Perform Periodic Checks of Eberline AMS-3, 4, 5, 5A and 5AS CAMs

Tank Farm Plant Operating Procedure

CHANGE HISTORY (≤ LAST 5 REV-MODS )

<table>
<thead>
<tr>
<th>Rev-Mod</th>
<th>Release Date</th>
<th>Justification</th>
<th>Summary of Changes</th>
</tr>
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<tbody>
<tr>
<td>D-2</td>
<td>05/08/2017</td>
<td>Recent change to wording for TFC-PLN-167.</td>
<td>Updating the White Label program statement to reflect recent changes to TFC-PLN-167.</td>
</tr>
<tr>
<td>D-1</td>
<td>09/01/2016</td>
<td>PER</td>
<td>Update Records section to current standard.</td>
</tr>
<tr>
<td>D-0</td>
<td>10/28/2015</td>
<td>Periodic Review</td>
<td>Minor change was made to bring it up to current writers standards, Section 5.7, Records, The word NOTE is removed.</td>
</tr>
<tr>
<td>C-1</td>
<td>07/16/2013</td>
<td>RadCon request.</td>
<td>Globally deleted PNL from referenced documents.</td>
</tr>
<tr>
<td>C-0</td>
<td>06/28/2013</td>
<td>All changes are as a result of the periodic review process.</td>
<td>Globally deleted/modified vague phrases. Modified wording in Steps 2.1.1, 5.3.1.1, 5.3.1.2, 5.5.2, and 5.5.9. Modified wording in fourth NOTE preceding Step 5.1.1. Deleted old Steps 5.2.2, 5.2.3, 5.3.1.3 with NOTE, 5.3.1.5, 5.3.1.7, 5.3.1.8, 5.5.3 with NOTE, and 5.5.4.</td>
</tr>
</tbody>
</table>

Table of Contents

1.0 PURPOSE AND SCOPE................................................................................................................. 3

1.1 Purpose........................................................................................................................................ 3

1.2 Scope............................................................................................................................................ 3

2.0 INFORMATION.............................................................................................................................. 3

2.1 General Information.................................................................................................................... 3

2.2 Terms and Definitions.................................................................................................................. 3

3.0 PRECAUTIONS AND LIMITATIONS......................................................................................... 4

3.1 Personnel Safety......................................................................................................................... 4

3.2 Radiation and Contamination Control....................................................................................... 4

3.3 Limits .......................................................................................................................................... 4

4.0 PREREQUISITES ......................................................................................................................... 5

4.1 Special Tools, Equipment, and Supplies.................................................................................... 5

4.2 Performance Documents.............................................................................................................. 5

4.3 Field Preparation......................................................................................................................... 5

5.0 PROCEDURE............................................................................................................................... 6

5.1 Setting ASP............................................................................................................................... 6
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.2</td>
<td>Adjusting Percent Subtraction (Alpha CAMs only)</td>
<td>7</td>
</tr>
<tr>
<td>5.3</td>
<td>Establish Response Limits</td>
<td>9</td>
</tr>
<tr>
<td>5.4</td>
<td>Daily Operability Check</td>
<td>11</td>
</tr>
<tr>
<td>5.5</td>
<td>Weekly Source Check</td>
<td>12</td>
</tr>
<tr>
<td>5.6</td>
<td>Monthly Alarm Function Test</td>
<td>14</td>
</tr>
<tr>
<td>5.7</td>
<td>Records</td>
<td>15</td>
</tr>
</tbody>
</table>
1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides specific information regarding Eberline AMS-3 Beta and Alpha 4, 5, 5A and 5AS continuous air monitors (CAMs) used for workplace air monitoring.

1.2 Scope

This procedure involves setting Alarm Set Points (ASP), adjusting Percent Subtraction, establishing Response Limits, performing daily operability checks, performing weekly source checks and performing monthly alarm functional test for Eberline AMS-3 Beta and Alpha 4, 5, 5A and 5AS CAMs.

2.0 INFORMATION

2.1 General Information

2.1.1 Specific information regarding theory of operation, calibration, maintenance and instrument specifications and limitations, including environmental and interfering radiation can be found in MA-562, Radiation Protection Instrument Manual (or equivalent).

