DEPARTMENT OF THE AIR FORCE
Headquarters US Air Force
Washington, DC 20330-1030

QTP 4B051-11
2 April 2015

AIR FORCE SPECIALTY CODE 4B051
BIOENVIRONMENTAL ENGINEERING

Confined Spaces

QUALIFICATION TRAINING PACKAGE

Accessibility: ***Publications and forms are available on the e-publishing website at http://www.e-publishing.af.mil for downloading or ordering.***

Realeasability: ***There are no releasability restrictions on this publication.***

Table of Contents

STS Line Item 4.8.2: Classify confined spaces (permit / non-permit required)

TRAINER GUIDANCE

Proficiency Code:	2b
PC Definition:	Can do most parts of the task. Needs assistance only on hardest parts. Can determine step-by-step procedures for doing the task.
Prerequisites:	N/A
Training References:	• AFOSH Std 91-203, *Consolidated occupational safety instruction* • 29 CFR 1910.146
Additional Supporting References:	
CDC Reference:	4B051
Training Support Material:	• Area of confined space • Description of confined space to be classified
Specific Techniques:	Conduct hands-on training and evaluation. This training should be performed in conjunction with TM OH 9-1 and 9-2.
Criterion Objective:	Given a confined space (CS), confined space description and atmospheric monitoring results, accurately classify the confined space while completing all checklist items with limited trainer assistance on only the hardest parts.
Notes: Provide trainee with atmospheric monitoring results to use for this QTP.	

TASK STEPS

1. Review atmospheric monitoring results.
2. Compare results to classification criteria in AFI Std 91-203.
   a. Determine whether or not atmosphere is Immediately Dangerous to Life or Health (IDLH).
   b. Determine whether or not oxygen content is acceptable (deficient, acceptable or enriched).
   c. Determine whether or not atmosphere flammability (gases, vapors, mists, fibers or dusts) is acceptable.
   d. Determine whether or not toxicity levels are acceptable.
   e. Determine whether there is a possibility of engulfment or entrapment.
3. Compile and report determination(s) (as per AF Form 55, Employee Safety and Health Record) to the confined space program team (CSPT) with recommended classification: permit-required or non-permit confined space.

LOCAL REQUIREMENTS:

NOTES:

TRAINEE REVIEW QUESTIONS

STS Line Item 4.8.2: Classify confined spaces (permit / non-permit required)

1. List the three things that constitute a confined space. 1. 2. 3.
2. When classifying a confined space, would a permit be required if the oxygen levels were at 19%?
3. The classification of confined spaces is based on what three things. 1. 2. 3.

PERFORMANCE CHECKLIST

STS Line Item 4.8.2: Classify confined spaces (permit / non-permit required)

Proficiency Code:	2b
PC Definition:	Can do most parts of the task. Needs help only on hardest parts. Can determine step-by-step procedures for doing the task.

DID THE TRAINEE…		YES	NO
1. Review atmospheric monitoring results?			
2. Compare results to classification criteria in AFI Std 91-203?			
a. Determine whether or not atmosphere is Immediately Dangerous to Life or Health (IDLH)?			
b. Determine whether or not oxygen content is acceptable (deficient, acceptable or enriched)?			
c. Determine whether or not atmosphere flammability (gases, vapors, mists, fibers or dusts) is acceptable?			
d. Determine whether or not toxicity levels are acceptable?			
e. Determine if there is a possibility of engulfment or entrapment?			
3. Compile and report determination(s) (as per AF Form 55, Employee Safety and Health Record) to the confined space program team (CSPT) with recommended classification: permit-required or non-permit confined space?			
Did the trainee successfully complete the task?			

TRAINEE NAME (PRINT) TRAINER NAME (PRINT)

ANSWERS

1. List the three things that constitute a confined space.

A:

1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and
2) Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.)
3) Is not designed for continuous employee occupancy.

(Source: 1910.146 (b)-permit required confined spaces)

2. When classifying a confined space, would a permit be required if the oxygen levels were at 19%?

A: Yes

(Source: AFI 91-203, *Air Force Consolidated Occupational Safety Instructio*n, Table 23.1)

3. The classification of confined spaces is based on what three things.

A:

1) Measurements of oxygen content
2) Flammability
3) Toxicity by testing

(Source: AFI 91-203, *Air Force Consolidated Occupational Safety Instructio*n, para 23.3.4)

STS Line Item 4.8.3: Test confined space atmospheric conditions and interpret results

TRAINER GUIDANCE

Proficiency Code:	2b
PC Definition:	Can do most parts of the task. Needs assistance only on hardest parts. Can determine step-by-step procedures for doing the task.
Prerequisites:	Training Module 4.8.5 – Operate atmospheric monitoring equipment (combustible gas meter, PID)
Training References:	• AFI 91-203, *Air Force Consolidated Occupational Safety Instruction* • Manual/references for DRI being used http://www.msanorthamerica.com/catalog/product16577.html • http://media.msanet.com/NA/USA/PortableInstruments/CombinationInstrumentsandCombustibleGasIndicators/PassportPersonalAlarm/803919.pdf
Additional Supporting References:	• 29 CFR 1910.146
CDC Reference:	4B051
Training Support Material:	• Direct reading atmospheric equipment (i.e., single or multi-gas meter or detector tubes) • Calibration gases • Writing/electronic record taking materials to document results
Specific Techniques:	Conduct hands-on training and analysis. This training should be performed in conjunction with 4.8.3 and 4.8.6.
Criterion Objective:	Given a confined space (CS) and atmosphere monitoring equipment, test and interpret confined space hazards (i.e. oxygen, lower explosive limit, toxicity) successfully completing all checklist items with limited trainer assistance on only the hardest parts.
Notes: Changes to the scenario may be necessary based on availability of specific atmospheric monitoring equipment.	

TASK STEPS

Equipment Selection and Preparation:

1. Select portable direct-reading atmospheric monitoring instrument(s) to be used based on hazards present
2. Prepare equipment per user's manual(s), as applicable.[1]
3. Insert tube/probe into the CS.[2]

Determination of Oxygen Content:

4. Use portable combustible gas monitor in accordance with manufacturer's instructions.
5. Monitor oxygen level.
6. Read and record levels.
7. Interpret results.

Determination of LEL:

8. Use portable combustible gas monitor in accordance with manufacturer's instructions.
9. Monitor LEL level.
10. Read and record levels.
11. Interpret results.

