1663, MS J978
Los Alamos, New Mexico 87545
(505) 665-8855/Fax: (505) 665-8858

Date: October 9, 2003
Refer to: RRES-MAQ:03-255

Mr. George P. Brozowski
1445 Ross Avenue (6 PDT)
Suite 1200
Dallas, TX 75202

Subject: Request for EPA Approval: Alternative Method to Perform Inspections on Tritium-Emitting Stack TA-21-0209-01

Dear Mr. Brozowski:

This memo is a request for approval for an alternative method for stack sampling system inspections for the tritium sampling system at Technical Area (TA-) 21, Building 209, Exhaust Stack 1. The request is for LANL's periodic tritium sampling system performance test to be approved to take the place of the visual inspection required under the revised Rad-NESHAP regulations.

This stack is only monitored for tritium emissions, using a "bubbler" collector which captures tritiated water vapor and elemental tritium gas.

Background

Los Alamos National Laboratory (LANL) has certain radioactive emission stacks which are considered "tritium stacks," from which tritium is emitted in quantities that exceed the 0.1 millirem per year continuous monitoring threshold, and for which tritium makes up at least 10% of the potential effective dose equivalent to an off-site receptor. These stacks are continuously sampled with a "bubbler" which measures the amounts of tritiated water vapor and elemental tritium that is released from the stack. A series of collection vials filled with ethylene glycol and a high-temperature catalyst allows complete collection and differentiation of the different chemical forms of tritium.

New maintenance and inspections requirements were imposed as part of the recent revision to 40 CFR 61, Subpart H and the associated quality assurance requirements in Appendix B, Method 114. The goal of these requirements is to ensure the stack sampling system is in adequate working condition to obtain a representative sample of the stack air stream.

All of the tritium stacks at LANL are categorized as Tier II stacks.[1] This category of stacks requires inspection of the stack probe nozzle(s) and transport lines for damage, deposits, etc., and cleaning of the

[1] The LANL stack categorization system is described in the "Quality Assurance Project Plan for the Rad-NESHAP Compliance Team," controlled document number RRES-MAQ-RN. The most recent revision, revision 3, was issued on May 30, 2003. It is available on the RRES-MAQ web page at:

system if certain criteria are met. Also, a leak inspection is performed on the system to determine if there is potential for leakage into or out of the system.

At least annually, each of the LANL tritium stack sampling systems is performance-tested by releasing a known amount of tritium into the stack and comparing the emissions measured by the system with the known amount released. This performance test evaluates the sampling system in its entirety, including nozzle performance, glycol collection efficiency, sample flow rate, and effectiveness of the catalyst in the bubbler system. This system performance test provides a complete picture of the operation of the stack sampling system.

LANL has a several-year history of the results of these performance tests. This stack sampling system has been shown to perform at 90% or better for all but two tests, in which cases the performance was 87% and 79%. In these tests, influencing factors have been identified which account for the less-than-expected result.

The performance test results are actually more useful and more thorough than the results achieved by a simple visual inspection of the sampling systems. **LANL requests that this program of tritium stack performance testing be approved to take the place of stack sampling system inspection requirements for this tritium sampling system.**

Guidance from ANSI N13.1-1999

When examining ways to meet the inspection requirements in the revised Rad-NESHAP, the guidance provided in section 6.5 of the ANSI N13.1-1999 standard states (page 41):

> "When non-reactive gases and vapors are the only species being sampled, the sampling requirements are considerably simpler than those for aerosol particles. The requirements for minimizing particle line-loss are irrelevant."

The type of source test in use at LANL is suggested in the ANSI standard as a method for "Sampling System Performance Verification" in Annex F (page 84-85). The standard states that this method ("In-place testing") can be used to verify sample transmission performance. Section F.3.2 cites examples of a similar performance tests conducted for radioiodine sampling systems, which measure gas and vapor emissions comparable to the LANL tritium stacks.

