Understanding Water Safety for Construction

Lessons Learned

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Learning Objectives

1. **Review** published guidance on Water Management for Construction (WMC)

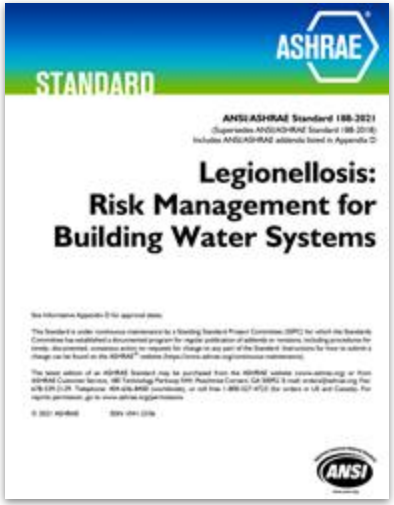
2. **Identify** construction risk factors and their impact on water safety

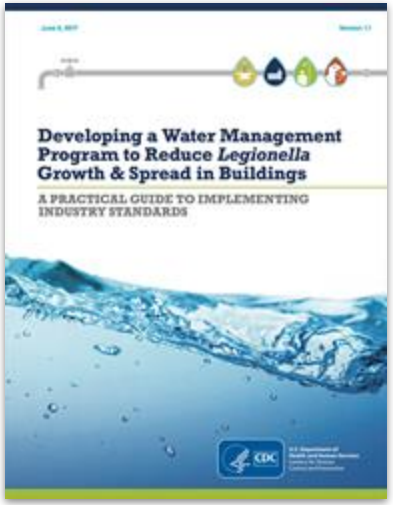
3. **Demonstrate** the use of the WMC Infection Risk Control Assessment (ICRA) tool

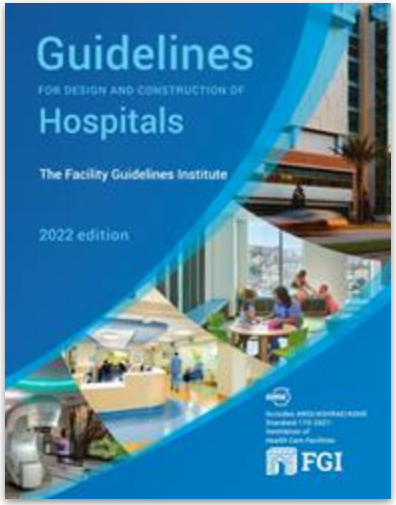
4. **Evaluate** lessons learned from WMC-ICRA implementation to mitigate construction-related water hazards.

What are the standards and risk factors for water management during construction?

Key WMC Documents







Water Management Training: CDC Prevent LD (Legionnaires' Disease)
https://www.cdc.gov/nceh/ehs/elearn/prevent-LD-training.html

phigenics Independent Water Management

ASHRAE Standard 188 Compliance w/Construction Activities

Section 4.2 Building Owner Requirements:

- ✓ **Survey Requirement:** Building owners must survey all buildings and water systems as described in Section 5.
- ✓ **Timing of Compliance:** Complete the survey and comply with Section 4 before occupancy and construction.

ASHRAE Standard 188 Compliance w/Construction Activities

Section 8.4 Commissioning

- **Commissioning Instructions and Disinfection:** Provide commissioning instructions to the building owner and follow AWWA Standards C651 & C652 for disinfection and flushing, to be completed within 3 weeks before occupancy.

- **Occupancy Delays:** If occupancy is delayed by 2-4 weeks, re-flush all fixtures. If delayed by 4 weeks or more, the WMT will determine the need for additional disinfection and flushing.

The Joint Commission — EC.02.05.02

Element of Performance 4:

The individual or team responsible for WMP reviews the program annually and when the following occurs:

- Changes have been made to the water system that would add additional risk.
- New equipment or at-risk system(s) [generate aerosols] or be potential source of *Legionella*.
- This includes the **commissioning of a new wing or building**.

