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12-ECD-0233

US DEPARTMENT OF ENERGY OFFICE OF RIVER PROTECTION (ORP) SUBMITTAL OF COMPLETED STACK SAMPLING SYSTEM INSPECTION CHECKLIST AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) N13.1-1999 SAMPLING AND MONITORING RELEASES OF AIRBORNE RADIOACTIVE SUBSTANCES FROM THE STACKS AND DUCTS OF NUCLEAR FACILITIES FOR THE AN AND AW DOUBLE SHELL TANK FARM TANK EXHAUSTERS STACKS 296-A-44 296-A-45 296-A-46 AND 296-A-47 EMISSION UNITS 735 736 855 AND 856 RESPECTIVELY

SECTION 1 OF 4

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

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12-ECD-0233

Mr. John Martell, Manager
Radioactive Air Emissions Section
Washington State Department of Health
309 Bradley Blvd., Suite 201
Richland, Washington 99352
(Hanford Mailstop: B1-42)

Dear Mr. Martell:

U.S. DEPARTMENT OF ENERGY, OFFICE OF RIVER PROTECTION (ORP) SUBMITTAL OF COMPLETED STACK SAMPLING SYSTEM INSPECTION CHECKLIST, AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) N13.1-1999, SAMPLING AND MONITORING RELEASES OF AIRBORNE RADIOACTIVE SUBSTANCES FROM THE STACKS AND DUCTS OF NUCLEAR FACILITIES FOR THE AN AND AW DOUBLE-SHELL TANK FARM, TANK EXHAUSTERS, STACKS 296-A-44, 296-A-45, 296-A-46, AND 296-A-47, EMISSION UNITS 735, 736, 855, AND 856 RESPECTIVELY

References:
1. WDOH letter from J. Martell to S. Samuelson, ORP, "Compliance Matrix for 241-AN Exhausters 296-A-44, 296-A-45, 296-A-46, and 296-A-47," AIR 12-402, dated April 10, 2012.

2. ORP letter from S. L. Samuelson to J. Martell, WDOH, "U.S. Department of Energy (DOE), Office of River Protection (ORP) Extension Request for Completion of the Stack Sampling System Inspection Check List, American National Standards Institute (ANSI) N13.1-1999, Sampling and Monitoring Releases of Airborne Radioactive Substances from the Stacks and Ducts of Nuclear Facilities for the AN & AW Double-Shell Tank Farm, Tank Exhausters, Stacks 296-A-44, 206-A-45, 296-A-46, & 296-A-47, Emission Units 735, 736, 855, & 856 Respectively," 12-ECD-0045, dated September 13, 2012.

ORP is requesting the Washington State Department of Health (WDOH) to review the attached "Stack Sampling System Inspection Checklist," Project Title, "ANSI N13.1-1999, Sampling and Monitoring Releases of Airborne Radioactive Substances from the Stacks and Ducts of Nuclear Facilities," which includes an enclosure of cited references, to WDOH.

ORP is submitting the ANSI N13.1-1999 Checklist as requested in Reference 1. This submittal also is intended to satisfy FF-01 "Radioactive Air Emissions License," Condition #9 of the current NOC_ID 809, Approval #AIR 11-1004 for Units 735 and 736 and Condition #8 for Emission Units 855 and 856. These conditions are both the same and read as follows:

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The effluent monitoring and sampling system shall meet the requirements of ANSI N13.1-1999. A written technical basis document required by Section 4 of ANSI N13.1-1999 shall be provided to WDOH for review and approval.

Reference 1 required completion and submittal of this checklist by September 15, 2012. As discussed between WDOH and ORP during an August 24, 2012, meeting, a revised submittal date for the checklist of December 31, 2012, was requested based on an agreement for additional time to support ongoing discussions on the content of the matrix and its format (Reference 2).

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

Sincerely,

Stacy Charboneau for

Scott L. Samuelson, Manager
Office of River Protection

ECD:DWB

Attachment

cc w/attach:
Administrative Record
Environmental Portal, LMSI
WRPS Correspondence

cc w/o attach:
L. Bostic, BNI
B. G. Erlandson, BNI
J. A. Bates, CHPRC
J. Cox, CTUIR
S. Harris, CTUIR
K. A. Conaway, Ecology
P. M. Gent, Ecology
D. Bartus, EPA (Region 10, Seattle)
D. Zhen, EPA (Region 10, Seattle)
R. H. Anderson, MSA
T. G. Beam, MSA
G. Bohnee, NPT
K. Niles, Oregon Energy
D. E. Jackson, RL
R. Jim, YN
J. W. Schmidt, WDOH
R. M. Allen, WRPS
L. L. Penn, WRPS
B. P. Rumburg, WRPS
BNI Correspondence

Attachment
12-ECD-0233
(1 CD)

Stack Sampling System Inspection Checklist ANSI N13.1-1999
Sampling and Monitoring Releases of Airborne Radioactive Substances
from the Stacks and Ducts of Nuclear Facilities

Stack Sampling System Inspection Checklist

ANSI N13.1-1999

Sampling and Monitoring Releases of Airborne Radioactive Substances from the Stacks and Ducts of Nuclear Facilities

Emission Units: 735, 736, 855, & 856	**Author:** Gary Crummel	**Date:** 10/30/12
Building: AN & AW Double Shell Tank Farm, Tank Exhausters		
Facility: Stacks 296-A-44, 296-A-45, 296-A-46, & 296-A-47		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
4. Objectives and Approaches for Sampling Programs		
Has a written Technical Basis Document been prepared?	Yes	The technical basis for the sampling program was developed previous to, during, as well as after the project to permit, build, and install these exhausters. Most of the development, but not all of it, was documented in numerous publications, specifications, studies, procedures, and plans. Where available, these references will be cited as the answers to the various questions asked throughout this checklist. Where references are not available, an explanation will be provided. A section has been included at the end of this checklist which cites these references.
Does it include the sampling objective, the graded approach for meeting the objectives, the relevant facility operating conditions and airborne contaminants, and the action levels that signal changing conditions of significance?	Yes	**Sampling Objective:** The objective of the sampling program was acquire approval to operate new ventilation systems in AN and AW Tank Farms per *Washington Administrative Code* (WAC) 246-247-060, *Applications, Registration and Licensing*. Page 1 of the Notice of Construction (NOC) Application (reference 04-ED-028, subject Approval of Radioactive Air Emissions Notice of Construction (NOC) for Operation of New Ventilation Systems in AN and AW Tank Farms, dated March 23, 2004) identified the total effective dose equivalent (TEDE) to the maximum exposed individual (MEI) as 1,330 mrem/yr without controls and 2.6 mrem/yr with controls. This was further broken out to 690 mrem/yr for the AN Farm Exhauster and 640 mrem/yr for the AW exhauster. **Graded Approach for meeting the objectives:** Because the TEDE to the MEI was above 5 mrem/yr, a sampling system was designed to continuously sample as well as monitor (with alarms) radionuclides per ANSI N13.1-1999. See section 9.1, page 12 in the NOC application (04-ED-028) (04-ED-028). This is in accordance with a PIC 1 emission unit defined in Table 2 – "Graded Approach to Sampling and Monitoring" of ANSI N13.1-1999. According to this table PIC 1

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Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
		emission units require continuous sampling and in-line monitoring with alarm capability is required for an emission unit whose potential fraction of the allowable limit is above 0.5. The allowable limit is 10 mrem/yr per WAC 247-247. This interpretation was agreed to in letter 03/ED-141, subject "Title 40, Code of Federal Regulations (CFR), Part 61, Subpart H Amendment Implementation on the Hanford Site,: dated September 3, 2003. **Relevant facility operating conditions and airborne contaminants:** This is discussed within the application (04-ED-028). Section 5, page 7 & 8 discuss chemical and physical processes. Section 6.2, pages 9 & 10 discuss the exhauster designs and capacities. Section 8, page 12 discuss the radionuclides airborne contaminants of concern. **Action levels that signal changing conditions of significance:** Action levels are discussed in terms on alarms – especially the continuous air monitoring alarm – in Section 6, page 28 of RPP-15034, Project W-314 Primary Ventilation System Setpoint Determination.
4.2.1 Estimating potential emissions		
Has a review been conducted of the potential sources of radionuclide emissions at a facility to determine 1) the form and radiological inventory of materials being handled, 2) the potential extent of airborne dispersal of this inventory and resultant concentrations at the facility boundary in the event of accidental loss of filtration and control of stack emissions, 3) the potential effective dose equivalent that would be received by a member of the public if such a release occurs, and 4) a comparison of potential doses to appropriate regulatory limits?	Yes	1) The form and radiological inventory of materials being handled is discussed in the NOC application (04-ED-028), Section 10, pages 13 thru 15 and section 11, page 19. 2) The potential extent of airborne dispersal of this inventory and resultant concentrations at the facility boundary in the event of accidental loss of filtration and control of stack emissions are discussed in the NOC application (04-ED-028), section 13, pages 19, thru 23 and section 14, page 23. 3) The potential effective dose equivalent that would be received by a member of the public if such a release occurs is discussed in the NOC application (04-ED-028), section 15, pages 24 thru 28. 4) A comparison of potential doses to appropriate regulatory limits is discussed in the NOC application (04-ED-028), section 8, page 12.
Have the potential emissions been documented?	Yes	The potential emissions are summarized on page 1 of the NOC application (04-ED-028).

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
Have regulatory approvals been given for potential emissions estimates?	Yes	Regulatory approvals are provided in the Air Operating Permit Emission Unit numbers 735, 736, 855, & 856.
4.2.2 A graded approach to sampling		
Has the decision to utilize real-time monitoring in addition to continuous record sampling been made?	Yes	The systems are designed with real-time monitoring (CAMs) in addition to continuous record sampling based upon potential emissions estimated in the NOC application (04-ED-028). See section 9.1, page 12 in the NOC application (04-ED-028). Because of the estimated emission levels, these emission units are classified as PIC 1 in accordance with Table 2 of the standard.
Has method of periodic sampling been documented?	NA	Not applicable. These units require continuous sampling.
Has method of periodic sampling been approved?		
4.3 Considerations for different sampling situations		
Have considerations been made to the potential interactions between the operating conditions of the facility, the airborne contaminants, the ventilation components and the sampling system?	Yes	These systems were designed to be corrosive resistant with stainless steel used wherever possible. Section 3.3.4.2, Page 42 of RPP-7881, "*Specification for a Primary Exhauster System for Waste Tank Ventilation*" specifies that the sample collection system shall be designed to operate in a pH range of 10-14, RH of 85%, and a temperature range of 27 to 75 °C (80 to 167 °F).
4.3.1 Considerations for sampling normal and off-normal conditions		
Has the effluent sampling system been designed to accommodate normal operating conditions with an expected variability? Note: These are usually the average operating conditions and their variance as defined in statistical terms. The normal operating conditions may have a large range of temperature and flow rates depending on the processes in operation.	Yes	The record sampling flow rate is designed to be proportional to the stack flow rate. The CAM is designed to operate at a continuous flow rate. Flow rate setpoints are documented on page 2 of RPP-15034, Rev 0, "Project W-314 Primary Ventilation System Setpoint Determination." The record sampler is designed to operate from 90 to 115% of the stack flow rate and the CAM is designed to operate from 1.8 to 2.2 SCFM no matter what the stack flow rate is. These flow rates are in accordance with the requirements specified in ANSI N13.1 for the emission levels estimated in the NOC application (04-ED-028).

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
Has the effluent sampling system been designed to function under conditions for particle size and concentration and effluent reactivity and corrosivity?	Yes	The systems were designed and tested for 10 micron sized particles. This is documented in RPP-46436, Rev 1, "Generic Effluent Monitoring System Qualification 3000 CFM Exhaust Stack." See PDF page 15, table note that cites 10 µm monodispersed particles. This is in accordance with section 5.1.5 of the standard which "suggests that for most applications, a particle size of 10 µm AD is appropriate to use in design and evaluation of sampling systems, for both normal and off normal conditions." As stated above, the exhaust effluents are considered corrosive and the sample collection system was designed to operate in a pH range of 10-14.
Do process changes or maintenance conditions exist which should be addressed in design? Note: Such changes of conditions should be considered design conditions if potential emissions during these periods are unlikely to exceed 10% of the total expected emissions. They should be considered off-normal conditions if they occur for only brief periods on an infrequent basis, such as once every 6 months, and are likely to involve more than 10% of the total expected emissions.	Yes	Emissions were based upon conservative release factors – see page 20 on the NOC application (04-ED-028). These release factors yielded unabated and abated emissions that were expected to account for any process change. Permitted abatement equipment include de-entrainers (to remove moisture), heaters (to lower humidity), and High Efficiency Particulate Air (HEPA) filters (to remove particulates) HEPA filters are considered by WAC 246-247 to be best available radionuclide control technology" (BARCT). The filters were designed and are maintained in accordance with required standards (e.g. ASME AG-1). See section 6.2, pages 9 and 10 in the NOC application (04-ED-028).
Off-normal conditions are generally considered to be unplanned with unknown consequences. They may result from: • Accidents such as fires, explosions, spills, or natural disasters; • Incidents, which are planned events whose outcomes were	Yes	The exhauster and sampling system has numerous interlocks and alarms to manage incidents and notify personnel. A summary of these are shown on pages 2 and 3 in RPP-15034.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
not fully anticipated or in which an accident or error altered the outcome; or • Equipment failures, which are events that alter the quality of the effluent, particularly such failures of the effluent clean-up system as leaking or damaged filters or loss of fluid to spray systems or traps. Off-normal conditions may include the following: • off-normal flow conditions (low or high flowrate in stack or duct); • off-normal temperature conditions (high or low); • off-normal gaseous constituents (corrosive, humid, condensing, vaporizing, high concentration, unknown composition); • off-normal particle characteristics (high concentration, unusual particle shape, exceptionally large size). Any one or a combination of these conditions may be possible and may alter the collection characteristics of the sampler. If any of these conditions are possible and		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
probable, then the sample should accommodate the conditions or account for the effect and the resulting non-representative sample. If necessary, a back-up system should be provided that can increase the range of sampling conditions.		
Does the sample include conditions or account for the effect and the result of a non-representative sample?	Yes	The systems are designed with CAMs. The CAMs provide near real time notification of elevated emissions. The CAMs have alarms to alert personnel. The CAM sample filters can also be used as a backup to the record sample filters to compensate the effect and the result of a non-representative sample.
Is there a back-up system that will increase the range of sampling conditions, to compensate the effect and the result of a non-representative sample?		
Is the sampling system capable of accommodating all off-normal conditions, due to its inherent design or because it is sufficiently controlled to alter its sampling characteristics to fit the altered sampling conditions?		
Does the back-up sampling system provide the necessary information for a calculation algorithm to account for the off normal conditions?		
Is there a mechanism or means in place to alert personnel and to institute corrective actions in addition to obtaining a representative sample during off-normal conditions?		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
4.3.2 Sampling for aerosol particles		
Have studies been conducted to establish the size distribution and chemical nature of airborne particles in an effluent as an aid to the sample system design?	Yes	The systems were designed and tested for 10 micron sized particles. This is documented in RPP-46436, PDF page 15, table note that cites 10 μm monodispersed particles. This is in accordance with section 5.1.5 of the standard which "suggests that for most applications, a particle size of 10 μm AD is appropriate to use in design and evaluation of sampling systems, for both normal and off normal conditions."
Has the sampling or monitoring system been designed so that emissions occurring under accidental or off-normal conditions can be adequately sampled and detected?	Yes	The systems are designed with real-time monitoring (CAMs) in addition to continuous record sampling based upon potential emissions estimated. See section 9.1, page 12 in the NOC application (04-ED-028).
4.3.3. Concerns for large particles		
Is there a concern for large particles (greater than 10μm AD)? Has it been addressed?	Yes	Permitted abatement equipment include de-entrainers (to remove moisture), heaters (to lower humidity), and High Efficiency Particulate Air (HEPA) filters (to remove particulates) HEPA filters are considered by WAC 246-247 to be best available radionuclide control technology" (BARCT). The filters were designed and are maintained in accordance with required standards (e.g. ASME AG-1). See section 6.2, pages 9 and 10 in the NOC application. As such, large particles should be minimized. Never-the-less, as suggested by the standard designing the systems to collect 10 μm AD particles was deemed sufficient. This is documented in RPP-46436, PDF page 15, table note that cites 10 μm monodispersed particles.
4.3.4 Sampling condensable vapors or reactive gases		
Have deposition in long transport lines and condensation due to temperature changes in the line been avoided?	Yes	The sample transport lines were designed and tested to minimize deposition of 10 μm AD particles. A sampling line loss deposition run was performed by Idaho State University. The results are documented in RPP-46436 using three methods: 1. Computer modeling: Deposition losses of aerosol particles from the sample extraction point of collection were evaluated using Deposition 2001a over the range of exhauster flow rate i.e. 401 scfm (corresponding to a free stream velocity of 2.6 m/s) to 2484 scfm (corresponding to a free stream velocity of 16.1 m/s) for the Thermo-Anderson RF2-111 probe's nominal sampling flow rate of 2.0 scfm (56.6 lpm). The lowest total penetration was 70.6% for the CAM system at a free stream velocity of 2.6 m/s. See PDF pages 15 & 16.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
		2. Evaluation of shrouded probe performance data documented in Chandra and Andrew R. McFarland, Shrouded Probe Performance: Variable Flow Operation and Effect of Free Stream Turbulence, Aerosol Science and Technology 26:111-126 (1997): Figure 28 of this study showed losses within the probe through a range of sample flow and free stream velocities ranging from 6 m/s at a sample flow rate of 30 lpm (1.1 scfm) to a free stream velocity of 24 m/s at a sample flow rate of 113 lpm (4 scfm). The lowest total penetration of 94.3% occurred at a free stream velocity of 12 m/s (56.6 lpm – 2 scfm). Deposition 2001a was also used to evaluate penetration through the transport tube only (without the probe) for the sample flow rate range from 20 lpm (0.7 scfm) to 70 lpm (2.5 scfm). The worst case penetration for this was 53.7%. Combining these 2 results (94.3% with 53.7%) provided a minimum total penetration of 50.6% through the entire system. See PDF pages 17 thru 20. Experimental field measurements: Measured samples were obtained from the sample line nozzle through the transport tube to just before the where the CAM and record sample holder are connected. This series of measurements provided experimental evidence of deposition losses in the transport lines at the low sample flow rate of 20 lmp (0.7 scfm). The free stream velocity was varies during this series of tests from 2.6 m/s (401 scfm) to 16.1 m/s (2484 scfm). Of the data that was available, the worst case penetration was 72.1% on the record sample lines for particles sized at 0.7 microns. The discussion began on PDF page 33. The modeling data and discussion began on PDF page 48. To prevent condensation, the sample lines are heat traced and insulated – see notes on drawings H-14-105566, Sheet 1, AN241 Exhauster Train "A" Effluent Monitoring Systems, H-14-105580, Sheet 1, AN241 Exhauster Train "B" Effluent Monitoring Systems, H-14-105715, Sheet 1, AW241 Exhauster Train "A" Effluent Monitoring Systems, H-14-105727, Sheet 1, AW241 Exhauster Train "B" Effluent Monitoring Systems.
Have the inner surfaces of the sampling probe and transport line been constructed of or coated with nonreactive materials to minimize surface interactions with the sample?	Yes	The sample probes are Thermo-Anderson RF2-111 shrouded probes and are made of stainless steel – reference Thermo-Anderson's wed site. The sample transport lines are also made of stainless steel. Stainless steel construction was used to minimize, not only electrostatic effects, but also minimize any such reactions. See sheets 1& 2 on drawings H-14-105529, "AN241 Exhauster Train "A" Assembly," H-14-105543, "AN241 Exhauster Train "B" Assembly," H-14-105679, "AW241 Exhauster Train "A" Assembly," and H-14-105693, . "AW241 Exhauster Train "B" Assembly."
Has the possibility for conversion of a portion of the sample by chemical		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
transformations induced by the sample transport process, such as conversion of molecular iodine gas into organic iodine vapor, been understood and accounted for in the sampling system design?		
Has conditioning of the sample itself been considered, such as deliberately changing the temperature or purpose fully diluting the sample with a carrier gas?		
Has the presence of non-radioactive constituents which could undergo phase changes that could cause loss or distortion of the sample, such as the condensation of water vapor, been taken into account in sample system design?		
4.3.5 Sampling noncondensible, nonreactive gases		
If the radioactive contaminant in the effluent stream is a noncondensible, non-reactive gas (e.g., krypton-85), then it is not as critical to avoid long transport lines as it is for the other types of contaminants described above. In this instance chemical or phase change interactions will not be a factor for system design.	NA	The NOC application (04-ED-028) (see section 8, page 12) characterized the radionuclides of concern in the effluent and the currently approved AOP list consist of Sr-90, Cs-137, Am-241, Y-90, Cs-134, Pa-231, Pu-238, Pu-239, Pu-240, Pu-241. These radionuclides are expected to be particulate in nature. As such the sampling system was designed to collect particulates and the transport lines were designed to minimize deposition of 10 μm AD particles.
4.4 Determining action levels		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
Have action levels of the air sampling system and program been considered as part of the design basis? Note: The desired action levels determine the sensitivity requirements of the sampling system and affect design parameters such as sample volume, sampling frequency, the capacity of the collector, and the sensitivity of on- or off-line analyzers.	Yes	The CAM radiation alarm set points are established in RPP-15034, page 3. The basis for the set point is starts on page 7-6 in section 7.2.2 of HNF-EP-0479-5, "Facility Effluent Monitoring Plan for Tank Farms."
In determining action levels, has consideration been given to accuracy, precision, and uncertainty? Note: These terms apply to both the process of sampling and the process of measurement. Regular calibration of sampling and measuring equipment using accepted procedures and traceable standards is used to establish accuracy. Accuracy should be estimated at the 95% confidence level. Statistical measures of dispersion of results about a measurement population mean are used to calculate precision. Sampling precision can be determined by replicate samples obtained under the same conditions. Measurement precision is obtained from the		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
statistics of repeated measurements on replicate samples and by detailed analysis and propagation of errors in component measurements. Sampling and measuring precision are combined statistically to obtain an estimate of overall precision. The precision shall be estimated at the 95% confidence level. The concern of precision determinations is the estimation, and where possible, reduction of random errors in the sampling and measuring processes. The departures of measured values from either the true values (accuracy effects) or from the mean of measured values (precision effects) are measures of error or uncertainty in the sampling and measurement system results.		
4.4.1 Action levels for control monitoring		
Have action levels for control monitoring been set?	Yes	The CAM radiation alarm set points are established on page 3 of RPP-15034 and the basis is in section 7.2.2 of HNF-EP-0479-5.
What is the basis?		
4.4.2 Action levels for record sampling		
Has the frequency of record sampling been set?	Yes	The minimum sample volume for alpha and beta analysis has been set to be 20,000 cubic feet and the minimum sample volume for various isotopic analyses has been set to 262,000 cubic feet. This is documented on page 7 of the 2012 revision was HNF-EP-0835, Revision 18, "Statement of Work for Services Provided by the Waste Sampling and Characterization Facility for Effluent and Environmental Monitoring Program during Calendar Year 2012." Emissions data are reviewed near the end of each calendar year for AOP emissions limit certification.
Is trending of data performed? Note: For this purpose certain statistical tests and trending procedures (e. g., control chart) are		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
important. A retrospective action level may be set above the trend line in the data (say, at the 3σ level) to help decide whether a datum should be regarded as belonging to the family of normal values for the parameter being measured (e.g., the mean concentration of radioactivity emitted during the previous month or Quarter), or belongs to a new, unidentified situation that requires investigation and intervention.		
4.4.3 System sensitivity needed to achieve selected action levels		
Is the proposed sampling or monitoring system sufficiently sensitive (at the 95% confidence level)? Note: This is not a question of accuracy, but of whether a chosen system will be able to provide the needed net response above background.	Yes	Analytical error and minimum detectable concentrations are established on page 5 of HNF-EP-0835, Revision 18.
4.4.4 System performance and availability alarms		
Have alarms activated by system component failure been considered? Documented?	Yes	Types of alarms and interlocks are summarized on pages 2 & 3 of RPP-15034.
5. Sampling locations		
5.1 Characterizing the sampling environment		
Has the sampling environment within a stack or duct been characterized to design the sampling system for those conditions?	Yes	The sampling site was characterized in accordance with the criteria required in ANSI N13.1-1999, Table 4. This is documented in RPP-46436 as discussed in section 5.2 below. Further discussion is included in following subsections -5.1.1, 5.1.2, 5.1.3, 5.1.4, & 5.1.5 - of this checklist.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
Note: A number of important parameters should be considered in the design process; however, accident or off-normal conditions shall always be kept in mind.		
Information used as a basis for design and location of sampling systems shall be fully and carefully documented.		
5.1.1 Temperature		
Has the expected temperature range at potential sampling points under normal operating conditions and credible accident conditions been determined?	Yes	The maximum temperature was based upon the operating temperature limit of the CAM, which is 167°F. This limit is listed on page 42 of RPP-7881.
5.1.2 Effluent flowrate		
Facility design basis accident descriptions, and accident control and mitigation plans, may provide a basis for estimating changes in flow (including substantially reduced flow) as a result of accident conditions. Have these been taken into account in the design of a sampling system for this facility?	Yes	The sampling systems were designed and qualified for a variable exhauster system. The tested qualified operating range spans an exhaust flow rate range from 401 scfm corresponding to a free stream velocity of 2.6 m/s employing a minimum stack sample flow rate of 0.7 scfm (20 LPM) to 2484 scfm, corresponding to a free stream velocity of 16.1 m/s employing a maximum stack sample flow rate of 2.5 scfm (70 LPM). See PDF page 23 in RPP-46436. The records sample flow and CAM flow rate set points are listed on page 2 of RPP-15034.
5.1.3 Duct geometry		
Has the stack and duct geometry information been fully documented?	Yes	The stacks are designed to extend 24 ft 10 in above the bottom of the skid. The stack consists of a 12-in. schedule-40 pipe section where a radionuclide particulate shrouded sampling probe is installed. Above that, the stack necks down to a 10-in. schedule-40 pipe section. Flow measurements are taken from two 1-in. ports located 90° apart, 10 in. below an installed veribar flow sensor and 78 in. above the bottom of the 12-to-10 inch stack transition section. A stack figure was provided within the NOC application (04-ED-028). Also reference Sheet 3 of drawing H-14-105531, AN241 Exhauster Train "A" Upper and Lower Stack Assemblies & Details, H-14-105545, AN241 Exhauster Train "B" Upper and Lower Stack Assemblies & Details, H-14-105681, AW241 Exhauster Train "A" Upper and Lower Stack Assemblies & Details, and H-14-105695, AW241 Exhauster Train "B" Upper and Lower Stack Assemblies & Details.
Has the discharge of a secondary flow of radionuclides into a main stack in a manner that injects contaminants into the boundary layer of the stack been avoided?		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
		There are no secondary flows into the stack. See flow diagrams on sheet 10 on drawings H-14-020101, "Ventilation Tank Primary System (VTP) A-Train O&M SYS P&ID," sheet 11 on drawings H-14-020101, "Ventilation Tank Primary System (VTP) B-Train O&M SYS P&ID," sheet 6 on drawing H-14-105351, "P&ID 241-AW HVAC Exhaust Train "A," and sheet 7 on drawing H-14-105351, "P&ID 241-AW HVAC Exhaust Train "B."
5.1.4 Effluent composition		
Has the composition of a stack effluent under both normal and accident conditions been taken into account in the design of the sampling system?	Yes	As mentioned above, these systems were designed to be corrosive resistant with stainless steel used wherever possible. Section 3.3.4.2, Page 42 of RPP-7881 specifies that the sample collection system shall be designed to operate in a pH range of 10-14, RH of 85%, and a temperature range of 27 to 75 °C (80 to 167 °F). Also, on this same page it was specified that the transport lines shall be insulated and heated to preclude the condensation of moisture between the sample point and the entry into the Sample Cabinet, between the Sample Cabinet and the vacuum pumps, and on the return line of the sample pumps to the exhaust stack.
Have radioactive contaminant characteristics been considered?		
Have non-radioactive constituents been identified whenever they may influence the sampling system design? Note: An important example is the presence of strong acid or caustic fumes that could cause rapid deterioration of a nozzle or sample transport line unless suitable compensation is provided by the selection of appropriate materials for construction of nozzles and lines. Inert dust loading in an effluent can also be a factor in the design of appropriate nozzles due to its potential for plugging inlets or interfering in the proper operation of sampling system elements. Moisture content of the effluent can also be a significant factor in the design of sampling systems due to possible interactions with		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
contaminant components, condensation, and plugging of filters.		
5.1.5 Particle size		
Has the system design been based on an assumed particle size of 10 µm AD unless there is evidence that a significant fraction of the aerosol mass or activity will be associated with larger sizes? Note: In the latter case the design should proceed on the basis of an assumed largest AD particle size or a size for which not more than a specified percentage (e.g., 10%) of radioactivity could be assumed to be associated with all sizes larger than that size.	Yes	The systems were designed and tested for 10 micron sized particles. This is documented in RPP-46436. See PDF page 15, table note that cites 10 µm monodispersed particles.
5.2 Selection of sampling sites		
5.2.1 General considerations		
Is the sample extraction location situated between the discharge plane of a fan and the stack exit plane, with caution that the location should not be so close to the stack exit plane that wind effects can significantly influence the velocity profile at the sampling location?	Yes	The sample extraction location is described above under 5.1.3. Qualification of this location was documented in RPP-46436. The qualification included testing to all the acceptance criteria listed in Table 4 of the standard. These criteria included: The average resultant angle of cyclonic flow shall be less than 20°. This discussion begins on PDF page 28 of RPP-46436. Velocity profile coefficient of variation (*COV*) shall not exceed 20% over the center region of the stack that encompasses at least 2/3 of the stack area. This discussion begins on PDF page 30 of RPP-46436. Tracer gas concentration profiles coefficient of variation (*COV*) shall not exceed 20% over the center region of the stack that encompasses at least 2/3 of the stack area. This discussion begins on PDF page 30 of RPP-46436.
Is the sampling location in a region where the contaminant profile is well mixed and stable, readily and safely accessible, not a problem for sampling services and maintenance activities, and able to accommodate analysis or collection equipment that		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
does not compromise the quality of the sample?		The maximum value of tracer gas concentration shall not exceed the mean value by more than 30% of the mean value at any point on a complete Method 1 set of velocity traverse points. This discussion begins on PDF page 31 of RPP-46436. Aerosol particle concentration profile coefficient of variation (*COV*) shall not exceed 20% over the center region of the stack that encompasses at least 2/3 of the stack area. This discussion begins on PDF page 31 of RPP-46436. All these criteria were met, as further explained section 5.2.2.2 of this checklist.
Have heat trace lines been installed for contaminants in the form of condensable vapors or reactive gases?	Yes	To prevent condensation, the sample lines are heat traced and insulated. See notes on Sheet 1 of drawings H-14-105566, H-14-105580, H-14-105715, H-14-105727. Also, note requirement specified in RPP-7881, page 42.
Is conditioning of the sample, such as temperature change and/or dilution with a carrier gas needed? If so, how?	NA	Conditioning or dilution was not deemed necessary.
In the case of particulate contaminants, have attempts been made to keeping sample lines short? Have abrupt temperature changes and abrupt cross-sectional reductions been avoided?	Yes	The systems were designed and qualified to minimize deposition of 10 μm particles. According to ANSI N13.1-1999, particle penetration to the collection point is required above 50%. This was met and the qualification is documented in RPP-46436. This is discussed further below.
5.2.2 Qualifying the sample extraction location		
Is the sample extraction process occurring downstream of all inputs and control equipment? Note: Bends, fans, and duct junctions may produce distortions in velocity and contaminant profiles and may introduce angularity in the flow that can adversely affect sampling nozzle performance. Therefore, such locations should be avoided.	Yes	The radionuclide particulate shrouded sampling probes were installed in the 12-inch stack section above the fan. Before the fans are the HEPA filters, heaters, de-entrainers, etc. The radionuclide source of emissions is prior to all of that. A figure on the stack and exhauster is provided in the NOC application (04-ED-028). Also reference Sheet 3 of drawing H-14-105531, AN241 Exhauster Train "A" Upper and Lower Stack Assemblies & Details, H-14-105545, AN241 Exhauster Train "B" Upper and Lower Stack Assemblies & Details, H-14-105681, AW241 Exhauster Train "A" Upper and Lower Stack Assemblies & Details, and H-14-105695, AW241 Exhauster Train "B" Upper and Lower Stack Assemblies & Details.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
Can it be demonstrated the site chosen can provide a valid representative sample of the entire contaminant discharge?	Yes	The demonstration lies in the results of the qualification which is documented in RPP-46436. Further discussion of the details which demonstrate this are provided section 5.2.2.2 of this checklist.
5.2.2.1 Angular or cyclonic flow **KEY ITEM**		
In the proposed sampling location does the flow of particles and gases exhibit excessive angularity or swirl? Note: The presence of swirl can adversely affect the mixing of particles in the effluent and degrade the performance of a sample nozzle. The criterion of acceptability is that the average flow angle shall not exceed 20 degrees (relative to the longitudinal axis of the stack or duct). An appropriate method for determining if a proposed location meets this criterion is described in 40 CFR 60, Appendix A, Method 1, Section 2.4, "Verification of the Absence of Cyclonic Flow." If there is excessive flow swirl, it can be corrected by using internal elements placed in the stack or duct. In the past it was common practice to use either honeycomb or parallel plate flow straighteners. However, such elements should be used only after suitable mixing of contaminants has been achieved. In some situations excessive flow swirl can be eliminated through the use of static flow mixing elements rather	Yes	Testing for the cyclonic flow angle was documented in RPP-46436. The maximum flow angle for all four stacks tested was 8.125 °. The average flow angles are shown in Table One, PDF page 36 of RPP-46436. These results were deemed acceptable based upon Table 4 of ANSI requiring the average resultant angle of cyclonic flow be less than 20°.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
than flow straighteners.		
5.2.2.2 Contaminant concentration and velocity profiles **KEY ITEM**		
If the stack is based on an existing model, it is not necessary to completely test the sampling location in a candidate stack or duct for compliance with the requirements given in clause 5.2.2 provided it has: 1) A geometrically similar stack or duct (one with proportional critical dimensions) has been tested and the sampling location has been found to comply with the requirements of clause 5.2.2. Critical dimensions are those associated with components of the effluent flow system that can influence the degree of contaminant mixing the velocity profile. The prior testing may be conducted either on a stack or duct in the field, or it may be conducted on a scale model. 2) The product of mean velocity, times the hydraulic diameter of the candidate stack or duct is within a factor of six of that of the tested stack or duct, and the hydraulic diameter of the stack or duct is at least 250 mm at the sampling location. The Reynolds numbers	Yes	All four stacks (the two AN stacks and the two AW stacks) were designed and built to be exactly the same. The cyclonic flow angle test and the coefficient of variance (COV) for the velocity profile were done on both the two, AN stacks and the two, AW stack systems. The average COV for the AN stack systems was 5.2%. The average COV for the AW stack systems was 4.5%. See Table Two on PDF page 37 of RPP-46436. In this table, skid A is the AN, A-Train skid, skid B is the AN, B-Train skid, skid AW is the AW, A-Train skid, and skid BW is the AW, B-Train Skid. 5.2% is the average of the COV results of 0.06, 0.04, 0.04, 0.11, 0.04, and 0.02. 4.5% is the average of 0.05, 0.05, 0.04, and 0.04. Since the difference in the COVs for the AW and AN stack systems was less than 5%, and because these stacks were all designed to be exactly the same, the AN and AW stack systems were deemed to be similar to each other based upon the criteria listed in ANSI N13.1-1999. With this determination, the rest of the testing required by Table 4 on ANSI N13.1 was completed on only two AN stack systems. This is discussed on PDF page 26 of RPP-46436.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
based on hydraulic diameter of both the candidate stack or duct and the tested stack or duct are greater than 10,000. 3) The velocity profile in the candidate stack or duct meets the requirements of clause 5.2.2.2. 4) The difference between velocity *COV*s of the two systems is not more than 5%. 5) The sampling location in the candidate stack or duct is placed at a geometrically similar location to that in the tested stack. If these requirements are fulfilled, the sampling location in the second stack or duct is acceptable.		
Have the following ANSI N 13.1-1999 Table 4 criteria been met and documented? Measurement to determine if flow in a stack or duct is cyclonic. Velocity profile in a large duct (> about 0.3 m diameter) and small stacks and ducts (< about 0.3 m). Tracer gas concentration profiles in large and small stacks and ducts.	Yes	The maximum flow angle for all four stacks tested was 8.125 °. The average flow angles are shown in Table One, PDF page 36 of RPP-46436. These results were deemed acceptable based upon ANSI requiring the average resultant angle of cyclonic flow be less than 20°.
	Yes	The maximum COV for all four stacks was 11%. This is documented in Table Two, PDF page 37 of RPP-46436. This was deemed acceptable based upon the ANSI acceptance criterion being less than 20% across the center 2/3 of the stack.
	Yes	The maximum COV for the tracer gas concentration profile for the two, AN stacks was 16.3%. This is documented in Table Three, PDF page 39 of RPP-46436. This was deemed acceptable based upon the ANSI acceptance criterion being less than 20% across the center 2/3 of the stack.
	Yes	The maximum % absolute difference of the maximum value of the tracer gas concentration profile for the two, AN stacks was 29.7%. This is documented in Table Four, PDF page 41 of RPP-46436. This was deemed acceptable based upon the ANSI acceptance criterion being that the maximum value of tracer gas concentration shall not exceed the mean value by more than 30% of the mean value at any point on a complete Method 1 set of velocity traverse points.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
Maximum tracer gas concentration in large and small stacks and ducts. Aerosol particle concentration profile in large and small ducts.	Yes	Testing results for the 10 μm particle profile is documented on PDF pages 43 thru 48, Table Five, Six, Seven, and Eight of RPP-46436. The maximum COV for the two, AN stacks was 18.9% - see Table Seven. But that was for 1.76 micron sized particles. As pointed out in the discussion at the bottom of PDF page 44 the COVs for the 7.1 and 11.19 micron sized particles are the only results that matter for meeting the criteria specified in section 5.2.2.2 of the standard which states: If aerosol particles can be present in the flow, the criterion for establishing the acceptable uniformity of contaminant mixing and velocity across a stack or duct is that the coefficient of variation (*COV*, the standard deviation as a percentage of the mean) of concentration of 10 ± 1 μm AD tracer aerosol particles and of a tracer gas (e.g., helium, sulphur hexafluoride) shall be less than or equal to 20% across an area that encompasses at least the center two-thirds of the cross-sectional area of the stack or duct. The maximum COV for the 7.1 and/or 11.19 sized particles then was 18.6%. This is shown in Table Six, on PDF page 46, of RPP-46436. As such, this was deemed acceptable.
If the requirements of clause 5.2.2 are met, sampling may be conducted at a single point. Has the nozzle been placed within the center two-third of the cross sectional area of the stack or duct at the qualified location?	Yes	The probes are placed within the 12 inch diameter section of these stacks. For a 12 inch diameter stack, the center 2/3rds area begins and ends at 1.1 inches from the inside wall of the stack. Reference Sheet 3 of drawing H-14-105531, AN241 Exhauster Train "A" Upper and Lower Stack Assemblies & Details, H-14-105545, AN241 Exhauster Train "B" Upper and Lower Stack Assemblies & Details, H-14-105681, AW241 Exhauster Train "A" Upper and Lower Stack Assemblies & Details, and H-14-105695, AW241 Exhauster Train "B" Upper and Lower Stack Assemblies & Details. These drawings show that there are 2 sampling probes mounted 7.5 inches in from the mounting flange and 4.5 inches apart (center to center). This location is well within the center 2/3rds area of the stack cross-section.
5.3 Methods for qualifying the sample extraction location		
To meet the contaminant mixing criteria given in clause 5.2.2, can it be demonstrated the stream is well mixed or otherwise sufficiently described to establish that a sample of the effluent will be representative? Note: When tests are conducted with a tracer gas (e.g., sulfur hexafluoride) the gas should be	Yes	The tracer gas and aerosols were injected into the stack through a port (e.g. H-14-105531 and H-14-105545) downstream of the exhaust fan and samples were taken over the entire stack cross-section. This is in accordance with the standard. Sulfur hexafluoride (SF_6) or carbon dioxide (CO_2) were used to ensure uniform mixing of tracer gases at the sample extraction point. Soybean oil enhanced with yellow die to enhance detectability was used to generate aerosols. See PDF pages 30 thru & 32 in RPP-46436 for a detailed discussion.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
introduced downstream of the last location at which contamination can enter the effluent stream. If there is a fan that draws air from ducts equipped with air pollution control equipment (e.g., HEPA filters), and subsequently discharges the air into the stack or duct, the injection location can be between the control equipment and fan. Tests should be run with a tracer introduced at five or more locations across the cross section of the air stream. However, if a stack needs to be tested for both particles and gases, the same injection location would generally be used for both types of tests. For a rectangular duct the injection shall be at the center and near each corner (at or within a distance of 25% of a hydraulic diameter from a corner). For a round duct the introduction shall be at the center and near the wall (within 20% of a diameter from the wall). For tests conducted with a tracer gas injected upstream of a fan, the gas only needs to be introduced at a single point, e.g., the center of the duct). Sampling of the tracer gas shall be conducted across the cross sectional plane at the proposed sampling location. The tests should be conducted while the stack flowrate is approximately the same as the expected normal flowrate. The degree of mixing for aerosol		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
particles shall be tested with particles of 10 ± 1 μm AD, or other selected size if there can be a significant fraction of the aerosol mass or activity associated with sizes larger than 10 μm AD. The aerosol may be introduced at only one location, which is at the center of a stack or duct as far upstream as possible of the sampling plane, yet downstream of feeder ducts, fans, and air pollution control equipment. As in the case of a gas, the particles are demonstrated to be well mixed by sampling over the cross section at the proposed sampling location. Testing to establish the degree of mixing *requires* sufficient gas or particles to provide an adequate signal at the extraction point. The method of detection and its detection limit are the important considerations in the amount of material introduced. Sufficient material shall be introduced to be detectable after dilution in the effluent stream.		
5.5 Designing effluent discharge systems for sampler placement		
Effluent system design and construction shall accommodate sampler placement. Did the design	Yes	The sampling location was qualified as discussed in section 5.2.2.2 of this checklist. The sample probe placement is shown on Sheet 1 of drawings H-14-105531, H-14-105545, H-14-105681, and H-14-105695.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
include provisions for extracting a representative sample and for supporting transport and collection equipment in a manner that ensures the extracted sample is transported and collected with minimal loss for all contaminants? The most important requirement for extracting a representative sample is that the sampling plane shall be located where the effluent is well mixed. Other considerations that should be included in the effluent discharge design are as follows: • do not add another effluent discharge point to the stream beyond the sampling location; • do not locate the sampling location upstream of any effluent attenuation devices; • include a section upstream of the sampling plane where corrective devices such as mixing elements could be easily installed; • locate the sampling plane downstream of devices that promote mixing of the contaminants;		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
• avoid the use of flow straighteners except after the contaminants are well mixed and only to remedy angular or cyclonic flow; • locate the sampling plane close to the collector or analyzer to ensure that transport lines are short and have few bends and transitions; • provide ample access to service and maintain the sampling system and to install any needed shielding; • provide for a stable electrical supply, environmental conditioning, and low levels of vibration; • provide ample access ports for visual inspection of the nozzle, flow transmitter verification, and sampler performance testing. NOTE: The conditions of the effluent stream may provide an indication that the stream is well mixed. Devices that will aid mixing		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
include bends, a mixing plenum receiving one or more streams, baffles that promote mixing, or a turbulent stream in a long length of duct. Nevertheless, conditions within the devices or combination of devices may be such that streaming occurs or that separation is induced. Highly cyclonic flow can inertially separate large-sized particles (those with sizes on the order of several µm AD or larger), or a temperature gradient could cause condensation, Stephan flow, or thermal density effects. Flaws in the emission control devices or physical or chemical conditions in the devices can induce streaming, which can lead to non-uniformities in concentration profiles.		
6 Sampling system design		
6.1 Sample flow rate		
What is the basis for the selected sample flow rate?	Yes	The basis for the sample flow rate was determined using 2 criteria. The stack flow rate was designed to vary and a Thermo-Anderson RF2-111 shrouded probe was chosen. The designed flow rate for this probe is 2 scfm. In addition, ANSI N13.1-1999, section 6.3.4.4 requires for PIC 1 emission units that the record sample flow rate be varied in proportion to the stack flow rate. For CAM, however, the sample flows may be fixed. As such, the CAMs were designed to operate at 2 scfm, while the record sampler was qualified to an operating range of 0.7 to 2.5 scfm as the stack flow varied. This range of flows is shown on page 2 of RPP-15034.
6.2 Bulk stream volumetric flow measurement		
Have accurate measurements of the flow in stacks and ducts been provided?	Yes	These stacks have differential pressure type flow measuring instrumentation (called Verabar Flow Sensors) installed. These instruments are calibrated annually and a response check is performed quarterly. In addition, the stack flow rates are also manually measured following Method 2 in 40 CFR 60, Appendix A. Reference vent and balance stack flow test procedure 3-VBP-155, *Air Flow*

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
Note: The accuracy of any emissions estimate is directly related to the accuracy of flow measurements.		*Test for Tank Farm Stacks and Ducts,* 3-VB-155ZA, *Appendix ZA, 241 AN Exhauster Stack 296-A-44 Air Flow Test Data Sheets*, 3-VB-155ZB, *Appendix ZB, 241 AN Exhauster Stack 296-A-45 Air Flow Test Data Sheets*, 3-VBP-155ZC, *Appendix ZC, 241 AW Exhauster Stack 296-A-46 Air Flow Test Data Sheets,* and 3-VBP-155ZD, *Appendix ZD, 241 AW Exhauster Stack 296-A-47 Air Flow Test Data Sheets.* This manual measurement is also performed annually. During this measurement, the flow rate indication from the instrument is recorded and compared to the manually measured value. If the instrument indication is found to vary by more than ± 10% from the manually measured flow rate value, then the system is checked for possible sources of error and recalibrated, if necessary.
Has flowrate of air exhausted through a stack or duct been periodically measured (or continuously monitored if there is a potential for significant emissions)?		
6.2.1 Requirements		
Are flowrate of sources that are PIC 1 continuously measured?	Yes	The emission estimate provided in the NOC application (04-ED-028) indicated that these stacks are PIC 1 emission units. As such these stacks have differential pressure type flow measuring instrumentation installed. These instruments are calibrated annually and a response check is performed quarterly. In addition, the stack flow rates are also manually measured following Method 2 in 40 CFR 60, Appendix A. This manual measurement is also performed annually. During this measurement, the flow rate indication from the instrument is recorded and compared to the manually measured value. If the instrument indication is found to vary by more than ± 10% from the manually measured flow rate value, then the system is checked for possible sources of error and recalibrated, if necessary. The signals from the stack flow instruments are continuously totalized. Meaning, if the sample "off" value is subtracted from the sample "on" value, the stack volume for the sample period can be determined. See pages 43 & 44 of RPP-7881. Continuous flow measurement devices based on electronic or acoustical principles are not used.
Are sources that are PIC 2 continuously measured if the flow rate is anticipated to vary by more than 20% during a year? Note: If historical data are available, the 20% value can be approximated by the standard deviation of the measurements. If the variability of flow rate is based on engineering judgment, such factors as fan maintenance, the opening of doors, and the variations in the number of fans shall be taken into account in determining the need for continuously measuring flowrate.		
For effluents that fall into PIC 3 of Table 2, only periodic measurements of flowrate may need to be performed?		
If continuous measurement of flowrate is not *required*, are annual measurements of flowrate being		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
performed following the requirements of 40 CFR 60, Appendix A, Methods 1 and 2 subject to the modifications in annex A of N13.1, or other methods that can be demonstrated to have equivalent or better accuracy?		
For stacks and ducts that must be continuously monitored, is the flow measurement and recording system capable of determining the mass flowrate of the effluent stream with an accuracy that is within 10% of that measured with the 40 CFR 60 Method? Note: Here the mass flowrate is defined as the volumetric flowrate based on a pressure of 760 mm Hg (101.3 kPa) and a temperature of 25degrees C (298 degrees K), and is given in units of m^3_{std}/s (or m^3_{std}/min). The use of these standard conditions is of value in dealing with sampling system data; however, in other topical areas of health physics such as dose assessment, the use of actual conditions may be more appropriate.		
Are continuous flow measurement device subjected to annual accuracy audits? Note: Performance of the unit shall be compared against the 40 CFR 60 Method. If the sensor of the continuous flow measurement		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
device is based on electronic or acoustical principles, automated daily checks of the instrument zero and span (or linearity) shall be made.		
6.2.2 Apparatus and applications		
Note: Three types of systems are commonly used for continuously measuring flowrates in stacks and ducts: thermal anemometers, pitot tubes, and acoustic meters. Other methods may be used if their accuracy is within the limits specified in clause 6.2.1.	Yes	The installed Verabar flow sensor, stack flow rate instrumentation is a pitot tube type instrument. The Varabar flow sensor measures differential pressures. Pitot tubes also measure differential pressure. The difference between pitot tubes and the Verabar is that a pitot tube measures the differential pressure from a single point. The Varabar measures differential pressure from several locations along a tube that traverses the stack cross-section. See page 43 in RPP-7881.
6.2.2.1 Thermal anemometers		
Is a thermal anemometer installed to measure flow? Note: Thermal anemometers should not be used if there is a possibility of condensed vapor being deposited on the sensing element. Also, if a background aerosol is present, the use of thermal anemometry is discouraged; however, a cleaning schedule may be set up if it can be demonstrated that the bias of results due to accumulation of debris on the nozzle will be less than 3% at the end of the interval of the cleaning schedule. Rakes (arrays of multiple sensors) of thermal anemometers are acceptable. However, the requirements of uniformity of velocity profiles stipulated in clause 4.2.2 accommodate the use of single point velocity determinations.	NA	Thermal anemometers are not installed.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
When single point anemometry is used, a correction factor shall be established to relate average mass flowrate to the reading from the single thermal anemometer element. In many applications, it may be beneficial to deploy redundant (two) single-point thermal anemometry systems.		
6.2.2.2 Pitot tubes		
If a Prandtl-type pitot-static tube is used, the pressure coefficient is unity. However, if an S-type pitot tube is used, has the pressure coefficient been validated using the procedure stipulated in the Reference Method?	NA	A Verabar flow sensor is used. This instrument is designed to convert flow rates into standard units of temperature and pressure. These readings are compared annually to a manual method similar to Method 2. All appropriate conversions are made when using that method. Reference vent and balance stack flow test procedure 3-VBP-155, 3-VBP-155ZC, 3-VBP-155ZD, 3-VB-155ZA, and 3-VB-155ZB. These conversions, or final calculations, are done on Data Sheet 5 of these procedures.
The readings from a single point pitot tube can be correlated with the actual flowrate. Has data from a single point pitot tube been recorded at intervals not to exceed 10 min duration? For reporting purposes the actual volumetric flowrate through the stack or duct, q_a (m^3/min), should be converted to standard conditions, q_{std}. **Note:** If the absolute pressure in the stack does not vary by more than ±5% during the course of a year (exclusive of variations in barometric pressure), and if the temperature in the stack does not vary by more than ±10°C during a year, average values of stack pressure and stack temperature may	NA	The stack flow rate readings from the Verabar are totalized continuously. The readings are automatically converted to standard unit of temperature and pressure – see pages 43 & 44 of RPP-7881.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
be used to calculate velocity.		
If the pressure and temperature variations are outside these ranges, is the pressure and temperature continuously measured and a value of air density calculated and recorded at intervals that do not exceed 10 minutes? Velocity values shall be based on the calculated values of density.		
Is the pitot tube inspected for the presence of deposits of contamination on an annual basis, or more frequently if the air is not HEPA-filtered? **NOTE:** For some applications it may be necessary to perform daily instrument checks for assurance that there is no buildup of material on the ports of the pitot tube nozzle. Such checks may be performed by measurement of the pressure associated with a given rate of backflow through the ports.	Yes	The Verabar are inspected annually via procedures 3-FCD-728, ANSI N13.1 Compliance for AN Exhausters, and 3-FCD-738, ANSI N13.1 Compliance for AW Exhausters. Section 5.4 of these procedures is used and the visual inspection is recorded on Table 6. Figures 1 & 2 in these procedures show the configuration of these systems, and figure 3 is an actual picture. Also, reference letter 03-ED-141, from Roy Schepens, DOE/ORP, to Mr. Jeff Knight, EPA, Subject: *Title 40, Code of Federal Regulations (CFR), Part 61, Subpart H Amendment Implementation on the Hanford Site*, dated September 3, 2003. In this letter, there was an agreement that for stack flow instruments certified accurate to 40 CFR 52, Appendix E, the inspection of the pitot tube for deposits and leaks can be substituted with an evaluation that instruments produce reading that are within 10 percent of a manual flow measurement done in accordance with Method 2 or 2C in 40 CFR 60, Appendix A. Justification to the certification of these flow instruments to 40 CFR 52, Appendix E is provided in section 4.1 (beginning on page 10) of RPP-19233, "Technical Justification for Applicability of General WAC 246-247 Technology Standards for Tank Farm Facility Waste Tank Ventilation Systems." So, in addition to the annually inspections done via section 5.5 of 3-FCD-728 and 3-FCD-738, the stack flow rates are manually measured annually following Method 2 in 40 CFR 60, Appendix A. The procedures are 3-VBP-155, 3-VBP-155ZC, 3-VBP-155ZD, 3-VB-155ZA, and 3-VB-155ZB. During this measurement, the flow rate indication from the instruments are recorded and compared to the manually measured value. If the instrument indication is found to vary by more than ± 10% from the manually measured flow rate value, then the system is checked for possible sources of error and recalibrated, if necessary. See data sheet 5 in these procedures.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
During the annual inspection, is the system checked for leaks? Leakage at average flow conditions shall not affect the results of differential pressure by more than 1%.	Yes	RPP-22211 justifies that the 1% criteria is met if the lines were pressurized and leaked at rate less than 0.0042 scfm – see page 4 of this calculation. In fact, if the line was pressurized to 10 in wc and it held a positive pressure for more than 16 seconds that this 1% criteria was met. Section 5.5 in 3-FCD-728, and 3-FCD-738 instruct leak tests are performed at 10 inches, wc. The acceptance criterion is a change in pressure by no less than 5 inches, wc in a 15 minute period.
6.2.2.3 Acoustic flowmeters		
Does the acoustic flowmeter accommodate measurements of temperature and take those values into account when calculating the velocity?	NA	Acoustic flow meters are not used.
Velocity measured by this device is an average over a single line across the stack and not an area average, where the latter measurement would allow direct calculation of flowrate. Has a correction factor been established between the reading of the instrument and the volumetric flowrate through the stack? **Note:** When such a correction factor is applied, the result will be the actual volumetric flowrate through the stack or duct, q_a. The flowrate can be converted to that at standard conditions, q_{std}. If the absolute pressure in the stack does not vary by more than ±5% during the course of a year (exclusive of variations in barometric pressure), and if the temperature in the stack does not vary by more than ±10°C during a year, average values of absolute stack pressure and stack temperature		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
may be used. If the pressure and temperature variations are outside these ranges, pressure and temperature shall be continuously measured. Values of flowrate at standard conditions will be calculated and recorded for intervals that do not exceed 10 minutes.		
6.3 Nozzle design and operation for sampling aerosol particles		
6.3.1 Basic considerations		
Have aspiration ratio and wall losses been considered and documented?	Yes	Performance of the Thermo-Anderson RF2-111shrouded probe used in these stacks has been well documented in the literature (Chandra and Andrew R. McFarland 1997, Shrouded Probe Performance: Variable Flow Operation and Effect of Free Stream Turbulence, Aerosol Science and Technology 26:111-126 (1997)). See PDF page 34 in RPP-46436 for further discussion regarding this matter.
6.3.2 Nozzle performance		
Does the sampling nozzle have an aerosol transmission ratio within the range of 0.80 to 1.30 over the anticipated range of normal or anticipated accident operational conditions for an aerosol particle size of 10 μm AD, or for the range of sizes that could be encountered in normal operating or accident conditions if those sizes are greater than 10 μm AD?	Yes	A Thermo-Anderson RF2-111 shrouded probe was used in the design. The nozzle characteristics are inherent in the design and were verified by the designers during wind tunnel tests - reference McFarland, A. R., C. A. Ortiz, M.E. Moore, R. E. DeOtte, Jr., and A. Somasundaram, 1989, "A shrouded Aerosol Sampling Probe", *Environmental Science Technology* 23:1487-1492. In addition, according to Figure 28 of Chandra and Andrew R. McFarland, Shrouded Probe Performance: Variable Flow Operation and Effect of Free Stream Turbulence, Aerosol Science and Technology 26:111-126 (1997) the lowest probe transmission ratio of 0.943 occurs at a free stream velocity of 12 m/s (1850 scfm) at a sample flow rate of 56.6 LPM (2 scfm). This is cited on PDF page 17 of RPP-46436. Also, using Deposition 2001a, transmission through the probe was shown to be from 92.8% to 109.7% when the free stream velocity was varied from 2.6 m/s to 16.1 m/s respectively and the sample flow rate was 56.6 LPM for 10 μm particles – see PDF pages 15 & 16 in RPP-46436. Lastly, the measured probe transmission with 2.59 m/s free stream velocity and at a 20 LPM sample flow rate ranged from 0.97 to 1.03 for the AN, A-Train stack and from 0.94 tp 1.04 for the AN, B-Train stack. This data is presented on PDF page 52 of RPP-46436.
Is the aspiration ratio of a sampling nozzle within the range of 0.80 to 1.50 for the anticipated range of operating conditions and the previously noted particle size or sizes.		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
Note: Compliance shall be demonstrated with liquid aerosol particles, which will provide conservative transmission values in comparison with solid particles because liquid particles adhere to walls, while solid particles may rebound or be re-entrained from a surface.		
6.3.3 Nozzle designs		
Does the presence of a nozzle disturb the aerosol concentration in the stack or duct? Note: The frontal area of a nozzle should not be greater than 15% of the stack or duct cross sectional area	Yes	The probe is installed in the 12 inch section of the stack. Fifteen percent of the area of a 12 inch stack is about 17 square inches. The RF2-111 sampling probe is made out of a 1.5 inch pipe. The area of a 1.5 inch pipe is less than 2 square inches. Thus the criteria was deemed met. See sheets 1& 3 of drawings H-14-105531, H-14-105545, H-14-105681, and H-14-105695.
6.3.4 Application and performance considerations		
6.3.4.1 Location		
Is the sampling in a place at a location where both the aerosol concentration and fluid momentum (velocity) are well mixed and thus meet the performance criteria of clause 5.2.2.2?	Yes	The location was qualified and documented in RPP-46436. See section 5.2.2.2 of this checklist for further discussion.
6.3.4.2 Orientation		
For aerosol sampling, is the nozzle axis aligned parallel to the temporal mean flow stream direction?	Yes	See drawings Sheet 1 of H-14-105531, H-14-105545, H-14-105581, and H-14-105695.
6.3.4.3 Transmission and aspiration ratios		
Is the transmission and aspiration ratios of the selected nozzle design traceable to experimental verification of performance for conditions that include the nominal	Yes	A Thermo-Anderson RF2-111shrouded probe was used in the design. The nozzle characteristics are inherent in the design and were verified by the designers during wind tunnel tests - reference McFarland, A. R., C. A. Ortiz, M.E. Moore, R. E. DeOtte, Jr., and A. Somasundaram, 1989, "A shrouded Aerosol Sampling Probe", *Environmental Science Technology* 23:1487-1492.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
sampling flowrate and range of anticipated sampling flowrates, the nominal free stream velocity and the range of anticipated free stream velocities, and a particle size of 10 µm AD?		In addition, according to Figure 28 of Chandra and Andrew R. McFarland, Shrouded Probe Performance: Variable Flow Operation and Effect of Free Stream Turbulence, Aerosol Science and Technology 26:111-126 (1997) the lowest probe transmission ratio of 0.943 occurs at a free stream velocity of 12 m/s (1850 scfm) at a sample flow rate of 56.6 LPM (2 scfm). This is cited on PDF page 17 of RPP-46436. Also, using Deposition 2001a, transmission through the probe was shown to be from 92.8% to 109.7% when the free stream velocity was varied from 2.6 m/s to 16.1 m/s respectively and the sample flow rate was 56.6 LPM for 10 µm particles – see PDF pages 15 & 16 in RPP-46436.
If actual testing is used, have the means for determining the transmission and wall loss ratios been documented?		
If reference to previous testing is employed, has the equivalency of the selected design and the design that was tested been documented?		
6.3.4.4 Sampling flowrate and free stream velocity		
If the source is PIC 1 of Table 2, is the sampling flowrate varied in proportion to the flowrate through the stack or duct in order to permit an accurate assessment of the quantities of any releases? Note: Continuous air monitors (CAMs) in PIC 1 applications may be operated at a fixed flowrate.	Yes	The sampling system was designed for a variable exhauster system. The tested operating range spans an exhaust flow rate range from 401 scfm corresponding to a free stream velocity of 2.6 m/s employing a minimum stack sample flow rate of 0.7 scfm (20 LPM) to 2484 scfm, corresponding to a free stream velocity of 16.1 m/s employing a maximum stack sample flow rate of 2.5 scfm (70 LPM). The CAM is designed to operate continuously at a 2 scfm flow rate. The sample to stack flow proportional is checked via 6-FCD-648. The formula for acceptance is: One hundred times (sample flow minus the stack flow/1000)/sample flow = < 10%. See data Sheets for PM IDs ET-09059, ET-09061, ET-09082, and ET-09084. **Note: Since the record sampler flow rate proportionality fraction to the stack flow rate is 1 to 1000 and since the qualified flow rates for the record samplers are from 0.7 scfm to 2.5 scfm, the qualified flow rates for the stack, for record sampler operation is not 400 to 2484. The 400 to 2484 range is only acceptable for the CAM. The range which is acceptable for the record sampler, because of the proportionality fraction, can only be from 700 to 2484.**
If the sample flowrate is varied, is the ratio of the sampling flowrate to the stack flowrate established for nominal operational conditions of the stack or duct? Note: Over the range of operational flowrates that is based on either historical records or *a priori* considerations, the ratio should not vary by more than ±25%.	Yes	

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
6.3.4.5 Nozzle configuration		
Does the leading edge of the nozzle have a sharp edge with the external cone angle not to exceed 30°? Note: Other configurations may be used if experimental data show either equivalent or superior performance to the sharp-edged nozzle. If the sampling nozzle is shrouded, the shroud should not have a sharp leading edge.	Yes	The probes are Thermo-Anderson RF2-111 shrouded probes. These probes are designed to meet this requirement.
For sharp-edged nozzles, has the leading edge of the nozzle been inspected for damage following installation and subsequent to any maintenance procedures in which the nozzle could be damaged?	Yes	The nozzles were inspected after installation and annually via 3-FCD-728 and 3-FCD-738. This is done in section 5.3 of these procedures. The inspection is record of Table 3 of those procedures.
6.3.4.6 Rakes		
If a sample rake is used, has it been tested to for aerosol transmission? Note: Each of the nozzles shall meet the requirements contained in clause 6.3.2. Either *in situ* or laboratory tests may be used in the testing procedure to determine compliance. If all nozzles on the rake are identical and a nozzle can be separated from the rake, tests may be conducted on a single nozzle, otherwise, tests shall be conducted with the nozzles mounted on the rake and the rake shall meet the criteria in clause 6.3.2. Flowrate through each nozzle in a rake, or the velocity at the inlet plane of each	NA	Rakes are not used.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
nozzle in a rake, shall be measured by a method that does not affect the flow through other nozzles in the rake. Flowrate or inlet-plane velocity measurements may be conducted with the rake removed from the stack or duct. The flowrate or inlet-plane velocity of any nozzle may not differ from the mean flowrate by more than ±10%.		
Has the transmission of an aerosol through a rake been measured or calculated and documented?		
6.3.4.7 Materials of construction		
Are the nozzles constructed of materials that will not react with either the aerosol or the vaporous constituents of the gas stream?	Yes	The probes are Thermo-Anderson RF2-111 shrouded probes. The nozzle material is stainless steel to resist corrosion and the probes are designed to meet roughness requirements.
Is the average surface roughness of the internal regions of nozzle that contact the sampled stream less than or equal to 0.8 μm?		
Is the average surface roughness of the external region of the sampling nozzle from the inlet plane to a distance of two nozzle inlet diameters from the inlet plane less than or equal to 1.6 μm.		
Does the shroud have an average surface roughness less than or equal to 3.2 μm?		
6.3.4.8 Maintenance		
Is the sampling nozzle checked annually for alignment, presence of deposits of foreign materials and other factors that could degrade the	Yes	The nozzles are inspected and cleaned annually via 3-FCD-728 and 3-FCD-738. This is done in section 5.3 of these procedures. The inspection is record of Table 3 of those procedures.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
performance of the sampling system?		
If there are background aerosols that can produce deposits, is a cleaning schedule established that will not allow over 5% of the inlet area of a nozzle to be occluded?		
For nozzles that are used to sample HEPA-filtered air, is the nozzle cleaned if there are visible deposits of material on either the internal or external regions of the nozzle?		
6.4 Sample transport for particles		
6.4.1 Depositional losses		
Have the deposition of particles inside the transport tubing been evaluated either through experimental techniques, through use of documented computer codes (e.g., Riehl et al. 1996), or through use of documented and referenced hand calculations (Brockman 1993), for either 10 μm AD aerosol particles or the size range expected in the particular application under normal, off-normal, and anticipated accident conditions?	Yes	Sample transport line losses were evaluated in RPP-46436 using three methods: 1. Computer modeling: Deposition losses of aerosol particles from the sample extraction point of collection were evaluated using Deposition 2001a over the range of exhauster flow rate i.e. 401 scfm (corresponding to a free stream velocity of 2.6 m/s) to 2484 scfm (corresponding to a free stream velocity of 16.1 m/s) for the Thermo-Anderson RF2-111 probe's nominal sampling flow rate of 2.0 scfm (56.6 lpm). The lowest total penetration was 70.6% for the CAM system at a free stream velocity of 2.6 m/s. See PDF pages 15 & 16. 2. Evaluation of shrouded probe performance data documented in Chandra and Andrew R. McFarland, Shrouded Probe Performance: Variable Flow Operation and Effect of Free Stream Turbulence, Aerosol Science and Technology 26:111-126 (1997): Figure 28 of this study showed losses within the probe through a range of sample flow and free stream velocities ranging from 6 m/s at a sample flow rate of 30 lpm (1.1 scfm) to a free stream velocity of 24 m/s at a sample flow rate of 113 lpm (4 scfm). The lowest total penetration of 94.3% occurred at a free stream velocity of 12 m/s (56.6 lpm – 2 scfm). Deposition 2001a was also used to evaluate penetration through the transport tube only (without the probe) for the sample flow rate range from 20 lpm (0.7 scfm) to 70 lpm (2.5 scfm). The worst case penetration for this was 53.7%. Combining these 2 results (94.3% with 53.7%) provided a minimum total penetration of 50.6% through the entire system. See PDF pages 17 thru 20.
Have the straight sections of transport tubes, particularly horizontal tubing sections, been kept as short as possible, and the number of bends been minimized within the geometrical constraints of the application?		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
		3. Experimental field measurements: Measured samples were obtained from the sample line nozzle through the transport tube to just before the where the CAM and record sample holder are connected. This series of measurements provided experimental evidence of deposition losses in the transport lines at the low sample flow rate of 20 lmp (0.7 scfm). The free stream velocity was varies during this series of tests from 2.6 m/s (401 scfm) to 16.1 m/s (2484 scfm). Of the data that was available, the worse case penetration was 72.1% on the record sample lines for particles sized at 0.7 microns. The discussion began on PDF page 33. The modeling data and discussion began on PDF page 48.
Have inward facing steps at the tubing connections that cause more than a 1% reduction in tube diameter been excluded?	Yes	See figure and notes on Sheet 1 of drawings H-14-105531, H-14-105645, H-14-105681, and H-14-105695.
Are the tubing ends shall be free of burrs and crimping?		
For record samples, is there more than one 90° bend used? Note: It is recommended that not more than one 90° bend be used, although there may be applications where more than one bend may be necessary.		
Do all bends have a curvature ratio (radius of curvature of the bend divided by the tube diameter) of at least 3.0?		
Does flattening of the bend caused by a bending process not exceed 15%? Note: Where flattening is defined in terms of the original and minor axes of the tube cross section at the angular midpoint of the bend. As an example, the diameters of a 90° bend would be measured at the 45°		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
location. The ratio of the minimum tube diameter to the original tube diameter shall not be less than 0.85.		
Is the penetration of 10 µm AD aerosol particles from the free stream to the collector or analyzer known and 50% or more?	Yes	Sample transport line losses were evaluated in RPP-46436 using three methods: 1. Computer modeling: Deposition losses of aerosol particles from the sample extraction point of collection were evaluated using Deposition 2001a over the range of exhauster flow rate i.e. 401 scfm (corresponding to a free stream velocity of 2.6 m/s) to 2484 scfm (corresponding to a free stream velocity of 16.1 m/s) for the Thermo-Anderson RF2-111 probe's nominal sampling flow rate of 2.0 scfm (56.6 lpm). The lowest total penetration was 70.6% for the CAM system at a free stream velocity of 2.6 m/s. See PDF pages 15 & 16. 2. Evaluation of shrouded probe performance data documented in Chandra and Andrew R. McFarland, Shrouded Probe Performance: Variable Flow Operation and Effect of Free Stream Turbulence, Aerosol Science and Technology 26:111-126 (1997): Figure 28 of this study showed losses within the probe through a range of sample flow and free stream velocities ranging from 6 m/s at a sample flow rate of 30 lpm (1.1 scfm) to a free stream velocity of 24 m/s at a sample flow rate of 113 lpm (4 scfm). The lowest total penetration of 94.3% occurred at a free stream velocity of 12 m/s (56.6 lpm – 2 scfm). Deposition 2001a was also used to evaluate penetration through the transport tube only (without the probe) for the sample flow rate range from 20 lpm (0.7 scfm) to 70 lpm (2.5 scfm). The worse case penetration for this was 53.7%. Combining these 2 results (94.3% with 53.7%) provided a minimum total penetration of 50.6% through the entire system. See PDF pages 17 thru 20. 3. Experimental field measurements: Measured samples were obtained from the sample line nozzle through the transport tube to just before the where the CAM and record sample holder are connected. This series of measurements provided experimental evidence of deposition losses in the transport lines at the low sample flow rate of 20 lmp (0.7 scfm). The free stream velocity was varies during this series of tests from 2.6 m/s (401 scfm) to 16.1 m/s (2484 scfm). Of the data that was available, the worse case penetration was 72.1% on the record sample lines for particles sized at 0.7 microns. The discussion began on PDF page 33. The modeling data and discussion began on PDF page 48.
6.4.2 Corrosion		
Are the internal walls of the	Yes	As mentioned above, the transport lines are constructed out of stainless steel to resist corrosion. See