When establishing an acceptance threshold for the performance test, the ANSI standard states (also in 6.5, page 41):

> "The penetration of the gas or vapor through the complete extraction and transport system shall be documented. The minimum transport efficiency for vapor or gas samples from the free stream to the collector/analyzer should be 50%."

Implementation of the performance test results

For conservatism, the acceptance threshold for sampler system performance applied to LANL stacks will be set at 80%. A performance test result below this level will require a repeat of the test and investigation into causal factors. If a repeat test or the investigation indicates a problem, further inspection of the sampling system will take place.

For all tritium emissions, a performance test result less than 100% will be used as a correction factor when calculating emissions and scale the measured emissions value up accordingly. A performance test score of 100% or more will result in no change to the sampling system's measured emissions value.

Additional notes

This alternative method will only be applicable to tritium stack sampling systems, for which particulate deposition, particle size mixing, etc., is not a factor. For stacks with multiple sampling systems (e.g., both a particulate sampling system and a tritium sampling system), this inspection waiver only applies to the tritium system. The particulate sampling system will still undergo a visual inspection as required in 40 CFR 61.

Attachment A has the history of tritium performance tests for this stack in recent years.

As mentioned above, Attachment A shows two performance tests which had results less than 90%. In the first, an 87% test result on 6/29/2000, the calibration gas was impure and biased the test results low. Subsequent calibrations indicate >90% performance. In the second low result, a 79% result from 4/14/2003, there is question about the stack flow rates used for analysis of sampling system performance. This system will be re-tested in October or November 2003 for performance verification. Another low result will trigger a physical inspection of the tritium sampling system.

Sincerely,

Dave Fuehne
RRES-MAQ

DF:db

Att: a/s

Cy:
Jean Dewart, RRES-MAQ, J978
Victor Martinez, RRES-MAQ, J978
Steve Fong, DOE-LAAO, A316
Karlissa Benally, DOE-LAAO, A316
Rad-NESHAP Records, Position Statements
RRES-MAQ File

ATTACHMENT A:
HISTORY OF TRITIUM SAMPLING SYSTEM PERFORMANCE TESTS
Stack ID 21020901 TA-21 BLDG-0209 ES-01
2000 - present

Stack ID	Performance Test Date	System Response Factor
21020901	12/08/1999	>100%
21020901	06/29/2000	**87%***
21020901	01/03/2001	>100%
21020901	06/26/2001	>100%
21020901	12/11/2001	>100%
21020901	06/25/2002	>100%
21020901	04/14/2003	**79%***

*These readings generated investigations; explanatory notes and investigation results are included in the text of this document

Los Alamos
NATIONAL LABORATORY

Risk Reduction & Environmental Stewardship Division
Meteorology & Air Quality Group
PO Box 1663, MS J978
Los Alamos, New Mexico 87545
(505) 665-8855/Fax: (505) 665-8858

Date: October 9, 2003
Refer to: RRES-MAQ:03-256

Mr. George P. Brozowski
1445 Ross Avenue (6 PDT)
Suite 1200
Dallas, TX 75202

Subject: Request for EPA Approval: Alternative Method to Perform Inspections on Tritium-Emitting Stack TA-21-0155-05

Dear Mr. Brozowski:

This memo is a request for approval for an alternative method for stack sampling system inspections for the tritium sampling system at Technical Area (TA-) 21, Building 155, Exhaust Stack 5. The request is for LANL's periodic tritium sampling system performance test to be approved to take the place of the visual inspection required under the revised Rad-NESHAP regulations.

This stack is only monitored for tritium emissions, using a "bubbler" collector which captures tritiated water vapor and elemental tritium gas.