Determination of Presence of Toxic Chemicals in the Atmosphere (e.g., CO, chlorine, hydrogen sulfide, etc.):

12. Use appropriate sensors in DRI or PID/FID in accordance with manufacturer's instructions.
13. Monitor chemical levels.
14. Read and record levels.
15. Interpret results.

Evaluation of Results

16. Apply correction factors (CF), if necessary, referring to instrument's user manual for information.
17. Determine if recorded values are acceptable.
18. Re-test if necessary.

LOCAL REQUIREMENTS:

NOTES:

1. Be sure to complete the following when preparing equipment:
   - Check and connect rechargeable battery pack/replace batteries.
   - Conduct operator checks.
   - Field-calibrate instruments.
   - Replace sensors, if needed.
   - Attach pump modules/hoses.

2. Draw samples at three (top, middle and bottom OR shallow, medium and deep) or more elevations (allow five seconds per meter of tubing).

TRAINEE REVIEW QUESTIONS

STS Line Item 4.8.3: Test confined space atmospheric conditions and interpret results

1. What is the sequence for atmospheric testing of confined spaces?
2. What is an upper explosive limit?

PERFORMANCE CHECKLIST

STS Line Item 4.8.3: Test confined space atmospheric conditions and interpret results

Proficiency Code:	2b
PC Definition:	Can do most parts of the task. Needs help only on hardest parts. Can determine step-by-step procedures for doing the task.

DID THE TRAINEE…		YES	NO
EQUIPMENT SELECTION AND PREPARATION:			
1. Select portable direct-reading atmospheric monitoring instrument(s) to be used based on hazards present?			
2. Prepare equipment per user's manual(s), as applicable?			
3. Insert tube/probe into the CS?			
DETERMINATION OF OXYGEN CONTENT:			
4. Use portable combustible gas monitor in accordance with manufacturer's instructions?			
5. Monitor oxygen level?			
6. Read and record levels?			
7. Interpret result?			
DETERMINATION OF LEL:			
8. Use portable combustible gas monitor in accordance with manufacturer's instruction?			
9. Monitor LEL level?			
10. Read and record levels?			
11. Interpret results?			
DETERMINATION OF PRESENCE OF TOXIC CHEMICALS IN THE ATMOSPHERE (e.g., CO, chlorine, hydrogen sulfide, etc.):			
12. Use appropriate sensors in DRI or PID/FID in accordance with manufacturer's instructions?			
13. Monitor chemical levels?			

14. Read and record levels?			
15. Interpret results?			
EVALUATION OF RESULTS			
16. Apply correction factors (CF), if necessary, referring to instrument's user manual for information?			
17. Determine if recorded values are acceptable?			
18. Re-test if necessary?			
Did the trainee successfully complete the task?			

TRAINEE NAME (PRINT)

TRAINER NAME (PRINT)

ANSWERS

1. What is the sequence for atmospheric testing of confined spaces?

   A: Oxygen, combustible gases and toxic materials

   (Source: Career Development Course 4B051)

2. What is an upper explosive limit?

   A: The highest percentage of a flammable gas in the air at which it will ignite.

   (Source: Career Development Course 4B051)

STS Line Item 4.8.5(a): Combustible Gas Meters: MSA Passport® Personal Alarm*

TRAINER GUIDANCE

Proficiency Code:	2b
PC Definition:	Can do most parts of the task. Needs assistance only on hardest parts. Can determine step-by-step procedures for doing the task.
Prerequisites:	None
Training References:	MSA Passport® Personal Alarm Instruction Manual
Additional Supporting References:	MSA Passport® Personal Alarm Technical Manual http://media.msanet.com/NA/USA/PortableInstruments/CombinationInstrumentsandCombustibleGasIndicators/PassportPersonalAlarm/803919.pdf
CDC Reference:	4B051
Training Support Material:	• MSA Passport® Personal Alarm with fully charged battery pack/power source • Calibration gas
Specific Techniques:	Conduct hands-on training and evaluation of calibration and operation of equipment with verification of steps.
Criterion Objective:	Given a Passport® Personal Alarm, demonstrate how to operate and calibrate it successfully completing all the checklist items with limited trainer assistance.

Notes:
***** The Passport® Personal Alarm detects oxygen (O_2), carbon monoxide (CO), hydrogen sulfide (H_2S), and sulfur dioxide (SO_2). The Passport® Personal Alarm detects gases and vapors in air only. It cannot measure combustible or toxic gases in reducing atmospheres, furnace stacks, or environments with inert gas backgrounds. The Passport Alarm measures combustible gases and vapors; however, it cannot measure the presence of combustible airborne mists such as lubricating oils.

TASK STEPS

1. Turn on Passport in clean, fresh air environment.[1]
2. Observe readings to verify no gas present.
3. Check battery condition.
4. Perform calibration check.[2]
5. Attach sampling lines and related equipment, if available and collecting a sample from a remote or inaccessible location.[3]
6. Expose instrument to environment.
7. Record meter readings.
8. Utilize DOEHRS or equivalent.

LOCAL REQUIREMENTS:

NOTES:

1. When the unit is turned on it responds with the following:
   - backlight flashes
   - screen flashes
   - alarm sounds
   - alarm lights flash
   - major electronic components are tested automatically

2. Calibration checks must be made frequently if materials such as silicone, silicates, or lead-containing compounds such as leaded gasoline are suspected to be present in the tested atmosphere. If you do not recalibrate, the instrument may give false readings and endanger life and health. To perform a calibration check, do the following steps:

   a. Attach the pump module or calibration cap to the Passport Alarm, orienting the inlet fitting to point toward the battery pack
   b. Attach the calibration adapter to the calibration cap or pump module
   c. Attach the regulator to the cylinder
   d. Connect the black tubing to the regulator
   e. Open the valve on the regulator and connect the other end of the tubing to the inlet fitting
   f. Observe readings are within limits stated on the calibration cylinder

3. To attach probe to sampling line, follow these steps:

   a. Grasp the probe handle by the top two sections [the large section (cap) with the MSA logo and the center section (base) with the label].
   b. Unscrew lower section (guard) from the label section.
   c. Feed male end of the sample line through the guard and screw into the exposed connector ring on the probe.
   d. Screw the guard back onto the base.