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
transport system constructed of materials that are minimally reactive to inadvertently deposited aerosol particles or to reactive vaporous compounds that could be present in the sample?		sheets 1& 2 on drawings H-14-105529, H-14-105543, H-14-105679, and H-14-105693.
Are the materials of construction for external walls and seals between sampling system components compatible with the environment to which they are exposed? Note: Materials recommended for the nuclear industry are stainless steel for general applications and tetrafluoroethylene for radioiodine.		
6.4.3 Electrostatic effects and flexible tubes		
Is the transport system constructed of materials such as metals or conductive plastics that will not sustain internal electrostatic fields? Note: The inside diameter of the plastic line should not be smaller than the inside diameter of the components with which it is connected and the bend curvature ratio should not be less than a ratio of three, nor may the curvature of a bend cause more than a 15% change in the inside diameter of the tube. If nonconductive flexible tubing is used, the line length exposed to the	Yes	The transport lines are constructed out of stainless steel. See 1& 2 on drawings H-14-105529, H-14-105543, H-14-105679, and H-14-105693.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
sample should not exceed two times the internal diameter of the tube. Of the flexible tubes that can be categorized as nonconductors, neoprene and natural rubber are recommended to minimize electrostatic deposition of particulate matter (Charuau 1982). If radioiodine is present in the effluent stream, materials suggested in annex C should be used.		
6.4.4 Smoothness of internal surfaces		
Are the internal surfaces of transport lines as close to hydraulically smooth as practical? Note: This is an average surface roughness of approximately 1.6 µm or less for tube sizes that are on the order of 25 mm (1-inch) in diameter.	Yes	The smoothness of the internal surfaces is not known. The requirements of N13.1 were included in the procurement specification and the system design performance was verified by testing (RPP-46436); therefore the surfaces are assumed adequately smooth. Also see notes on drawings See notes on Sheet 1 on drawings H-14-105566, H-14-105580, H-14-105715, and H-14-105727.
6.4.5 Condensation		
Are transport lines, collectors, and analyzers designed to avoid condensation of vapors?	Yes	The sample lines are heat traced and insulated to prevent condensation. See notes on Sheet 1 of drawings H-14-105566, H-14-105580, H-14-105715, and H-14-105727.
6.4.6 Cleaning transport lines		
Are transport lines cleaned on a frequent basis? Note: As a minimum, for systems that sample HEPA-filtered air, inspections for deposits should be made annually. If there is an indication of deposits inside the nozzle inlet, the transport line shall be inspected; and, if deposits are	Yes	The transport lines are cleaned as necessary, annually via 3-FCD-728 and 3-FCD-738. See section 5.3 of these procedures.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
visible inside the transport line, the line shall be cleaned. For systems that sample non-HEPA-filtered air containing background aerosols, if an estimate can be made of the rate of deposition of all aerosol particles on the internal walls of the system, the system should be cleaned when the mean mass of deposited material exceeds 1 g/cm^3. Alternatively, a cleaning schedule can be set up based on performance of the transport system. The interval between cleanings should not exceed that during which accumulations of wall losses will cause the overall penetration of 10 μm AD aerosol particles through the sampling system to be reduced by more than 10%. In addition, if there are indications of re-entrainment of deposits from the walls of the sampling system or if there has been sampling of easily re-entrainable aerosol particles (e.g., flakes), either of which could cause anomalous radiological data to be gathered, the system should be cleaned. Decontamination requirements shall be taken into account in any cleaning procedure.		
6.5 Gas and vapor sample extraction and transport		
Has deposition in long transport lines and condensation due to temperature changes in the line been avoided?	Yes	The sample lines are heat traced and insulated to prevent condensation. See notes on Sheet 1 of drawings H-14-105566, H-14-105580, H-14-105715, and H-14-105727.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
Is the sampling taking place at a location where the flow is well mixed and meets the criteria of clause 5.2.2.2.? Note: If the flow can contain only gaseous contaminants, the nozzle design is not critical. The nozzle design can be simply an open ended or perforated tube.	Yes	The system was qualified and documented in RPP-46436. See discussion in section 5.2.2.2 of this checklist.
Have the extraction and transport requirements, include extracting the sample from a well-mixed location and avoiding water and vapor condensation in the transport and collection system (except where condensation is used as the collection method), been considered?	NA	The sample transport lines are heat traces - see notes on Sheet 1 of drawings H-14-105566, H-14-105580, H-14-105715, and H-14-105727. Also, as explained in the NOC application (04-ED-028) and the AOP approval conditions for emission units 735, 736, 855, & 856, only particulate sampling is required. The sample location was shown to be well mixed per the qualification documented in RPP-46436. See discussion in section 5.2.2.2 of this checklist.
When non-reactive gases, vapors, and particles are being simultaneously sampled, have the particle sample extraction and transport requirements been applied, which will also ensure adequate delivery of the gas and vapor sample?		
Is the gas or vapor collection device located downstream of a particle filter to eliminate potential radionuclide interferences by particulate matter?		
Has construction material been selected which has a minimum reactivity with the gas?		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
Has a separate sampling system for particulate and gas been considered?		
In cases of low reactivity, has the sample line been kept to a minimum?		
Has the penetration of the gas or vapor through the complete extraction and transport system been documented?		
Is the minimum transport efficiency for vapor or gas samples from the free stream to the collector/analyzer 50%?		
If long transport lines are unavoidable, have consideration been given to the effect of transport and detection delay time caused by deposition, chemical transformation and subsequent resuspension?		
Has consideration been given to how significant an effect the delay has on the timeliness, interpretation, and usefulness of the resulting data? Note: Although rapid changes in the emission may become smeared over a large time interval relative to the change in emission, the data may still be useful and quantitative when interpreted in that light.		
6.6 Collection of particle samples		
6.6.1 General considerations		
Have the following issues for selection and operation of particle collection devices been considered:	Yes	As explained in the NOC application (04-ED-028), the sample will consist of particulate radionuclides. Particulates are collected on a record sample filter and analysis occur offline at a later date. Near real time analysis is done using a CAM.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
• appropriate presentation of the sample for realtime analyses or preservation of the sample for retrospective analyses; • adequate flowrates and detection efficiencies to meet sensitivity requirements; • minimal in-leakage within the collector; • minimal particle loss within the collection zone.		The minimum sample volume for alpha and beta analysis has been set to be 20,000 cubic feet and the minimum sample volume for various isotopic analyses has been set to 262,000 cubic feet. This is documented on page 7 of the 2012 revision was HNF-EP-0835, Revision 18, "Statement of Work for Services Provided by the Waste Sampling and Characterization Facility for Effluent and Environmental Monitoring Program during Calendar Year 2012." This means that to meet the minimum volume limits for routine alpha and beta analysis, e.g., for a 1 scfm sample flow, the sample size needs to be at least 336 hours long. In leakage is minimized via annual inspections via 3-FCD-728 and 3-FCD-738 (recorded in Table 5 of those procedures – page 47 & 49 respectively) and by the design of the record sample and CAM holder. The record sample holders, for example; are Gelman Sciences (later versions are called PALL Corporation holders). The housings of these holders are made from stainless steel and have support screens behind the filter to provide support to the filter. In addition, there is a 1/8" wide edge and a 1/8" rubber o-ring which presses against the filter paper when the holder is closed. This o-ring is designed to prevent bypass around the paper and thus minimizes additional particle losses when the system is in operation – for an illustration, reference drawing H-14-105158. Also see Sheet 3 on drawings H-14-105566, H-14-105580, H-14-1005715, and H-14-105727. In addition see page 42 of RPP-7881. Particle loss evaluations were conducted in RPP-46436 (various pages as discussed section 6.4.1 of this checklist) in using Deposition 2001a and via field testing.
6.6.2 Filter media		
Has the selection of filter media been based on consideration of collection efficiency for the typical particle size in the duct, the area of the filter, the pore size, the filter's resistance to air flow, the background radioactive material of the filter, filter fragility, cost, self-absorption within the filter, and chemical solubility?	Yes	A 47 mm Versapor 3000 membrane filter is used. This filter is referenced in Table D.1 of ANSI N13.1 as filters evaluated for use in sampling radioactive particulates. Also see page 42 of RPP-7881.
If the performance characteristics of the front and back surfaces of the		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
filter are not within 5% of each other for the intended purpose of the sample, has a means of identifying the appropriate surface for particle collection been made?		
Is the filter strong enough to maintain integrity at the required sample flowrates and during handling activities?		
If a filter and sample are to be separated for a particular analytical method, has the user selected a filter medium that can be easily dissolved by a method that will not attack the particles of interest?		
Note: Higby (1984) has demonstrated that absorption of alpha radiation emitted from airborne particles collected on glass-fiber filters does not constitute a major source of error in estimating concentrations of airborne alpha-emitting radionuclides, but excellent resolution in alpha spectroscopy requires use of membrane-type filters, which are front-surface collectors.		
When filter media are used, is a backup support that produces negligible pressure drop used behind the filter to prevent filter distortion or deterioration?	Yes	The housings of these holders are made from stainless steel and have support screens behind the filter to provide support to the filter. Reference drawing H-14-105158
Does the sample holder provide adequate structural support while not damaging the filter, prevent sampled air from bypassing the filter, facilitate changing of the		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
filter, and facilitate decontamination?		
If gaskets are used to seal the filter to the backing plate, is it verified the gasket is in contact with the filter along the entire circumference to ensure a good fit?	Yes	The holders and the o-rings are inspected during each sample exchange via TFC-OPS-006. See section 5.1 of that procedure.
Are periodic inspections of the gasket performed to detect degradation and eliminate buildup of dust or filter material, which could result in sampled air bypassing the filter?		
Do filters used for sampling airborne radioactive particles have a minimum efficiency of 95%? Note: Efficiency values shall be applicable to the conditions of use. For example, the collection efficiency of a Whatman 41 cellulose fiber filter is 99.5% for 0.3 µm aerodynamic diameter when the face velocity is 124 cm/s, but drops to only 72% at a face velocity of 16.9 cm/s (Liu et al. 1983).	Yes	Table D.1 of ANSI N13.1 specifies that the Versapor 3000 filter used, has an efficiency range from 99.7 to greater than 99.99 for 3.0 µm pore size. In addition, Gelman Sciences performed testing on the Versapor 3000 filter material and found it to be have a collection efficiency of greater than 95% using 0.3 µm particles at 32 LPM.. Reference Liu, Christina P., 1993, (letter to John Schmidt, January 21, regarding Versapor-3000 membrane efficiency), Gelman Sciences, Ann Arbor, Michigan.
If published or manufacturer's data on filter collection efficiency are not available for the particle sizes of interest, has the efficiency been determined by the user?		
If a filter with efficiency lower than 95% is required to meet the overall sampling objectives, has a correction for efficiency been made?		
Because filter efficiency is a function of air flowrate, has the	Yes	Flow rates were established in the design of the system – see discussion in section 6.4.1 of this checklist. The systems are inspected for appropriate flow rates daily via TFC-OPS-005, Daily CAM

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
sample flowrate been adequately maintained to achieve the desired collection efficiency?		and Record Sampler Inspections. See section 5.4 of that procedure.
If penetration of radioactive material into the collection media or self-absorption of radiation by the material collected would reduce the count rate by more than 5%, is a correction factor used?	NA	Not applicable.
6.7 Collection of gas and vapor samples		
6.7.1 Sampling with retention of specific constituents		
Have sampling rates been established to ensure adequate sensitivity for the selected radioassay method and compatible with the collector performance characteristics?	Yes	Considerations for these factors are made in the development of HNF-EP-0835 the "statement of work" (SOW) that defines analytical services of the Waste Sampling and Characterization Facility (WSCF) which provides the Effluent Monitoring (EM) Program for the Hanford site throughout calendar year. See nominal sample volumes in Table 1 of HNF-EP-0835. These volumes were derived years ago by working with WSCF radchemists to ensure the attainment of the MDAs/MDCs in Table 1 of the SOW. The Versapor 3000 sample filter, used in the sampling systems, is a very sturdy hydrophilic filtering medium, consisting of acrylic copolymer on a nylon-fiber support, recommended by the ANSI/HPS N13.1-1999 standard (see Table D.1, Appendix D, where is judged as "rugged"). The typical "sampling rate" of roughly 2 cfm and duration of two weeks to one month has amply demonstrated avoidance of breakthrough. We know of no historical instance of sample filter breakthrough.
Has avoiding sample breakthrough been considered when choosing the sampling rate and duration?		
6.7.2 Sampling without constituent separation		
If used, has the flow through or volume collection device been evaluated to determine the sensitivity?	NA	Not applicable. As described in the NOC application (04-ED-028) this system designed to collect particulates radionuclides. This system is not designed to sample gasses or vapors.
Is the gas well above its dewpoint in the sampling system and ionization chamber?		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
If used, has the flow-through chamber been decontaminated periodically?		
6.8 Sample volume measurement		
For the volume of air sampled, has a standard density value been selected and documented?	Yes	The standard density used, is that specified in 40 CFR 60, Appendix A, Method 2. This is applied via the 3-VB-155 series procedures. See data sheet 5 within 3-VBP-155ZC, 3-VBP-155ZD, 3-VB-155ZA, and 3-VB-155ZB.
If the density value is non-standard, is it included in reports?		
For record sampling, if the stack or duct is PIC 1 of Table 2 is the measurement and control of the sample flowrate used and is the sample flowrate in proportion to the flowrate through the stack or duct?	Yes	These are PIC emission units as discussed in section 4 of this checklist. As such, the records samplers are designed to vary using a proportionality record sample flow rate to stack flow rate fraction of 1 to 1000. See page 2 of RPP-15034 and the discussion in section 6.3.4.4 above.
For other PICs of Table 2, or when CAMs are used with PIC 1 sources, is the sample flowrate held constant? Note: This reduces the accuracy of the quantity of emitted radioactivity	Yes	The CAM is designed to operate continuously at a fixed, 2 scfm flow rate.
6.8.1 Basic considerations		
Is the flowrate through the sampling system measured?	Yes	The flow devices are located downstream of the record sample holder and the CAM – see Figure 2 in TO-060-106, *Operate AN Tank Farm Primary Ventilation System (VTP)*, and Figure 3 in TO-060-107, *Operate AW Tank Farm Primary Ventilation System (VTP)*.
Is an indication of the value displayed? Note: However, if the flowrate is controlled at a set value (e.g., for PIC 2 and 3 systems of Table 2), the display can be an error signal that the control system is out of compliance.		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
Is the flow detector placed in the flow system in such a manner that it does not cause losses of aerosol particles or reactive radioactive gases? Note: As a consequence, the flow sensor is generally located downstream of the collector or analyzer. This sensor location generally causes the pressure at the point of measurement to be less than that in the stack or duct. Also, temperature at the point of measurement may differ from that in the stack, duct, or chamber from which samples are being removed.	Yes	The flow detectors are located downstream of the collector. See drawings H-14-020101, Sheet 11 Ventilation Tank Primary System (VTP) B-Train O&M SYS P&ID, H-14-020101, Sheet 12 Ventilation Tank Primary System (VTP) A-Train O&M SYS P&ID, H-14-020102, Sheet 11, P&ID 241-AW HVAC Exhauster Train "A," and H-14-020102, Sheet 12, P&ID 241-AW HVAC Exhauster Train "B."
6.8.2 Volume of air sampled		
If the sampling flowrate will not vary by more than ±20% over the sampling period, is it recorded at the start and the end of a sampling period at a minimum?	Yes	Sample flow rates and totalized values recorded at the beginning and end of every sample period. It is recorded in the Automated Bar Coding of Air Samples at Hanford (ABCASH) using TFC-OPS-006, Air Sample Filter Exchange and Inspection for Record Samplers, Stack and Annulus CAMs. The readings are produced from instruments which automatically convert the readings to standard units of temperature and pressure.
Is continuous flow measurement control used for all stacks and ducts where significant emissions could occur, or where the flowrate can vary by more than ±20% during the sampling period?		
Is continuous flow measurement used, is the flowrate recorded at intervals not to exceed 10 minutes?		
If the indicated flowrate is not based on standard conditions, have the appropriate corrections been made?		
6.8.3 Flowrate control		
If sampling is performed with constant sample flowrate conditions,	Yes	The sampling flow rate is varied to track the stack flow. Test results documented a qualified operating range for stack flow from 401 to 2484 scfm, corresponding to a variable sample flow rate

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
where a controller is used to maintain constancy of flowrate, is the flow controller maintaining the flowrate within ±15% over conditions that correspond to an initial pressure drop across the collector (usually a filter) or analyzer to a value that is twice the initial pressure drop?		from 0.7 to 2.5 scfm, The CAM is operated at a fixed sample flow rate of 2.0 scfm. The record samplers operate proportional to the stack flow rate. As such, because the lowest tested sample flow rate was 0.7 scfm, the lowest the stack flow rate can operate at for the record sampler is 700 scfm. See discussion above in section 6.3.4.4.
Dose the vacuum source used during a test of the controller have similar characteristics to the vacuum source used to draw air through the system in the field application?	NA	Not Applicable. The systems automatically convert to units of standard temperature and pressure.
If the source is PIC 1 of Table 2, is a controller used to maintain the ratio between sample flowrate and effluent flowrate within ±20% of a predetermined value?	Yes	The sampling system was designed for a variable exhauster system. The tested operating range spans an exhaust flow rate range from 401 scfm corresponding to a free stream velocity of 2.6 m/s employing a minimum stack sample flow rate of 0.7 scfm (20 LPM) to 2484 scfm, corresponding to a free stream velocity of 16.1 m/s employing a maximum stack sample flow rate of 2.5 scfm (70 LPM). The CAM is designed to operate continuously at a 2 scfm flow rate. The sample to stack flow proportional is checked via 6-FCD-648, Calibrate Hastings HFC-303 Flow Controller on AN, AW, and POR107 Exhausters. The formula for acceptance is: 100 times (sample flow minus the stack flow/1000)/sample flow = < 10%. See data Sheets for PM IDs ET-09059, ET-09061, ET-09082, and ET-09084. In addition, the controller is accurate to 1%. See PM IDs ET-09059, ET-09061, ET-09082, and ET-09084.
6.9 Leak checks		
Is the sampling system inspected for leaks at the time of installation and at any time when either significant maintenance is performed or during an annual inspection?	Yes	Sample line inspections and leak tests were conducted at startup and annually via 3-FCD-728 and 3-FCD-738. The test is recorded in Table 5 of these procedures.
If the sampling system is used with a PIC 2 or 3 source (Table 2), is the methodology of the inspection of the system documented?	Yes	These are PIC 1 emission units and a leak test is accomplished via 3-FCD-728 and 3-FCD-738. The method used follows the method described in this section of ANSI N13.1. The probes are plugged, and flow is applied to the system until a nominal vacuum is achieved (4 in Hg). Acceptance is achieved is the flows remain below 0.05 scfm. The standard calls for an acceptance leak rate less

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
For sampling systems used on PIC 1 sources, is the system tested for assurance that leakage does not exceed an acceptable rate?		than 5%. Since the normal flows are around 1 scfm, 0.05 scfm meets this 5% criteria – see section 5.3 and Table 5 within these procedures.
Is the methodology used to quantify the leakage flow rate documented?		
6.10 Optimization and upgrading of new and existing system		
6.10.1 Defining the scope of the study		
Has the scope of the optimization study been defined?	Yes	A specific optimization study was not done. However, Tank Farm systems are usually designed based upon past designs. Designs do take into account new studies that are performed by PNNL or elsewhere when these studies become known. In general, designs are documented in the NOC application (04-ED-028) and qualification studies such as RPP-46436.
Does it specify radiological protection factors, constraints on access, applicability of certain options to achieve good mixing, and other factors and limitations?		
6.10.2 Identifying options and their consequences		
Have options been considered in each case, with the implications of their adoption considered with respect to their contribution (or detriment) to representative sampling performance, consequences for workers' safety, and other factors affecting the decision?	NA	Not applicable. A specific optimization study was not done.
6.10.3 Use of decision-aiding techniques		
Has documentation and reliability of any estimation and prioritization procedures used been entered into the record of decision?	NA	Not applicable. A specific optimization study was not done.
7 Quality assurance and quality		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
control		
7.1 Quality assurance plan		
Have the following points been addressed in the air sampling QA Plan? • organizational responsibilities; • personnel qualifications; • administrative controls; • means for identification of sources; • basis for the selection of sampling points. The methodology for verification of compliance with mixing requirements shall be documented; • basis for selection of sampling and monitoring systems. The methodology for demonstrating compliance with performance requirements shall be documented; • sample collection and tracking procedures; • calibration methods and calibration standards; • system operating procedures; • maintenance and inspection	Yes	The quality assurance plan followed is based upon the requirements in 40 CFR 61, Appendix B, Method 114, Section 4. The elements of these Method 114 requirements are addressed in TFC-PLN 71. The Method 114 sections corresponding to the TFC-PLN 71 sections and page numbers addressing these sections are as follows: 4.1 The organizational structure, functional responsibilities, levels of authority and lines of communications: - TFC-PLN 71 section 3.3, page 4 4.2 Administrative controls – TFC-PLN 71 section 3.4, page 8 4.3 The sample collection and analysis procedures used in measuring the emissions – TFC-PLN 71 section 3.5, page 9 4.3.1 Identification of sampling sites and number of sampling points, including the rationale for site selections – TFC-PLN 71 section 3.5.1, page 9 4.3.2 A description of sampling probes and representativeness of the samples – TFC-PLN 71 section 3.5.2, page 9 4.3.3 A description of any continuous monitoring system used to measure emissions, including the sensitivity of the system, calibration procedures and frequency of calibration - TFC-PLN 71 section 3.5.3, page 10 4.3.4 A description of the sample collection systems for each radionuclide measured, including frequency of collection, calibration procedures and frequency of calibration - TFC-PLN 71 section 3.5.4, page 10. 4.3.5 A description of the laboratory analysis procedures used for each radionuclide measured, including frequency of analysis, calibration procedures and frequency of calibration - TFC-PLN 71 section 3.5.5, page 10. 4.3.6 A description of the sample flow rate measurement systems or procedures, including

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
procedures; • procedure qualification; • data quality objectives and how they are accomplished; • audit and surveillance procedures; • corrective action program; • reporting and notification system; • program documentation requirements; • data analysis; • inspection status and disposition of deficient items and conditions.		calibration procedures and frequency of calibration - TFC-PLN 71 section 3.5.6, page 10. 4.3.7 A description of the effluent flow rate measurement procedures, including frequency of measurements, calibration procedures and frequency of calibration - TFC-PLN 71 section 3.5.7, page 10. 4.4 The objectives of the quality assurance program - TFC-PLN 71 section 3.6, page 11 4.5 A quality control program shall be established to evaluate and track the quality of the emissions measurement data against preset criteria - TFC-PLN 71 section 3.7, page 11 4.6 A sample tracking system shall be established to provide for positive identification of samples and data through all phases of the sample collection, analysis and reporting system - TFC-PLN 71 section 3.8, page 11 4.7 Regular maintenance, calibration and field checks shall be performed for each sampling system in use by satisfying the requirements found in Table 2: Maintenance, Calibration and Field Check Requirements - TFC-PLN 71 section 3.9, page 11 4.8 Periodic internal and external audits shall be performed to monitor compliance with the quality assurance program - TFC-PLN 71 section 3.10, page 12 4.9 A corrective action program shall be established including criteria for when corrective action is needed, what corrective actions will be taken and who is responsible for taking the corrective action - TFC-PLN 71 section 3.11, page 12 4.10 Periodic reports to responsible management shall be prepared on the performance of the emissions measurements program- TFC-PLN 71 section 3.12, page 12 4.11 The quality assurance program should be documented in a quality assurance project plan that should address each of the above requirements - TFC-PLN 71 section 3.13, page 12
7.2 Documentation		
Does the record keeping system ensure that all results are well	Yes	Document control and records management are described in TFC-BSM-IRM_DC-C-01, "Document Control" and TFC-BSM-IRM_DC-C-02, Records Management," as well as and other more specific

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
documented and retrievable for analyses, audits, and archival purposes?		procedures.
Is a copy of all documentation maintained at a location remote from the principal data storage area?		
Are documents affecting the quality of air sampling data prepared and reviewed by qualified personnel?		
Is the distribution of such documents controlled?		
Is a records system established by the responsible organization that recognizes internal, external, and regulatory requirements?		
Does the records system designate records, their storage requirements, retention period, legibility requirements, identification and retrievability?		
7.3 System characterization and documentation		
Does the quality assurance program assure that the air sampling system and its components are characterized and documented?	Yes	The air sampling system and its components are characterized and documented in the quality assurance plan contained within TFC-PLN 71. See section 7.1 of this checklist for further discussion.
7.3.1 Source term		
Are drawings of the ventilation system serving each sampled stack maintained?	Yes	Drawings are controlled via TFC-ENG-DESIGN-C-09, Engineering Drawings.
Have modifications to the system performed during construction or anytime thereafter been described in detail?		
Has the nature of the processes serving each stack been identified,	Yes	Processes, radionuclides, chemicals, etc. as well as the air cleaning systems serving theses stacks is identified in the Section 5, pages 7 & 8 of the NOC application (04-ED-028). A figure of the

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
including information about the identity of the radionuclides as well as their chemical and physical forms?		exhausters is also provided on page 11 therein.
Has the air cleaning systems associated with each stack been identified as well as the probable nature of releases resulting from the possible failure of these systems?		
7.3.2 Effluent flow characterization		
Have the results of studies to characterize the flow conditions of the effluents been documented (e.g., spatial and temporal variations in velocity across the stack or duct, checks for cyclonic flow, estimates of particle size distributions, etc.)?	Yes	Flow conditions have been addressed in the qualification study, RPP-46436. See referenced page numbers and further discussion in section and subsections of 5.1 and 5.2 in this checklist.
Does the documentation include or list all procedures employed, times and dates of the measurements, individuals involved, equipment used, and any pertinent information regarding facility operations?		
7.3.3 Design and construction		
Is documentation that describes the objectives of each stack sampling system, and includes or lists all radionuclides and their physical and chemical forms, available?	Yes	Section 8, page 12 of the NOC application (04-ED-028) and the current FF-01 Radioactive Air Emissions License approval AIR-11-1004 for NOC ID 809 lists the radionuclides of interest to be Sr-90, Cs-137, Am-241, Y-90, Cs-134, Pa-231, Pu-238, Pu-239, Pu-240, Pu-241. Section 12, page 19 of the NOC application (04-ED-028) states that these radionuclides are released as particulates.
If a particular component is present but not sampled, are the reasons discussed?		
Has the rationale and any supporting evidence for sampling at a particular	Yes	The sampling location was qualified in RPP-46436 – various pages cited in the discussions in section 5.2.2.2 of this checklist..

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
location along the duct or stack been documented?		
Has the rationale for sampling at a particular point(s) within (across) the stack or duct been documented?		
Is the documentation that explains the rationale for the design of the sampling system available? Note: This includes documentation regarding the choice of the transport system, the material, diameter and configuration of the sampling lines, the choice of filters or absorbers, the selection of flowmeters, etc. Also, there should be a means for allowing verification that the installed sampling equipment is that described in the documentation. This can be accomplished by identification marks on the installed components.		
Has an evaluation of particulate losses in the sampling lines been documented?		
Are other design documents being maintained including engineering change control documents, equipment manuals and vendor supplied information?		
7.4 Training		
Have individuals involved in system operation, inspection, audits, surveillance, and calibrations received training in these commensurate with their nature?	Yes	Training consists of a combination of classroom training and on-the-job training. Training is identified in TFC OPS-006 sample exchange procedure.
Have training requirements been		

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
determined by the responsible management organization and documented?		
7.5 Maintenance and inspection requirements		
Is routine maintenance planned to be performed as described in the manufacturer's equipment manuals?	Yes	Maintenance activities are controlled via TFC-OPS-MAINT-C-01, "Tank Operations Contractor Work Control" and other more specific procedures.
Is non-routine maintenance planned to be performed as the result of inspections?		
Are inspection and maintenance activities described in procedures?		
Are checklists employed as part of inspection protocols, and, after use, does the checklist become a part record of the inspection?		
Do the inspection and maintenance records include the nature of the inspection or maintenance, reasons for the inspection or maintenance, names of the individuals involved, times and dates, identity of the equipment employed, and a description of any replacement parts or materials?		
Will all deficiencies identified during scheduled and unscheduled inspections be dispositioned? Note : A summary of recommended maintenance and inspection requirements is given in table 5 of ANSI N13.1.		
Are regularly scheduled inspections performed at least once a year, possibly concurrent with	Yes	These inspections and tests are performed under procedures 3-FCD-728 and 3-FCD-738. See sections and page references as well as further discussions under sections and subsections of 7.5 and 7.6 of this checklist.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
calibrations? Note: The inspections should include but not be limited to: • checks of nozzle position and orientation; • the measurements of the nozzle opening and checks for dust accumulation; • functional checks of instrumentation; • visual inspections for corrosion, physical damage or dust loading to the sampling lines and equipment; • checks to ensure the tightness of all fittings and connections; • leak tests.		
7.5.1 Sampling system flow meter inspections		
Are inspections scheduled to be performed quarterly?	Yes	Quarterly response checks are done via 3-FCD-728 and 3-FCD-738, section 5.2, page12. An inline meter is installed and the acceptance criterion is less than 10% as required by this section of the standard.
Does the inspection procedure contain the requirements of section 7.5.1?		
Will the rotameter be inspected at the start of each sampling interval for assurance that no foreign matter has been deposited on inside	Yes	These systems do not have rotameters.

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
surfaces in the measurement tube?		
If foreign matter is visible, will the rotameter be removed from service, cleaned, and re-calibrated?		
7.5.2 Continuous effluent flow measurement apparatus		
Will response checks be performed on a quarterly basis using a Prandtl-type pitot-static tube?	Yes	Quarterly response checks are done via 3-FCD-728 and 3-FCD-738, section 5.1, page 10. The response is checked as agreed to in Letter 03-ED-141, from Roy Schepens, DOE/ORP, to Mr. Jeff Knight, EPA, Subject: *Title 40, Code of Federal Regulations (CFR), Part 61, Subpart H Amendment Implementation on the Hanford Site*, dated September 3, 2003. The agreement was that quarterly response check of stack flow rate systems can be done simply by changing the exhaust fan rate (e.g., by valve alignment) or producing a pressure pulse by some other means and checking that the corresponding instrument reading changed.
Does the response check procedure contain the requirements of section 7.5.2?		
7.6 Calibration		
Will measurement and test equipment be calibrated using standards whose calibration is traceable to NIST (or other nationally recognized standards) or derived from accepted values of natural physical constants? Note: The suggested calibration frequency is annually for systems operated under normal or controlled environmental conditions. For systems used under extreme conditions, the calibrations should be conducted more frequently, e.g., every six months.	Yes	Calibration is done annually.
7.6.1 Calibration of sampling system flow meters		
Will sampling system flow meters be calibrated using the requirements of section 7.6.1?	Yes	The AN & AW record sample flow meters are calibrated annually via 6-FCD-648 - the entire procedure. Five separate points are used: 0, 1, 2, 3, & 4 cfm. These points are consistent with the Instrument Society of America (ISA) standards. These five points are chosen to accommodate a

Item	Compliant: Yes/No/NA	Compliance Discussion – References Cited Where Applicable.
		sufficient range over which the sample flow system must operate to remain proportional to the stack flow rate. The ANSI N13.1 standard suggests using 5 points set to 40%, 70%, 100%, 130%, & 170% of nominal flow rates. WRPS has taken actions to evaluate the current calibration flow rates against ANSI recommended flow rates.
7.6.2 Calibration of effluent flow measurement devices		
Will the effluent flow measurement device be calibrated at least annually?	Yes	The effluent flow measurement devices are calibrated annually via 6-PCD-373, "Yokogawa Instruments EJA 110 & 120 Differential Pressure Transmitter," the entire procedure.
Is the measured flow within ±10% of the reference EPA method?	Yes	Stack flow rates are measured manually (following Method 2- the EPA method) annually via 3-VB-155ZA, 3-VB-155ZC, 3-VB-155 ZD, and 3-VB-155ZG – the entire procedure. During these measurements, the measured value is compared to the instrument reading to ensure the instrument is reading within ±10% of the EPA method – see Data Sheet 5 within these procedures. If not, corrective maintenance is scheduled.
7.6.3 Calibration of timing devices		
Will timing devices be calibrated at least annually? Note: The maximum acceptable error is 10 (ten) minute per month.	Yes	The timing mechanisms are checked annually via 3-FCD-728 and 3-FCD-738, section 5.6, pages 36 & 38 respectively. The timing device is checked by ensuring the totalizer is accurate to less than or equal ±10%, tested over a 30 minute period.

List of References: (files on compact disk)

03-ED-141, Letter, R. J. Schepens, DOE/ORP, and K. A. Klein, DOE-RL, to Mr. J. K. Knight, EPA, "Title 40, Code of Federal Regulations (CFR), Part 61, Subpart H Amendment Implementation on the Hanford Site," 03-ED-141, dated September 3, 2003

04-ED-028, Letter, R. J. Schepens, DOE/ORP, to J. K. Knight, EPA, and A. W. Conklin, WDOH, "Approval of Radioactive Air Emissions Notice of Construction (NOC) for Operation of New Ventilation Systems in AN and AW Tank Farms," 04-ED-028, dated March 23, 2004

3-VBP-155, "Air Flow Test for Tank Farm Stacks and Ducts"

3-VB-155ZA, "Appendix ZA, 241- AN Exhauster Stack 296-A-44 Air Flow Test Data Sheets"

3-VB-155ZB, "Appendix ZB, 241- AN Exhauster Stack 296-A-45 Air Flow Test Data Sheets"

3-VBP-155ZC, "Appendix ZC, 241- AW Exhauster Stack 296-A-46 Air Flow Test Data Sheets"

3-VBP-155ZD, "Appendix ZD, 241- AW Exhauster Stack 296-A-47 Air Flow Test Data Sheets"

3-FCD-728, ANSI N13.1 Compliance for AN Exhausters

3-FCD-738, ANSI N13.1 Compliance for AW Exhausters

6-PCD-373_C13_Yokogawa_Instruments_EJA_110_&_120_Differentia, "Yokogawa Instruments EJA 110 & 120 Differential Pressure Transmitter"

6-FCD-648_DO_Calibrate_Hastings_HFC-303_Flow_Controller_on_A, "Calibrate Hastings HFC-303 Flow Controller on AN, AW, and POR107 Exhausters"

H-14-020101-11, Sheet 11, "Ventilation Tank Primary System (VTP) B-Train O&M SYS P&ID"

H-14-020101-012-04, Sheet 12, "Ventilation Tank Primary System (VTP) A-Train O&M SYS P&ID"

H-14-020102-011-03, Sheet 11, "P&ID 241-AW HVAC Exhauster Train 'A'"

H-14-020102-012-03, Sheet 12, "P&ID 241-AW HVAC Exhauster Train 'B'"

H-14-105158-001-01, Sheet 1, "Record Sample Filter Holder Assembly"

H-14-105351-6, Sheet 6, "P&ID 241-AW HVAC Exhauster Train 'A'"

H-14-105351-7, Sheet 7, "P&ID 241-AW HVAC Exhauster Train 'B'"

H-14-105529-1, Sheet 1, "AN241 Exhauster Train 'A' Assembly"

H-14-105529-2, Sheet 2, "AN241 Exhauster Train 'A' Assembly"

H-14-105531-001-05, Sheet 1, "AN241-VTP (W-314) Exhauster Train 'A' Upper and Lower Stack Assemblies"

H-14-105531-003-05, Sheet 3, "AN241-VTP (W-314) Exhauster Train 'A' Upper and Lower Stack Assemblies"

H-14-105543-1, Sheet 1, "AN241 Exhauster Train 'B' Assembly"

H-14-105543-2, Sheet 2, "AN241 Exhauster Train 'B' Assembly"

H-14-105545-001-05, Sheet 1, "AN241-VTP (W-314) Exhauster Train 'B' Upper and Lower Stack Assemblies"

H-14-105545-003-05, Sheet 3, "AN241-VTP (W-314) Exhauster Train 'B' Upper and Lower Stack Assemblies"

H-14-105566-1, Sheet 1, "AN241-VTP (W-314) Exhauster Train 'A' Effluent Monitoring System"

H-14-105566-3, Sheet 3, "AN241-VTP (W-314) Exhauster Train 'A' Effluent Monitoring System"

H-14-105580-1, Sheet 1, "AN241-VTP (W-314) Exhauster Train 'B' Effluent Monitoring System"

H-14-105580-3, Sheet 3, "AN241-VTP (W-314) Exhauster Train 'B' Effluent Monitoring System"

H-14-105679-1, Sheet 1, "AW241 Exhauster Train 'A' Assembly"

H-14-105679-2, Sheet 2, "AW241 Exhauster Train 'A' Assembly"

H-14-105681-001-04, Sheet 1, "AW241-VTP (W-314) Exhauster Train 'A' Upper and Lower Stack Assemblies"

H-14-105681-003-03, Sheet 3, "AW241-VTP (W-314) Exhauster Train 'A' Upper and Lower Stack Assemblies"

H-14-105693-1, Sheet 1, "AW241 Exhauster Train 'B' Assembly"

H-14-105693-2, Sheet 2, "AW241 Exhauster Train 'B' Assembly"

H-14-105695-001-04, Sheet 1, "AW241-VTP (W-314) Exhauster Train 'B' Upper and Lower Stack Assemblies"

H-14-105695-003-03, Sheet 3, "AW241-VTP (W-314) Exhauster Train 'B' Upper and Lower Stack Assy"

H-14-105715-001-04, Sheet 1, "AW241-VTP (W-314) Exhauster Train 'A' Effluent Monitoring Sys"

H-14-105715-003-04, Sheet 3, "AW241-VTP (W-314) Exhauster Train 'A' Effluent Monitoring Sys"

H-14-105727-001-04, Sheet 1, "AW241-VTP (W-314) Exhauster Train 'B' Effluent Monitoring Sys"

H-14-105727-003-04, Sheet 3, "AW241-VTP (W-314) Exhauster Train 'B' Effluent Monitoring Sys"

HNF-EP-0479, "Facility Effluent Monitoring Plan for Tank Farms," published November of 2005

HNF-EP-0835-18, Rev.18, "Statement of Work for Services Provided by the Waste Sampling and Characterization Facility for the Effluent Monitoring Program during Calendar Year 2012"

RPP-7881, Rev. 0-B, "Specification for a Primary Exhauster System for Waste Tank Ventilation"

RPP-15034, Rev. 0, "Project W-314 Primary Ventilation System Setpoint Determination"

RPP-19233-04, Rev. 4, "Technical Justification for Applicability of General WAC 246-247 Technology Standards for Tank Farm Facility Waste Tank Ventilation Systems"

RPP-22211, Rev. 0, "241-AN/AW VTP Stack Flow Transmitter Maintenance Calculation"

Attachment

RPP-46436_-_Rev_01, "Generic Effluent Monitoring System Qualification 3000 CFM Exhaust Stack"

TFC-BSM-IRM_DC-C-01,_Document_Control, "Document Control"

TFC-BSM-IRM_DC-C-02,_Records_Management, "Records Management"

TFC-ENG-DESIGN-C-09,_Engineering_Drawings, "Engineering Drawings."

TFC-OPS-MAINT-C-01,_Tank_Operations_Contractor_Work_Control , "Tank Operations Contractor Work Control."

TFC-PLN-71,_Quality_Assurance_Program_Plan_for_Tank_Farm_Con, Rev A-4,"Quality Assurance Program Plan for Tank Farm Contractor Radioactive Air Emissions"

TF-OPS-005_G18_Daily_CAM_and_Record_Sampler_Inspections, "Daily CAM and Record Sampler Inspections"

TF-OPS-006, "Air Sample Filter Exchange and Inspections for Record Samplers, Stack and Annulus CAMs"

TO-060-106_B12_Operate_AN_Tank_Farm_Primary_Ventilation_Syst, "Operate AN Tank Farm Primary Ventilation System (VTP)"

TO-060-107 C0 Operate AW Tank Farm Primary Ventilation Syst, "Operate AW Tank Farm Primary Ventilation System (VTP)"

U.S. Department of Energy
Hanford Site

SEP 0 3 2003

Penn

03-ED-141

Mr. Jeff KenKnight, Unit Manager
Office of Air Quality
U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, OAQ-107
Seattle, Washington 98081

Dear Mr. KenKnight:

TITLE 40, CODE OF FEDERAL REGULATIONS (CFR), PART 61, SUBPART H AMENDMENT IMPLEMENTATION ON THE HANFORD SITE

Attached please find a summary of technical discussions held between the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA), Region 10, regarding implementation of the recent 40 CFR Part 61, Subpart H. These discussions between DOE and EPA were started February 19, 2003, and concluded August 6, 2003. All EPA comments from both meetings have been incorporated into this summary. DOE requests your concurrence with the attached summary.

If you have any questions, please contact Dennis Bowser, Environmental Division, Office of River Protection, (509) 373-2566, or Mary Jarvis, Regulatory Compliance and Analysis Division, Richland Operations Office, (509) 376-2256.

Roy J. Schepens, Manager
Office of River Protection

Keith A. Klein, Manager
Richland Operations Office

ED:DWB

Attachment

cc: See page 2

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10295

cc w/attach:
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C. J. Kemp, CH2M HILL
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Attachment
03-ED-141

Title 40 Code of Federal Regulations (CFR) Part 61, Subpart H
Amendment Implementation on the Hanford Site

Attachment
03-ED-141

TITLE 40 CODE OF FEDERAL REGULATIONS (CFR) PART 61 SUBPART H AMENDMENT IMPLEMENTATION ON THE HANFORD SITE

The following summarizes the technical discussion between the U.S. Department of Energy (DOE) and the Environmental Protection Agency, Region 10 (EPA) regarding implementation of new requirements promulgated by EPA in the Federal Register, Volume 67, Number 174 as published September 9, 2002, which amends the National Emissions Standards for Hazardous Air Pollutants (NESHAP) 40 CFR 61, Subpart H, - "National Emissions Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities."

A. FREQUENTLY USED DEFINITIONS:

ANSI 1999 Standard – ANSI/HPS N13.1 – 1999 "Sampling and Monitoring Releases of Airborne Radioactive Substances From the Stacks and Ducts of Nuclear Facilities," published by the Health Physics Society and approved by the American National Standards Institute, Inc., January 12, 1999.

DOE – the U.S. Department of Energy, including its Richland Operations Office (RL) and the Office of River Protection (ORP).

EPA – the U.S. Environmental Protection Agency and its authorized representatives.

Major Stack – a stationary point source which has a potential to discharge radionuclides into the air in quantities which could cause an effective dose equivalent in excess of 0.1 mrem/yr to members of the public. The potential to discharge radionuclides is based on the discharge of the effluent stream that would result if all pollution control equipment did not exist, but the facilities operations were otherwise normal. Major stacks are sometimes referred to as major sources or designated stacks.

Minor Stack – a stationary point source which has a potential to discharge radionuclides into the air in quantities which could cause an effective dose equivalent less than 0.1 mrem/yr to members of the public. Minor stacks are sometimes called minor sources or non-designated stacks.

NESHAP Amendment – the EPA final amendment to 40 CFR Part 61 as promulgated in the Federal Register, Volume 67, Number 174, published Monday, September 9, 2002.

Table 2 Requirements – 40 CFR 61, "National Emissions Standards for Hazardous Air Pollutants," Subpart H, National Emissions Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities, Appendix B Test Methods, Method 114 Test Methods for Measuring Radionuclide Emissions from Stationary Sources, 4. Quality Assurance Methods, Table 2. – Maintenance, Calibration, and Field Check Requirements.

Attachment
03-ED-141

B. BACKGROUND INFORMATION:

The EPA amended 40 CFR 61 Subpart H in the **Federal Register**, Volume 67, Number 174, as published Monday, September 9, 2002. The amended rule became effective October 9, 2002. The Table 2 – Maintenance, Calibration, and Field Check Requirements apply to existing major stacks as well as newly constructed major sources.

A meeting was held on February 19, 2003, between the EPA, State of Washington Department of Health, Air Emissions, and Defense Waste Section, (WDOH), DOE and Hanford contractors to discuss important concepts and details that may be useful when interpreting and implementing the NESHAPs amendment requirements. Representatives from the EPA, WDOH, RL, ORP, Fluor Hanford, Inc., CH2M HILL Hanford Group, Inc., Pacific Northwest National Laboratory, and Bechtel Hanford, Inc. attended the meeting.

C. COMPLIANCE:

1. The regulatory agencies expect a compliance plan to be developed and submitted by December 31, 2003, for those stacks and facilities not in full compliance with the NESHAP amendment requirements by December 31, 2003.

2. DOE will pursue good faith efforts to comply with the NESHAP Table 2 maintenance requirements before December 31, 2003. EPA will exercise its enforcement discretion as appropriate during that time.

3. Notice of Construction permit applications and associated regulatory agency approvals are not needed to accomplish the tasks associated with Table 2 requirements because these actions will not result in increased emissions.

4. With respect to Federal enforcement of the NESHAP, Table 2 requirements do not apply to minor stacks.

D. CLARIFICATIONS:

1. Where applicable, the ANSI 1999 Table 2, "Graded approach to sampling and monitoring," could be used. The ANSI 1999 Table 2, "Potential fraction of allowable limit," refers to an emission unit's potential to discharge radionuclides and the allowable limit is the 40 CFR 61.92, **10 mrem per year** effective dose equivalent to any member of the public. Note: The ANSI 1999 Table 2 is not the same as the NESHAP Amendment Table 2.

2. The ANSI 1999 Table 2, "Graded approach to sampling and monitoring," can be applied to the sample transport system leak testing – leak inspection requirement as discussed in ANSI 1999, Paragraph 6.9.

3. Although the NESHAP Amendment uses ANSI 1999 Table 5 as the basis for the new Table 2 requirements, the EPA did not adopt, reference, or otherwise make use of the

related ANSI 1999 text. The ANSI 1999 text provides useful information that can be used for guidance and clarification, where appropriate.

4. For stack flow instruments certified as accurate per the requirements of 40 CFR 52 Appendix E, Table 2 inspection of the pitot tube for deposits and leaks can be substituted with an evaluation that the instrument is still producing measurements within 10 percent of a manual flow measurement recorded per 40 CFR 60, Appendix A, Method 2 or 2C.

5. The Table 2 quarterly response check of stack flow rate systems can be done simply by changing the exhaust fan rate (e.g., by valve alignment) or producing a pressure pulse by some other means and checking that the corresponding instrument reading changed.

6. The Table 2 sharp edged nozzle inspection is <u>not</u> for shrouded probes.

7. The Table 2 transport line cleaning is not required if visible deposits are not seen inside the sample probe nozzle(s).

8. The Table 2 timing device calibration applies to electronic controllers or computer timing devices. All timing items must be checked and traceable to a national standard.

9. The Table 2 requirement to clean transport lines must be accomplished within the annual inspection cycle.

E. OTHER

1. The NESHAP Amendment copied Table 2 from ANSI – 1999 Table 5, which included a typographical error. The ANSI 1999 Table 5 and NESHAP Amendment Table 2 frequency to clean transport lines requirement states, "Visible deposits for HEPA-filtered applications. Surface density of 1 g/cm^3 for other applications." The surface density value as published is incorrect and should be 1 g/m^2.

2. EPA will consider written proposals requesting approval for alternate methods of Table 2 compliance for individual facilities/stacks. ANSI 1999 Paragraph 6.4.6 states a cleaning schedule can be based on the actual performance of the sampling transport system. FHI plans to develop and submit a proposal for a stack sampling system aerosol test that will accomplish several Table 2 requirements in a single performance based test.

GENERAL NOTES:

1. INSTALLATION SHALL CONFORM TO THE 2002 EDITION OF THE NATIONAL ELECTRICAL CODE, NFPA 70.
2. ABBREVIATIONS ARE PER ASME Y1.1.
3. (Rev. 3) INSTALL HEAT TRACE ON TUBING TO CAM AND RECORD SAMPLE HOLDER. USE GLASS TAPE TO FASTEN HEAT TRACE.
4. ALL POWER WIRES WIRE SHALL BE THHN/THWN CONDUCTOR SIZE AWG #12 UNLESS OTHERWISE NOTED.
5. ALL INSTRUMENT WIRE AND 5 VDC POWER WIRE SHALL BE TSP #16 AW TYPE TC (# OF PAIRS AS REQUIRED) UNLESS OTHERWISE NOTED.
6. CONNECT CAM DETECTOR TO SAMPLE PROBE. SHIM BETWEEN DETECTOR AND MOUNT TO PREVENT LOADING THE DETECTOR WHEN MOUNTING HARDWARE IS TIGHTENED. (ELONGATE MOUNTING HOLES AS NECESSARY.) CONNECT FLEXIBLE TUBING TO DISCHARGE OF CAM.
7. TOLERANCES SHALL BE AS FOLLOWS, UNLESS OTHERWISE NOTED:

   FRACTIONS: ± 1/16"
   DECIMALS: ± .06

8. FOR SAMPLE TUBING RUNS:

   - THERE SHALL BE NO INWARD FACING STEPS AT THE TUBING CONNECTIONS THAT CAUSE MORE THAN A 1% REDUCTION IN TUBE DIAMETER.
   - THE TUBING ENDS SHALL BE FREE OF BURRS AND CRIMPING.
   - BENDS SHALL HAVE A CURVATURE RATIO (RADIUS OF CURVATURE OF THE BEND DIVIDED BY THE TUBE DIAMETER) OF AT LEAST 3.0.
   - FLATTENING OF THE BEND CAUSED BY A BENDING PROCESS SHALL NOT EXCEED 15%, WHERE FLATTENING IS DEFINED IN TERMS OF THE ORIGINAL AND MINOR AXES OF THE TUBE CROSS SECTION AT THE ANGULAR MIDPOINT OF THE BEND.

   SPECIAL FABRICATION TECHNIQUES MAY BE REQUIRED TO MEET THESE SPECIFICATIONS (ANSI/HPS N13.1-1999).

9. NOT USED
10. THE MASS FLOW CONTROLLERS SHALL MEET THE FOLLOWING SPECIFICATIONS:
    - RANGE: 0-4.00 SCFM OF AIR
    - UPSTREAM PRESSURE: 8.1 PSIA
    - DOWNSTREAM PRESSURE: 6.1 PSIA
    - WITH THE FOLLOWING ORDERING CODES:
    01- H PINOUT (HASTINGS)
    02- 4-20 mA OUTPUT SIGNAL WITH A 0-5.00 VDC INPUT SIGNAL
    04- 3/4" SAWGELOK SYSTEM CONNECTIONS
    01- 500 PSIG WORKING PRESSURE RATING
    01- 5 POINT NIST (STANDARD)
11. PANELS SHALL BE ASSEMBLED, INSPECTED AND UL LABELED PER UL 508A.
12. PREFIX EQUIPMENT IDENTIFICATION NUMBERS WITH "AN241-".
13. LABEL EQUIPMENT AS SHOWN ON SH 2 AND LABEL VALVES AND PRESSURE INDICATOR AS SHOWN ON SH 3. NAMEPLATE MATERIAL SHALL BE 1/16" THICK (MIN) LAMINATED PLASTIC WITH WHITE OUTER SURFACE AND BLACK CORE. LETTER SIZE IS 1/4". FIELD MOUNT NAMEPLATES IN APPROXIMATE AREAS AS SHOWN WITH APPLICABLE ADHESIVE.
14. DETECTOR ELECTRONICS LOCATED REMOTELY (10 FOOT CABLE LENGTH) FROM THE DETECTOR.
15. WHEN INSTALLING ITEM 12 REMOVE UPPER HOUSING AND REPLACE WITH ITEM 30. DISCARD NPT-TO-HOSE BARB FITTINGS AND THREAD 3/8 NPT OF ITEM 13 INTO LOWER HOUSING. INSTALL PER MANUFACTURER'S INSTRUCTIONS.
16. WIRE COLORS ARE PER NFPA 79.

PARTS LIST/MATERIAL LIST

QTY -010	PARTS / DASH NUMBER	NOMENCLATURE/DESCRIPTION	MATERIAL/REFERENCE	SHEET	ITEM NO
X	-010	ASSEMBLY, SAMPLE CABINET		3	1
1	A-48H36FLP	ENCLOSURE, 48"H X 36"W X 16"D, NEMA TYPE 4 OR 4X WITH DOOR CLAMPS	HOFFMAN	3	2
1	A-48P36	INTERIOR PANEL, 48"H X 36"W, STEEL	HOFFMAN	3	3
2	HFC-303-01-02-04-01-01, 28-13-437	SEE NOTE 10, MASS FLOW CONTROLLER, LOW PRESSURE DROP SPRING	TBE-HASTINGS	3	4
1	A-4AXFN	FAN, SAMPLE CABINET, 4" 100 CFM	HOFFMAN	3	5
1	A-BRKT-4	BRACKET, FAN	HOFFMAN	3	6
1	AMC-1B	THERMOSTAT, LINE SENSING	RAYCHEM	3	7
AR	5BTV1-CT	HEAT-TRACE, 5W/FT, SELF-REGULATING	RAYCHEM	3	8
1	A-GARD4	FINGER GUARD	HOFFMAN	3	9
1	AMS4 OPT7S0	CAM, IN-LINE SAMPLING HEAD (SEE NOTE 14)	EBERLINE	3	10
1	D-AH8001B	HEATER, 115V, 800W, UL LISTED WITH BUILT-IN THERMOSTAT, ADJ 0°F-100°F	HOFFMAN	3	11
1	#2220	FILTER HOLDER (SEE NOTE 15)	GELMAN SCIENCES	3	12
1	SS-PB8 TA8 TA8-18	FLEXIBLE HOSE ASSEMBLY	SWAGELOK	3	13
1	LD15-100	DUAL OUTPUT VOLTAGE, DC POWER SUPPLY, ±15VDC, CASE SIZE TN8H	ACOPIAN	3	14
2	SS-63ES8	VALVE, BALL, 1/2", SWAGELOK ENDS, 316SS	WHITEY	3	15
1	A-TEMNO	FAN CONTROL THERMOSTAT, W/ N.O. CONTACT, 120V, UL LISTED	HOFFMAN	3	16
2	A-VK86	LOUVER PLATE KIT	HOFFMAN	3	17
2	A-FLT86	FILTER W/ MOUNTING BRACKETS	HOFFMAN	3	18
1	SS-2000-61	UNION, BULKHEAD, 1-1/4"X1-1/4", 316SS	SWAGELOK	3	19
1	SS-1210-61	UNION, BULKHEAD, 3/4"X3/4", 316SS	SWAGELOK	3	20
					21
2	63030V	VACUUM GAUGE, 0-30"Hg LIQUID FILLED	DWYER	3	22
1	SS-2000-6	UNION, 1-1/4"X1-1/4", 316SS	SWAGELOK	3	23
1	H-14-105539 ITEM 12	TUBE BEND			24
AR	#9455	CABLE #20 AWG, 9 CONDUCTOR OD 0.317	BELDEN	3	25
2	17D-A15S	CONNECTOR, D SUBMINIATURE SOLDER 15 PIN (RCPT)	AMPHENOL	3	26
2	17-1725-2	CONNECTOR BACKSHELL, D SUBMINIATURE 15 PIN WITH LOCK SCREW	AMPHENOL	3	27
AR	GS-54	GLASS TAPE	RAYCHEM		28
5	30 04 17 1	FUSE TERMINAL BLOCK W/DISCONNECT LEVER, UK 6,3-HESI	PHOENIX CONTACT	3	29
1	H-14-105539 ITEM 11	FILTER COMPRESSOR WELDMENT			30
AR	08 01 73 3	MOUNTING RAIL, PERFORATED, TYPE NS, 35/7, 5	PHOENIX CONTACT	3	31
AR	12 01 44 2	UNIVERSAL END BRACKET, TYPE E/UK	PHOENIX CONTACT	3	32
AR	30 03 02 0	END COVER, TYPE D-UK 4/10	PHOENIX CONTACT	3	33
AR	30 04 36 2	TERMINAL BLOCK, TYPE UK 5 N	PHOENIX CONTACT	3	34
AR	10 51 01 6	ZACK STRIP, LABELED HORIZONTALLY, 1 - 20, TYPE LGS, QR:1-20	PHOENIX CONTACT	3	35
					36
					37
1	SS-2400-61	UNION, BULKHEAD, 1-1/2"X1-1/2", 316SS	SWAGELOK	3	38
2	E-150	HEAT TRACE END SEAL	RAYCHEM	3	39
3		COAX CABLE	COM'L	3	40
1	SS-1210-3	UNION TEE	SWAGELOK		41
					42
4	SS-4-SE	STREET ELBOW, MALE & FEMALE NPT 1/4"	SWAGELOK		43
AR		TUBING, 3/4" OD X .049 WALL, SM LS	ASTM A269 TYPE 304L	3	44
1	D-AH2001A	HEATER, 120V, 200W, UL LISTED WITH BUILT-IN THERMOSTAT, ADJ 0°F-100°F	HOFFMAN	3	45
	SEE NOTE 13	NAMEPLATE			46
3	SS-12-TA-1-12	MALE ADAPTER	SWAGELOK		47
2	SS-12-CS	CROSS	SWAGELOK		48
2	SS-12-RB-4	REDUCING BUSHING	SWAGELOK		49
1	SS-810-1-12	MALE CONNECTOR	SWAGELOK		50
2	SS-12-P	PLUG	SWAGELOK		51
2		FUSE, SLO-BLO, 0.5A 1/4 X 1 1/4	COML		52
1		FUSE, SLO-BLO, 1A 1/4 X 1 1/4	COML		53
2		FUSE, SLO-BLO, 15A 1/4 X 1 1/4	COML		54
AR	COML	WIRE, 12 AWG, SINGLE CNDCT, COPPER, BLACK	THHN/THWN		55
AR	COML	WIRE, 12 AWG, SINGLE CNDCT, COPPER, BLACK, WHITE	THHN/THWN		56
AR	COML	WIRE, 12 AWG, SINGLE CNDCT, COPPER, GREEN	THHN/THWN		57
AR	COML	WIRE, 14 AWG, SINGLE CNDCT, COPPER, BLUE	THHN/THWN		58
AR	COML	WIRE, 14 AWG, SINGLE CNDCT, COPPER WHITE W/ BLUE STRIPE	THHN/THWN		59
1	EB 10-10	INSERTION BRIDGE (USE W/ ITEM 29)	PHOENIX CONTACT		60
AR	EB 10-6	INSERTION BRIDGE (USE W/ ITEM 34)	PHOENIX CONTACT		61
AR	COML	WIRE, 14 AWG, SINGLE CNDCT, COPPER RED W/ YELLOW	THHN/THWN		62
1	NPH35DIN	DIN RAIL KIT, USE W/ ITEM 14	ACOPIAN	3	63
1	SS-810-1-6	MALE CONNECTOR	SWAGELOK		64
1	SS-810-1-4	MALE CONNECTOR	SWAGELOK		65
1	SS-1210-R-8	REDUCER	SWAGELOK		66
2	SS-1211-PC	PORT CONNECTOR	SWAGELOK		67
1	SS-810-9	UNION ELBOW	SWAGELOK		68
2	SS-811-PC	PORT CONNECTOR	SWAGELOK		69
1	SS-PB8 TA8 TA8-12	PUSH-ON HOSE ASSEMBLY SHORTEN AS REQD	SWAGELOK		70

DWG NO	TITLE	REF NUMBER	TITLE
DRAWING TRACEABILITY LIST		REFERENCES	
NEXT USED ON H-14-105529			

REVISIONS

REV	DESCRIPTION
6	DIRECT DRAWING REVISION PER ECN 721772-R0 AND REVISED PER ECN-W314-5A-081-R0

KSD 5/04

J. Lobrecht 1-24-04

NAME: ERC HOAG; D. Bowers

SIGNATURES ON FILE

PREMIER Technology, Inc.

GForce engineering & technology

U.S. DEPARTMENT OF ENERGY
Office of River Protection

AN241-VTP (W-314)
EXHAUSTER TRAIN "A"
EFFLUENT MONITORING SYSTEM

F | 241AN | 7508 | H-14-105566 | 6

SCALE NONE | 820447 | SHEET 1 OF 3

H-14-105566

Ownership matrix

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1.0 PURPOSE AND SCOPE

1.1 Scope

(7.1.1, 7.1.2, 7.1.3, 7.1.4, 7.1.5, 7.1.6, 7.1.7, 7.1.8)

This procedure defines work management from initiation of a work request through work order closeout.

This procedure applies to all Tank Operations Contractor (TOC) and Construction personnel, who plan, approve, schedule, release, perform field execution, perform operations acceptance and post review of work packages. It does not apply to operator rounds, radiological surveillances, Industrial Hygiene monitoring and/or sampling, administrative building maintenance governed by TFC-BSM-FPM_PR-C-03 or operational activities performed with technical procedures developed in accordance with TFC-OPS-OPER-C-13; ATS-310, Section 11.16; or TFC-OPS-OPER-C-49 (e.g., waste transfers and/or chemical additions to Double-Shell or Single-Shell Tanks). This procedure defines processes that are credited as Defense-in-Depth controls as described in RPP-13303, "Tank Farm Documented Safety Analysis."

Construction shop fabrication is exempt from the Work Control process; however, work performed in site shops is subject to job hazard analysis (JHA) in accordance with TFC-ESHQ-S_SAF-C-02.

Work packages within the work scope and responsibility of a prime contractor service organization (e.g., Fire Systems Maintenance, Refrigerated Equipment Service) are prepared in accordance with the prime contractor's work processes, however work is reviewed for unreviewed safety question (USQ) applicability as outlined in TFC-ENG-SB-C-03. Operations pre-work release review and work release is also required as defined by this procedure.

1.2 Computerized History and Maintenance Planning Software (CHAMPS)

Computerized History and Maintenance Planning Software (CHAMPS) is the work management system (WMS) software used at Washington River Protection Solutions LLC (WRPS) to process work orders.

The term "work order" refers to the document validated for performance and managed through the CHAMPS database. The term, "work package" refers to the hard copy (printed) work order and supporting documents (e.g., permits, plans, checklists) assembled and contained in the package. Work order and work package may be used interchangeably in this procedure.

2.0 IMPLEMENTATION

This procedure is effective on the date shown in the header.

3.0 RESPONSIBILITIES

Responsibilities are contained within Section 4.0.

4.0 PROCEDURE

This procedure is intended to provide general guidance for the performance of work planning and work control activities. It is not intended that this procedure be used in a step-by-step manner, and may be performed in any order as applicable to the work activity.

4.1 Levels of Work Planning

Various factors are considered in determining the level of planning and work package assembly required. The determination of the level of detail required for a given work package considers the following:

- Nuclear, radiological, and industrial safety significance of the task
- Complexity of the task
- Human factors and performance considerations
- Skill and experience of the workers (e.g., skill of the craft).

Typical activities considered "skill of the craft" are listed on the Work Planning & Control Website. Refer to TFC-OPS-MAINT-STD-03 for information on skill of the craft. Other factors for determining the level of planning and work package development are included in Attachment A of this procedure. TFC-OPS-MAINT-STD-02 may also be referenced to assist in determining the level of planning required.

There are four levels of work planning primarily determined by complexity and risk. Each work activity must be evaluated separately to ensure the proper overall complexity and risk level are identified. Refer to Attachment A for specific criteria.

- Level 1 – Generation of detailed work instructions required
- Level 2 – Pre-approved procedures or pre-approved work instructions
- Level 3 – No detailed work instructions required
- Level 4 – Verbal directions, no work control document is generated for the work activity.

For troubleshooting activities, a Level 1 work package is typically warranted as a means to minimize risk associated with the troubleshooting or inadvertent disruption of plant operations. A Level 2 work package could be used if pre-approved procedures or work instructions exist for the specific troubleshooting activity. The specifics of each troubleshooting effort must be evaluated to determine the appropriate level of work package. A Level 3 work package may be used if the troubleshooting activity is within the skill of the craft and the hazards and other factors align with the requirements outlined in Attachment A.

4.2 Identification of Work

4.2.1 Define Scope of Work

Initiator

1. If an identified condition is unsafe, unstable, and/or may be urgent immediately notify Shift Manager.

2. Obtain information on the condition requiring work, noting locations, physical characteristics, and instrument indications.

3. Notify Maintenance/Shift Manager to initiate work request.

Maintenance/Shift Manager

4. Determine if work is required to repair/restore the structure, system, or component (SSC);

   a. If work is required, initiate a work request or direct verbal performance if Level 4 work.

   b. If no work is required, inform initiator and no further action is required.

5. If CHAMPS is unavailable or a Level 3activity is being initiated by the FWS, initiate a Level 1 (A-6005-439) or Level 3 (A-6005-440) work package site form and refer to Section 4.3.

   NOTE: Following the expedited packaging process, CHAMPS is updated at the point of completion of the work.

PM Planner

6. For PM activities, generate a new PM (see TFC-OPS-MAINT-C-12) and refer to Section 4.3.2 of this procedure.

4.2.2 Work Screening, Validation, and Prioritization

Operations Representative/or designee

1. Review the work request to determine validity/need.

   a. If the request is not needed or invalid, discontinue the CHAMPS work request and notify the initiator.

   b. If covered by a Repetitive Use Work Order or the task meets the criteria of a Level 4, discontinue the CHAMPS work request and proceed to Step 5.

2. If the work valid, validate the work request in CHAMPS and populate the required fields.

3. Determine the level of work planning/work package using the criteria in Attachment A.

4. Assign the priority per Attachment C.

5. Communicate work that needs to be expedited to the responsible organization.

4.3 Work Planning

Work planning includes identification of scope, tasks, hazards, interferences, controls, requirements, instructions, and restoration testing requirements. Performance of field walkdowns play a key role in understanding the scope and development of work instructions. A JHA walkdown, as outlined in TFC-ESHQ-S_SAF-C-02, is performed to identify, evaluate, and control hazards associated with the work activity.

Work packages may be developed for repetitive or routine use. Repetitive and routine work packages are developed following the work planning steps described below; however the scope of

work and intent to use on a repetitive basis must be clearly documented. Standing repetitive/routine work packages are regenerated on a quarterly basis.

4.3.1 Level 1 Work Planning

Level 1 Work Planning is used for tasks where detailed work instructions are needed to accomplish the activity. Level 1 work packages are routinely used for activities involving: safety SSCs, high/medium complexity, high hazard/consequence, and/or involves implementing complex hazard controls. Level 1 work packages employ a planning team. Walkdowns are performed to define the scope, develop work instructions, identify lock out tag out (LOTO) boundaries, verify workability, and develop job hazard analysis. Relevant Subject Matter Expert (SME) review and concurrence is required (as outlined in Attachment B) as well as Responsible Manager approval.

Steps in this section may be performed in any order as long as the scope is clearly defined and planned tasks are known prior to finalizing the job hazard analysis. For example, draft work instructions may be developed and routed for input from SMEs prior to conducting the walk down and job hazard analysis. The work instructions cannot be finalized until the process steps outlined in this section have been completed. The Work Order Planning Checklist (A-6003-707) is an optional tool available for use in the work planning process.

Engineering

1. Generate a Plant Forces Work Review (PFWR) if required by TFC-BSM-HR_EM-C-05.

Planner

2. Obtain input from the FWS to identify craft personnel necessary for the field work.

   NOTE: Steps 3 and 4 may be performed as one evolution as long as required information is obtained and thorough job hazard analysis is performed.

3. Conduct field walkdowns and team planning meetings with the FWS, craft, SMEs and Operations Representative as required to understand the scope, determine tasks, critical tasks, interferences, controls, requirements, instructions, LOTO boundaries, workability, and restoration testing requirements.

   NOTE 1: The Team Review Meeting Checklist (form A-6003-746) is available for optional use.

   NOTE 2: Refer to Attachment B for areas of SME applicability.

   NOTE 3: The FWS is the individual responsible for confirming the workability of the work package.

Planner/FWS/SME

4. Determine if the work hazards and controls are adequately addressed by the General Hazard Analysis (GHA) or a Standing JHA Checklist:

   a. If not, develop JHA checklist in accordance with TFC-ESHQ-S_SAF-C-02.

b. If the work hazards and controls are adequately addressed, continue to step 5.

Planner

5. Determine if radiological work and perform screening as described in TFC-ESHQ-RP_RWP-C-01.

6. Review Lessons Learned to identify lessons applicable to the scope of the work to be performed.

7. As applicable, use the information from the JHA checklist, AMW, radiological work permit (RWP), Lessons Learned, SME, Operations Representative, and worker input to develop the work instructions.

   NOTE: Refer to TFC-OPS-MAINT-STD-02 for guidance/considerations for work planning including information on the level of detail of work instructions.

SMEs

8. Provide input for lessons learned, hold points, necessary quantitative or qualitative acceptance criteria, and requirements based on the area of expertise.

Planner

9. Work with SMEs to initiate/obtain required forms and permits.

   NOTE: Refer to Attachment D.

Planner

10. Assemble the work package.

Responsible Engineer

11. If the work package is a modification:

    a. Perform evaluation and document evaluation results on the Modification Impact Review form (MIRF) (A-6005-427).

    b. Ensure actions are initiated to make required changes.

12. Determine the need for Criticality Safety Representative (CSR) review/approval.

    NOTE: If the activity is not listed in the Criticality Prevention Specification (CPS) then CSR approval is required (not applicable to 222-S).

13. Provide input on material needed and ensure initiation of material procurement (e.g., submittal of Bill of Material).

Planner

14. Route the work package to SMEs/FWS as identified in Attachment B for review/comment.

    NOTE: If routing the work package in CHAMPS, it shall be ensured that the documents necessary to support the SME review are attached.

SME Reviewers

15. Using the Work Order Review and Approval Checklist (A-6003-728), or equivalent review process, review the work package to ensure technical accuracy and completeness based on the SME area of expertise.

    NOTE: The following items shall be considered during the review:

    - The work instructions implement applicable requirements and hazard controls.
    - The supporting documents (permits, evaluations, lift plans, etc.) are complete and applicable requirements are implemented through the work instructions.
    - That parallel steps do not compromise safe or compliant performance of work.
    - That step sequencing is logical and aligns with established hold points.
    - The instructions provide sufficient detail to support safe execution of the work.

Planner

16. Disposition comments received during the review process.

17. Obtain concurrence from appropriate SMEs for any changes made.

18. Route the work package to the Work Control Management representative for review/comment.

Work Control Management Representative

19. Using the Work Order Review and Approval Checklist (A-6003-728) review to ensure requirements are met.

Planner

20. Disposition comments received.

21. If work requires JRG review/approval as outlined in Attachment B:

    a. Provide documents to support JRG meeting in accordance with TFC-ESHQ-RP_ADM-C-11.

    b. Incorporate changes from JRG review/meeting.

22. If required, route package for final SME approvals as outlined in Attachment B.

    NOTE: For approvals by telephone, the name of the approver, the date, your name and signature shall be documented on the work record (or in CHAMPS).

Planner/USQ Evaluator

23. Perform a USQ evaluation as required by TFC-ENG-SB-C-03.

    NOTE 1: If work being performed is routine maintenance, or performed in accordance with a procedure for which a USQ evaluation was already performed (i.e., the work package contains no additional work scope); no additional USQ evaluation is required.

    NOTE 2: If a USQ evaluation has been performed and changes are made to the work order following the approval process, the USQ evaluation must be reviewed and updated if determined necessary.

4.3.2 Level 2 Work Planning

Level 2 Work Planning is used when detailed work instructions are already available from previously approved work instructions or procedures. If pre-approved work instructions are deemed inadequate due to the need for significant changes work should be planned using the Level 1 process.

Due to the repetitive nature of these work activities, field walk downs are performed as required to ensure scope and hazards are adequately addressed as the work package is assembled. For PM work packages refer to TFC-OPS-MAINT-C-12 for specific packaging requirements.

For Level 2 PM work packages, the change control process (Section 4.9) is used if additional scope of work is needed to complete minor or routine corrective maintenance activities identified during performance. Caution should be used to ensure scope added does not have a long duration for completion causing delay of closing out the Level 2 PM work package.

Planner/FWS

1. Determine if changes to existing work instructions are required for the pre-approved procedure/work instructions.

   NOTE: If changes to existing instructions are necessary (change in location, interferences, additional JHA controls, etc.) appropriate SME reviews and approvals will be required.

Planner

2. Determine if the GHA, a Standing JHA or an existing JHA Checklist adequately addresses hazards and controls.

   1. If not, develop a JHA checklist in accordance with TFC-ESHQ-S_SAF-C-02.

   2. If the JHA checklist adequately address hazards and controls, continue to step 3.

3. Determine if radiological work and perform screening as described in TFC-ESHQ-RP_RWP-C-01.

Planner/Material Coordinator

4. Identify material needed to support the work and initiate material procurement (e.g., submit a Bill of Material), if needed.

Planner

5. Working with SMEs, initiate/obtain required forms and permits. Refer to Attachment D.

6. Assemble the work package.

7. Route the work package to SMEs as identified in Attachment B for review/comment.

   NOTE: If routing the work package in CHAMPS, it must be ensured that documents necessary to support the SME review are attached.

SME Reviewers

8. For Level 2 work packages (excluding PMs), use the Work Order Review and Approval Checklist (A-6003-728) to review work package and ensure technical accuracy and completeness based on the SME area of expertise.

Planner

9. Disposition any comments received.

10. Obtain concurrence from appropriate SMEs for any changes made.

Planner/JRG Chairman

11. If work activity was previously approved by JRG:

    a. Submit work package to JRG Chairman for JRG determination in accordance with TFC-ESHQ-RP_ADM-C-11.

    b. If JRG meeting is required, provide documents to support JRG meeting in accordance with TFC-ESHQ-RP_ADM-C-11.

    c. Incorporate changes from JRG review/meeting.

Planner

12. If required, route package for final SME approvals as outlined in Attachment B.

    NOTE: For approvals by telephone, the name of the approver, the date, your name and signature, must be documented on the work record (or in CHAMPS).

Planner/USQ Evaluator

13. Perform a USQ evaluation as required by TFC-ENG-SB-C-03.

    NOTE 1: If work being performed is routine maintenance, or performed in accordance with a procedure for which a USQ evaluation was already performed (i.e., the work package contains no additional work scope); no additional USQ evaluation is required.

    NOTE 2: If a USQ evaluation has been performed and changes are made to the work order following the approval process, the USQ evaluation must be reviewed and updated if determined necessary.

    NOTE 3: If work being performed uses a document owned by other Hanford prime contractors, refer to TFC-BSM-AD-04.

4.3.3 Level 3 Work Planning

Level 3 Work Planning is used when a work scope can be communicated and performed without detailed work instructions. Tasks are generally skill of the craft (refer to TFC-OPS-MAINT-STD-03), performed frequently, routine, and low hazard. Hazards and controls are addressed by the GHA, Standing JHA Checklist, or new JHA Checklist for the specific scope of work. These work activities are subject to relevant SME review/approval of the work scope.

Planner/FWS

1. Determine if the GHA or an existing JHA Checklist adequately addresses hazards and controls. If not, develop a JHA checklist in accordance with TFC-ESHQ-S_SAF-C-02.

2. Factor in Lessons Learned (refer to TFC-OPS-MAINT-STD-02 for additional information on accessing/use of Lessons Learned).

3. If needed, identify the material needed to support the work and initiate material procurement (e.g., submittal of Bill of Material).

4. Determine if radiological work and perform screening as described in TFC-ESHQ-RP_RWP-C-01.

5. Working with SMEs, to initiate/obtain required forms and permits. Refer to Attachment D.

6. Assemble work package.

7. Obtain/document Field Work Supervisor approval.

Planner/USQ Evaluator

8. Perform a USQ determination as required by TFC-ENG-SB-C-03.

   NOTE 1: If work being performed is routine maintenance no additional USQ evaluation is required.

   NOTE 2: If a USQ evaluation has been performed and changes are made to the work order following the approval process, the USQ evaluation must be reviewed and updated if determined necessary.

4.3.4 Level 4 (Verbal)

Level 4 Work planning is used for work activity that is considered low hazard, simple, routine, performed frequently and where facility postings and worker skills, knowledge, training and controls are satisfactory for the safe conduct of work. Work does not impact the safety-related functions critical to tank farm operations, and/or environmental requirements and is covered by GHA or a Standing JHA. A pre-job briefing involving the worker(s) and supervisor is performed. Refer to TFC-OPS-MAINT-STD-03 for list of authorized Level 4 activities.

4.4 Operations Pre-Work Review For Level 1, 2, and 3 Work Packages

Operations Engineer/ Shift Manager

1. Complete the work package pre-release review to confirm it is ready to be worked. Consider the complexity of the task; impacts on the facility system configuration, and the need to coordinate with other work groups.

   NOTE 1: Completion of the Work Release Checklist for Operations Engineer (OE) (A-6003-677) is required for Level 1 and Level 2 work packages (excluding PMs).

   NOTE 2: During the review, the following items shall be considered:

   - All required approvals have been obtained.
   - The following supporting documents are prepared and included in the work package.
     - Referenced procedures/instructions
     - Engineering documentation such as design media, drawings, evaluations, and specifications.
     - Permits for excavation, confined space, etc.
     - Safety support documentations such as job hazard analysis, fall protection plans, electrical hazard analysis, etc.
   - Restoration and retest, including post-maintenance tests, operational functional testing, and applicable acceptance criteria.

2. Ensure a Lockout/Tagout Form (A-6004-460) or Eight Criteria Checklist (A-6003-801) has been prepared if required.

4.5 Scheduling and Work Order Release

(7.1.1, 7.1.2, 7.1.3, 7.1.4, 7.1.6)

Scheduler

1. Develop the schedule as outlined in TFC-OPS-MAINT-C-09.

Work Week Manager

2. Develop a daily release form that reflects the work to be performed, ensuring identification of pre-requisite actions required based on current environmental or plant conditions (e.g., set up of rest tent).

3. Provide the Shift Manager with a work release form and any work orders requiring release.

Shift Manager

4. Review work orders and the Work Release Checklist for OEs as applicable.

NOTE 1: Work orders previously released are not required to be re-reviewed daily.

NOTE 2: Work orders that have been in a ready to work (RTW) or suspended status for six months or greater are required to be returned and refreshed by the planning organization prior to release.