Background

Los Alamos National Laboratory (LANL) has certain radioactive emission stacks which are considered "tritium stacks," from which tritium is emitted in quantities that exceed the 0.1 millirem per year continuous monitoring threshold, and for which tritium makes up at least 10% of the potential effective dose equivalent to an off-site receptor. These stacks are continuously sampled with a "bubbler" which measures the amounts of tritiated water vapor and elemental tritium that is released from the stack. A series of collection vials filled with ethylene glycol and a high-temperature catalyst allows complete collection and differentiation of the different chemical forms of tritium.

New maintenance and inspections requirements were imposed as part of the recent revision to 40 CFR 61, Subpart H and the associated quality assurance requirements in Appendix B, Method 114. The goal of these requirements is to ensure the stack sampling system is in adequate working condition to obtain a representative sample of the stack air stream.

All of the tritium stacks at LANL are categorized as Tier II stacks.[1] This category of stacks requires inspection of the stack probe nozzle(s) and transport lines for damage, deposits, etc., and cleaning of the

[1] The LANL stack categorization system is described in the "Quality Assurance Project Plan for the Rad-NESHAP Compliance Team," controlled document number RRES-MAQ-RN. The most recent revision, revision 3, was issued on May 30, 2003. It is available on the RRES-MAQ web page at:

system if certain criteria are met. Also, a leak inspection is performed on the system to determine if there is potential for leakage into or out of the system.

At least annually, each of the LANL tritium stack sampling systems is performance-tested by releasing a known amount of tritium into the stack and comparing the emissions measured by the system with the known amount released. This performance test evaluates the sampling system in its entirety, including nozzle performance, glycol collection efficiency, sample flow rate, and effectiveness of the catalyst in the bubbler system. This system performance test provides a complete picture of the operation of the stack sampling system.

LANL has a several-year history of the results of these performance tests. The stack sampling system has been shown to perform at 90% or better for this stack..

The performance test results are actually more useful and more thorough than the results achieved by a simple visual inspection of the sampling systems. **LANL requests that this program of tritium stack performance testing be approved to take the place of stack sampling system inspection requirements for this tritium sampling system.**

Guidance from ANSI N13.1-1999

When examining ways to meet the inspection requirements in the revised Rad-NESHAP, the guidance provided in section 6.5 of the ANSI N13.1-1999 standard states (page 41):

> "When non-reactive gases and vapors are the only species being sampled, the sampling requirements are considerably simpler than those for aerosol particles. The requirements for minimizing particle line-loss are irrelevant."

The type of source test in use at LANL is suggested in the ANSI standard as a method for "Sampling System Performance Verification" in Annex F (page 84-85). The standard states that this method ("In-place testing") can be used to verify sample transmission performance. Section F.3.2 cites examples of a similar performance tests conducted for radioiodine sampling systems, which measure gas and vapor emissions comparable to the LANL tritium stacks.

When establishing an acceptance threshold for the performance test, the ANSI standard states (also in 6.5, page 41):

> "The penetration of the gas or vapor through the complete extraction and transport system shall be documented. The minimum transport efficiency for vapor or gas samples from the free stream to the collector/analyzer should be 50%."

Implementation of the performance test results

For conservatism, the acceptance threshold for sampler system performance applied to LANL stacks will be set at 80%. A performance test result below this level will require a repeat of the test and investigation

---

http://www.airquality.lanl.gov/QADocs/RadNQAPP-R3.pdf

into causal factors. If a repeat test or the investigation indicates a problem, further inspection of the sampling system will take place.

For all tritium emissions, a performance test result less than 100% will be used as a correction factor when calculating emissions and scale the measured emissions value up accordingly. A performance test score of 100% or more will result in no change to the sampling system's measured emissions value.

Additional notes

This alternative method will only be applicable to the tritium stack sampling system mentioned in the first paragraph of this memo. Requests for approval to use this method on additional stacks with similar sampling systems will be with separate memos

Attachment A has the history of tritium performance tests for this stack in recent years.