PERFORMANCE CHECKLIST

STS Line Item 4.8.5(a): Combustible Gas Meters: MSA Passport® Personal Alarm

Proficiency Code:	2b
PC Definition:	Can do most parts of the task. Needs assistance only on hardest parts. Can determine step-by-step procedures for doing the task.

DID THE TRAINEE…		YES	NO
1. Turn on Passport in clean, fresh air environment?			
2. Observe readings to verify no gas present?			
3. Check battery condition?			
4. Perform calibration check?			
5. Attach sampling lines and related equipment, if available and collecting a sample from a remote or inaccessible location?			
6. Expose instrument to environment?			
7. Record meter readings?			
8. Utilize DOEHRS or equivalent.			
Did the trainee successfully complete the task?			

TRAINEE NAME (PRINT)

TRAINER NAME (PRINT)

STS Line Item 4.8.5(b): Combustible Gas Meters: MSA Sirius® Multigas Detector*

TRAINER GUIDANCE

Proficiency Code:	2b
PC Definition:	Can do most parts of the task. Needs assistance only on hardest parts. Can determine step-by-step procedures for doing the task.
Prerequisites:	None
Training References:	MSA Sirius® Multigas Detector Operating Manual
Additional Supporting References:	http://www.msanorthamerica.com/catalog/product16577.html http://www.msanorthamerica.com/
CDC Reference:	4B051
Training Support Material:	• MSA Sirius® Multigas Detector with fully charged battery/power source • Calibration gas
Specific Techniques:	Conduct hands-on training and evaluation of calibration and operation of equipment with verification of steps.
Criterion Objective:	Given a Sirius® Multigas Detector, demonstrate how to operate it successfully completing all the checklist items with limited trainer assistance.

Notes:

***** The Sirius® Multigas Detector is designed to detect gases and vapors in air only and to detect only specified toxic gases for which a sensor is installed.

Use only Teflon sampling lines for reactive gases such as chlorine ($CL_{2)}$, phosphine ($PH_{3)}$, ammonia ($NH_{3)}$, hydrogen cyanide (HCN), and for semivolatile organic compounds such as gasoline and jet fuels. Do not use silicone tubing or sampling lines. The operating manual contains additional warnings and acceptable usage limits for the unit as well as a discussion of how the unit functions.

TASK STEPS

Turning ON the Sirius® Multigas Detector

1. Press the **Power ON** button.[1]
    1. Perform Fresh Air Set Up Option for automatic zero adjustment of the Sirius® Multigas Detector sensors.[2]

Verifying Pump Operation

1. Turn **ON** the Sirius® Multigas Detector.[3]
2. Once gas readings are displayed, plug the free end of the sampling line or probe.[4]
3. Check the pump before each day's use.
4. Press the **RESET/▼** button to reset the alarm and restart the pump. [8]

Clearing an Alarm

1. Correct any flow blockage.
2. Press the **RESET/▼** button. The Pump will now restart.

Conducting a Pre-Operational Check

The pre-operational check is simple and should only take about one minute. Perform this check before each day's use for each installed sensor.

1. Turn **ON** the Sirius® Multigas Detector in clean, fresh air.
2. Verify that readings indicate no gas is present.
3. Attach regulator (supplied with calibration kit) to the cylinder.
4. Connect tubing (supplied with calibration kit) to the regulator.
5. Attach other end of tubing to the instrument.
6. Open the valve on the regulator, if so equipped.
7. Determine that the reading on the Sirius® Multigas Detector display is within the limits stated on the calibration cylinder or limits pre-determined by your flight.
8. If necessary, change cylinder to introduce other calibration gases.
9. If readings are not within these limits, the Sirius® Multigas Detector requires recalibration.[6]

Conducting a Calibration Check

1. Turn **ON** the Sirius® Multigas Detector in clean, fresh air.
2. Verify that readings indicate no gas is present.
3. Attach regulator (supplied with calibration kit) to the cylinder.
4. Connect tubing (supplied with calibration kit) to the regulator.
5. Attach other end of tubing to the instrument.
6. Open the valve on the regulator, if so equipped.[7]

Performing Recalibration (if necessary)

1. Turn **ON** the instrument and verify that battery has sufficient life.
2. Wait until the Measure Gases page appears.
3. Push and hold the **RESET/▼** button until **CAL ZERO?** flashes on the display.
4. Push the **ON-OFF/ACCEPT** button to zero the instrument.[8]
5. Connect the appropriate calibration gas (MSA recommends 100ppm isobutylene) to the instrument by connecting one end of the tubing to the pump inlet on the instrument and the other end of tubing to the cylinder regulator (supplied in the calibration kit).*
6. Open the valve on the regulator, if so equipped.
7. Push the **ON-OFF/ACCEPT** button to calibrate (span) the instrument.[9]
8. Remove the tubing from the instrument.

Measuring Gas Concentrations[10]

1. Expose instrument to environment
2. Calculate response factor

Resetting Short Term Exposure Limits (STELs) [11]

1. Access the STEL page.
2. Press the RESET/▼ button

Resetting the Time Weighted Average (TWA)[12]

1. Access the TWA page.
2. Press the RESET/▼ button.

Recording data

1. Utilize DOEHRS or equivalent.

LOCAL REQUIREMENTS:

NOTES:

1. The instrument displays the following information:

    a. A self-test:
        a. Audible alarm sounds
        b. Alarm LEDs illuminate
        c. Display backlight illuminates
        d. Pump activates
        e. Software version displays
        f. Internal diagnostics.

    b. Alarm setpoints:
        a. Low
        b. High
        c. STEL (if activated)
        d. TWA (if activated)

    c. Calibration gas (expected calibration gas values)

d. Time and date (if data logging option installed)

e. Last CAL date (if data logging option installed) —The Sirius® Multigas Detector is equipped with a "last successful calibration date" feature. The date shown is the last date that all installed sensors were successfully calibrated. **LAST CAL** is displayed with this date in the following format: **MM/DD/YY**

f. Instrument warm-up period

g. Fresh Air Setup (FAS) option.

2. Persons responsible for the use of the Sirius® Multigas Detector must determine whether or not the Fresh Air Setup option should be used. The user's abilities, training and normal work practices must be considered when making this decision.

   Warning: Do not activate the Fresh Air Setup unless you are certain you are in fresh, uncontaminated air; otherwise, inaccurate readings can occur which can falsely indicate that a hazardous atmosphere is safe. If you have any doubts as to the quality of the surrounding air, do not use the Fresh Air Setup feature. Do not use the Fresh Air Setup as a substitute for daily calibration checks. The calibration check is required to verify span accuracy. Failure to follow this warning can result in serious personal injury or death.