5. Verify the facility can support the work factoring in operability of redundant equipment, effect of work on other on-going activities, and facility conditions required for equipment repair/work.

   a. Determine release requirements (e.g., Full release, partial release, or no release required (NRR)).

      - If full release, sign release authorization in the work package.
      - If a partial release is required, document release requirements on a partial release sheet (A-6005-826).
      - If NRR, no additional action is required. Work activity may be identified on the work release form.

   b. Initial the work package entries on the work release form to approve release for the day.

   c. Change the state of the work to "Working" in CHAMPS for Level 1, 2, and 3 work packages.

Shift Manager

6. During the day, add any emergent work by:

   a. Verifying the facility can support the work.

   b. Adding emergent work to the work release form and initialing the work release form to approve the release.

   c. Changing the state of the work to "WORKING" in CHAMPS for Level 1, 2, and 3 work packages.

   NOTE: The Shift Manager release may be provided via telecom, e-mail, etc.

Work Week Manager

7. Ensure the cause for not releasing work has been identified prior to rescheduling work.

4.6 Field Work Execution

4.6.1 General Requirements

Field Work Supervisor

1. Review the work package to ensure all supporting documents are current (e.g., Procedures, RWP, JHA, Tank Vapor Information Sheet (TVIS), etc.).

   NOTE: General RWPs are inserted into the work package during the initial FWS review.

2. Prior to performing work, ensure work package release and notification of applicable Shift Manager has been completed.

3. Ensure work to be performed is within the skill set of the assigned workers.

4. Ensure workers have the necessary training and qualifications.

5. Conduct a pre-job briefing in accordance with TFC-OPS-MAINT-C-02.

6. Ensure prerequisites have been met or verified as complete. Coordinate with Shift Operations to establish prerequisite conditions if required.

7. If required, coordinate with Shift Operations to establish prerequisite conditions.

8. Review work performed with the crew daily to obtain feedback on issues and opportunities for improvement. If identified issues require follow-on action, or opportunities for improvement warrant consideration for development of a Lessons Learned, document feedback on the Work Record.

4.6.2 Level 1/Level 2 Work Activities

FWS/Worker

1. Perform field condition review to identify any additional hazards present due to current environment/field conditions, and implement appropriate controls as necessary (see TFC-ESHQ-S_SAF-C-02).

2. Prior to performing work on equipment:

   a. Notify the applicable shift manager immediately prior to placing equipment out of service.

   b. Notify the applicable shift manager of any alarms that will be initiated.

FWS

3. Use a graded approach in providing field oversight of activities, placing emphasis/focus on work considered high risk or when critical steps are being performed.

4. Ensure work is performed in a safe manner as outlined by the work package.

   NOTE: Refer to Section 4.6.7 for guidance on compliance and management of HOLD POINTS.

FWS/Worker

5. Maintain a current detailed status of work performed by recording equipment performance information, job status, and general feedback in the Work Record.

   a. Include information of technical issues encountered, abnormalities noted and required follow-on or corrective actions required.

   b. When troubleshooting, include information on results/findings of the troubleshooting effort including recommendations for further action.

6. Ensure blanks in the work package are legibly filled in with information or "N/A," and print, sign and date.

   a. If information recorded is out of the minimum or maximum specification (spec), red circle the reading showing the out of the spec condition.

   b. If corrections are made to entries, perform the following:

      - Draw a single line through the incorrect information.
      - Enter the correct information adjacent to the entry or in space available with reference to the deleted information.
      - Initial and date next to the corrected entry.

7. Notify the Shift Manager of abnormal indications, readings, or other technical concerns noted while performing the work activity (reference TFC-OPS-MAINT-C-12 for PM activities).

Shift Manager

8. Evaluate information received and notify Responsible Engineering if determined necessary.

FWS

9. If a change to the work scope or work instructions is required, refer to Section 4.9, "Work Order Changes."

10. If suspension of the work activity is required due to issues, significant delays, etc. refer to Section 4.10.

4.6.3 Level 3 Work Activities

FWS/Worker	1.	Perform field condition review to identify any additional hazards present due to current environment/field conditions, and implement appropriate controls if necessary (see TFC-ESHQ-S_SAF-C-02).
Worker	2.	Implement GHA controls or controls specified by the JHA Checklist. If hazards/controls specified on the GHA/JHA checklist do not align with the scope of work being performed, STOP and notify the FWS.
FWS	3.	If a change to the work scope or work instructions is required, refer to Section 4.9.
	4.	If suspension of the work activity is required due to issues, significant delays, etc. refer to Section 4.10.

4.6.4 Level 4 (Verbal)

FWS	1.	Ensure work to be performed is listed on the Authorized Level 4 Activity List provided on the Work Planning & Control Website.
FWS/Worker	2.	Perform field condition review to identify any additional hazards present due to current environment/field conditions, and implement appropriate controls if necessary (see TFC-ESHQ-S_SAF-C-02).
Worker	3.	If hazards/controls specified on the GHA/Standing JHA checklist do not align with the scope of work being performed, STOP and notify the Field Work Supervisor for resolution.

4.6.5 FWS Turnovers

1. If the work activity is performed over multiple shifts, or a relief FWS is assigned to the activity, a turnover of FWS responsibility must be performed and documented. The turnover should consist of the following at a minimum:

   - Review work package instructions, work record entries, and present work activity status
   - Discuss facility and equipment status at the time of relief including but not limited to the following:
     - Lockout/Tagout status
     - Scaffold inspections
     - Industrial Hygiene/environmental sampling
     - Radiological conditions/status
     - Permit status
   - Qualifications and training status of assigned personnel
   - Any anomalies or issues with the work activity.

2. Document turnover and any issues discussed in the work record.

4.6.6 Resuming Work

Field Work Supervisor

1. If resuming work after a work package was suspended, or field work was delayed for other reasons:

   a. Ensure reason(s) for suspension have been resolved if applicable.

   b. Review the work record and work instructions to determine the appropriate starting point.

      NOTE: If the status of the work is unclear, the previous FWS/Workers shall be contacted for clarification.

   c. Perform walkdowns as necessary to verify current facility configuration, equipment status.

   d. Verify prerequisite conditions for the work activity are met, or can be established. Coordinate with Shift Operations to establish prerequisite conditions if required.

   e. If work instruction changes are required to properly reinitiate the work activity, refer to Section 4.9.

4.6.7 Management of Hold Points

When hold points are used in the sequence of work package instructions, work will not proceed to the next step until the hold point requirement is met, and the hold point signature has been recorded.

4.6.7.1 Documentation of Hold Point Signatures

Signatures shall be recorded on the work document to indicate satisfaction of the hold point.

FWS/SME

1. If the person conducting the hold point action is not in a position to sign the record copy of the work instruction, complete the following:

   1. Take a report from the person actually conducting the hold point action.

   2. Initial and date the hold point.

   NOTE 1: Another qualified SME (e.g., health physics or quality assurance team member) may sign for the hold point action if they have direct knowledge that the hold point action has been completed.

   NOTE 2: If field conditions preclude taking a copy of the work package to the job location, a Working Copy of the work instructions may be used for the initial field recording of the hold point signatures.

NOTE 3: If a copy of the work instruction is used, hold point signatures and dates shall be transcribed to the record copy of the work package instruction when the field activity is complete, or by the end of the shift, whichever comes first.

NOTE 4: Working copies of the work instructions shall be retained until hold point information is transcribed on the record document.

NOTE 5: Field work supervisors with overall responsibility for the job activity are responsible for ensuring the:

- Accurate and timely transfer of hold point signatures
- Special annotations from the Working Copy of the work instruction to the record document are complete
- Control of the copies until information is accurately and completely transcribed to the record document.

4.6.7.2 Removal and Change of Hold Points

FWS/Planner

1. If a hold point needs to be removed from the work package, follow the change control process outlined in Section 4.8 of this procedure.

4.6.7.3 Delays in Accomplishment and Missed Hold Points

FWS

1. If a hold point cannot be performed as planned, and the work has NOT progressed past the hold point work instruction step:
   a. Place the work area in a safe condition if the problem cannot be resolved and work resumed within a timely manner.
   b. Suspend the work package in accordance with Section 4.9 of this procedure.

4.6.7.4 Missed Hold Points

FWS

1. Stop work immediately if a hold point action or signature is not performed as planned, and work has progressed past the hold point work instruction step.
2. Place the work area in a safe condition and inform the:
   - Respective Level 2 manager
   - Respective Shift Operations Manager
   - Responsible Manager for the organization requiring the hold point (RadCon, Quality Assurance).

3. Document the missed hold point and actions taken on the work record.

4. Contact the Shift Manager to initiate an evaluation for need for event investigation team activation.

5. Write a Problem Evaluation Request (PER) that describes the problem and record the PER number in the work record.

6. Identify actions that need to be completed before resuming work and make corrective action assignments.

7. Obtain approval to resume the work activity from the shift operations manager and management of the organization responsible for the hold point, after the corrective actions are complete.

4.7 Work Order Changes

Work Order changes may be made to the work document using three methods: inconsequential change, technical change, and work change notice (WCN). The type of change used will be dependent upon the scope, consequence, and type of change. For inconsequential changes the steps outlined in Section 4.7.1 apply.

Technical changes to Level 1 and Level 2 work packages are made in accordance with Section 4.7.2 or 4.7.3, depending on the extent of the change and ability to communicate the change in a legible manner. Changes to Level 2 PM work packages are processed in accordance with these sections however, additional action is required as outlined in TFC-OPS-MAINT-C-12 prior to work order closeout to ensure update of the PMId prior to generating work orders for the next scheduled performance.

If a change is required to a procedure used in a Level 2 work package, it may also be necessary to process a procedure change authorization (PCA) as outlined in TFC-OPS-OPER-C-13. Scope changes are authorized to Level 3 work packages with concurrence from the field work supervisor, Operations representative, and RadCon representative (if radiological work). When scope of work is changed for a Level 3 work package, a review of the impacts listed on the job hazard analysis is required as outlined by TFC-ESHQ-S_SAF-C-02, and a USQ evaluation per TFC-ENG-SB-C-03 unless the work being performed is routine maintenance.

4.7.1 Inconsequential Change

Field Work Supervisor/ Operations Engineer/ Work Planner

1. If change meets the definition of inconsequential change (refer to Section 5.0) write the change legibly on the work instructions and initial and date next to the changed area on the work instructions.

   NOTE: Inconsequential changes are **not** allowed for changes that affect the technical content of the document, numbers associated with units of measure, changes in decimal points, numbers associated with components, or system/name plate information or data. This excludes number corrections to add a character inadvertently omitted where the new numbering structure represents the same number after the change is made such as the addition or deletion of a zero (e.g., MO-0493 vs. MO-493), hyphen instead of a slash, etc.

4.7.2 Technical Change

Field Work Supervisor/ Operations Engineer/ Work Planner	1.	If work scope or change cannot be written legibly within the work instructions, refer to Section 4.7.3.
	2.	If work can be written legibly, enter the change information in the work instructions and initial and date next to changed area.
	3.	Enter the date on the work record and summarize the change made providing reference to the work instruction step or paragraph.
Field Work Supervisor/ Operations Engineer/ Work Planner	4.	Obtain approvals for the change as outlined in Attachment B. Approvals are to be documented on the work record with the change summary/description. a. For approvals by telephone, document the name of the approver, the date, your name and signature on the work record.
	5.	Review changes for impacts to existing documents and the hazard analysis and controls. Make changes to reflect the work instruction step, if necessary. a. If the change impacts a supporting document, ensure the document is updated as outlined by the document processing requirements. b. If the change impacts the hazard analysis and relating controls, enlist SME support and initiate a change as outlined in TFC-ESHQ-S_SAF-C-02.
	6.	If the change is considered routine maintenance or if the change is to incorporate a document for which a USQ evaluation was already performed (e.g., ECN, Field Change Notice, procedure) as defined by TFC-ENG-SB-C-03, go to Step 8. If not routine maintenance or if the change includes more than incorporating a document for which a USQ was already performed, proceed to Step 7.
USQ Evaluator	7.	Perform USQ evaluation per TFC-ENG-SB-C-03. • When the USQ process is applicable it must be performed to the work order with all applicable documents in their final approved status.
Field Work Supervisor	8.	Before work is resumed, brief workers on changes to the work order.

4.7.3 Work Change Notice Method

The Work Change Notice (WCN) method is used for more complex changes or when changes to the work package cannot be done in a legible manner. Depending on the amount of changes

required, it may be necessary to reconvene a planning team to review the extent of the changes to be made and obtain worker and SME input on impacts on the hazard analysis results.

Field Work Supervisor/ Operations Engineer/ Work Planner

1. Enter the reasons for the change and change summary information in the work record of the work order.

2. If pen and ink changes were previously made, and work has not been completed on the sections containing the pen and ink changes, incorporate the pen and ink changes in the Work Change Notice (WCN).

3. Create a new CHAMPS "step" to contain the WCN or generate a site form Work Change Notice (A-6005-644).

   a. Modify the work order through the creation of new or revised work instruction steps.

   b. Supersede the work instruction step(s) being replaced.

Field Work Supervisor/Work Planner

4. Obtain approvals for the change as outlined in Attachment B. For CHAMPS generated WCNs, approvals are documented on the work record or within CHAMPS with the change summary/description.

   a. For approvals by telephone, document the name of the approver, the date, your name and signature on the work record.

5. Review changes for impacts to existing documents and the hazard analysis and controls. Make changes to reflect the work instruction step, if necessary.

   a. If the change impacts a supporting document, ensure the document is updated as outlined by the document processing requirements.

   b. If the change impacts the hazard analysis and relating controls, enlist SME support and initiate a change as outlined in TFC-ESHQ-S_SAF-C-02.

USQ Evaluator

6. Perform USQ review per TFC-ENG-SB-C-03.

   NOTE: If work being performed is routine maintenance, or performed in accordance with a procedure for which a USQ evaluation was already performed (i.e., the work package contains no additional work scope); no additional USQ evaluation is required.

Field Work Supervisor

7. Before work is resumed, brief workers on changes to the work package as outlined in TFC-OPS-MAINT-C-02.

4.8 Work Suspension/Cancellation

Work suspension could range from a few days to several months depending on the reason for suspension (e.g., changes in field conditions, resource availability, work priorities, additional materials or parts required, work activity no longer required, etc.). Section 4.8.1 outlines actions to take for temporary suspension of work, Section 4.8.2 outlines actions to take to cancel a work package if no field work has been performed, and Section 4.10 outlines actions to take when determination is made that the work is no longer required after field work has been performed. If a safety concern is raised that requires immediate attention to resolve, the DOE-0343, "Stop Work" process applies.

4.8.1 Work Suspension

Field Work Supervisor/ Operations Representative	1.	Perform the following in CHAMPS if work cannot be continued.
		a. If changes are required, and the change cannot be expedited to allow work to continue, return the work order to "Rework in Planning;" otherwise, return it to "Ready for Work."
		b. Document the reason for suspension in the work record.
		c. Update the work flow status in CHAMPS to show the suspension and reason.
	2.	If a modification work package or partially completed corrective maintenance on equipment where the equipment must be returned to service (lockout/tagout removed), obtain Engineering input on impacts of the suspension.
Engineering	3.	Review suspended modification work packages and revise ECN(s) as needed if work is not expected to be completed/resumed (reference TFC-ENG-DESIGN-C-06).
	4.	Document review results and actions taken in the Work Record.
Field Work Supervisor	5.	Route the work package to the actionee for resolution of the suspension reason and/or re-scheduling.

4.8.2 Work Cancellation

Work Planning cancels work orders that have not been worked, and are no longer required. The steps are as follows:

Employee	1.	Determine that the work order needs to be canceled. Provide a reason for the cancellation for record purposes, ensuring the work order was not generated to support closure of a PER. If PER related, the PER originator must be notified with the alternate resolution if the work order will not be performed.

Operations Representative/ or designee	2.	Verify no work was performed by the work order to be cancelled and change state to "CANCELLED" in CHAMPS.
Work Control	3.	Enter into the work record the name of the operations representative or designee and the reason the work order is no longer needed (e.g., duplicate of another work package and include the work order number, work no longer needed).
	4.	Provide the Bill of Material number to Material Services indicating the work has been canceled.
	5.	Notify Engineering of cancellation actions as additional actions may be required by Engineering (e.g., stop work and cancel ECNs, USQs, and commercial grade items).
	6.	Notify Scheduling that the work order has been canceled to initiate removal from the schedule.
	7.	If no field work was performed, change location to "no hard copy retained," and change work order state to "CANCELLED."
Work Control	8.	Advance the work order to the state of "CLOSED."

4.9 Work Order Post Job Review and Closeout

4.9.1 Field Work Complete and Operations Acceptance

FWS	1.	When field work is complete, sign work complete in the work package, and if a CHAMPS work package was generated, status the work as "Field Work Complete" in CHAMPS. NOTE: If the work package contains review signatures that will be performed following completion of the field work, the FWS may still document "Field Work Complete" in CHAMPS.
	2.	Ensure that the ECN is signed for Modification Work Complete by Engineering (not required for project ECNs) or that Engineering has verified field work installation is complete and included justification for Operations acceptance in the Work Record.
	3.	Review the work record for feedback comments and ensure any identified issues are properly recorded. If necessary, initiate a new work request to repair or replace failed components and record the work request number in the work record. Provide feedback to the worker on actions taken.

4. Review the work package and ensure:

   - Entries are accurate, complete, and legible
   - Forms and performance documents are present
   - Documents are appropriately signed and dated.

5. Return excess materials or parts not used to the material coordinator in accordance with TFC-BSM-CP_CPR-C-18 and update the Bill of Material, if used, or contact Construction point of contact for construction activities.

6. Forward the work package to Operations for acceptance.

Operations Engineer/ Shift Manager

7. Complete the work package acceptance review as follows:

   NOTE: Operations Work Package (WP) Acceptance Checklist (A-6003-676) is required for Level 1 and Level 2 work packages (excluding PMs).

   a. Ensure recorded data is within the tolerances specified in the procedure or work instruction steps.

   b. Ensure post maintenance and operational testing is satisfactory, if applicable.

   c. If the work involved a modification,

      - Review the MIRF (A-6005-427) to verify required actions (e.g., procedure revisions, spare parts adjustments, training updates) resulting from implementation of the ECN have been completed or dispositioned to allow restoration of the SSC.

      - Verify the ECN is signed for Modification Work Complete by Engineering (not required for project ECNs) or that Engineering has verified field work installation is complete and included justification for Operations acceptance in the Work Record.

   d. Verify applicable information and signatures are complete.

      NOTE: If the work package contains review signatures that will be performed following completion of the field work, Operations may sign for operational acceptance review if work was satisfactorily completed with acceptance data within the specified tolerances.

   e. If the work is acceptable, sign Operations acceptance in the work package, and if a CHAMPS work package, status Operations acceptance in CHAMPS.

f. If the work is NOT acceptable, complete the following:

- Make a work record entry document issues identified
- Resolve issues or return the work order to the field work supervisor for resolution.

4.9.2 Post Job Review and Feedback

FWS

1. Post job reviews are expected to be performed for all activities on a graded approach, and may take place at the end of an entire job, or following a discrete part of a job.

   a. Informal reviews are performed by the FWS soliciting feedback from work team members on observed problems, opportunities for improvement, and/or good practices identified during the work activity. The FWS is responsible for evaluating this feedback and documenting the post review and any recommendations in the work record.

   b. Documented post-job reviews are required when:

   - Work was high radiological risk or an ALARA review is determined necessary by the Radiological planner.
   -
   - As directed in TFC-OPS-MAINT-C-02.

   NOTE: Completion of the ALARA review is required within 60 calendar days from the field work complete date unless an extension is approved as outlined by TFC-ESHQ-RP_RWP-C-03.

Rad Planner

2. Attach a copy of the completed ALARA review to the work order, if generated.

4.9.3 Planner Post Review and Feedback

Planner

1. Review the work package for:

   - Accuracy and completeness
   - Appropriate signatures and dates
   - Legibility
   - Correct forms inserted
   - Signed completion of ECNs.

2. Ensure disposition of items identified during the post job review and record the disposition on the Work Record.

3. Provide feedback of the disposition to the FWS/workers.

4. If longer term actions are required, initiate a PER in accordance with TFC-ESHQ-Q_C-C-01 and document in the work record.

PM Planner

5. If a PM work package, perform additional post review actions as required by TFC-OPS-MAINT-C-12.

6. Update the PM system with completion information and establish the next due date.

4.10 Work Order Closure

Work Control

1. Update the CHAMPS work order.

   NOTE: For expedited work packages using site forms, it may be necessary to generate a new CHAMPS work order to record the completion information.

PM Planner

2. Evaluate changes made to preventive maintenance work packages and take actions as follows:

   a. If change made requires an update to the (PM) data in CHAMPS, notify Engineering to process a change as outlined by TFC-OPS-MAINT-C-12.

   b. If change made requires an update to a technical procedure, process a procedure change request as outlined by TFC-OPS-OPER-C-13.

   NOTE: The work order does not advance to the "CLOSED" state until the CHAMPS PMId or Technical Procedure has been updated with required information.

Work Control

3. Prepare the work package for closure by:

   a. If PM work package for Technical Safety Requirement (TSR) or environmental permit commitment (ENV), perform validation of last done and next due dates to ensure accuracy.

   b. Scanning the cover page of the procedure and pages with hand written information with values or information filled in and attach to the work order.

   c. Scan the JHA, and other supporting documents with hand written information recorded.

   d. Remove reference documents that do not contain hand written information (e.g., collected data, signatures).

4. Advance the work order state to "closed."

Work Control Center Technical Specialist/Manager

5. Evaluate feedback received and determine need for issuance of Lessons Learned or incorporation of information on the Work Planning Resource Center web page.

Work Control Center 6. Archive the work order in accordance with TFC-BSM-IRM_DC-C-02.

5.0 DEFINITIONS

Construction. Work designated to be Construction forces (building trades) following a Plant Forces Work Review as outlined by TFC-BSM-HR_EM-C-05.

Corrective Maintenance. Restoration of plant process equipment or components that are materially degraded or substantially deficient in performing their intended functions. Corrective maintenance can be Level 1 or Level 3 work packages. As a rule, if the specific component requiring maintenance has degraded, affecting performance or has failed, the action required to restore it to its as-designed condition it is classified as corrective maintenance.

Hold point. A point in the specific work sequence beyond which work may not proceed until inspection has been performed and documented by Quality Assurance or Radiological Control representative. For additional guidance on management of hold points, refer to Section 4.6.7.

Inconsequential Change. Changes to documents that are:

- Correction of grammatical, typographical, or spelling errors that:
  - Do not affect numbers other than page, table, figure, title numbers, or obvious and demonstrable typographical errors. Changes in decimal points, units of measure or nameplate information/data are not inconsequential changes.
  - Do not affect units of measure other than obvious and demonstrable typographical errors.
  - Do not affect acceptance criteria other than obvious and demonstrable typographical errors.
  - That did not translate correctly from the original source document due to software issues.
- Updating of position or organization names or titles,
- Rewording of phrases, sentences, and paragraphs,
- Change the format of the document (e.g., rearrange unnumbered lists of items, rescale items, move details to new sheets, pagination, table, or figure title number changes, etc.),
- Add/update document references (provided changes to the references have already been appropriately USQ reviewed), or
- Add, change, delete or clarify notes or cautions that do not direct operator actions.

Modification. Work tasks that change the design configuration of the physical asset being maintained as defined in TFC-ENG-DESIGN-C-06.

Use of like-for-like or identical items, or temporary changes for performing routine repairs are not modifications. Temporary changes that are not considered modifications include performing a tie-in to a secured system or troubleshooting a system that is planned to be restored to its original configuration, before the system is placed back into normal operation. Temporary changes are to include configuration steps identified in a work package directing the tie-in and return of the system to normal, as designed configuration.

Modification Impact Review. A means of ensuring that each modification to the facility is carefully reviewed for any procedure changes, training required, etc., resulting from the modification. Results of the Modification Impact Review are documented on the Modification Impact Review form (MIRF) (A-6005-427).

No Release Required (NRR). A designation given to activities that do not affect the operation and configuration of the facility and do not require Release Authority approval prior to performing the work and does not require Acceptance Authority approval upon completion.

Operational Work Package. Routinely used to accomplish an operational scope of work that is unique or so infrequently performed that development of an operational technical procedure is not warranted (e.g. special waste packaging, camera operations, etc).

Partial Work Release. The act of authorizing personnel to accomplish a limited amount of work defined in the WO.

Planner. An individual assigned responsibility for facilitating the work planning process and other responsibilities outlined in this procedure. Individuals performing planning of Level 1 and Level 2 work packages must be qualified as a Work Planner in accordance with training course 350019 (latest revision). Requalification will take place every two years in accordance with training course 351019 (latest revision).

Post Maintenance Testing. Testing done to verify components will fulfill their design function when returned to service after maintenance. Verification of the affected equipment (including interfaces, controls, interlocks, and instrumentation) performs their intended functions following corrective maintenance, PM, modifications, new construction, and troubleshooting to ensure that the original deficiency was corrected, and no additional deficiencies were created.

Pre-Approved Work Instructions. A document approved by a defined approval process. These documents may be packaged in the WO to accomplish the work. Examples are maintenance procedures, CHAMPS work instructions/job plans and operations surveillance procedures.

Repetitive Work Order. A WO that remains open for an extended period, developed to allow multiple/repeat performance of similar tasks or multiple activities against a specific or group of similar equipment/instruments. A partial release is used for each task authorized for performance as required by the release expectations established by the Shift Manager.

Routine Maintenance. An activity is routine maintenance and does not require USQ review if the following criteria are met:

a. The activity is limited to calibration; repair or maintenance work activities performed to restore facilities or SSCs to their original condition; replacement with an exact replacement part; in-service inspection; removal of out-of-service equipment; and housekeeping.

b. The activity does not involve hot work permits, newly installed compressed gas cylinders (replacement of existing compressed gas cylinders is considered routine maintenance), or placing of vehicles and equipment onto waste tanks that could exceed analyzed limits.

c. The activity does not involve inserting equipment into waste or removing equipment from waste.

Troubleshooting. A systematic approach to data collection, failure analysis, or a measurement plan developed and documented in the work scope or work instructions to determine the cause of system/equipment degradation.

Urgent. Conditions requiring immediate action due to the critical nature of the situation (e.g., stopping flooding or fire). Only initial stabilization of the emergency condition is allowed. Refer to Attachment C.

Working copy. A copy generated from the original work order used to allow performance of work in separate work areas or by multiple work groups. The working copy is duplicated to allow efficient and compliant performance of work. Data is recorded on the working copy and the completed working copy is merged, for records purposes, with the original work order prior to closeout.

6.0 RECORDS

The following record is generated during the performance of this procedure:

- Work package (and supporting forms/permits, and other documentation with recorded information).

A work package becomes an in process record document at the time it is released and work was performed in the field. From this point, the work package must be retained in secured storage when not in actual use. All personnel should ensure hard copies of work packages that have had any work performed are placed in file/desk drawers when the work package is not being used. It becomes a record document when it is received at Work Control for closure and is required to be retained for 75 years.

The records custodian identified in the Company Level Records Inventory and Disposition Schedule (RIDS) is responsible for record management in accordance with TFC-BSM-IRM_DC-C-02.

NOTE: Lost or damaged records are handled in accordance with TFC-BSM-IRM_DC-C-02.

7.0 SOURCES

7.1 Requirements

1. DOE 422.1, "Conduct of Operations."

2. RPP-13033, "Tank Farms Documented Safety Analysis."

3. TFC-POL-16, "Integrated Safety Management System Policy."

4. TFC-PLN-01, "Integrated Environment, Safety, and Health Management System Plan."

5. TFC-ENG-SB-C-03, "Unreviewed Safety Question Process."

6. TFC-PLN-02, "Quality Assurance Program Description."

7. TFC-PLN-29, "Nuclear Maintenance Management Program."

8. 10 CFR 851, "Worker Safety and Health Program."

7.2 References

1. ATS-310, Conduct of Operations, Section 11.16.1, "222-S Laboratory Technical Procedure Writing and Formatting Guide."

2. DOE-0336, "Hanford Site Lockout/Tagout."

3. DOE-0343, "Stop Work."

4. HNF-5183, "Tank Farm Radiological Control Manual (TFRCM)."

5. HNF-IP-1266, "Tank Farms Operations Administrative Controls."

6. HNF-SD-WM-TSR-006, "Tank Farms Technical Safety Requirements."

7. MSC-PRO-2001, "Facility Modification Package Process."

8. RPP-16922, "Environmental Specification Requirements."

9. RPP-MP-003, "Integrated Environment, Safety, and Health Management System Description for the Tank Operations Contractor."

10. TFC-BSM-AD-C-04, "Documents Owned by Other Hanford Prime Contractors Used by WRPS."

11. TFC-BSM-CP_CPR-C-18, "Material Receipt, Storage, Issuance, Return, and Excess Control."

12. TFC-BSM-FPM_PR-C-01, "Property Management."

13. TFC-BSM-FPM_PR-C-03, "Work Control - General Purpose Facilities."

14. TFC-BSM-HR_EM-C-05, "Plant Forces Work Review (Davis-Bacon Act Compliance)."

15. TFC-BSM-IRM_DC-C-02, "Records Management."

16. TFC-ENG-DESIGN-C-06, "Engineering Change Control."

17. TFC-ENG-DESIGN-C-09, "Engineering Drawings."

18. TFC-ENG-DESIGN-C-15, "Commercial Grade Dedication."

19. TFC-ENG-FACSUP-C-02, "Operability/Technical Evaluations."

20. TFC-ENG-FACSUP-C-23, "Equipment Identification and Data Management."

21. TFC-ENG-STD-08, "Post Maintenance Testing."

22. TFC-ESHQ-ENV-PP-C-07, "NEPA, SEPA, Ecological and Cultural Reviews."

23. TFC-ESHQ-Q_ADM-C-02, "Nonconforming Item Reporting and Control."

24. TFC-ESHQ-Q_C-C-01, "Problem Evaluation Request."

25. TFC-ESHQ-Q_INSP-C-01, "Control of Inspections."

26. TFC-ESHQ-RP_ADM-C-11, "Joint Review Group."

27. TFC-ESHQ-RP_RWP-C-01 , "Radiological Risk Screening."

28. TFC-ESHQ-RP_RWP-C-03, "ALARA Work Planning."

29. TFC-ESHQ-RP_RWP-C-04, "Radiological Work Permits."

30. TFC-ESHQ-S_SAF-C-02, "Job Hazard Analysis."

31. TFC-ESHQ-S-STD-03, "Electrical Safety."

32. TFC-OPS-MAINT-C-02, "Pre-Job Briefing and Post Job Reviews."

33. TFC-OPS-MAINT-C-09, "Eight Week Rolling Schedule Process."

34. TFC-OPS-MAINT-C-10, "Pre-Calibration and Staging."

35. TFC-OPS-MAINT-C-12, "Preventive/Predictive Maintenance."

36. TFC-OPS-MAINT-STD-02, "Work Planning and Work Instruction Development."

37. TFC-OPS-MAINT-STD-03, "Tank Operations Contractor Skill of the Craft."

38. TFC-OPS-OPER-C-11, "Equipment Temporary Modifications and Bypasses."

39. TFC-OPS-OPER-C-13, "Technical Procedure Control and Use."

40. TFC-OPS-OPER-C-22, "Control and Use of Administrative Locks."

41. TFC-OPS-OPER-C-39, "Caution Tags."

42. TFC-OPS-WM-C-10, "Contaminated Equipment Management Practices."

43. TFC-ESHQ-S_IH-C-49, "Chronic Beryllium Disease Prevention Program."

44. TFC-PLN-33, "Waste Management Basis."

45. URS Global Management & Operations Services Work Planning and Control Program Standard.

ATTACHMENT A – TYPE OF WORK PACKAGE DESIGNATION

The table below contains the factors/criteria used for selecting the level of work package.

Factor/Criteria	Level 1	Level 2	Level 3	Level 4
Asbestos Work	Allowed	Allowed	NOT allowed	NOT allowed
Beryllium Work	Allowed	Allowed	NOT allowed	NOT allowed
Chemical Use	Allowed	Allowed	NOT allowed if JHA checklist requires prerequisites/ precautions/limitations, WARNINGS, or specific work instructions to establish controls for chemical hazards identified. *	Allowed if meets Consumer product safety act 15U.S.C.2051 criteria for household use
Complexity of the Task	Any level of complexity	Any level of complexity	Skill based task	Skill based task
Confined Space – Permit Required	Allowed	Allowed	NOT allowed	NOT allowed
Crane or Lifting Operations	Allowed	Allowed	Critical and Special Lifts NOT allowed	Critical and Special Lifts NOT allowed
Elevated Work	Allowed	Allowed	Allowed	NOT allowed if under a Fall Protection Plan
Electrical Work (EHE)	Allowed	Allowed	Allowed	Visual Inspection of systems and components only
Energized Electrical Work (Requiring EEWP)	Allowed	Allowed	NOT allowed	NOT allowed
Hazard Analysis	GHA, Standing JHA, or job specific JHA	GHA, Standing JHA, or job specific JHA	GHA, Standing JHA* or job specific JHA* *Standing or Job Specific JHA NOT allowed if checklist requires prerequisites/ precautions/limitations, WARNINGS, or specific work instructions to establish controls.	GHA, Standing JHA* or job specific JHA* *Standing or Job Specific JHA NOT allowed if checklist requires prerequisites/ precautions/limitations, WARNINGS, or specific work instructions to establish controls.
Impact on Design Configuration	Modification work allowed	Modification work allowed	No modification work allowed (exact replacement allowed for GS SSCs)	No impact on design configuration

ATTACHMENT A - TYPE OF WORK PACKAGE DESIGNATION (cont.)

Factor/Criteria	Level 1	Level 2	Level 3	Level 4
Impact on SSCs	Any level of risk of single failure or errors causing impact on SSCs	Any level of risk of single failure or errors causing impact on SSCs	Low risk of single failure or errors causing impact on general services (GS) SSCs. Work on SS SSCs not allowed.	Low risk of single failure or errors causing impact on general services (GS) SSCs. Work on SS SSCs not allowed.
Performance of Hot Work	Allowed	Allowed	NOT allowed	NOT allowed
Pre-Approved Procedure/Work Instruction	Procedure/work instruction necessary but does not exist	Procedure/work instruction available and is sufficient	Work instruction unnecessary	Paperless – No procedure/work instruction
Radiological Considerations	High, medium or low risk	High, medium or low risk	Medium or low risk where no hold points are required	Low or no risk
Reliance on Skill of the Craft	Reliance on approved work instructions and skill of the craft	Reliance on approved work instructions/ procedure instructions and skill of the craft	Reliance on bounded scope statement and limitations along with skill of the craft as outlined in TFC-OPS-MAINT-STD-03	Reliance on limitation of scope along with skill of the craft as outlined in TFC-OPS-MAINT-STD-03
Risk of entry into an Limiting Condition of Operation (LCO)	Any level of risk of entry into an LCO	Any level of risk of entry into an LCO	No risk of entry into an LCO	No risk of entry into an LCO
Hazardous energy control LOTO	Allowed	Allowed	LOTO installed as prerequisite to performance of work scope	Use of LOTO not authorized
Risk of impact on Environmental Permit Requirement	Any level of risk of impact	Any level of risk of impact	No risk of impact	No risk of impact
Tank Waste	May have potential to disturb	May have potential to disturb	No potential to disturb	No potential to disturb
Unreviewed Safety Question (TFC-ENG-SB-C-03)	Not required if routine maintenance	Procedure/pre-approved work instruction subject to USQ review or is routine maintenance	Not required if routine maintenance	Not required – only Routine maintenance allowed

* With exception to a LOTO prerequisite, if a control method 1, 2, or 3 is selected on the JHA checklist, a Level 1/Level 2 work package is required.

ATTACHMENT B – REVIEW AND APPROVAL OF WORK INSTRUCTIONS

(7.1.2)

The following table applies to reviews/approvals required for Level 1 work instructions or technical changes to Level 1 or Level 2 work instructions. As the Approval Authority, the Field Work Supervisor's approval is the final approval obtained in the process.

Reviewer/Concurrence	Applicability
Responsible Engineer	• New work instructions for Level 1 work packages associated with SSCs and technical changes to Level 1 and Level 2 work instructions involving work on assigned SSCs to ensure compliance with the safety basis, active Justification for Continued Operations (JCOs), and other technical requirements and recommendations. • Documents and applicable changes to documents that authorize disturbance of the waste (e.g., waste disturbing activities, waste intrusive activities, ultra-sonic activities affecting the waste, introducing fluids, sampling, etc.) for inclusion on the list of activities allowed per Criticality Prevention Specification (CPS). If the activity is not listed in the CPS then Criticality Safety Representative (CSR) approval of the document is also required. • Documents and applicable changes to documents that authorize the use of chemicals that may come in contact with or be added to tank waste to ensure they are listed in RPP-11192, Tank Farms Chemical Compatibility Evaluation. If chemicals are not listed in RPP-11192 are to be used, RPP-11192 must be revised to recognize use of the chemical prior to approving the work package or changes to the work package.
Criticality Safety Representative (not applicable to 222-S)	• Documents and changes to documents where activities are not listed in the CPS (when determined necessary by the Responsible Engineer).
Radiological Controls Planner	• Activities that control radiological work (including work with radioactive materials) or direct work in radiological areas (e.g., radiation area, high radiation area, very high radiation area, contamination area, high contamination area, airborne radioactivity area). • Activities that have a potential to release radioactive materials into the environment. • Work directing excavation within a posted Radiologically Controlled Area (RCA). • Performance of operations, maintenance, or repair of radiation generating devices. • Establish or modify radiological processes; describe control activities that prescribe the use or support of radiation monitoring or detection equipment; fabricate or change radiological monitoring equipment, and when documents include or should include radiological control steps or direction, radiological requirements, or radiological hold points or changes to these documents where Radiological Control steps, directions, or regulatory compliance is impacted.

ATTACHMENT B - REVIEW AND APPROVAL OF WORK INSTRUCTIONS (cont.)

Reviewer/Concurrence	Applicability

Environmental	• Work packages and work package changes involving or have the potential to affect:
	  • Changes to air abatement equipment, emissions monitoring capability, processes or source term (CAA)
	  • Corrective maintenance or project activities that use ALARCTs
	  • Changes to systems that treat, store or dispose of dangerous waste (tanks, piping, pits, etc.) , monitor for leakage, monitor or control hazards (RCRA)
	  • Changes to, or activities that impact, sanitary water and septic systems (CWA)
	  • Activities with the potential to spill or release water or chemicals to the environment (CWA)
	  • New or significantly modified work scope, process, and /or configuration (NEPA)
	  • Activities that have the potential to use or dispose of PCBs (TSCA)
	• Activities with a potential for release of radioactive or hazardous material in excess of environmental protection limits and/or that affect hazardous or radioactive transportation and packaging activities.
	• Work that design, fabricate, or modify environmental equipment related to compliance with environmental regulatory requirements.
	• Activities that have or may have impact on waste minimization and pollution prevention activities.
	• Activities with the potential for generating hazardous and/or radiological waste and transporting or packaging waste.
	• Activities that have or may have impact on waste activities, including but not limited to, the following:
	  • Radiological and chemical characterization of waste
	  • Waste sample analysis
	  • Waste designation
	  • Treatment, storage and disposal (TSD) acceptance
	  • Waste verification activities.

Quality Assurance	• Activities affecting safety class and safety significant items including modification where the safety function or the margin of safety is affected or involves a design change. • Activities involving opening and closing of Safety Significant or General Service systems that interfaces with a Safety Significant plant system. • Activities requiring QA witness, verification or hold points or changes to steps affecting QA witness, verification or hold points.

ATTACHMENT B - REVIEW AND APPROVAL OF WORK INSTRUCTIONS (cont.)

Reviewer/Concurrence	Applicability
Industrial Safety Representative (IS)	• Fire Hazard, Weld, Burn, Grind, Solder (Hot Work) • Hazardous/Stored Energy • Confined Space • Blind (e.g. Wall/Ceiling) Penetration • Electrical • Rotating/Moving Equipment (Pinch Points) • Hoisting & Rigging • Heavy Equipment • Elevating Work Platforms • Contact w/ Overhead Utilities • Fall Hazards/Roof Work • Scaffold Use • Excavations
Industrial Hygiene Representative (IH)	• Respiratory Protection • Chemical Use • Potential Contact w/ Tank Waste • Tank Farm Vapors • Beryllium, Asbestos, Lead, Carcinogens • Fire Hazard, Weld, Burn, Grind, Solder (Hot Work) • Ergonomics • Noise >80dB • Confined Space • Flammable/Explosive • Illumination • Thermal Stress • Biological Hazards • Disturbing building materials suspect of containing asbestos
Fire Protection Engineer	Activities, or modifications, which affect the safety functions of the fire protection systems.
Hanford Site Utilities Water Purveyor	Activities involving water system changes or connections. Note: City of Richland is the water purvey for the Cold Test Facility on Horn Rapids Road.

ATTACHMENT B - REVIEW AND APPROVAL OF WORK INSTRUCTIONS (cont.)

Reviewer/Concurrence	Applicability
Joint Review Group	• Documents and changes to documents categorized as High Risk work (as defined in TFC-ESHQ-RP_RWP-C-03) • Documents and changes to documents to perform non-radiological activities considered higher risk when determined necessary by the subject matter experts or as directed by management (e.g., Hot work, confined space entry where permit is required and additional physical hazards are introduced, work requiring a fall protection plan, critical and special lifts, work requiring a beryllium, asbestos, or energized electrical work permit, work involving chemical use where an IH Monitoring plan is required or when chemical contains or is suspected to contain a carcinogen).
Field Work Supervisor (Approval Authority)	• New work instructions for Level 1 work packages and changes to Level 1 and Level 2 work instructions and approval of Level 3 work packages.
Shift Manager	• Changes to Level 1, Level 2, or Level 3 work packages that have gone beyond the OE/SM pre-work review.

ATTACHMENT C - PRIORITIES

Priority	Description
Urgent	Requires immediate action to: Prevent imminent danger to personnel, property, or the environment; Prevent a significant breach in security. It is worked without delay or interruption until the condition is stabilized. **NOTE:** Does not necessarily but could meet the conditions to declare at least an operational emergency.
1 (Rapid)	Does not meet conditions for urgent work, but requires rapid action to: Correct a condition that will result in a permit violation or regulatory compliance violation if not corrected immediately; Correct a significant personnel safety deficiency as determined by management; Correct problems deemed critical to sustain the current mission of a facility to include preventing programmatic impact, property loss, or financial impact; Recovery from a TSR violation; Correct conditions that cause major impacts to security response or mission; Place or maintain the facility/activity/site in a safe condition when a potential inadequate safety analysis (PISA) is identified.
2 (High)	Does not meet conditions for immediate work, but requires responsive action to: Correct a condition that will result in a permitted facility or other ES&H regulatory compliance violation if not corrected (including compliance driven preventive maintenance); Support milestones required by a court-ordered settlement agreement or to prevent a significant negative impact to facility/programmatic mission; Correct a safety deficiency that requires immediate action and is likely to cause an injury to personnel that cannot be prevented by appropriate personal protective equipment (PPE) or barriers; Correct conditions that cause significant impacts to security response or mission; Correct conditions resulting in a USQ; **NOTE:** Priority may be adjusted up or down depending on evaluation of safety or impact to mission. Correct conditions resulting in the identification of a potential inadequate safety analysis (PISA); **NOTE:** Priority may be adjusted up or down depending on evaluation of safety or impact to mission. Correct deficient conditions for safety SSCs to restore operability. **NOTE:** Priority may be adjusted up or down depending on LCO Required Action Completion Times, evaluation of safety, or impact to mission.
3 (Medium)	Does not meet conditions for high priority work, but requires action to: Correct deficiencies, make repairs and modifications, or conduct preventive maintenance that has reasonably acceptable risk to property, programs, or compliance issues; Correct deficiencies for which the risks to human health or safety are minimal and are not of an immediate nature; Correct conditions that cause impacts to security response or mission; Project work to meet contract mission.
4 (Low)	Work that requires routine action to implement improvements or correct deficiencies not directly related to sustaining the mission of the facility or is to be deferred or is unfunded during the current fiscal year.

ATTACHMENT D - FORMS AND PERMITS, CROSS REFERENCE TABLE

This table provides a cross-reference from forms/permits to the manuals that control their use and provides the forms/permits and instructions for preparation.

Permit or Form	Form Number	Document No.	Site Form
ALARA Management Worksheet (AMW)	A-6003-904	TFC-ESHQ-RP_RWP-C-03	YES
Asbestos Work Permit	A-6003-870	TFC-ESHQ-S_IH-C-52	NO
Attendance Roster	A-6003-211	TFC-OPS-MAINT-C-01	YES
Hanford Beryllium Work Permit	A-6006-202	TFC-ESHQ-S_IH-C-49	YES
WRPS - Bill of Material	A-6002-729	TFC-BSM-CP_CPR-C-18	YES
Commercial Grade Dedication Form	A-6002-544	TFC-ENG-DESIGN-C-15	YES
Competent Person for Asbestos	A-6005-803	TFC-ESHQ-S-STD-29	YES
Competent Person for Excavation	A-6005-804	TFC-ESHQ-S-STD-29	YES
Competent Person for Fall Protection	A-6005-805	TFC-ESHQ-S-STD-29	YES
Competent Person for Ladders	A-6005-806	TFC-ESHQ-S-STD-29	YES
Competent Person for Scaffolds	A-6005-807	TFC-ESHQ-S-STD-29	YES
Qualified Person for Fall Protection	A-6005-808	TFC-ESHQ-S-STD-29	YES
Qualified Person for Scaffolds	A-6005-809	TFC-ESHQ-S-STD-29	YES
Hanford Confined Space Entry Permit	A-6005-717	DOE-0360	YES
Hanford Permit Required Confined Space Entry Notification	A-6005-718	DOE-0360	YES
Confined Space Hazard Identification	A-6005-724	DOE-0360	YES
Dome Load Assessment and Route Map	N/A	TFC-ENG-FACSUP-C-10	NO
Eight Criteria Checklist	A-6003-801	DOE-0336	YES
Energized Electrical Work Permit	A-6003-873	TFC-ESHQ-S-STD-03	YES
Electrical Hazard Evaluation	A-6005-432	TFC-ESHQ-S-STD-03	YES
Hanford Site Excavation Permit	A-7400-373	DOE-0344	YES
Fall Protection Work Permit	A-6004-286	DOE-0359	YES
Tank Operations Contractor Hotwork Permit	A-6003-692	TFC-ESHQ-FP-C-01	YES
Ignition Source Control Evaluation Worksheet	A-6003-749	TFC-ENG-FACSUP-P-17	YES
Ignition Source Control Requirements Screening	A-6003-774	TFC-ENG-FACSUP-P-17	YES
Level 1 Work Package	A-6005-439	TFC-OPS-MAINT-C-01	YES
Level 3 Work Package	A-6005-440	TFC-OPS-MAINT-C-01	YES
Lifted/Landed Lead Record	A-6003-876	TFC-ESHQ-S-STD-03	YES

ATTACHMENT D - FORMS AND PERMITS, CROSS REFERENCE TABLE (cont.)

Permit or Form	Form Number	Document No.	Site Form
Lockout/Tagout Authorization Form	A-6004-460	DOE-0336	YES
Hanford Fire Marshal Permit Request form	N/A	TFC-ESHQ-FP-STD-01	NO
Modification Impact Review Form	A-6005-427	TFC-OPS-MAINT-C-01	YES
NEPA Review Screening Form	RL-721	TFC-ESHQ-ENV_PP-C-07	YES
Operations Work Package (WP) Acceptance Checklist	A-6003-676	TFC-OPS-MAINT-C-01	YES
Partial Release Sheet	A-6005-826	TFC-OPS-MAINT-C-01	YES
Preventive Maintenance Deferral	A-6004-745	TFC-OPS-MAINT-C-01	YES
Radiological Screening Form	A-6003-910	TFC-ESHQ-RP_RWP-C-01	YES
Tank Vapor Information Sheet	A-6004-063	TFC-ESHQ-S_IH-C-48	YES
Work Change Notice	A-6005-644	TFC-OPS-MAINT-C-01	YES
Work Release Checklist for OE's	A-6003-677	TFC-OPS-MAINT-C-01	YES
Confined Space Entry Permit	A-6005-717	DOE-0360	YES
Confined Space Hazard ID Form	A-6005-724	DOE-0360	YES
Hanford Permit Required Confined Space Entry Notification	A-6005-718	DOE-0360	YES
Fall Protection Work Permit	A-6004-286	DOE-0346	YES
Work Order Planning Checklist	A-6003-707	TFC-OPS-MAINT-C-01	YES
Work Order Review and Approval Checklist	A-6003-728	TFC-OPS-MAINT-C-01	YES
WRPS Work Record	A-6003-243	TFC-OPS-MAINT-C-01	YES
WRPS Caution Tag Installation/Removal	A-6003-108	TFC-OPS-OPER-C-39	YES
Administrative Lock Establishment/ Removal	N/A	TFC-OPS-OPER-C-22	NO
Plant Forces Work Review	A-6003-813	TFC-BSM-HR_EM-C-05	YES
WRPS ALARA Review Form	A-6002-919	TFC-ESHQ-RP_RWP-C-03	YES
Pre-Job Briefing	A-6002-893	TFC-OPS-MAINT-C-02	YES
Radiological Work Permit	A-6003-902	TFC-ESHQ-RP_RWP-C-04	YES
Job Hazard Analysis Checklist	A-6004-101	TFC-ESHQ-S_SAF-C-02	YES
Performance and Functional Requirements/Evaluation for Special Tools or Test Equipment **[Evaluation of fabricated stairs and platforms should be to requirements for walking and working surfaces.]**	A-6003-129, or **Engineering-provided design media**	TFC-ENG-DESIGN-C-25 TFC-ENG-DESIGN-C-34	YES

ATTACHMENT D - FORMS AND PERMITS, CROSS REFERENCE TABLE (cont.)

Permit or Form	Form Number	Document No.	Site Form
Lift Instructions Determination **[To be used for fabricated items to be lifted including waste boxes, stairs, and platforms as well.]**	A-6003-884	TFC-ENG-FACSUP-C-25	YES
Waste Planning Checklist - WRPS	A-6002-848	TFC-OPS-WM-C-01	YES
Team Review Meeting Checklist	A-6003-746	TFC-OPS-MAINT-C-01	YES
WRPS Skill-of-the-Craft Listing Change Form	A-6005-855	TFC-OPS-MAINT-STD-03	YES

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

MAR 23 2004

04-ED-028

Mr. Jeff KenKnight, Unit Manager
Office of Air Quality
U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, OAQ-107
Seattle, Washington 98081

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

Addressees:

APPROVAL OF RADIOACTIVE AIR EMISSIONS NOTICES OF CONSTRUCTION (NOC) FOR OPERATION OF NEW VENTILATION SYSTEMS IN AN AND AW TANK FARMS

Attached for your review and approval is the radioactive air emissions NOC application for operation of new ventilation systems in AN and AW Tank Farms (Attachment 1) and the Hanford Site Air Operating Permit 00-05-006, "Notification of Off-Permit Change" (Attachment 2). This NOC is being submitted to you in accordance with Washington Administrative Code 246-247, "Radiation Protection Air Emissions," and Title 40 Code of Federal Regulations, Part 61, "National Emissions Standards for Hazardous Air Pollutants."

This NOC combines two previously submitted NOCs, currently being reviewed by the State of Washington Department of Health (WDOH), for operation of new ventilation systems in AN and AW Tank Farms. This combined NOC approach was requested by a representative of the WDOH during approval negotiations in a meeting held on December 17, 2003. Upon approval of this NOC, operation of the new AN and AW Tank Farm Ventilation System exhauster will be permitted. This activity is being conducted under Project W-314.

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

ED:DWB

Attachments: (2)

cc w/attachs:
D. J. Carrell, CH2M HILL
C. J. Kemp, CH2M HILL
J. Cox, CTUIR
S. Harris, CTUIR
O. S. Wang, Ecology
D. Zhen, EPA
W. E. Green, Jr., FHI
P. Sobotta, NPT
J. Martell, WDOH Richland Office of River Protection (2 copies)
R. Jim, YN
Administrative Record
CH2M Correspondence Control
Environmental Portal, LMSI

cc w/o attachs:
B. G. Erlandson, BNI
E. S. Aromi, CH2M HILL
J. A. Bates, FHI
M. F. Jarvis, RL

Attachment 1
04-ED-028

Radioactive Air Emissions Notice of Construction Application for Operation of New Ventilation Systems in AN and AW Tank Farms

Radioactive Air Emissions Notice of Construction, Project W-314 – Operation of New Ventilation Systems in AN and AW Tank Farms

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LIST OF LIST OF ABBREVIATIONS, ACRONYMS, AND INITIALISMS

ALARACT	As Low As Reasonably Achievable Control Technology
AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute
APQ	Annual Possession Quantity
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
BARCT	Best Available Radionuclide Control Technology
CFR	Code of Federal Regulations
DST	Double Shell Tank
EPA	U.S. Environmental Protection Agency
ERDA	U.S. Energy Research and Development Agency
FEMP	Facility Effluent Monitoring Plan
HEPA	High Efficiency Particulate Air
HPS	Health Physics Society
MEI	Maximum Exposed Individual
MPR	Maximum Public Receptor
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOC	Notice of Construction
NDA	Nondestructive Analysis
ORP	U.S. Department of Energy, Office of River Protection
PNNL	Pacific Northwest National Laboratory
PTE	Potential to Emit
RCW	Revised Code of Washington
RL	U.S. Department of Energy, Richland Operations Office
SEPA	State Environmental Policy Act
SST	Single Shell Tank
TEDE	Total Effective Dose Equivalent
TWINS	Tank Waste Information Network System
USC	United States Code
WAC	Washington Administrative Code
WDOH	Washington State Department of Health
WTP	Waste Treatment and Immobilization Plant

INTRODUCTION

This notice of construction (NOC) will be submitted for approval in accordance with *Washington Administrative Code* (WAC) 246-247-060, *Applications, Registration and Licensing*, to operate new ventilation systems in AN and AW Tank Farms. Additionally, pursuant to 40 CFR 61.09 (a)(1), *National Emission Standards for Hazardous Air Pollutant*, this application is intended to provide anticipated initial start-up notification. It is requested that the U.S. Environmental Protection Agency (EPA) approval of this application also will constitute EPA acceptance of the initial start-up notification. Approval for installation of these new ventilation systems were as follows:

> AN Farm, external letter AIR 03-602, A. W. Conklin, Washington State Department of Health (WDOH), to J. Hebdon, U. S. Department of Energy, Richland Operations (RL), and J. E. Rasmussen, U.S. Department of Energy, Office of River Protection (ORP), dated June 3, 2003. This letter transmitted Approval Number AIR 03-302 for NOC ID 565.
>
> AW Farm, external letter AIR 03-712, A. W. Conklin, WDOH, to J. Hebdon, RL, and J. E. Rasmussen, ORP, dated August 01, 2003. This letter transmitted Approval Number AIR 03-712 for NOC ID 566.

These new ventilation systems include the replacement of the existing AN and AW exhaust trains with two parallel exhaust trains (in each farm). Each individual train is capable of providing up to at least 0.9 m^3/s (2,000 standard ft^3/min) of exhaust flow. In addition, these systems are designed for both trains to operate either one at a time or together for a combined total flow rate of up to 1.89 m^3/s (4,000 standard ft^3/min) for each farm. Operation of these new ventilation systems will be for the storage, treatment, retrieval, and disposal of the waste contained within the tanks. This includes transfer of waste to the Waste Treatment and Immobilization Plant (WTP).

The total effective dose equivalent (TEDE) to the maximum exposed individual (MEI) for purposes of this NOC is estimated to be 1,330 mrem/yr without controls and 2.6 mrem/yr with controls. These emission estimates are summarized in Table 1.

Table 1. Emissions Summary.

	Estimated Emissions	
	Unabated	Abated
	mrem per year	
AN Farm Ventilation System removal	1.7E-02	1.7E-02
AW Farm Ventilation System removal	2.8E-02	2.8E-02
AN Farm New Ventilation System operation	690	1.4
AW Farm New Ventilation System operation	640	1.2
Sum	1,330	2.6

Emissions from AN and AW Farm Ventilation Systems were last reported under the existing stack number 296-A-29 and 296-A-27 respectively in DOE/RL-2003-19, *Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2002.* The emission results are listed in Table 2.

Table 2. Emissions Report Summary.

		Curies	mrem/yr
For AN Farm:	Alpha	1.3E-09	1.9E-09
	Beta	1.9E-07	4.4E-09
For AW Farm:	Alpha	1.2E-09	1.7E-09
	Beta	4.7E-08	1.1E-09

This report also cites the total dose due to radionuclide emissions in calendar year 2002 from all Hanford Site point sources, diffuse sources, and fugitive sources as 0.066 mrem.

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"Official Use Only"

Figure 1. The Hanford Site Map.

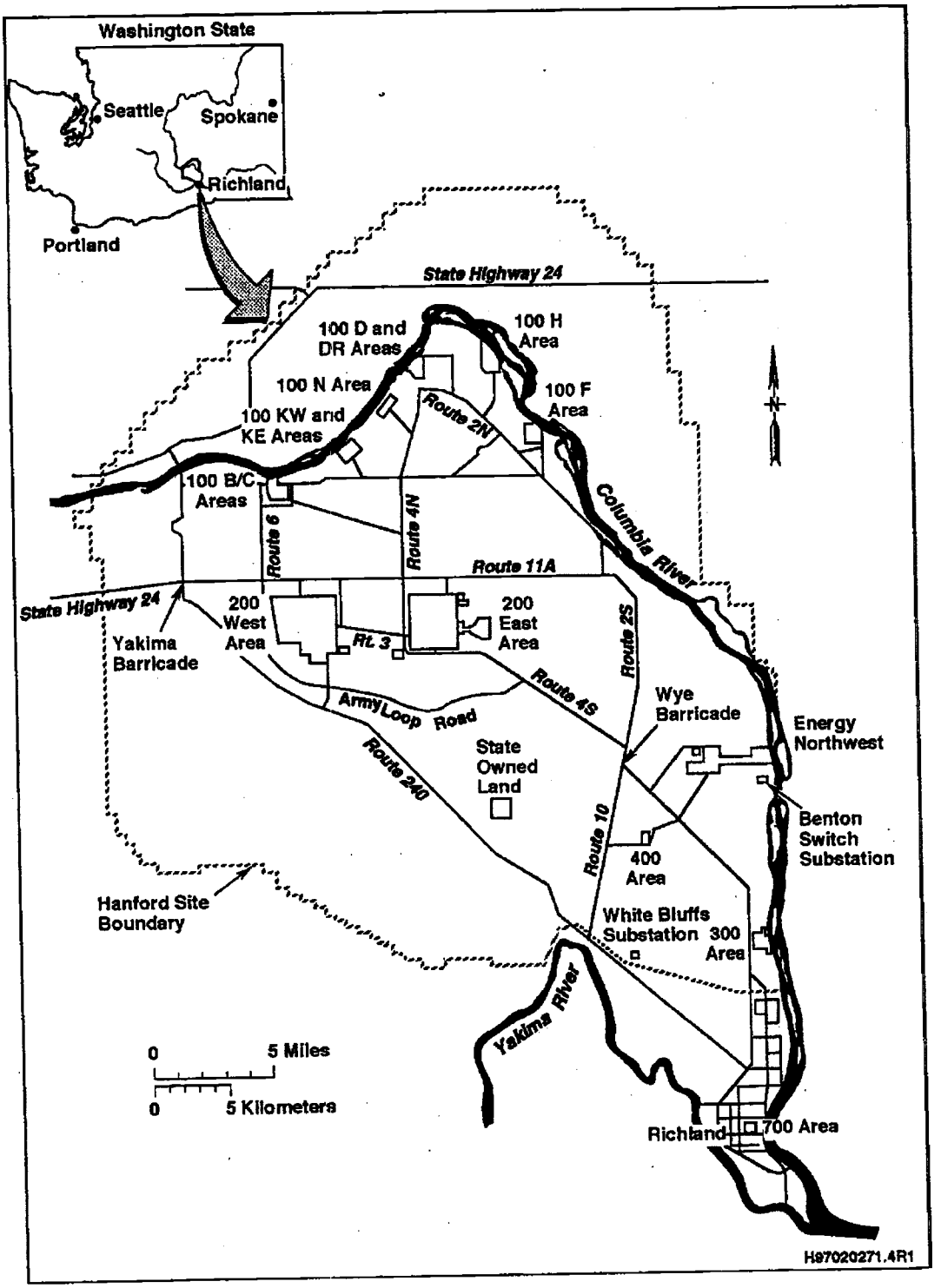
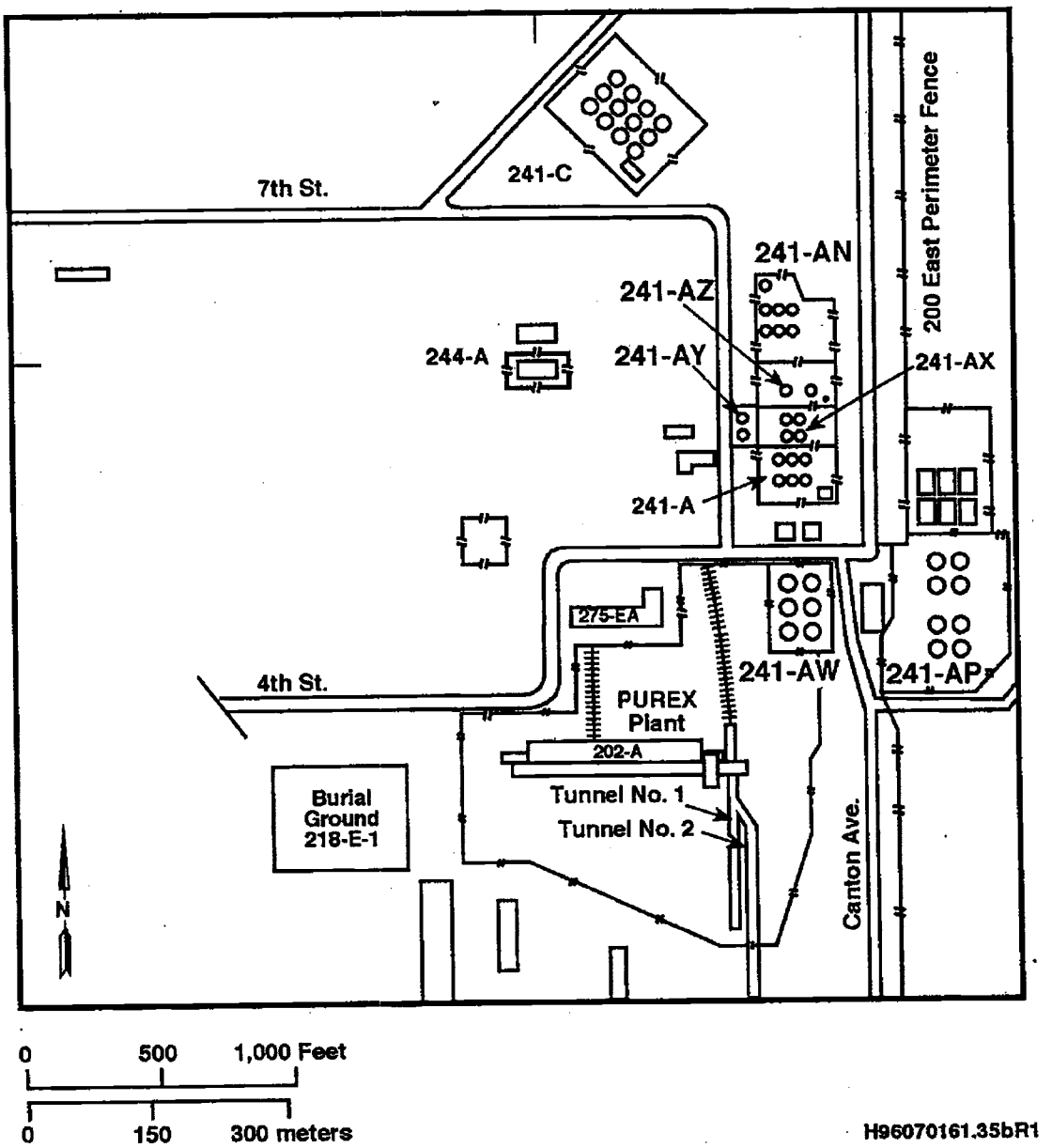


Figure 2. Location of AN and AW Tank Farms.



2.0 RESPONSIBLE MANAGER

Regulatory Citation: "Name, title, address, and phone number of responsible manager."

The responsible facility manager is:

Roy J. Schepens, Manager
U.S. Department of Energy, Office of River Protection
P.O. Box 450
Richland, Washington 99352
(509) 376-6677

3.0 PROPOSED ACTION

Regulatory Citation: "Identify the type of proposed action for which this application is submitted:

a. *Construction of new emission unit(s)*

b. *Modification of existing emission unit(s); identify whether this is a significant modification – significant means the potential-to-emit airborne radioactivity at a rate that could increase the TEDE to the MEI by at least 1.0 mrem/yr as a result of the proposed modification*

c. *Modification of existing unit(s), unregistered."*

This application is submitted for approval to modify the existing AN and AW Tank Farm Primary Ventilation System exhausters. Specifically, it is proposed that the existing exhausters, which are designed to operate at less than 0.47 m^3/s (1,000 ft^3/min), be replaced by systems that will operate from a nominal 0.47 m^3/s (1,000 standard ft^3/min) flow rate, during steady state storage, and up to 1.89 m^3/s (4,000 standard ft^3/min) during operational activities such as waste retrieval. The increased flow rate is due to recommendations that arose from the following studies:

- RPP-7171, *Thermal Hydraulic Evaluation for the 241-AN Tank Farm Primary Ventilation System*, Rev. 0.
- RPP-11731, *Thermal Hydraulic Evaluation for the 241-AW Tank Farm Primary Ventilation System*, Rev. 0.

The exhaust flow rate capacity will be increased for the following reasons:

- To mitigate any increase in temperatures because of mixer pump operation during retrieval operations.
- To maintain appropriate tank vacuum requirements because of increased waste transfer and maintenance activities expected to occur during retrieval activities.

The new exhaust system will have two exhaust fans each, per farm. For normal operations and most retrieval activities only one exhaust fan will operate. The second fan only will be used if necessary. Each two-fan exhauster system will not be operated above 1.89 m^3/s (4,000 standard ft^3/min).

The proposed actions addressed in this NOC include the following:

- Removal and disposal of the existing ventilation system
- Operation of the new ventilation system for the storage, treatment, retrieval, and disposal of the waste contained in the tanks; including transfer of waste to the WTP.

Potential unabated doses for use of the AN exhauster are estimated to be increased from 0.017 mrem/yr for the current exhauster to 690 mrem/yr for the new exhausters. This is a significant modification as defined by WAC 246-247-030(25), *Definitions*; " 'Significant' means the potential-to-emit airborne radioactivity at a rate that could increase the TEDE to the MEI by at least 1.0 mrem/yr as a result of the proposed modification."

Potential unabated doses for use of AW exhauster are estimated to be increased from 0.028 mrem/yr for the current exhauster to 640 mrem/yr for the new exhausters. This is a significant modification as defined by WAC 246-247-030(25).

4.0 STATE ENVIRONMENTAL POLICY ACT

Regulatory Citation: "If the project is subject to the requirements of the State Environmental Policy Act (SEPA) contained in chapter 197-11 WAC, provide the name of the lead agency, lead agency contact person, and their phone number."

The proposed action is categorically exempt from the requirements of RCW 43.21C, "State Environmental Policy Act of 1971," *Revised Code of Washington*, as amended under WAC 197-11-845, "SEPA Rules," *Washington Administration Code*, as amended.

5.0 CHEMICAL AND PHYSICAL PROCESS

Regulatory Citation: "Describe the chemical and physical processes upstream of the emission unit(s)."

The 241-AN Double Shell Tank (DST) Farm consists of seven individual DSTs. The 241-AW DST Farm consists of six individual DSTs. DSTs are fabricated as two concentric tanks surrounded by a concrete shell. The inner tank (where the waste is stored) is 75 feet in diameter and has a 46.8-foot high crown. The maximum usable volume in each of the AN and AW tanks is 1.14×10^6 gal. The inner tank is surrounded by a two-and-one-half-foot annulus space. The waste stored in the inner tank consists of mixed wastes. Mixed waste includes hazardous components regulated under 42 USC 6901, *Resource Conservation and Recovery Act of 1976*

and radioactive material regulated under 42 USC 2011, *Atomic Energy Act of 1954*. The DSTs are used for storage, treatment, retrieval, and disposal of the waste contained in the tanks. This includes transfer of waste to the WTP.

All seven AN Tank Farm tanks are ventilated through the AN Tank Farm primary ventilation system. All six AW Tank Farm tanks are ventilated through the AW Tank Farm primary ventilation system. These ventilation systems serve to remove heat, and serve as containment systems for radioactive particulates present in the tank headspaces, they ventilate/remove flammable gases and vapors that evolve from the liquid surface in the DSTs. Both ventilation systems do this by drawing outside air into the tanks vapor space. After the air leaves the vapor space, the air is conditioned by the ventilation system. It removes entrained moisture, the relative humidity is reduced, and particulates are filtered out. Before discharge of this air to the atmosphere from the stack, the air is monitored and sampled for radionuclide particulates.

6.0 EXISTING AND PROPOSED ABATEMENT TECHNOLOGY

Regulatory Citation: "Describe the existing and proposed (as applicable) abatement technology. Describe the basis for the use of the proposed system. Include expected efficiency of each control device, and the annual average volumetric flow rate(s) in meters3/sec for the emission unit(s)."

6.1 Abatement Technology for the Existing Systems

The current system operates at less than 0.47 m^3/s (1,000 ft^3/min). It has a single stack with dual fans and dual high efficiency particulate air (HEPA) filter trains each containing two HEPA filters in series. The exhauster is designed to only operate one fan and one HEPA filter train at a time. Flow rate measurements from the AN Farm ventilation system during calendar year 2002 averaged 0.32 m^3/s (673 standard ft^3/min). Flow rate measurements from the AW Farm ventilation system during calendar year 2002 averaged 0.38 m3/s (815 standard ft^3/min). These values were used to estimate emissions reported in DOE/RL-2003-19, *Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2002*. The abatement technology on these existing systems are described in RPP-9782, *ALARACT Demonstration for the Primary Ventilation Systems at the DST Tank Farms for the SST Interim Stabilization Project (Saltwell Pumping)*. Deviations to the technology standards cited in this document were approved (conditionally) in external letter AIR-02-706, A. W. Conklin, WDOH, to J. E. Rasmussen, ORP, dated July 22, 2002. The WDOH granted these deviations, provided the exhausters are upgraded on the schedule identified in DOE external letter 01-EQD-048, W. J. Pasciak, ORP, to A. W. Conklin, WDOH, "Response to the Washington State Department of Health (WDOH) Request for Schedule for Upgrading Double-Shell Tank (DST) Farms 241-SY, 241-AN, 241-AP, and 241-AW Exhauster," dated June 6, 2001. This NOC accomplishes the upgrade for the AN and AW Farms.

6.2 Abatement Technology for the New System

The new ventilation systems in the AN and AW Farm will operate up to a maximum flow rate of 1.89 m^3/s (4,000 standard ft^3/min). Each ventilation system will consist of two individual exhauster trains (fans and stacks), designed with a fan rating of 0.94 m^3/s (2,000 standard ft^3/min). This rating is based on design specifications that the system must be capable of producing flows up to 0.94 m^3/s (2,000 standard ft^3/min) at 150°F and 100% relative humidity. The actual fans have been designed to produce an air flow of up to 1.35 m^3/s (2,851 actual ft^3/min) at 170°F, at a relative humidity of 61%, and at a combined pressure at the fan inlet of 22.7 in. of water. At this capacity, it has been estimated that these fans will produce flows up to 1.00 m^3/s (2,120 standard ft^3/min) under the hottest operating temperatures, and with dirty pre-filters and HEPA filters.

The abatement technology for these new systems is described in HNF-6779, *Project Development Specification for HVAC* and RPP-7881, *Specification of a Primary Exhaust System for Waste Tank Ventilation.* These documents establish the performance, design development, and test requirements for ventilation systems. The major components of this ventilation system are:

- Moisture de-entrainment
- Heater
- HEPA filters
- Fans
- Exhaust stack
- Monitoring and control instruments and equipment.

These ventilation systems will be capable of providing individual tank exhaust flow rates of 0.24 m^3/s (500 ft^3/min), when the mixer pumps are operating. The system will be capable of maintaining the vapor space pressures of the tanks between –6.0 in w.g. and –0.3 in w.g. during normal operating conditions. Specific to tank 241-AN-107, the ventilation will be capable of maintaining vapor space pressure within the required range while the airlift circulators are operating at a maximum airflow rate of 0.09 m^3/s (200 ft^3/min).

These ventilation systems will remove particulates and moisture, collect condensate, and reduce relative humidity in the exhaust stream. Moisture will be entrained via a de-entrainer (moisture separator). The moisture separator will be designed, fabricated, and tested in accordance with ASME, 2001, *ASME Boiler and Pressure Vessel Code,* Section VIII, Division 1. Moisture separator performance will be in accordance with Table FA-4200-1 of ASME AG-1, *Code on Nuclear Air and Gas Treatment.*

These ventilation systems will reduce the relative humidity by heating the exhaust air stream before entering the HEPA filters. Air heater design analysis will verify that the heater system will prevent formation of condensate on or within any component or ductwork from the heater location to the emission point. It also will be verified that air stream temperatures are limited by allowable operating temperatures for components subjected to the air streams. Air heaters will be designed in accordance with ASME N509, Section 5.5; *Nuclear Power Plant Air Cleaning Units and Components* and ASME AG-1a, Section CA. Where there are conflicts in the

standards, ASME AG-1 shall take precedence. The heater alarm set point will be set to annunciate at no greater than 167°F.

These ventilation systems will use HEPA filters qualified by the manufacturer to remove 99.97% of particulates greater than or equal to 0.3 μm when tested in accordance with ASME AG-1a, Section FC. The filters will be tested at the facility, in-place, to a pass/fail criterion of 99.95% per ERDA 76-21, Section 8.3.1, *Nuclear Air Cleaning Handbook.*

These ventilation exhaust trains will incorporate a pre-filter bank before the primary HEPA filters. A secondary HEPA filter bank will be incorporated in series with the primary HEPA filter bank. Each bank will consist of two high flow rate filters tested to 0.71 m^3/s (1,500 actual ft^3/min) each. Therefore, each bank will be capable of filtering flows up to 1.42 m^3/s (3,000 actual ft^3/min). This will make both trains capable of filtering up to a total flow of 2.83 m^3/s (6,000 actual ft^3/min). However, total flows will be allowed to go as high as 1.89 m^3/s (4,000 standard ft^3/min).