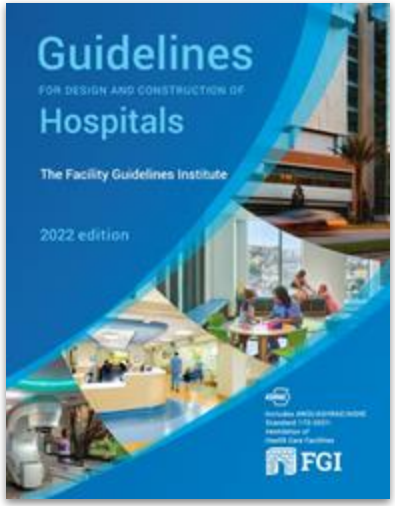
2018/2022 Facility Guideline Institute (FGI Guidelines)

Guidelines for Design & Construction of Hospitals

https://www.fgiguidelines.org/guidelines/state-adoption-fgi-guidelines/

1.2-4.2 Infection Control Risk Assessment (ICRA)

Documented process to identify potential risks of airborne and waterborne biological contaminants during construction, renovation, and commissioning.



1.2-4.2.3.1 Infection control risk mitigation recommendations (ICRMRs).

Written plans detailing methods to prevent transmission of airborne and waterborne contaminants during construction and commissioning of HVAC and plumbing systems.

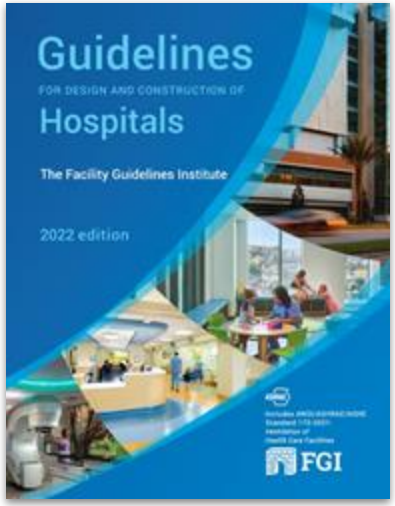
2018/2022 Facility Guideline Institute (FGI Guidelines)

Guidelines for Design & Construction of Hospitals

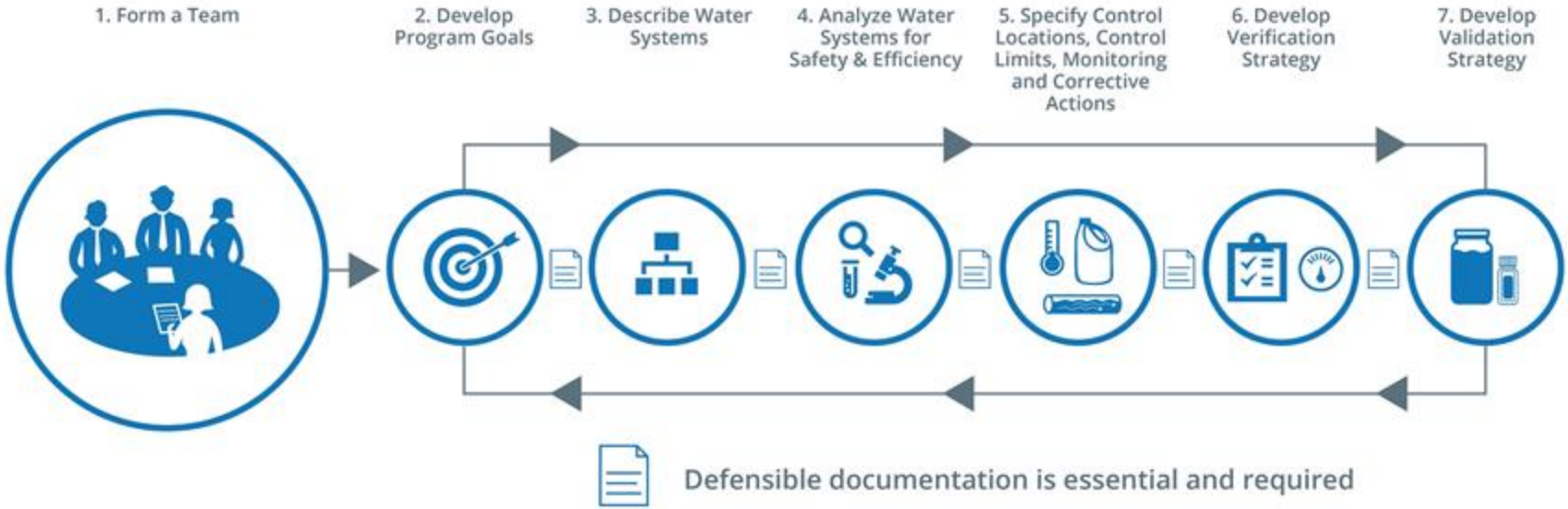
https://www.fgiguidelines.org/guidelines/state-adoption-fgi-guidelines/