   To perform a Fresh Air Setup, push the ON/OFF button while **ZERO?** is flashing. The Fresh Air Setup (FAS) has limits. If a hazardous level of gas is present, the Sirius® Multigas Detector ignores the FAS command and goes into alarm.

   Once the instrument self check is complete, **ZERO?** flashes for 10 seconds.

   If no buttons are pushed, the **ZERO?** automatically stops flashing after the 10 seconds have expired and the FAS is not performed.

   To immediately skip the FAS, push the **RESET/▼** button.

3. The pump motor will start fast and then slows down as the instrument adjusts the power to run the pump.

4. If the pump motor shuts down and an alarm sounds, **PUMP ALARM** will flash on the display and the readings on the display may change. When the pump inlet, sample line or probe is blocked, the pump alarm must activate. If the alarm does not activate, check the sample line and probe for leaks. Once leak is fixed, re-check pump alarm by blocking flow.

5. **Warning:** Perform a blocked flow test before each day's use. Do not use the pump, sample line, or probe unless the pump alarm activates when the flow is blocked. Lack of an alarm is an indication that a sample may not be drawn to the sensors, which could cause inaccurate readings. Failure to follow the above can result in serious personal injury or death.

During operation, a pump alarm may occur when the flow system is blocked, pump is inoperative, and sample lines are attached or removed.

When the instrument is in a gas alarm, the pump alarm may not display until gas alarm is cleared.

6. The presence of other calibration gases may cause the PID to under range, indicated by dashes for the displayed **VOC** reading.

7. The reading on the Sirius® Multigas Detector display should be within the limits stated on the calibration cylinder or limits which are predetermined by the user. If necessary, change cylinder to introduce other calibration gases. If readings are not within these limits, the Sirius Multigas Detector requires recalibration.

8. Instrument must be in fresh air to perform the zero. **CAL ZERO** flashes. To skip the Zero procedure and move directly to the calibration span procedure, push the **RESET/▼** button. If no button is pushed for 30 seconds, the instrument returns to the Measure mode. Once the zeros are set, **CAL SPAN?** flashes

9. **CAL SPAN** flashes for approximately 90 seconds. If autocalibration sequence passes, the instrument beeps three times and returns to the Measure mode. To skip calibration and return to the Measure mode, push the **RESET/▼** button. If no button is pushed for 30 seconds, it will return to the Measure page.

10. **Warning:** Never let the end of the sampling line touch or go under any liquid surface. If liquid is sucked into the instrument, readings will be inaccurate and the instrument could be damaged. We recommend the use of an MSA Sample Probe (P/N 10042621, 10042622, 10040589, or equivalent) containing a special membrane filter, permeable to gas but impermeable to water, to prevent such an occurrence.

    The Sirius® Multigas Detector can be equipped to detect combustible gases in the atmosphere.
    a. Alarms sound when concentrations reach:

        i. Alarm Setpoint or
        ii. 100% LEL (Lower Explosive Limit), 5% CH4.

    b. When the combustible gas indication reaches the Alarm Setpoint:

        i. Alarm sounds
        ii. Alarm lights flash
        iii. % LEL or CH4 flag above the concentration flashes.

    c. To silence the alarm, press the RESET/▼ button. The alarm will stay silent if the alarm condition has cleared.

d. When the combustible gas indication reaches 100% LEL or 5% CH4, the LockAlarm™ circuit locks the combustible gas reading and alarm and:

i. Alarm sounds
ii. Alarm lights flash
iii. 100 (or 5.00 in CH4 mode) appears on the display and flashes.

e. This alarm cannot be reset with the RESET/▼ button. After moving to a safe, fresh-air environment, reset the alarm by turning OFF the instrument and turning it ON again.

To determine a response factor for a target chemical, perform the following procedure:

1. Calibrate the Sirius Detector using isobutylene as the span gas.

2. On the monitor, set the sample gas name to isobutylene.

3. Apply a known concentration of the target chemical to the monitor and note the concentration reported in the display.

4. The response factor for the target chemical relative to isobutylene:

$$\text{RF target gas} = \frac{\text{Actual known concentration}}{\text{Concentration reported by instrument}}$$

For example:

A monitor is calibrated on isobutylene, and has isobutylene defined as the sample gas. When sampling 106 ppm of benzene in air, the instrument reports a concentration of 200 ppm. In this example, the response factor for benzene relative to isobutylene would be:

$$RF\ benz = \frac{106 \text{ ppm known conc. benzene}}{200 \text{ ppm reported}} = 0.53$$

When surveying, if benzene is selected as the sample gas in the Response Factor page, and 0.53 is entered into the monitor as the response factor, the instrument would use this response factor to automatically correct the displayed concentration into PPM benzene.

If a chemical has a response factor between zero and one, the monitor has a higher detector response for this chemical than isobutylene. If the response factor is greater than one, the monitor has a lower detector response for this chemical than isobutylene.

11. The STEL alarm is calculated over a 15-minute exposure. Calculation examples are as follows:

• Assume the detector has been running for at least 15 minutes:

• 15-minute exposure of 35 PPM:

$$\frac{(15 \text{ minutes} \times 35 \text{ PPM})}{15 \text{ minutes}} = 35 \text{ PPM}$$

• 10-minute exposure of 35 PPM

• 5-minute exposure of 15 PPM:

$$\frac{(10 \text{ minutes} \times 35 \text{ PPM}) + (5 \text{ minutes} \times 15 \text{ PPM})}{15 \text{ minutes}} = 28 \text{ PPM}$$

12. The TWA alarm is calculated over an eight-hour exposure. Calculation examples are as follows:

• 1-hour exposure of 50 PPM:

$$\frac{(1 \text{ hour} \times 50 \text{ PPM}) + (7 \text{ hours} \times 0 \text{ PPM})}{8 \text{ hours}} = 6.25 \text{ PPM}$$

• 4-hour exposure of 50 PPM
4-hour exposure of 100 PPM:

$$\frac{(4 \text{ hours} \times 50 \text{ PPM}) + (4 \text{ hours} \times 100 \text{ PPM})}{8 \text{ hours}} = 75 \text{ PPM}$$

• 12-hour exposure of 100 PPM:

$$\frac{(12 \text{ hours} \times 100 \text{ PPM})}{8 \text{ hours}} = 150 \text{ PPM}$$

NOTE: The accumulated reading is always divided by eight hours.