These ventilation systems will be designed and tested in accordance with ASME AG-1a. They will collect all condensate generated by system operation for return to a designated DST. A hot operational test of the new primary ventilation system will be performed. When the new ventilation systems are deemed operational, the old ventilation systems will be removed.

6.3 Abatement Technology for Removal of the Old Ventilation System

Controls established in As Low As Reasonably Achievable Control Technology (ALARACT) will be followed for removal of the old ventilation systems. Refer to:

ALARACT 12, *Tank Farm ALARACT Demonstration for Packaging and Transportation of Equipment and Vehicles*

ALARACT 15, *Tank Farm ALARACT Demonstration for Size Reduction of Waste Equipment for Disposal*

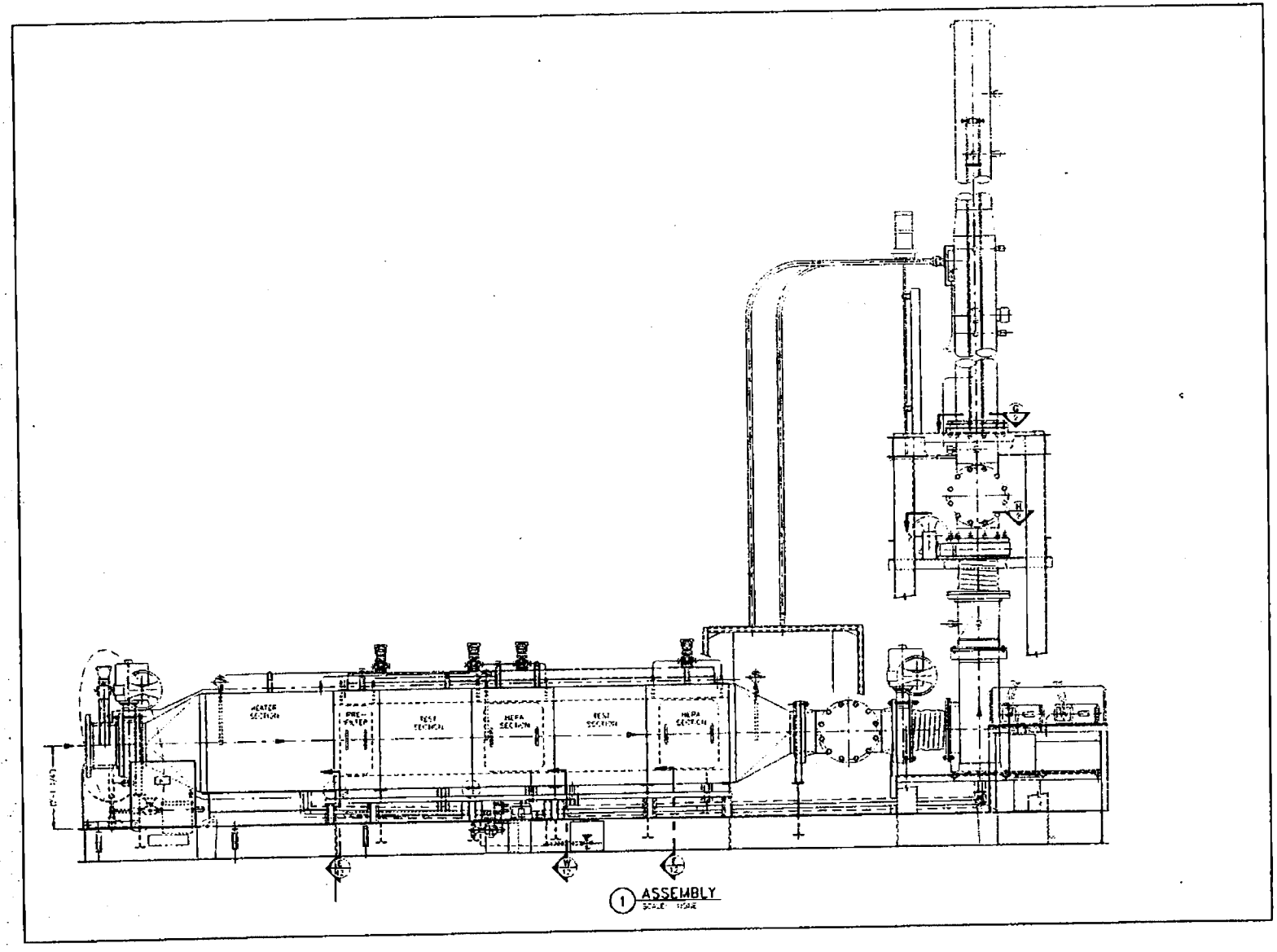
ALARACT 16, *Tank Farm ALARACT Demonstration for Work on Potentially Contaminated Ventilation System Components.*

7.0 APPLICABLE CONTROL TECHNOLOGY DRAWINGS

Regulatory Citation: "Provide conceptual drawings showing all applicable control technology components from the point of entry of radionuclides into the vapor space to release to the environment."

Figure 3 is the new exhauster design, showing applicable control technology components, HEPA filters, and stack.

Figure 3. New Exhauster Details.



11

8.0 RADIONUCLIDES OF CONCERN – POTENTIAL EMISSIONS

Regulatory Citation: "Identify each radionuclide that could contribute greater than ten percent of the potential–to-emit TEDE to the MEI, or greater than 0.1 mrem/yr potential–to-emit TEDE to the MEI."

During operation of the new exhausters, radionuclide emissions estimated to contribute greater than 10% of the potential-to-emit TEDE to the MEI from operation of the new AN and AW Tank Farm ventilation system are ^{90}Sr, ^{137}Cs, and ^{241}Am. Emissions of those radionuclides estimated to contribute greater than 0.1 mrem/yr potential-to-emit TEDE to the MEI are ^{14}C, ^{90}Y, ^{90}Sr, ^{134}Cs, ^{137}Cs, ^{154}Eu, ^{227}Ac, ^{231}Pa, ^{233}U, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{241}Am, and ^{244}Cm.

9.0 EFFLUENT MONITORING SYSTEM

Regulatory Citation: "Describe the effluent monitoring system for the proposed control system. Describe each piece of monitoring equipment and its monitoring capability, including detection limits, for each radionuclide that could contribute greater than ten percent of the potential-to-emit TEDE to the MEI, or greater than 0.1 mrem/yr potential-to-emit TEDE to the MEI, or greater than twenty-five percent of the TEDE to the MEI, after controls. Describe the method with detail sufficient to demonstrate compliance with the applicable requirements."

9.1 Sampling and Monitoring System for the New Ventilation System

The new ventilation system will sample and monitor the ventilation emissions continuously. The system will collect a sample using a shrouded probe. The shrouded probe assembly will be installed in the 12-in. section of the stack. The shrouded probe installation location and the transport lines will be designed to adhere to the applicable requirements of ANSI/HPS N13.1-1999, *Sampling and Monitoring Releases of Airborne Radioactive Substances from Stacks and Ducts of Nuclear Facilities.*

As noted in Section 8.0, emissions of ^{90}Sr, ^{137}Cs, and ^{241}Am are estimated to contribute greater than 10% of the potential-to-emit TEDE to the MEI; potential emissions for ^{14}C, ^{90}Y, ^{90}Sr, ^{134}Cs, ^{137}Cs, ^{154}Eu, ^{227}Ac, ^{231}Pa, ^{233}U, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{241}Am, and ^{244}Cm are estimated to be greater than 0.1 mrem/yr to the MEI. Emissions of ^{14}C are estimated to contribute greater than 25% of the TEDE to the MEI after controls. The method used to arrive at these contributors is conservative. Therefore, except for ^{14}C, a representative sample of all other radionuclides of concern will be continuously collected in the record sampler system, of which will be transported and analyzed at the laboratory. Regarding ^{14}C, it is proposed that a sample of ^{14}C be collected quarterly and analyzed to determine its true contribution to the MEI. If analyses show that ^{14}C does contribute greater than 25% after controls, a ^{14}C continuous sampler will be installed.

Results of the analyses will be published in the following Hanford Site Annual Emission Reports. The quality of these analyses is discussed in the current revisions of these documents:

> HNF-EP-0528, *National Emission Standards for Hazardous Air Pollutants (NESHAP) Quality Assurance Project Plan for Radioactive Air Emissions*
>
> HNF-EP-0835-8, *Statement of Work for Services Provided by the Waste Sampling and Characterization Facility for the Environmental Compliance Program during Calendar Year 2002*
>
> RPP-QAPP-004, *CHG Quality Assurance Program Plan for Tank Farm Contractor Radioactive Air Emissions.*

9.2 Sampling and Monitoring During Removal of the Old Ventilation System

Monitoring during removal of the old ventilation system will be in accordance with ALARACT 12, ALARACT 15, ALARACT 16

10.0 RADIONUCLIDE ANNUAL POSSESSION QUANTITY

Regulatory Citation: "Indicate the annual possession quantity for each radionuclide."

10.1 Annual Possession Quantity for Operation of the New Ventilation Systems in AN and AW Tank Farms

The annual possession quantity (APQ) for operation of the new ventilation system is listed in Tables 3 and 4. These tables lists a possible maximum radionuclide inventory in AN and AW Farms respectively. This inventory was derived in the following manner:

> The data listed was derived from the Tank Waste Information Network System 3 (TWINS) data base, Best Basis Inventory, Best Basis Summary as of September 9, 2003.
>
> Radionuclides from all 177 single shell tanks (SSTs) and DSTs in the tank farm complex were compiled into a single spreadsheet. Then each radionuclide was sorted from highest to lowest. To account for all seven tanks in the AN Tank Farm, the seven highest quantities for each individual radionuclide was chosen. For the AW Farm inventory, the six highest quantities were chosen. These quantities were summed to arrive at an AN and an AW Farm APQ.

Table 3. AN Farm Annual Possession Quantity.

Radionuclide	APQ (Ci)		Radionuclide	APQ (Ci)
^{3}H	2.71E+03		^{226}Ra	2.38E+02
^{14}C	5.07E+02		^{227}Ac	1.30E+02
^{59}Ni	7.70E+02		^{228}Ra	3.87E+01
^{60}Co	4.46E+03		^{229}Th	2.49E+01
^{63}Ni	7.26E+04		^{231}Pa	2.70E+02
^{79}Se	5.70E+01		^{232}U	2.79E+01
^{90}Y	2.30E+07		^{232}Th	6.16E+00
^{90}Sr	2.30E+07		^{233}U	4.48E+02
^{93}Zr	1.86E+03		^{234}U	6.76E+01
^{93}mNb	1.82E+03		^{235}U	2.58E+00
^{99}Tc	6.89E+03		^{236}U	2.87E+00
^{106}Ru	1.02E+03		^{237}Np	6.20E+01
^{113}mCd	7.50E+03		^{238}Pu	3.04E+03
^{125}Sb	2.06E+04		^{238}U	5.61E+01
^{126}Sn	2.40E+02		^{239}Pu	2.92E+04
^{129}I	9.18E+00		^{240}Pu	5.25E+03
^{134}Cs	1.81E+04		^{241}Pu	6.40E+04
^{137}Cs	1.85E+07		^{241}Am	1.03E+05
^{137}mBa	1.75E+07		^{242}Pu	4.05E-01
^{151}Sm	1.53E+06		^{242}Cm	7.57E+01
^{152}Eu	1.06E+03		^{243}Am	1.37E+01
^{154}Eu	4.63E+04		^{243}Cm	8.35E+00
^{155}Eu	4.56E+04		^{244}Cm	2.36E+02

Table 4. AW Farm Annual Possession Quantity.

Radionuclide	APQ (Ci)		Radionuclide	APQ (Ci)
^{3}H	2.47E+03		^{226}Ra	2.38E+02
^{14}C	4.38E+02		^{227}Ac	1.29E+02
^{59}Ni	7.44E+02		^{228}Ra	3.65E+01
^{60}Co	4.13E+03		^{229}Th	2.49E+01
^{63}Ni	7.02E+04		^{231}Pa	2.70E+02
^{79}Se	5.38E+01		^{232}U	2.73E+01
^{90}Y	2.08E+07		^{232}Th	6.08E+00
^{90}Sr	2.08E+07		^{233}U	4.46E+02
^{93}Zr	1.80E+03		^{234}U	6.14E+01
^{93}mNb	1.77E+03		^{235}U	2.34E+00
^{99}Tc	6.09E+03		^{236}U	2.73E+00
^{106}Ru	1.02E+03		^{237}Np	5.81E+01
^{113}mCd	7.25E+03		^{238}Pu	2.95E+03
^{125}Sb	2.04E+04		^{238}U	5.06E+01
^{126}Sn	2.21E+02		^{239}Pu	2.71E+04
^{129}I	8.13E+00		^{240}Pu	4.86E+03
^{134}Cs	1.80E+04		^{241}Pu	6.00E+04
^{137}Cs	1.70E+07		^{241}Am	9.67E+04
^{137}mBa	1.61E+07		^{242}Pu	3.77E-01
^{151}Sm	1.48E+06		^{242}Cm	6.99E+01
^{152}Eu	1.01E+03		^{243}Am	1.34E+01
^{154}Eu	4.26E+04		^{243}Cm	7.29E+00
^{155}Eu	4.42E+04		^{244}Cm	2.25E+02

10.2 Annual Possession Quantity for Removal of the old AN and AW Farm Ventilation Systems

The annual possession quantity for removal of the old ventilation system in AN and AW Farms is listed in Tables 5 and 6. These inventories are those values transmitted in external letter 02-EMD-024, J. E. Rasmussen, ORP, to A. W. Conklin, WDOH, "Non-Destructive Analysis Results for the 241-AN, 241-AP, and 241-AW Tank Farms," dated March 5, 2002. These inventories are the inventories of radionuclides estimated (using the non-destructive analysis technique) to be contained within the respective ventilation systems.

Table 5. AN Farm Exhauster Removal Annual Possession Quantity. (2 sheets)

Analyte	Analyte to NDA Results Normalized Values (Ci)	Condensate Result (Ci)	Total Inventory (Ci)
^{3}H	7.77E-08	1.55E-04	1.55E-04
^{14}C	8.34E-08		8.34E-08
^{60}Co	7.75E-07		7.75E-07
^{59}Ni	7.92E-09		7.92E-09
^{63}Ni	7.50E-07		7.50E-07
^{79}Se	4.45E-09		4.45E-09
^{90}Sr	8.30E-04	1.72E-05	8.47E-04
^{90}Y	8.30E-04		8.30E-04
^{93}Zr	7.98E-08		7.98E-08
^{93}mNb	5.73E-08		5.73E-08
^{99}Tc	1.71E-06	3.20E-05	3.37E-05
^{106}Ru	3.48E-13		3.48E-13
^{113}mCd	3.16E-07		3.16E-07
^{126}Sn	2.83E-08		2.83E-08
^{125}Sb	1.74E-07		1.74E-07
^{129}I	1.46E-09		1.46E-09
^{134}Cs	2.46E-09		2.46E-09
^{137}Cs +D	3.10E-03	5.90E-02	6.21E-02
^{137}mBa	2.94E-03		2.94E-03
^{151}Sm	5.39E-05		5.39E-05
^{152}Eu	1.63E-08		1.63E-08
^{154}Eu	7.59E-06		7.59E-06
^{155}Eu	4.93E-06		4.93E-06
^{226}Ra	6.50E-13		6.50E-13
^{228}Ra	1.43E-09		1.43E-09
^{227}Ac	3.82E-12		3.82E-12
^{229}Th	3.32E-11		3.32E-11
^{232}Th	1.74E-10		1.74E-10
^{231}Pa	1.78E-11		1.78E-11
^{232}U	6.89E-10		6.89E-10
^{233}U	2.82E-09		2.82E-09
^{234}U	5.82E-10		5.82E-10
^{235}U	2.32E-11		2.32E-11
^{236}U	2.07E-11		2.07E-11
^{238}U	5.14E-10		5.14E-10
^{237}Np	5.93E-08		5.93E-08

Table 5. AN Farm Exhauster Removal Annual Possession Quantity. (2 sheets)

Analyte	Analyte to NDA Results Normalized Values (Ci)	Condensate Result (Ci)	Total Inventory (Ci)
^{238}Pu	1.93E-08		1.93E-08
^{239}Pu	3.84E-07		3.84E-07
^{240}Pu	6.78E-08		6.78E-08
^{241}Pu	6.28E-07		6.28E-07
^{242}Pu	4.70E-12		4.70E-12
^{241}Am	5.70E-06		5.70E-06
^{243}Am	2.33E-10		2.33E-10
^{242}Cm	1.44E-08		1.44E-08
^{243}Cm	1.19E-09		1.19E-09
^{244}Cm	8.31E-09		8.31E-09

NDA = nondestructive analysis.

Table 6. AW Farm Exhauster Removal Annual Possession Quantity. (2 sheets)

Analyte	Analyte to NDA Results Normalized Values (Ci)	Condensate Result (Ci)	Total Inventory (Ci)
^{3}H	1.29E-06	1.55E-04	1.56E-04
^{14}C	8.98E-07		8.98E-07
^{60}Co	2.10E-06		2.10E-06
^{59}Ni	9.79E-08		9.79E-08
^{63}Ni	9.26E-06		9.26E-06
^{79}Se	6.12E-08		6.12E-08
^{90}Sr	2.03E-03	1.72E-05	2.05E-03
^{90}Y	2.03E-03		2.03E-03
^{93}Zr	8.28E-07		8.28E-07
^{93}mNb	1.15E-06		1.15E-06
^{99}Tc	1.94E-05	3.20E-05	5.15E-05
^{106}Ru	1.01E-07		1.01E-07
^{113}mCd	4.56E-06		4.56E-06
^{126}Sn	1.40E-05		1.40E-05
^{125}Sb	1.78E-07		1.78E-07
^{129}I	2.65E-08		2.65E-08
^{134}Cs	3.19E-06		3.19E-06
^{137}Cs	4.00E-02	5.90E-02	9.90E-02

Table 6. AW Farm Exhauster Removal Annual Possession Quantity. (2 sheets)

Analyte	Analyte to NDA Results Normalized Values (Ci)	Condensate Result (Ci)	Total Inventory (Ci)
^{137}mBa	3.79E-02		3.79E-02
^{151}Sm	7.79E-04		7.79E-04
^{152}Eu	2.40E-07		2.40E-07
^{154}Eu	8.91E-06		8.91E-06
^{155}Eu	2.35E-05		2.35E-05
^{226}Ra	9.56E-12		9.56E-12
^{228}Ra	2.07E-08		2.07E-08
^{227}Ac	5.51E-11		5.51E-11
^{229}Th	4.79E-10		4.79E-10
^{232}Th	1.88E-09		1.88E-09
^{231}Pa	2.58E-10		2.58E-10
^{232}U	3.26E-08		3.26E-08
^{233}U	1.33E-07		1.33E-07
^{234}U	4.51E-07		4.51E-07
^{235}U	1.72E-08		1.72E-08
^{236}U	3.60E-08		3.60E-08
^{238}U	3.14E-07		3.14E-07
^{237}Np	1.06E-07		1.06E-07
^{238}Pu	2.79E-06		2.79E-06
^{239}Pu	2.42E-05		2.42E-05
^{240}Pu	7.28E-06		7.28E-06
^{241}Pu	2.14E-04		2.14E-04
^{242}Pu	1.12E-09		1.12E-09
^{241}Am	1.66E-05		1.66E-05
^{243}Am	1.22E-09		1.22E-09
^{242}Cm	1.71E-08		1.71E-08
^{243}Cm	1.97E-09		1.97E-09
^{244}Cm	4.40E-08		4.40E-08

NDA = nondestructive analysis.

11.0 PHYSICAL FORM OF EACH RADIONUCLIDE IN THE INVENTORY

Regulatory Citation: "Indicate the physical form of each radionuclide in inventory: Solid, particulate solids, liquid, or gas."

The radionuclide in inventory listed in Tables 3 and 4 (pages 14 and 15 respectively) are contained in the tank waste, which consists of sludges and liquids. Radionuclides given as the inventory for removal of the old exhausters (Tables 5 and 6, pages 16 and 17 respectively) are particulate in nature.

12.0 RELEASE FORM OF EACH RADIONUCLIDE IN THE INVENTORY

Regulatory Citation: "Indicate the release form of each radionuclide in inventory: Particulate solids, vapor, or gas. Give the chemical form and ICRP 30 solubility class, if known."

The radionuclides in the inventory listed in Tables 3 and 4 are all assumed to be released as particulate except for ^{3}H and ^{14}C. These are assumed to be released as gases.

13.0 RELEASE RATES

Regulatory Citation: "a. New emission unit(s): Give predicted release rates without any emission control equipment (the potential-to-emit) and with the proposed control equipment using the efficiencies described in subsection 6 of this section.

b. Modified emission unit(s): Give predicted release rates without any emissions control equipment (the potential-to-emit) and with the existing and proposed control equipment using the efficiencies described in subsection 6 of this section. Provide the latest year's emission data or emissions estimates.

In all cases, indicate whether the emission unit is operating in a batch or continuous mode."

13.1 Releases from the Current Exhauster

Abated (with controls) emissions from the existing AN and AW Farm Ventilation Systems (stacks 296-A-29 and 296-A-27 respectively) were reported in DOE/RL-2003-019, *Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2002* as listed in Table 2 (page 2).

The AN Farm exhauster operated for a total of 8,709 hours in calendar year 2002 and the AW Farm exhauster operated for a total of 7314 hours in 2002. Therefore both exhausters operated in nearly a continuous mode.

Potential (without controls) emissions from the existing AN Farm Exhauster were estimated at 1.7×10^{-2} mrem/yr. Potential emissions from the existing AW Farm Exhauster were estimated at 2.8×10^{-2} mrem/yr. These estimates are documented in external letter 02-EMD-024.

13.2 Estimated Releases from the New Exhauster

Emission estimates from the new AN and AW exhausters are presented in Tables 7 and 8. Emissions were estimated using the most conservative release fraction values (8.0×10^{-5}) cited in PNNL-14467, *Preliminary Synopsis of Release Fraction Tests*, Judith Bamberger and John Glissmeyer. Unabated emissions were determined by applying this release factor directly to the APQ values listed in Tables 3 and 4 (pages 14 and 15). Abated emissions were determined by dividing the unabated results by 2,000, the usual HEPA filter decontamination factor that represents an in-place tested particulate removal efficiency of 99.95%. The decontamination factor was not used on ^{3}H or ^{14}C. For these radionuclides, the unabated emissions equal the abated emissions based on the assumption that the HEPA filters are not designed to control these types of emissions.

Table 7. Estimated AN Farm Exhauster Releases. (2 sheets)

	APQ (Ci)	Release Factor	Unabated Release (Ci)	Abated (1filter) (Ci)
^{3}H	2.71E+03	1.00E+00	2.71E+03	2.71E+03
^{14}C	5.07E+02	1.00E+00	5.07E+02	5.07E+02
^{59}Ni	7.70E+02	8.00E-05	6.16E-02	3.08E-05
^{60}Co	4.46E+03	8.00E-05	3.56E-01	1.78E-04
^{63}Ni	7.26E+04	8.00E-05	5.80E+00	2.90E-03
^{79}Se	5.70E+01	8.00E-05	4.56E-03	2.28E-06
^{90}Y	2.30E+07	8.00E-05	1.84E+03	9.20E-01
^{90}Sr	2.30E+07	8.00E-05	1.84E+03	9.20E-01
^{93}Zr	1.86E+03	8.00E-05	1.49E-01	7.46E-05
^{93}mNb	1.82E+03	8.00E-05	1.46E-01	7.28E-05
^{99}Tc	6.89E+03	8.00E-05	5.51E-01	2.75E-04
^{106}Ru	1.02E+03	8.00E-05	8.13E-02	4.06E-05
^{113}mCd	7.50E+03	8.00E-05	6.00E-01	3.00E-04
^{125}Sb	2.06E+04	8.00E-05	1.65E+00	8.24E-04
^{126}Sn	2.40E+02	8.00E-05	1.92E-02	9.58E-06
^{129}I	9.18E+00	8.00E-05	7.34E-04	3.67E-07
^{134}Cs	1.81E+04	8.00E-05	1.44E+00	7.22E-04
^{137}Cs	1.85E+07	8.00E-05	1.48E+03	7.40E-01
^{137}mBa	1.75E+07	8.00E-05	1.40E+03	7.00E-01

Table 7. Estimated AN Farm Exhauster Releases. (2 sheets)

	APQ (Ci)	Release Factor	Unabated Release (Ci)	Abated (1filter) (Ci)
^{151}Sm	1.53E+06	8.00E-05	1.22E+02	6.12E-02
^{152}Eu	1.06E+03	8.00E-05	8.45E-02	4.22E-05
^{154}Eu	4.63E+04	8.00E-05	3.70E+00	1.85E-03
^{155}Eu	4.56E+04	8.00E-05	3.65E+00	1.82E-03
^{226}Ra	2.38E+02	8.00E-05	1.90E-02	9.52E-06
^{227}Ac	1.30E+02	8.00E-05	1.04E-02	5.18E-06
^{228}Ra	3.87E+01	8.00E-05	3.10E-03	1.55E-06
^{229}Th	2.49E+01	8.00E-05	1.99E-03	9.97E-07
^{231}Pa	2.70E+02	8.00E-05	2.16E-02	1.08E-05
^{232}U	2.79E+01	8.00E-05	2.23E-03	1.12E-06
^{232}Th	6.16E+00	8.00E-05	4.93E-04	2.47E-07
^{233}U	4.48E+02	8.00E-05	3.59E-02	1.79E-05
^{234}U	6.76E+01	8.00E-05	5.41E-03	2.71E-06
^{235}U	2.58E+00	8.00E-05	2.07E-04	1.03E-07
^{236}U	2.87E+00	8.00E-05	2.29E-04	1.15E-07
^{237}Np	6.20E+01	8.00E-05	4.96E-03	2.48E-06
^{238}Pu	3.04E+03	8.00E-05	2.43E-01	1.22E-04
^{238}U	5.61E+01	8.00E-05	4.49E-03	2.25E-06
^{239}Pu	2.92E+04	8.00E-05	2.33E+00	1.17E-03
^{240}Pu	5.25E+03	8.00E-05	4.20E-01	2.10E-04
^{241}Pu	6.40E+04	8.00E-05	5.12E+00	2.56E-03
^{241}Am	1.03E+05	8.00E-05	8.24E+00	4.12E-03
^{242}Pu	4.05E-01	8.00E-05	3.24E-05	1.62E-08
^{242}Cm	7.57E+01	8.00E-05	6.06E-03	3.03E-06
^{243}Am	1.37E+01	8.00E-05	1.10E-03	5.48E-07
^{243}Cm	8.35E+00	8.00E-05	6.68E-04	3.34E-07
^{244}Cm	2.36E+02	8.00E-05	1.89E-02	9.43E-06

Table 8. Estimated AW Farm Exhauster Releases. (2 sheets)

	APQ (Ci)	Release Factor	Unabated Release (Ci)	Abated (1filter) (Ci)
^{3}H	2.47E+03	1.00E+00	2.47E+03	2.47E+03
^{14}C	4.38E+02	1.00E+00	4.38E+02	4.38E+02
^{59}Ni	7.44E+02	8.00E-05	5.96E-02	2.98E-05
^{60}Co	4.13E+03	8.00E-05	3.31E-01	1.65E-04
^{63}Ni	7.02E+04	8.00E-05	5.61E+00	2.81E-03
^{79}Se	5.38E+01	8.00E-05	4.31E-03	2.15E-06
^{90}Y	2.08E+07	8.00E-05	1.66E+03	8.32E-01
^{90}Sr	2.08E+07	8.00E-05	1.66E+03	8.32E-01
^{93}Zr	1.80E+03	8.00E-05	1.44E-01	7.18E-05
^{93}mNb	1.77E+03	8.00E-05	1.41E-01	7.07E-05
^{99}Tc	6.09E+03	8.00E-05	4.87E-01	2.44E-04
^{106}Ru	1.02E+03	8.00E-05	8.13E-02	4.06E-05
^{113}mCd	7.25E+03	8.00E-05	5.80E-01	2.90E-04
^{125}Sb	2.04E+04	8.00E-05	1.63E+00	8.17E-04
^{126}Sn	2.21E+02	8.00E-05	1.77E-02	8.86E-06
^{129}I	8.13E+00	8.00E-05	6.50E-04	3.25E-07
^{134}Cs	1.80E+04	8.00E-05	1.44E+00	7.22E-04
^{137}Cs	1.70E+07	8.00E-05	1.36E+03	6.80E-01
^{137}mBa	1.61E+07	8.00E-05	1.29E+03	6.43E-01
^{151}Sm	1.48E+06	8.00E-05	1.19E+02	5.93E-02
^{152}Eu	1.01E+03	8.00E-05	8.05E-02	4.03E-05
^{154}Eu	4.26E+04	8.00E-05	3.41E+00	1.70E-03
^{155}Eu	4.42E+04	8.00E-05	3.53E+00	1.77E-03
^{226}Ra	2.38E+02	8.00E-05	1.90E-02	9.52E-06
^{227}Ac	1.29E+02	8.00E-05	1.04E-02	5.18E-06
^{228}Ra	3.65E+01	8.00E-05	2.92E-03	1.46E-06
^{229}Th	2.49E+01	8.00E-05	1.99E-03	9.94E-07
^{231}Pa	2.70E+02	8.00E-05	2.16E-02	1.08E-05
^{232}U	2.73E+01	8.00E-05	2.18E-03	1.09E-06
^{232}Th	6.08E+00	8.00E-05	4.87E-04	2.43E-07
^{233}U	4.46E+02	8.00E-05	3.57E-02	1.78E-05
^{234}U	6.14E+01	8.00E-05	4.91E-03	2.45E-06
^{235}U	2.34E+00	8.00E-05	1.87E-04	9.37E-08
^{236}U	2.73E+00	8.00E-05	2.18E-04	1.09E-07
^{237}Np	5.81E+01	8.00E-05	4.65E-03	2.33E-06
^{238}Pu	2.95E+03	8.00E-05	2.36E-01	1.18E-04

Table 8. Estimated AW Farm Exhauster Releases. (2 sheets)

	APQ (Ci)	Release Factor	Unabated Release (Ci)	Abated (1filter) (Ci)
^{238}U	5.06E+01	8.00E-05	4.05E-03	2.03E-06
^{239}Pu	2.71E+04	8.00E-05	2.17E+00	1.08E-03
^{240}Pu	4.86E+03	8.00E-05	3.89E-01	1.94E-04
^{241}Pu	6.00E+04	8.00E-05	4.80E+00	2.40E-03
^{241}Am	9.67E+04	8.00E-05	7.73E+00	3.87E-03
^{242}Pu	3.77E-01	8.00E-05	3.01E-05	1.51E-08
^{242}Cm	6.99E+01	8.00E-05	5.59E-03	2.79E-06
^{243}Am	1.34E+01	8.00E-05	1.07E-03	5.36E-07
^{243}Cm	7.92E+00	8.00E-05	6.33E-04	3.17E-07
^{244}Cm	2.25E+02	8.00E-05	1.80E-02	8.99E-06

13.3 Estimated Releases from Removal of the Old Exhauster

The potential to emit (PTE) for removal of the old AN and AW exhausters are the values cited in external letter 02-EMD-024. These PTE estimates are based on the results of a nondestructive assay of the AN and AW exhausters. This estimate assumes that the entire radionuclide content contained within the old exhausters will be released during removal. For the AN exhauster, the PTE was cited as 1.7×10^{-2} mrem per year. For the AW exhauster, the PTE was cited as 2.8×10^{-2} mrem per year. The inventories available for release (that these PTEs represent) are given in Tables 5 and 6 (pages 16 and 17).

14.0 DISTANCES AND DIRECTION OF THE MAXIMUM EXPOSED INDIVIDUAL

Regulatory Citation: "Identify the MEI by distances and direction from the emission unit(s). The MEI is determined by considering distance, windrose data, presence of vegetable gardens, and meat or milk producing animals at unrestricted areas surrounding the emission unit."

The MEI is determined using CAP-88 dispersion factors, which are derived for use on the Hanford Site and published in HNF-3602, *Calculating Potential-to-Emit Releases and Doses for FEMPs and NOCs*. Values, used for both the AN Tank Farm and the AW Tank Farm Ventilation systems are shown in Table 4-9, of HNF-3602, for 200 East Area with effective release height < 40 meters. Table 4-9 gives values in two separate columns for an offsite maximum public receptor (MPR) and an onsite MPR. Values from both columns were used to determine the maximum dose. The results showed that the maximum dose occurred to the offsite MPR. Table 4-2, of HNF-3602, states that the offsite MPR for the 200 East Area is 20,200 meters in the east southeast direction. This location is just east of the river, at Ringold.

15.0 TOTAL EFFECTIVE DOSE EQUIVALENT TO THE MAXIMUM EXPOSED INDIVIDUAL

Regulatory Citation: "Calculate the TEDE to the MEI using an approved procedure (see WAC 246-247-085). For each radionuclide identified in subsection 8 of this section, determine the TEDE to the MEI for existing and proposed emission controls, and without any emission controls (the potential-to-emit) using release rates from subsection 13 of this section. Provide all input data used in the calculations."

The TEDE to the MEI, for purposes of this NOC, is estimated to be 1,330 mrem/yr without controls and 2.6 mrem/yr with controls. This estimate is summarized in Table 1 (page 1).

15.1 Estimated Emissions to the MEI from the New Exhauster

The TEDE to the MEI from the new AN and AW exhausters are presented in Tables 9 and 10. Emissions due to operation of the new AN and AW Farm ventilation, are estimated to be 690 and 640 mrem/yr respectively without controls. With controls, the emissions are estimated to be 1.4 and 1.2 mrem/yr respectively. CAP-88 dispersion factors were applied to the emission estimates. Both the offsite and onsite MPR values were used. After totaling the results, it was determined that the offsite results were higher. The percentage of each radionuclide was, therefore, determined from the offsite results. The abated emissions also were determined from the offsite results. Abated emissions were determined by dividing the unabated results by 2,000, the usual HEPA filter decontamination factor that represents an in-place tested particulate removal efficiency of 99.95 %. The decontamination factor was not used on ^{3}H or ^{14}C. For these radionuclides, the unabated emissions equal the abated emissions, based on the assumption that the HEPA filters are not effective controls for these types of emissions.

15.2 Estimated Emissions to the Maximum Exposed Individual from Removal of the Old Exhauster

The PTE for removal of the old AN and AW exhausters are the values cited in external letter 02-EMD-024. These PTE estimates are based on the results of a nondestructive assay of the AN and AW exhausters. This estimate assumes that the entire radionuclide content contained within the old exhausters will be released during removal. For the AN exhauster, the PTE was cited as 1.7×10^{-2} mrem/yr. For the AW exhauster, the PTE was cited as 2.8×10^{-2} mrem/yr.

Table 9. Unabated and Abated Dose to the Maximum Exposed Individual from the New AN Farm Exhauster. (2 sheets)

	APQ	Release Factor	Released	CAP-88 – East		Unabated Emissions		% Total Offsite	Abated Emissions	
				Offsite MPR	Onsite MPR	Offsite MPR	Onsite MPR		1 filter	% Total Abated
	Ci			mrem/Ci		mrem/yr				
^{3}H	2.71E+03	1.0E+00	2.7E+03	2.50E-05	7.10E-06	6.8E-02	1.9E-02	0.01%	6.8E-02	4.92%
^{14}C	5.07E+02	1.0E+00	5.1E+02	1.90E-03	1.80E-04	9.6E-01	9.1E-02	0.14%	9.6E-01	69.92%
^{59}Ni	7.70E+02	8.0E-05	6.2E-02	3.10E-04	2.90E-04	1.9E-05	1.8E-05	0.00%	9.6E-09	0.00%
^{60}Co	4.46E+03	8.0E-05	3.6E-01	2.50E-01	3.00E-01	8.9E-02	1.1E-01	0.01%	4.5E-05	0.00%
^{63}Ni	7.26E+04	8.0E-05	5.8E+00	2.60E-04	6.90E-05	1.5E-03	4.0E-04	0.00%	7.5E-07	0.00%
^{79}Se	5.70E+01	8.0E-05	4.6E-03	1.30E-01	1.50E-01	5.9E-04	6.8E-04	0.00%	3.0E-07	0.00%
^{90}Y	2.30E+07	8.0E-05	1.8E+03	3.40E-04	2.60E-04	6.3E-01	4.8E-01	0.09%	3.1E-04	0.02%
^{90}Sr	2.30E+07	8.0E-05	1.8E+03	1.10E-01	9.50E-03	2.0E+02	1.7E+01	29.18%	1.0E-01	7.35%
^{93}Zr	1.86E+03	8.0E-05	1.5E-01	1.30E-03	1.30E-03	1.9E-04	1.9E-04	0.00%	9.7E-08	0.00%
^{93}mNb	1.82E+03	8.0E-05	1.5E-01	2.10E-03	1.20E-03	3.1E-04	1.7E-04	0.00%	1.5E-07	0.00%
^{99}Tc	6.89E+03	8.0E-05	5.5E-01	2.30E-02	1.40E-03	1.3E-02	7.7E-04	0.00%	6.3E-06	0.00%
^{106}Ru	1.02E+03	8.0E-05	8.1E-02	2.00E-02	1.90E-02	1.6E-03	1.5E-03	0.00%	8.1E-07	0.00%
^{113}mCd	7.50E+03	8.0E-05	6.0E-01	1.30E-01	1.50E-01	7.8E-02	9.0E-02	0.01%	3.9E-05	0.00%
^{125}Sb	2.06E+04	8.0E-05	1.6E+00	2.60E-02	3.30E-02	4.3E-02	5.4E-02	0.01%	2.1E-05	0.00%
^{126}Sn	2.40E+02	8.0E-05	1.9E-02	4.70E-02	4.10E-02	9.0E-04	7.9E-04	0.00%	4.5E-07	0.00%
^{129}I	9.18E+00	8.0E-05	7.3E-04	2.00E-01	2.20E-02	1.5E-04	1.6E-05	0.00%	7.3E-08	0.00%
^{134}Cs	1.81E+04	8.0E-05	1.4E+00	1.00E-01	4.70E-02	1.4E-01	6.8E-02	0.02%	7.2E-05	0.01%
^{137}Cs	1.85E+07	8.0E-05	1.5E+03	2.40E-01	2.70E-01	3.6E+02	4.0E+02	51.23%	1.8E-01	12.91%
^{137}mBa	1.75E+07	8.0E-05	1.4E+03	5.30E-13	1.00E-11	7.4E-10	1.4E-08	0.00%	3.7E-13	0.00%
^{151}Sm	1.53E+06	8.0E-05	1.2E+02	7.50E-04	8.40E-04	9.2E-02	1.0E-01	0.01%	4.6E-05	0.00%
^{152}Eu	1.06E+03	8.0E-05	8.4E-02	2.40E-01	3.10E-01	2.0E-02	2.6E-02	0.00%	1.0E-05	0.00%
^{154}Eu	4.63E+04	8.0E-05	3.7E+00	2.00E-01	2.50E-01	7.4E-01	9.3E-01	0.11%	3.7E-04	0.03%
^{155}Eu	4.56E+04	8.0E-05	3.6E+00	8.00E-03	9.80E-03	2.9E-02	3.6E-02	0.00%	1.5E-05	0.00%
^{226}Ra	2.38E+02	8.0E-05	1.9E-02	4.60E-01	2.50E-01	8.8E-03	4.8E-03	0.00%	4.4E-06	0.00%
^{227}Ac	1.30E+02	8.0E-05	1.0E-02	1.50E+01	1.80E+01	1.6E-01	1.9E-01	0.02%	7.8E-05	0.01%

Table 9. Unabated and Abated Dose to the Maximum Exposed Individual from the New AN Farm Exhauster. (2 sheets)

	APQ	Release Factor	Released	CAP-88 – East		Unabated Emissions		% Total Offsite	Abated Emissions	
				Offsite MPR	Onsite MPR	Offsite MPR	Onsite MPR		1 filter	% Total Abated
	Ci			mrem/Ci		mrem/yr				
^{228}Ra	3.87E+01	8.0E-05	3.1E-03	1.90E-01	7.00E-02	5.9E-04	2.2E-04	0.00	2.9E-07	0.00
^{229}Th	2.49E+01	8.0E-05	2.0E-03	1.60E+01	2.00E+01	3.2E-02	4.0E-02	0.00	1.6E-05	0.00
^{231}Pa	2.70E+02	8.0E-05	2.2E-02	1.20E+01	1.40E+01	2.6E-01	3.0E-01	0.04	1.3E-04	0.01
^{232}U	2.79E+01	8.0E-05	2.2E-03	1.10E+01	1.30E+01	2.5E-02	2.9E-02	0.00	1.2E-05	0.00
^{232}Th	6.16E+00	8.0E-05	4.9E-04	8.00E+00	1.00E+01	3.9E-03	4.9E-03	0.00	2.0E-06	0.00
^{233}U	4.48E+02	8.0E-05	3.6E-02	3.10E+00	3.70E+00	1.1E-01	1.3E-01	0.02	5.6E-05	0.00
^{234}U	6.76E+01	8.0E-05	5.4E-03	3.10E+00	3.70E+00	1.7E-02	2.0E-02	0.00	8.4E-06	0.00
^{235}U	2.58E+00	8.0E-05	2.1E-04	3.00E+00	3.50E+00	6.2E-04	7.2E-04	0.00	3.1E-07	0.00
^{236}U	2.87E+00	8.0E-05	2.3E-04	2.90E+00	3.50E+00	6.7E-04	8.0E-04	0.00	3.3E-07	0.00
^{237}Np	6.20E+01	8.0E-05	5.0E-03	1.20E+01	1.40E+01	5.9E-02	6.9E-02	0.01	3.0E-05	0.00
^{238}Pu	3.04E+03	8.0E-05	2.4E-01	7.60E+00	8.90E+00	1.8E+00	2.2E+00	0.27	9.2E-04	0.07
^{238}U	5.61E+01	8.0E-05	4.5E-03	2.80E+00	3.30E+00	1.3E-02	1.5E-02	0.00	6.3E-06	0.00
^{239}Pu	2.92E+04	8.0E-05	2.3E+00	8.20E+00	9.50E+00	1.9E+01	2.2E+01	2.76	9.6E-03	0.69
^{240}Pu	5.25E+03	8.0E-05	4.2E-01	8.20E+00	9.50E+00	3.4E+00	4.0E+00	0.50	1.7E-03	0.13
^{241}Pu	6.40E+04	8.0E-05	5.1E+00	1.30E-01	1.50E-01	6.7E-01	7.7E-01	0.10	3.3E-04	0.02
^{241}Am	1.03E+05	8.0E-05	8.2E+00	1.30E+01	1.50E+01	1.1E+02	1.2E+02	15.44	5.4E-02	3.89
^{242}Pu	4.05E-01	8.0E-05	3.2E-05	7.80E+00	9.10E+00	2.5E-04	2.9E-04	0.00	1.3E-07	0.00
^{242}Cm	7.57E+01	8.0E-05	6.1E-03	4.10E-01	5.00E-01	2.5E-03	3.0E-03	0.00	1.2E-06	0.00
^{243}Am	1.37E+01	8.0E-05	1.1E-03	1.30E+01	1.50E+01	1.4E-02	1.6E-02	0.00	7.1E-06	0.00
^{243}Cm	8.35E+00	8.0E-05	6.7E-04	8.50E+00	1.00E+01	5.7E-03	6.7E-03	0.00	2.8E-06	0.00
^{244}Cm	2.36E+02	8.0E-05	1.9E-02	6.70E+00	8.00E+00	1.3E-01	1.5E-01	0.02	6.3E-05	0.00
Total						6.9E+02	5.7E+02		1.4E+00	

APQ = annual possession quantity.
MPR = maximum public receptor.

Table 10. Unabated and Abated Dose to the Maximum Exposed Individual from the New AW Farm Exhauster. (2 sheets)

	APQ	Release Factor	Released	CAP-88 – East		Unabated Emissions		% Total Offsite	Abated Emissions	
				Offsite MPR	Onsite MPR	Offsite MPR	Onsite MPR		1 filter	% Total Abated
	Ci			mrem/Ci		mrem/yr				
^{3}H	2.47E+03	1.0E+00	2.5E+03	2.50E-05	7.10E-06	6.2E-02	1.8E-02	0.01	6.2E-02	5.08
^{14}C	4.38E+02	1.0E+00	4.4E+02	1.90E-03	1.80E-04	8.3E-01	7.9E-02	0.13	8.3E-01	68.69
^{59}Ni	7.44E+02	8.0E-05	6.0E-02	3.10E-04	2.90E-04	1.8E-05	1.7E-05	0.00	9.2E-09	0.00
^{60}Co	4.13E+03	8.0E-05	3.3E-01	2.50E-01	3.00E-01	8.3E-02	9.9E-02	0.01	4.1E-05	0.00
^{63}Ni	7.02E+04	8.0E-05	5.6E+00	2.60E-04	6.90E-05	1.5E-03	3.9E-04	0.00	7.3E-07	0.00
^{79}Se	5.38E+01	8.0E-05	4.3E-03	1.30E-01	1.50E-01	5.6E-04	6.5E-04	0.00	2.8E-07	0.00
^{90}Y	2.08E+07	8.0E-05	1.7E+03	3.40E-04	2.60E-04	5.7E-01	4.3E-01	0.09	2.8E-04	0.02
^{90}Sr	2.08E+07	8.0E-05	1.7E+03	1.10E-01	9.50E-03	1.8E+02	1.6E+01	28.73	9.1E-02	7.55
^{93}Zr	1.80E+03	8.0E-05	1.4E-01	1.30E-03	1.30E-03	1.9E-04	1.9E-04	0.00	9.3E-08	0.00
^{93}mNb	1.77E+03	8.0E-05	1.4E-01	2.10E-03	1.20E-03	3.0E-04	1.7E-04	0.00	1.5E-07	0.00
^{99}Tc	6.09E+03	8.0E-05	4.9E-01	2.30E-02	1.40E-03	1.1E-02	6.8E-04	0.00	5.6E-06	0.00
^{106}Ru	1.02E+03	8.0E-05	8.1E-02	2.00E-02	1.90E-02	1.6E-03	1.5E-03	0.00	8.1E-07	0.00
^{113}mCd	7.25E+03	8.0E-05	5.8E-01	1.30E-01	1.50E-01	7.5E-02	8.7E-02	0.01	3.8E-05	0.00
^{125}Sb	2.04E+04	8.0E-05	1.6E+00	2.60E-02	3.30E-02	4.2E-02	5.4E-02	0.01	2.1E-05	0.00
^{126}Sn	2.21E+02	8.0E-05	1.8E-02	4.70E-02	4.10E-02	8.3E-04	7.3E-04	0.00	4.2E-07	0.00
^{129}I	8.13E+00	8.0E-05	6.5E-04	2.00E-01	2.20E-02	1.3E-04	1.4E-05	0.00	6.5E-08	0.00
^{134}Cs	1.80E+04	8.0E-05	1.4E+00	1.00E-01	4.70E-02	1.4E-01	6.8E-02	0.02	7.2E-05	0.01
^{137}Cs	1.70E+07	8.0E-05	1.4E+03	2.40E-01	2.70E-01	3.3E+02	3.7E+02	51.26	1.6E-01	13.46
^{137}mBa	1.61E+07	8.0E-05	1.3E+03	5.30E-13	1.00E-11	6.8E-10	1.3E-08	0.00	3.4E-13	0.00
^{151}Sm	1.48E+06	8.0E-05	1.2E+02	7.50E-04	8.40E-04	8.9E-02	1.0E-01	0.01	4.4E-05	0.00
^{152}Eu	1.01E+03	8.0E-05	8.1E-02	2.40E-01	3.10E-01	1.9E-02	2.5E-02	0.00	9.7E-06	0.00
^{154}Eu	4.26E+04	8.0E-05	3.4E+00	2.00E-01	2.50E-01	6.8E-01	8.5E-01	0.11	3.4E-04	0.03
^{155}Eu	4.42E+04	8.0E-05	3.5E+00	8.00E-03	9.80E-03	2.8E-02	3.5E-02	0.00	1.4E-05	0.00
^{226}Ra	2.38E+02	8.0E-05	1.9E-02	4.60E-01	2.50E-01	8.8E-03	4.8E-03	0.00	4.4E-06	0.00

Table 10. Unabated and Abated Dose to the Maximum Exposed Individual from the New AW Farm Exhauster. (2 sheets)

	APQ	Release Factor	Released	CAP-88 - East		Unabated Emissions		% Total OffSite	Abated Emissions	
				Offsite MPR	OnSite MPR	Offsite MPR	OnSite MPR		I filter	% Total Abated
	Ci			mrem/Ci		mrem/yr				
^{227}Ac	1.29E+02	8.0E-05	1.0E-02	1.50E+01	1.80E+01	1.6E-01	1.9E-01	0.02	7.8E-05	0.01
^{228}Ra	3.65E+01	8.0E-05	2.9E-03	1.90E-01	7.00E-02	5.6E-04	2.0E-04	0.00	2.8E-07	0.00
^{229}Th	2.49E+01	8.0E-05	2.0E-03	1.60E+01	2.00E+01	3.2E-02	4.0E-02	0.00	1.6E-05	0.00
^{231}Pa	2.70E+02	8.0E-05	2.2E-02	1.20E+01	1.40E+01	2.6E-01	3.0E-01	0.04	1.3E-04	0.01
^{232}U	2.73E+01	8.0E-05	2.2E-03	1.10E+01	1.30E+01	2.4E-02	2.8E-02	0.00	1.2E-05	0.00
^{232}Th	6.08E+00	8.0E-05	4.9E-04	8.00E+00	1.00E+01	3.9E-03	4.9E-03	0.00	1.9E-06	0.00
^{233}U	4.46E+02	8.0E-05	3.6E-02	3.10E+00	3.70E+00	1.1E-01	1.3E-01	0.02	5.5E-05	0.00
^{234}U	6.14E+01	8.0E-05	4.9E-03	3.10E+00	3.70E+00	1.5E-02	1.8E-02	0.00	7.6E-06	0.00
^{235}U	2.34E+00	8.0E-05	1.9E-04	3.00E+00	3.50E+00	5.6E-04	6.6E-04	0.00	2.8E-07	0.00
^{236}U	2.73E+00	8.0E-05	2.2E-04	2.90E+00	3.50E+00	6.3E-04	7.6E-04	0.00	3.2E-07	0.00
^{237}Np	5.81E+01	8.0E-05	4.7E-03	1.20E+01	1.40E+01	5.6E-02	6.5E-02	0.01	2.8E-05	0.00
^{238}Pu	2.95E+03	8.0E-05	2.4E-01	7.60E+00	8.90E+00	1.8E+00	2.1E+00	0.28	9.0E-04	0.07
^{238}U	5.06E+01	8.0E-05	4.1E-03	2.80E+00	3.30E+00	1.1E-02	1.3E-02	0.00	5.7E-06	0.00
^{239}Pu	2.71E+04	8.0E-05	2.2E+00	8.20E+00	9.50E+00	1.8E+01	2.1E+01	2.79	8.9E-03	0.73
^{240}Pu	4.86E+03	8.0E-05	3.9E-01	8.20E+00	9.50E+00	3.2E+00	3.7E+00	0.50	1.6E-03	0.13
^{241}Pu	6.00E+04	8.0E-05	4.8E+00	1.30E-01	1.50E-01	6.2E-01	7.2E-01	0.10	3.1E-04	0.03
^{241}Am	9.67E+04	8.0E-05	7.7E+00	1.30E+01	1.50E+01	1.0E+02	1.2E+02	15.79	5.0E-02	4.15
^{242}Pu	3.77E-01	8.0E-05	3.0E-05	7.80E+00	9.10E+00	2.3E-04	2.7E-04	0.00	1.2E-07	0.00
^{242}Cm	6.99E+01	8.0E-05	5.6E-03	4.10E-01	5.00E-01	2.3E-03	2.8E-03	0.00	1.1E-06	0.00
^{243}Am	1.34E+01	8.0E-05	1.1E-03	1.30E+01	1.50E+01	1.4E-02	1.6E-02	0.00	7.0E-06	0.00
^{243}Cm	7.92E+00	8.0E-05	6.3E-04	8.50E+00	1.00E+01	5.4E-03	6.3E-03	0.00	2.7E-06	0.00
^{244}Cm	2.25E+02	8.0E-05	1.8E-02	6.70E+00	8.00E+00	1.2E-01	1.4E-01	0.02	6.0E-05	0.00
Total						6.4E+02	5.3E+02		1.2E+00	

APQ = annual possession quantity.
MPR = maximum public receptor.

16.0 COST FACTORS/BEST AVAILABLE RETROFIT CONTROL TECHNOLOGY OR AS LOW AS REASONABLY ACHIEVEABLE CONTROL TECHNOLOGY DEMONSTRATION

Regulatory Citation: "Provide cost factors for construction, operating, and maintenance of the proposed control technology components and system, if a BARCT or ALARACT demonstration is not submitted with the NOC."

Pursuant to WAC 246-247-110, App. A (16), *Application Information Requirements*, cost factors for construction, operation, and maintenance of proposed technology requirements are not required, because the WDOH has provided guidance that HEPA filters generally are best available radionuclide control technology (BARCT) for particulate emissions (external letter AIR 92-107, A. W. Conklin, WDOH, to J. D. Bauer, RL, "Surveillance Report Generated by the DOH of KE and KW Basin on 09/16/1992," dated October 5, 1992). Because the radionuclides of concern are particulates, it is proposed that the HEPA filter controls described in Section 6.0 be accepted as BARCT. Compliance with the substantive BARCT technology standards is described in Section 18.0.

17.0 FACILITY PROCESS ESTIMATED LIFETIME

Regulatory Citation: "Provide an estimate of the lifetime for the facility process with the emission rates provided in this application."

Removal of the old AN and AW exhausters, once the work has begun, is expected to take no longer than six months each. The new ventilation systems are designed for continuous operation for over 35 years, with the exception of consumable materials.

18.0 CONTROL TECHNOLOGY STANDARDS

Regulatory Citation: "Indicate which of the following control technology standards have been considered and will be complied with in the design and operation of the emission unit(s) described in this application:....

ASME AG-1, ASME N509, ASME N510, ASME NQA-1, 40 CFR 60, Appendix A Methods 1, 1A, 2, 2A, 2C, 2D, 4, 5, and 17, and ANSI N13.1"

These ventilation systems are designed to meet the required WAC-246-247-110 control technology standards as described in Section 18.1.

18.1 Abatement Technology Standards for the New Ventilation System

The required abatement technology standards are: ASME AG-1, ASME N509, and ASME N510, *Testing of Nuclear Air Treatment Systems.*

The abatement technology for the new ventilation system is described in HNF-6779. This ventilation system will be designed to meet the cited codes and standards as follows:

The exhauster skid ducting, filters, demister pad, valves, and fan will meet the applicable design, construction, and testing requirements contained in ASME AG-1a, ASME N509, and ASME N510, *Testing of Nuclear Air Treatment Systems*. Where there are conflicts in standards, ASME AG-1a shall take precedence.

The system ductwork will meet the requirements of ASME N509, Section 5.10, and ASME AG-1a, Section SA. Where there are conflicts in standards, ASME AG-1a will take precedence.

The primary tank offgas piping, valves, and condensate drain lines will meet the applicable requirements for design and construction contained in ASME B31.3, *Process Piping*.

All sections of the condensate piping construction (except tie-in to the ventilation system) will be fully welded construction. The condensate drain line will be fabricated from 300 series stainless steel material. Ventilation condensate lines will be designed, fabricated, and inspected per ASME B31.3.

The primary ventilation system will be designed using the materials specified in ASME AG-1a and ASME N509. Where there are conflicts in standards, ASME AG-1a will take precedence.

The primary ventilation exhaust fan and drives will meet requirements of ASME AG-1a, Section BA, ASME N509, Sections 5.7 and 5.8, and AMCA 99, *Standards Handbook*. Where there are conflicts in standards, ASME AG-1a will take precedence. The fans will be tested and certified in accordance with ASHRAE 51-85, *Laboratory Methods of Testing Fans for Rating*" and AMCA 210-85, *Laboratory Methods of Testing Fans for Rating*.

The HEPA filters will meet the applicable performance, design, construction, acceptance testing, and quality assurance requirements in ASME AG-1a, Section FC.

The filter housings and housing supports will meet the applicable design performance, fabrication, inspection, acceptance testing, and quality assurance requirements of ASME AG-1a, Section Ha, and ASME N509, Section 5.6. Where there are conflicts in standards, ASME AG-1a will take precedence.

The heating coils, exposed to DST vapor space airflow, will utilize a liquid heat transfer medium and will be designed, manufactured, and tested to meet applicable requirements of ASME AG-1a, Section CA, and ASME N509, Section 5.5. Where there are conflicts in standards, ASME AG-1a will take precedence.

The ASME AG-1 portions of the system shall be tested in accordance with the methods described in ASME AG-1 and ASME N510 to verify compliance with the requirements

of ASME N509. The ASME B31.3 and ASME Section VIII, Division 1 portions of the system shall be tested and examined in accordance with these codes.

18.2 Quality Assurance for the New Ventilation System

The required technology standard is ASME NQA-1, *Quality Assurance Program Requirements for Nuclear Facilities*. Quality assurance for the ventilation system will be performed in accordance with the current revision of TFC-PLN-02, *Quality Assurance Program Description.*

18.3 Stack Volumetric Flow Rate Determination Methods for the New Ventilation System

Required technology standards that address volumetric flow rates are discussed in this section. Stack effluent flow rates are necessary to compile emissions and complete the required annual reports. Requirements for flow rates can be broken into three areas of discussion:

1. Measurements Location: The regulatory methods that specify the measurement location, distances from flow disturbances, and number of measurements to take, are provided in the following two methods:

   40 CFR 60, Appendix A, Methods 1 – "Sample and Velocity Traverses for Stationary Sources."

   40 CFR 60, Appendix A, Methods 1A – "Sample and Velocity Traverses for Stationary Sources with Small Stacks or Ducts."

   Discussion: The difference between these two methods is that one is for stacks 12- in. in diameter and larger, and the other is for under 12 in. The stacks are designed to extend 24 ft 10 in above the bottom of the skid. The stack consists of a 12-in. schedule-40 pipe section where a radionuclide particulate shrouded sampling probe will be installed. Above that the stack necks down to a 10-in. schedule-40 pipe section. Flow measurements will be taken from two 1-in. ports located 90° apart, 10 in. below an installed veribar flow sensor and 78 in. above the bottom of the 12-to-10-in. stack transition section. This location is in accordance with Method 1A.

2. Measurement Method: The regulatory methods that specify the measurement method and instrumentation to use are as follows:

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

   40 CFR 60, Appendix A, Methods 2A – *Direct Measurement of Gas Volume Through Pipes and Small Ducts*

   40 CFR 60, Appendix A, Methods 2C – *Determination of Gas Velocity and Volumetric Flow Rate in Small Stacks or Ducts (Standard Pitot Tube).* This

method is applicable for the determination of average velocity and volumetric flow rate of gas streams in small stacks or ducts.

40 CFR 60, Appendix A, Methods 2D – *Measurement of Gas Volume Flow Rates in Small Pipes and Ducts.*

Discussion: Either Method 2 or Method 2C are used in tank farms. The primary difference between Method 2 and 2C is that Method 2 is applicable for stacks larger than 12 in. in diameter, while 2C applies to stacks smaller than 12 in. Additionally, Method 2 uses an S-type pitot tube, but does allow for a standard type pitot tube. Standard type pitot tubes are used throughout the tank farms.

The stack flow measurement will be taken using a written procedure patterned after Method 2C. A standard pitot tube will be used.

3. Measurement Result: Flow rates are to be reported in dry standard units of temperature and pressure. This means that the moisture content of the air stream must be considered when finalizing the flow rate values. Method 2 and Method 2C (through reference to Method 2) call for the use of the following method for this determination:

   40 CFR 60, A, Methods 4 – *Determination of Moisture Content in Stack Gases.* This method is applicable to determination of moisture content in stack gas. This method is called out for use in Method 2 and 2C (through call out of Method 2). Method 2 requires that flow rates be converted to dry standard units.

Discussion: This method is not used, however. Instead a humidity probe is used to determine moisture content of the stream. The humidity value determined from this instrument is mathematically incorporated into the final flow rate measurement.

In addition to the methods just discussed; 40 CFR 52, Appendix E, *Performance Specifications and, Specification Test Procedures for Monitoring Systems for Effluent Stream Gas Volumetric Flow Rate* is also used. The methods discussed in this section are for manual measurements. The Appendix E method allows for the installation and operation of instrumentation to automatically and continuously take flow rate measurements. The Appendix E method requires use of Method 2 for use in comparison of the instrumentation readings and if after a series of measurements are taken the instrument accuracy is determined to be within that specified by the Appendix E method, the instrumentation is considered acceptable and can be used for flow rate determination and emission reporting purposes.

These ventilation systems will be tested to Appendix E.

18.4 Sampling System Design Methods and Standards

Methods and standards specified for sampling system design are as follows:

40 CFR 60, Appendix A, Methods 5 – *Determination of Particulate Matter Emissions from Stationary Sources*. This method is applicable for the determination of particulate

emissions. This method details the sample probe, collection filter and holder, the vacuum system, and instrumentation that might be used in the design of a particulate sample collection system.

40 CFR 60, Appendix A, Methods 17 – *Determination of Particulate Matter Emissions from Stationary Sources*. This method is applicable for determination of particulate matter emissions, where particulate matter concentrations are known to be independent of temperature over the normal range of temperatures characteristic of emissions from a specified source category. It is intended for use only when specified by an applicable subpart of the standards, and only within the applicable temperature limits (if specified), or when otherwise approved by the administrator. There are other provisions for use of this method. This method details the sample probe, collection filter and holder, the vacuum system, and instrumentation that might be used in the design of a particulate sample collection system.

ANSI N13.1-1969, *Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities.*

ANSI/HPS N13.1-1999, *Sampling and Monitoring Releases of Airborne Radioactive Substances from Stacks and Ducts of Nuclear Facilities.*

Discussion: No attempts have been made to design the sampling and monitoring system to Methods 5 and 17. Instead, the system has been designed to meet the intent of ANSI/HPS N13.1-1999. As discussed in this section, a shrouded probe assembly will be installed in the 12-in. section of the stack. The installation location, as well as the shrouded probe assembly, to include transport lines, will be qualified per the applicable requirements of ANSI/HPS N13.1-1999.

19.0 REFERENCES

00-05-006, 2001, *Hanford Air Operating Permit*, Washington State Department of Ecology, Olympia, Washington.

40 CFR 52, "Approval and Promulgation of Implementation Plans," *Code of Federal Regulations*, as amended.

40 CFR 60, "Standards for Performance of New Stationary Sources," *Code of Federal Regulations*, as amended.

40 CFR 61, "National Emission Standards for Hazardous Air Pollutant," *Code of Federal Regulations*, as amended.

42 USC 2011, *Atomic Energy Act of 1954*, et seq.

42 USC 4321, *National Environmental Policy Act of 1969*, et seq.

42 USC 6901, *Resource Conservation and Recovery Act of 1976*, et seq.

AMCA 99, 1999, *Standards Handbook*, Air Movement and Control Association International, Inc., Arlington Heights, Illinois.

AMCA 210-85, 1985, *Laboratory Methods of Testing Fans for Rating*, Air Movement and Control Association International, Inc., Arlington Heights, Illinois.

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ASHRAE 51-85, *Laboratory Methods of Testing Fans for Rating*, American Society of Heating, Refrigeration, and Air Conditioning Engineers, New York, New York.

ASME, 2001, *ASME Boiler and Pressure Vessel Code*, Section VIII, Division 1, American Society of Mechanical Engineers, New York, New York.

ASME AG-1, 1997, *Code on Nuclear Air and Gas Treatment*, American Society of Mechanical Engineers, New York, New York.

ASME B31.3, 1999, *Process Piping*, American Society of Mechanical Engineers, New York, New York.

ASME N509, 1989, *Nuclear Power Plant Air Cleaning Units and Components*, American Society of Mechanical Engineers, New York, New York.

ASME N510, 1989, *Testing of Nuclear Air Treatment Systems*, American National Standards Institute, New York, New York.

ASME NQA-1, 1989, *Quality Assurance Program Requirements for Nuclear Facilities*, American Society of Mechanical Engineers, New York, New York.

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ERDA 76-21, 1979, *Nuclear Air Cleaning Handbook*, "Design, Construction, and Testing of High-Efficiency Air Cleaning Systems for Nuclear Applications," Oak Ridge National Laboratory, Oak Ridge Tennessee.

External Letter AIR-02-706, A. W. Conklin, WDOH, to J. E. Rasmussen, ORP, dated July 22, 2002.

External Letter AIR 03-602,A. W. Conklin, WDOH, to J. Hebdon, RL, and J. E. Rasmussen, ORP, dated June 3, 2003.

External Letter AIR 03-712, A. W. Conklin, WDOH, to J. Hebdon, RL, and J. E. Rasmussen, ORP, dated August 01, 2003.

External Letter AIR 92-107, A. W. Conklin, WDOH, to J. D. Bauer, RL, "Surveillance Report Generated by the DOH of KE and KW Basin on 09/16/1992," dated October 5, 1992.

External Letter 02-EMD-024, J. E. Rasmussen, ORP, to A. W. Conklin, WDOH, "Non-Destructive Analysis Results for the 241-AN, 241-AP, and 241-AW Tank Farms," dated March 5, 2002.

External Letter 01-EQD-048, W. J. Pasciak, ORP, to A. W. Conklin, WDOH, "Response to the Washington State Department of Health (WDOH) Request for Schedule for Upgrading Double-Shell Tank (DST) Farms 241-SY, 241-AN, 241-AP, and 241-AW Exhauster," dated June 6, 2001.

HNF-6779, 2002, *Project Development Specification for HVAC*, Rev. 0, Numatec Hanford Corporation, Richland, Washington.

HNF-3602, 2002, "*Calculating Potential-to-Emit Release and Dose for FEMP and NOCs*," Revision 1, Fluor Hanford Group Inc., Richland, Washington.

HNF-EP-0528, *National Emission Standards for Hazardous Air Pollutants (NESHAP) Quality Assurance Project Plan for Radioactive Airborne Emissions*, latest revision, Fluor Hanford, Inc., Richland, Washington.

HNF-EP-0835-8, 2002, *Statement of Work for Services Provided by the Waste Sampling and Characterization Facility for the Environmental Compliance Program during Calendar Year 2002*, Fluor Hanford, Inc., Richland, Washington.

RCW 43.21C, "State Environmental Policy Act of 1971," *Revised Code of Washington*, as amended.

PNNL-14467, *Preliminary Synopsis of Release Fraction Tests*, Pacific Northwest National Laboratory, Richland, Washington.

RPP-7171, 2001, *Thermal Hydraulic Evaluation for the 241-AN Tank Farm Primary Ventilation System*, Rev. 0, CH2M Hill Hanford Group Inc., Richland, Washington.

RPP-7881, 2002, *Specification of a Primary Exhauster System for Waste Tank Ventilation*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

RPP-9782, 2002, *ALARACT Demonstration for the Primary Ventilation Systems at the DST Tank Farms for the SST Interim Stabilization Project (Saltwell Pumping)*, Rev. 1, CH2M HILL Hanford Group, Inc., Richland, Washington.

ALARACT 12, *Tank Farm ALARACT Demonstration for Packaging and Transportation of Equipment and Vehicles*

ALARACT 15, *Tank Farm ALARACT Demonstration for Size Reduction of Waste Equipment for Disposal*

ALARACT 16, *Tank Farm ALARACT Demonstration for Work on Potentially Contaminated Ventilation System Components.*

RPP-11731, 2003, *Thermal Hydraulic Evaluation for the 241-AW Tank Farm Primary Ventilation System*, Rev. 0, CH2M HILL Hanford Group Inc., Richland, Washington.

RPP-QAPP-004, 2001, *CHG Quality Assurance Program Plan For Tank Farm Contractor Radioactive Air Emissions*, Rev.0, CH2M HILL Hanford Group, Inc., Richland, Washington.

TFC-PLAN-02, 2002, *Quality Assurance Program Description*, Rev. A, CH2M HILL Hanford Group, Inc., Richland, Washington.

Tank Waste Information Network System (TWINS) database, Queried September 9, 2003, [Sample Analysis], http://twins.pnl.gov/twins.htm.

WAC 197-11-845, "SEPA Rules," *Washington Administration Code*, as amended.

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

Attachment 2
04-ED-028

Hanford Site Air Operating Permit 00-05-006,
"Notification of Off-Permit Change"

HANFORD SITE AIR OPERATING PERMIT

Notification of Off-Permit Change

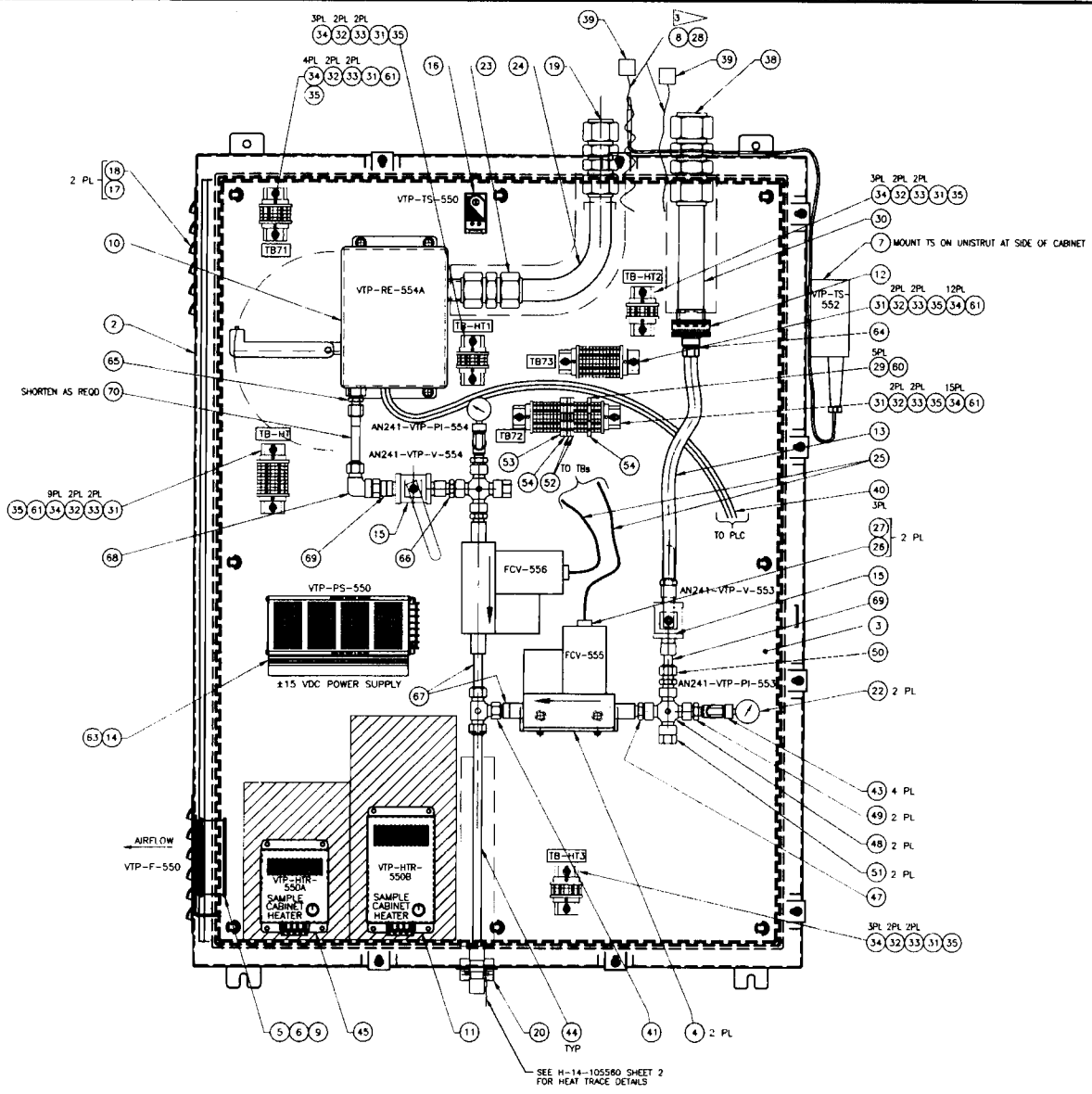
Permit Number: 00-05-006

This notification is provided to the State of Washington, Department of Ecology; Washington State Department of Health; and the U.S. Environmental Protection Agency as notice of an off-permit change described as follows.

This change is allowed pursuant to WAC 173-401-724(1) as:
1. Change is not specifically addressed or prohibited by the permit terms and conditions
2. Change does not weaken the enforceability of the existing permit conditions
3. Change is not a Title I modification or a change subject to the acid rain requirements under Title IV of the FCAA
4. Change meets all applicable requirements and does not violate an existing permit term or condition
5. Change has complied with applicable preconstruction review requirements established pursuant to RCW 70.94.152.

Provide the following information pursuant to Washington Administrative Code 173-401-724(3):

Description of the change:	
Submittal of *Radioactive Air Emissions Notice of Construction, Project W-314 – Operation of New Ventilation Systems in AN and AW Tank Farms*, due to an increase in capacity (ventilation flow rate). This notice of construction allows replacement of the existing ventilation system with a new system with a higher flow rate. The new ventilation system also has abatement controls and monitoring devices that meet current standards. The current emission units (200E P-296AN-001 and 200EP-296AW-001) operate at approximately 1,000 ft^3/min. The new ventilation systems will be capable of operating up to 4,000 ft^3/min.	
Date of Change: To be provided in the agency approval order.	
The date the approval order is issued by Washington State Department of Health.	
Describe the emissions resulting from the change:	
Current emissions from the existing AN and AW ventilation system were reported as a dose to the public of 9.1E-09 mrem/year (6.3E-09 for AN and 2.8E-09 for AW). These values are from DOE/RL-2003-19, *Radioactive Air Emissions Report for the Hanford Site, Calendar Year 2002*. The abated dose to the public from the operation of these new ventilation systems is estimated to be 2.6 mrem/year (1.4 for AN and 1.2 for AW).	
Describe the new applicable requirements that will apply as a result of the change: To be provided in the agency approval order.	
Conditions and limitations will be those identified in the approved order when issued by Washington State Department of Health.	
For Hanford Use Only:	
AOP Change Control Number:	Date Submitted:



VTP-ENCL-550

1 ASSEMBLY, SAMPLE CABINET

SCALE: 3/8

DWG NO	TITLE	REF NUMBER	TITLE
DRAWING TRACEABILITY LIST		REFERENCES	
		NEXT USED ON SHEET 1	

REV	DESCRIPTION	DATE	BY
6	DIRECT DRAWING REVISION PER ECN 721772-R0	5/04	KSD

REVISIONS

PREMIER Technology, Inc.