A1.2-4.2.2.1 (3)(b)

Water Management Programs: Refer to ANSI/ASHRAE Standard 188 for implementing water management programs affecting design, construction, and commissioning during renovations or prior to occupancy.



7 STEPS OF THE COMPREHENSIVE AND DEFENSIBLE WATER MANAGEMENT PROGRAM



Adapted from Figure 1 of ASHRAE 188:2018

Known Risk Factors

COMMISSIONING

EXCAVATION

REPRESSURIZATION

DEMOLITION

CONSTRUCTION EQUIPMENT

WATER MAIN BREAKS

VIBRATION

EFFICIENCY DESIGN

UNDERGROUND UTILITY CONNECTIONS

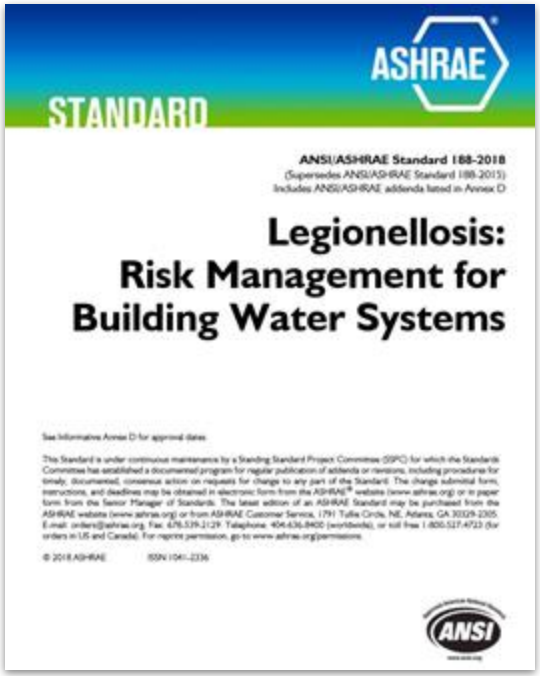
Known Risk Factors: Commissioning

Improper disinfection, flushing, monitoring, and balancing of the building water distribution system leading to poor water quality at building start-up.

Often the water distribution system is checked to be functioning, however the quality of the water is not **verified** or **validated** through proper water management at building start-up.

Most notable risk factor for disease cases & deaths.