MSA Sirius® MultiGas Detector

PERFORMANCE CHECKLIST

STS Line Item 4.8.5(b): Combustible Gas Meters: MSA Sirius® Multigas Detector

Proficiency Code:	2b
PC Definition:	Can do most parts of the task. Needs assistance only on hardest parts. Can determine step-by-step procedures for doing the task.

DID THE TRAINEE…		YES	NO
TURNING ON THE SIRIUS® MULTIGAS DETECTOR			
1. Press the **Power ON** button?			
2. Perform Fresh Air Set Up Option for automatic zero adjustment of the Sirius® MultiGas Detector sensors?			
VERIFYING PUMP OPERATION			
1. Turn ON the Sirius® MultiGas Detector?			
2. Once gas readings were displayed, plug the free end of the sampling line or probe?			
3. Check the pump before use?			
4. Press the RESET/▼ button to reset the alarm and restart the pump?			
CLEARING AN ALARM			
1. Correct any flow blockage?			
2. Press the RESET/▼ button to restart the pump?			
CONDUCTING A PRE-OPERATIONAL CHECK			
1. Turn ON the Sirius® Multigas Detector in clean, fresh air?			
2. Verify that readings indicate no gas is present?			
3. Attach regulator (supplied with calibration kit) to the cylinder?			
4. Connect tubing (supplied with calibration kit) to the regulator?			
5. Attach other end of tubing to the instrument?			
6. Open the valve on the regulator, if so equipped?			

7. Determine that the reading on the Sirius® Multigas Detector display is within the limits stated on the calibration cylinder or limits pre-determined by your flight?			
8. If necessary, change cylinder to introduce other calibration gases?			
9. If readings are not within these limits, the Sirius® Multigas Detector requires recalibration?			
CONDUCTING A CALIBRATION CHECK			
1. Turn ON the Sirius Multigas Detector in clean, fresh air?			
2. Verify that readings indicate no gas is present?			
3. Attach regulator (supplied with calibration kit) to the cylinder?			
4. Connect tubing (supplied with calibration kit) to the regulator?			
5. Attach other end of tubing to the instrument?			
6. Open the valve on the regulator, if so equipped?			
PERFORMING RECALIBRATION (IF NECESSARY)			
1. Turn **ON** the instrument and verify that battery has sufficient life?			
2. Wait until the Measure Gases page appears?			
3. Push and hold the **RESET**/ ▼button until **CAL ZERO?** flashes on the display?			
4. Push the **ON-OFF**/**ACCEPT** button to zero the instrument?			
5. Connect the appropriate calibration gas to the instrument by connecting one end of the tubing to the pump inlet on the instrument and the other end of tubing to the cylinder regulator (supplied in the calibration kit)?			
6. Open the valve on the regulator, if so equipped?			
7. Push the **ON-OFF**/**ACCEPT** button to calibrate (span) the instrument?			
8. Remove the tubing from the instrument?			
MEASURING GAS CONCENTRATIONS			
1. Expose instrument to environment?			
2. Calculate a response factor?			
RESETTING SHORT TERM EXPOSURE LIMITS (STELS)			
1. Access the STEL page			
2. Press the RESET/▼ button			
RESETTING THE TIME WEIGHTED AVERAGE (TWA)			

1. Access the TWA page			
2. Press the RESET/▼ button			
RECORDING DATA			
1. Utilize DOEHRS or equivalent.			
Did the trainee successfully complete the task?			

TRAINEE NAME (PRINT)

TRAINER NAME (PRINT)

STS Line Item 4.8.6: Provide atmosphere monitoring equipment training
(Combustible Gas Meter*)

TRAINER GUIDANCE

Proficiency Code:	2b
PC Definition:	Can do most parts of the task. Needs help only on hardest parts. Can determine step-by-step procedures for doing the task.
Prerequisites:	N/A
Training References:	• MSA Sirius® Multigas Detector Operating Manual
Additional Supporting References:	http://www.msanorthamerica.com/catalog/product16577.html • AFI 91-203, *Air Force Consolidated Occupational Safety Instruction* • OSHA 1910.146 Appendix C
CDC Reference:	4B051
Training Support Material:	Combustible Gas Meter (Sirius) Calibration Gas Tubing
Specific Techniques:	Conduct hands-on training and evaluation.
Criterion Objective:	Given a combustible gas meter, communicate how to operate it successfully by completing all the checklist items with limited assistance on only the hardest parts.

Notes:

***** The Sirius® Multigas Detector is designed to detect gases and vapors in air only and to detect only specified toxic gases for which a sensor is installed.

Use only Teflon sampling lines for reactive gases such as chlorine ($CL_{2)}$, phosphine ($PH_{3)}$, ammonia ($NH_{3)}$, hydrogen cyanide (HCN), and for semivolatile organic compounds such as gasoline and jet fuels. Do not use silicone tubing or sampling lines. The operating manual contains additional warnings and acceptable usage limits for the unit as well as a discussion of how the unit functions.

TASK STEPS

Turning ON the Sirius® Multigas Detector

1. Press the **Power ON** button.[1]
2. Perform Fresh Air Set Up Option for automatic zero adjustment of the Sirius® Multigas Detector sensors.[2]

Verifying Pump Operation

5. Turn **ON** the Sirius® Multigas Detector.[3]
6. Once gas readings are displayed, plug the free end of the sampling line or probe.[4]
7. Check the pump before each day's use.
8. Press the **RESET/▼** button to reset the alarm and restart the pump. [8]

Clearing an Alarm

3. Correct any flow blockage.
4. Press the **RESET/▼** button. The Pump will now restart.

Conducting a Pre-Operational Check

The pre-operational check is simple and should only take about one minute. Perform this check before each day's use for each installed sensor.