Sincerely,

Dave Fuehne
RRES-MAQ

DF:db

Att: a/s

Cy:
Jean Dewart, RRES-MAQ, J978
Victor Martinez, RRES-MAQ, J978
Steve Fong, DOE-LAAO, A316
Karlissa Benally, DOE-LAAO, A316
Rad-NESHAP Records, Position Statements
RRES-MAQ File

ATTACHMENT A:
HISTORY OF TRITIUM SAMPLING SYSTEM PERFORMANCE TESTS
Stack ID 21015505 TA-21 BLDG-0155 ES-05
2000 - present

Stack ID	Performance Test Date	System Response Factor
21015505	06/08/2000	>100%
21015505	12/11/2000	>100%
21015505	06/13/2001	94%
21015505	12/12/2001	>100%
21015505	06/24/2002	97%
21015505	04/15/2003	>100%

Los Alamos
NATIONAL LABORATORY

Risk Reduction & Environmental Stewardship Division
Meteorology & Air Quality Group
PO Box 1663, MS J978
Los Alamos, New Mexico 87545
(505) 665-8855/Fax: (505) 665-8858

Date: Octobe 9, 2003
Refer to: RRES-MAQ:03-257

Mr. George P. Brozowski
1445 Ross Avenue (6 PDT)
Suite 1200
Dallas, TX 75202

Subject: Request for EPA Approval: Alternative Method to Perform Inspections on Tritium-Emitting Stack TA-16-0205-04

Dear Mr. Brozowski:

This memo is a request for approval for an alternative method for stack sampling system inspections for the tritium sampling system at Technical Area (TA-) 16, Building 205, Exhaust Stack 4. The request is for LANL's periodic tritium sampling system performance test to be approved to take the place of the visual inspection required under the revised Rad-NESHAP regulations.

This stack is only monitored for tritium emissions, using a "bubbler" collector which captures tritiated water vapor and elemental tritium gas.

Background

Los Alamos National Laboratory (LANL) has certain radioactive emission stacks which are considered "tritium stacks," from which tritium is emitted in quantities that exceed the 0.1 millirem per year continuous monitoring threshold, and for which tritium makes up at least 10% of the potential effective dose equivalent to an off-site receptor. These stacks are continuously sampled with a "bubbler" which measures the amounts of tritiated water vapor and elemental tritium that is released from the stack. A series of collection vials filled with ethylene glycol and a high-temperature catalyst allows complete collection and differentiation of the different chemical forms of tritium.

New maintenance and inspections requirements were imposed as part of the recent revision to 40 CFR 61, Subpart H and the associated quality assurance requirements in Appendix B, Method 114. The goal of these requirements is to ensure the stack sampling system is in adequate working condition to obtain a representative sample of the stack air stream.

All of the tritium stacks at LANL are categorized as Tier II stacks.[1] This category of stacks requires inspection of the stack probe nozzle(s) and transport lines for damage, deposits, etc., and cleaning of the

[1] The LANL stack categorization system is described in the "Quality Assurance Project Plan for the Rad-NESHAP Compliance Team," controlled document number RRES-MAQ-RN. The most recent revision, revision 3, was issued on May 30, 2003. It is available on the RRES-MAQ web page at:

system if certain criteria are met. Also, a leak inspection is performed on the system to determine if there is potential for leakage into or out of the system.

At least annually, each of the LANL tritium stack sampling systems is performance-tested by releasing a known amount of tritium into the stack and comparing the emissions measured by the system with the known amount released. This performance test evaluates the sampling system in its entirety, including nozzle performance, glycol collection efficiency, sample flow rate, and effectiveness of the catalyst in the bubbler system. This system performance test provides a complete picture of the operation of the stack sampling system.

LANL has a several-year history of the results of these performance tests. The stack sampling system has been shown to perform at 90% or better for this stack..