Verification and Validation



As defined in ASHRAE Standard 188

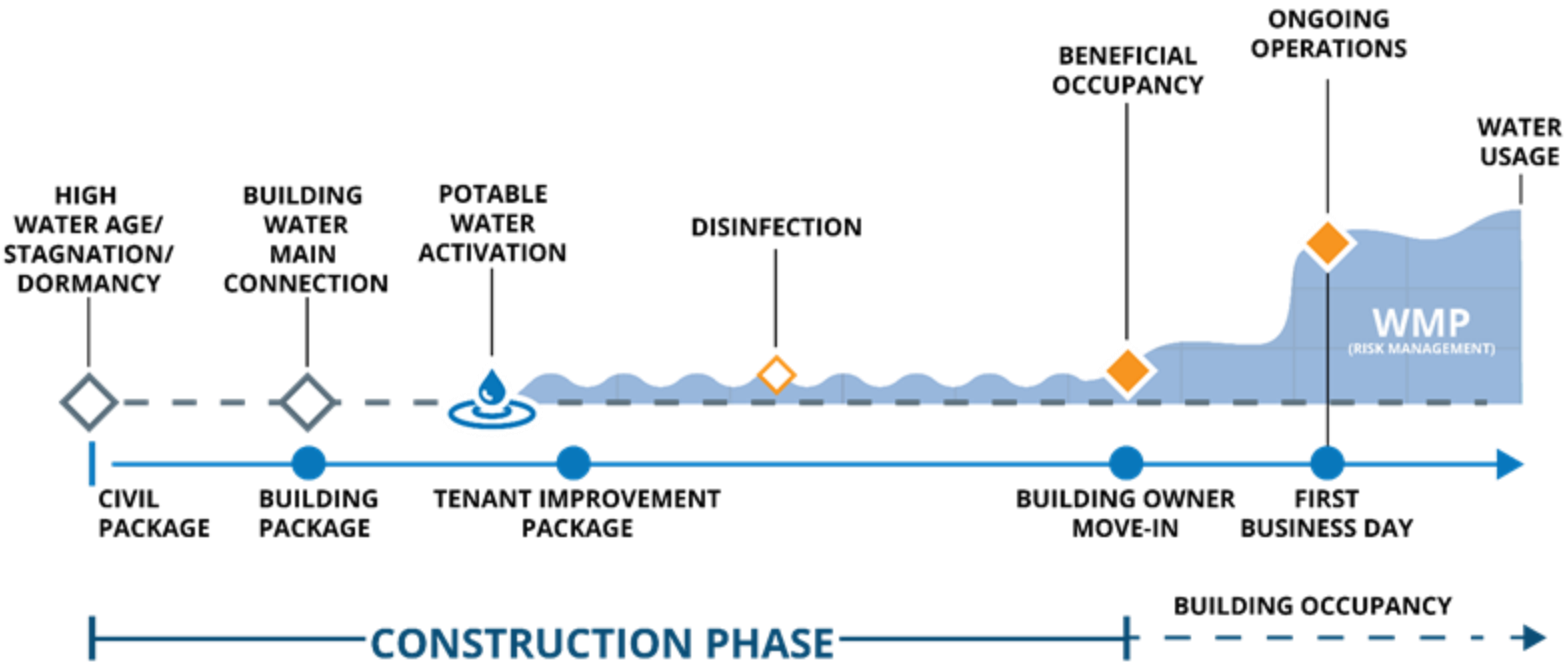
Verification: initial and ongoing confirmation that the program is being implemented as designed.

Validation: initial and ongoing confirmation that the program, when implemented as designed, effectively controls the hazardous conditions throughout the building water systems.