10. Turn **ON** the Sirius® Multigas Detector in clean, fresh air.
11. Verify that readings indicate no gas is present.
12. Attach regulator (supplied with calibration kit) to the cylinder.
13. Connect tubing (supplied with calibration kit) to the regulator.
14. Attach other end of tubing to the instrument.
15. Open the valve on the regulator, if so equipped.
16. Determine that the reading on the Sirius® Multigas Detector display is within the limits stated on the calibration cylinder or limits pre-determined by your flight.
17. If necessary, change cylinder to introduce other calibration gases.
18. If readings are not within these limits, the Sirius® Multigas Detector requires recalibration.[6]

Conducting a Calibration Check

7. Turn **ON** the Sirius® Multigas Detector in clean, fresh air.
8. Verify that readings indicate no gas is present.
9. Attach regulator (supplied with calibration kit) to the cylinder.
10. Connect tubing (supplied with calibration kit) to the regulator.
11. Attach other end of tubing to the instrument.
12. Open the valve on the regulator, if so equipped.[7]

Performing Recalibration (if necessary)

1. Turn **ON** the instrument and verify that battery has sufficient life.
2. Wait until the Measure Gases page appears.
3. Push and hold the **RESET/▼**button until **CAL ZERO?** flashes on the display.
4. Push the **ON-OFF/ACCEPT** button to zero the instrument.[8]
5. Connect the appropriate calibration gas (MSA recommends 100ppm isobutylene) to the instrument by connecting one end of the tubing to the pump inlet on the instrument and the other end of tubing to the cylinder regulator (supplied in the calibration kit).*
6. Open the valve on the regulator, if so equipped.
7. Push the **ON-OFF/ACCEPT** button to calibrate (span) the instrument.[9]
8. Remove the tubing from the instrument.

Measuring Gas Concentrations[10]

3. Expose instrument to environment
4. Calculate response factor

Resetting Short Term Exposure Limits (STELs) [11]

3. Access the STEL page.
4. Press the RESET/ ▼ button

Resetting the Time Weighted Average (TWA)[12]

3. Access the TWA page.
4. Press the RESET/▼ button.

Communicate the results of the set-up/calibration to applicable person

1. The minimum parameters to be monitored are oxygen deficiency, UEL, LEL and hydrogen sulfide concentration.

LOCAL REQUIREMENTS: N/A

NOTES:

13. The instrument displays the following information:

h. A self-test:
   a. Audible alarm sounds
   b. Alarm LEDs illuminate
   c. Display backlight illuminates
   d. Pump activates
   e. Software version displays
   f. Internal diagnostics.

i. Alarm setpoints:
   a. Low
   b. High
   c. STEL (if activated)
   d. TWA (if activated)

j. Calibration gas (expected calibration gas values)

k. Time and date (if data logging option installed)

l. Last CAL date (if data logging option installed) —The Sirius® Multigas Detector is equipped with a "last successful calibration date" feature. The date shown is the last date that all installed sensors were successfully calibrated. **LAST CAL** is displayed with this date in the following format: **MM/DD/YY**

m. Instrument warm-up period

n. Fresh Air Setup (FAS) option.

14. Persons responsible for the use of the Sirius® Multigas Detector must determine whether or not the Fresh Air Setup option should be used. The user's abilities, training and normal work practices must be considered when making this decision.
Warning: Do not activate the Fresh Air Setup unless you are certain you are in fresh, uncontaminated air; otherwise, inaccurate readings can occur which can falsely indicate that a hazardous atmosphere is safe. If you have any doubts as to the quality of the surrounding air, do not use the Fresh Air Setup feature. Do not use the Fresh Air Setup as a substitute for daily calibration checks. The calibration check is required to verify span accuracy. Failure to follow this warning can result in serious personal injury or death.

To perform a Fresh Air Setup, push the ON/OFF button while **ZERO?** is flashing. The Fresh Air Setup (FAS) has limits. If a hazardous level of gas is present, the Sirius® Multigas Detector ignores the FAS command and goes into alarm.

Once the instrument self check is complete, **ZERO?** flashes for 10 seconds.

If no buttons are pushed, the **ZERO?** automatically stops flashing after the 10 seconds have expired and the FAS is not performed.

To immediately skip the FAS, push the **RESET/▼** button.

15. The pump motor will start fast and then slows down as the instrument adjusts the power to run the pump.

16. If the pump motor shuts down and an alarm sounds, **PUMP ALARM** will flash on the display and the readings on the display may change. When the pump inlet, sample line or probe is blocked, the pump alarm must activate. If the alarm does not activate, check the sample line and probe for leaks. Once leak is fixed, re-check pump alarm by blocking flow.

17. **Warning:** Perform a blocked flow test before each day's use. Do not use the pump, sample line, or probe unless the pump alarm activates when the flow is blocked. Lack of an alarm is an indication that a sample may not be drawn to the sensors, which could cause inaccurate readings. Failure to follow the above can result in serious personal injury or death.

During operation, a pump alarm may occur when the flow system is blocked, pump is inoperative, and sample lines are attached or removed.

When the instrument is in a gas alarm, the pump alarm may not display until gas alarm is cleared.

18. The presence of other calibration gases may cause the PID to under range, indicated by dashes for the displayed **VOC** reading.

19. The reading on the Sirius® Multigas Detector display should be within the limits stated on the calibration cylinder or limits which are predetermined by the user. If necessary, change cylinder to introduce other calibration gases. If readings are not within these limits, the Sirius Multigas Detector requires recalibration.

20. Instrument must be in fresh air to perform the zero. **CAL ZERO** flashes. To skip the Zero procedure and move directly to the calibration span procedure, push the **RESET/ ▼** button. If no button is pushed for 30 seconds, the instrument returns to the Measure mode. Once the zeros are set, **CAL SPAN?** flashes

21. **CAL SPAN** flashes for approximately 90 seconds. If autocalibration sequence passes, the instrument beeps three times and returns to the Measure mode. To skip calibration and return to the Measure mode, push the **RESET/▼** button. If no button is pushed for 30 seconds, it will return to the Measure page.

22. **Warning:** Never let the end of the sampling line touch or go under any liquid surface. If liquid is sucked into the instrument, readings will be inaccurate and the instrument could be damaged. We recommend the use of an MSA Sample Probe (P/N 10042621, 10042622, 10040589, or equivalent) containing a special membrane filter, permeable to gas but impermeable to water, to prevent such an occurrence.

The Sirius® Multigas Detector can be equipped to detect combustible gases in the atmosphere.

f. Alarms sound when concentrations reach:

iii. Alarm Setpoint or
iv. 100% LEL (Lower Explosive Limit), 5% CH4.

g. When the combustible gas indication reaches the Alarm Setpoint:

iv. Alarm sounds
v. Alarm lights flash
vi. % LEL or CH4 flag above the concentration flashes.

h. To silence the alarm, press the RESET/ ▼ button. The alarm will stay silent if the alarm condition has cleared.

i. When the combustible gas indication reaches 100% LEL or 5% CH4, the LockAlarm™ circuit locks the combustible gas reading and alarm and:

iv. Alarm sounds
v. Alarm lights flash
vi. 100 (or 5.00 in CH4 mode) appears on the display and flashes.

j. This alarm cannot be reset with the RESET/ ▼ button. After moving to a safe, fresh-air environment, reset the alarm by turning OFF the instrument and turning it ON again.