The performance test results are actually more useful and more thorough than the results achieved by a simple visual inspection of the sampling systems. **LANL requests that this program of tritium stack performance testing be approved to take the place of stack sampling system inspection requirements for this tritium sampling system.**

Guidance from ANSI N13.1-1999

When examining ways to meet the inspection requirements in the revised Rad-NESHAP, the guidance provided in section 6.5 of the ANSI N13.1-1999 standard states (page 41):

> "When non-reactive gases and vapors are the only species being sampled, the sampling requirements are considerably simpler than those for aerosol particles. The requirements for minimizing particle line-loss are irrelevant."

The type of source test in use at LANL is suggested in the ANSI standard as a method for "Sampling System Performance Verification" in Annex F (page 84-85). The standard states that this method ("In-place testing") can be used to verify sample transmission performance. Section F.3.2 cites examples of a similar performance tests conducted for radioiodine sampling systems, which measure gas and vapor emissions comparable to the LANL tritium stacks.

When establishing an acceptance threshold for the performance test, the ANSI standard states (also in 6.5, page 41):

> "The penetration of the gas or vapor through the complete extraction and transport system shall be documented. The minimum transport efficiency for vapor or gas samples from the free stream to the collector/analyzer should be 50%."

Implementation of the performance test results

For conservatism, the acceptance threshold for sampler system performance applied to LANL stacks will be set at 80%. A performance test result below this level will require a repeat of the test and investigation

---

http://www.airquality.lanl.gov/QADocs/RadNQAPP-R3.pdf

into causal factors. If a repeat test or the investigation indicates a problem, further inspection of the sampling system will take place.

For all tritium emissions, a performance test result less than 100% will be used as a correction factor when calculating emissions and scale the measured emissions value up accordingly. A performance test score of 100% or more will result in no change to the sampling system's measured emissions value.

Additional notes

This alternative method will only be applicable to the tritium stack sampling system mentioned in the first paragraph of this memo. Requests for approval to use this method on additional stacks with similar sampling systems will be with separate memos

Attachment A has the history of tritium performance tests for this stack in recent years.

Sincerely,

Dave Fuehne
RRES-MAQ

DF:db

Att: a/s

Cy:
Jean Dewart, RRES-MAQ, J978
Victor Martinez, RRES-MAQ, J978
Steve Fong, DOE-LAAO, A316
Karlissa Benally, DOE-LAAO, A316
Rad-NESHAP Records, Position Statements
RRES-MAQ File

ATTACHMENT A:
HISTORY OF TRITIUM SAMPLING SYSTEM PERFORMANCE TESTS
Stack ID 16020504 TA-16 BLDG-0205 ES-04
2000 - present

Stack ID	Performance Test Date	System Response Factor
16020504	01/11/2000	>100%
16020504	07/11/2000	>100%
16020504	01/17/2001	>100%
16020504	07/16/2001	96%
16020504	01/10/2002	100%
16020504	07/15/2002	98%
16020504	02/13/2003	>100%
16020504	08/13/2003	95%

Los Alamos
NATIONAL LABORATORY

Risk Reduction & Environmental Stewardship Division
Meteorology & Air Quality Group
PO Box 1663, MS J978
Los Alamos, New Mexico 87545
(505) 665-8855/Fax: (505) 665-8858

Date: November 3, 2003
Refer to: RRES-MAQ:03-279

Mr. George P. Brozowski
1445 Ross Avenue (6 PDT)
Suite 1200
Dallas, TX 75202

TRITIUM SAMPLING SYSTEM PERFORMANCE TEST AT TA-21-209 EXHAUST STACK-01

Dear Mr. Brozowski:

The tritium stack sampling system at Technical Area (TA-) 21, Building 209, Exhaust Stack-01 was performance tested on October 23, 2003. Prior to this test, a thorough inspection of the "bubbler" collection device was also performed to verify flow rates & general system operability.

The performance test is conducted by the Laboratory's Radiation Instrumentation & Calibration team (RIC), part of the Health Physics Measurements group, HSR-4. The RIC team conducts these performance tests on a periodic basis (at least annually) for the Laboratory's four major tritium-emitting stacks. The test consists of a release of a known amount of tritium gas (HT) into the stack system, and comparing the known release with the emissions measured by the stack sampling system.