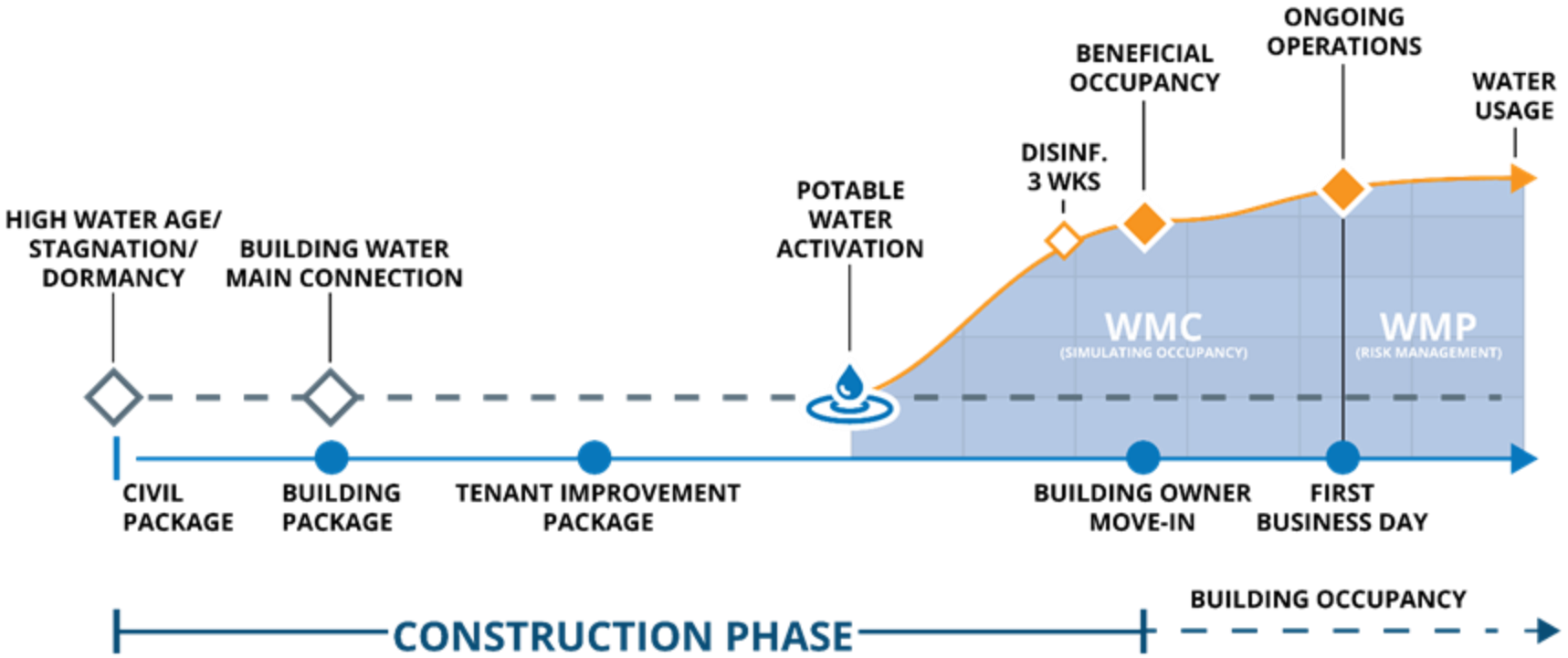
Both require documentation— if you didn't document it then you didn't do it.

What is the WMC-ICRA Tool and how can water management teams use it?

Historical Building Water Distribution System Project Schedule



Best Practice Water Management Project Schedule



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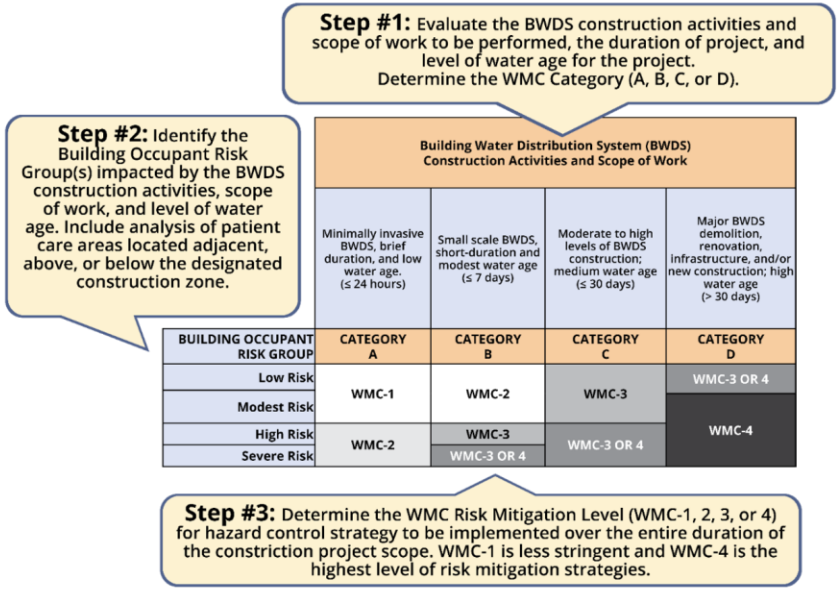
Reducing the Risk of Healthcare Associated Infections from *Legionella* and Other Waterborne Pathogens Using a Water Management for Construction (WMC) Infection Control Risk Assessment (ICRA) Tool

Scanlon MM, Gordon JL, Tonozzi AA, Griffin SC — Infectious Disease Reports, May 2022



Step 1:
Identify Project Categories for Construction Activities

A

BWDS Inspection, maintenance, and non-invasive activities of brief duration.