2.2 Terms and Definitions

ASP - Alarm Set Point
3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

3.1.1 Non-electrical worker accessing electrical enclosures must ensure the following:

- The enclosure must have a white label indicating that it has been evaluated.
- The work activity within the enclosure does not involve:
  - Reaching around or moving electrical equipment
  - Contacting electrical connectors/connections
  - By-passing protective shielding/barriers.

3.1.1.1 Stop and notify management if these conditions cannot be met, or if discrepancies exist (e.g. conflicting or missing labels, missing or damaged protective barriers).

3.2 Radiation and Contamination Control

3.2.1 When radiological work is being performed without a work package, this procedure is limited to radiological areas and work activities permitted by a general radiological work permit.

3.2.2 When work is performed in or when work will result in a high contamination, high radiation, or an airborne radioactivity area, an approved work package must be developed which is reviewed by Radiological Control per ALARA work planning procedure TFC-ESHQ-RP_RWP-C-03.

3.3 Limits

TFRCM Article 555.3
4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Supplies

The following supplies may be needed to perform this procedure:
- Alpha radioactive source (minimum activity of 3000 dpm) for Alpha CAMs
- Beta radioactive source (minimum activity of 3000 dpm) for Beta CAMs
- CAM set point adjustment tool.

4.2 Performance Documents

The following documents may be needed to perform this procedure:
- Form A-6004-216, TOC Radiological Control CAM Operability Checklist or equivalent.

4.3 Field Preparation

4.3.1 DETERMINE operating flow rate for CAM AND RECORD on A-6004-216 (e.g., typical flow rate 2 cfm or 57.6 lpm).

4.3.2 DETERMINE number of DAC-hours at which CAM will be set to alarm prior to ASP calculation.
5.0 PROCEDURE

5.1 Setting ASP

NOTE - CAM ASP should be set at the lowest possible level without resulting in a significant number (one per month per CAM) of false alarms.

- ASP, as set on a CAM, can be determined as background count rate (may assume background to be zero) measured with a clean (radioactively) filter paper and no flow + calculated ASP.

- Applying a sticker to the CAM identifying ASP provides a convenient method of communicating current ASP to other HPTs. (It is not required.)

- At no time should CAM ASP exceed 40 DAC-hr, after accounting for any respiratory protection factor (i.e., maximum DAC-hr value = 40). (TFRCM Article 555.3)

5.1.1 CALCULATE CAM ASP as follows:

<table>
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<tr>
<th>ASP Equation</th>
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<tr>
<td>ASP = (DAC)<em>(hr)</em>(60 min/hr)<em>(E)</em>(F)*(PF)/1.6E-11</td>
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</table>

Where:

- ASP - Alarm Set Point (cpm)
- DAC - Derived Air Concentration for the isotope of concern (uCi/ml)
- hr - Ideally eight or less; no greater than 24 unless prevented by Rn progeny
- 60 min/hr - (conversion factor)
- E - CAM counting efficiency in decimal form (e.g., if 12% use 0.12, NOT 12)
- F - CAM flow rate in ft³/min (as measured on CAM or the flow rate that will be used when the instrument is placed into service.) 28.3 liters/min = 1 ft³/min
- PF - Respiratory protection factor (PF=1 if not wearing respirator)
- 1.6E-11 - {conversion factor [(uCi/dpm)*(ft³/ml)]}
Perform Periodic Checks of Eberline AMS-3, 4, 5, 5A and 5AS CAMs

5.1 Setting ASP (Cont.)

NOTE - ASP is displayed on recorded readout when PUSH-TO-SET button on front of CAM is pressed.

5.1.2 ADJUST ASP as follows:

5.1.2.1 PRESS AND HOLD PUSH-TO-SET button.

5.1.2.2 ADJUST SET adjustment until recorder displays desired ASP.

5.1.2.3 RELEASE PUSH-TO-SET button.

5.1.3 RECORD ASP on A-6004-216.

5.2 Adjusting Percent Subtraction (Alpha CAMs only)

NOTE - GROSS/PHA-SUB switch must be in PHA-SUB position for this process.

- In general, these CAMs are operated with GROSS/PHA-SUB switch in the PHA-SUB position. Confirming switch is positioned in PHA-SUB position is part of the Daily Operability Check (Section 5.4).