To determine a response factor for a target chemical, perform the following procedure:

1. Calibrate the Sirius Detector using isobutylene as the span gas.

2. On the monitor, set the sample gas name to isobutylene.

3. Apply a known concentration of the target chemical to the monitor and note the concentration reported in the display.

4. The response factor for the target chemical relative to isobutylene:

$$\text{RF target gas} = \frac{\text{Actual known concentration}}{\text{Concentration reported by instrument}}$$

For example:

A monitor is calibrated on isobutylene, and has isobutylene defined as the sample gas. When sampling 106 ppm of benzene in air, the instrument reports a concentration of 200 ppm. In this example, the response factor for benzene relative to isobutylene would be:

$$RF\ benz = \frac{106 \text{ ppm known conc. benzene}}{200 \text{ ppm reported}} = 0.53$$

When surveying, if benzene is selected as the sample gas in the Response Factor page, and 0.53 is entered into the monitor as the response factor, the instrument would use this response factor to automatically correct the displayed concentration into PPM benzene.

If a chemical has a response factor between zero and one, the monitor has a higher detector response for this chemical than isobutylene. If the response factor is greater than one, the monitor has a lower detector response for this chemical than isobutylene.

23. The STEL alarm is calculated over a 15-minute exposure. Calculation examples are as follows:

• Assume the detector has been running for at least 15 minutes:

• 15-minute exposure of 35 PPM:

$$\frac{(15 \text{ minutes} \times 35 \text{ PPM})}{15 \text{ minutes}} = 35 \text{ PPM}$$

• 10-minute exposure of 35 PPM

• 5-minute exposure of 15 PPM:

$$\frac{(10 \text{ minutes} \times 35 \text{ PPM}) + (5 \text{ minutes} \times 15 \text{ PPM})}{15 \text{ minutes}} = 28 \text{ PPM}$$

24. The TWA alarm is calculated over an eight-hour exposure. Calculation examples are as follows:

• 1-hour exposure of 50 PPM:

$$\frac{(1 \text{ hour} \times 50 \text{ PPM}) + (7 \text{ hours} \times 0 \text{ PPM})}{8 \text{ hours}} = 6.25 \text{ PPM}$$

• 4-hour exposure of 50 PPM
4-hour exposure of 100 PPM:

$$\frac{(4 \text{ hours} \times 50 \text{ PPM}) + (4 \text{ hours} \times 100 \text{ PPM})}{8 \text{ hours}} = 75 \text{ PPM}$$

• 12-hour exposure of 100 PPM:

$$\frac{(12 \text{ hours} \times 100 \text{ PPM})}{8 \text{ hours}} = 150 \text{ PPM}$$

NOTE: The accumulated reading is always divided by eight hours.

MSA Sirius® MultiGas Detector

PERFORMANCE CHECKLIST

STS Line Item 4.8.6: Provide atmosphere monitoring equipment training (Combustible Gas Meter)

Proficiency Code:	2b
PC Definition:	Can do most parts of the task. Needs help only on hardest parts. Can determine step-by-step procedures for doing the task.

DID THE TRAINEE…		YES	NO
TURNING ON THE SIRIUS® MULTIGAS DETECTOR			
1. Press the **Power ON** button?			
2. Perform Fresh Air Set Up Option for automatic zero adjustment of the Sirius® MultiGas Detector sensors?			
VERIFYING PUMP OPERATION			
1. Turn ON the Sirius® MultiGas Detector?			
2. Once gas readings were displayed, plug the free end of the sampling line or probe?			
3. Check the pump before use?			
4. Press the RESET/▼ button to reset the alarm and restart the pump?			
CLEARING AN ALARM			
1. Correct any flow blockage?			
2. Press the RESET/▼ button to restart the pump?			
CONDUCTING A PRE-OPERATIONAL CHECK			
1. Turn ON the Sirius® Multigas Detector in clean, fresh air?			
2. Verify that readings indicate no gas is present?			
3. Attach regulator (supplied with calibration kit) to the cylinder?			
4. Connect tubing (supplied with calibration kit) to the regulator?			
5. Attach other end of tubing to the instrument?			

6. Open the valve on the regulator, if so equipped?			
7. Determine that the reading on the Sirius® Multigas Detector display is within the limits stated on the calibration cylinder or limits pre-determined by your flight?			
8. If necessary, change cylinder to introduce other calibration gases?			
9. If readings are not within these limits, the Sirius® Multigas Detector requires recalibration?			
CONDUCTING A CALIBRATION CHECK			
1. Turn ON the Sirius Multigas Detector in clean, fresh air?			
2. Verify that readings indicate no gas is present?			
3. Attach regulator (supplied with calibration kit) to the cylinder?			
4. Connect tubing (supplied with calibration kit) to the regulator?			
5. Attach other end of tubing to the instrument?			
6. Open the valve on the regulator, if so equipped?			
PERFORMING RECALIBRATION (IF NECESSARY)			
1. Turn **ON** the instrument and verify that battery has sufficient life?			
2. Wait until the Measure Gases page appears?			
3. Push and hold the **RESET**/ ▼button until **CAL ZERO?** flashes on the display?			
4. Push the **ON-OFF**/**ACCEPT** button to zero the instrument?			
5. Connect the appropriate calibration gas to the instrument by connecting one end of the tubing to the pump inlet on the instrument and the other end of tubing to the cylinder regulator (supplied in the calibration kit)?			
6. Open the valve on the regulator, if so equipped?			
7. Push the **ON-OFF**/**ACCEPT** button to calibrate (span) the instrument?			
8. Remove the tubing from the instrument?			
MEASURING GAS CONCENTRATIONS			
1. Expose instrument to environment?			
2. Calculate a response factor?			
RESETTING SHORT TERM EXPOSURE LIMITS (STELS)			

1. Access the STEL page			
2. Press the RESET/ ▼ button			
RESETTING THE TIME WEIGHTED AVERAGE (TWA)			
1. Access the TWA page			
2. Press the RESET/ ▼ button			
COMMUNICATE RESULTS TO APPICABLE PERSON			
1. The minimum parameters to be monitored are oxygen deficiency, UEL, LEL and hydrogen sulfide concentration.			
Did the trainee successfully complete the task?			