Low water age: ≤ 24 hrs

B

Small scale BWDS, short duration activities with minimal water disruption

Modest water age: ≤ 7 Days

C

High BWDS disruption or removes any fixed BWDS components or assemblies

Medium water age: ≤ 30 Days

D

Major BWDS demolition, renovation, infrastructure, and/or new construction projects

High water age: > 30 Days

Step 2:
Identify Building Occupant Risk Groups




Low

- Office Areas
- Conference Rooms
- Administration

Modest

- Cafeterias
- Lobbies
- Family Waiting Areas

High

- Emergency Department
- Acute Surgical Unit
- Low-Risk Maternity

Severe

- Dialysis
- ICU's
- Bone Marrow Transplant Units

Step 3: Select a Risk Mitigation Level

WMC-1

Baseline measurements: temperature, pH, residual oxidant (FRO), etc.

Focus on pre- and post-work Flushing with measurements of temperature & FRO on hot & cold water

Log & report data.

WMC-2

All components of WMC-1

Establish enclosure to prevent aerosolized water from leaving work area and keep up until work is complete.

EVS to perform cleaning prior to use/occupancy.

WMC-3

All components of WMC-1 & 2

Additional protocols for verification through regular (daily/weekly) flushing, FRO logs, evaluating of any disinfection procedures to be performed, and inspection of work completed. Validation through environmental testing.

WMC-4

All components of WMC-1-3

Conduct pre-work risk assessment and prepare a project-specific WMC plan following risk, establish risk management aligned with ANSI/ASHRAE Std. 188. Set up milestones leading up to first day of patient occupancy. Implement with WMC Team

WMC During Construction Activities — Review

Facilities should develop a project specific water management plan for construction plan using the 7-steps of water management per ASHRAE Standard 188.

Categories for Steps 1-3 should be pre-determined by the water management team, which should include infection prevention and risk management.

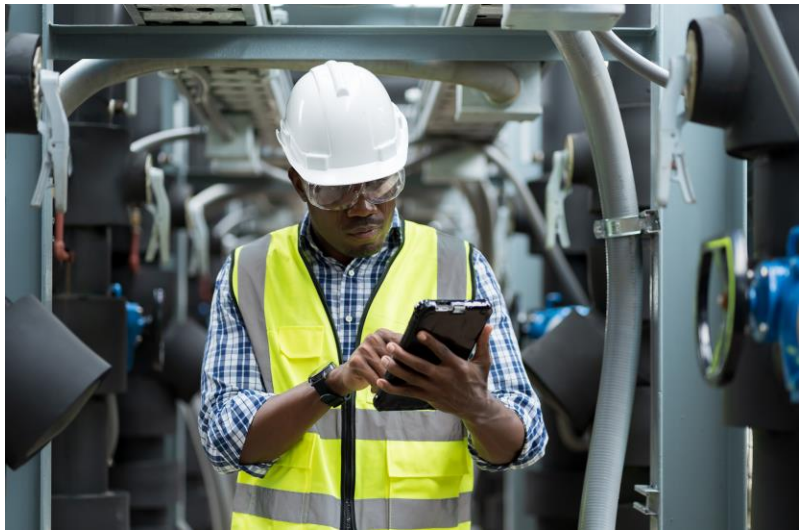
Lessons Learned from the Field

Lesson Learned #1:
Validation Responses and Hazard Control

- **Review results of water testing**—THAB (Total Heterotrophic Aerobic Bacteria), a general water quality indicator
- **The testing will inform hazard control**, e.g. flushing, that might need to / should be applied
- **For new facilities, there must be a definitive plan as to <u>who</u> will do the flushing**

Lesson Learned #2:
Proactive Water Management Costs Less

- **Stakeholders should be brought in early**, from design to occupancy
- **Water Management for Construction should be part of the project plan from the beginning**— the contractor should be made aware of and trained on hazard control protocols
- **Host regularly scheduled meetings** in the months prior to opening



Lesson Learned #3:
Document Everything

Establish documentation and communication procedures for all activities of the program.

Documented defensible records of independent, third-party verification and validation are essential.

In the absence of clear, defensible records documenting that something was done, it is as if that something was not done.

Q & A