CAM background

5.2.1 CONFIRM CAM flow meter is zero, unless facility guidance directs otherwise.

5.2.2 PLACE a radioactively clean air filter into filter housing.

5.2.3 RETAIN existing filter according to facility directives.

5.2.4 WAIT up to two minutes for background reading to stabilize.
5.2 Adjusting Percent Subtraction (Alpha CAMs only) (Cont.)

NOTE - Background levels should be ~1 cpm or less, ~ 5 cpm or less for CAMs with a keep alive source.

5.2.5 IF background levels are elevated, USE form A-6004-216 to document out of service information AND

PERFORM the following steps to reduce background:

NOTE - Air must be free of any significant (e.g., 2% DAC) alpha emitting isotope of concern (e.g., $^{239}\text{Pu}$, $^{241}\text{Am}$, $^{235}\text{U}$). This process should not be performed in an ARA, CA, or HCA. Grab air samples can be used to confirm absence of alpha emitters other than radon progeny.

5.2.5.1 PLACE CAM where radon progeny levels are comparable to location where CAM will be used.

5.2.5.2 CONFIRM flow rate is appropriately set.

5.2.5.3 ALLOW CAM to collect radon progeny for 1-3 days.

5.2.5.4 ADJUST PERCENT SUBTRACTION control until recorder reads an acceptably low rate, typically a few counts per minute (e.g., 2), but NOT zero. (ASPs can be set as counts above this “background” value)

5.2.5.5 ALLOW CAM to continue operating for several minutes (e.g., 10 minutes) AND

RE-CONFIRM recorder reading.

5.2.5.6 IF reading has increased to an unacceptable level, or decreased to the point where the meter is reading zero, REPEAT Steps 5.2.5.4 and 5.2.5.5.

5.2.5.7 ATTACH a sticker or tag to instrument indicating date Percent Subtraction was established.
5.3 Establish Response Limits

5.3.1 ESTABLISH response limit for each CAM when it is received from the calibration laboratory

OR

PERFORM the following steps when placing CAM into operation:

5.3.1.1 NOTIFY personnel in the local area and any personnel monitoring remote alarm panels or chart recorders of CAM testing and potential for a CAM alarm.

5.3.1.2 IF bypass timers are installed, ENERGIZE alarm bypass timers before initiating checks.

5.3.1.3 ADJUST ASP above expected response value.

5.3.1.4 PLACE an alpha radioactive source for alpha CAM or beta radioactive source for beta CAM (minimum activity of 3000 dpm) in CAM AND

ALLOW count rate to stabilize.
5.3 Establish Response Limits (Cont.)

5.3.1.5 **ENSURE** the stable response and source ID are recorded on form A-6004-216 AND **ENSURE** response limits are established at ±20% of that stable response.

5.3.1.6 **REPEAT** the process with another source when possible to establish response limits for secondary source.

5.3.1.7 **RECORD** completion or inability to complete response limit task on form A-6004-216.

**Alarm Functional Check**

5.3.1.8 **ADJUST** ASP just below stable count rate.

5.3.1.9 **CONFIRM** light and audible response alarm (it may take up to one minute for CAM to alarm).

5.3.1.10 **COMPLETE** task by placing a new filter into CAM.

5.3.1.11 **SET** ASP.

5.3.1.12 **CONFIRM** all CAM alarms have reset.

5.3.1.13 **IF** being put into service, **PERFORM** a daily operability check per Section 5.4.
5.4 Daily Operability Check

NOTE - Daily operability checks are performed and documented once each day.

5.4.1 CONFIRM positive airflow within established range of 48.1 - 65.1 lpm (1.7 - 2.3 cfm).

5.4.2 CONFIRM non zero response to background.

5.4.3 CONFIRM electronic chart recorder/meter operation and adequate paper supply (paper out indicator not present) as equipped.

5.4.4 CONFIRM that vacuum lines are secure (CAMS with dedicated vacuum pumps only).

5.4.5 REMOVE any debris/obstructions present on CAM.

5.4.6 CONFIRM “Counting” light is ON.

5.4.7 CONFIRM “Failure” light is OFF.

5.4.8 CONFIRM Sample door is shut tightly.

5.4.9 CONFIRM CAM calibration is current.

NOTE - Step 5.4.10 is applicable to Alpha CAMs only.