GFORCE

NAME	
RB HOAG	
D. Bowers	

U.S. DEPARTMENT OF ENERGY
Office of River Protection

AN241-VTP (W-314)
EXHAUSTER TRAIN "A"
EFFLUENT MONITORING SYSTEM

SIZE	SYSTEM	DWG NO	REV
F	241AN	7508	H-14-105566 6

SCALE SHOWN | REF 620447 | SHEET 3 OF

22278

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1.0 PURPOSE AND SCOPE

1.1 Purpose
(5.1.1, 5.1.2)

This Quality Assurance Project Plan (QAPP) addresses Quality Assurance (QA) requirements and responsibilities for radioactive air emission measurement activities conducted by the Tank Operations Contractor (TOC). This QAPP applies to designated (major) and non-designated (minor) emission sources and has been prepared to address those QA program elements specified in 40 CFR 61, Appendix B, Method 114, Section 4.0.

Radioactive air emission measurement requirements are defined in Subpart H of 40 CFR 61, "National Emission Standards for Hazardous Air Pollutants" (NESHAP). Subpart H is titled, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities." NESHAP requires continuous collection and measurement of emissions from emission points with the potential to exceed one percent of the standard of 10 millirem annual effective dose equivalent (EDE) to the maximally exposed individual (MEI) from operations on the Hanford Site -- a potential public exposure consequence of equal to or greater than 0.1 mrem per year. In addition, a quality assurance program is conducted that meets the performance requirements described in Appendix B, Method 114, "Test Methods for Measuring Radionuclide Emissions from Stationary Sources," for major and minor sources.

Radioactive air emission measurement requirements are also defined in WAC 246-247, "Radiation Protection -- Air Emissions." WAC 246-247-075 reiterates the quality assurance requirement of Method 114, and specifies that the quality assurance program be compatible with applicable national standards such as ANSI/ASME NQA-1-1988, "Quality Assurance Program Requirements for Nuclear Facilities;" ANSI/ASME NQA-2-1986, "Quality Assurance Requirements for Nuclear Facilities Applications;" QA/R-2; and QA/R-5. These QAPP implements applicable requirements of the quality assurance program description (QAPD) described in TFC-PLN-02. The WRPS QAPD is responsive to 10 CFR 830, Subpart A and DOE O 414.1C and uses NQA-1-2004 as an implementation standard. Laboratories performing analytical work shall be required to develop and implement QA plans that meet the minimum requirements of DOE/RL-96-68, "Hanford Analytical Services Quality Assurance Requirements Document (HASQARD)." In addition, these QA plans shall be established to satisfy the requirements of 10 CFR 830, Subpart A and DOE O 414.1C, with appropriate grading of control, to the scope of work defined in the contract.

The Mission Support Alliance, LLC (MSA) Environmental Integration group maintains and implements the site-wide effluent and environmental monitoring program conducted in compliance with all applicable environmental regulations, DOE Orders, and Mission Support Contractor management control systems. The MSA project is addressed in the most recent revision of MSC-23333, "MSA Environmental Quality Assurance Project Plan."

1.2 Scope

The QA requirements of 40 CFR 61, Appendix B, Method 114, apply to those emission points that have been estimated to possess the potential of releasing emissions with consequential public dose exposures equal to or greater than 0.1 mrem per year, commonly referred to as "major" emission units. These QA requirements are also applied to those emission points that have been

estimated to possess the potential of releasing emissions with consequential public dose exposures less than 0.1 mrem per year, referred to as "minor" emission units, on a graded basis.

References for potential emission estimates for Tank Farm related activities can be found in the latest revision of RPP-29791, "Tank Farm Stack NESHAP Designation Determinations." This document has been written to include, although is not limited to, all those emission points with potential emission estimates equal to or greater than 0.1 mrem per year. Currently, these emission points include the following:

Stack #	Facility	AOP Emission Unit Number
296-A-22	242-Evaporator Vessel Vent Stack - major only during campaigns	142
296-A-42	241-AY/AZ Tank Exhauster	93
296-A-44	241-AN Tank Farm Exhauster	735
296-A-45	241-AN Tank Farm Exhauster	736
296-A-46	241-AW Tank Farm Exhauster	855
296-A-47	241-AW Tank Farm Exhauster	856
296-P-43	Portable Exhauster (POR04)	57
296-P-44	Portable Exhauster (POR05)	58
296-P-45	Portable Exhauster (POR06)	50
296-P-47	Portable Exhauster (POR08)	498
296-P-48	Portable Exhauster (POR03)	749
296-P-49	Portable Exhauster (POR126)	885
296-P-50	Portable Exhauster (POR127)	886
296-S-21	222-S Laboratory Exhauster.	254
296-P-107	Portable Exhauster (POR107)	1293

Major and minor emission points are also identified and permitted in the current revision of the Hanford Site Air Operating Permit (AOP) #00-05-006, WDOH Conditions.

2.0 IMPLEMENTATION

This plan is effective on the date shown in the header.

3.0 PROCESS

Method 114 of the NESHAP specifies that each facility, required to measure its radionuclide emissions, shall conduct a QA program in conjunction with the radionuclide emission measurements. This program shall ensure that the emission measurements are representative, are of known precision and accuracy, and include administrative controls to ensure prompt response when emission measurements indicate unexpectedly large emissions. Method 114 specifies that the program shall consist of a system of policies, organizational responsibilities, written procedures, data quality specifications, audits, corrective actions and reports. The following sections are included to demonstrate compliance with the Method 114 quality assurance specified program elements.

3.1 Stack Monitoring and Sample Collection Methods

The NESHAP regulations specify, for those emission points that require continuous collection and measurement, that all radionuclides that could contribute greater than ten percent of the potential effective dose equivalent shall be measured. For the applicable Tank Farm emission points, particulate radionuclides fall into this category. Particulate radionuclides samples are collected on filter media. Currently, membrane filters are the type selected for use on all applicable emission points.

Minor emission points are measured periodically in accordance with permit conditions identified in the current AOP (e.g., via alpha/beta smears, Non-Destructive Assays (NDA), filter media, etc.).

3.2 Radionuclide Analysis Methods

Radionuclide analysis is controlled by the current revision of HNF-EP-0835-xx, "Statement of Work for Services provided by the Waste Sampling and Characterization Facility for Environmental Compliance Program During Calendar Year XXXX." Radioactive air emission measurement data is managed in accordance with Appendix D of MSC-23333 to ensure compliance with Method 114.

3.3 Organizational Structure, Functional Responsibilities, Levels of Authority, and Lines of Communications

NESHAP specifies that the organizational structure, functional responsibilities, levels of authority, and lines of communications for all activities related to the emissions measurement program shall be identified and documented. This section addresses these items.

NESHAP and WAC 246-247 require annual reporting of radioactive emissions from all Hanford Site emission sources. Reporting is the final step in the process. The entire process includes a variety of tasks. These tasks are addressed separately below. Each task is described and the organization responsible is identified. The entire process involves both the TOC Organizations and the Mission Support Contractor ES group. Organization charts for the TOC are contained in TFC-PLN-02. The MSA Organization is addressed in the most recent revision of MSC-23333.

3.3.1 Sampler Design

Current sampling system design compliance with the NESHAP requirements are addressed in Notice of Construction Applications submitted in accordance with WAC 246-247.

3.3.2 Emission Point and Sample Identification

MSA assigns individual emission point or stack identification numbers. In addition, MSA assigns sample Electronic Data Processing (EDP) codes for each type of radionuclide sampler located at each emission point. Washington Department of Health (WDOH) assigns emission unit numbers for all emission points, major and minor, through the AOP process. Samples taken to the labs are also assigned unique identifiers. These sample identifiers and EDP Codes can be found in a database known as the Automated Bar Coding of Air Samples at Hanford (ABCASH). Each EDP Code has location files associated with it. Within these location files are various fields such as: EDP Code emission point identification, sampler instrument type, instrument accuracy,

emission point estimated flow rate, sampler collection efficiency, etc. ABCASH uses the information contained within these fields, in part, to derive sample results. The TOC Environmental Group is responsible for the information these fields contain.

3.3.3 Sampler Maintenance

Sampling systems are maintained by the TOC instrument technicians per corrective and preventive maintenance procedures. The Computerized History and Maintenance Planning Software (CHAMPS) is the work management system (WMS) software used at Washington River Protection Solutions LLC (WRPS) to process work orders. Applicable preventive maintenance procedures are listed using individually assigned preventive maintenance (PM) ID numbers. The Work Management System, including preventive and corrective maintenance, is conducted in accordance with TFC-OPS-MAINT-C-01.

3.3.4 Sampler Operation

Health Physics Technicians (HPTs) operate the sampling systems per the following procedures:

- TF-OPS-005, "Daily CAM and Record Sampler Inspections"
- TF-OPS-006, "Air Sample Filter Exchange and Inspections for Record Samplers, Stack and Annulus CAMs"
- TF-OPS-013, "Inspections and Source Checks of AMS-3 CAMs and Effluent Record Samplers"
- TF-OPS-015, "Inspections and Source Checks of AMS-4 Annulus Leak Detector CAMs"
- TF-OPS-016, "Inspections and Source Checks of 702-AZ AMS-4 CAMs and Effluent Record Samplers"
- TF-OPS-018, "Inspections and Source Checks of POR03, POR04, POR05, POR06, and POR-008 AMS-4 CAMs and Effluent Record Samplers"
- TF-OPS-021, "Inspections and Source Checks of Primary Tank Exhauster, Annulus Exhauster AMS-4 CAMs and Effluent Record Samplers"
- TF-OPS-022, "Inspections and Source Checks for 242-A Stack CAMs and Effluent Record Samplers."
- TF-OPS-031, "Inspections and Source Checks on AMS-4 CAMs and Effluent Record Samplers on AN/AW HMI-Controlled Exhausters."

The TOC Environmental Group is responsible for identifying the requirements in these procedures. These requirements are contained in TFC-ESHQ-ENV-STD-03 and TFC-ESHQ-ENV-STD-05. For example, sampler flow rates are established based on the method listed in TFC-ESHQ-ENV-STD-05.

3.3.5 Sample and Sample Data Collection

HPTs collect the samples and sample data in accordance with TF-OPS-006. The data is collected via the ABCASH system. Use of the ABCASH system is described in TFC-ESHQ-RP_MON-P-02.

Sampling frequency is determined by the TOC Environmental Group and coordinated with MSA. MSA coordination ensures that detection limits are consistent with sample periods and that appropriate sample media, (e.g., the particulate collection filter type) is used. MSA writes, and WRPS approves, the Statement of Work (SOW) that instructs the labs on what to analyze for and how to perform the analysis. The type of sample media used affects these decisions.

3.3.6 Sample Transport to the Laboratory

HPTs transport sample and sample data to the laboratory. In addition, they download the data into the ABCASH system. Chain-of-custody and transport to laboratory requirements are addressed in TFC-ESHQ-ENV-STD-05 and TFC-ESHQ-RP_MON-P-02.

3.3.7 Sample Analysis at the Laboratory

The laboratory analyzes data in accordance with the statement of work (SOW) written by MSA. The TOC Environmental Group provides input and reviews the SOW during its development.

3.3.8 Sample Data Validation

Once the samples are turned in and the sample data is downloaded into the ABCASH system, the responsible HPT validates the sample data. Validation is the process used to indicate that possible transcription errors have been eliminated as much as possible. Periodically other errors appear. These errors may include, for example, incorrectly recorded totalizer "off" readings due to change-out of a totalizer in the middle of a sample period. When these types of errors are found, the Environmental Group provides assistance in estimating what the value should be and suggests data changes that will minimize sample result errors. The responsible HPT makes the corrections, or is at least informed of the changes that were made and the reasons therefore. Once the data has been corrected, the data is re-validated by the responsible HPT.

3.3.9 Sample Results

The data reduction process by which the raw sample data and analysis results are combined into a final result is accomplished at the laboratory via the most current revision of MSC-23333 and HNF-EP-0835. These results are input into the ABCASH system. For more details concerning the ABCASH system the reader may reference HNF-7926, "ABCASH 2 User Guide."

3.3.10 Review of Sample Results

MSA sends quarterly ABCASH data reviews. These data reviews are for the facilities to be familiar with their stack sampling data throughout the year and to adhere to a corrective action stemming from a WDOH Notice of Correction No. 4 from Audit No. 64, "Sitewide Dose Assessment Audit," September 1995.

The TOC Environmental Group reviews these ABCASH reports and ensures the following tasks are accomplished:

- Appropriate corrections are determined
- The responsible HPTs are requested to make necessary corrections
- MSA is sent a response documenting either the corrections which are made or the reason why the anomaly does not need to be corrected.

3.3.11 Derivation of Annual Emission Point Final Emission Results

MSA derives the final emission results from the data listed in the ABCASH system, which is addressed in MSC-23333.

3.3.12 Determination of Emission Point Flow Rates

Emission point flow rates are determined either by manual measurements taken via procedures performed by Vent and Balance personnel or by instrument measurements. These instruments or similar instruments have been certified accurate to 40 CFR 52, Appendix E.

Procedures used are a combination of the generic procedure 3-VBP-155, "Air Flow Test For Tank Farm Stack and Ducts," and the applicable emission point specific Appendix to this procedure. The measurements are performed by Vent and Balance personnel. Final calculations are completed by qualified personnel assigned by the Facility Environmental Group.

Flows are also measured, in those systems, once a year by Vent and Balance using the same procedures and appropriate appendix. The Environmental Group is responsible for completion of the final calculations. The final value computed from the measured flow is compared to the instrument reading to confirm that its accuracy is still being maintained. If not, the TOC Ventilation Engineering Discipline Lead is contacted to determine the cause of the inaccurate readings, and correct as necessary.

3.3.13 Determination of Emission Point Operating Time

Exhauster operating times are recorded in the following ways.

- Most exhauster operating times are recorded on data sheets found in the Tank Monitor and Control System (TMACS) station. The TOC Operators notify the TMACS station of any exhauster status changes per instruction in the various exhauster operating procedure. The TMACS Operator logs exhauster status changes per Tank Farm Operating Procedure, TO-040-035, "Operate Tank Monitor and Control System (TMACS) Surveillance System for Underground Storage Tanks."
- Operating times for portable exhausters used for retrieval of Single Shell Tank (SST) waste is also recorded on various other data sheets listed in procedures developed specific for the tank being retrieved.

- Operating times for the 242-A Evaporator exhausters are compiled on ticker data sheets.
- Operating times for the 296-S-21, 222-S exhausters are assumed to operate all year long.

The TOC Environmental Group compiles the information from the above sources and uses this information to compile annual exhauster operating times used for annual reports.

3.3.14 Derivation of Volumetric Flow from Emission Points

Volumetric flows are determined by the TOC Environmental Group in the following manner:

- The flows, measured by Vent and Balance procedures, are averaged and multiplied by the total annual emission point operating time.
- For systems with certified flow instruments, the recorded totalized flows are added for the year.

These derived volumetric flows are compiled for all applicable emission points and submitted to MSA for Annual Report preparation.

3.3.15 Final Emission Point Emission Determination

MSA combines the final emission results with the emission point volumetric flows to obtain total annual emissions in accordance with MSC-23333.

3.3.16 Dose Modeling

Pacific Northwest National Laboratory (PNNL) is designated by DOE/RL to perform dose modeling for the Hanford Site as described in MSC-23333. Thus, MSA coordinates this activity as necessary to derive the effective dose equivalents (EDE) from the Tank Farm emission points, as well as for the rest of the Site. With this, the dose modeled dispersion factors generated by PNNL are combined with the final emission point results to arrive at a final EDE to the maximum exposed individual (MEI).

3.3.17 Annual Report

A draft report is sent out for review. The TOC Environmental Group reviews this report and provides comments as necessary. After comment incorporation, a TOC Facility Manager Certification is required before submittal to RL with subsequent release and publication. MSA coordinates all these activities.

3.4 Administrative Controls for Prompt Response of Emissions Increase due to Unplanned Operations

Method 114 requires that administrative controls be prescribed to ensure prompt response in the event that emission levels increase due to unplanned operations. The TOC complies with this through implementation of:

- TFC-ESHQ-ENV_FS-C-01, "Environmental Notification"
- TFC-PLN-85, "Emergency Management Program Plan."

3.5 Sample Collection and Analysis Procedures

Method 114 requires that the sample collection and analysis procedures used in measuring the emissions be described. The following sections provide the necessary discussion.

3.5.1 Sampling Sites Identification, Number of Sampling Points, and Rationale for Site Selections

The following documents provide the necessary information:

- PNNL-11701, "Generic Effluent Monitoring System Certification for Salt Well Portable Exhauster" provides certification to ANSI/HPS N13.1-1999 for exhausters 296-P-43, 296-P-44, 296-P-45, 296-P-47, and 296-P-48
- RPP-15242, "ANSI N13.1 Compliance Matrix for Portable Exhauster POR-008"
- RPP-15693, "ANSI N13.1 Compliance Matrix for Portable Exhauster POR04"
- RPP-16031, "ANSI N13.1 Compliance Matrix for Portable Exhauster POR03"
- RPP-20901, "ANSI N13.1 Compliance Matrix for Portable Exhauster POR05"
- RPP-20902, "ANSI N13.1 Compliance Matrix for Portable Exhauster POR06"
- RPP-25694, "ANSI N13.1 Compliance Matrix for Portable Exhausters POR-126 and POR-127"
- RPP-ENV-46801, "ANSI N13.1 Compliance Matrix for the 241-AN Tank Farm Exhauster Stacks 296-A-44, and 296-A-45."
- RPP-ENV-46802, "ANSI N13.1 Compliance Matrix for the 241-AW Tank Farm Exhauster Stacks 296-A-46, and 296-A-47."
- HNF-EP-0479-5 provides additional description for 296-A-42
- HNF-7717, "222-S Laboratory Complex Facility Effluent Monitoring Plan Determination."
- RPP-29791, "Tank Farm Stack Designation Determinations."
- Vent and Balance procedures contain figures that show the sample locations.

3.5.2 Sampling Probe Description and Representativeness of Samples

The sampling probes and representativeness of the samples are identified/discussed in the references in Section 3.5.1.

3.5.3 Continuous Monitoring System Description, Sensitivity, and Calibration

The Tank Farm systems applicable to discussion within this QAPP have Continuous Air Monitors (CAMs). The collection efficiency of these systems has not been determined. Therefore, these CAMs are only used as indicating devices.

3.5.4 Sample Collection Systems Description for each Radionuclide Measured, Frequency of Collection, Calibration Procedures, and Frequency of Calibration

Particulates are collected via what is known as a record sampler. The record sampler's instrumentation used on the applicable emission points are described in NOC Applications. For particulate radionuclides, membrane filters are currently used. These filters are changed, for the most part, after the system has been running for at least 336 hours. Sample collection occurs continuously during operation of the applicable emission point.

Calibration of the collection portion of the system is not applicable.

3.5.5 Laboratory Analysis Procedures Description, Radionuclide Measured, Frequency of Analysis, Calibration Procedures, and Frequency of Calibration

A description of the laboratory analysis procedures used for each radionuclide measured, including frequency of analysis, calibration procedures and frequency of calibration can be found in the current revisions of HNF-EP-0835 and MSC-23333.

3.5.6 Sample Flow Rate Measurement Systems Description, Calibration Procedures and Frequency of Calibration

As discussed previously, the sampling systems instrumentation (including flow rate instruments) are maintained by applicable maintenance procedures listed in the computer based CHAMPS System. The maintenance procedures can be identified by referring to individually assigned instruments PMID numbers. The frequency is also identified in CHAMPS.

3.5.7 Effluent Flow Rate Measurement Description, Frequency of Measurements, Calibration Procedures, and Frequency of Calibration

As mentioned previously, emission point flow rates are determined either by manual measurements taken via procedures performed by Vent and Balance personnel or by instrument measurements which have been certified accurate to 40 CFR 52, Appendix E.

Manual flows are determined by procedures, and the measurements (for applicable stacks) are obtained quarterly. Currently, the procedures used are a combination of the generic procedure 3-VBP-155 and the applicable emission point specific vent and balance attachment to this plan.

Flows from certified flow instrumentation are measured once a year by Vent and Balance using the same procedure and appropriate vent and balance attachment. The final values determined within the procedure from the measured flows are compared to the instrument reading to determine its accuracy is still being maintained.

The flow instruments and totalizers are also calibrated at least once in every 365 days via maintenance procedures.

3.6 Objectives of Quality Assurance Program

Method 114 specifies that the objectives of the quality assurance program shall be documented and shall state the required precision, accuracy and completeness of emission measurement data including a description of the procedures used to assess these parameters. Accuracy, precision, and completion are defined as follows:

- Accuracy is the degree of agreement of a measurement with a true or known value
- Precision is a measure of the agreement among individual measurements of the same parameters under similar conditions
- Completeness is a measure of the amount of valid data obtained compared to the amount expected under normal conditions.

The objective of the Quality Assurance Program is addressed in MSC-23333 and in the current revision of HNF-EP-0835.

3.7 Quality Control Program for Evaluating and Tracking the Quality of the Emissions Measurement Data Against Preset Criteria

Method 114 specifies a quality control program be established to evaluate and track the quality of the emissions measurement data against preset criteria. The program is to include, where applicable, a system of replicates, spiked samples, split samples, blanks and control charts. Method 114 requires that the number and frequency of such quality control checks be identified.

MSC-23333 addresses these items.

3.8 Sample Tracking System, Sample Handling and Preservation

Method 114 specifies that a sample tracking system be established to provide for positive identification of samples and data through all phases of sample collection, analysis, and reporting. Method 114 also specifies that sample handling and preservation procedures be established to maintain the integrity of samples during collection, storage, and analysis.

The ABCASH system is used to meet the sample tracking requirement. Chain-of-custody is part of the ABCASH system protocols and the process is identified in TFC-ESHQ-RP_MON-P-02. Use of the data once it reaches MSA is described in MSC-23333.

Sample handling and preservation requirements and procedures are in TFC-ESHQ-ENV-STD-05 and the TF-OPS series procedures mentioned previously.

Sample tracking, handling, and preservation at the lab are addressed MSC-23333.

3.9 Regular Maintenance, Calibration and Field Checks

Method 114 specifies that regular maintenance, calibration, and field checks be performed for each sampling system in use by satisfying the requirements found in Table 1.

Where applicable, these maintenance activities are addressed per maintenance procedures and the TF-OPS series procedures. Applicable maintenance procedures are listed in the computer based CHAMPS System and can be found by using the individually assigned instrument PMId numbers. The Work management System is explained in TFC-OPS-MAINT-C-01.

3.10 Periodic Internal and External Audits

Method 114 specifies that periodic internal and external audits be performed to monitor compliance with the quality assurance program. These audits are to be performed in accordance with written procedures and conducted by personnel who do not have responsibility for performing any of the operations being audited. The following is in place to meet this audit requirement:

- A TOC self-assessment program is conducted periodically in accordance with TFC-PLN-123. This plan is not only used for self-assessments of the emissions units discussed in this plan, but it is used for self-assessments regarding all environmental issues at Tank Farms.

- A discussion of the MSA audit program can be found in MSC-23333.

3.11 Corrective Action Program

Method 114 specifies a corrective action program be established including criteria for when corrective action is needed, what corrective actions will be taken, and who is responsible for taking the corrective action.

The TOC problem evaluation/corrective action process is described in TFC-PLN-123.

Discussion of the MSA corrective action program can be found in MSC-23333.

3.12 Periodic Emission Performance Reports

Method 114 specifies that periodic reports to responsible management shall be prepared on the performance of the emissions measurements program. These reports should include assessment of the quality of the data, results of audits and description of corrective actions.

Refer to MSC-23333 for discussion of this issue conducted by MSA.

3.13 Quality Assurance Program Documentation

Method 114 specifies that the quality assurance program should be documented in a quality assurance project plan. This document is written to satisfy this requirement.

4.0 DEFINITIONS

No terms or phrases unique to this plan are used.

5.0 SOURCES

5.1 Requirements

1. 40 CFR 61, Subpart H, "National Emission Standards for Hazardous Air Pollutants (NESHAP)" Code of Federal Regulations, as amended.

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

5.2 References

1. 00-05-006, "Hanford Site Air Operating Permit."

2. 3-VBP-155, "Air Flow Test for Tank Farm Stack and Ducts."

3. 10 CFR 830, Subpart A, "Quality Assurance Requirements."

4. 40 CFR 52, Appendix E, "Performance Specifications and, Specification Test Procedures for Monitoring Systems for Effluent Stream Gas Volumetric Flow Rate."

5. 40 CFR 61, Appendix B, Method 114, "Test Methods for Measuring Radionuclide Emissions from Stationary Sources."

6. ANSI/ASME NQA-1-1988, "Quality Assurance Program Requirements for Nuclear Facilities."

7. ANSI/ASME NQA-2-1986, "Quality Assurance Program Requirements for Nuclear Facilities Applications."

8. DOE/RL-96-68, "Hanford Analytical Services Quality Assurance Requirements Document (HASQARD)."

9. HNF-EP-0479-5, "Tank Farm Facility Effluent Monitoring Plan."

10. MSC-23333, "MSA Environmental Quality Assurance Project Plan."

11. HNF-0835, "Statement of Work for Services Provided by the Waste Sampling and Characterization Facility for the Effluent and Environmental Monitoring Program during Calendar Year xxxx."

12. HNF-7717, "222-S Laboratory Complex Facility Effluent Monitoring Plan Determination."

13. HNF-7926, "ABCASH 2 User Guide."

14. PNNL-11701, "Generic Effluent Monitoring System Certification for Salt Well Portable Exhauster."

15. RPP-15242, "ANSI N13.1 Compliance Matrix for Portable Exhauster POR-008."

16. RPP-15693, "ANSI N13.1 Compliance Matrix for Portable Exhauster POR04."

17. RPP-16031, ANSI N13.1 Compliance Matrix for Portable Exhauster POR03."

18. RPP-20901, "ANSI N13.1 Compliance Matrix for Portable Exhauster POR05."

19. RPP-20902, "ANSI N13.1 Compliance Matrix for Portable Exhauster POR06."

20. RPP-25694, "ANSI N13.1 Compliance Matrix for Portable Exhausters POR-126 and POR-127."

21. RPP-29791, "Tank Farm Stack NESHAP Designation Determinations."

22. RPP-ENV-46801, "ANSI N13.1 Compliance Matrix for the 241-AN Tank Farm Exhauster Stacks 296-A-44, and 296-A-45."

23. RPP-ENV-46802, "ANSI N13.1 Compliance Matrix for the 241-AW Tank Farm Exhauster Stacks 296-A-46, and 296-A-47."

24. TO-040-035, "Operate Tank Monitor and Control system (TMAC) Surveillance System for Underground Storage Tanks."

25. TF-OPS-005, "Daily CAM and Record Sampler Inspections."

26. TF-OPS-006, "Air Sample Filter Exchange and Inspections for Record Samplers, Stack and Annulus CAMs."

27. TO-OPS-013, "Inspections and Source Checks of AMS-3 CAMs and Effluent Record Samplers."

28. TF-OPS-015, "Inspections and Source Checks of AMS-4 Annulus Leak Detector CAMs."

29. TF-OPS-016, "Inspections and Source Checks of 702-AZ AMS-4 CAMs and Effluent Record Samplers."

30. TF-OPS-018, "Inspections and Source Checks of POR03, POR04, POR05, POR06, and POR-008 AMS-4 CAMs and Effluent Record Samplers."

31. TF-OPS-021, "Inspections and Source Checks of Primary Tank Exhauster, Annulus Exhauster AMS-4 CAMs and Effluent Record Samplers."

32. TF-OPS-021, "Inspections and Source Checks of Primary Tank Exhauster, Annulus Exhauster AMS-4 CAMs and Effluent Record Samplers."

33. TF-OPS-022, "Inspections and Source Checks for 242-A Stack CAMs and Effluent Record Samplers."

34. TF-OPS-031, "Inspections and Source Checks on AMS-4 CAMs and Effluent Record Samplers on AN/AW HMI-Controlled Exhausters."

35. TFC-ESHQ-ENV_FS-C-01, "Environmental Notification."

36. TFC-ESHQ-ENV-STD-03, "Air Quality - Radioactive Emissions."

37. TFC-ESHQ-ENV-STD-05, "Radioactive Airborne Effluent Sampling."

38. TFC-ESHQ-RP_MON-P-02, "Automated Bar Coding of Air Samples."

39. TFC-OPS-MAINT-C-01, "Tank Operations Contractor Work Control."

40. TFC-PLN-02, "Quality Assurance Program Description."

41. TFC-PLN-85, "Emergency Management Program Plan."

42. Washington Administrative Code (WAC) 246-247, "Radiation Protection -- Air Emissions."

Table 1. Maintenance, Calibration, and Field Check Requirements.

Sampling system components	Frequency of activity
Cleaning of thermal anemometer elements	As required by application
Inspect pitot tubes for contaminant deposits	At least annually
Inspect pitot tube systems for leaks	At least annually
Inspect sharp-edged nozzles for damage	At least annually or after maintenance that could cause damage
Check nozzles for alignment, presence of deposits, or other potentially degrading factors	Annually
Check transport lines of HEPA-filtered applications to determine if cleaning is required	Annually
Clean transport lines	Visible deposits for HEPA-filtered applications. Surface density of 1 g/cm^3
Inspect or test the sample transport system for leaks	At least annually
Check mass flow meters of sampling systems with a secondary or transfer standard	At least quarterly
Inspect rotameters of sampling systems for presence of foreign matter	At the start of each sampling period
Check response of stack flow rate systems	At least quarterly
Calibration of flow meters of sampling systems	At least annually
Calibration of effluent flow measurement devices	At least annually
Calibration of timing devices	At least annually

ANSI N13.1 Compliance for AN Exhausters

Tank Farm Maintenance Procedure	AN Farm HMI Exhausters

USQ #TF-10-0935-D R 2

Justification:

Format changes and Operations request

Summary of Changes:

Pages 13, 20, 29, and 30, Format change to current limits.
Pages 44 & 45 – Updated fail criteria in table 2 to match identical criteria in 3-FCD-738

Next Periodic Review Date — 07/11/2011

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for inspection and leak testing of the stack flow elements and test sample nozzles of exhausters (A-Train and B-Train) and for checking exhauster sample flow response to comply with requirements of ANSI N13.1, Sampling and Monitoring Releases of Airborne Radioactive Substances From the Stacks and Ducts of Nuclear Facilities (ANSI-N13.1).

1.2 Scope

1.2.1 Performance of this procedure ensures exhauster compliance with ANSI N13.1 as mandated by 40 CFR 61.

1.2.2 This procedure is applicable to both A and B Trains of the AN Farm exhauster. Series 500 numbers identify A-Train components (e.g., AN241-VTP-V-500), and series 600 numbers identify B-Train components (e.g., AN241-VTP-V-600).

1.2.3 Procedure component numbers specify only the instrument/component identifier and the sequential number (e.g., V-500 or V-600). On system drawings and component labels the component numbers include the applicable tank farm and system designator (e.g., AN241-VTP-).

2.0 INFORMATION

2.1 Terms and Definitions

- DMM - Digital MultiMeter
- HMI - Human Machine Interface
- NIST - National Institute of Standards and Technology
- ATP - Acceptance Test Procedure
- OAT - Operational Acceptance Test.

2.2 General Information

2.2.1 The subsections within Section 5.0 (and the associated tables) are intended to be worked as independent activities. The subsections within 5.0 can be worked independently, concurrently, or in parallel with other sections as directed by the field work supervisor. When this procedure is being performed to support maintenance activities the necessary sections of this procedure will be indicated in the work package, data sheets or other maintenance procedures.

2.2.2 If performance of any steps in this procedure is not required for procedure completion, steps not performed shall be indicated as such by marking "N/A" in the appropriate table signoff and explained in the Comments section.

2.2.3 To support maintenance/training and testing activities under a released Acceptance Test Procedure (ATP) or Operational Acceptance Test (OAT) when equipment is not physically attached to contaminated ducting, or the operation will not impact any tank intrusive zones, the exhauster may be operated under the direction of the Test Director utilizing engineering drawings, electrical and valve line up tables or attachments.

2.2.4 Steps that identify components applicable to both A-Train and B-Train may list the A-Train component first and the B-Train component in brackets after (e.g., FTP-562 [FTP-662]). All equipment EINs listed in this procedure are to be prefixed with AN241-VTP- for the full nomenclature unless otherwise indicated.

2.2.5 See Attachment 1 for overview on operation of the Exhauster HMI and navigation to the screens required for completion of this procedure.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

3.1.1 Confirm pressure media (gas, water, chemicals, steam, etc.) and take necessary precautions to prevent personnel injury or damage to equipment when relieving pressure.

3.1.2 All identified hazards and personal protective equipment (PPE) requirements are to be addressed in the pre-job safety meeting.

3.1.3 Industrial Hygiene Technician (IHT) perform Industrial Hygiene (IH) Monitoring per direction from Industrial Hygienist or as specified in an IH Monitoring Plan.

3.2 Equipment Safety

CAUTION - Use of a metal brush is not allowed to be used to clean nozzle or transport tubing because it could cause damage or could impair proper air flow after reassembly.

CAUTION - To prevent potential damage to the stack or fan assemblies from test equipment accidentally dropped into the stack, use of a lanyard or other positive means of securing test equipment placed into the stack from falling in is required.

3.3 Radiation and Contamination Control

3.3.1 When disconnecting, breaching or opening potentially contaminated systems or system components:

- Continuous HPT coverage is required
- Pre-job and post-job surveys are required
- A rag will be used to contain the breach until radiological verifications have been performed
- Special care shall be taken to ensure contamination control when inserting and withdrawing test equipment
- All test equipment shall be surveyed by Health Physics Technician for contamination when withdrawn from the system
- Externals of caps, plugs, and instrumentation shall be surveyed before and after removal from the system and again after reinstallation.

3.3.2 Prior to, periodically during, and after cleaning sampling components, contamination surveys will be performed.

3.3.3 Work in radiological areas will be performed using a Radiological Work Permit following review by Radiological Control per ALARA Work Planning procedure TFC-ESHQ-RP-RWP-C-03.

3.3.4 All waste materials are to be managed in accordance with Waste Planning Checklist and TO-100-052.

3.3.5 When cleaning lines using air pressure, air will be vented and depressurized through an absorbent material and surveyed for contamination by an HPT.

3.4 Environmental Compliance

3.4.1 In accordance with WAC-246-247, Washington Department of Health (WDOH) must be notified at least 7 calendar days prior to any planned operational tests of new or modified emission units that involve emissions control, monitoring, or containment systems of the emission unit. WDOH reserves the right to witness such tests [WAC-246-247-060 (4)].

3.4.2 Tank Farm ventilation systems and exhaust monitoring systems are regulated under Washington State Administrative CODE (WAC) Chapters 173-400, 173-460, and 246-247 and applicable Notices of Construction (NOC) issued to ensure compliance with these regulations. To ensure reporting requirements are met, all planned and unplanned outages of Tank Farm ventilation systems, abatement control equipment, and exhaust monitoring systems, including portable exhausters, must be immediately reported to Environmental per the Environmental On-Call List in accordance with Environmental notification procedure TFC-ESHQ-ENV_FS-C-01.

3.4.3 Comply with RPP-16922, Chapter 4.0, ALARACT Requirements, for Work on Potentially Contaminated Ventilation System Components.

3.4.4 ANSI N13.1 requires Sections 5.1 and 5.2 be performed quarterly and Sections 5.3 through 5.6 be performed, at a minimum, annually. Sections may be performed more frequently in support of corrective maintenance.

3.4.5 Notify Environmental On-Call List in accordance with procedure TFC-ESHQ-ENV_FS-C-01 if any of the below items are met:

- Initial field count of air samples with beta-gamma activity greater than 0.2 Derived Air Concentration (DAC)
- Initial field count of air samples with total alpha activity greater than 5.0 DAC
- Results of 7-day decay count of air samples with total alpha activity greater than 0.2 DAC.

3.4 Environmental Compliance (Cont.)

3.4.6 Elevated workspace air samples that are suspected to be radon or its daughter products are to be reported to the Environmental On-Call List within 24 hours of field count if radon is NOT confirmed. If the sample decay rate is indicative of radon, whether or not the sample remains above 5 DAC alpha within the 24 hour verification period, notification to the Environmental On-Call List is NOT required. If the decay rate is not indicative of radon, the Environmental On-Call List must be notified. Upon notification of the elevated workspace air sample, the Environmental On-Call List must notify WDOH within 24 hours.

3.4.7 HPT coverage will be performed as specified in the radiological Work Permit and/or Radiological Monitoring Plan.

3.4.8 Equipment with removable contamination and/or work with removable contamination will be contained per the latest revision of the Containment Selection guide, Attachment A, in TFC-ESHQ-RP_RWP-C-02.

3.4.9 Pre- and post-job surveys (smears) shall be taken.

3.5 Limits

RPP-16922, Environmental Specification Requirements, Chapter 4.0, ALARACT Requirements.

4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Supplies

The following supplies may be needed to perform this procedure:

- Adjustable-angle inspection mirror with handle
- Tool capable of removing 3" test port cap and bolts
- Man-lift or other approved methods for access to stack air flow test ports
- Calculator
- HMI Engineering password
- Calibrated pressure gauge capable of measuring 0 - 5 In. Hg. in 0.1 increments
- High pressure air source (to 120 psi) with appropriate relief
- Calibrated pressure source, or pressure source and calibrated measuring device, capable of 0-20 In. WC. in 0.01 increments (minimum)
- Communications devices (walkie-talkie, cell phones) as needed
- Calibrated mass flow meter capable of measuring 0-4 scfm in 0.01 scfm increments
- Tygon tubing, ½" diameter
- Calibrated temperature measuring device minimum to 140 °F and accuracy ± 0.1 °F.
- Calibrated Stop Watch or equivalent.

4.2 Performance Documents

The following documents may be needed to perform this procedure:

- TO-060-106, Operate AN Tank Farm Primary Ventilation System (VTP)
- 6-FCD-648, Calibrate Hastings HFC-303 Flow Controller
- 6-PCD-373, Yokogawa EJA110 & EJA120 Pressure Transmitters
- 3-VB-155ZA, Appendix ZA 241-AN Exhauster Stack 296-A-44 Air Flow Test Data Sheets
- 3-VB-155ZB, Appendix ZB 241-AN Exhauster Stack 296-A-45 Air Flow Test Data Sheets
- TO-100-052, Perform Waste Segregation, and Accumulation
- Waste Planning Checklist as required.

4.3 Field Preparation

4.3.1 **ENSURE** Operations has configured system/equipment, as required, to allow performance of this procedure.

4.3.2 **IF** an exhaust train is NOT to be tested, **MARK** N/A for that train in Table 1 through Table 10, as applicable.

4.3.3 **ENSURE** man-lift or other approved stack access method is in place.

4.3.4 **REFER** to Figure 1 to Figure 5 for guidance on equipment nomenclature and location for each train.

4.3.5 **IF** performing Section 5.4, 5.5, or 5.6, **ENSURE** applicable STACK Flow Transmitter (PDIT-551 for A-Train and PDIT-651 for B-Train) is within calibration.

AN241-VTP-PDIT-551: ET-08251 AN241-VTP-PDIT-651: ET-08252

FWS: _____ / _____
Signature Date

4.3.6 **IF** performing Section 5.2, 5.3, or 5.6, **ENSURE** applicable Flow Control Valve (FCV-556 for A-Train and FCV-656 for B-Train) is within calibration.

AN241-VTP-FCV-556: ET-09060 AN241-VTP-FCV-656: ET-09062

FWS: _____ / _____
Signature Date

5.0 PROCEDURE

NOTE - Component numbers are prefixed AN241-VTP-.

- This procedure is applicable to both A and B Trains, A-Train component numbers may be shown first followed by B-Train component numbers in brackets where applicable (e.g., V-580 [680]).
- During performance of this procedure, tools, equipment, and fittings will be removed from and/or inserted into the stack or sample lines. Such items shall be surveyed for radiological contamination prior to and after insertion/removal.
- Exhauster operation shall be conducted per TO-060-106, Operate AN Tank Farm Primary Ventilation System (VTP).
- If performance of any section is not applicable to the exhauster being tested, as determined by the Shift Manager or FWS, mark N/A in applicable section of Data Sheets.
- Sections 5.1, 5.2, 5.3, 5.4, 5.5, and 5.6 are independent and can be performed in any sequence.

5.1 Quarterly Stack Flow Response Test

NOTE - Applicable alarms may be acknowledged as necessary.

5.1.1 **ENSURE** exhaust train to be tested is running, per Operating Procedure TO-060-106, test procedure, or work package instructions as applicable.

5.1.2 **GO TO** the "Exhauster Process Details" screen as follows.

5.1.2.1 **PRESS** F2 on the HMI keyboard.

5.1.2.2 **CLICK** on the Exhauster 'A' or Exhauster 'B' button for the train to be tested.

5.1.3 **RECORD** As-Found stack flow from HMI "Exhauster Process Details" screen on Table 1.

5.1.4 **SET** stack flow as follows:

5.1.4.1 **ENSURE** logged in to HMI from HMI "Exhauster Process Details" screen.

5.1.4.2 **SELECT** [Fan Control].

5.1 Quarterly Stack Flow Response Test (Cont.)

5.1.5 **ENSURE** Fan Mode is "AUTO".

5.1.5.1 **RECORD** As Found Setpoint in Table 1.

5.1.5.2 **SELECT** [Setpoints], **THEN** [Adjust].

5.1.5.3 **ADJUST** setpoint value to 100 acfm above As-Found setpoint recorded in Step 5.1.5.1.

5.1.6 **CHECK** result on Table 1 of stack flow from HMI "Exhauster Process Details" screen (FI-551 for A-Train or FI-651 for B-Train) is tracking satisfactory above As-Found ($\pm$ 10 acfm).

5.1.7 **SET** stack flow as follows:

5.1.7.1 **SELECT** [Fan Control] from HMI "Exhauster Process Details" screen.

5.1.7.2 **SELECT** [Setpoints], **THEN** [Adjust].

5.1.7.3 **ADJUST** setpoint value to 100 acfm below As-Found setpoint recorded in Step 5.1.5.1.

5.1.8 **CHECK** result on Table 1 of stack flow from HMI "Exhauster Process Details" screen (FI-551 for A-Train or FI-651 for B-Train) tracking satisfactory below As-Found ($\pm$ 10 acfm).

5.1.9 **RETURN** stack flow to As-Found flow, as follows.

5.1.9.1 **SELECT** [Fan Control].

5.1.9.2 **SELECT** [Setpoints], **THEN** [Adjust].

5.1.9.3 **ADJUST** stack flow value to As-Found Setpoint value recorded in Step 5.1.5.1.

5.1.10 **RECORD** As-Left stack flow from HMI on Table 1.

5.1.11 **RECORD** any discrepancies on Table 1.

5.2 Record Sample/CAM Flow Meter Secondary Standard Check

5.2.1 **ENSURE** applicable prerequisites in Section 4.0 are satisfied.

5.2.2 **ENSURE** Health Physics Technician (HPT) is available for survey of all tools, equipment and parts inserted into and/or removed from potentially contaminated equipment and systems. **(RPP-16922)**

5.2.3 **ENSURE** the following supplies are available prior to performing Section 5.2.

- Calculator
- Calibrated mass flow meter capable of measuring 0-4 scfm in 0.01 scfm increments
- Tygon tubing, ½" diameter.

5.2.4 **RECORD** MT&E data of test equipment used in this section in Table 10.

5.2.5 **OPERATE** the exhauster per operating procedure TO-060-106, test procedure, or work package instructions as applicable.

5.2.6 **IF** exhaust train to be tested is OPERATING, **SWITCH** exhausters per operating procedure TO-060-106, test procedure,.

OR

IF both exhaust trains will be shut down, **DON** proper PPE.

5.2.6.1 **SHUT DOWN** exhauster(s)

5.2.7 **IF** required, **LOG IN** to HMI.

5.2.8 **ENSURE** sample pumps for the train to be tested are not running.

5.2 Record Sample/CAM Flow Meter Secondary Standard Check (Cont.)

5.2.9 **ENSURE** the following valves for the train to be tested are fully CLOSED.

5.2.9.1 **IF** A-Train is to be tested, **ENSURE** record sample isolation valve V-553 and CAM isolation valve V-554 are CLOSED in ENCL-550.

5.2.9.2 **IF** B-Train is to be tested, **ENSURE** record sample isolation valve V-653 and CAM isolation valve V-654 are CLOSED in ENCL-650.

5.2.10 **ENSURE** the following sample pump outlet valves for the train to be tested are fully OPEN.

5.2.10.1 **IF** A-Train is to be tested, **ENSURE** V-562 and V-572 are fully OPEN.

5.2.10.2 **IF** B-Train is to be tested, **ENSURE** V-662 and V-672 are fully OPEN.

NOTE - The following step will place the HMI to the Exhauster 'A' or Exhauster 'B' Process Detail screen depending on the train to be tested.

5.2.11 **PRESS** F2 on the HMI keyboard, **AND**

CLICK on the appropriate exhauster train button (Exhauster 'A' or Exhauster 'B') to be tested.

5.2.12 **IF** the exhauster "System Mode" is NOT in MANUAL, **SELECT** MANUAL mode as follows;

5.2.12.1 **SELECT** System Mode on Exhauster Process Detail screen.

5.2.12.2 **SELECT** MANUAL to change to MANUAL Mode.

5.2 Record Sample/CAM Flow Meter Secondary Standard Check (Cont.)

NOTE - Sample cabinet (ENCL-550 [650]) door should remain closed and latched except when record sampler isolation valves (V-553 [V-653]) are being operated in order to keep instruments within allowable temperature range.

5.2.13 **IF** testing Record Sampler flow control valve (FCV-555 for A-Train or FCV-655 for B-Train), **PERFORM** the following:

5.2.13.1 **REMOVE** flexible hose from cross fitting at inlet to FCV-555 (for A-Train)

OR

REMOVE flexible hose from cross fitting at inlet to FCV-655 (for B Train)

5.2.13.2 **INSTALL** in-line Mass Flow Meter on cross fitting at INLET side of AN241-VTP-FCV-555 (for A-Train)

OR

INLET side of AN241-VTP-FCV-655 (for B Train).

5.2.13.3 **SELECT** "Stack Monitor" button from the HMI Exhauster Process Detail screen, to go to the Exhauster Stack Sampler screen for the train to be tested.

5.2.13.4 **START** the following sample pump for the appropriate exhauster train to be tested.

- **IF** A-Train is being tested, **SELECT AND START** ONE of the Sample Pumps P-564 or P-574.
- **IF** B-Train is being tested, **SELECT AND START** ONE of the Sample Pumps P-664 or P-674].

5.2.13.5 **WAIT** at least two (2) minutes to reach steady state.

5.2.13.6 **RECORD** the Record Sample flow measurement from installed inline Mass Flow Meter in the FCV-555 [FCV-655] section of Table 2 on "Inline Mass Flow Meter" line.

5.2.13.7 **RECORD** the HMI Record Sample flow measurement in the FCV-555 [FCV-655] section of Table 2 on "Record Sampler Flow (Exhauster display *)" line.

5.2 Record Sample/CAM Flow Meter Secondary Standard Check (Cont.)

5.2.13.8 **STOP** Sample Pump started in Step 5.2.13.4.

5.2.13.9 **CALCULATE** percent flow rate error, **AND**

RECORD the "Pass" or "Fail" determination in Table 2.

5.2.13.10 **REMOVE** in-line Mass Flow Meter, **AND**

CONNECT flexible hose to cross fitting at INLET to AN241-VTP-FCV-555 (for A-Train)

OR

INLET to AN241-VTP-FCV-655 (for B Train).

NOTE - Sample cabinet (ENCL-550[650]) door should remain closed and latched except when CAM isolation valves (V-554 [V-654]) are being operated in order to keep instruments within allowable temperature range.

5.2.14 **IF** testing the CAM flow control valve (FCV-556 for A-Train or FCV-656 for B-Train), **PERFORM** the following:

5.2.14.1 **REMOVE** flexible hose from cross fitting at inlet to FCV-556 (for A-Train)

OR

REMOVE flexible hose from cross fitting at inlet to FCV-656 (for B Train)

5.2.14.2 **INSTALL** in-line Mass Flow Meter on the on the cross fitting at INLET side of AN241-VTP-FCV-556 (for A-Train)

OR

INLET side of AN241-VTP-FCV-656 (for B Train).

5.2.14.3 **SELECT** "Stack Monitor" button from the HMI Exhauster Process Detail screen, to go to the Exhauster Stack Sampler screen for the train to be tested.

5.2 Record Sample/CAM Flow Meter Secondary Standard Check (Cont.)

5.2.14.4 **START** the following sample pump for the appropriate exhauster train to be tested.

- **IF** A-Train is being tested, **SELECT AND START** ONE of the Sample Pumps P-564 or P-574.
- **IF** B-Train is being tested, **SELECT AND START** ONE of the Sample Pumps P-664 or P-674].

5.2.14.5 **WAIT** for flow rates to reach steady state.

5.2.14.6 **RECORD** CAM sample flow measurements from Mass Flow Meter in FCV-556 [FCV-656] section of Table 2 on "Inline Mass Flow Meter" line.

5.2.14.7 **RECORD** the HMI CAM Sample flow measurements in FCV-556 [FCV-656] section of Table 2 on "CAM Flow (Exhauster display)" line.

5.2.14.8 **STOP** Sample Pump started in Step 5.2.14.4.

5.2.14.9 **CALCULATE** percent flow rate error, **AND**

RECORD the "Pass" or "Fail" determination in Table 2.

5.2.14.10 **REMOVE** in-line Mass Flow Meter, **AND**

CONNECT flexible hose to cross fitting at INLET to AN241-VTP-FCV-556 (for A-Train)

OR

INLET to AN241-VTP-FCV-656 (for B Train).

5.2.15 **IF** percent difference calculation FAILS (for either flow control valve), **PERFORM** the following Steps 5.2.15.1 to 5.2.15.3:

5.2.15.1 **ENSURE** exhauster is SHUTDOWN per operating procedure TO-060-106, test procedure, or work package instructions as applicable.

5.2.15.2 **REPLACE** failed flow control valve with calibrated flow control valve.

5.2.15.3 **GO TO** Step 5.2.4 to test newly installed flow control valve.

5.2 Record Sample/CAM Flow Meter Secondary Standard Check (Cont.)

5.2.16 **AS** applicable, **ENSURE** the following isolation valves are open.

- V-553
- V-653
- V-554
- V-654

5.2.17 **ENSURE** exhauster returned to the desired operating configuration as required by the Shift Manager/OE per operating procedure TO-060-106, test procedure, or work package instructions as applicable.

5.2.18 **ENSURE** all test equipment has been removed and system is restored to original configuration.

5.3 Sample Probe Assembly and Sample Lines

NOTE - The sampling systems use shrouded probe type assemblies that are bolted through a steel plate or flange on the associated stack. The probe assemblies make a 90 degree downward angle inside the stack and must be installed in the correct orientation to work properly. A three-piece coupling (union) outside the flange facilitates probe removal/installation.

- Refer to Figure 5 for sample tube connections.

5.3.1 **ENSURE** Health Physics Technician (HPT) is available for survey of all tools, equipment, and parts inserted into and/or removed from potentially contaminated equipment and systems or opening potentially contaminated lines. **(RPP-16922)**

5.3.2 **IF** the desired exhaust train to be tested is OPERATING, **SWITCH** operating exhaust train per operating procedure TO-060-106, test procedure, or work package instructions as applicable.

NOTE - The following step will place the HMI to the Exhauster 'A' or Exhauster 'B' Process Detail screen depending on the train to be tested.

5.3.3 **PRESS** F2 on the HMI keyboard, **AND**

CLICK on the appropriate train button (Exhauster 'A' or Exhauster 'B') to be tested.

5.3.4 **IF** the exhauster "System Mode" is NOT in MANUAL, **SELECT** MANUAL mode as follows;

5.3.4.1 **SELECT** "System Mode" on Exhauster Process Detail screen.

5.3.4.2 **SELECT** MANUAL to change to MANUAL Mode.

5.3.5 **ENSURE** Fan Mode is set to MANUAL.

5.3.5.1 **IF** Fan Mode displayed is not MANUAL, **SELECT** Fan Control button on Exhauster Process Detail HMI screen.

5.3.5.2 **SELECT** AUTO button to change Mode to MANUAL.

5.3 Sample Probe Assembly and Sample Lines (Cont.)

Check/Examine Sample Assembly Nozzles

5.3.6 **BREAK OPEN** three-piece coupling (union) outside flanges to facilitate nozzle removal.

5.3.7 **REMOVE** the nozzles (Probe assemblies) from stack undergoing testing.

5.3.8 **INSPECT** both nozzles for following As-Found conditions, **AND**

RECORD PASS/FAIL determination on Table 3.

- Nozzle assembly appears parallel to stack flow axis
- Nozzle free of deposits
- No damage to nozzle
- No damage to gasket.

5.3.9 **IF** As-Found Nozzle Inspection determinations from Step 5.3.8 are PASS:

NOTE - The As-Left for "Nozzle assemblies appear parallel to stack flow axis" will be recorded in Step 5.3.22.

5.3.9.1 **RECORD** PASS for both the CAM and Record Sampler nozzle assemblies in As-Left column on Table 3 for the following.

- Nozzle free of deposits
- No damage to nozzle
- No damage to gasket.

5.3.9.2 **GO TO** Step 5.3.13.

5.3.10 **CLEAN/REPAIR/REPLACE** nozzles as necessary.

5.3.11 **RECONNECT** associated tubing, as necessary.

5.3.12 **REPEAT** Step 5.3.8, **AND**

RECORD As-Left PASS/FAIL determination for nozzle inspection retest on Table 3 for the following.

- Nozzle free of deposits
- No damage to nozzle
- No damage to gasket.

5.3 Sample Probe Assembly and Sample Lines (Cont.)

Inspect/Clean Sample System Lines

5.3.13 **INSPECT** sample line tops for damage and/or contaminate deposits.

5.3.14 **RECORD** As-Found Sample Line Inspection PASS/FAIL determination for both the CAM and Record Sampler sample lines on Table 4.

5.3.15 **IF** As-Found Sample Line Inspection determination (Step 5.3.14) is PASS:

5.3.15.1 **RECORD** PASS in As-Left column on Table 4.

5.3.15.2 **GO TO** Step 5.3.21.

5.3.16 **DISCONNECT** both the CAM and Record Sampler sample lines at bottom end.

5.3.17 **IF** air pressure is used to assist in cleaning sample line, **ENSURE** HPT is present before air pressure is applied to sample line.

CAUTION

Use of a metal brush is not allowed to be used to clean nozzle or transport tubing because it could cause damage or could impair proper air flow after reassembly.

NOTE - Any suitable means may be used to clean sample lines, the following two examples:

- One method would be using a vacuum or pressure to move string through the lines, then using it to pull cleaning swab(s) through
- Another method could be to use a non-metal bottle brush.

5.3.18 **CLEAN/REPAIR/REPLACE** sample lines as necessary.

5.3.19 **RECONNECT** sample lines at bottom end.

5.3.20 **REPEAT** Step 5.3.13, recording As-Left Sample Line Inspection PASS/FAIL determination on Table 4.

5.3 Sample Probe Assembly and Sample Lines (Cont.)

CAUTION

To prevent potential damage to the stack or fan assemblies from test equipment accidentally dropped into the stack, use of a lanyard or other positive means of securing test equipment placed into the stack from falling in is required.

5.3.21 **If** desired, both nozzles may be plugged with rubber plugs prior to reinstallation of nozzle assemblies into stack; **OTHERWISE** nozzles will be plugged in Step 5.3.25

5.3.22 **REINSTALL** nozzle assemblies in stack, as applicable, ensuring proper nozzle alignment parallel to stack flow, **AND**

RECORD "As-Left" Nozzle assembly appears parallel to stack flow axis PASS/FAIL determination in Table 3.

5.3.23 **RECONNECT** both the CAM and Record Sampler nozzle assemblies to sample tubing.

Sample Line Leak Test

5.3.24 **REMOVE** 3" flow test port (FTP-556 [FTP-656], FTP-557 [FTP-657]) threaded caps to provide access to nozzles as necessary to aid in plug installation and removal.

CAUTION

To prevent potential damage to the stack or fan assemblies from test equipment accidentally dropped into the stack, use of a lanyard or other positive means of securing test equipment placed into the stack from falling in is required.

5.3.25 **IF** not already performed under Step 5.3.21, **PLUG** both nozzles with rubber plugs.

5.3 Sample Probe Assembly and Sample Lines (Cont.)

5.3.26 **OPEN** the following valve for the exhauster train under test as required.

5.3.26.1 **IF** A-Train is being tested, **OPEN** valve V-555 located under the sample cabinet ENCL-550, **AND**

REMOVE cap from valve end as required.

5.3.26.2 **IF** B-Train is being tested, **OPEN** valve V-655 located under the sample cabinet ENCL-650, **AND**

REMOVE cap from valve end as required.

5.3.27 **GO TO** the Exhauster Stack Sampler screen for the exhauster under test on the HMI as follows;

5.3.27.1 **PRESS** F2 on the HMI keyboard.

5.3.27.2 **SELECT** Exhauster Stack Sampler button for the exhauster under test.

NOTE - Sample flow rate system setpoint is found above each Flow Control Valve on the HMI Exhauster Stack Sampler screen.

5.3.28 **RECORD** As-Found CAM and Record Sampler Flow Control Valve sample flow rate system setpoints from HMI Exhauster Stack Sampler screen on Table 5.

5.3.29 **PERFORM** the following for CAM only:

5.3.29.1 **CHECK** sample flow rate system set point is set at 4.0 scfm:

5.3.29.2 **IF** sample flow rate system set point is NOT set at 4.0 scfm, **SELECT** Setpoint (for each Flow Control Valve) on Exhauster Stack Sampler HMI screen, **AND**

ENTER new setpoint.

5.3 Sample Probe Assembly and Sample Lines (Cont.)

5.3.30 **START** an applicable sample vacuum pump for the exhauster train under test as follows from the Exhauster Stack Sampler HMI screen:

5.3.30.1 **IF** A-Train is being tested, **SELECT** one of the two vacuum pumps P-564 or P-574, **AND**

CLICK START.

5.3.30.2 **IF** B-Train is being tested, **SELECT** one of the two vacuum pumps P-664 or P-674, **AND**

CLICK START.

5.3.31 **OPERATE** the following valve as follows;

5.3.31.1 **IF** testing A-Train, **SLOWLY CLOSE** V-555 located under sample cabinet ENCL-550 until both PI-553 and PI-554 indicate 4.0 (3.5 to 4.5) In. Hg.

5.3.31.2 **IF** testing B-Train, **SLOWLY CLOSE** V-655 located under sample cabinet ENCL-650 until both PI-653 and PI-654 indicate 4.0 (3.5 to 4.5) In. Hg.

5.3.32 **ALLOW** system flow readings to stabilize.

5.3.33 **CHECK** the following readings on Exhauster Stack Sampler HMI screen:

5.3.33.1 **IF** testing A-Train, **CHECK** flow indication for FCV-555 and FCV-556.

5.3.33.2 **IF** testing B-Train, **CHECK** flow indication for FCV-655 and FCV-656.

5.3.34 **RECORD** YES/NO on Table 5 that As-Found FCV-555 and FCV-556 (for A-Train) or FCV-655 and FCV-656 (for B-Train) flow is less than or equal to 0.05 scfm.

5.3.35 **STOP** applicable vacuum pump for exhauster train under test by selecting Stop on Exhauster Stack Sampler HMI screen:

5.3.36 **IF** As-Found FCV-555 [655] and FCV-556 [656] flow (Step 5.3.34) is less than or equal to 0.05 scfm (YES), **RECORD** YES in As-Left column on Table 5, **AND**

GO TO Step 5.3.46.

5.3 Sample Probe Assembly and Sample Lines (Cont.)

NOTE - CAM and Record Sample transport lines may be leak tested separately via operation of the individual transport line isolation valves.

5.3.37 **IF** testing A-Train CAM Sample Line, **OPERATE** the following valves as given:

5.3.37.1 **CLOSE** V-553 located inside sample cabinet ENCL-550, **AND**

ENSURE V-554 located inside sample cabinet ENCL-550 is OPEN.

5.3.38 **IF** testing A-Train Record Sample Line, **OPERATE** the following valves as given:

5.3.38.1 **CLOSE** V-554 located inside sample cabinet ENCL-550, **AND**

ENSURE V-553 located inside sample cabinet ENCL-550 is OPEN.

5.3.39 **IF** testing B-Train CAM Sample Line, **OPERATE** the following valves as given:

5.3.39.1 **CLOSE** V-653 located inside sample cabinet ENCL-650, **AND**

ENSURE V-654 located inside sample cabinet ENCL-650 is OPEN.

5.3.40 **IF** testing B-Train Record Sample Line, **OPERATE** the following valves as given:

5.3.40.1 **CLOSE** V-654 located inside sample cabinet ENCL-650, **AND**

ENSURE V-653 located inside sample cabinet ENCL-650 is OPEN.

5.3.41 **INSPECT** sample line system for leaks from probe to vacuum pump.

5.3.42 **TIGHTEN** sample system fittings and connections, as necessary.

5.3.43 **ENSURE** nozzle plugs are secure and sealed.

5.3 Sample Probe Assembly and Sample Lines (Cont.)

NOTE - Leaks typically occur at couplings and valves.

5.3.44 **CHECK** for **AND REPAIR** any other leaks in sample system.

5.3.45 **REPEAT** Steps 5.3.26 through 5.3.33, (along with Steps 5.3.37 thru 5.3.44 as necessary) recording YES/NO on Table 5 that As-Left FCV-555 [655] and FCV-556 [656] flow is less than or equal to 0.05 scfm.

5.3.45.1 **IF** FCV-555 [655] and FCV-556 [656] flow remains greater than 0.05 scfm, **PROCEED** as follows in order given:

- **PLACE** system in safe/stable condition
- **NOTIFY** FWS
- **STOP** work until further instructed.

NOTE - Steps 5.3.46 through 5.3.48may be performed in order necessary.

5.3.46 **REMOVE** plug/cap installed in Step 5.3.21 or 5.3.25 from nozzle being tested.

5.3.47 **IF** A-Train is being tested, **OPERATE** the following valve(s) as needed.

5.3.47.1 **CLOSE** V-555 below Sample Cabinet ENCL-550, **AND**

REINSTALL cap on end of valve that was removed in Step 5.3.26.1.

5.3.47.2 **ENSURE** valves V-553 and V-554 located inside sample cabinet ENCL-550 are OPEN.

5.3.48 **IF** B-Train is being tested, **OPERATE** the following valve(s) as needed:

5.3.48.1 **CLOSE** V-655 below Sample Cabinet ENCL-650, **AND**

REINSTALL cap on end of valve that was removed in Step 5.3.26.2.

5.3.48.2 **ENSURE** valves V-653 and V-654 located inside sample cabinet ENCL-650 are OPEN.

5.3 Sample Probe Assembly and Sample Lines (Cont.)

5.3.49 **ENSURE** sample flow rate setpoints are returned to As-Found values from Table 5.

5.3.49.1 **IF** sample flow rate system set points are NOT set at As-Found values, **SELECT** Setpoint (for each Flow Control Valve) on Exhauster Stack Sampler HMI screen, **AND**

ENTER As-Found values from Table 5.

5.3.50 **RECORD** As-Left sample flow rate system set points in Table 5.

5.3.51 **SELECT** "Unselect" on Stack Sampler HMI screen.

5.3.52 **REMOVE** all test equipment,

5.3.53 **REINSTALL** any 3" flow test port (FTP-556 [FTP-656], FTP-557 [FTP-657]) threaded caps removed in Step 5.3.24, **AND**

RESTORE system to original configuration or as directed by Shift Manager.

5.4 Stack Flow Instrumentation

NOTE - This section is required to be performed (at a minimum) annually. However, it may be performed more frequently as directed by FWS, Engineering, or work package due to corrective maintenance or stack flow rate discrepancies greater than 10% between installed instrumentation and Vent & Balance measurements.

- Refer to Figure 3 and Figure 4 for photos of instrument connection.

5.4.1 **ENSURE** Health Physics Technicians (HPT) are available for survey of all tools, equipment and parts inserted into and/or removed from potentially contaminated equipment and systems. **(RPP-16922)**

5.4.2 **DISCONNECT AND RECORD** on Table 7, the three wires applicable to RTD at Verabar (FE-551 for A-Train or FE-651 for B-Train) for exhauster train being tested.

5.4.3 **DISCONNECT** Verabar flow element from associated tubing.

5.4.4 **REMOVE** RTD, if necessary.

5.4.5 **REQUEST** HPT survey equipment as it is removed from stack. **(RPP-16922)**

5.4.6 **REMOVE** the Verabar from stack as follows.

5.4.6.1 **IF** testing A-Train, **REMOVE** Verabar FE-551 from stack.

5.4.6.2 **IF** testing B-Train, **REMOVE** Verabar FE-651 from stack.

5.4.7 **INSPECT** Verabar for damage and/or deposits that may impede flow.

5.4.8 **RECORD** As-Found Verabar PASS/FAIL determination on Table 6.

5.4.9 **IF** As-Found Verabar determination (Step 5.4.7) is PASS, **RECORD** As-Left on Table 6, **AND**

GO TO Step 5.4.13.

5.4 Stack Flow Instrumentation (Cont.)

5.4.10 **REQUEST** HPT survey additional equipment as it is removed from stack. **(RPP-16922)**

5.4.11 **IF** As-Found Verabar determination (Step 5.4.7) is FAIL due to Verabar element being damaged/dirty, **CLEAN/REPAIR/REPLACE** element as necessary, **AND**

RECORD in Comment section of Table 6.

5.4.12 **REPEAT** Step 5.4.7, **AND**

RECORD As-Left on Table 6.

NOTE - Radiological survey must verify Verabar radiological contamination is within acceptable limits before high pressure air blow down is performed.

5.4.13 **ENSURE** the following valve lineup:

5.4.13.1 **IF** testing A-Train, **ENSURE** the following valve line-up (see Figure 1).

Valve	Required Position
V-580	CLOSED
V-581	CLOSED
V-582	CLOSED
V-583	OPEN
V-584	OPEN
V-585	CLOSED
V-586	OPEN

5.4.13.2 **IF** testing B-Train, **ENSURE** the following valve line-up (see Figure 2).

Valve	Required Position
V-680	CLOSED
V-681	CLOSED
V-682	CLOSED
V-683	OPEN
V-684	OPEN
V-685	CLOSED
V-686	OPEN

5.4 Stack Flow Instrumentation (Cont.)

5.4.14 **CONNECT** high pressure air source as follows;

5.4.14.1 **ENSURE** in-line pressure indication is used.

5.4.14.2 **IF** A-Train is being tested, **CONNECT** high pressure air source to V-586.

5.4.14.3 **IF** B-Train is being tested, **CONNECT** high pressure air source to V-686.

5.4.15 **OPEN** high pressure air supply valve (up to 120 psi max.) to blow out Verabar sensing lines.

5.4.16 **WAIT** approximately 5 minutes, **CLOSE** high pressure air supply valve.

5.4.17 **CLOSE** V-586 [686].

5.4.18 **PRIOR** to disconnecting high pressure air source, **CONFIRM** no pressure on system.

5.4.19 **DISCONNECT** high pressure air source.

5.4.20 **CONNECT** high pressure air source as follows;

5.4.20.1 **IF** A-Train is being tested, **CONNECT** high pressure air source to valve V-585, **AND**

OPEN valve V-585.

5.4.20.2 **IF** B-Train is being tested, **CONNECT** high pressure air source to valve V-685, **AND**

OPEN valve V-685.

5.4.21 **OPEN** high pressure air supply valve to blow out Verabar sensing lines.

5.4.22 **WAIT** approximately 5 minutes, **CLOSE** high pressure air valve.

5.4.23 **DISCONNECT** high pressure air source.

5.4 Stack Flow Instrumentation (Cont.)

5.4.24 **ENSURE** the following valve lineup:

5.4.24.1 **IF** testing A-Train, **ENSURE** the following valve line-up (see Figure 1).

Valve	Required Position
V-580	OPEN
V-581	OPEN
V-582	CLOSED
V-583	OPEN
V-584	OPEN
V-585	CLOSED
V-586	CLOSED

5.4.24.2 **IF** testing B-Train, **ENSURE** the following valve line-up (see Figure 2).

Valve	Required Position
V-680	OPEN
V-681	OPEN
V-682	CLOSED
V-683	OPEN
V-684	OPEN
V-685	CLOSED
V-686	CLOSED

5.4.25 **IF** cleaning fails to remove deposits or Verabar remains unusable:

- **PLACE** system in safe/stable condition
- **NOTIFY** FWS
- **STOP** work until further instructed.

NOTE - Steps 5.4.26 through 5.4.27 may be performed in any order necessary.

5.4.26 **REINSTALL** Verabar removed in Step 5.4.6 (FE-551 for A-Train or FE-651 for B-Train) into stack.

5.4.27 **REINSTALL** associated RTD, as applicable.

5.4.28 **RECONNECT AND RECORD** on Table 7, three wires applicable to RTD lifted in Step 5.4.2 (at Verabar FE-551 for A-Train or Verabar FE-651 for B-Train).

5.4 Stack Flow Instrumentation (Cont.)

5.4.29 **REMOVE** test plug close to Verabar port for train being tested, **AND**

INSERT M&TE temperature probe.

5.4.30 **GO TO** Exhauster Process Details screen as follows;

5.4.30.1 **PRESS** F2 on the HMI keyboard.

5.4.30.2 **CLICK** on the appropriate Exhauster 'A' or Exhauster 'B' button associated with the train under test.

5.4.31 **COMPARE** the M&TE temperature reading to the appropriate HMI temperature reading from TE-551 (for A-Train) or TE-651 (for B-Train) obtained from the Exhauster Process Details screen.

5.4.32 **IF** M&TE temperature is not within 2.5 degrees of TE-551 [651], **NOTIFY** Engineering or FWS, **AND**

PROCEED as directed.

5.4.33 **REMOVE** M&TE, **AND**

REPLACE test plug.

5.5 Leak Test of Stack Flow Lines

NOTE - Refer to Figure 3 and Figure 4 for photos of instrument connection.

- This section is required to be performed (at a minimum) annually. However, it may be performed more frequently as directed by FWS, Engineering or work package due to corrective maintenance or stack flow rate discrepancies greater than 10% between installed instrumentation and Vent & Balance measurements.

5.5.1 **ENSURE** following valves are in the position indicated:

5.5.1.1 **IF** testing A-Train, **ENSURE** the following valve line-up (see Figure 1).

Valve	Valve Position
V-580	OPEN
V-581	OPEN
V-582	OPEN
V-583	CLOSED
V-584	CLOSED
V-585	CLOSED
V-586	OPEN

5.5.1.2 **IF** testing B-Train, **ENSURE** the following valve line-up (see Figure 2).

Valve	Position
V-680	OPEN
V-681	OPEN
V-682	OPEN
V-683	CLOSED
V-684	CLOSED
V-685	CLOSED
V-686	OPEN

5.5.2 **CONNECT** calibrated pressure source and gauge to the following valve;

5.5.2.1 **IF** testing A-Train, **CONNECT** a calibrated pressure source and gauge to valve V-586.

5.5.2.2 **IF** testing B-Train, **CONNECT** a calibrated pressure source and gauge to valve V-686.

5.5 Leak Test of Stack Flow Lines (Cont.)

5.5.3 **SLOWLY RAISE** pressure to 10 (9.5 to 10.5) In. WC.

5.5.4 **WAIT** at least 10 minutes for system pressure to stabilize.

5.5.5 **RECORD** As-Found Initial Pressure (P_i) from the calibrated pressure source and gauge on Table 8.

5.5.6 **WAIT** at least 15 minutes.

5.5.7 **RECORD** As-Found Final Pressure (P_f) from the calibrated pressure source and gauge on Table 8.

5.5.8 **RELEASE** calibration pressure on system.

5.5.9 **CALCULATE** As-Found Differential Pressure (ΔP) on Table 8.

5.5.10 **RECORD** As-Found ΔP PASS/FAIL determination on Table 8.

5.5.11 **IF** As-Found ΔP PASS/FAIL determination is PASS, **RECORD** PASS in As-Left column of Table 8, **AND**

GO TO Step 5.5.15.

5.5.12 **TIGHTEN** flow sensing lines fittings and connections.

5.5.13 **CHECK** flow sensing system for additional leaks, **AND**

REPAIR as necessary.

5.5.14 **REPEAT** Steps 5.5.3 through 5.5.13 recording As-Left indications on Table 8.

5.5.14.1 **IF** calculated ΔP remains greater than 5.0 in. WC:

- **PLACE** system in safe/stable condition
- **NOTIFY** FWS
- **STOP** work until further instructed.

5.5 Leak Test of Stack Flow Lines (Cont.)

5.5.15 **ENSURE** following valves are in the position indicated:

5.5.15.1 **IF** testing A-Train, **ENSURE** the following valve line-up (see Figure 1).

Valve	Valve Position
V-580	OPEN
V-581	OPEN
V-582	CLOSED
V-583	OPEN
V-584	OPEN
V-585	CLOSED
V-586	CLOSED

5.5.15.2 **IF** testing B-Train, **ENSURE** the following valve line-up (see Figure 2).

Valve	Valve Position
V-680	OPEN
V-681	OPEN
V-682	CLOSED
V-683	OPEN
V-684	OPEN
V-685	CLOSED
V-686	CLOSED

5.5 Leak Test of Stack Flow Lines (Cont.)

5.5.16 **ENSURE** fan for the exhauster train under test is in AUTO mode as follows.

NOTE - This step gets you to the Exhauster Process Detail screen.

5.5.16.1 **PRESS** F2 on the HMI keyboard, **AND**

CLICK on the appropriate exhauster train button under test (Exhauster 'A' or Exhauster 'B') from the menu that appears.

5.5.16.2 **IF** fan mode displayed is not AUTO, **SELECT** Fan Control button on Exhauster Process Detail HMI screen.

5.5.16.3 **SELECT** MANUAL to change Fan Mode to AUTO.

5.5.17 **ENSURE** System is in AUTO mode as follows;

5.5.17.1 **SELECT** "System Mode" on Exhauster Process Detail screen.