The attached memo from the RIC team, designated HSR-4-RIC-03:015 documents the performance test at TA-21-209-1. The overall performance of the system was outstanding, with the system measuring a release that was 99.4% of the actual amount emitted during the test.

This "bubbler response factor" will be used as a correction factor for measured emissions from this stack.

This stack system had a response factor of 79% measured during the last performance test in April 2003. We believe that the low response in the April test was due to an stack flow measurement that was either incorrect or not reflect normal operations at the facility (e.g., at the time of the flow measurement, an exhaust damper could have been temporarily adjusted as part of facility maintenance activities). Since the response factor trends directly with the stack flow rate, such a low stack flow would bias the performance test low. The flow measurement used for the April performance test was lower than "typical" flow measurements in recent years.

The system performance test in October used a more recent stack flow, measured in August 2003, which was better aligned with typical flow measurements taken in recent years.

We had previously submitted alternative method requests to use these periodic stack sampling system performance tests in lieu of a visual inspection on each tritium stack sampling system. This memo and the attached data are intended to support that request. We are looking forward to hearing from you in November on the status of these requests.

Please contact me if you would like more information.

Sincerely,

Dave Fuehne
RRES-MAQ

Att: a/s

DF:alb

Cy:
Jean Dewart, RRES-MAQ, J978
Victor Martinez, RRES-MAQ, J978
Steve Fong, DOE-LAAO, A316
Karlissa Benally, DOE-LAAO, A316
Christopher Bjork, HSR-4, J573
Robert Murphy, HSR-4, J573
Rad-NESHAP Records, Position Statements
RRES-MAQ File

Los Alamos

memorandum

Health, Safety and Radiation Protection Division
HSR-4 Health Physics Measurements

To/MS: Mike Rogers, ESA-TSE, MS/C348
Thru:/MS: Robert O. Murphy, HSR-4, MS/J573
From/MS: Chris Bjork, HSR-4, MS/J573
Phone/Fax: 7-8001/Fax 5-7686

Symbol: HSR-4-RIC-03:015
Date: October 28, 2003

SUBJECT: TA21 BLDG 209 ES 1 BUBBLER 6994 CALIBRATION 10/23/03

Introduction

The EG&G LABSERCO EL-700 tritium bubbler was installed as part of the Stack Monitoring System, SMS. This bubbler is designed for nearly complete collection of tritium as oxide from air bubbling through six bottles of glycol. HT is distinguished from HTO by collecting the oxide in the first three bottles from the air stream before a heated palladium catalyst can convert HT to HTO, which is then collected in the final three bottles. The EL-700 maintains a precise air flow via a mass flow controller. The unit has sufficient catalyst to achieve quantitative elemental tritium collection and because only glycol is used, the correction for evaporation is minimized.

Calibration

The objective of the calibration is to determine the bubbler response, R_{bub} , for the SMS. Present for the calibration were Gerald Lucero and Chuck Tesch of ESA-TSE, Ken Vigil and Dennis Duran of HSR-1, and Chris Bjork, Robert Murphy and Ivan Vigil of HSR-4. The HSR-4 tritium calibration cart was used for the controlled tritium stack release. The volume of the loop was determined to be 25.36 liters (see Table 1). After injection of tritium, the measured concentration in the loop was 11970 mCi/m^3, corrected to 11252 mCi/m^3.

Table 1. Closed-loop system volume

Description	Volume (liters)
Ion Chambers	4.8
Calibration Cart Cylinders	20.0
Metal Tubing	0.56
Total	**25.36**

The stack flow rate is 737.4 m^3/min, as measured by KSL on August 11, 2003.