TRAINEE NAME (PRINT) TRAINER NAME (PRINT)

STS Line Item 4.8.8: Review confined space master entry plans and non-routine entry permits

TRAINER GUIDANCE

Proficiency Code:	2b
PC Definition:	Can do most parts of the task. Needs help only on hardest parts. Can determine step-by-step procedures for doing the task.
Prerequisites:	None
Training References:	• OSHA 1910.146 • AFI 91-203, *Air Force Consolidated Occupational Safety Instruction,* Chapter 23
Additional Supporting References:	None
CDC Reference:	4B051
Training Support Material:	• AF Form 1024, *Confined Space Permit* (completed) • MEP (completed)
Specific Techniques:	Conduct hands-on training and evaluation.
Criterion Objective:	Given a confined space (CS) permit and/or MEP, review the permit/MEP successfully completing all checklist items with limited trainer assistance on only the hardest parts.
Notes:	

TASK STEPS

MEP (Master Entry Plan) Review

Does the MEP:

1. Describe the acceptable entry conditions, including atmospheric conditions, under which permits may be issued.
2. Identify types and locations of spaces to be entered and types of tasks or operations to be performed.
3. List either by reference or direct statement in the MEP the procedures to be used for entry, e.g., shop OI that cover specific tasks.
4. List PPE, monitoring and rescue equipment, and conditions under which it shall be used.
5. Designate frequency and type of atmospheric monitoring.
6. List other controls required, e.g., lockout and/or tagout, ventilation.
7. List chemicals and quantities authorized for use. List expected exposure levels based on air sampling results.
8. List conditions under which the space may be reclassified.
9. Require verification of the condition of all monitoring equipment and PPE.[1]

Permits (AF Form 1024) for Non-routine Entry Review

Does the AF Form 1024 include:

1. Location and description of CS to be entered[2]
2. Atmospheric and contact hazards within the permit space
3. Personal protective equipment [3]
4. Atmospheric testing/monitoring equipment details[4]
5. Names of authorized entrants[5]
6. Name of attendants[5]
7. Entry preparations (i.e., measures used to control/eliminate all hazards, briefings, etc)[6]
8. Results of initial and periodic tests along with names and initials of testers[7]
9. Acceptable entry conditions
10. Name of entry supervisor
11. Ensure personnel know that the entry permit should be posted at the confined space and remain so until the work is completed[8]

LOCAL REQUIREMENTS:

NOTES:

1. Review training documents to ensure workers are trained on the equipment.
2. The work that is to be done in the confined space.
3. The protective equipment and emergency equipment to be used by any person who takes part in a rescue or responds to other emergency situations in the confined space.
4. The details of any atmospheric testing done of the confined space - when, where, results, date monitoring equipment were last calibrated. Ideally, calibration would be done just before each use. If this is not possible, follow the equipment manufacturer's guidelines for frequency of calibration.
5. Documentation to show all individuals have been trained on their roles.
6. The use of mechanical ventilation and other protective equipment needed and any other precautions that will be followed by every worker who is going to enter the confined space.
7. A signature of a worker who did the confined space testing. The signature on the permit would indicate that adequate precautions are being taken to control the anticipated hazards.
8. The entry permit should be posted at the confined space and remain so until the work is completed. The employer should keep a copy of the completed permit on file.

TRAINEE REVIEW QUESTIONS

STS Line Item 4.8.8: Review confined space master entry plans and non-routine entry permits

1. What should you do if the conditions in the space are more hazardous than contemplated under the permit?
2. How long should an entry permit be retained by the organization?

PERFORMANCE CHECKLIST

STS Line Item 4.8.8: Review confined space master entry plans and non-routine entry permits

Proficiency Code:	2b
PC Definition:	Can do most parts of the task. Needs help only on hardest parts. Can determine step-by-step procedures for doing the task.

DID THE TRAINEE…	YES	NO
MEP (MASTER ENTRY PLAN) REVIEW		
Did the MEP:		
1. Describe the acceptable entry conditions, including atmospheric conditions, under which permits may be issued?		
2. Identify types and locations of spaces to be entered and types of tasks or operations to be performed?		
3. List either by reference or direct statement in the MEP the procedures to be used for entry, e.g., shop OI that cover specific tasks?		
4. List PPE, monitoring and rescue equipment, and conditions under which it shall be used?		
5. Designate frequency and type of atmospheric monitoring?		
6. List other controls required, e.g., lockout and/or tagout, ventilation?		
7. List chemicals and quantities authorized for use. List expected exposure levels based on air sampling results?		
8. List conditions under which the space may be reclassified?		
9. Require verification of the condition of all monitoring equipment and PPE?		
PERMITS (AF FORM 1024) FOR NON-ROUTINE ENTRY REVIEW		
Did the AF Form 1024 include:		
1. Location and description of CS to be entered?		
2. Atmospheric and contact hazards within the permit space?		
3. Personal protective equipment?		
4. Atmospheric testing/monitoring equipment details?		

5. Names of authorized entrants?		
6. Name of attendants?		
7. Entry preparations (i.e., measures used to control/eliminate all hazards, briefings, etc)?		
8. Results of initial and periodic tests along with names and initials of testers?		
9. Acceptable entry conditions?		
10. Name of entry supervisor?		
11. Ensure personnel know that the entry permit should be posted at the confined space and remain so until the work is completed?		
Did the trainee successfully complete the task?		

TRAINEE NAME (PRINT)

TRAINER NAME (PRINT)

ANSWERS

1. What should you do if the conditions in the space are more hazardous than contemplated under the permit?

   A: The permit will be revoked if testing shows conditions in the space are more hazardous than contemplated under the permit. The entry supervisor will stop operations and ensure a new permit is issued

   (Source: AFI 91-203, *Air Force Consolidated Occupational Safety Instructio*n, para 23.2.5.4)

2. How long should an entry permit be retained by the organization?

   A: Each completed entry permit, including those canceled or revoked, shall be retained for one year by the organization responsible for the entry and be available for review.

   (Source: AFI 91-203, *Air Force Consolidated Occupational Safety Instructio*n,, para 23.5.1.2)