5.5.17.2 **SELECT** AUTO to change to AUTO Mode.

5.5.18 **LOG OFF** at HMI.

5.6 Check Calibration of Timing Devices

NOTE - ANSI N13.1 requires timing devices be checked annually. All timed devices are controlled by a PLC master clock and software. Checking any one timed device will validate clock accuracy and other timed activities may be assumed accurate as software and other timed function setups are proven during acceptance testing.

- Testing will be performed by calculating total CAM sample flow over 30 minutes and then comparing it to the indicated totalized CAM flow on HMI. This will indirectly prove PLC clock accuracy, as the flow totalizer depends on clock and FCV accuracy.

5.6.1 **ENSURE** train to be tested is running.

5.6.2 **ENSURE** Flow Control Valve (FCV-556 for A-Train or FCV-656 for B-Train) calibration has been checked per Step 4.3.5 for the exhaust train being tested.

5.6.3 **ACCESS** HMI Totalized Parameters Screen as follows.

5.6.3.1 **PRESS** F2 on the HMI keyboard.

5.6.3.2 **CLICK** on the "Exhauster Totalized Parameters" button for the exhaust train being tested.

NOTE - Steps 5.6.4 through 5.6.8 are to be done quickly in a timely manner when accessing screens and recording parameters.

5.6.4 **RECORD** CAM Sampler (FCV-556 for A-Train or FCV-656 for B-Train) totalized flow (current) on Table 9 for the exhaust train being tested, **AND**

START calibrated stopwatch.

5.6.5 **ACCESS** HMI "Exhauster Stack Sampler" screen as follows.

5.6.5.1 **PRESS** F2 on the HMI keyboard.

5.6.5.2 **CLICK** on the "Exhauster Stack Monitor" button for the exhaust train being tested.

5.6.6 **RECORD** current CAM sample flow on Table 9, **AND**

REPEAT every minute until 29 minutes on the stopwatch. (29 times total).

5.6 Check Calibration of Timing Devices (Cont.)

5.6.7 **ACCESS** HMI Totalized Parameters Screen as follows.

5.6.7.1 **PRESS** F2 on the HMI keyboard.

5.6.7.2 **CLICK** on the "Exhauster Totalized Parameters" button for the exhaust train being tested.

5.6.8 **WHEN** stopwatch indicates 30 minutes have passed, **RECORD** CAM Sampler (FCV-556 for A-Train or FCV-656 for B-Train) totalized flow (current) on Table 9 immediately for the exhaust train being tested.

5.6.9 **CALCULATE** CAM Sampler totalized flow on Table 9.

5.6.10 **CALCULATE** totalized flow error on Table 9.

NOTE - Out-of tolerance Runtime Error indicates master clock problems.

5.6.11 **IF** totalized flow error is greater than 10 %, **NOTIFY** FWS and Engineering, **AND**

REPEAT timing tests when repairs have been completed.

5.6.12 **ENSURE** Exhausters are returned to pre-testing configuration or as directed by Shift Manager/OE.

5.7 Restoration

5.7.1 **ENSURE** all M&TE has been disconnected and removed.

5.7.2 **ENSURE** all test ports are plugged/capped.

5.7.3 **RESTORE** work area to normal conditions (remove barricades, etc. as applicable).

5.7.4 **ENSURE** M&TE information and calibration status is recorded on Table 10.

5.7.5 **ENSURE** equipment system restoration by observing indications are consistent with expected conditions.

5.7.6 **ENSURE** all applicable Data Sheets are completed or N/A'd, as needed.

5.7.7 **NOTIFY** Operations testing is complete and system may be returned to desired configuration.

5.8 Acceptance Criteria

Comparison and verification of data in applicable steps of the procedure with the limits of the Data Tables satisfies the Acceptance Criteria for this procedure.
Table 11 - Approval Signatures must be completely filled out.

5.9 Review

5.9.1 **INFORM** FWS test is complete.

5.9.2 FWS **REVIEW AND ENSURE** the following:

- Completed Data Tables meet the acceptance criteria
- Comments sections are filled out appropriately
- Work requests needed as a result of this procedure are identified and generated
- Work request number(s) of any work documents generated as a result of this procedure, are recorded in the Comments/Remarks section of the Data Tables, as applicable.

5.10 Records

NOTE – The following records are generated during the performance of this procedure and are maintained in the CHAMPS work package as record material.

- Steps 4.3.5 and 4.3.6
- Table 1 through Table 11.

The record custodian identified in the Company Level Records Inventory and Disposition Schedule (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.

Table 1 - Quarterly Stack Flow Response

A-Train					N/A✓ ☐
As-Found Stack Flow (Step 5.1.3):					ACFM
As-Found Setpoint (Step 5.1.5.1)					ACFM
Stack Flow Tracking satisfactory above As-Found (± 10 SCFM)? ✓ (Step 5.1.6)	YES		NO		
Stack Flow Tracking satisfactory below As-Found (± 10 SCFM)? ✓(Step 5.1.8)	YES		NO		
As-Left Stack Flow (Step 5.1.10)					ACFM
Comments:					

B-Train					N/A✓ ☐
As-Found Stack Flow (Step 5.1.3):					ACFM
As-Found Setpoint (Step 5.1.5.1)					ACFM
Stack Flow Tracking satisfactory above As-Found (± 10 SCFM)? ✓ (Step 5.1.6)	YES		NO		
Stack Flow Tracking satisfactory below As-Found (± 10 SCFM)? ✓(Step 5.1.8)	YES		NO		
As-Left Stack Flow (Step 5.1.10)					ACFM
Comments:					

Table 2 - Record Sample/CAM Flow Measurements

A-Train				N/A✓ ☐
Flow Control Valve - FCV-555	**Initial Test**		**Retest, if needed**	
Inline Mass Flow Meter (± 0.01 scfm) (Step 5.2.13.6)	scfm		scfm	
Record Sampler Flow (Exhauster display *) (Step 5.2.13.7)	scfm		scfm	
Flow Rate Error = $\left[\frac{\text{Record Sampler Flow}}{\text{Inline Flow Meter}}\right] \times 100$	%		%	
PASS CRITERIA: Acceptable from 90% to 110% (Step 5.2.13.9)	PASS		PASS	
	FAIL		FAIL	
			N/A	
Comments:				
Flow Control Valve - FCV-556	**Initial**		**Retest, if needed**	
Inline Mass Flow Meter (± 0.01 scfm) (Step 5.2.14.6)	scfm		scfm	
CAM Flow (Exhauster display *) (Step 5.2.14.7)	scfm		scfm	
Flow Rate Error = $\left[\frac{\text{CAM Flow}}{\text{Inline Flow Meter}}\right] \times 100$	%		%	
PASS CRITERIA: Acceptable from 90% to 110% (Step 5.2.14.9)	PASS		PASS	
	FAIL		FAIL	
			N/A	
Comments:				

* Flow will be displayed in message view.

Table 2 Continued on Next Page

Table 2 - Record Sample/CAM Flow Measurements (Cont.)

B -Train				N/A✓ ☐
Flow Control Valve - FCV-655	**Initial Test**		**Retest, if needed**	
Inline Mass Flow Meter (± 0.01 scfm) (Step 5.2.13.6)	scfm		scfm	
Record Sampler Flow (Exhauster display *) (Step 5.2.13.7)	scfm		scfm	
Flow Rate Error = $\left[\frac{\text{Record Sample Flow}}{\text{Inline Flow Meter}}\right] \times 100$	%		%	
PASS CRITERIA: Acceptable from 90% to 110% (Step 5.2.13.9)	PASS		PASS	
	FAIL		FAIL	
			N/A	
Comments:				
Flow Control Valve - FCV-656	**Initial**		**Retest, if needed**	
Inline Mass Flow Meter (± 0.01 scfm) (Step 5.2.14.6)	scfm		scfm	
CAM Flow (Exhauster display *) (Step 5.2.14.7)	scfm		scfm	
Flow Rate Error = $\left[\frac{\text{CAM Flow}}{\text{Inline Flow Meter}}\right] \times 100$	%		%	
PASS CRITERIA: Acceptable from 90% to 110% (Step 5.2.14.9)	PASS		PASS	
	FAIL		FAIL	
			N/A	
Comments:				

* Flow will be displayed in message view.

Initials/Date_____

Table 3 - Nozzle Visual Inspection

A-Train					N/A✓ ☐
Prior to Leak Test					
CAM Sample Probe assembly					
As-Found			**As-Left**		
	Pass ✓	**Fail ✓**		**Pass ✓**	**Fail ✓**
Nozzle assembly appears parallel to stack flow axis Step 5.3.8)			No deposits (Step 5.3.9.1 or 5.3.12)		
No deposits (Step 5.3.8)			No damage (Step 5.3.9.1 or 5.3.12)		
No damage (Step 5.3.8)			No damage to gasket (Step 5.3.9.1 or 5.3.12)		
No damage to gasket (Step 5.3.8)			Nozzle assembly appears parallel to stack flow axis (Step 5.3.22)		
Comments:					

A-Train					N/A✓ ☐
Prior to Leak Test					
Record Sample Probe assembly					
As-Found			**As-Left**		
	Pass ✓	**Fail ✓**		**Pass ✓**	**Fail ✓**
Nozzle assembly appears parallel to stack flow axis Step 5.3.8)			No deposits (Step 5.3.9.1 or 5.3.12)		
No deposits (Step 5.3.8)			No damage (Step 5.3.9.1 or 5.3.12)		
No damage (Step 5.3.8)			No damage to gasket (Step 5.3.9.1 or 5.3.12)		
No damage to gasket (Step 5.3.8)			Nozzle assembly appears parallel to stack flow axis (Step 5.3.22)		
Comments:					

Initials: **Date:**

Table 3 Continued on Next Page

Table 3 - Nozzle Visual Inspection (Cont.)

B-Train N/A✓ ☐

Prior to Leak Test

CAM Sample Probe assembly

As-Found			As-Left		
	Pass ✓	Fail ✓		Pass ✓	Fail ✓
Nozzle assembly appears parallel to stack flow axis Step 5.3.8)			No deposits (Step 5.3.9.1 or 5.3.12)		
No deposits (Step 5.3.8)			No damage (Step 5.3.9.1 or 5.3.12)		
No damage (Step 5.3.8)			No damage to gasket (Step 5.3.9.1 or 5.3.12)		
No damage to gasket (Step 5.3.8)			Nozzle assembly appears parallel to stack flow axis (Step 5.3.22)		

Comments:

B-Train N/A✓ ☐

Prior to Leak Test

Record Sample Probe assembly

As-Found			As-Left		
	Pass ✓	Fail ✓		Pass ✓	Fail ✓
Nozzle assembly appears parallel to stack flow axis Step 5.3.8)			No deposits (Step 5.3.9.1 or 5.3.12)		
No deposits (Step 5.3.8)			No damage (Step 5.3.9.1 or 5.3.12)		
No damage (Step 5.3.8)			No damage to gasket (Step 5.3.9.1 or 5.3.12)		
No damage to gasket (Step 5.3.8)			Nozzle assembly appears parallel to stack flow axis (Step 5.3.22)		

Comments:

Initials: **Date:**

Table 4 - Sample Line Inspection

A-Train CAM Sample Line				N/A✓ ☐
As-Found (Step 5.3.14)				
Pass (no deposits or damage) ✓		**Fail** ✓		
Comments:				
As-Left (Step 5.3.15 or Step 5.3.20)				
Pass (no deposits or damage) ✓		**Fail** ✓		
Comments:				

A-Train Record Sample Line				N/A✓ ☐
As-Found (Step 5.3.14)				
Pass (no deposits or damage) ✓		**Fail** ✓		
Comments:				
As-Left (Step 5.3.15 or Step 5.3.20)				
Pass (no deposits or damage) ✓		**Fail** ✓		
Comments:				
Initials:				**Date:**

Table 4 Continued on Next Page

Table 4 - Sample Line Inspection (Cont.)

B-Train CAM Sample Line				N/A✓ ☐
As-Found (Step 5.3.14)				
Pass (no deposits or damage) ✓		**Fail** ✓		
Comments:				
As-Left (Step 5.3.15 or Step 5.3.20)				
Pass (no deposits or damage) ✓		**Fail** ✓		
Comments:				

B-Train Record Sample Line				N/A✓ ☐
As-Found (Step 5.3.14)				
Pass (no deposits or damage) ✓		**Fail** ✓		
Comments:				
As-Left (Step 5.3.15 or Step 5.3.20)				
Pass (no deposits or damage) ✓		**Fail** ✓		
Comments:				
Initials:				**Date:**

Table 5 - Sample Line Leak Test

A-Train								N/A ✓ ☐
FCV-555 Setpoint (Step 5.3.28 or 5.3.50)	As-Found:				As-Left:			
FCV-556 Setpoint (Step 5.3.28 or 5.3.50)	As-Found:				As-Left:			
FCV-555/556 = A-Train	As-Found (check ✓) (Step5.3.34)				As-Left (check ✓) (Step 5.3.36 or 5.3.45)			
FCV-555 sample flow rate at HMI less than or equal to 0.05 scfm	YES		NO		YES		NO	
FCV-556 sample flow rate at HMI less than or equal to 0.05 scfm	YES		NO		YES		NO	
B-Train								N/A ✓ ☐
FCV-655 Setpoint (Step 5.3.28 or 5.3.50)	As-Found:				As-Left:			
FCV-656 Setpoint (Step 5.3.28 or 5.3.50)	As-Found:				As-Left:			
FVC-655/656 = B-Train	As-Found (check ✓) (Step5.3.34)				As-Left (check ✓) (Step 5.3.36 or 5.3.45)			
FCV-655 sample flow rate at HMI less than or equal to 0.05 scfm	YES		NO		YES		NO	
FCV-656 sample flow rate at HMI less than or equal to 0.05 scfm	YES		NO		YES		NO	
Comments:								
Initials:			Date:					

Table 6 - Verabar Flow Element Visual Inspection

A-Train				N/A✓ ☐
As-Found (Step 5.4.8)				
Pass (no deposits or damage) ✓		**Fail ✓**		
Comments:				
As-Left (Step 5.4.9 or Step 5.4.12)				
Pass (no deposits or damage) ✓		**Fail ✓**		
Comments:				
B-Train				N/A✓ ☐
As-Found (Step 5.4.8)				
Pass (no deposits or damage) ✓		**Fail ✓**		
Comments:				
As-Left (Step 5.4.9 or Step 5.4.12)				
Pass (no deposits or damage) ✓		**Fail ✓**		
Comments:				
Initials:		**Date:**		

Table 7 - RTD Lifted/Landed Lead Record

A-Train and/or B-Train

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Page _____ of _____

LOCATION (Terminal Block, Device ID)	WIRE NUMBER or COLOR	TERMINATION POINT	OPENED/LIFTED (Initial/Date) (Step 5.4.2)	CLOSED/LANDED (Initial/Date) (Step 5.4.28)

Comments: _____

All Temporary Markers Removed (if used): Craftsman: _____ / _____
Signature Date

Completed Record Reviewed by: OE: _____ / _____
Signature Date

Table 8 - Stack Flow Sensing Lines Leak Test

A-Train								N/A✓ ☐
	As-Found				**As-Left**			
Initial pressure (P_i) (Step 5.5.5 or 5.5.14)	In.WC.				In.WC.			
Final pressure (P_f) (Step 5.5.7 or 5.5.14)	In.WC.				In.WC.			
Calculate Differential Pressure (ΔP) $P_i - P_f = \Delta P$ (Step 5.5.9 or 5.5.14)	In.WC.				In.WC.			
PASS/FAIL (Step 5.5.10 or 5.5.14) Pass indicates ΔP less than or equal to 5.0 In.WC.	**PASS** ✓ ($\Delta P \leq 5.0$)		**FAIL** ✓ ($\Delta P > 5.0$)		**PASS** ✓ ($\Delta P \leq 5.0$)		**FAIL** ✓ ($\Delta P > 5.0$)	
Comments:								

B-Train								N/A✓ ☐
	As-Found				**As-Left**			
Initial pressure (P_i) (Step 5.5.5 or 5.5.14)	In.WC.				In.WC.			
Final pressure (P_f) (Step 5.5.7 or 5.5.14)	In.WC.				In.WC.			
Calculate Differential Pressure (ΔP) $P_i - P_f = \Delta P$ (Step 5.5.9 or 5.5.14)	In.WC.				In.WC.			
PASS/FAIL (Step 5.5.10 or 5.5.14) Pass indicates ΔP less than or equal to 5.0 In.WC.	**PASS** ✓ ($\Delta P \leq 5.0$)		**FAIL** ✓ ($\Delta P > 5.0$)		**PASS** ✓ ($\Delta P \leq 5.0$)		**FAIL** ✓ ($\Delta P > 5.0$)	
Comments:								
Initials:			**Date:**					

NOTE - Leakage rate calculation is found in RPP-22211, Stack Flow Transmitter Maintenance Calculation

Table 9 - Check Calibration of Timing Devices

A-Train			N/A✓ ☐	
Initial Totalized Flow FCV-556 (Step 5.6.4)				SCF
Current CAM Sample Flow FCV-556 (Step 5.6.6)	Minute 0:		Minute 15:	
	Minute 1:		Minute 16:	
	Minute 2:		Minute 17:	
	Minute 3:		Minute 18:	
	Minute 4:		Minute 19:	
	Minute 5:		Minute 20:	
	Minute 6:		Minute 21:	
	Minute 7:		Minute 22:	
	Minute 8:		Minute 23:	
	Minute 9:		Minute 24:	
	Minute 10:		Minute 25:	
	Minute 11:		Minute 26:	
	Minute 12:		Minute 27:	
	Minute 13:		Minute 28:	
	Minute 14:		Minute 29:	
Final Totalized Flow FCV-556 (Step 5.6.8)				SCF
Calculated Totalized Flow (Step 5.6.9)	(Sum of 30 recorded CAM Sample Flows) =			SCF
Totalized Flow Error (Acceptable: 90-110%) $\left[\frac{\text{Final Totalized Flow} - \text{Initial Totalized Flow}}{\text{Calculated Totalized Flow}}\right] \times 100\% =$				%
			Pass ✓	
			Fail ✓	
Comments:				
Initials:			Date:	

Table 9 Continued on Next Page

Table 9 - Check Calibration of Timing Devices (Cont.)

B-Train				N/A✓ ☐
Initial Totalized Flow FCV-656 (Step 5.6.4)				**SCF**
Current CAM Sample Flow FCV-656 (Step 5.6.6)	**Minute 0:**		**Minute 15:**	
	Minute 1:		**Minute 16:**	
	Minute 2:		**Minute 17:**	
	Minute 3:		**Minute 18:**	
	Minute 4:		**Minute 19:**	
	Minute 5:		**Minute 20:**	
	Minute 6:		**Minute 21:**	
	Minute 7:		**Minute 22:**	
	Minute 8:		**Minute 23:**	
	Minute 9:		**Minute 24:**	
	Minute 10:		**Minute 25:**	
	Minute 11:		**Minute 26:**	
	Minute 12:		**Minute 27:**	
	Minute 13:		**Minute 28:**	
	Minute 14:		**Minute 29:**	
Final Totalized Flow FCV-656 (Step 5.6.8)				**SCF**
Calculated Totalized Flow (Step 5.6.9)	**(Sum of 30 recorded CAM Sample Flows) =**			**SCF**
Totalized Flow Error (Acceptable: 90-110%) $\left[\frac{\text{Final Totalized Flow} - \text{Initial Totalized Flow}}{\text{Calculated Totalized Flow}}\right] \times 100\% =$				**%** **Pass ✓** ☐ **Fail ✓** ☐
Comments:				
Initials:				**Date:**

Table 10 - M&TE Calibration Data

A-Train and/or B-Train		
TOOL NAME	**ID. NUMBER**	**CAL DUE DATE**
Comments:		
Initials:	**Date:**	

Table 11 - Approval Signatures

Check Train(s) for AN Exhauster Submitted For Approved

Train A✓ ☐
Train B✓ ☐

	DISPOSITION		
	ENSURE appropriate work has been performed correctly and completely. Ventilation system has been restored to operating configuration Sign when complete. FWS: _____ (Signature)	_____ (Print Name)	_____ Date
	REVIEW for completeness. Review will include verification of documentation completion. Environmental: _____ (Signature)	_____ (Print Name)	_____ Date
	ENSURE appropriate tables are filled out correctly and are accurate, complete, and legible. Sign when complete. Engineer: _____ (Signature)	_____ (Print Name)	_____ Date

Comments:

Figure 1 – A-Train Stack Sample and Flow System Configuration

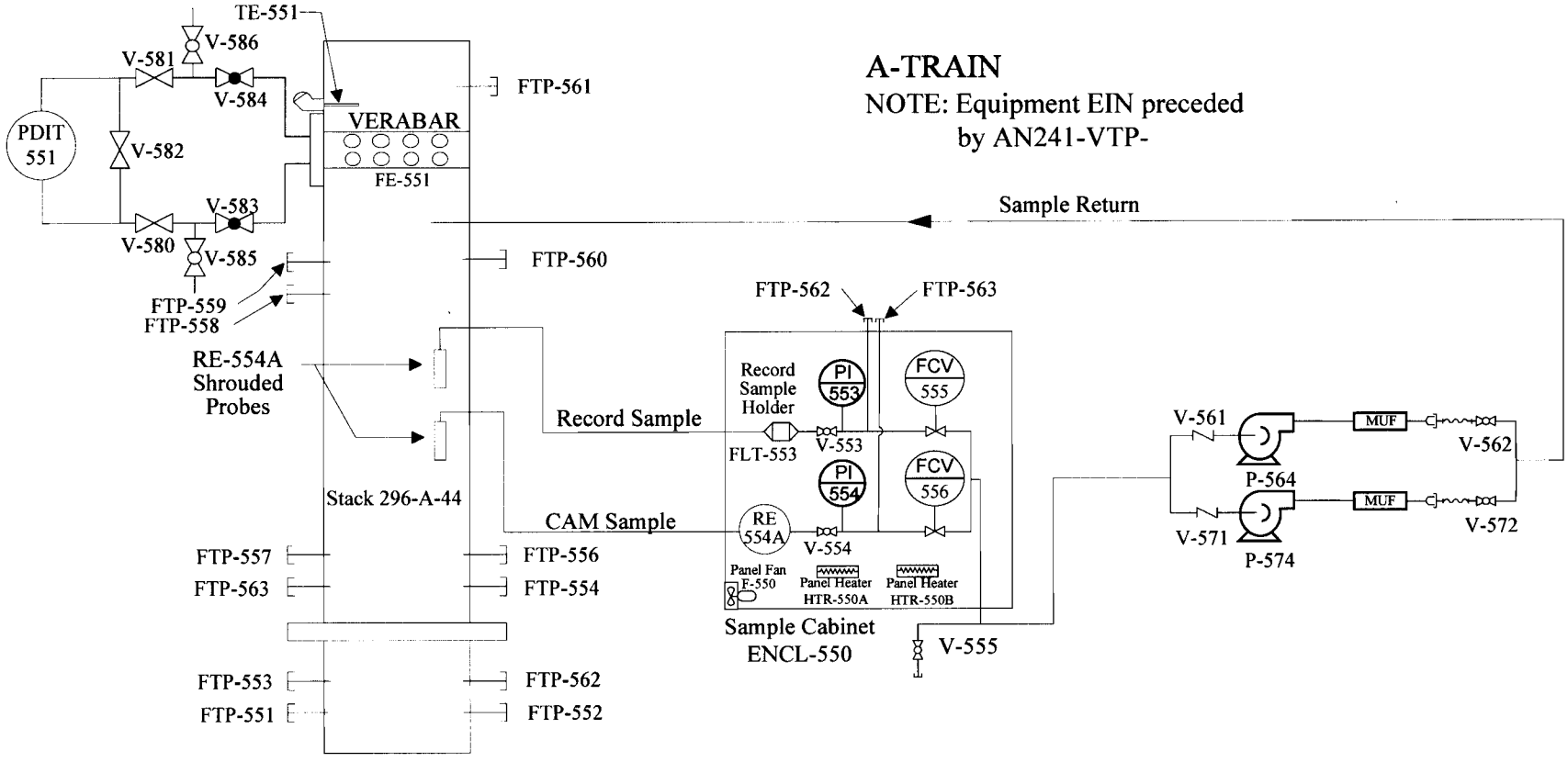


Figure 2 – B-Train Stack Sample and Flow System Configuration

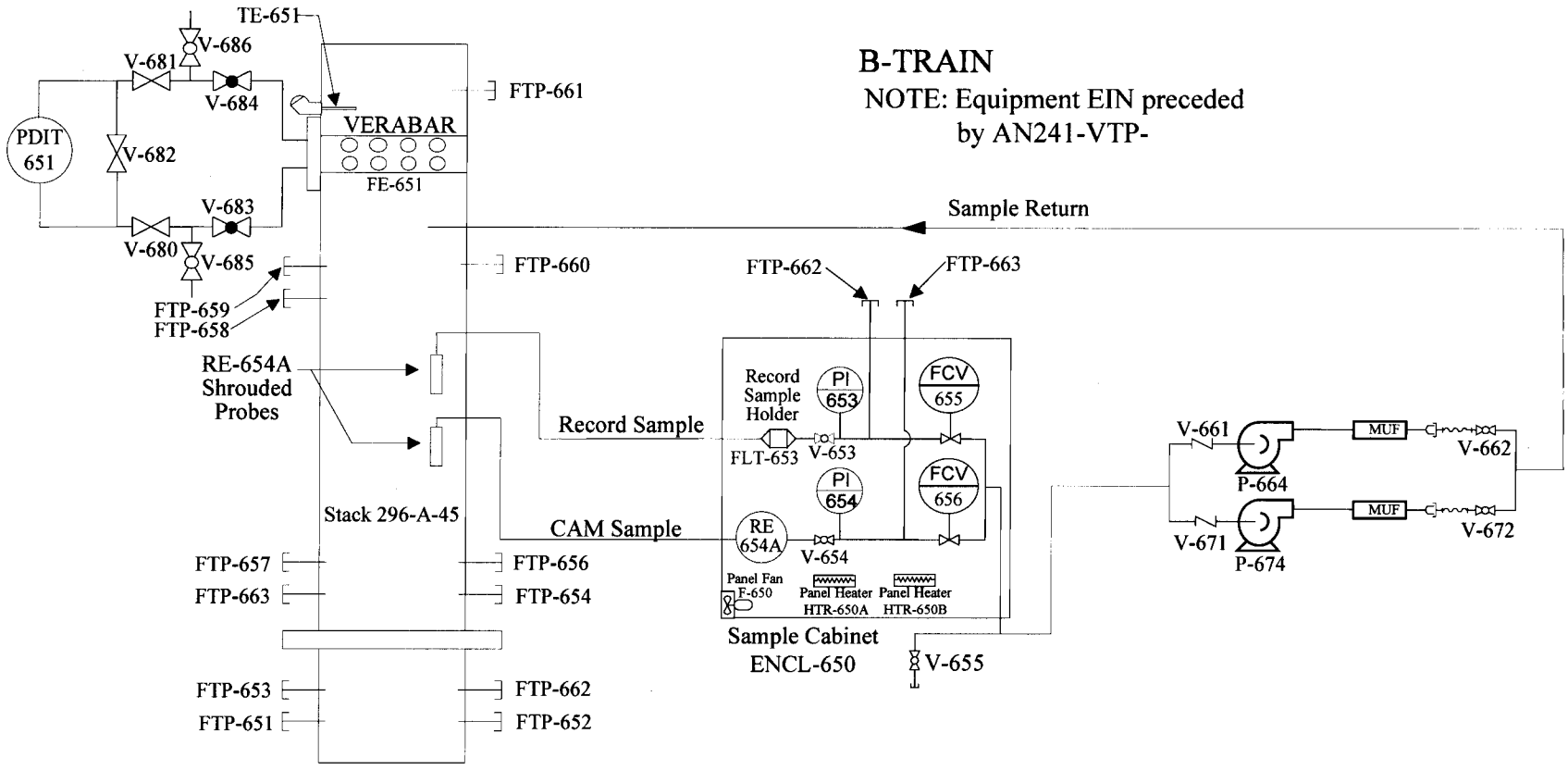


Figure 3 - Verabar with RTD

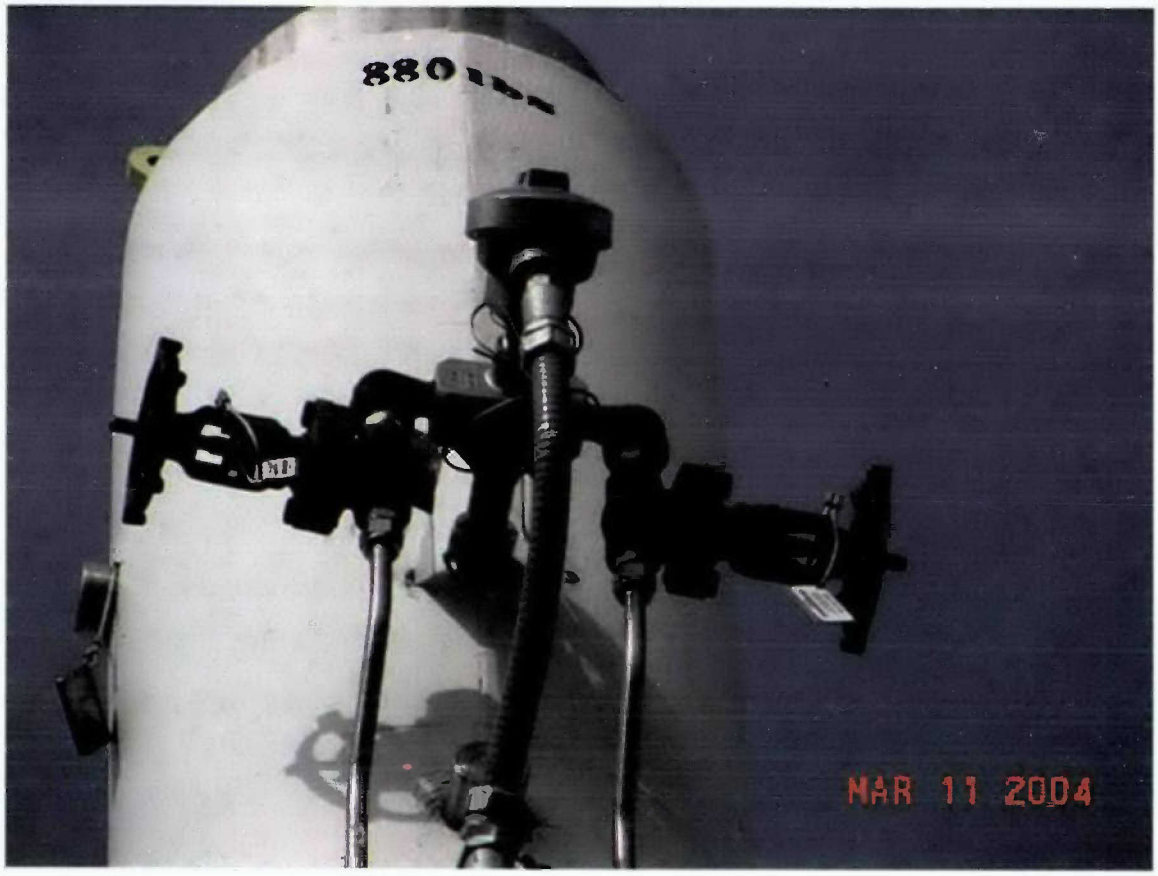


Figure 4 - Stack Flow DP Transmitter

Figure 5 - Sample Lines and Stack

Attachment 1 - HMI Screen Navigation

1. The following are the standard keyboard commands:

Keystroke	Command
F1	Display Help Pages
F2	Display Page Menu
F3	Display New User Login Form
F4	Display Current User
F5	Display Alarm Page
F6	Display Alarm Summary Page
F7	Display Hardware Alarm Page
F8	Go to Main HVAC Page
F9	Display Last Page
F10	Display System Information Window
F11	Display Applications Menu
F12	Log Out of System
End	Close Active Child Window
ESC	System Shutdown
Ctrl + C	Display Citect Point Count
Ctrl + P	Print Current Window
Shift + F2	Displays System Stats Window

NOTE - The figures show the AN Tank Farm "A" Train but the same process will hold true for "B" Train (just replace Exhauster 'A' with Exhauster 'B' in the following steps).

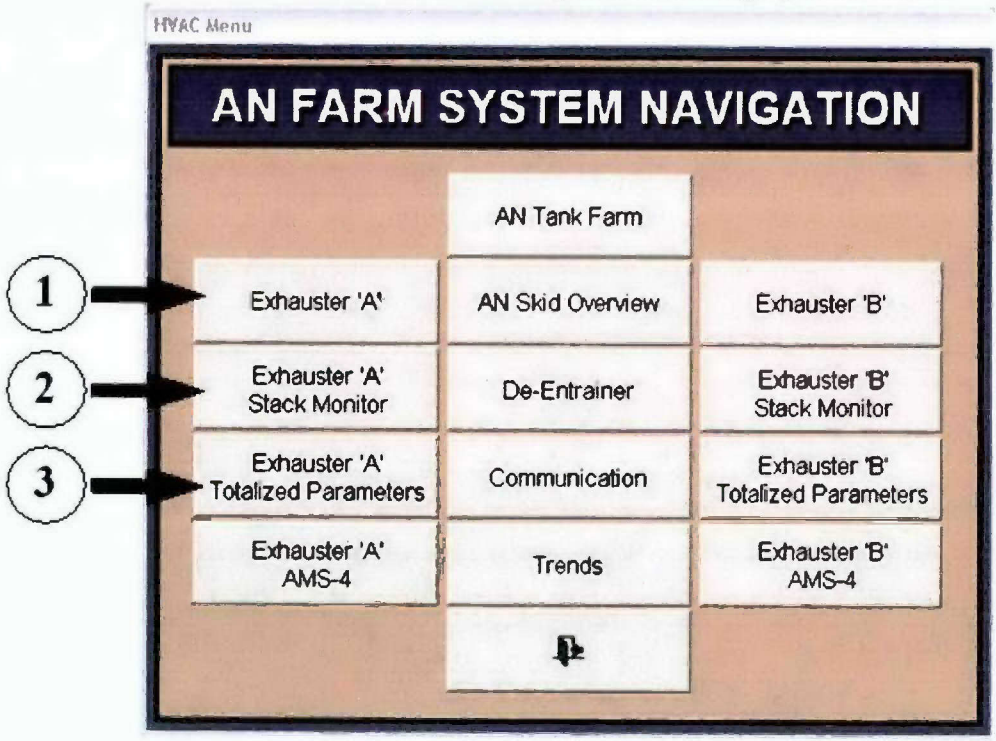
2. Pressing F2 presents the AN FARM SYSTEM NAVIGATION screen (see Picture 1 on the next page).

3. Navigation is with the "Mouse" (a small red joystick device between two buttons that are the left and right mouse buttons).

Attachment 1 - HMI Screen Navigation (Cont.)

Picture 1 - AN Farm System Navigation Screen

PRESS F2 on HMI keyboard to bring up this MENU



4. If you press the Exhauster 'A' button shown by (1) in Picture 1 above, it takes you to the Exhauster 'A' Process Details screen (See Picture 2).

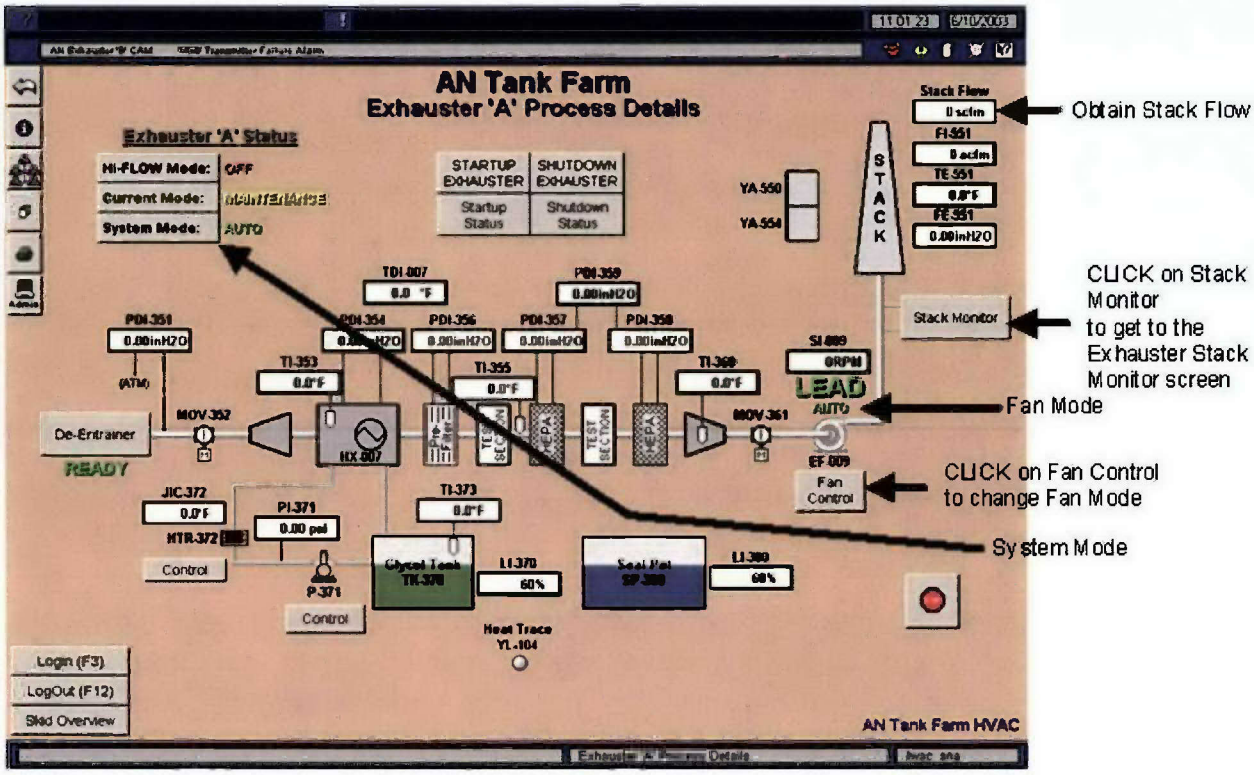
   If you press the Exhauster 'A' Stack Monitor button shown by (2) in Picture 1 above, it takes you to the Exhauster 'A' Stack Sampler screen (See Picture 3).

   If you press the Exhauster 'A' Totalized Parameters button shown by (3) in Picture 1 above, it takes you to the Exhauster 'A' Totalized Parameters screen (See Picture 4).

Attachment 1 - HMI Screen Navigation (Cont.)

4. Picture 2 below shows where to obtain Stack Flow (FI-551), Fan Mode, System Mode, and the buttons to CLICK on to change Fan Mode and to get to the Exhauster Stack Monitor screen.

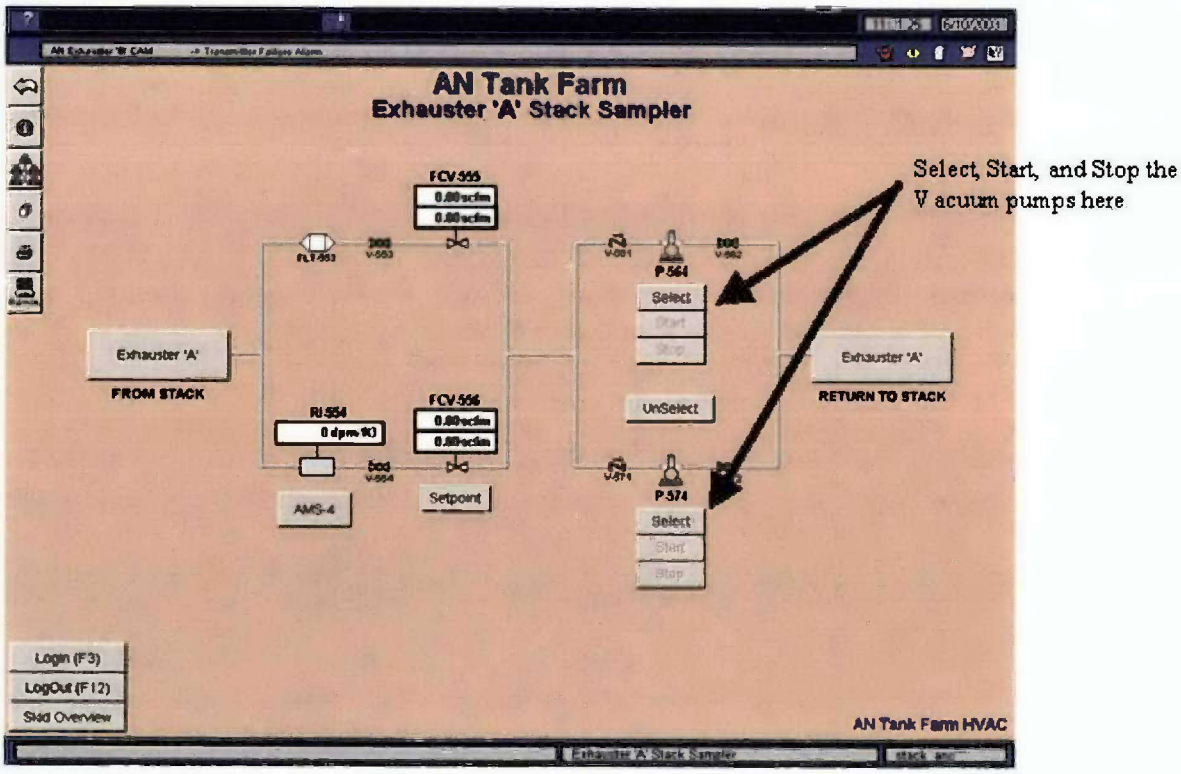
Picture 2 - Exhauster 'A' Process Details Screen



Attachment 1 - HMI Screen Navigation (Cont.)

5. Picture 3 below shows where to click to select, start, and stop the CAM and Record Sampler vacuum pumps and where to read the flow through the Flow Control Valves.

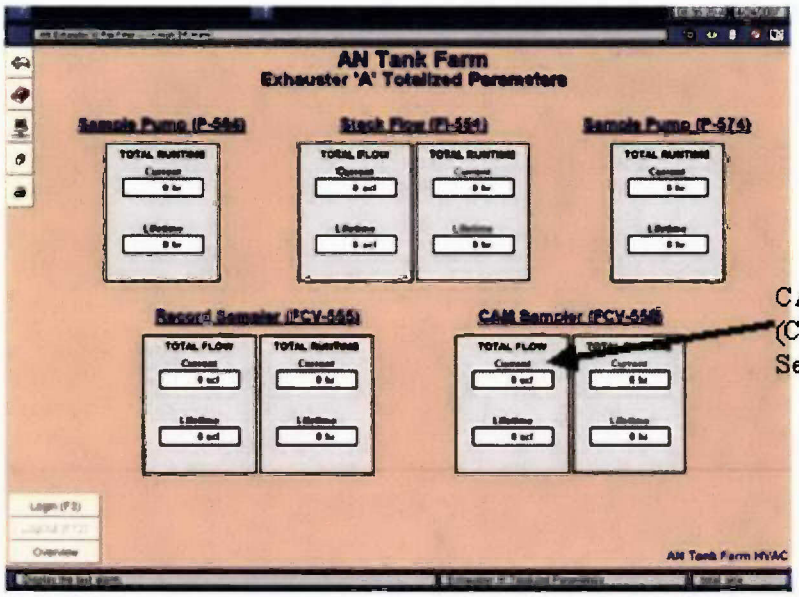
Picture 3 - Exhauster 'A' Stack Sampler Screen



Attachment 1 - HMI Screen Navigation (Cont.)

5. Picture 4 below shows where to obtain the total flow through the Flow Control Valves.

Picture 4 - Exhauster 'A' Totalized Parameters Screen



CAM Sampler Totalized Flow (Current) reading required for Section 5.6

GENERAL NOTES:

1. INSTALLATION SHALL CONFORM TO THE 2002 EDITION OF THE NATIONAL ELECTRICAL CODE, NFPA 70.
2. ABBREVIATIONS ARE PER ASME Y1.1.
3. INSTALL HEAT TRACE ON TUBING TO CAM AND RECORD SAMPLE HOLDER. USE GLASS TAPE TO FASTEN HEAT TRACE.
4. ALL POWER WIRES WIRE SHALL BE THHN/THWN CONDUCTOR SIZE AWG #12 UNLESS OTHERWISE NOTED.
5. ALL INSTRUMENT WIRE AND 5 VDC POWER WIRE SHALL BE TSP #16 AW TYPE TC (# OF PAIRS AS REQUIRED) UNLESS OTHERWISE NOTED.
6. CONNECT CAM DETECTOR TO SAMPLE PROBE. SHIM BETWEEN DETECTOR AND MOUNT TO PREVENT LOADING THE DETECTOR WHEN MOUNTING HARDWARE IS TIGHTENED. (ELONGATE MOUNTING HOLES AS NECESSARY.) CONNECT FLEXIBLE TUBING TO DISCHARGE OF CAM.
7. TOLERANCES SHALL BE AS FOLLOWS, UNLESS OTHERWISE NOTED:

   FRACTIONS: ± 1/16"
   DECIMALS: ± .06

8. FOR SAMPLE TUBING RUNS:
   - THERE SHALL BE NO INWARD FACING STEPS AT THE TUBING CONNECTIONS THAT CAUSE MORE THAN A 1% REDUCTION IN TUBE DIAMETER.
   - THE TUBING ENDS SHALL BE FREE OF BURRS AND CRIMPING.
   - BENDS SHALL HAVE A CURVATURE RATIO (RADIUS OF CURVATURE OF THE BEND DIVIDED BY THE TUBE DIAMETER) OF AT LEAST 3.0.
   - FLATTENING OF THE BEND CAUSED BY A BENDING PROCESS SHALL NOT EXCEED 15%. WHERE FLATTENING IS DEFINED IN TERMS OF THE ORIGINAL AND MINOR AXES OF THE TUBE CROSS SECTION AT THE ANGULAR MIDPOINT OF THE BEND.

   SPECIAL FABRICATION TECHNIQUES MAY BE REQUIRED TO MEET THESE SPECIFICATIONS (ANSI/HPS N13.1-1999).

9. NOT USED
10. THE MASS FLOW CONTROLLERS SHALL MEET THE FOLLOWING SPECIFICATIONS:
    - RANGE 0-4.00 SCFM OF AIR
    - UPSTREAM PRESSURE 8.1 PSIA
    - DOWNSTREAM PRESSURE 6.1 PSIA
    - WITH THE FOLLOWING ORDERING CODES:

    01- H PINOUT (HASTINGS)
    02- 4-20 mA OUTPUT SIGNAL WITH A 0-5.00 VDC INPUT SIGNAL
    04- 3/4" SWAGELOK SYSTEM CONNECTIONS
    01- 500 PSIG WORKING PRESSURE RATING
    01- 5 POINT NIST (STANDARD)

11. PANELS SHALL BE ASSEMBLED, INSPECTED AND UL LABELED PER UL 508A.
12. PREFIX EQUIPMENT IDENTIFICATION NUMBERS WITH "AN241-".
13. LABEL EQUIPMENT AS SHOWN ON SH 2 AND LABEL VALVES AND PRESSURE INDICATOR AS SHOWN ON SH 3. NAMEPLATE MATERIAL SHALL BE 1/16" THICK (MIN) LAMINATED PLASTIC WITH WHITE OUTER SURFACE AND BLACK CORE. LETTER SIZE IS 1/4". FIELD MOUNT NAMEPLATES IN APPROXIMATE AREAS AS SHOWN WITH APPLICABLE ADHESIVE.
14. DETECTOR ELECTRONICS LOCATED REMOTELY (10 FOOT CABLE LENGTH) FROM THE DETECTOR.
15. WHEN INSTALLING ITEM 12 REMOVE UPPER HOUSING AND REPLACE WITH ITEM 30. DISCARD NPT-TO-HOSE BARB FITTINGS AND THREAD 3/8 NPT OF ITEM 13 INTO LOWER HOUSING. INSTALL PER MANUFACTURER'S INSTRUCTIONS.
16. WIRE COLORS ARE PER NFPA 79.

PARTS LIST/MATERIAL LIST

QTY -010	PARTS / DASH NUMBER	NOMENCLATURE/DESCRIPTION	MATERIAL/REFERENCE	SHEET	ITEM NO
3		COAX CABLE	COML	3	40
1	SS-1210-3	UNION TEE	SWAGELOK		41
					42
4	SS-4-SE	STREET ELBOW, MALE & FEMALE NPT 1/4"	SWAGELOK		43
AR		TUBING, 3/4" OD X .049 WALL, SM LS	ASTM A269 TYPE 304L	3	44
1	D-AH2001A	HEATER, 120V, 200W, UL LISTED WITH BUILT-IN THERMOSTAT, ADJ OFF-100°F	HOFFMAN	3	45
	SEE NOTE 13	NAMEPLATE			46
3	SS-12-TA-1-12	MALE ADAPTER	SWAGELOK		47
2	SS-12-CS	CROSS	SWAGELOK		48
2	SS-12-RB-4	REDUCING BUSHING	SWAGELOK		49
1	SS-810-1-12	MALE CONNECTOR	SWAGELOK		50
2	SS-12-P	PLUG	SWAGELOK		51
2		FUSE, SLO-BLO, 0.5A 1/4 X 1 1/4	COML		52
1		FUSE, SLO-BLO, 1A 1/4 X 1 1/4	COML		53
2		FUSE, SLO-BLO, 15A 1/4 X 1 1/4	COML		54
AR	COML	WIRE, 12 AWG, SINGLE CNDCT, COPPER, BLACK	THHN/THWN		55
AR	COML	WIRE, 12 AWG, SINGLE CNDCT, COPPER, BLACK, WHITE	THHN/THWN		56
AR	COML	WIRE, 12 AWG, SINGLE CNDCT, COPPER, GREEN	THHN/THWN		57
AR	COML	WIRE, 14 AWG, SINGLE CNDCT, COPPER, BLUE	THHN/THWN		58
AR	COML	WIRE, 14 AWG, SINGLE CNDCT, COPPER WHITE W/ BLUE STRIPE	THHN/THWN		59
1	EB 10-10	INSERTION BRIDGE (USE W/ ITEM 29)	PHOENIX CONTACT		60
AR	EB 10-6	INSERTION BRIDGE (USE W/ ITEM 34)	PHOENIX CONTACT		61
AR	COML	WIRE, 14 AWG, SINGLE CNDCT, COPPER RED W/ YELLOW	THHN/THWN		62
1	NPH35DIN	DIN RAIL KIT, USE W/ ITEM 14	ACOPIAN	3	63
1	SS-810-1-6	MALE CONNECTOR	SWAGELOK		64
1	SS-810-1-4	MALE CONNECTOR	SWAGELOK		65
1	SS-1210-R-8	REDUCER	SWAGELOK		66
2	SS-1211-PC	PORT CONNECTOR	SWAGELOK		67
1	SS-810-9	UNION ELBOW	SWAGELOK		68
2	SS-811-PC	PORT CONNECTOR	SWAGELOK		69
1	SS-P88 TAB TAB-12	PUSH-ON HOSE ASSEMBLY SHORTEN AS REQD	SWAGELOK		70

QTY -010	PARTS / DASH NUMBER	NOMENCLATURE/DESCRIPTION	MATERIAL/REFERENCE	SHEET	ITEM NO
	-010	ASSEMBLY, SAMPLE CABINET		3	1
1	A-48H36FLP	ENCLOSURE, 48"H X 36"W X 18"D, NEMA TYPE 4 OR 4X WITH DOOR CLAMPS	HOFFMAN	3	2
1	A-48P36	INTERIOR PANEL, 48"H X 36"W, STEEL	HOFFMAN	3	3
2	MFC-303-01-02-04-01-01, 28-13-437	SEE NOTE 10, MASS FLOW CONTROLLER, LOW PRESSURE DROP SPRING	TBE-HASTINGS	3	4
1	A-4AXFN	FAN, SAMPLE CABINET, 4" 100 CFM	HOFFMAN	3	5
1	A-BRKT-4	BRACKET, FAN	HOFFMAN	3	6
1	AMC-1B	THERMOSTAT, LINE SENSING	RAYCHEM	3	7
AR	SBTV1-CT	HEAT-TRACE, 5W/FT, SELF-REGULATING	RAYCHEM	3	8
1	A-GARD4	FINGER GUARD	HOFFMAN	3	9
1	AMS4 OPT7SD	CAM, IN-LINE SAMPLING HEAD (SEE NOTE 14)	EBERLINE	3	10
1	D-AH8001B	HEATER, 115V, 800W, UL LISTED WITH BUILT-IN THERMOSTAT, ADJ OFF-100°F	HOFFMAN	3	11
1	#2220	FILTER HOLDER (SEE NOTE 13)	GELMAN SCIENCES	3	12
1	SS-P88 TAB TAB-18	FLEXIBLE HOSE ASSEMBLY	SWAGELOK	3	13
1	LD15-100	DUAL OUTPUT VOLTAGE, DC POWER SUPPLY, ±15VDC, CASE SIZE TN8H	ACOPIAN	3	14
2	SS-63ES8	VALVE, BALL, 1/2", SWAGELOK ENDS, 316SS	WHITEY	3	15
1	A-TEMN0	FAN CONTROL THERMOSTAT, W/ N.O. CONTACT, 120V, UL LISTED	HOFFMAN	3	16
2	A-VK88	LOUVER PLATE KIT	HOFFMAN	3	17
2	A-FLT88	FILTER W/ MOUNTING BRACKETS	HOFFMAN	3	18
1	SS-2000-61	UNION, BULKHEAD, 1-1/4"X1-1/4", 316SS	SWAGELOK	3	19
1	SS-1210-61	UNION, BULKHEAD, 3/4"X3/4", 316SS	SWAGELOK	3	20
					21
2	63030V	VACUUM GAUGE, 0-30"Hg LIQUID FILLED	DWYER	3	22
1	SS-2000-6	UNION, 1-1/4"X1-1/4", 316SS	SWAGELOK	3	23
1	H-14-105553 ITEM 12	TUBE BEND			24
AR	#9455	CABLE #20 AWG, 9 CONDUCTOR OD 0.317	BELDEN	3	25
2	17D-A15S	CONNECTOR, D SUBMINIATURE SOLDER 15 PIN (RCPT)	AMPHENOL	3	26
2	17-1725-2	CONNECTOR BACKSHELL, D SUBMINIATURE 15 PIN WITH LOCK SCREW	AMPHENOL	3	27
AR	GS-54	GLASS TAPE	RAYCHEM		28
5	30 04 17 1	FUSE TERMINAL BLOCK W/DISCONNECT LEVER, UK 6,3-HESI	PHOENIX CONTACT	3	29
1	H-14-105553 ITEM 11	FILTER COMPRESSOR WELDMENT			30
AR	08 01 73 3	MOUNTING RAIL, PERFORATED, TYPE NS, 35/7, 5	PHOENIX CONTACT	3	31
AR	12 01 44 2	UNIVERSAL END BRACKET, TYPE E/UK	PHOENIX CONTACT	3	32
AR	30 03 02 0	END COVER, TYPE D-UK 4/10	PHOENIX CONTACT	3	33
AR	30 04 36 2	TERMINAL BLOCK, TYPE UK 5 N	PHOENIX CONTACT	3	34
AR	10 51 01 6	ZACK STRIP, LABELED HORIZONTALLY, 1 - 20, TYPE LGS, QR.1-20	PHOENIX CONTACT	3	35
					36
					37
1	SS-2400-61	UNION, BULKHEAD, 1-1/2"X1-1/2", 316SS	SWAGELOK	3	38
2	E-150	HEAT TRACE END SEAL	RAYCHEM	3	39

DWG NO	TITLE	REF NUMBER	TITLE
DRAWING TRACEABILITY LIST		NEXT USED ON H-14-105543	REFERENCES

REV	DESCRIPTION	DATE	APPR
6	DIRECT DRAWING REVISION PER ECN 721772-R0 AND REVISED PER ECN-W314-SA-081-R0	4-5-04	KSD

REVISIONS

PREMIER Technology, Inc.
Licensed to
GRONCO Engineering & Manufacturing

NAME / DATE
DRAWN: P.R. FOAG
CHECKED:
ENGINEER:
ENGINEERING MANAGER: D. Dowers

U.S. DEPARTMENT OF ENERGY
Office of River Protection

AN241-VTP (W-314)
EXHAUSTER TRAIN "B"
EFFLUENT MONITORING SYSTEM

SIZE F | BLDG NO 241AN | SERIES NO 7501 | DWG NO H-14-105580 | REV 6
SCALE NONE | APP B204A7 | SHEET 1 OF 3

Daily CAM and Record Sampler Inspections

Tank Farm Plant Operating Procedure | **Health Physics**

USQ #TF-12-0830-D Rev. 1

Justification:

Operations request.

Summary of Changes:

Page 5: Modified bullets 4 & 7 to include all potential tanks.
Pages 15 & 30: Changed CAM flow range (design change)
Page 16: Added new steps and modified one step.
Page 30: Updated format of cells needed to record additional information.

Next Periodic Review Date - 10/26/2012

Click for copy of Word (native) file

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for performing daily inspections of CAMs and Record Air Samplers to meet the requirements of TFC-ESHQ-ENV-STD-05, Radioactive Airborne Effluent Sampling.

1.2 Scope

1.2.1 This procedure involves inspections of the following:

- AMS-3, AMS-4, and Alpha CAMs
- Record Air Samplers
- HMI controlled ventilation systems (HMI Exhausters).

1.2.2 The sections in this procedure may be performed in any sequence and independently as necessary.

1.2.3 If during performance of this procedure a CAM is found out of calibration as noted on instrument calibration sticker, verify CAM operability with the applicable Shift Manager, otherwise exit this procedure for that particular CAM.

2.0 INFORMATION

2.1 Terms and Definitions

- ASP - Alarm Set Point
- BO - Base Operations
- HMI - Human Machine Interface
- RAS - Record Air Sampler.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

3.1.1 Compliance with TFC-ESHQ-S-STD-03, Electrical Safety is required when working with this procedure.

3.1.1.1 If a red label or no label is present, HPTs will enter into a CAM cabinet only after a qualified electrical worker has put the cabinet into an electrically safe condition.

3.2 Equipment Safety

3.2.1 During windy conditions the CAM cabinet door(s) may swing out of control when opened causing damage to the cabinet.

3.3 Radiation and Contamination Control

3.2.1 When performed without a work package, this procedure is limited to radiological areas and work activities permitted by a general radiological work permit.

3.3.1 When work is performed in a high contamination, high radiation, or airborne radioactivity area, then an approved work package must be developed which is reviewed by Radiological Control per the ALARA Work Planning procedure TFC-ESHQ-RP_RWP-C-03.

3.4 Environmental Compliance

3.4.1 In accordance with WAC-246-247, Washington Department of Health (WDOH) must be notified at least 7 calendar days prior to any planned operational tests of new or modified emission units that involve emissions control, monitoring, or containment systems of the emission unit. WDOH reserves the right to witness such tests [WAC-246-247-060(4)].

3.4.2 Tank Farm ventilation systems and exhaust monitoring systems are regulated under Washington State Administrative CODE (WAC) Chapters 173-400, 173-460, and 246-247 and applicable Notices of Construction (NOC) issued to ensure compliance with these regulations. To ensure reporting requirements are met, all planned and unplanned outages of Tank Farm ventilation systems, abatement control equipment, and exhaust monitoring systems (including portable exhausters) must be immediately reported to Environmental per the Environmental On-Call List in accordance with TFC-ESHQ-ENV_FS-C-01.

3.4.3 PER WDOH requirements, during periods of exhauster shutdown or record sampler outage, waste-disturbing activities (e.g., waste transfers, sluicing, or other waste-disturbing activities) within tanks served by the affected exhauster (either major or minor), must be shut down.

3.4.4 Daily inspections of CAMs and Record Air Samplers are not required for the following systems on the weekends or holidays unless waste-disturbing activities occur;

- 296-P-43, at 241-S-112. Portable Exhauster 04, EDP Code E045
- 296-P-44, at 241-S-102. Portable Exhauster 05, EDP Code E046
- 296-P-47, at 241-C-108/109/C-111/C-112. Portable Exhauster 008, EDP Code E096
- 296-P-48, at 241-C-101/102/104/107/110. Portable Exhauster 03, EDP Code E098
- 296-S-18, at 242-S Evaporator, Building Exhauster, EDP Code W096
- 296-S-21, at 222-S. Main Exhauster, EDP Code S289
- 296-P-107, at 241-C-101/102/104/107/110. Portable Exhauster POR107, EDP Code E-104.

3.5 Limits

NOTE - This procedure complies with the Environmental Specification Requirements listed in this section.

RPP-16922, Environmental Specification Requirements

4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Supplies

The following supplies may be needed to perform this procedure:

- 2-way radio (portable/handheld)
- Hearing protection
- Small screwdriver (for flow adjustments)
- CAM tool (for CAMs without ASP knob adjustment)
- Access keys
- Red and black pens.

4.2 Performance Documents

The following documents may be needed to perform this procedure:

- CAM and Record Sampler Data Sheet 1, Data Sheet 2, Data Sheet 3, Data Sheet 4, and/or Data Sheet 5, as needed (required in the field)
- TFC-ESHQ-ENV-STD-05, Radioactive Airborne Effluent Sampling
- TFC-OPS-MAINT-C-01 Tank Operations Contractor Work Control
- H-14-020101, P&ID AN Farm Primary Ventilation
- H-14-020102, P&ID AW Farm Primary Ventilation.

4.3 Training Requirements

4.3.1 First Line Manager

4.3.1.1 Review records to ensure the HPT has completed the following training requirements:

- HPT Initial qualification
- Orientation Checklist (site form A-6003-481)
- OJT
- AMS-4 course (course number 356030)

OR

OJT, Daily CAM & Record Inspections (course number 351572).

4.3.1.2 Only assign qualified personnel to perform this procedure activity.

5.0 PROCEDURE

NOTE - If at any time during the performance of this procedure any item is identified as Out-of-Specification per Data Sheets or Attachment 1 Inspection Criteria that may render the CAM or Record Sampler inoperable, the following immediate actions must be taken:

The HPT will:

- Notify Shift Manager of the Out-of-Specification condition identified on Data Sheets or Attachment 1 Inspection Criteria that may render the CAM or Record Sampler inoperable.

The applicable Shift Manager will:

- Initiate appropriate actions if the CAM or Record Sampler is inoperable.
- Immediately Secure waste-disturbing activities if CAM or Record Sampler is inoperable for major stacks.
- Initiate required maintenance.
- Notify System Engineer within 1 working day of discovery of the condition.
- Notify Environmental immediately of any abnormal conditions and actions for continued operation of exhausters.

The System Engineer will:

- Evaluate the Out-of-Specification condition(s) for causes and effect on system operation.
- Provide any additional recommendations and maintenance requests to the applicable Shift Manager as required.

Environmental will:

- Make notifications as required by TFC-ESHQ-ENV_FS-C-01.
- Provide any additional recommendations to the applicable Shift Manager regarding how condition affects emissions monitoring requirements.

5.1 Daily AMS-3 CAM Inspection

5.1.1 **IF** the applicable Shift Manager requests HPT to perform an inspection of Annulus or Primary Tank Exhauster CAMs with an unexpected High Radiation alarm, **FOLLOW** the actions specified in the appropriate Alarm Response Procedure (ARP).

NOTE - Steps 5.1.2 and 5.1.13 do not apply if the CAM is not operating.

5.1.2 **RECORD** CAM Serial Number on the applicable Data Sheet.

5.1.3 **IF** Exhauster/Annulus CAM is shut down for planned outage, **PERFORM** the following:

5.1.3.1 **RECORD** on applicable Data Sheet COMMENTS section.

5.1.3.2 **CONTINUE** with procedure for other operating CAMs and Record Samplers.

5.1.4 **RECORD** As-Found Flow Rate on applicable Data Sheet.

5.1.5 **IF** As-Found flow rate is not within acceptable range specified on applicable Data Sheet, **RECORD** findings in the COMMENTS section.

NOTE - The CAM flow rate may be adjusted to anywhere within the acceptable range to allow a margin for change in performance as long as the As-Left flow rate is recorded in Step 5.1.7.

5.1.6 **IF** necessary, **ADJUST** flow rate to any setting within the range specified on applicable Data Sheet.

5.1.7 **RECORD** the following on applicable Data Sheet:

- As-Left flow rate
- CAM meter reading.

5.1 Daily AMS-3 CAM Inspection (Cont.)

5.1.8 **OBSERVE** CAM meter Alarm Set Points (ASP) are per Attachment 1.

5.1.9 **IF** CAM meter Alarm Set Points are NOT observed within values as specified on Attachment 1, **PERFORM** the following:

5.1.9.1 **NOTIFY** applicable Shift Manager.

5.1.9.2 **IF** necessary, **ADJUST** the ASP per Attachment 1 criteria.

5.1.9.3 **RECORD** findings in Comment section of the applicable work area section of Data Sheet 1 through Data Sheet 5.

NOTE - Items identified as discrepancies from Attachment 1 do not affect system operability.

5.1.10 **PERFORM** inspection of CAM per Attachment 1.

5.1.11 **IF** CAM passes all inspections (excluding discrepancies), **CHECK** SAT box on applicable Data Sheet.

5.1.12 **IF** a CAM fails inspection, **CHECK** UNSAT box on applicable Data Sheet **AND**

RECORD in COMMENT section of applicable Data Sheet, a statement to clarify the UNSAT condition(s) found.

5.1.13 **CIRCLE** any Out-of-Specification readings in red on applicable Data Sheet.

5.2 Daily AMS-4 CAM Inspection

NOTE - The applicable Shift Manager must be informed immediately of any unplanned primary exhauster shutdown.

5.2.1 **IF** the Shift Manger requests HPT to perform an inspection of Annulus or Primary Tank Exhauster CAMs with an unexpected High Radiation alarm, **FOLLOW** actions specified in the appropriate Alarm Response Procedure (ARP).

NOTE - The 242-S AMS-4 CAM is not required to be operating to support 242-S exhauster start-up or shutdown, therefore, subsequent CAM Functional Checks are not required.

5.2.2 **IF** 242-S AMS-4 CAM is not operating, **GO TO** Section 5.4,Daily Record Sampler Inspection.

NOTE - Steps 5.2.3 through 5.2.45 do not have to be performed if the CAM is not operating.

5.2.3 **RECORD** CAM Serial Number on applicable Data Sheet.

5.2.4 **IF** Exhauster/Annulus CAM is shut down for planned outage, **PERFORM** the following:

5.2.4.1 **RECORD** in applicable Data Sheet COMMENTS section.

5.2.4.2 **CONTINUE** with procedure for other operating CAMs and Record Samplers.

5.2.5 **PRESS** (9) **AND ENSURE** that CAM display indicates INSTRUMENT STATUS NORMAL,

OR

PRESS [-] until display returns to INSTRUMENT STATUS NORMAL.

5.2 Daily AMS-4 CAM Inspection (Cont.)

5.2.6 **PERFORM** one of the following;

IF readings are being taken on POR03, POR04, POR05, POR06, POR-008, or 241-SY Primary Exhauster B-Train, **GO TO** Step 5.2.7,

OR

IF readings are to be taken on AN/AW Farm HMI controlled Exhausters, **GO TO** Step 5.2.8,

OR

IF readings are to be taken on POR107 HMI controlled Exhauster, **GO TO** Step 5.2.21,

OR

IF taking readings on any other than the above, **GO TO** Step 5.2.35.

5.2.7 **IF** readings are being taken on POR03, POR04, POR05, POR06, POR-008, or 241-SY Primary Exhauster B-Train, **PERFORM** the following:

NOTE - For POR04, inside VTP-ENCL-107, MV-101 will display SAMPLE TOTALIZER FLOWS ACTIVE and MV-102 will scroll current and total flows for stack, record sampler, and CAM sampler.

- For POR03, POR05, POR06, POR-008 (inside ENCL-107) and 241-SY Primary Exhauster B-Train pressing [F1] and then [F5] on the Human Machine Interface (HMI) will display Environmental data for current and total flows for stack, record sampler, and CAM sampler. Press [F1] to return to main menu.

5.2.7.1 **PRESS** [F1] activate monitor and return to main menu.

5.2.7.2 **PRESS** [F5] to display Environmental Data screen for current and total flows for stack, record sampler, and CAM sampler.

NOTE - Step 5.2.7.3 may be performed in parallel with Section 5.4.

5.2.7.3 **RECORD** As-Found and As-Left CAM sample flow on applicable Data Sheet.

5.2.7.4 **IF** flow rate is not within acceptable range specified on applicable Data Sheet, **RECORD** findings in COMMENTS section.

5.2 Daily AMS-4 CAM Inspection (Cont.)

5.2.7.5 **PRESS** [F1] to return to main menu.

5.2.7.6 **IF** performing inspection of SY-B Train, **GO TO** Section 5.4.

5.2.7.7 **GO TO** Step 5.2.37.

5.2.8 **IF** readings are to be taken on an AN/AW Farm HMI controlled exhauster, **PERFORM** the following applicable Steps 5.2.9 through 5.2.20:

NOTE - See Figure 1 for a list of keyboard commands for navigating the HMI exhauster screens.

- To take readings required by this procedure does NOT require logging in to the HMI.
- Figure 3 to Figure 6 shows the AN Farm "A" Train but the same process will hold true AW Farm and for the "B" Train (just replace AN with AW or Exhauster "A" with Exhauster "B" in the following.
- Navigation is with a computer mouse to acquire readings from the HMI.

5.2.9 **PRESS** F2 key to navigate to the AN or AW Farm System Navigation screen as desired (See Figure 3).

5.2.10 **CLICK** on the Exhauster "A" or Exhauster "B" button as needed (Shown as (1) for Exhauster "A" or (2) for Exhauster "B" on Figure 3) to navigate to the Exhauster Process Details screen (Figure 4).

5.2.11 **RECORD** Stack Flow from the Exhauster Process Details screen (See Figure 4) on applicable Data Sheet (HMI Exhauster Data Sheet).

5.2.12 **PRESS** F2 key to navigate to the AN or AW Farm System Navigation screen as desired (See Figure 3).

5.2.13 **CLICK** on the Exhauster "A" AMS-4 button or Exhauster "B" AMS-4 button as needed (Shown as (3) for Exhauster "A" or (4) for Exhauster "B" on Figure 3) to navigate to the Exhauster AMS-4 screen (Figure 6).

5.2.14 **RECORD** the As-Found CAM Sample Flow from HMI Exhauster AMS-4 screen (See Figure 6) on applicable Data Sheet (HMI Exhauster Data Sheet).

5.2 Daily AMS-4 CAM Inspection (Cont.)

5.2.15 **CHECK** As-Found CAM Sample Flow is within expected value (1.9 scfm to 2.1 scfm).

5.2.15.1 **IF** AS-Found CAM Sample Flow is NOT within expected value (1.9 scfm to 2.1 scfm), **PERFORM** the following;

a. **NOTIFY** the applicable Shift Manager.

b. **CIRCLE** Out of Specification reading in red on applicable Data Sheet (HMI Exhauster Data Sheet)

c. **RECORD** findings in the Comments Section.

5.2.16 **RECORD** As-Found Record Sampler Flow from HMI Exhauster AMS-4 screen (See Figure 6) on applicable Data Sheet (HMI Exhauster Data Sheet).

5.2.17 **IF** Expected Record Sampler flow is NOT within range of 0.8 – 1.2 scfm of As-Found Record Sampler Flow recorded from AMS-4 screen, **PERFORM** the following;

5.2.17.1 **NOTIFY** the applicable Shift Manager

5.2.17.2 **CIRCLE** Out of Specification reading in red on applicable Data Sheet (HMI Exhauster Data Sheet)

5.2.17.3 **RECORD** findings in the Comments Section.

5.2.18 **FROM** AMS-4 screen, **CLICK** on the Totalized Parameters button (See Figure 6).

5.2.18.1 **RECORD** both of the following from the Totalized Parameters screen on applicable Data Sheet (See Figure 6):

- Total Record Sampler Flow Volume
- Total Stack Flow Volume.

5.2.19 **PRESS** F2 key to navigate to the AN or AW Farm System Navigation screen as desired (See Figure 3).

5.2.20 **GO TO** Step 5.2.37.

5.2 Daily AMS-4 CAM Inspection (Cont.)

5.2.21 **IF** readings are to be taken on POR107 HMI controlled exhauster, **PERFORM** the following applicable Steps 5.2.22 through 5.2.34.

NOTE - See Figure 7 to Figure 10 for navigating the POR107 HMI exhauster screens.

- To take readings required by this procedure does NOT require logging in to the HMI.
- Navigation is with a computer mouse to acquire readings from the HMI.

5.2.22 **PRESS** "System Start Page" to bring up the POR107 "Tank Farm Overview" screen (See Figure 7).

5.2.23 **CLICK** on the "Exhauster Process Details" button at the top of the "Tank Farm Overview" screen (See Figure 7).

5.2.24 **RECORD** Stack Flow from the POR107 "Exhauster Process Details" screen (See Figure 8) on applicable Data Sheet 5 (HMI Exhauster Data Sheet).

5.2.25 **CLICK** on "Exhauster Stack Sampler" at the top of POR107 "Exhauster Process Details" screen (See Figure 7).

5.2.26 **CLICK** on the POR107 Exhauster AMS-4 button to navigate to the Exhauster AMS-4 screen (See Figure 9 and Figure 10).

5.2.27 **RECORD** the As-Found CAM Sample Flow from POR107 HMI "Exhauster AMS-4" screen (See Figure 10) on applicable Data Sheet 5 (HMI Exhauster Data Sheet).

5.2.28 **CHECK** As-Found CAM Sample Flow is within expected value (0.85 to 1.15 scfm).

5.2.28.1 **IF** AS-Found CAM Sample Flow is not within expected value (0.85 to 1.15 scfm), **PERFORM** the following;

a. **NOTIFY** the applicable Shift Manager.

b. **CIRCLE** Out of Specification reading in red on applicable Data Sheet 5 (HMI Exhauster Data Sheet).

c. **RECORD** findings in the Comments Section.

5.2 Daily AMS-4 CAM Inspection (Cont.)

5.2.29 **RECORD** As-Found Record Sampler Flow from POR107 HMI "Exhauster AMS-4" screen (See Figure 10) on applicable Data Sheet 5 (HMI Exhauster Data Sheet).

5.2.30 **CALCULATE** expected Record Sampler Flow by dividing the POR107 stack flow taken in Step 5.2.24 by 1000 **AND**

RECORD on applicable Data Sheet 5 (HMI Exhauster Data Sheet).