Calculations

(1) The total activity of the closed loop system, measured with the HSR-4 calibrated transfer instrument, is HT_{sys}:

$$HT_{sys} = (11252\ mCi/m^3)\ (.02536\ m^3) = 285.4\ mCi.$$

(2) The net HT activity, determined by the HPAL liquid scintillation counter, as collected by the bubbler is HT_{bub}:

$$HT_{bub} = (2.039 \times 10^{-3}\ \mu Ci/mL)\ (30\ mL) - (0.115 \times 10^{-3}\ \mu Ci/mL)\ (30mL) = 0.05772\ \mu Ci$$

(3) The total HT activity stacked according to the bubbler, where F_{stk} and F_{bub} are the flow rates for the stack and bubbler, respectively, is HT_{stk}:

$$HT_{stk} = (\ HT_{bub}\ )(\ F_{stk}\ ) / (\ F_{bub}\ )$$

$$HT_{stk} = [\ (0.05772\ \mu Ci\ )(\ 10^{-3}\ mCi/\mu Ci\ )(737.4\ m^3/min\ )\ ] / [\ (\ 150\ cc/min\ )(\ m^3/10^6\ cc\ )\ ] = 283.8\ mCi$$

(4) The bubbler response for the SMS is R_{bub}:

$$R_{bub} = HT_{stk} / HT_{sys}$$

$$R_{bub} = 283.8 / 285.4 = 0.994$$

Note that this response factor must be changed if the flow rate is changed.

CB

xc: R. H. Olsher, MS/J573
Mel Jaramillo, MS/J573
Ivan Vigil, MS/J573
David Fuehne, MS/J978
Debra Archuleta, MS/J978
Carolyn Macdonell, MS/J978
Dennis Duran, MS/C348
Ken Vigil, MS/C348
Gerald Lucero, MS/C348
Chuck Tesch, MS/C348
Gail Zimmerman, MS/C927
HSR-4 Group Office File

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6
1445 ROSS AVENUE
DALLAS, TEXAS 75202-2733

Mr. David Fuehne
Risk Reduction & Environmental Stewardship Division
Meteorology & Air Quality Group
U. S. Department of Energy
Los Alamos National Laboratory
POB 1663 - MS J978
Los Alamos, NM 88221

Re: National Emission Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61, Subparts A and H, Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities

Dear Mr. Fuehne:

The Environmental Protection Agency (EPA) Region 6 is in receipt of the November 12, 2003 applications for EPA approval regarding using an alternative method to perform inspections on tritium stacks at the Los Alamos National Laboratory. I have completed the review of the applications pursuant to 40 CFR 61.07 Subpart H (National Emission Standards for Emissions of Radionuclides Other than Radon From Department of Energy Facilities) and have concluded your applications are acceptable as submitted.

These conditions of approval include:

1. This approval is effective on the date of this letter **only for** those facilities containing tritium-emitting stacks.

2. Any change in the information of this approved Application, shall be provided in writing to EPA-Region 6 within 30 days after the change.

3. Any revision to the plans and specifications of this approved Application, which may affect the radiation emissions to the outside air from the new construction, shall require prior written approval by Region 6 of EPA.

4. No condition presented herein precludes the Applicant from compliance with additional or more stringent conditions or requirements of any other Federal, State, or local approval or permit.

5. Failure to comply with the conditions of this approval may result in revocation of the approval and/or enforcement action by EPA.

This approval does not relieve the Applicant of the legal responsibility to comply with the NESHAPs standards for radionuclide emissions, with all other applicable requirements of Part 61 of Title 40 of the Code of Federal Regulations (40 CFR), and with any other applicable provisions of Federal, State, or Local law and regulations. Further, this approval does not limit any action which the EPA could take to implement or enforce air pollution requirements, including measures necessary to protect public health or welfare, or the environment from imminent and substantial endangerment under Section 303 of the Clean Air Act, as amended (42 U.S.C. 7603 et seq.).

Should you have any questions concerning the substance of this letter and approval, you may contact me at (214) 665-8541.

Sincerely yours,

George P. Brozowski
Regional Health Physicist