5.4.10 CONFIRM the following CAM control settings:
- PHA/SUB-Gross switch in PHA/Sub position
- Proper WINDOW setting: 1.0 for $^{239}$Pu, 1.6 for Uranium
- Proper THRESHOLD setting: 4.65 for $^{239}$Pu, 3.6 for Uranium
- ASP appropriately set.

NOTE - Step 5.4.11 is applicable to Beta CAMs only.

5.4.11 CONFIRM the following CAM control settings:
- ASP appropriately set.
- “Background Subtraction” switch is ON.

5.4.12 RECORD results on site form A-6004-216.
5.5 Weekly Source Check

NOTE - This check is performed once each week to verify CAM’s measured response is within response limits established for the source, upon receipt from calibration. Weekly Source Checks are documented on site form A-6004-216 and valid until midnight of the 7th day after the test is performed.

- Certain weekly tests may initiate a CAM alarm.

5.5.1 NOTIFY personnel in the local area and any personnel monitoring remote alarm panels or chart recorders of CAM testing and the potential for a CAM alarm.

5.5.2 IF bypass timers are installed, ENERGIZE alarm bypass timers before initiating checks.

5.5.3 ADJUST ASP above expected response value.

5.5.4 REPLACE CAM sample filter with an appropriate source (i.e., one with established response limits for this CAM).

5.5.5 RETAIN filter according to facility directives.

5.5.6 WAIT for count rate to increase and stabilize.

5.5.7 IF count rate does not increase, IDENTIFY AND TAG OUT CAM with a service tag and fill out Site Form A-6004-216.
5.5 Weekly Source Check (Cont.)

5.5.8 CONFIRM stable count rate is within established response limits for CAM/source combination.

5.5.8.1 IF stable count rate is not within established limits, REPEAT test with a second source, if available.

5.5.8.2 REMOVE CAM from service if two sources indicate failure AND TAG OUT with a service tag.

5.5.9 PERFORM Monthly Alarm Function Test per Section 5.6. (Normally only once every 30 days)

5.5.10 REMOVE source AND REPLACE with original or a new filter.

5.5.11 RESET ASP to required setting, if altered.

5.5.12 RETURN flow to CAM AND CONFIRM proper flow.

5.5.12.1 ENSURE flow is adjusted to required setting.

5.5.13 CONFIRM all CAM alarms have reset.

5.5.14 PERFORM a daily operability test per Section 5.4.

5.5.15 COMPLETE form A-6004-216.

5.5.16 FORWARD the form to Radiological Control First Line Manager for review.
5.6 Monthly Alarm Function Test

NOTE - Once each month, every CAM in service is tested for proper operation of alarming capabilities. (Month is defined as every 30 days.)

- CAM alarms are initiated by placing a radioactive source into sample holder.
- Source activity should be sufficient to produce a count rate that is, as a minimum, within the decade of, and greater than, a typical ASP for the CAM.
- Monthly alarm tests are valid until midnight of the 30th day after performing test.

5.6.1 ADJUST ASP just below stable count rate.

NOTE - It may take up to one minute for CAM to alarm.

5.6.2 CONFIRM light and audible response alarm perform properly (i.e., local and remote).
5.7 Records

5.7.1 **PERFORM** the following for records identified within this procedure.

5.7.1.1 On the Records Submittal Checklist, **RECORD** the number of pages that were completed

OR

**PLACE** a check mark (✓) in the N/A column.

5.7.1.2 **ATTACH** the completed records to the Records Submittal Checklist **AND**

**SIGN** Records Submittal Checklist indicating the package is complete.

5.7.1.3 **SUBMIT** the completed records to an approved RadCon Record Storage Area for retention.

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>
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<th>Records Submittal Checklist</th>
<th>Number of pages completed</th>
<th>N/A (✓)</th>
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<tbody>
<tr>
<td>Site Form A-6004-216 TOC Radiological Control CAM Operability Checklist (or equivalent)</td>
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_________________________ / ______________________ / ______________________
Signature
First Line Manager (or designee)
Print (First and Last Name) Date