5.2.31 **IF** As-Found Record Sampler flow from Step 5.2.29 is not within 15% of the expected Record Sampler Flow from Step 5.2.30 , **PERFORM** the following;

5.2.31.1 **NOTIFY** the applicable Shift Manager.

5.2.31.2 **CIRCLE** Out of Specification reading in red on applicable Data Sheet 5 (HMI Exhauster Data Sheet).

5.2.31.3 **RECORD** findings in the Comments Section.

5.2.32 **PRESS** "System Start Page" to bring up the POR107 "Tank Farm Overview" screen (See Figure 7).

NOTE - PI-553 and PI-554 are located in POR107 VTP-ENCL-550

5.2.33 **CHECK** CAM outlet pressure PI-553 and Record Sampler outlet pressure PI-554 are ≤ 11 in. Hg.

5.2.33.1 **IF** outlet pressures are not between 0 in. Hg to11 in. Hg, **NOTIFY** OE/Shift Manager.

5.2.34 **GO TO** Step 5.2.37.

5.2 Daily AMS-4 CAM Inspection (Cont.)

5.2.35 **PERFORM** the following steps to obtain CAM flow rate:

5.2.35.1 **IF** system is equipped with a Masstron, **GO TO** Step 5.2.35.4.

5.2.35.2 **PRESS** (2) **AND OBSERVE** display indicates as follows:

##.# ft^3/min

###.# ft^3.

5.2.35.3 **PRESS** ENTER to ensure displayed format is as follows:

SAMPLE FLOW RATE
TOTAL FLOW VOLUME.

NOTE - Display will return to previous format in approximately 5 seconds.

- For systems with Masstrons CAM flows are recorded from Masstron.

5.2.35.4 **RECORD** As-Found SAMPLE FLOW RATE value on applicable Data Sheet.

5.2.35.5 **IF** As-Found flow rate is not within acceptable range specified on applicable Data Sheet, **RECORD** findings in the COMMENT section.

NOTE - The CAM flow rate may be adjusted to anywhere within the acceptable range to allow a margin for change in performance as long as the As-Left flow rate is recorded in Step 5.2.36.1.

5.2.36 **IF** necessary, **ADJUST** flow rate to any setting within the range specified on applicable Data Sheet **AND**

RECORD findings in the COMMENT section.

5.2.36.1 **RECORD** As-Left flow rate.

5.2 Daily AMS-4 CAM Inspection (Cont.)

5.2.37 **PERFORM** the following steps to OBSERVE CAM meter Alarm Set Points (ASP) are per Attachment 1:

5.2.37.1 **PRESS** (7) or [-] until display indicates BETA ASP.

5.2.37.2 **OBSERVE** display indicates as follows:

###.# CPM
###.# CPM

5.2.37.3 **PRESS** ENTER to ensure displayed format is as follows:

BETA ALARM SETPOINT.
BETA ALARM MDNCR

NOTE - Display will return to previous format in approximately 5 seconds.

5.2.38 **IF** BETA Alarm Set Points are NOT observed within values as specified on Attachment 1, **PERFORM** the following:

5.2.38.1 **NOTIFY** the applicable Shift Manager.

5.2.38.2 **RECORD** findings in Comment section of the applicable work area section of Data Sheet 1 through Data Sheet 5.

5.2 Daily AMS-4 CAM Inspection (Cont.)

5.2.39 **PERFORM** the following steps to obtain CAM meter reading:

5.2.39.1 **PRESS** (8) **AND OBSERVE** that display indicates as follows:

##.# DPM/ft^3
###.# CPM

5.2.39.2 **PRESS** ENTER to ensure displayed format is as follows:

FAST ALARM CONC.
BETA NET COUNT RATE

NOTE - Display will return to previous format in approximately 5 seconds.

5.2.39.3 **RECORD** BETA NET COUNT RATE value on applicable Data Sheet.

5.2.40 **PRESS** (9) **AND ENSURE** CAM display indicates INSTRUMENT STATUS NORMAL,

OR

PRESS [-] until display returns to INSTRUMENT STATUS NORMAL.

5.2.41 **ENSURE** READY green light is lit and INSTRUMENT STATUS NORMAL is displayed.

NOTE - Items identified as discrepancies from Attachment 1 do not affect system operability.

5.2.42 **PERFORM** inspection of CAM per Attachment 1.

5.2.43 **IF** CAM passes all inspections (excluding discrepancies), **CHECK** SAT box on applicable Data Sheet.

5.2.44 **IF** a CAM fails inspection, **CHECK** UNSAT box on applicable Data Sheet **AND**

RECORD in COMMENT section of applicable Data Sheet, a statement to clarify UNSAT condition(s) found.

5.2.45 **CIRCLE** any Out-of-Specification readings in red on applicable Data Sheet.

5.3 Daily Alpha CAM Inspection

5.3.1 **IF** the applicable Shift Manger requests HPT to perform an inspection of Annulus or Primary Tank Exhauster CAMs with an unexpected High Radiation alarm, **FOLLOW** the actions specified in the appropriate Alarm Response Procedure (ARP).

NOTE - Steps 5.3.2 and 5.3.17 do not have to be performed if the CAM is not operating.

5.3.2 **RECORD** CAM Serial Number on Data Sheet.

5.3.3 **IF** Exhauster is shut down for planned outage, **RECORD** on applicable Data Sheet.

5.3.4 **CONTINUE** with procedure for other operating CAMs and Record Samplers.

5.3.5 **RECORD** As-Found flow rate on applicable Data Sheet.

5.3.6 **IF** As-Found Flow Rate is not within acceptable range specified on applicable Data Sheet, **RECORD** findings in the COMMENT section.

NOTE - The CAM flow rate may be adjusted to anywhere within the acceptable range to allow a margin for change in performance as long as the As-Left flow rate is recorded in Step 5.3.8.

5.3.7 **IF** necessary, **ADJUST** flow rate to any setting within the range specified on applicable Data Sheet.

5.3.8 **RECORD** As-Left flow rate on applicable Data Sheet.

5.3.9 **RECORD** CAM meter reading on applicable Data Sheet.

5.3.10 **OBSERVE** CAM meter Alarm Set Points (ASP) are per Attachment 1.

5.3 Daily Alpha CAM Inspection (Cont.)

5.3.11 **IF** CAM meter Alarm Set Points are NOT observed within values as specified Attachment 1, **PERFORM** the following:

5.3.11.1 **NOTIFY** the applicable Shift Manager.

5.3.11.2 **IF** necessary, **ADJUST** the ASP per Attachment 1 criteria.

5.3.11.3 **RECORD** findings in Comment section of the applicable work area section of Data Sheet 1 through Data Sheet 5.

5.3.12 **OBSERVE** CAM meter Electronic Pot Settings are per Attachment 1

5.3.13 **IF** CAM meter Electronic Pot Settings are NOT observed within values as specified on Attachment 1, **PERFORM** the following:

5.3.13.1 **NOTIFY** the applicable Shift Manager.

5.3.13.2 **RECORD** findings in Comment section of the applicable work area section of Attachment 1.

NOTE - Items identified as discrepancies on Attachment 1 do not affect system operability.

5.3.14 **PERFORM** inspection of CAM per Attachment 1.

5.3.15 **IF** CAM passes all inspections (excluding discrepancies), **CHECK** SAT box on applicable Data Sheet.

5.3.16 **IF** CAM fails inspection, **CHECK** UNSAT box on applicable Data Sheet **AND**

RECORD findings in the COMMENT section of applicable Data Sheet.

5.3.17 **CIRCLE** any Out-of-Specification readings in red on applicable Data Sheet.

5.4 Daily Record Sampler Inspection

5.4.1 **IF** the applicable Shift Manger requests HPT to perform an inspection of Annulus or Primary Tank Exhauster CAMs with an unexpected High Radiation alarm, **FOLLOW** the actions specified in the appropriate Alarm Response Procedure (ARP).

5.4.2 **IF** Exhauster is shut down for planned outage, **RECORD** on applicable Data Sheet **AND**

CONTINUE with procedure for other operating CAMs and Record Samplers.

5.4.3 **IF** readings are being taken on POR03, POR04, POR05, POR06, POR-008, or 241-SY Primary Exhauster B-Train **PERFORM** the following:

NOTE - For POR04, inside VTP-ENCL-107, MV-101 will display SAMPLE TOTALIZER FLOWS ACTIVE and MV-102 will scroll current and total flows for stack, record sampler, and CAM sampler.

- For POR03, POR05, POR06, POR-008 (inside ENCL-107) and 241-SY Primary Exhauster B-Train pressing [F1] and then [F5] on the Human Machine Interface (HMI) will display Environmental data for current and total flows for stack, record sampler, and CAM sampler. Press [F1] to return to main menu.

5.4.3.1 **PRESS** [F1] activate monitor and return to main menu.

5.4.3.2 **PRESS** [F5] to display Environmental Data screen for current and total flows for stack, record sampler, and CAM sampler.

5.4 Daily Record Sampler Inspection

NOTE - Step 5.4.3.3 may be performed in parallel with Section 5.2.

5.4.3.3 **RECORD** As-Found and As-Left record sample flow on applicable Data Sheet.

5.4.3.4 **IF** As-Found flow rate is not within acceptable range specified on applicable Data Sheet, **RECORD** findings in the COMMENT section.

5.4.3.5 **PRESS** [F1] to return to main menu.

5.4.3.6 **GO TO** Step 5.4.6.

NOTE - The record sampler flow rate may be adjusted to anywhere within the acceptable range to allow a margin for change in performance as long as the As-Left Flow Rate is recorded in Step 5.4.5.

5.4.4 **IF** necessary, **ADJUST** flow rate to any setting within the range specified on applicable Data Sheet.

5.4.5 **RECORD** As-Left flow rate on applicable Data Sheet.

NOTE - Items identified as discrepancies from Attachment 1 do not affect system operability.

5.4.6 **PERFORM** inspection of Record Sampler per Attachment 1.

5.4.7 **IF** record sampler passes all inspections (excluding discrepancies), **CHECK** SAT box on applicable Data Sheet.

5.4.8 **IF** record sampler fails inspection, **PERFORM** the following:

5.4.8.1 **DOCUMENT** notification of the applicable Shift Manager in the Health Physics logbook.

5.4.8.2 **CHECK** UNSAT box on applicable Data Sheet.

5.4.8.3 **RECORD** discrepancies in COMMENTS section of applicable Data Sheet to clarify UNSAT condition(s) found.

5.4.9 **CIRCLE** any Out-of-Specification readings in red on applicable Data Sheet.

5.5 Field Completion

5.5.1 **DOCUMENT** inspection on the Shifter Daily Checklist.

5.5.2 **IF** applicable, **UPDATE** status board.

5.5.3 **ENSURE** Sections 5.1 through 5.4 have been completed as required and systems/components performed as specified.

5.5.4 **SIGN** the work area section of applicable Data Sheet 1 to Data Sheet 5.

5.5.5 **FORWARD** completed applicable Data Sheet to the applicable Shift Manager.

5.6 Review

Applicable Shift Manager

5.6.1 **REVIEW** applicable Data Sheet(s) for completion of all activities and proper documentation of all Out-of-Specification conditions and component trends.

5.6.2 **SIGN** the work area section of applicable Data Sheet 1 to Data Sheet 5.

5.6.3 **FORWARD** the following to the Tank Surveillance and Data Acquisition Administration Specialist within 1 working day:

- Applicable Daily CAM and Record Sampler Data Sheet(s).

Tank Surveillance and Data Acquisition Administrative Specialist

5.6.4 **PROCESS** the Data Sheet information in accordance with department desk instruction RPP-DI-PE-002.

5.7 Records

NOTE - Some data contained in this procedure needs to be saved and filed as required by Dangerous Waste Regulations of the Washington Administrative Code (WAC) 173-303-380 "Facility Record Keeping."

- The following records are generated during the performance of this procedure
  - Data Sheet 1 through Data Sheet 5
  - Attachment 1

  The record custodian identified in the Company Level Records Retention and Disposition Schedules (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.

Daily CAM and Record Sampler Inspections

Data Sheet 1 – A/AX/AY/AZ Area

DATE:					Time:				
LOCATION	**EQUIP TYPE**	**EDP CODE**	**CAM S/N**	**SAT**	**UN SAT**	**FLOW RATE**	**AS FOUND**	**AS LEFT**	**Meter Reading (cpm)**
241-AY/AZ Primary [2] Tank Exhauster (702-AZ) (296-A-42)	BETA*	E153				Auto. Adjust. 0.5 - 1.7 cfm			
	RECORD*	E147				Auto. Adjust 0.5 - 1.7 cfm			
241-AZ 702-AZ [4] Building Exhauster (296-A-43)	BETA	E154				Auto. Adjust. 0.5 - 2.1 cfm			
	RECORD	E148				Auto. Adjust 0.5 - 2.1 cfm			
241-AY-101 [4] Annulus Exhauster (296-A-18)	RECORD	E060				108-132 scfh			
241-AY-102 [4] Annulus Exhauster (296-A-19)	RECORD	E061				108-132 scfh			
241-AY-101 Annulus [4]	BETA	E145				1.8-2.2 cfm			
241-AY-102 Annulus [4]	BETA	E146				1.8-2.2 cfm			
241-AZ [4] Annulus Exhauster (296-A-20)	RECORD	E197				108-132 scfh			
241-AZ-101 Annulus [4]	BETA	E195				1.8-2.2 cfm			
241-AZ-102 Annulus [4]	BETA	E196				1.8-2.2 cfm			

* Waste disturbing activities must be secured immediately if CAM or associated record sampler is not operable.

2. Both the CAM and Record Sampler are required instruments. Contact Environmental On-Call regarding continued exhauster operation when abnormal conditions exist.

4. CAM not required for emissions monitoring. If record sampler flow rate is out-of-range, continued exhauster operation is allowed. During last month of calendar quarter, consult with Environmental regarding time to fix problem.

Comments:

	Print Name	**Signature**	**Date**	**Time:**
Health Physics Technician				
Area Shift Manager				

Daily CAM and Record Sampler Inspections

Data Sheet 2 – AN/B/BX/BY/C Area

DATE:				Time:					
LOCATION	**EQUIP TYPE**	**EDP CODE**	**CAM S/N**	**SAT**	**UN SAT**	**FLOW RATE**	**AS FOUND**	**AS LEFT**	**Meter Reading (cpm)**
241-AN [4] Annulus Exhauster (296-A-30)	BETA	E904				1.8-2.2 cfm			
	RECORD	E903				108-132 scfh			

(HMI Exhauster Data Sheet)

LOCA-TION	**EQUIP TYPE**	**EDP CODE**	**CAM S/N**	**SAT**	**UN SAT**	**FLOWRATE**	**AS FOUND**	**Stack Flow Rate(scfm)**	**Meter Reading (cpm)**	**Total Flow Stack/Record (scf)**
241-AN [2] "A" Train Primary Tank Exhauster (296-A-44)	BETA*	E921				Auto Adjust. 1.9 - 2.1 scfm				Stack:
	RECORD *	E920				Auto Adjust. 0.8 – 1.2 scfm				Record:
241-AN [2] "B" Train Primary Tank Exhauster (296-A-45)	BETA*	E923				Auto Adjust. 1.9 - 2.1 scfm				Stack:
	RECORD *	E922				Auto Adjust. 0.8 – 1.2 scfm				Record:

* Waste disturbing activities must be secured immediately if CAM or associated record sampler is not operable.

2. Both the CAM and Record Sampler are required instruments. Contact Environmental On-Call regarding continued exhauster operation when abnormal conditions exist.
4. CAM not required for emissions monitoring. If record sampler flow rate is out-of-range, continued exhauster operation is allowed. During last month of calendar quarter, consult with Environmental regarding time to fix problem.

Comments:

	Print Name	**Signature**	**Date**	**Time:**
Health Physics Technician				
Area Shift Manager				

Daily CAM and Record Sampler Inspections

Data Sheet 3 – AP/AW/242A Area

DATE:					Time:				
LOCATION	**EQUIP TYPE**	**EDP CODE**	**CAM S/N**	**SAT**	**UN SAT**	**FLOWRATE**	**AS FOUND**	**AS LEFT**	**Meter Reading (cpm)**
242-A Building [4] Stack Exhauster (296-A-21A)	BETA	E991				1.9 to 2.1 scfm			
	RECORD	E645				1.9 to 2.1 scfm			
242-A Vessel Vent [3] System (296-A 22)	BETA	E642				40-48 lpm			
	ALPHA	E465				40-48 lpm			
	RECORD*	E643				90-100 scfh			
241-AW [4] Annulus Exhauster (296-A-28)	BETA	E273				51-62 lpm			
	RECORD	E272				108-132 scfh			
241-AP [4] Primary Tank Exh. (296-A-40)	BETA	E014				1.8-2.2 cfm			
	RECORD*	E013				108-132 scfh			
241-AP [4] Annulus Exhauster (296-A-41)	BETA	E016				1.8-2.2 cfm			
	RECORD	E015				108-132 scfh			

(HMI Exhauster Data Sheet)

LOCA-TION	EQUIP TYPE	EDP CODE	CAM S/N	SAT	UN SAT	Flow Rate	AS FOUND	Stack Flow Rate (scfm)	Meter Reading (cpm)	Total Flow Stack/Record (scf)
241-AW [2] "A" Train Primary Tank Exhauster (296-A-46)	BETA*	E925				Auto Adjust. 1.9 - 2.1 scfm				Stack:
	RECORD *	E924				Auto Adjust. 0.8 – 1.2 scfm				Record:
241-AW [2] "B" Train Primary Tank Exhauster (296-A-47)	BETA*	E927				Auto Adjust. 1.9 - 2.1 scfm				Stack:
	RECORD *	E926				Auto Adjust. 0.8 – 1.2 scfm				Record:

* Waste disturbing activities must be secured immediately if CAM or associated record sampler is not operable.

2. Both the CAM and Record Sampler are required instruments. Contact Environmental On-Call regarding continued exhauster operation. when abnormal conditions exist.
3. Both CAM and Record Sampler are required instruments when waste is in 242-A Vessel. (See Note 2).
4. CAM not required for emissions monitoring. If record sampler flow rate is out-of-range, continued exhauster operation is allowed. During last month of calendar quarter, consult with Environmental regarding time to fix problem.

Comments:

	Print Name	Signature	Date	Time:
Health Physics Technician				
Area Shift Manager				

Daily CAM and Record Sampler Inspections

Data Sheet 4 – S/SX/SY/T/TX/TY/U Area

DATE:				Time:					
LOCATION	EQUIP TYPE	EDP CODE	CAM S/N	SAT	UN SAT	FLOW RATE	AS FOUND	AS LEFT	Meter Reading (cpm)
241-SY A-Train Primary Tank Exhauster (296-S-25) [4]	BETA*	W146				Auto. Adjust. (1.4-1.9 cfm)			
	RECORD *	W145				Auto. Adjust. (1.4-1.9 cfm)			
241-SY B-Train Primary Tank Exhauster (296-P-23) [4]	BETA*	W199				Auto. Adjust. (0.75-1.25 cfm)			
	RECORD *	W190							
241-SY Annulus Exhauster (296-P-22) [4]	BETA	W198				1.8-2.2 cfm			
	RECORD	W191				108-132 scfh			
296-S-18 242-S Bldg Exh. [4]	RECORD	W096				108-132 scfh			

* Waste disturbing activities must be secured immediately if CAM or associated record sampler is not operable.

4 CAM not required for emissions monitoring. If record sampler flow rate is out-of-range, continued exhauster operation is allowed. During last month of calendar quarter, consult with Environmental regarding time to fix problem.

Comments:

	Print Name	Signature	Date	Time
Health Physics Technician				
Area Shift Manager				

Daily CAM and Record Sampler Inspections

Data Sheet 5 - Portable Exhauster Daily[1]

DATE:						TIME:			
LOCATION	**EQUIP TYPE**	**EDP CODE**	**CAM S/N**	**SAT**	**UN SAT**	**FLOW RATE**	**AS FOUND**	**AS LEFT**	**Meter Reading (cpm)**
296-P-43 [2] POR04 Portable Exhauster	BETA*	E048				AUTO-adjust 0.85 - 1.15 scfm			
	RECORD *	E045	N/A			AUTO-adjust 0.85 - 1.15 scfm			
296-P-44 [2] POR05 Portable Exhauster	BETA*	E049				AUTO-adjust 0.85 - 1.15 scfm			
	RECORD	E046	N/A			AUTO-adjust 0.85 - 1.15 scfm			
296-P-47 [2] POR-008 Portable Exhauster	BETA*	E097				AUTO-adjust 0.85 - 1.15			
	RECORD *	E096	N/A			AUTO-adjust 0.85 - 1.15			
296-P-48 [2] POR03 Portable Exhauster	BETA*	E099				AUTO-adjust 0.85 - 1.15			
	RECORD*	E098	N/A			AUTO-adjust 0.85 - 1.15			
296-P-45 [2] POR06 "ER-311" Portable Exhauster	BETA*	E050				AUTO-adjust 0.85 - 1.15			
	RECORD*	E047	N/A			AUTO-adjust 0.85 - 1.15			

(HMI Exhauster Data Sheet)

LOCATION	**EQUIP TYPE**	**EDP CODE**	**CAM S/N**	**SAT**	**UN SAT**	**FLOW RATE**	**AS FOUND**	**Stack Flow Rate (scfm)**	**Meter Reading (cpm)**	**Total Flow Stack/Record (scf)**
296-P-107 POR107 C107 Portable Exhauster	BETA*	E-105				Auto Adjust. 0.85 - 1.15scfm				Stack:
	RECORD*	E-104	N/A			Expected Record Sampler flow (scfm)				Record:
						± 15%				

* Waste disturbing activities must be secured immediately if CAM or associated record sampler is not operable.

1. Not required on weekends or holidays unless waste disturbing activities occur.

2. Both the CAM and Record Sampler are required instruments. Contact Environmental On-Call regarding continued exhauster operation when abnormal conditions exist.

Comments:

	Print Name	**Signature**	**Date**	**Time:**
Health Physics Technician				
Applicable Shift Manager				

Figure 1 - HMI Keyboard Commands

Keystroke	Command
F1	Display Help Pages
F2	Display Page Menu
F3	Display New User Login Form
F4	Display Current User
F5	Display Alarm Page
F6	Display Alarm Summary Page
F7	Display Hardware Alarm Page
F8	Go to Main HVAC Page
F9	Display Last Page
F10	Display System Information Window
F11	Display Applications Menu
F12	Log Out of System
End	Close Active Child Window
ESC	System Shutdown
Ctrl + C	Display Citect Point Count
Ctrl + P	Print Current Window
Shift + F2	Displays System Stats Window

Figure 2 – Data Sheet Entry Definitions

Status Entry	Description
OFF	Not operating; available for manual operation. Data limits not applicable.
STBY	Not operating; available for auto operation. Data limits not applicable.
O/S	Out of service. Not operating. Not available. Data limits not applicable.
S/R	Service Required. Failed equipment. Take no readings.
N/A	Not Applicable. No data collected. Note reason in remarks.
Red Circle	Red circle all out of spec. and O/S & S/R readings. Note reason in remarks.

Figure 3 - HMI AN/AW Farm Navigation Screen (Example)

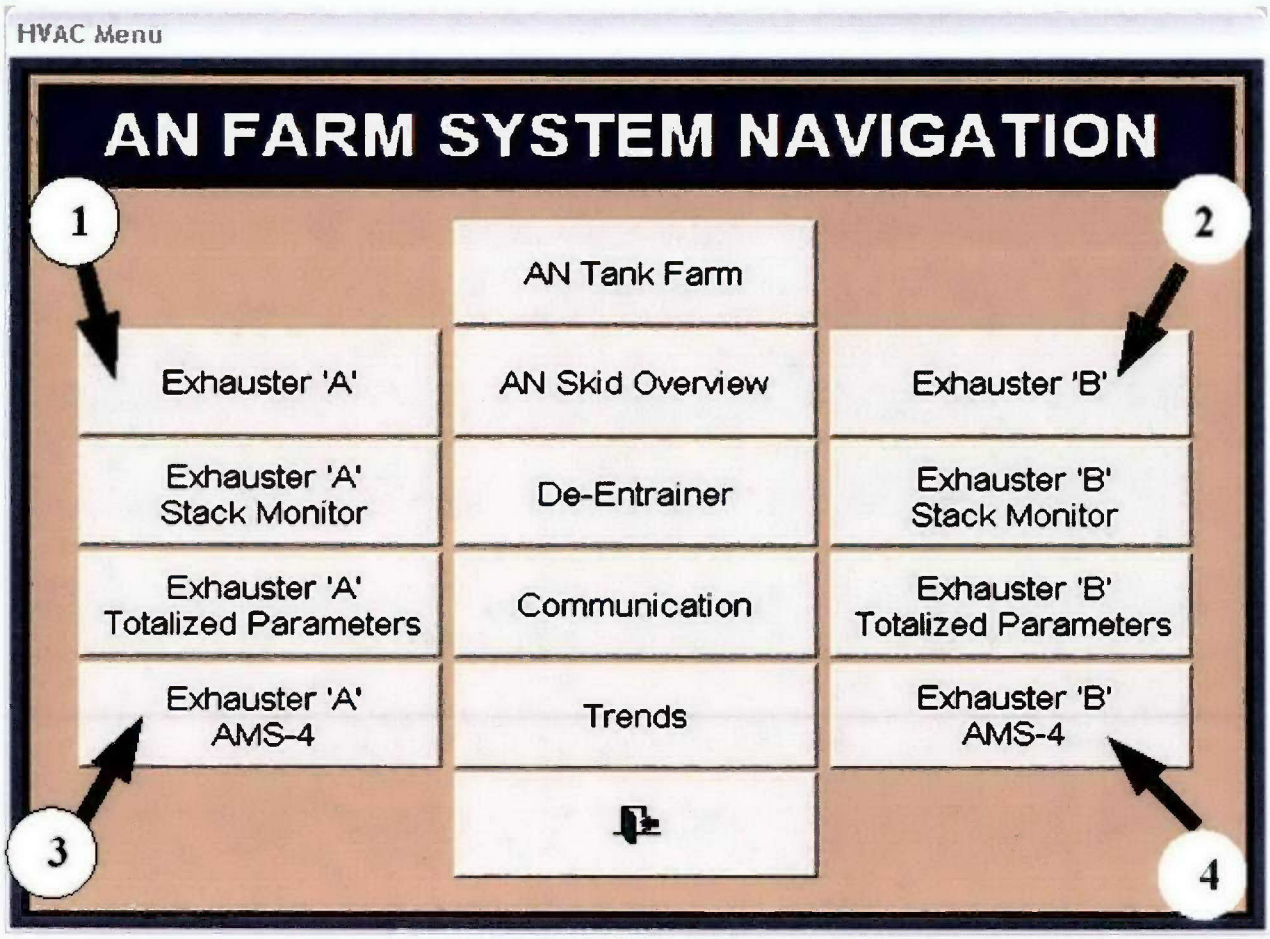
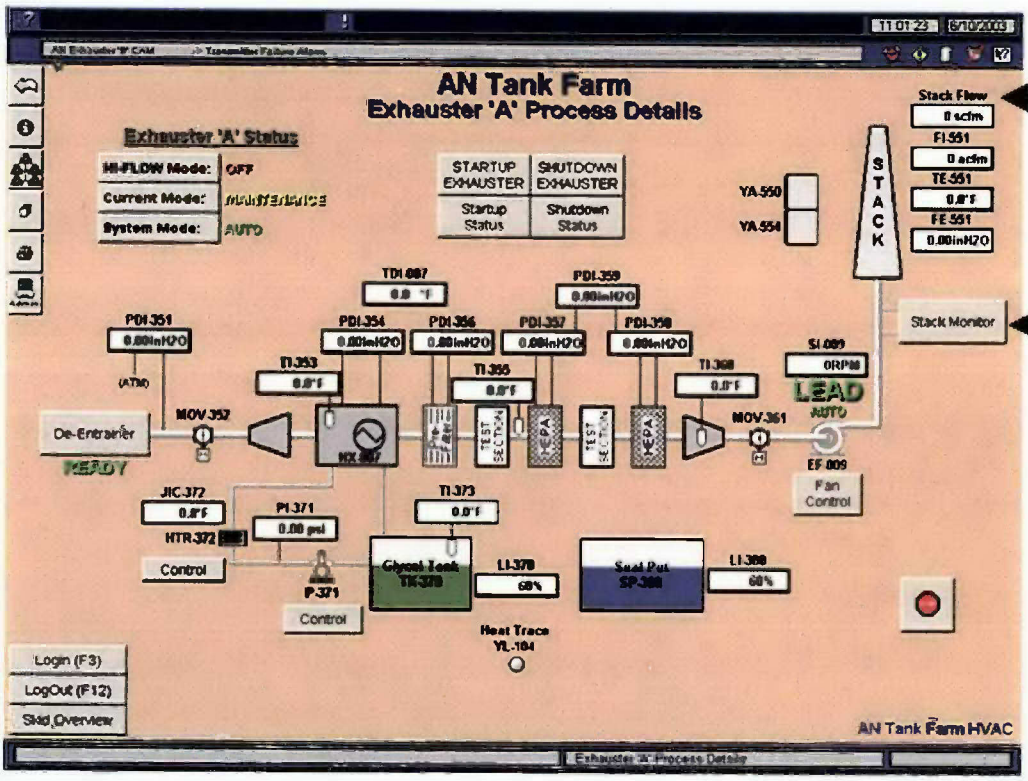


Figure 4 - AN/AW Exhauster Process Details Screen (Example)



Obtain Stack Flow

CLICK on Stack Monitor to get to the Exhauster Stack Sampler screen

Figure 5 – AN/AW Exhauster Stack Sampler Screen (Example)

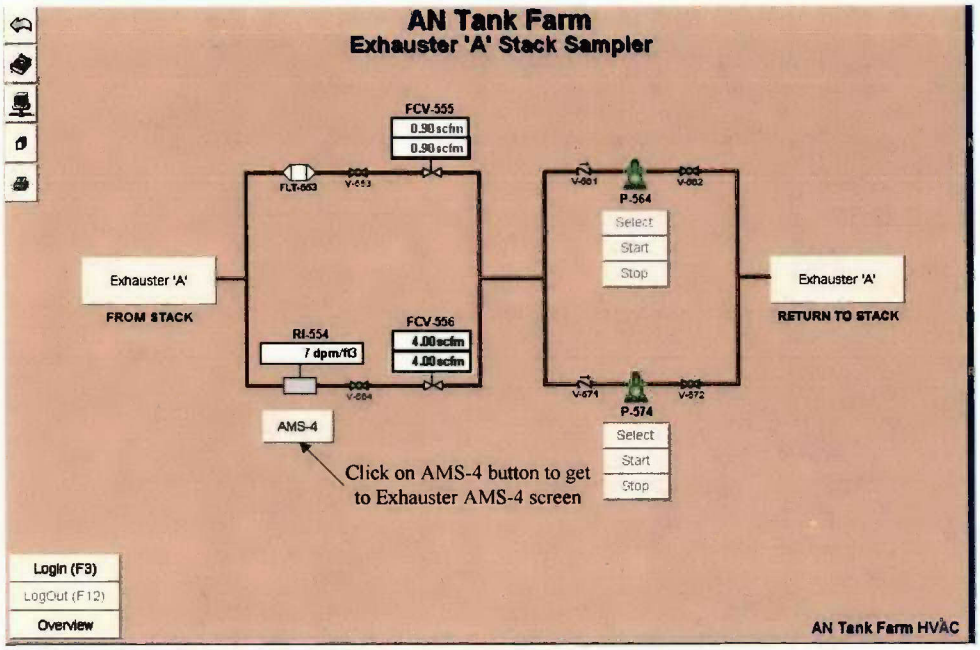
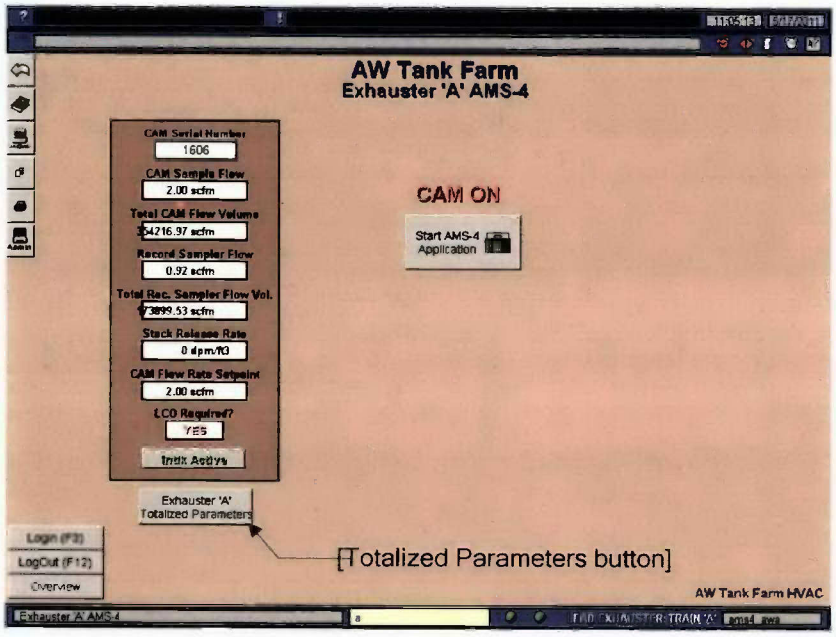


Figure 6 - AN/AW Exhauster AMS-4 Screen (Example)



Exhauster Totalized Parameters Screen (Example)

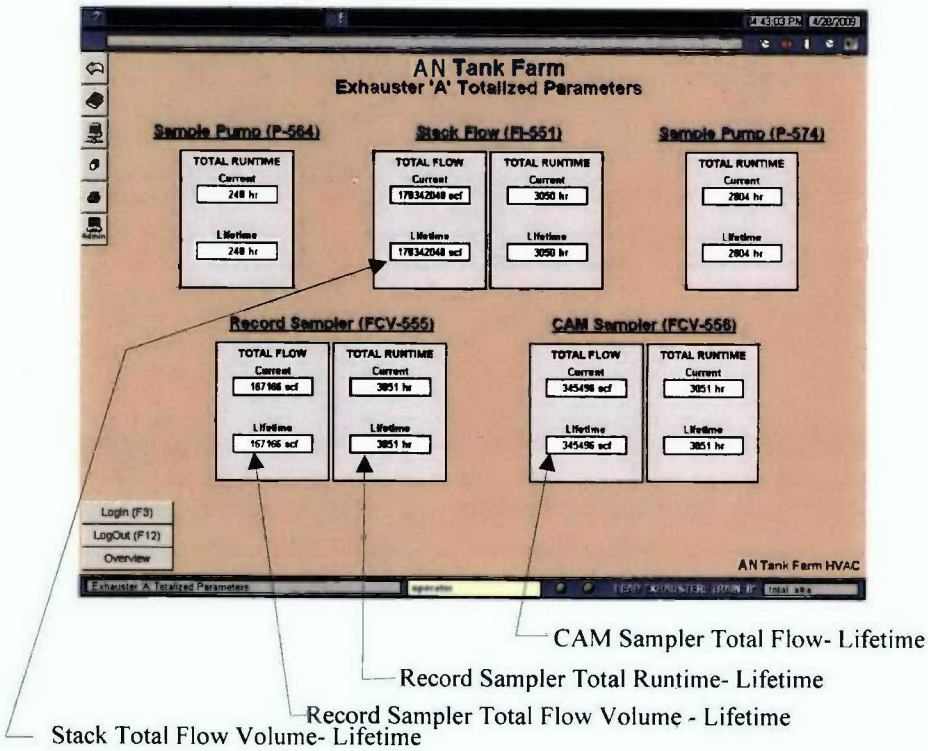


Figure 7 - POR107 Tank Farm Overview Screen (Example)

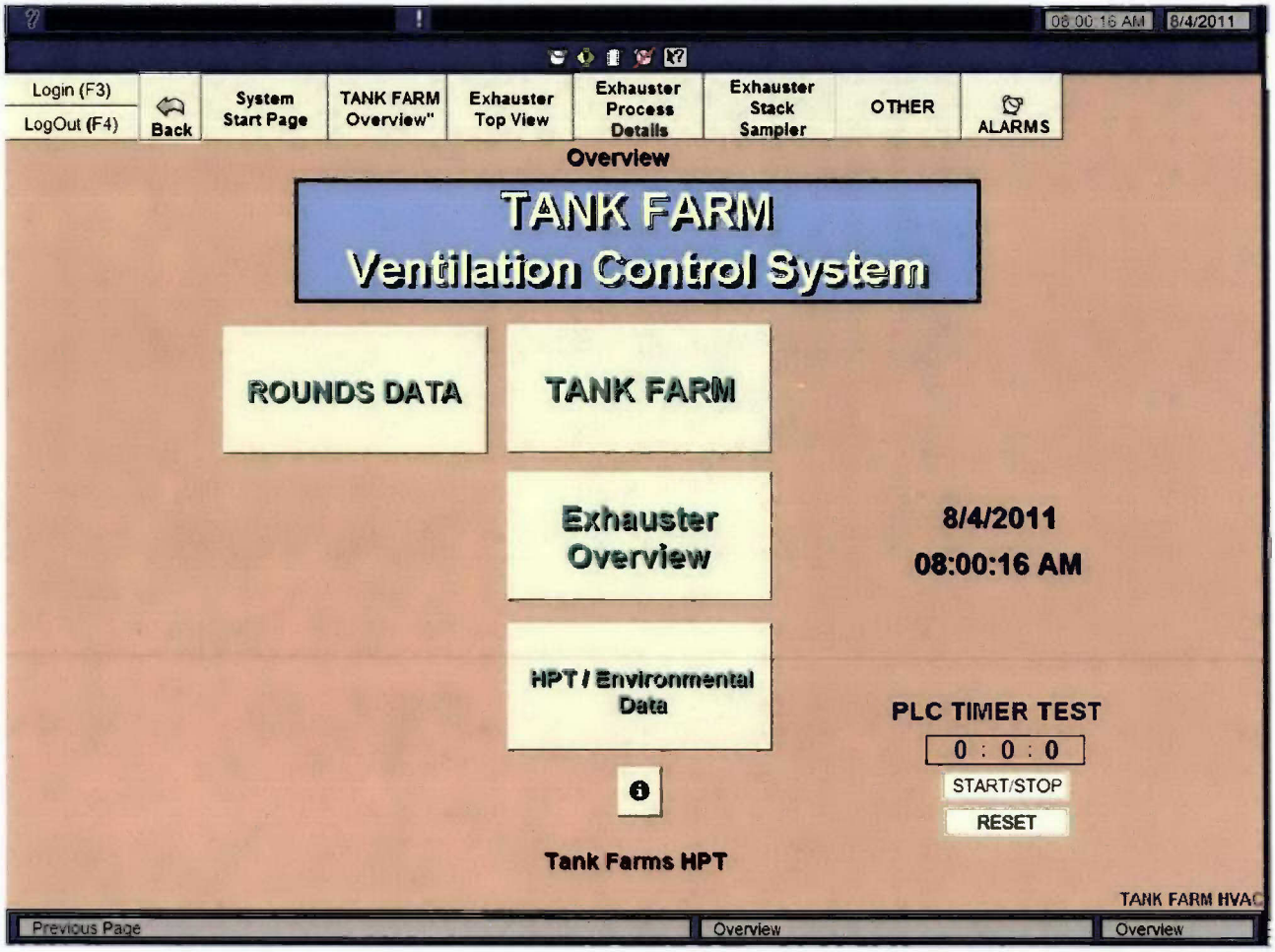


Figure 8 - POR107 Exhauster Process Details Screen (Example)

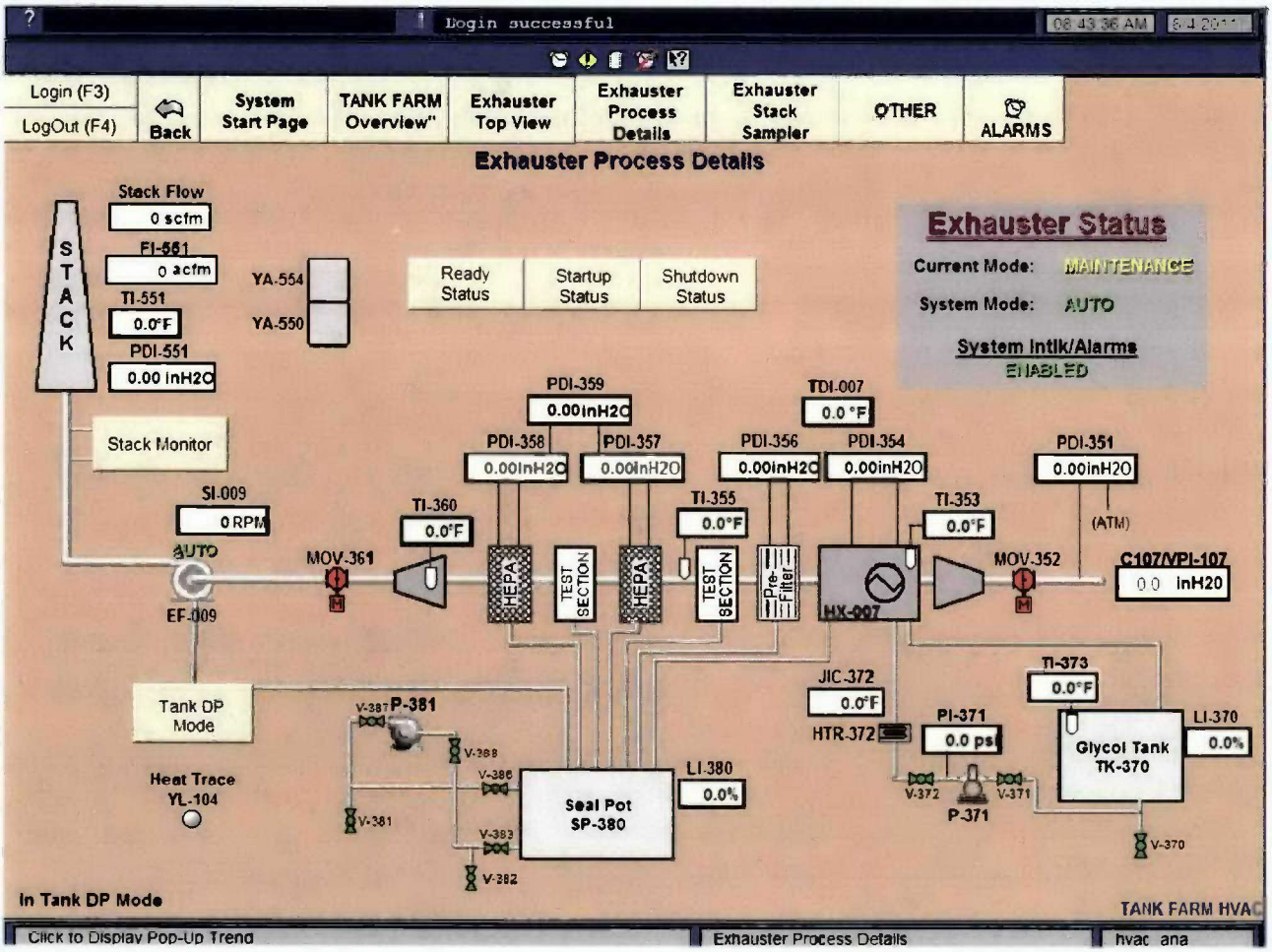


Figure 9 – POR107 Exhauster Stack Sampler Screen (Example)

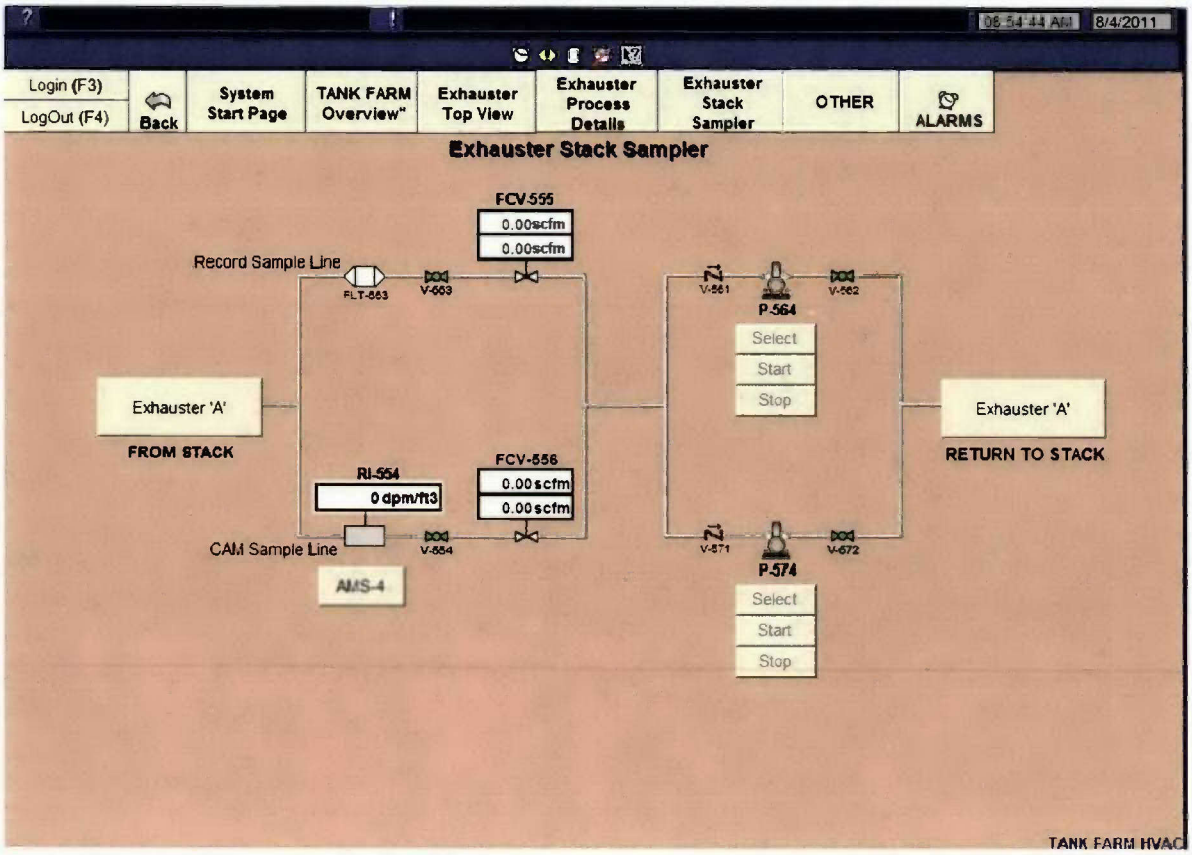


Figure 10 - POR107 Exhauster AMS-4 Screen (Example)

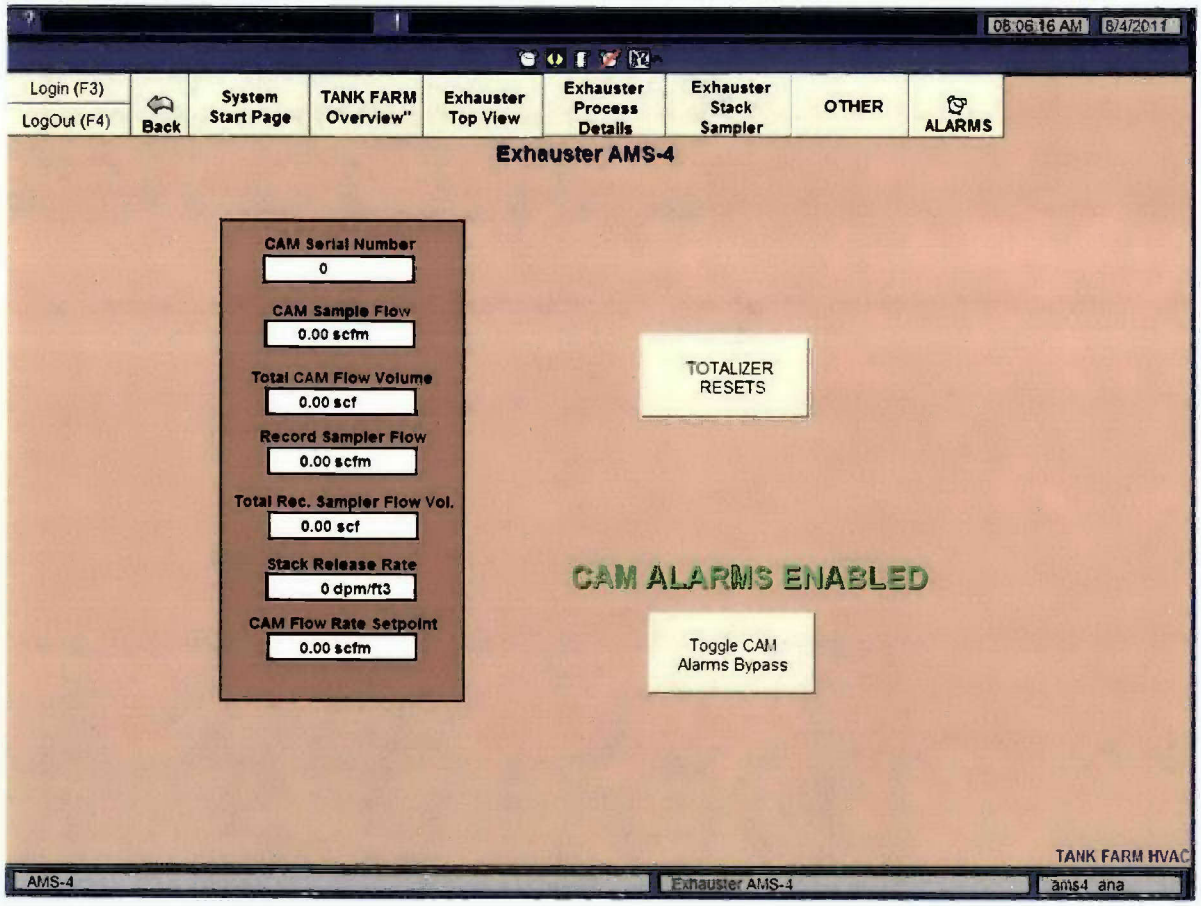
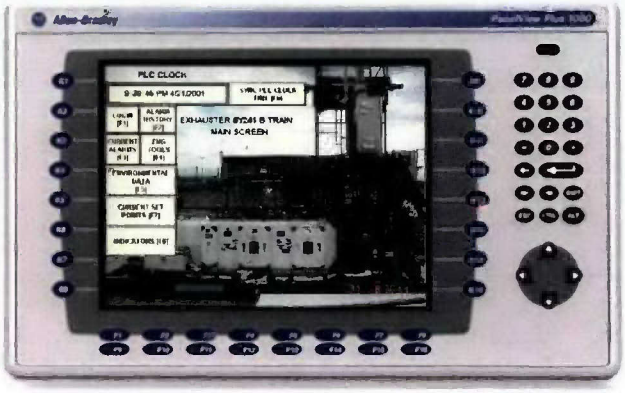


Figure 11 - SY-B-Train Primary Exhauster SY241-VTP-ENCL-107 Alarm Cabinet

(Sample view of [F1] screen)



(Sample view of [F5] screen)

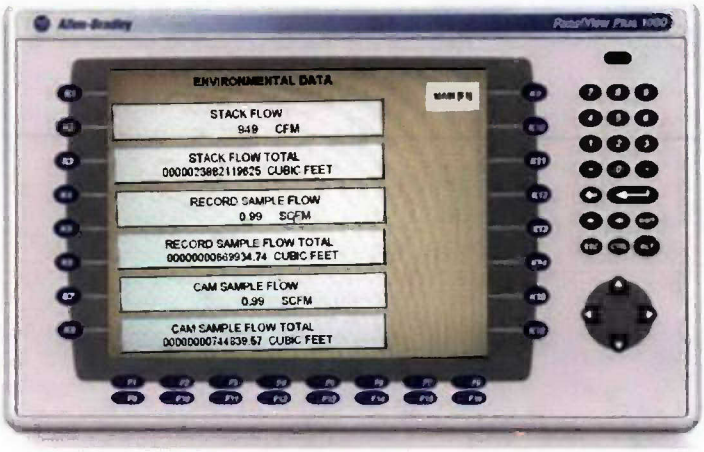


Figure 12 - SY241-VTP-ENCL-107 Alarm Cabinet

Panel View Plus1000 Main Menu Keyboard Commands

Keystroke	Screen Display
F1	Main Menu
F2	Alarm History
F3	Current Alarms
F4	Engineering Tools
F5	Environmental Data
F6	Time
F7	Current Set Points
F8	Indicators

Attachment 1 - Daily CAM and Record Sampler Inspection

INACTIVE SYSTEMS	
EAST	296-A-27 (241-AW Primary Exh)
296-A-25 (244-A DCRT Exh)	296-A-29 (241-AN Primary Exh)
296-C-006 (C-106 Sluicing Exh)	**WEST**
296-P-32 (244-AR Vault Core Sampling Exh)	296-U-11 (244-U DCRT Exh)
296-C-05 (244-CR Vault Exh)	296-P-28 (241-SY Tank Exh)
296-P-16 (241-C-105/106 Tank Exh)	296-T-18 (244-TX DCRT Exh)
296-B-28 (244-BX DCRT Exh)	296-S-22 (244-S-DCRT Exh)

Inspection Criteria for CAM & Record Sampler (as applicable)	
1. Record Sample vacuum pump "switched" power	19. HVAC in service and undamaged (Heating element/Pancake fans) *
2. Cabinet doors left open *	20. Flows are within range.
3. Stack monitor alarms clear (NOT in Alarm)	21. Instrument is within calibration date. **
4. No loose components or fitting/tubing connections	22. Source check is current (CAM)
5. Sample door and plunger properly secured and seated	23. Alpha CAM: Window: 1.0 Threshold: 4.65
6. "Power Ready" light is lit	
7. Background subtraction in "ON" position (AMS-3)	
8. Flow totalizer and/or Stack timer (if installed) operating NOTE - Stack timer is not required for record sampler operability if totalizer is functional.	24. Alarm Set Points (ASP) AMS-4 CAM's Primary and Annulus Tank Stacks: NET ALARM SETPOINT set to: 3000 CPM ** Annulus Tank Leak Detector CAM's: NET ALARM SETPOINT set to: 2000 CPM Bldg. Exh. 242-A CAM's, set to: 2000 CPM AMS-3 CAM's Primary and Annulus Tank Stacks, set to: 3000 CPM Annulus Tank Leak Detectors, set to: 2000 CPM Alpha CAM's, set to: 20 CPM
9. Cabinet or housing in serviceable condition (lighting, door latches, etc.) *	
10. Cabinet and/or housing housekeeping acceptable *	
11. No visible damage on sample equipment	
12. Rotameter assembly undamaged, if applicable	
13. Sample pump(s) undamaged and functioning	
14. CAM is undamaged **	
15. "Fail/Malfunction" light is NOT lit **	
16. "Count" light is lit	
17. Operating in "PHA-SUB" mode (Alpha CAM)	
18. Record Sample vacuum gauge is undamaged for systems with gas flow Totalizers (no excessive fluctuations). Vacuum inside range (1.5-12 in. Hg) *	

OS = Out of Service
* NOTIFY the applicable Shift Manager of the deficiency in the items above that may affect the emissions sampling period data for the CAM/Record Sampler, and require data correction by Environmental. These items are considered "Discrepancies" and do not affect system operability
** Not required for SY-B.

ANSI N13.1 Compliance for AW Exhausters

Tank Farm Maintenance Procedure	AW Farm HMI Exhausters

USQ #GCX-2

Justification:

Format change as requested by records management.

Summary of Changes:

Updated records section to reflect format changes.

Next Periodic Review Date — 03/19/2011

Click for copy of Word (native) file

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for inspection and leak testing of the stack flow elements and test sample nozzles of exhausters (A-Train and B-Train) and for checking exhauster sample flow response to comply with requirements of ANSI N13.1, Sampling and Monitoring Releases of Airborne Radioactive Substances From the Stacks and Ducts of Nuclear Facilities (ANSI-N13.1).

1.2 Scope

1.2.1 Performance of this procedure verifies exhauster compliance with ANSI N13.1 as mandated by 40 CFR 61.

1.2.2 This procedure is applicable to both A and B Trains of the AW Farm exhauster. Series 500 numbers identify A-Train components (e.g., AW241-VTP-V-500), and series 600 numbers identify B-Train components (e.g., AW241-VTP-V-600).

1.2.3 Procedure component numbers specify only the instrument/component identifier and the sequential number (e.g., V-500 or V-600). On system drawings and component labels the component numbers include the applicable tank farm and system designator (e.g., AW241-VTP-).

2.0 INFORMATION

2.1 Terms and Definitions

- DMM - Digital MultiMeter
- HMI - Human Machine Interface
- NIST - National Institute of Standards and Technology
- ATP - Acceptance Test Procedure
- OAT - Operational Acceptance Test.

2.2 General Information

2.2.1 The subsections within Section 5.0 (and the associated tables) are intended to be worked as independent activities. The subsections within 5.0 can be worked independently, concurrently, or in parallel with other sections as directed by the field work supervisor. When this procedure is being performed to support maintenance activities the necessary sections of this procedure will be indicated in the work package, data sheets or other maintenance procedures.

2.2.2 If performance of any steps in this procedure is not required for procedure completion, steps not performed shall be indicated as such by marking "N/A" in the appropriate table signoff and explained in the Comments section.

2.2.3 To support maintenance/training and testing activities under a released Acceptance Test Procedure (ATP) or Operational Acceptance Test (OAT) when equipment is not physically attached to contaminated ducting, or the operation will not impact any tank intrusive zones, the exhauster may be operated under the direction of the Test Director utilizing engineering drawings, electrical and valve line up tables or attachments.

2.2.4 Steps that identify components applicable to both A-Train and B-Train may list the A-Train component first and the B-Train component in brackets after (e.g., FTP-562 [FTP-662]). All equipment EINs listed in this procedure are to be prefixed with AW241-VTP- for the full nomenclature unless otherwise indicated.

2.2.5 See Attachment 1 for overview on operation of the Exhauster HMI and navigation to the screens required for completion of this procedure.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

3.1.1 Confirm pressure media (gas, water, chemicals, steam, etc.) and take necessary precautions to prevent personnel injury or damage to equipment when relieving pressure.

3.1.2 All identified hazards and personal protective equipment (PPE) requirements are to be addressed in the pre-job safety meeting.

3.1.3 Industrial Hygiene Technician (IHT) performs Industrial Hygiene (IH) Monitoring per direction from Industrial Hygienist or as specified in an IH Monitoring and Personal Sampling.

3.2 Equipment Safety

CAUTION - Use of a metal brush is not allowed to be used to clean nozzle or transport tubing because it could cause damage or could impair proper air flow after reassembly.

CAUTION - To prevent potential damage to the stack or fan assemblies from test equipment accidentally dropped into the stack, use of a lanyard or other positive means of securing test equipment placed into the stack from falling in is required.

3.3 Radiation and Contamination Control

3.3.1 When disconnecting, breaching or opening potentially contaminated systems or system components:

- Continuous HPT coverage is required
- Pre-job and post-job surveys are required
- A rag will be used to contain the breach until radiological verifications have been performed
- Special care shall be taken to ensure contamination control when inserting and withdrawing test equipment
- All test equipment shall be surveyed by Health Physics Technician for contamination when withdrawn from the system
- Externals of caps, plugs, and instrumentation shall be surveyed before and after removal from the system and again after reinstallation.

3.3.2 Prior to, periodically during, and after cleaning sampling components, contamination surveys will be performed.

3.3.3 Work in radiological areas will be performed using a Radiological Work Permit following review by Radiological Control per ALARA Work Planning procedure TFC-ESHQ-RP_RWP-C-03.

3.3.4 All waste materials are to be managed in accordance with Waste Planning Checklist and TO-100-052.

3.3.5 When cleaning lines using air pressure, air will be vented and depressurized through an absorbent material and surveyed for contamination by an HPT.

3.4 Environmental Compliance

3.4.1 In accordance with WAC-246-247, Washington Department of Health (WDOH) must be notified at least 7 calendar days prior to any planned operational tests of new or modified emission units that involve emissions control, monitoring, or containment systems of the emission unit. WDOH reserves the right to witness such tests [WAC-246-247-060 (4)].

3.4.2 Tank Farm ventilation systems and exhaust monitoring systems are regulated under Washington State Administrative CODE (WAC) Chapters 173-400, 173-460, and 246-247 and applicable Notices of Construction (NOC) issued to assure compliance with these regulations. To verify reporting requirements are met, all planned and unplanned outages of Tank Farm ventilation systems, abatement control equipment, and exhaust monitoring systems, including portable exhausters, must be immediately reported to Environmental per the Environmental On-Call List in accordance with Environmental notification procedure TFC-ESHQ-ENV_FS-C-01.

3.4.3 Comply with RPP-16922, ALARACT Requirements, for Work on Potentially Contaminated Ventilation System Components.

3.4.4 ANSI N13.1 requires Sections 5.1 and 5.2 be performed quarterly and Sections 5.3 through 5.6 be performed, at a minimum, annually. Sections may be performed more frequently in support of corrective maintenance.

3.4.5 Notify Environmental On-Call List in accordance with procedure TFC-ESHQ-ENV_FS-C-01 if any of the below items are met:

- Initial field count of air samples with beta-gamma activity greater than 0.2 Derived Air Concentration (DAC)
- Initial field count of air samples with total alpha activity greater than 5.0 DAC
- Results of 7-day decay count of air samples with total alpha activity greater than 0.2 DAC.

3.4 Environmental Compliance (Cont.)

3.4.6 Elevated workspace air samples that are suspected to be radon or its daughter products are to be reported to the Environmental On-Call List within 24 hours of field count if radon is NOT confirmed. If the sample decay rate is indicative of radon, whether or not the sample remains above 5 DAC alpha within the 24 hour verification period, notification to the Environmental On-Call List is NOT required. If the decay rate is not indicative of radon, the Environmental On-Call List must be notified. Upon notification of the elevated workspace air sample, the Environmental On-Call List must notify WDOH within 24 hours.

3.4.7 HPT coverage will be performed as specified in the radiological Work Permit and/or Radiological Monitoring Plan.

3.4.8 Equipment with removable contamination and/or work with removable contamination will be contained per the latest revision of the Containment Selection guide, Attachment A, in TFC-ESHQ-RP_RWP-C-02.

3.4.9 Pre- and post-job surveys (smears) shall be taken.

3.5 Limits

RPP-16922, Environmental Specification Requirements, Chapter 4.0, ALARACT Requirements.

4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Supplies

The following supplies may be needed to perform this procedure:

- Adjustable-angle inspection mirror with handle
- Tool capable of removing 3" test port cap and bolts
- Man-lift or other approved methods for access to stack air flow test ports
- Calculator
- HMI Engineering password
- Calibrated pressure gauge capable of measuring 0 - 5 in.Hg. in 0.1 increments
- High pressure air source (to 120 psi) with appropriate relief
- Calibrated pressure source, or pressure source and calibrated measuring device, capable of 0-20 in.WC in 0.01 increments (minimum)
- Communications devices (walkie-talkie, cell phones), as needed
- Calibrated mass flow meter capable of measuring 0-4 scfm in 0.01 scfm increments
- Tygon tubing, ½" diameter
- Calibrated temperature measuring device minimum to 140 °F and accuracy ± 0.1 °F
- Calibrated Stop Watch or equivalent.

4.2 Performance Documents

The following documents may be needed to perform this procedure:

- TO-060-107, Operate AW Tank Farm Primary Ventilation System (VTP)
- 6-FCD-648, Calibrate Hastings HFC-303 Flow Controller
- 6-PCD-373, Yokogawa EJA110 & EJA120 Pressure Transmitters
- 3-VB-155ZC, Appendix ZC 241-AW Exhauster Stack 296-A-46 Air Flow Test Data Sheets
- 3-VB-155ZD, Appendix ZD 241-AW Exhauster Stack 296-A-47 Air Flow Test Data Sheets
- TO-100-052, Perform Waste Segregation, and Accumulation
- Waste Planning Checklist as required.
- H-14-020102

4.3 Field Preparation

4.3.1 **CONFIRM** system/equipment is configured as required, to allow performance of this procedure.

4.3.2 **IF** an exhaust train is NOT to be tested, **MARK** N/A for that train in Table 1 through Table 10 as applicable.

4.3.3 **CONFIRM** man-lift or other approved stack access method is in place.

4.3.4 **REFER** to Figure 1 to Figure 5 for guidance on equipment nomenclature and location for each train.

4.3.5 **IF** performing Section 5.4, 5.5, or 5.6, **VERIFY** applicable STACK Flow Transmitter (PDIT-551 for A Train and PDIT-651 for B Train) is within calibration.

AW241-VTP-PDIT-551: ET-08296 AW241-VTP-PDIT-651: ET-08297

FWS: _____ / _____
Signature Date

4.3.6 **IF** performing Section 5.2, 5.3, or 5.6, **VERIFY** applicable Flow Control Valve (FCV-556 for A-Train and FCV-656 for B-Train) is within calibration.

AW241-VTP-FCV-556: ET-09083 AW241-VTP-FCV-656: ET-09081

FWS: _____ / _____
Signature Date

5.0 PROCEDURE

NOTE - Component numbers are prefixed AW241-VTP-.

- This procedure is applicable to both A and B Trains, A-Train component numbers may be shown first followed by B-Train component numbers in brackets where applicable (e.g., V-580 [680]).
- During performance of this procedure tools, equipment and fittings will be removed from and/or inserted into the stack or sample lines. Such items must be surveyed for radiological contamination prior to and after insertion/removal.
- Exhauster operation should be conducted per TO-060-107, Operate AW Tank Farm Primary Ventilation System (VTP).
- Sections 5.1, 5.2, 5.3, 5.4, 5.5 and 5.6 are independent and can be performed in any sequence.

5.1 Quarterly Stack Flow Response Test

5.1.1 **IF** performance of any section is not applicable to the exhauster being tested, as determined by the Shift Manager or FWS, **MARK** N/A in the applicable section of the Data Sheets.

NOTE - Applicable alarms may be acknowledged as necessary.

5.1.2 **CONFIRM** exhaust train to be tested is running, per Operating Procedure TO-060-107, test procedure, or work package instructions as applicable.

5.1.3 **GO TO** the "Exhauster Process Details" screen as follows:

5.1.3.1 **PRESS** F2 on the HMI keyboard.

5.1.3.2 **CLICK** on the Exhauster 'A' or Exhauster 'B' button for the train to be tested.

5.1.4 **RECORD** "As-Found" stack flow from HMI "Exhauster Process Details" screen on Table 1.

5.1.5 **SET** stack flow as follows:

5.1.5.1 **LOG IN** to HMI from HMI "Exhauster Process Details" screen as required.

5.1.5.2 **SELECT** [Fan Control].

5.1 Quarterly Stack Flow Response Test (Cont.)

5.1.5.3 **IF** Fan Mode is NOT in "AUTO", **PLACE** Fan Mode to "AUTO".

5.1.5.4 **RECORD** As Found Setpoint in Table 1.

5.1.5.5 **SELECT** [Setpoints], **THEN** [Adjust].

5.1.5.6 **ADJUST** setpoint value to 100 acfm above "As-Found" setpoint recorded in Step 5.1.5.4.

5.1.6 **CHECK** result on Table 1 of stack flow from HMI "Exhauster Process Details" screen (FI-551 for A-Train or FI-651 for B-Train) is tracking satisfactory above "As-Found" (± 10 SCFM).

5.1.7 **SET** stack flow as follows:

5.1.7.1 **SELECT** [Fan Control] from HMI "Exhauster Process Details" screen.

5.1.7.2 **SELECT** [Setpoints], **THEN** [Adjust].

5.1.7.3 **ADJUST** setpoint value to 100 acfm below "As-Found" setpoint recorded in Step 5.1.5.4.

5.1.8 **CHECK** result on Table 1 of stack flow from HMI "Exhauster Process Details" screen (FI-551 for A-Train or FI-651 for B-Train) tracking satisfactory below "As-Found" (± 10 SCFM).

5.1.9 **RETURN** stack flow to "As-Found" flow, as follows:

5.1.9.1 **SELECT** [Fan Control].

5.1.9.2 **SELECT** [Setpoints], **THEN** [Adjust].

5.1.9.3 **ADJUST** stack flow value to "As-Found" Setpoint value recorded in Step 5.1.5.4.

5.1.10 **RECORD** "As-Left" stack flow from HMI on Table 1.

5.1.11 **RECORD** any discrepancies on Table 1.

5.2 Record Sample/CAM Flow Meter Secondary Standard Check

5.2.1 **CHECK** applicable prerequisites in Section 4.0 are satisfied.

5.2.2 **CONFIRM** Health Physics Technician (HPT) is available for survey of all tools, equipment and parts inserted into and/or removed from potentially contaminated equipment and systems. **(RPP-16922)**

5.2.3 **CHECK** the following supplies are available prior to performing Section 5.2.

- Calculator
- Calibrated mass flow meter capable of measuring 0-4 scfm in 0.01 scfm increments
- Tygon tubing, ½" diameter.

5.2.4 **RECORD** MT&E data of test equipment used in this section in Table 10.

5.2.5 **OPERATE** the exhauster per operating procedure TO-060-107, test procedure, or work package instructions as applicable.

5.2.6 **IF** exhaust train to be tested is OPERATING, **SWITCH** exhausters per operating procedure TO-060-107, test procedure,

OR

IF both exhaust trains will be shut down, **DON** proper PPE.

5.2.6.1 **SHUT DOWN** exhauster(s)

5.2.7 **IF** required, **LOG IN** to HMI.

5.2.8 **IF** sample pumps for the train to be tested are running, **TURN OFF** sample pumps.

5.2.9 **CLOSE** the following valves for the train to be tested.

5.2.9.1 **IF** A-Train is to be tested, **CLOSE** record sample isolation valve V-553 and CAM isolation valve V-554 in ENCL-550.

5.2.9.2 **IF** B-Train is to be tested, **CLOSE** record sample isolation valve V-653 and CAM isolation valve V-654 in ENCL-650.

5.2 Record Sample/CAM Flow Meter Secondary Standard Check (Cont.)

5.2.10 **OPEN,** as required, the following sample pump outlet valves for the train to be tested.

5.2.10.1 **IF** A-Train is to be tested, **OPEN** V-562 and V-572.

5.2.10.2 **IF** B-Train is to be tested, **OPEN** V-662 and V-672.

NOTE - The following step will place the HMI to the Exhauster 'A' or Exhauster 'B' Process Detail screen depending on the train to be tested.

5.2.11 **PRESS** F2 on the HMI keyboard, **AND**

CLICK on the appropriate exhauster train button (Exhauster 'A' or Exhauster 'B') to be tested.

5.2.12 **IF** the exhauster System Mode is NOT in MANUAL, **SELECT** MANUAL mode as follows;

5.2.12.1 **SELECT** System Mode on Exhauster Process Detail screen.

5.2.12.2 **SELECT** MANUAL to change to MANUAL Mode.

5.2 Record Sample/CAM Flow Meter Secondary Standard Check (Cont.)

NOTE - Sample cabinet (ENCL-550[650]) door should remain closed and latched except when record sampler isolation valves (V-553 [V-653]) are being operated in order to keep instruments within allowable temperature range.

5.2.13 **IF** testing Record Sampler flow control valve (FCV-555 for A-Train or FCV-655 for B-Train), **PERFORM** the following:

5.2.13.1 **REMOVE** flexible hose from cross fitting at inlet to FCV-555 (for A-Train),

OR

REMOVE flexible hose from cross fitting at inlet to FCV-655 (for B Train).

5.2.13.2 **INSTALL** in-line Mass Flow Meter on cross fitting at INLET side of AW241-VTP-FCV-555

OR

INLET side of AW241-VTP-FCV-655.

5.2 Record Sample/CAM Flow Meter Secondary Standard Check (Cont.)

5.2.13.3 **SELECT** "Stack Monitor" button from the HMI Exhauster Process Detail screen to go to the Exhauster Stack Sampler screen for the train to be tested.

5.2.13.4 **START** the following sample pump for the appropriate exhauster train to be tested.

- **IF** A-Train is being tested, **SELECT AND START** ONE of the Sample Pumps P-564 or P-574.
- **IF** B-Train is being tested, **SELECT AND START** ONE of the Sample Pumps P-664 or P-674].

5.2.13.5 **WAIT** at least two (2) minutes to reach steady state.

5.2.13.6 **RECORD** the Record Sample flow measurement from installed inline Mass Flow Meter in the FCV-555 [FCV-655] section of Table 2 on "Inline Mass Flow Meter" line.

5.2.13.7 **RECORD** the HMI Record Sample flow measurement in the FCV-555 [FCV-655] section of Table 2 on "Record Sampler Flow (Exhauster display *)" line.

5.2.13.8 **STOP** Sample Pump started in Step 5.2.13.4.

5.2.13.9 **CALCULATE** percent difference, **AND**

RECORD the "Pass" or "Fail" determination in Table 2.

5.2 Record Sample/CAM Flow Meter Secondary Standard Check (Cont.)

5.2.13.10 **REMOVE** in-line Mass Flow Meter. **AND**

CONNECT flexible hose to cross fitting at INLET to AW241-VTP-FCV-555 (for A-Train)

OR

INLET to AW241-VTP-FCV-655 (for B Train).

NOTE - Sample cabinet (ENCL-550[650]) door should remain closed and latched except when CAM isolation valves (V-554 [V-654]) are being operated in order to keep instruments within allowable temperature range.

5.2.14 **IF** testing the CAM flow control valve (FCV-556 for A-Train or FCV-656 for B-Train), **PERFORM** the following:

5.2.14.1 **REMOVE** flexible hose from cross fitting at inlet to FCV-556 (for A-Train)

OR

REMOVE flexible hose from cross fitting at inlet to FCV-656 (for B Train)

5.2.14.2 **INSTALL** in-line Mass Flow Meter on cross fitting at INLET side of AW241-VTP-FCV-556 (for A-Train)

OR

INLET side of AW241-VTP-FCV-656 (for B Train).

5.2 Record Sample/CAM Flow Meter Secondary Standard Check (Cont.)

5.2.14.3 **SELECT** "Stack Monitor" button from the HMI Exhauster Process Detail screen to go to the Exhauster Stack Sampler screen for the train to be tested.

5.2.14.4 **START** the following sample pump for the appropriate exhauster train to be tested.

- **IF** A-Train is being tested, **SELECT AND START** ONE of the Sample Pumps P-564 or P-574.
- **IF** B-Train is being tested, **SELECT AND START** ONE of the Sample Pumps P-664 or P-674].

5.2.14.5 **WAIT** for flow rates to reach steady state.

5.2.14.6 **RECORD** CAM sample flow measurements from Mass Flow Meter in FCV-556 [FCV-656] section of Table 2 on "Inline Mass Flow Meter" line.

5.2.14.7 **RECORD** the HMI CAM Sample flow measurements in FCV-556 [FCV-656] section of Table 2 on "CAM Flow (Exhauster display)" line.

5.2.14.8 **STOP** Sample Pump started in Step 5.2.14.4.

5.2.14.9 **CALCULATE** percent difference, **AND**

RECORD the "Pass" or "Fail" determination in Table 2.

5.2 Record Sample/CAM Flow Meter Secondary Standard Check (Cont.)

5.2.14.10 **REMOVE** in-line Mass Flow Meter, **AND**

CONNECT flexible hose to cross fitting at INLET to AW241-VTP-FCV-556 (for A-Train)

OR

INLET to AW241-VTP-FCV-656 (for B Train).

5.2.15 **IF** percent difference calculation FAILS (for either flow control valve), **PERFORM** the following Steps 5.2.15.1 to 5.2.15.3:

5.2.15.1 **SHUT DOWN** exhauster per operating procedure TO-060-107, test procedure, or work package instructions as applicable.

5.2.15.2 **REPLACE** failed flow control valve with calibrated flow control valve.

5.2.15.3 **GO TO** Step 5.2.4 to test newly installed flow control valve.

5.2.16 **AS** applicable, **ENSURE** the following isolation valves are open.

- V-553
- V-653
- V-554
- V-654

5.2.17 **RETURN** exhauster system to the desired operating configuration as required by the Shift Manager/OE per operating procedure TO-060-107, test procedure, or work package instructions as applicable.

5.2.18 **REMOVE** all test equipment, **AND**

RESTORE system to original configuration or as directed by Shift Manager.

5.3 Sample Probe Assembly and Sample Lines

NOTE - The sampling systems use shrouded probe type assemblies that are bolted through a steel plate or flange on the associated stack. The probe assemblies make a 90-degree downward angle inside the stack and must be installed in the correct orientation to work properly. A three piece coupling (union) outside the flange facilitates probe removal/installation.

- Refer to Figure 5 for sample tube connections.

5.3.1 **CONFIRM** Health Physics Technician (HPT) is available for survey of all tools, equipment, and parts inserted into and/or removed from potentially contaminated equipment and systems or opening potentially contaminated lines. **(RPP-16922)**

5.3.2 **IF** the desired exhaust train to be tested is OPERATING, **SWITCH** operating exhaust train per operating procedure TO-060-107, test procedure, or work package instructions as applicable.

NOTE - The following step will place the HMI to the Exhauster 'A' or Exhauster 'B' Process Detail screen depending on the train to be tested.

5.3.3 **PRESS** F2 on the HMI keyboard, **AND**

CLICK on the appropriate train button (Exhauster 'A' or Exhauster 'B') to be tested.

5.3.4 **IF** the exhauster "System Mode" is NOT in MANUAL, **SELECT** MANUAL mode as follows;

5.3.4.1 **SELECT** "System Mode" on Exhauster Process Detail screen.

5.3.4.2 **SELECT** MANUAL to change to MANUAL Mode.

5.3.5 **CHECK** Fan Mode is set to MANUAL.

5.3.5.1 **IF** Fan Mode displayed is not MANUAL, **SELECT** Fan Control button on Exhauster Process Detail HMI screen.

5.3.5.2 **SELECT** AUTO button to change Mode to MANUAL.

5.3 Sample Probe Assembly and Sample Lines (Cont.)

Check/Examine Sample Assembly Nozzles

5.3.6 **BREAK OPEN** three-piece coupling (union) outside flanges to facilitate nozzle removal.

5.3.7 **REMOVE** the nozzles (Probe assemblies) from stack undergoing testing.

5.3.8 **INSPECT** both nozzles for following "As-Found" conditions, **AND**

RECORD PASS/FAIL determination on Table 3.

- Nozzle assembly appears parallel to stack flow axis
- Nozzle free of deposits
- No damage to nozzle
- No damage to gasket.

5.3.9 **IF** "As-Found" Nozzle Inspection determinations from Step 5.3.8 are PASS:

NOTE - The "As-Left" for Nozzle assemblies appear parallel to stack flow axis" will be recorded in Step 5.3.22.

5.3.9.1 **RECORD** PASS for both the CAM and Record Sampler nozzle assemblies in "As-Left" column on Table 3 for the following:

- Nozzle free of deposits
- No damage to nozzle
- No damage to gasket.

5.3.9.2 **GO TO** Step 5.3.13.

5.3.10 **CLEAN/REPAIR/REPLACE** nozzles as necessary.

5.3.11 **RECONNECT** associated tubing, as necessary.

5.3 Sample Probe Assembly and Sample Lines (Cont.)

5.3.12 **REPEAT** Step 5.3.8, **AND**

RECORD "As-Left" PASS/FAIL determination for nozzle inspection retest on Table 3 for the following:

- Nozzle free of deposits
- No damage to nozzle
- No damage to gasket.

Inspect/Clean Sample System Lines

5.3.13 **INSPECT** sample line tops for damage and/or contaminate deposits.

5.3.14 **RECORD** "As-Found" Sample Line Inspection PASS/FAIL determination for both the CAM and Record Sampler sample lines on Table 4.

5.3.15 **IF** "As-Found" Sample Line Inspection determination (Step 5.3.14) is PASS:

5.3.15.1 **RECORD** PASS in "As-Left" column on Table 4.

5.3.15.2 **GO TO** Step 5.3.23.

5.3.16 **DISCONNECT** both the CAM and Record Sampler sample lines at bottom end.

5.3.17 **IF** air pressure is used to assist in cleaning sample line, **CONFIRM** HPT is present before air pressure is applied to sample line.

CAUTION

Use of a metal brush is not allowed to be used to clean nozzle or transport tubing because it could cause damage or could impair proper air flow after reassembly.

NOTE - Any suitable means may be used to clean sample lines (see following two examples).

- One method would be using a vacuum or pressure to move string through the lines, then using it to pull cleaning swab(s) through
- Another method could be to use a non-metal bottle brush.

5.3.18 **CLEAN/REPAIR/REPLACE** sample lines as necessary.

5.3 Sample Probe Assembly and Sample Lines (Cont.)

5.3.19 **RECONNECT** sample lines at bottom end.

5.3.20 **REPEAT** Step 5.3.13, recording "As-Left" Sample Line Inspection PASS/FAIL determination on Table 4.

CAUTION

To prevent potential damage to the stack or fan assemblies from test equipment accidentally dropped into the stack, use of a lanyard or other positive means of securing test equipment placed into the stack from falling in is required.

5.3.21 **If** desired, both nozzles may be plugged with rubber plugs prior to reinstallation of nozzle assemblies into stack; **OTHERWISE** nozzles will be plugged in Step 5.3.25.

5.3.22 **REINSTALL** nozzle assemblies in stack, as applicable, ensuring proper nozzle alignment parallel to stack flow, **AND**

RECORD "As-Left" Nozzle assembly appears parallel to stack flow axis PASS/FAIL determination in Table 3.

5.3.23 **RECONNECT** both the CAM and Record Sampler nozzle assemblies to sample tubing.

Sample Line Leak Test

5.3.24 **REMOVE** 3" flow test port (FTP-556 [FTP-656], FTP-557 [FTP-657]) threaded caps to provide access to nozzles as necessary to aid in plug installation and removal.

CAUTION

To prevent potential damage to the stack or fan assemblies from test equipment accidentally dropped into the stack, use of a lanyard or other positive means of securing test equipment placed into the stack from falling in is required.

5.3.25 **IF** not already performed under Step 5.3.21, **PLUG** both nozzles with rubber plugs.

5.3 Sample Probe Assembly and Sample Lines (Cont.)

5.3.26 **OPEN** the following valve for the exhauster train under test as required.

5.3.26.1 **IF** A-Train is being tested, **OPEN** valve V-555 located under the sample cabinet ENCL-550, **AND**

REMOVE cap from valve end as required.

5.3.26.2 **IF** B-Train is being tested, **OPEN** valve V-655 located under the sample cabinet ENCL-650, **AND**

REMOVE cap from valve end as required.

5.3.27 **GO TO** the Exhauster Stack Sampler screen for the exhauster under test on the HMI as follows;

5.3.27.1 **PRESS** F2 on the HMI keyboard.

5.3.27.2 **SELECT** Exhauster Stack Sampler button for the exhauster under test.

NOTE - Sample flow rate system setpoint is found above each Flow Control Valve on the HMI Exhauster Stack Sampler screen.

5.3.28 **RECORD** "As-Found" CAM and Record Sampler Flow Control Valve sample flow rate system setpoints from HMI Exhauster Stack Sampler screen on Table 5.

5.3.29 **CHECK** the sample flow rate system set point for the CAM only is set to 4.0 scfm:

5.3.29.1 **IF** sample flow rate system set point is NOT set at 4.0 scfm, **SELECT** Setpoint (for each Flow Control Valve) on Exhauster Stack Sampler HMI screen, **AND**

ENTER new setpoint.

5.3.30 **START** an applicable sample vacuum pump for the exhauster train under test as follows from the Exhauster Stack Sampler HMI screen;

5.3.30.1 **IF** A-Train is being tested, **SELECT** one of the two vacuum pumps P-564 or P-574, **AND**

CLICK START.

5.3 Sample Probe Assembly and Sample Lines (Cont.)

5.3.30.2 **IF** B-Train is being tested, **SELECT** one of the two vacuum pumps P-664 or P-674, **AND**

CLICK START.

5.3.31 **OPERATE** the following valve as follows;

5.3.31.1 **IF** testing A-Train, **SLOWLY CLOSE** V-555 located under sample cabinet ENCL-550 until both PI-553 and PI-554 indicate 4.0 (3.5 to 4.5) In.Hg.

5.3.31.2 **IF** testing B-Train, **SLOWLY CLOSE** V-655 located under sample cabinet ENCL-650 until both PI-653 and PI-654 indicate 4.0 (3.5 to 4.5) In.Hg.

5.3.32 **ALLOW** system flow readings to stabilize.

5.3.33 **CHECK** the following flow indications on Exhauster Stack Sampler HMI screen:

5.3.33.1 **IF** testing A-Train, **CHECK** flow indication for FCV-555 and FCV-556.

5.3.33.2 **IF** testing B-Train, **CHECK** flow indication for FCV-655 and FCV-656.

5.3.34 **RECORD** YES/NO on Table 5 that "As-Found" FCV-555 and FCV-556 (for A-Train) or FCV-655 and FCV-656 (for B-Train) flow is less than or equal to 0.05 scfm.

5.3.35 **STOP** applicable vacuum pump for exhauster train under test by selecting Stop on Exhauster Stack Sampler HMI screen.

5.3.36 **IF** "As-Found" FCV-555 [655] and FCV-556 [656] flow (Step 5.3.34) is less than or equal to 0.05 scfm (YES), **RECORD** YES in "As-Left" column on Table 5, **AND**

GO TO Step 5.3.46.

5.3 Sample Probe Assembly and Sample Lines (Cont.)

NOTE - CAM and Record Sample transport lines may be leak tested separately via operation of the individual transport line isolation valves.

5.3.37 **IF** testing A-Train CAM Sample Line, **OPERATE** the following valves as given:

5.3.37.1 **CLOSE** V-553 located inside sample cabinet ENCL-550, **AND**

ENSURE V-554 located inside sample cabinet ENCL-550 is OPEN.

5.3.38 **IF** testing A-Train Record Sample Line, **OPERATE** the following valves as given:

5.3.38.1 **CLOSE** V-554 located inside sample cabinet ENCL-550, **AND**

ENSURE V-553 located inside sample cabinet ENCL-550 is OPEN.

5.3.39 **IF** testing B-Train CAM Sample Line, **OPERATE** the following valves as given:

5.3.39.1 **CLOSE** V-653 located inside sample cabinet ENCL-650, **AND**

ENSURE V-654 located inside sample cabinet ENCL-650 is OPEN.

5.3.40 **IF** testing B-Train Record Sample Line, **OPERATE** the following valves as given:

5.3.40.1 **CLOSE** V-654 located inside sample cabinet ENCL-650, **AND**

ENSURE V-653 located inside sample cabinet ENCL-650 is OPEN.

5.3.41 **INSPECT** sample line system for leaks from probe to vacuum pump.

5.3.42 **TIGHTEN** sample system fittings and connections, as necessary.

5.3.43 **CHECK** nozzle plugs are secure and sealed.

5.3 Sample Probe Assembly and Sample Lines (Cont.)

NOTE - Leaks typically occur at couplings and valves.

5.3.44 **CHECK** for **AND REPAIR** any other leaks in sample system.

5.3.45 **REPEAT** Steps 5.3.26 through 5.3.33, (along with Steps 5.3.37 thru 5.3.44 as necessary) recording YES/NO on Table 5 that "As-Left" FCV-555 [655] and FCV-556 [656] flow is less than or equal to 0.05 scfm.

5.3.45.1 **IF** FCV-555 [655] and FCV-556 [656] flow remains greater than 0.05 scfm:

- **PLACE** system in safe/stable condition
- **NOTIFY** FWS
- **STOP** work until further instructed.

NOTE - Steps 5.3.46 through 5.3.48 may be performed in order necessary.

5.3.46 **REMOVE** plug/cap installed in Step 5.3.21 or 5.3.25 from nozzle being tested.

5.3.47 **IF** A-Train is being tested, **OPERATE** the following valve(s) as needed:

5.3.47.1 **CLOSE** V-555 below Sample Cabinet ENCL-550, **AND**

REINSTALL cap on end of valve that was removed in Step 5.3.26.1.

5.3.47.2 **ENSURE** valves V-553 and V-554 located inside sample cabinet ENCL-550 are OPEN.

5.3.48 **IF** B-Train is being tested, **OPERATE** the following valve(s) as needed:

5.3.48.1 **CLOSE** V-655 below Sample Cabinet ENCL-650, **AND**

REINSTALL cap on end of valve that was removed in Step 5.3.26.2.

5.3.48.2 **ENSURE** valves V-653 and V-654 located inside sample cabinet ENCL-650 are OPEN.

5.3 Sample Probe Assembly and Sample Lines (Cont.)

5.3.49 **CHECK** sample flow rate setpoints are returned to "As-Found" values from Table 5.

5.3.49.1 **IF** sample flow rate system set points are NOT set at "As-Found" values, **SELECT** Setpoint (for each Flow Control Valve) on Exhauster Stack Sampler HMI screen, **AND**

ENTER "As-Found" values from Table 5.

5.3.50 **RECORD** "As-Left" sample flow rate system set points in Table 5.

5.3.51 **SELECT** "Unselect" on Stack Sampler HMI screen.

5.3.52 **REMOVE** all test equipment,

5.3.53 **REINSTALL** any 3" flow test port (FTP-556 [FTP-656], FTP-557 [FTP-657]) threaded caps removed in Step 5.3.24, **AND**

RESTORE system to original configuration or as directed by Shift Manager.

5.4 Stack Flow Instrumentation

NOTE - This section is required to be performed (at a minimum) annually. However, it may be performed more frequently as directed by FWS, Engineering, or work package due to corrective maintenance or stack flow rate discrepancies greater than 10% between installed instrumentation and Vent & Balance measurements.

- Refer to Figure 3 and Figure 4 for photos of instrument connection.

5.4.1 **CONFIRM** Health Physics Technicians (HPT) are available for survey of all tools, equipmen,t and parts inserted into and/or removed from potentially contaminated equipment and systems. **(RPP-16922)**

5.4.2 **DISCONNECT AND RECORD** on Table 7, the three wires applicable to RTD at Verabar (FE-551 for A-Train or FE-651 for B-Train) for exhauster train being tested.

5.4.3 **DISCONNECT** Verabar flow element from associated tubing.

5.4 Stack Flow Instrumentation (Cont.)

5.4.4 **REMOVE** RTD, if necessary.

5.4.5 **REQUEST** HPT survey equipment as it is removed from stack. **(RPP-16922)**

5.4.6 **REMOVE** the Verabar from stack as follows:

5.4.6.1 **IF** testing A-Train, **REMOVE** Verabar FE-551 from stack.

5.4.6.2 **IF** testing B-Train, **REMOVE** Verabar FE-651 from stack.

5.4.7 **INSPECT** Verabar for damage and/or deposits that may impede flow.

5.4.8 **RECORD** "As-Found" Verabar PASS/FAIL determination on Table 6.

5.4.9 **IF** "As-Found" Verabar determination (Step 5.4.7) is PASS, **RECORD** "As-Left" on Table 6, **AND**

GO TO Step 5.4.13.

5.4.10 **REQUEST** HPT survey additional equipment as it is removed from stack. **(RPP-16922)**

5.4.11 **IF** "As-Found" Verabar determination (Step 5.4.7) is FAIL due to Verabar element being damaged/dirty, **CLEAN/REPAIR/REPLACE** element as necessary, **AND**

RECORD in Comment section of Table 6.

5.4.12 **REPEAT** Step 5.4.7, **AND**

RECORD "As-Left" on Table 6.

5.4 Stack Flow Instrumentation (Cont.)

NOTE - Radiological survey must verify Verabar radiological contamination is within acceptable limits before high pressure air blow down is performed.

5.4.13 **PERFORM** the following valve lineup as needed:

5.4.13.1 **IF** testing A-Train, **PERFORM** the following valve line-up (see Figure 1).

Valve	Required Position
V-580	CLOSED
V-581	CLOSED
V-582	CLOSED
V-583	OPEN
V-584	OPEN
V-585	CLOSED
V-586	OPEN

5.4.13.2 **IF** testing B-Train, **PERFORM** the following valve line-up (see Figure 2).

Valve	Required Position
V-680	CLOSED
V-681	CLOSED
V-682	CLOSED
V-683	OPEN
V-684	OPEN
V-685	CLOSED
V-686	OPEN

5.4.14 **CONNECT** high pressure air source as follows;

5.4.14.1 **ENSURE** in-line pressure indication is used.

5.4.14.2 **IF** A-Train is being tested, **CONNECT** high pressure air source to V-586.

5.4.14.3 **IF** B-Train is being tested, **CONNECT** high pressure air source to V-686.

5.4 Stack Flow Instrumentation (Cont.)

5.4.15 **OPEN** high pressure air supply valve (up to 120 psi max) to blow out Verabar sensing lines.

5.4.16 **WAIT** approximately 5 minutes, **CLOSE** high pressure air supply valve.

5.4.17 **CLOSE** V-586 [686].

5.4.18 **PRIOR** to disconnecting high pressure air source, **CONFIRM** no pressure on system.

5.4.19 **DISCONNECT** high pressure air source.

5.4.20 **CONNECT** high pressure air source as follows;

5.4.20.1 **IF** A-Train is being tested, **CONNECT** high pressure air source to valve V-585, **AND**

OPEN valve V-585.

5.4.20.2 **IF** B-Train is being tested, **CONNECT** high pressure air source to valve V-685, **AND**

OPEN valve V-685.

5.4.21 **OPEN** high pressure air supply valve to blow out Verabar sensing lines.

5.4.22 **WAIT** approximately 5 minutes, **CLOSE** high pressure air valve.

5.4.23 **DISCONNECT** high pressure air source.

5.4.24 **PERFORM** the following valve lineup as needed:

5.4.24.1 **IF** testing A-Train, **PERFORM** the following valve line-up (see Figure 1).

Valve	Required Position
V-580	OPEN
V-581	OPEN
V-582	CLOSED
V-583	OPEN
V-584	OPEN
V-585	CLOSED
V-586	CLOSED

5.4 Stack Flow Instrumentation (Cont.)

5.4.24.2 **IF** testing B-Train, **PERFORM** the following valve line-up (see Figure 2).

Valve	Required Position
V-680	OPEN
V-681	OPEN
V-682	CLOSED
V-683	OPEN
V-684	OPEN
V-685	CLOSED
V-686	CLOSED

5.4.25 **IF** cleaning fails to remove deposits or Verabar remains unusable:

- **PLACE** system in safe/stable condition
- **NOTIFY** FWS
- **STOP** work until further instructed.

NOTE - Steps 5.4.26 through 5.4.27 may be performed in any order necessary.

5.4.26 **REINSTALL** Verabar removed in Step 5.4.6 (FE-551 for A-Train or FE-651 for B-Train) into stack.

5.4.27 **REINSTALL** associated RTD, as applicable.

5.4.28 **RECONNECT AND RECORD** on Table 7, three wires applicable to RTD lifted in Step 5.4.2 (at Verabar FE-551 for A-Train or Verabar FE-651 for B-Train).

5.4.29 **REMOVE** test plug close to Verabar port for train being tested, **AND**

INSERT M&TE temperature probe.

5.4.30 **GO TO** Exhauster Process Details screen as follows;

5.4.30.1 **PRESS** F2 on the HMI keyboard.

5.4.30.2 **CLICK** on the appropriate Exhauster 'A' or Exhauster 'B' button associated with the train under test.

5.4 Stack Flow Instrumentation (Cont.)

5.4.31 **COMPARE** the M&TE temperature reading to the appropriate HMI temperature reading from TE-551 (for A-Train) or TE-651 (for B-Train) obtained from the Exhauster Process Details screen.

5.4.32 **IF** M&TE temperature is not within 2.5 degrees of TE-551 [651], **NOTIFY** Engineering or FWS, **AND**

PROCEED as directed.

5.4.33 **REMOVE** M&TE, **AND**

REPLACE test plug.

5.5 Leak Test of Stack Flow Lines

NOTE - Refer to Figure 3 and Figure 4 for photos of instrument connection.

- This section is required to be performed (at a minimum) annually. However, it may be performed more frequently as directed by FWS, Engineering or work package due to corrective maintenance or stack flow rate discrepancies greater than 10% between installed instrumentation and Vent & Balance measurements.

5.5.1 **PERFORM** the following valve line up as needed:

5.5.1.1 **IF** testing A-Train, **PERFORM** the following valve line-up (see Figure 1).

Valve	Valve Position
V-580	OPEN
V-581	OPEN
V-582	OPEN
V-583	CLOSED
V-584	CLOSED
V-585	CLOSED
V-586	OPEN

5.5.1.2 **IF** testing B-Train, **PERFORM** the following valve line-up (see Figure 2).

Valve	Position
V-680	OPEN
V-681	OPEN
V-682	OPEN
V-683	CLOSED
V-684	CLOSED
V-685	CLOSED
V-686	OPEN

5.5.2 **CONNECT** calibrated pressure source and gauge to the following valve;

5.5.2.1 **IF** testing A-Train, **CONNECT** a calibrated pressure source and gauge to valve V-586.

5.5.2.2 **IF** testing B-Train, **CONNECT** a calibrated pressure source and gauge to valve V-686.

5.5 Leak Test of Stack Flow Lines (Cont.)

5.5.3 **SLOWLY RAISE** pressure to 10 (9.5 to 10.5) In. WC.

5.5.4 **WAIT** at least 10 minutes for system pressure to stabilize.

5.5.5 **RECORD** "As-Found" Initial Pressure (P_i) from the calibrated pressure source and gauge on Table 8.

5.5.6 **WAIT** at least 15 minutes.

5.5.7 **RECORD** "As-Found" Final Pressure (P_f) from the calibrated pressure source and gauge on Table 8.

5.5.8 **RELEASE** calibration pressure on system.

5.5.9 **CALCULATE** "As-Found" Differential Pressure (ΔP) on Table 8.

5.5.10 **RECORD** "As-Found" ΔP PASS/FAIL determination on Table 8.

5.5.11 **IF** "As-Found" ΔP PASS/FAIL determination is PASS, **RECORD** PASS in "As-Left" column of Table 8, **AND**

GO TO Step 5.5.15.

5.5.12 **TIGHTEN** flow sensing lines fittings and connections.

5.5.13 **CHECK** flow sensing system for additional leaks, **AND**

REPAIR as necessary.

5.5.14 **REPEAT** Steps 5.5.3 through 5.5.13 recording "As-Left" indications on Table 8.

5.5.14.1 **IF** calculated ΔP remains greater than 5.0 In.WC:

- **PLACE** system in safe/stable condition
- **NOTIFY** FWS
- **STOP** work until further instructed.

5.5 Leak Test of Stack Flow Lines (Cont.)

5.5.15 **PERFORM** the following valve line up as needed:

5.5.15.1 **IF** testing A-Train, **PERFORM** the following valve line-up (see Figure 1).

Valve	Valve Position
V-580	OPEN
V-581	OPEN
V-582	CLOSED
V-583	OPEN
V-584	OPEN
V-585	CLOSED
V-586	CLOSED

5.5.15.2 **IF** testing B-Train, **PERFORM** the following valve line-up (see Figure 2).

Valve	Valve Position
V-680	OPEN
V-681	OPEN
V-682	CLOSED
V-683	OPEN
V-684	OPEN
V-685	CLOSED
V-686	CLOSED

5.5 Leak Test of Stack Flow Lines (Cont.)

5.5.16 **PLACE** fan for the exhauster train under test to "AUTO" mode as follows:

NOTE - This step gets the user to the Exhauster Process Detail screen.

5.5.16.1 **PRESS** F2 on the HMI keyboard, **AND**

CLICK on the appropriate exhauster train button under test (Exhauster 'A' or Exhauster 'B') from the menu that appears.

5.5.16.2 **IF** fan mode displayed is not "AUTO", **SELECT** Fan Control button on Exhauster Process Detail HMI screen.

5.5.16.3 **SELECT** "MANUAL" to change Fan Mode to "AUTO".

5.5.17 **PLACE** System into "AUTO" mode as follows;

5.5.17.1 **SELECT** "System Mode" on Exhauster Process Detail screen.

5.5.17.2 **SELECT** "AUTO" to change to AUTO Mode.

5.5.18 **LOG OFF** at HMI.

5.6 Check Calibration of Timing Devices

NOTE - ANSI N13.1 requires timing devices be checked annually. All timed devices are controlled by a PLC master clock and software. Checking any one timed device will validate clock accuracy and other timed activities may be assumed accurate as software and other timed function setups are proven during acceptance testing.

- Testing will be performed by calculating total CAM sample flow over 30 minutes and then comparing it to the indicated totalized CAM flow on HMI. This will indirectly prove PLC clock accuracy; as the flow totalizer depends on clock and FCV accuracy.

5.6.1 **CHECK** train to be tested is running.

5.6.2 **CHECK** Flow Control Valve (FCV-556 for A-Train or FCV-656 for B-Train) calibration has been checked per Step 4.3.5 for the exhaust train being tested.

5.6.3 **ACCESS** HMI Totalized Parameters Screen as follows:

5.6.3.1 **PRESS** F2 on the HMI keyboard.

5.6.3.2 **CLICK** on the "Exhauster Totalized Parameters" button for the exhaust train being tested.

NOTE - Steps 5.6.4 through 5.6.8 are to be done quickly in a timely manner when accessing screens and recording parameters.

5.6.4 **RECORD** CAM Sampler (FCV-556 for A-Train or FCV-656 for B-Train) totalized flow (current) on Table 9 for the exhaust train being tested, **AND**

START calibrated stopwatch.

5.6.5 **ACCESS** HMI "Exhauster Stack Sampler" screen as follows:

5.6.5.1 **PRESS** F2 on the HMI keyboard.

5.6.5.2 **CLICK** on the "Exhauster Stack Monitor" button for the exhaust train being tested.

5.6.6 **RECORD** current CAM sample flow on Table 9, **AND**

REPEAT every minute until 29 minutes on the stopwatch. (29 times total).

5.6 Check Calibration of Timing Devices (Cont.)

5.6.7 **ACCESS** HMI Totalized Parameters Screen as follows:

5.6.7.1 **PRESS** F2 on the HMI keyboard.

5.6.7.2 **CLICK** on the "Exhauster Totalized Parameters" button for the exhaust train being tested.

5.6.8 **WHEN** stopwatch indicates 30 minutes have passed, **RECORD** CAM Sampler (FCV-556 for A-Train or FCV-656 for B-Train) totalized flow (current) on Table 9 immediately for the exhaust train being tested.

5.6.9 **CALCULATE** CAM Sampler totalized flow on Table 9.

5.6.10 **CALCULATE** totalized flow error on Table 9.

NOTE - Out-of tolerance Runtime Error indicates master clock problems.

5.6.11 **IF** totalized flow error is greater than 10 %, **NOTIFY** FWS and Engineering, **AND**

REPEAT timing tests when repairs have been completed.

5.6.12 **RETURN** Exhausters to pre-testing configuration or as directed by Shift Manager/OE.

5.7 Restoration

5.7.1 **DISCONNECT** and remove all M&TE connected for testing.

5.7.2 **CHECK** all test ports are plugged/capped.

5.7.3 **RESTORE** work area to normal conditions (remove barricades, etc. as applicable).

5.7.4 **RECORD** M&TE information and calibration status on Table 10 as needed.

5.7.5 **CHECK** equipment system restoration by observing indications are consistent with expected conditions.

5.7.6 **COMPLETE** all applicable Data Sheets or N/A, as needed.

5.7.7 **NOTIFY** Operations testing is complete and system may be returned to desired configuration.

5.8 Acceptance Criteria

Comparison and verification of data in applicable steps of the procedure with the limits of the Data Tables satisfies the Acceptance Criteria for this procedure.
Table 11 - Approval Signatures must be completely filled out.

5.9 Review

5.9.1 **INFORM** FWS test is complete.

5.9.2 FWS **REVIEW AND CONFIRM** the following:

- Completed Data Tables meet the acceptance criteria
- Comments sections are filled out appropriately
- Work requests needed as a result of this procedure are identified and generated
- Work request number(s) of any work documents generated as a result of this procedure, are recorded in the Comments/Remarks section of the Data Tables, as applicable.

5.10 Records

NOTE - The following records are generated during the performance of this procedure and are maintained in the CHAMPS work package as record material:

- Steps 4.3.5 and 4.3.6
- Table 1 through Table 11.

The record custodian identified in the Company Level Records Inventory and Disposition Schedule (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.

Table 1 - Quarterly Stack Flow Response

A-Train					N/A✓ ☐
As-Found Stack Flow (Step 5.1.4):					SCFM
As-Found Setpoint (Step 5.1.5.4)					ACFM
Stack Flow Tracking satisfactory above As-Found (± 10 SCFM)? ✓ (Step 5.1.6)	YES		NO		
Stack Flow Tracking satisfactory below As-Found (± 10 SCFM)? ✓(Step 5.1.8)	YES		NO		
As-Left Stack Flow (Step 5.1.10)					SCFM
Comments:					

B-Train					N/A✓ ☐
As-Found Stack Flow (Step 5.1.4):					SCFM
As-Found Setpoint (Step 5.1.5.4)					ACFM
Stack Flow Tracking satisfactory above As-Found (± 10 SCFM)? ✓ (Step 5.1.6)	YES		NO		
Stack Flow Tracking satisfactory below As-Found (± 10 SCFM)? ✓(Step 5.1.8)	YES		NO		
As-Left Stack Flow (Step 5.1.10)					SCFM
Comments:					

Table 2 - Record Sample/CAM Flow Measurements

A-Train					N/A✓ ☐
Flow Control Valve - FCV-555	**Initial Test**		**Retest, if needed**		
Inline Mass Flow Meter (± 0.01 scfm) (Step 5.2.13.6)	scfm		scfm		
Record Sampler Flow (Exhauster display *) (Step 5.2.13.7)	scfm		scfm		
$\%\,\text{diff} = \left[\frac{[\text{Record Sampler Flow} - \text{Inline Flow Meter}]}{\text{Record Sampler Flow}}\right] \times 100$	% diff		% diff		
FAIL CRITERIA: Fails if % diff ± 10% (Step 5.2.13.9)	PASS		PASS		
	FAIL		FAIL		
			N/A		
Comments:					
Flow Control Valve - FCV-556	**Initial**		**Retest, if needed**		
Inline Mass Flow Meter (± 0.01 scfm) (Step 5.2.14.6)	scfm		scfm		
CAM Flow (Exhauster display *) (Step 5.2.14.7)	scfm		scfm		
$\%\,\text{diff} = \left[\frac{[\text{CAM Flow} - \text{Inline Flow Meter}]}{\text{CAM Flow}}\right] \times 100$	% diff		% diff		
FAIL CRITERIA: Fails if % diff ± 10% (Step 5.2.14.9)	PASS		PASS		
	FAIL		FAIL		
			N/A		
Comments:					

* Flow will be displayed in message view.

Table 2 Continued on Next Page

Table 2 - Record Sample/CAM Flow Measurements (Cont.)

B -Train				N/A✓ ☐
Flow Control Valve - FCV-655	**Initial Test**		**Retest, if needed**	
Inline Mass Flow Meter (± 0.01 scfm) (Step 5.2.13.6)	scfm		scfm	
Record Sampler Flow (Exhauster display *) (Step 5.2.13.7)	scfm		scfm	
$\%\,\text{diff} = \left[\frac{[\text{Record Sampler Flow} - \text{Inline Flow Meter}]}{\text{Record Sampler Flow}}\right] \times 100$	% diff		% diff	
FAIL CRITERIA: Fails if % diff ± 10% (Step 5.2.13.9)	PASS		PASS	
	FAIL		FAIL	
			N/A	
Comments:				
Flow Control Valve - FCV-656	**Initial**		**Retest, if needed**	
Inline Mass Flow Meter (± 0.01 scfm) (Step 5.2.14.6)	scfm		scfm	
CAM Flow (Exhauster display *) (Step 5.2.14.7)	scfm		scfm	
$\%\,\text{diff} = \left[\frac{[\text{CAM Flow} - \text{Inline Flow Meter}]}{\text{CAM Flow}}\right] \times 100$	% diff		% diff	
FAIL CRITERIA: Fails if % diff ± 10% (Step 5.2.14.9)	PASS		PASS	
	FAIL		FAIL	
			N/A	
Comments:				

* Flow will be displayed in message view.

Initials/Date_____

Table 3 - Nozzle Visual Inspection

A-Train					N/A✓ ☐
Prior to Leak Test					
CAM Sample Probe assembly					
As-Found			**As-Left**		
	Pass ✓	**Fail ✓**		**Pass ✓**	**Fail ✓**
Nozzle assembly appears parallel to stack flow axis Step 5.3.8)			No deposits (Step 5.3.9.1 or 5.3.12)		
No deposits (Step 5.3.8)			No damage (Step 5.3.9.1 or 5.3.12)		
No damage (Step 5.3.8)			No damage to gasket (Step 5.3.9.1 or 5.3.12)		
No damage to gasket (Step5.3.8)			Nozzle assembly appears parallel to stack flow axis (Step 5.3.22)		
Comments:					

A-Train					N/A✓ ☐
Prior to Leak Test					
Record Sample Probe assembly					
As-Found			**As-Left**		
	Pass ✓	**Fail ✓**		**Pass ✓**	**Fail ✓**
Nozzle assembly appears parallel to stack flow axis Step 5.3.8)			No deposits (Step 5.3.9.1 or 5.3.12)		
No deposits (Step 5.3.8)			No damage (Step 5.3.9.1 or 5.3.12)		
No damage (Step 5.3.8)			No damage to gasket (Step 5.3.9.1 or 5.3.12)		
No damage to gasket (Step5.3.8)			Nozzle assembly appears parallel to stack flow axis (Step 5.3.22)		
Comments:					

Initials: **Date:**

Table 3 Continued on Next Page

Table 3 - Nozzle Visual Inspection(Cont.)

B-Train					N/A✓ ☐
Prior to Leak Test					
CAM Sample Probe assembly					
As-Found			As-Left		
	Pass ✓	Fail ✓		Pass ✓	Fail ✓
Nozzle assembly appears parallel to stack flow axis Step 5.3.8)			No deposits (Step 5.3.9.1 or 5.3.12)		
No deposits (Step 5.3.8)			No damage (Step 5.3.9.1 or 5.3.12)		
No damage (Step 5.3.8)			No damage to gasket (Step 5.3.9.1 or 5.3.12)		
No damage to gasket (Step5.3.8)			Nozzle assembly appears parallel to stack flow axis (Step 5.3.22)		
Comments:					

B-Train					N/A✓ ☐
Prior to Leak Test					
Record Sample Probe assembly					
As-Found			As-Left		
	Pass ✓	Fail ✓		Pass ✓	Fail ✓
Nozzle assembly appears parallel to stack flow axis Step 5.3.8)			No deposits (Step 5.3.9.1 or 5.3.12)		
No deposits (Step 5.3.8)			No damage (Step 5.3.9.1 or 5.3.12)		
No damage (Step 5.3.8)			No damage to gasket (Step 5.3.9.1 or 5.3.12)		
No damage to gasket (Step5.3.8)			Nozzle assembly appears parallel to stack flow axis (Step 5.3.22)		
Comments:					

Initials: **Date:**

Table 4 - Sample Line Inspection

A-Train CAM Sample Line				N/A✓ ☐
As-Found (Step 5.3.14)				
Pass (no deposits or damage) ✓		**Fail ✓**		
Comments:				
As-Left (Step 5.3.15 or Step 5.3.20)				
Pass (no deposits or damage) ✓		**Fail ✓**		
Comments:				

A-Train Record Sample Line				N/A✓ ☐
As-Found (Step 5.3.14)				
Pass (no deposits or damage) ✓		**Fail ✓**		
Comments:				
As-Left (Step 5.3.15 or Step 5.3.20)				
Pass (no deposits or damage) ✓		**Fail ✓**		
Comments:				
Initials:				**Date:**

Table 4 Continued on Next Page

Table 4 - Sample Line Inspection (Cont.)

B-Train CAM Sample Line				N/A✓ ☐
As-Found (Step 5.3.14)				
Pass (no deposits or damage) ✓		**Fail** ✓		
Comments:				
As-Left (Step 5.3.15 or Step 5.3.20)				
Pass (no deposits or damage) ✓		**Fail** ✓		
Comments:				

B-Train Record Sample Line				N/A✓ ☐
As-Found (Step 5.3.14)				
Pass (no deposits or damage) ✓		**Fail** ✓		
Comments:				
As-Left (Step 5.3.15 or Step 5.3.20)				
Pass (no deposits or damage) ✓		**Fail** ✓		
Comments:				
Initials:				**Date:**

Table 5 - Sample Line Leak Test

A-Train								N/A ✓ ☐
FCV-555 Setpoint (Step 5.3.28 or 5.3.50)	As-Found:				As-Left:			
FCV-556 Setpoint (Step 5.3.28 or 5.3.50)	As-Found:				As-Left:			
FCV-555/556 = A-Train	As-Found (check ✓) (Step5.3.34)				As-Left (check ✓) (Step 5.3.36 or 5.3.45)			
FCV-555 sample flow rate at HMI less than or equal to 0.05 scfm	YES		NO		YES		NO	
FCV-556 sample flow rate at HMI less than or equal to 0.05 scfm	YES		NO		YES		NO	
B-Train								N/A ✓ ☐
FCV-655 Setpoint (Step 5.3.28 or 5.3.50)	As-Found:				As-Left:			
FCV-656 Setpoint (Step 5.3.28 or 5.3.50)	As-Found:				As-Left:			
FVC-655/656 = B-Train	As-Found (check ✓) (Step5.3.34)				As-Left (check ✓) (Step 5.3.36 or 5.3.45)			
FCV-655 sample flow rate at HMI less than or equal to 0.05 scfm	YES		NO		YES		NO	
FCV-656 sample flow rate at HMI less than or equal to 0.05 scfm	YES		NO		YES		NO	
Comments:								
Initials:			Date:					

Table 6 - Verabar Flow Element Visual Inspection

A-Train				N/A✓ ☐
As-Found (Step 5.4.8)				
Pass (no deposits or damage) ✓		**Fail ✓**		
Comments:				
As-Left (Step 5.4.9 or Step 5.4.12)				
Pass (no deposits or damage) ✓		**Fail ✓**		
Comments:				
B-Train				N/A✓ ☐
As-Found (Step 5.4.8)				
Pass (no deposits or damage) ✓		**Fail ✓**		
Comments:				
As-Left (Step 5.4.9 or Step 5.4.12)				
Pass (no deposits or damage) ✓		**Fail ✓**		
Comments:				
Initials:		**Date:**		

Table 7 - RTD Lifted/Landed Lead Record

A-Train and/or B-Train

(This page may be reproduced as necessary)

Page _____ of _____

LOCATION (Terminal Block, Device ID)	WIRE NUMBER or COLOR	TERMINATION POINT	OPENED/LIFTED (Initial/Date) (Step 5.4.2)	CLOSED/LANDED (Initial/Date) (Step 5.4.28)

Comments: _____

All Temporary Markers Removed (if used): Craftsman: _____ / _____
Signature Date

Completed Record Reviewed by: OE: _____ / _____
Signature Date

Table 8 - Stack Flow Sensing Lines Leak Test

A-Train								N/A✓ ☐
	As-Found				As-Left			
Initial pressure (P_i) (Step 5.5.3 or 5.5.14)	In.WC.				In.WC.			
Final pressure (P_f) (Step 5.5.7 or 5.5.14)	In.WC.				In.WC.			
Calculate Differential Pressure (ΔP) $P_i - P_f = \Delta P$ (Step 5.5.9 or 5.5.14)	In.WC.				In.WC.			
PASS/FAIL (Step 5.5.10 or 5.5.14) Pass indicates ΔP less than or equal to 5.0 In.Wc.	**PASS ✓** ($\Delta P \leq 5.0$)		**FAIL ✓** ($\Delta P > 5.0$)		**PASS ✓** ($\Delta P \leq 5.0$)		**FAIL ✓** ($\Delta P > 5.0$)	
Comments:								

B-Train								N/A✓ ☐
	As-Found				As-Left			
Initial pressure (P_i) (Step 5.5.3 or 5.5.14)	In.WC.				In.WC.			
Final pressure (P_f) (Step 5.5.7 or 5.5.14)	In.WC.				In.WC.			
Calculate Differential Pressure (ΔP) $P_i - P_f = \Delta P$ (Step 5.5.9 or 5.5.14)	In.WC.				In.WC.			
PASS/FAIL (Step 5.5.10 or 5.5.14) Pass indicates ΔP less than or equal to 5.0 In.Wc.	**PASS ✓** ($\Delta P \leq 5.0$)		**FAIL ✓** ($\Delta P > 5.0$)		**PASS ✓** ($\Delta P \leq 5.0$)		**FAIL ✓** ($\Delta P > 5.0$)	
Comments:								

Initials: **Date:**

NOTE - Leakage rate calculation is found in RPP-22211, Stack Flow Transmitter Maintenance Calculation

Table 9 - Check Calibration of Timing Devices

A-Train			N/A✓ ☐	
Initial Totalized Flow FCV-556 (Step 5.6.4)				SCF
Current CAM Sample Flow FCV-556 (Step 5.6.6)	Minute 0:		Minute 15:	
	Minute 1:		Minute 16:	
	Minute 2:		Minute 17:	
	Minute 3:		Minute 18:	
	Minute 4:		Minute 19:	
	Minute 5:		Minute 20:	
	Minute 6:		Minute 21:	
	Minute 7:		Minute 22:	
	Minute 8:		Minute 23:	
	Minute 9:		Minute 24:	
	Minute 10:		Minute 25:	
	Minute 11:		Minute 26:	
	Minute 12:		Minute 27:	
	Minute 13:		Minute 28:	
	Minute 14:		Minute 29:	
Final Totalized Flow FCV-556 (Step 5.6.8)				SCF
Calculated Totalized Flow (Step 5.6.9)	(Sum of 30 recorded CAM Sample Flows) =			SCF
Totalized Flow Error (Acceptable: 90-110%) $\left[\frac{\text{Final Totalized Flow} - \text{Initial Totalized Flow}}{\text{Calculated Totalized Flow}}\right] \times 100\% =$			Pass ✓ / Fail ✓	%
Comments:				
Initials:			Date:	

Table 9 Continued on Next Page

Table 9 - Check Calibration of Timing Devices (Cont.)

B-Train				N/A✓ ☐
Initial Totalized Flow FCV-656 (Step 5.6.4)				SCF
Current CAM Sample Flow FCV-656 (Step 5.6.6)	Minute 0:		Minute 15:	
	Minute 1:		Minute 16:	
	Minute 2:		Minute 17:	
	Minute 3:		Minute 18:	
	Minute 4:		Minute 19:	
	Minute 5:		Minute 20:	
	Minute 6:		Minute 21:	
	Minute 7:		Minute 22:	
	Minute 8:		Minute 23:	
	Minute 9:		Minute 24:	
	Minute 10:		Minute 25:	
	Minute 11:		Minute 26:	
	Minute 12:		Minute 27:	
	Minute 13:		Minute 28:	
	Minute 14:		Minute 29:	
Final Totalized Flow FCV-656 (Step 5.6.8)				SCF
Calculated Totalized Flow (Step 5.6.9)	(Sum of 30 recorded CAM Sample Flows) =			SCF
Totalized Flow Error (Acceptable: 90-110%) $\left[\frac{\text{Final Totalized Flow} - \text{Initial Totalized Flow}}{\text{Calculated Totalized Flow}}\right] \times 100\% =$				%
				Pass ✓
				Fail ✓
Comments:				
Initials:				Date:

Table 10 - M&TE Calibration Data

A-Train and/or B-Train		
TOOL NAME	**ID. NUMBER**	**CAL DUE DATE**
Comments:		
Initials:	**Date:**	

Table 11 - Approval Signatures

Check Train(s) for AW Exhauster Submitted For Approved

Train A✓ ☐
Train B✓ ☐

	DISPOSITION
	CHECK appropriate work has been performed correctly and completely. Ventilation system has been restored to operating configuration Sign when complete. FWS: _____ _____ _____ (Signature) (Print Name) Date
	REVIEW for completeness. Review will include verification of documentation completion. Environmental: _____ _____ _____ (Signature) (Print Name) Date
	CONFIRM appropriate tables are filled out correctly and are accurate, complete, and legible. Sign when complete. Engineer: _____ _____ _____ (Signature) (Print Name) Date

Comments:

Figure 1 - A-Train Stack Sample and Flow System Configuration

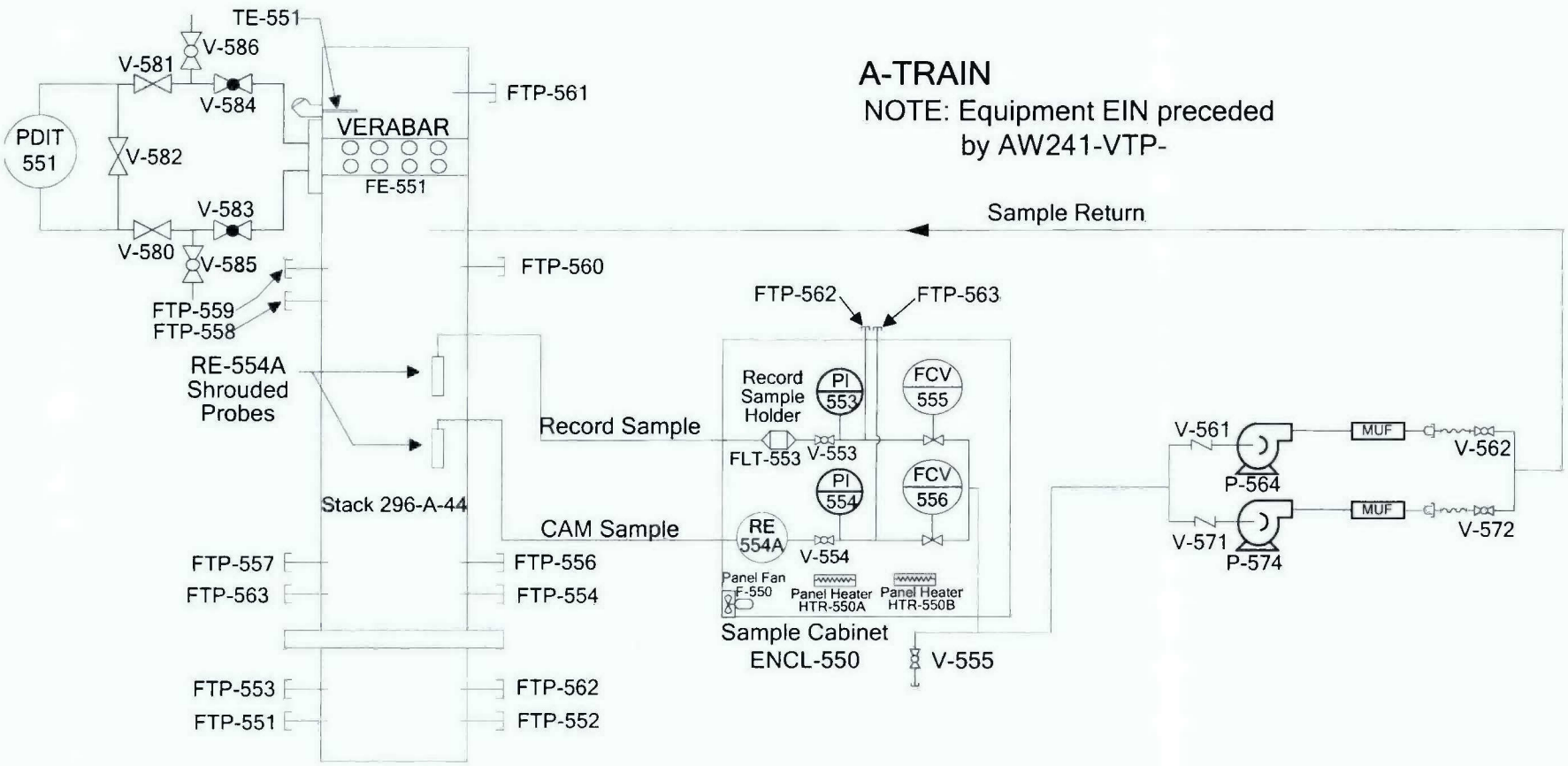


Figure 2 - B-Train Stack Sample and Flow System Configuration

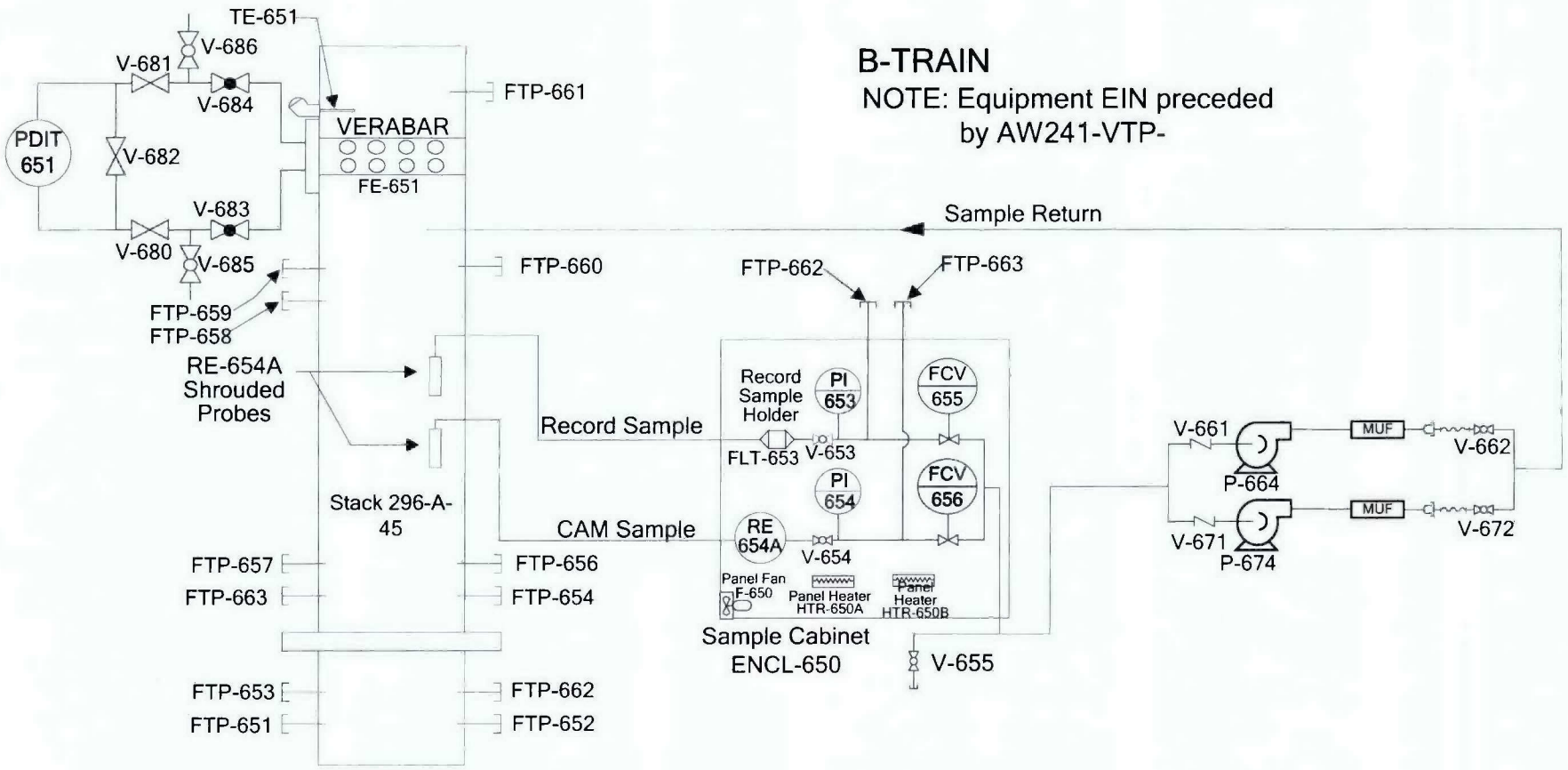


Figure 3 - Verabar with RTD

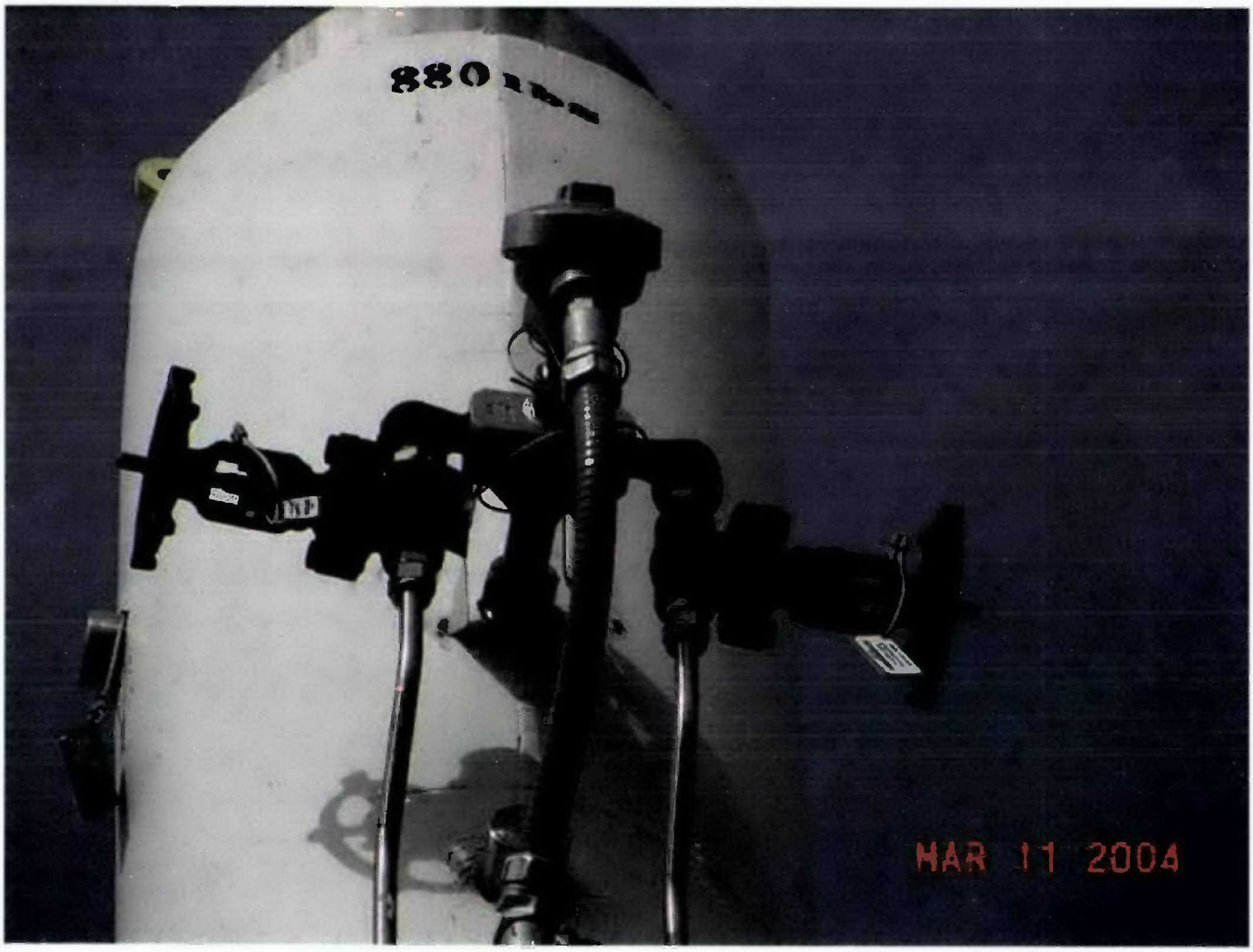
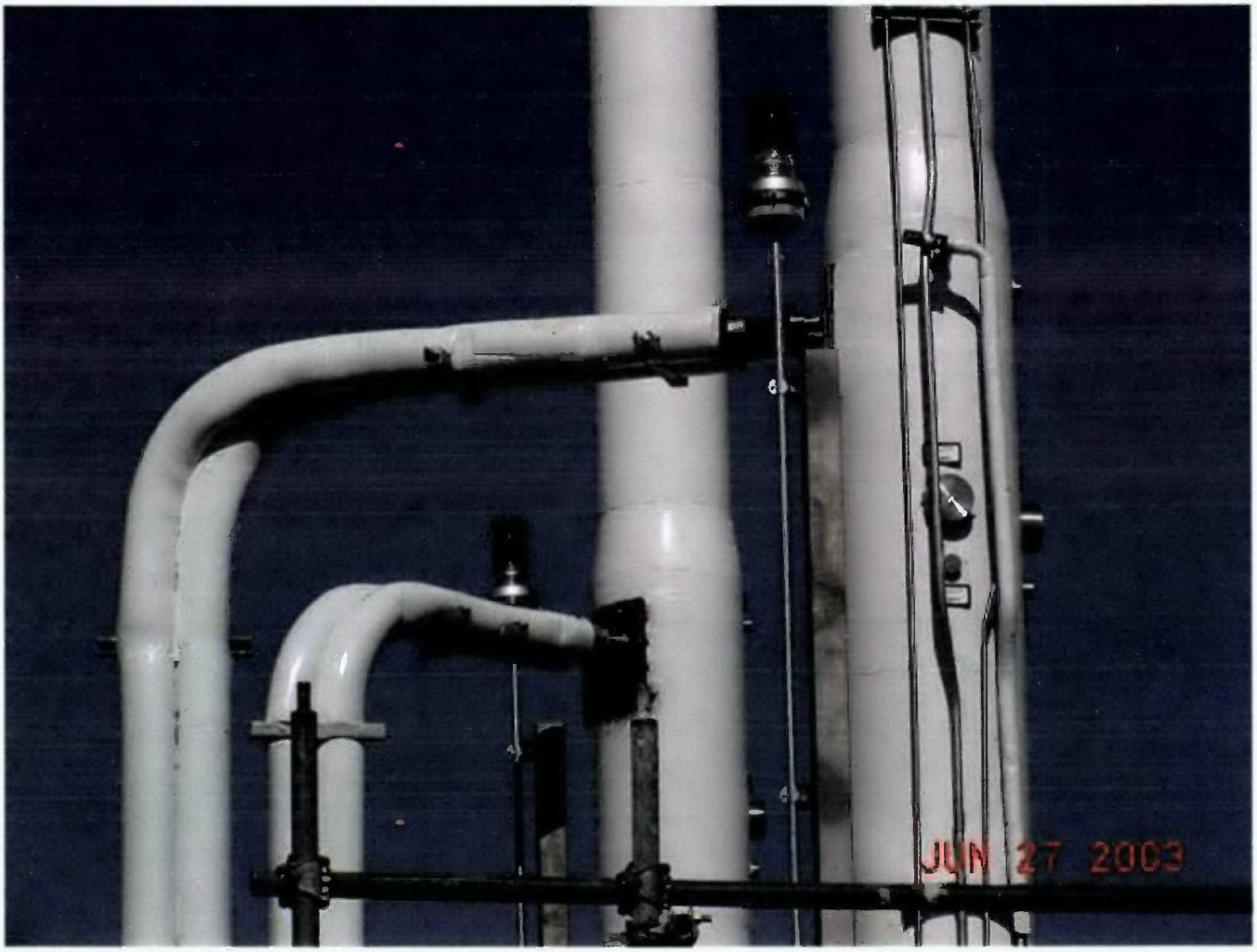


Figure 4 - Stack Flow DP Transmitter

Figure 5 - Sample Lines and Stack



Attachment 1 - HMI Screen Navigation

1. The following are the standard keyboard commands:

Keystroke	Command
F1	Display Help Pages
F2	Display Page Menu
F3	Display New User Login Form
F4	Display Current User
F5	Display Alarm Page
F6	Display Alarm Summary Page
F7	Display Hardware Alarm Page
F8	Go to Main HVAC Page
F9	Display Last Page
F10	Display System Information Window
F11	Display Applications Menu
F12	Log Out of System
End	Close Active Child Window
ESC	System Shutdown
Ctrl + C	Display Citect Point Count
Ctrl + P	Print Current Window
Shift + F2	Displays System Stats Window

NOTE - The figures show the AW Tank Farm "A" Train but the same process will hold true for "B" Train (just replace Exhauster 'A' with Exhauster 'B' in the following steps).

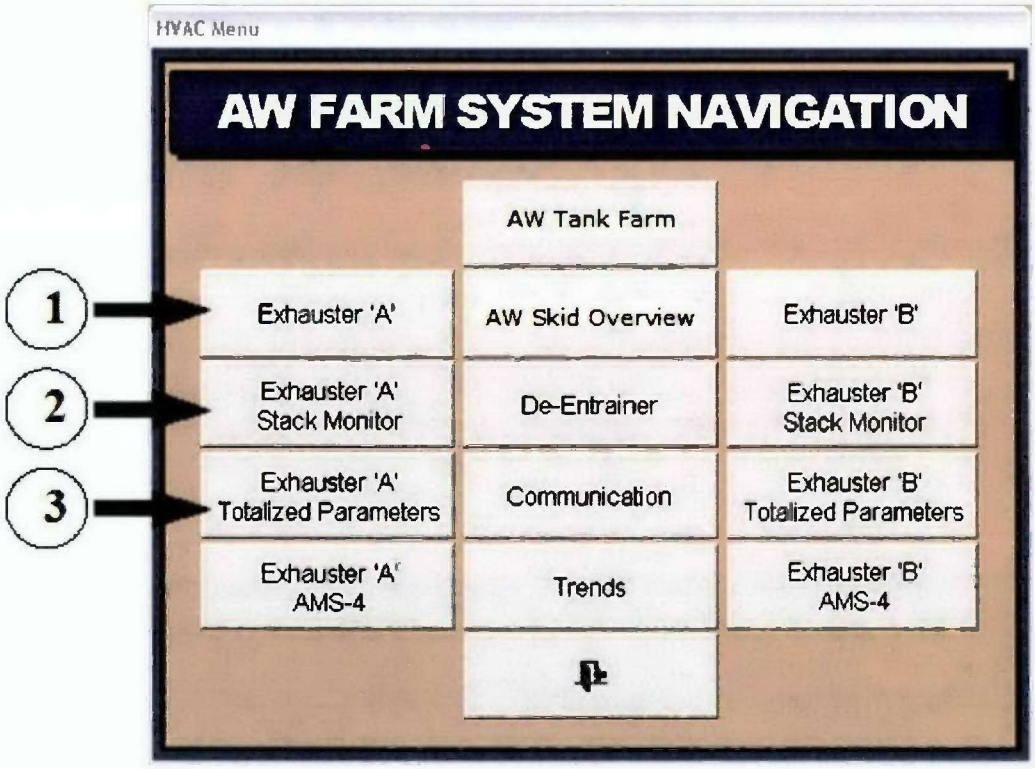
2. Pressing F2 presents the AW FARM SYSTEM NAVIGATION screen (see Picture 1 on the next page).

3. Navigation is with the "Mouse" (a small red joystick device between two buttons that are the left and right mouse buttons).

Attachment 1 - HMI Screen Navigation (Cont.)

Picture 1 - AW Farm System Navigation Screen

PRESS F2 on HMI keyboard to bring up this MENU



4. If you press the Exhauster 'A' button shown by (1) in Picture 1 above, it takes you to the Exhauster 'A' Process Details screen (See Picture 2).

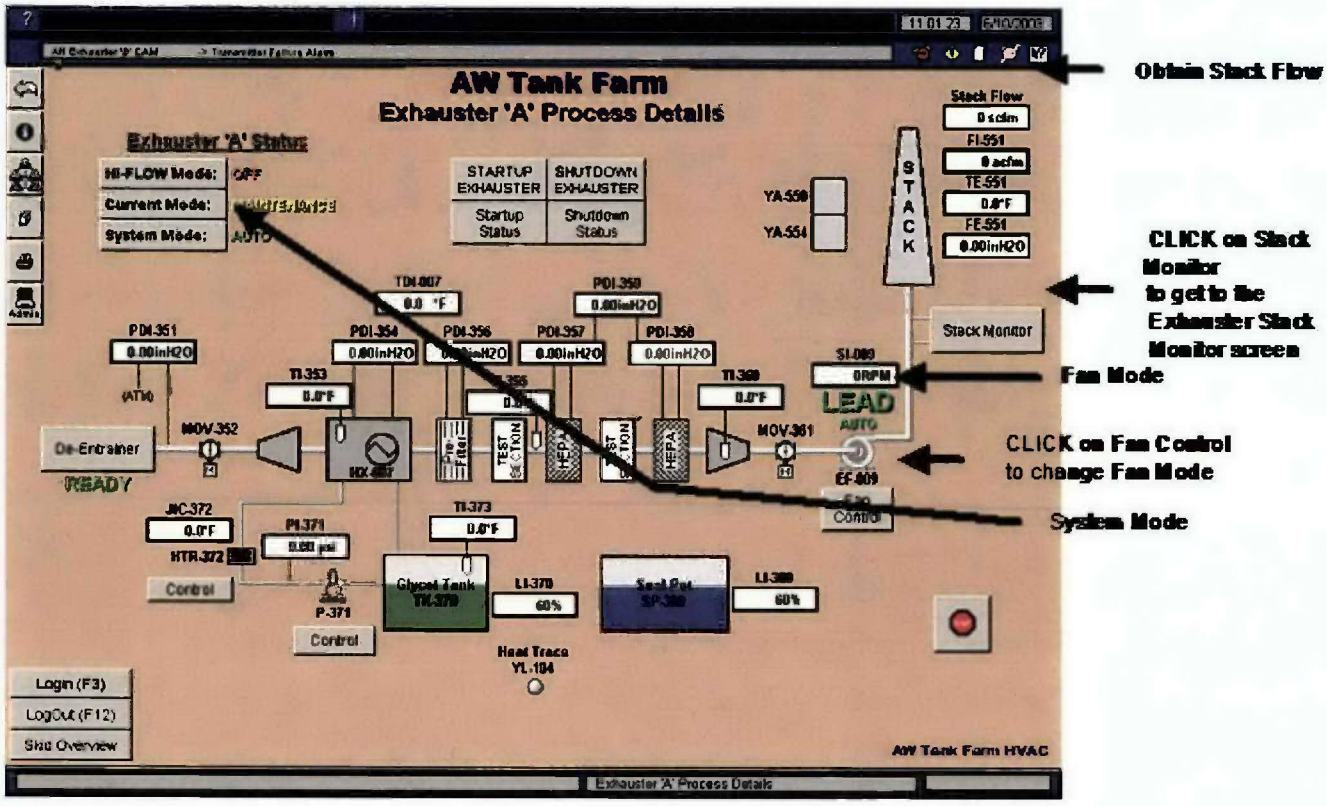
   If you press the Exhauster 'A' Stack Monitor button shown by (2) in Picture 1 above, it takes you to the Exhauster 'A' Stack Sampler screen (See Picture 3).

   If you press the Exhauster 'A' Totalized Parameters button shown by (3) in Picture 1 above, it takes you to the Exhauster 'A' Totalized Parameters screen (See Picture 4).

Attachment 1 - HMI Screen Navigation (Cont.)

4. Picture 2 below shows where to obtain Stack Flow (FI-551), Fan Mode, System Mode, and the buttons to CLICK on to change Fan Mode and to get to the Exhauster Stack Monitor screen.

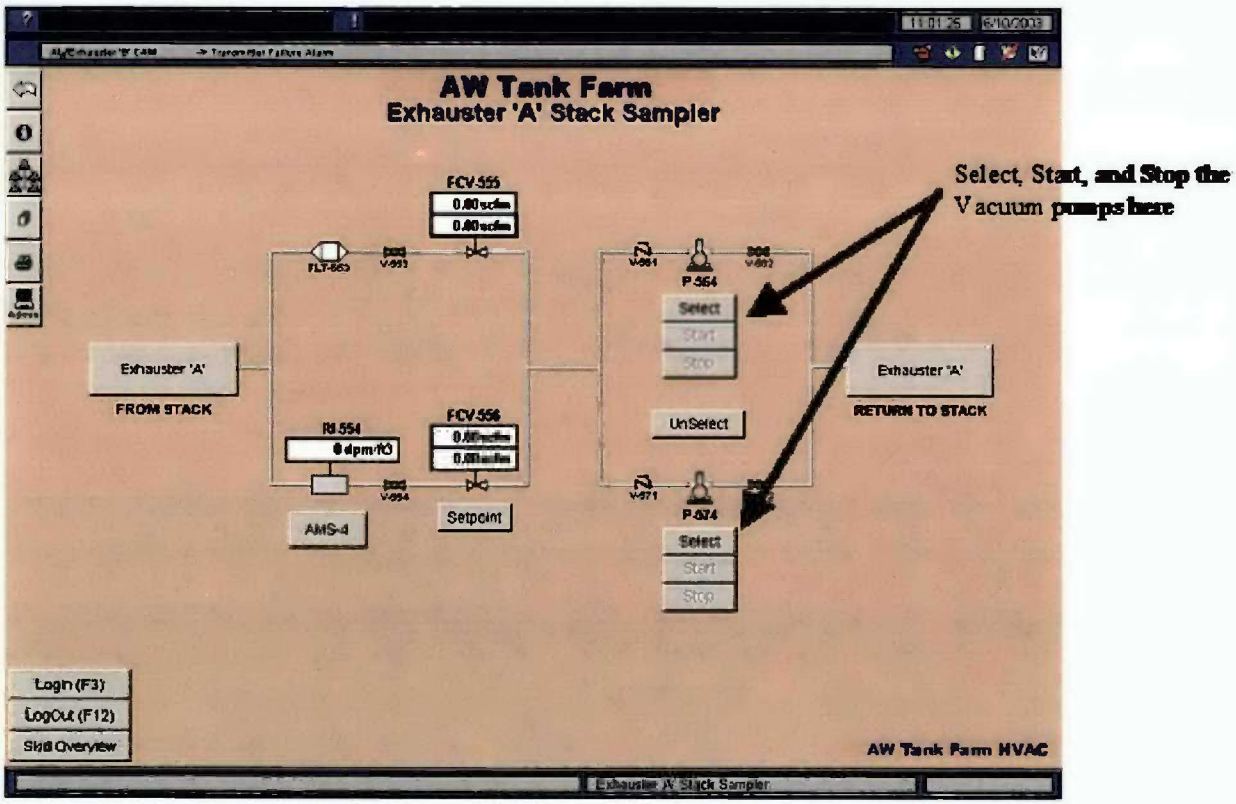
Picture 2 - Exhauster 'A' Process Details Screen



Attachment 1 - HMI Screen Navigation (Cont.)

5. Picture 3 below shows where to click to select, start, and stop the CAM and Record Sampler vacuum pumps and where to read the flow through the Flow Control Valves.

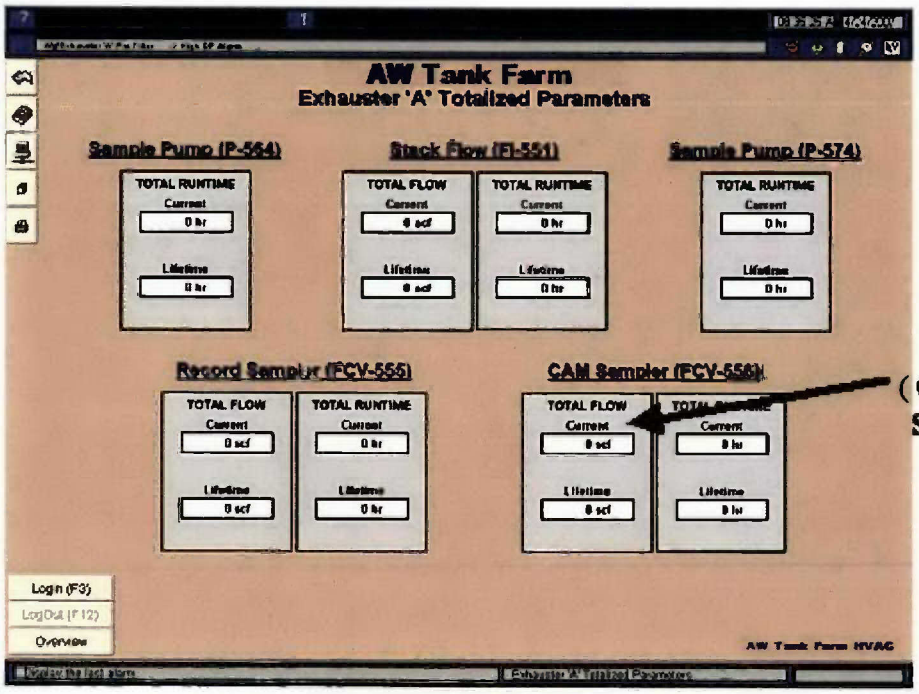
Picture 3 - Exhauster 'A' Stack Sampler Screen



Attachment 1 - HMI Screen Navigation (Cont.)

5. Picture 4 below shows where to obtain the total flow through the Flow Control Valves.

Picture 4 - Exhauster 'A' Totalized Parameters Screen



CAM Sampler Totalized Flow (Current) reading required for Section 5.6