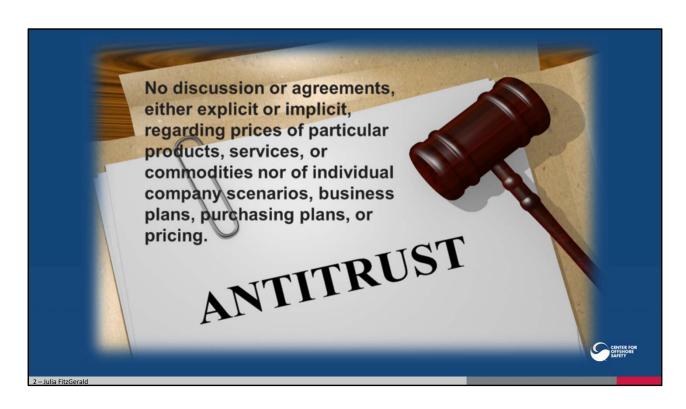


Good Morning everyone. I'm Julia FitzGerald with the Center for Offshore Safety, and I'd like to welcome you all to this COS Webinar introducing COS-THREE-OH-EIGHT *Guidance for Verifying Existing Barriers*.

During today's webinar, which is being recorded and will be posted on the COS website, we request that you keep your audio on mute, silence your ringer, keep your cameras turned off, and do not interrupt during the presentation. We've set aside time at the end for questions. Throughout the presentation, please send your questions through the chat box. Any questions we do not sufficiently address during the webinar, we will look to supplement in post-webinar materials.

Contact information will be shared at the end of this presentation.

If you are using a phone for your audio, please do not place us on hold, as you might subject the rest of us to what is undoubtedly delightful background music.



The Center for Offshore Safety is part of the American Petroleum Institute and as such, we are governed by API's policies and procedures, one of which is the Antitrust Guidelines. To remain in compliance with these guidelines, today we will not discuss pricing or vendors in any way that could negatively impact their business. We don't anticipate this happening, but if you feel like we have veered into those territories, please bring it to our attention via the chat box and we will get back on track.

Special Thanks to the Webinar Contributors

Today's presenters:

- Russ Holmes, COS
- Tricia Grant, Hess
- · Tim Pieplow, ExxonMobil
- Laurie Knape, Avetta

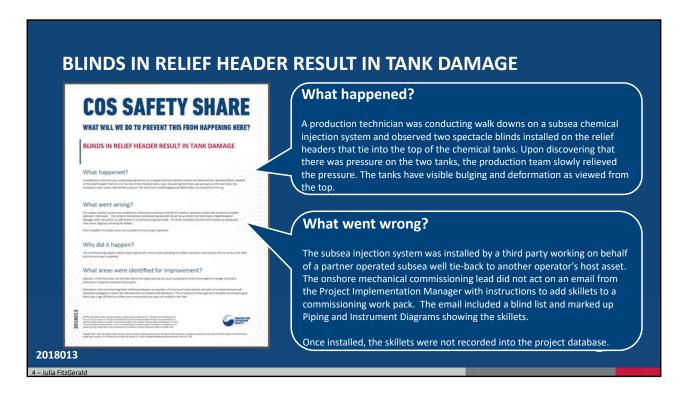


3 – Julia FitzGerald

Thank you to the members of the COS Verifying Existing Barriers Work Group, part of our Process Safety Subcommittee, for their hard work in preparing this new guidance document and today's webinar. Today's speakers have knowledge and many years of experience working in and supporting the offshore industry. In order of presentation, our speakers today are:

- Russell Holmes, Senior Director of the Center for Offshore Safety
- Tricia Grant, Process Safety Senior Advisor for Hess Corporation, and Chair of the COS Process Safety Subcommittee,
- Tim Pieplow, Operations Integrity Supervisor for Wells at ExxonMobil, and Chair of the guidance document work group, and
- Laurie Knape, HSE Professional for Regulatory and Industrial Relations for Avetta

Before handing things over to Russ Holmes, as I'm sure all of you know, we normally start all our COS meetings with some sort of safety moment. And since we have developed a range of COS Safety Shares that are available for free download from the COS website, covering topics related to Dropped Objects, Mechanical Lifting, and Process Safety, we thought it appropriate to discuss one today.



The library of Safety Shares includes several with a Process Safety focus, including this one from 2018 titled "Blinds in Relief Header Result in Tank Damage". We thought this particular share might be a good one for today's webinar because it includes an offshore worker discovering damage while in the process of walking-the-line to verify barriers. And what he discovers is that someone else had signed-off on equipment being removed without verifying the work had been done.

So, what happened?

A production technician was conducting walk downs on a subsea chemical injection system when he observed two SPECTACLE blinds installed on the relief headers tying into the top of the chemical tanks. Upon further investigation, it was discovered there was pressure on the two tanks with the tanks visibly bulging and deformed when viewed from the top. The production team proceeded to slowly relieved the pressure.

What went wrong?

The subsea injection system in question was installed by a third-party working on behalf of a partner-operated subsea well tie-back to another operator's host asset.

It was learned that the onshore mechanical commissioning lead had received, but did not act on, an email from the Project Implementation Manager with instructions to add skillets to a commissioning work pack. The email included a blind list and marked up P&ID showing the skillets.

However, once installed, the skillets were not recorded into the project database.



Why did this happen?

The commissioning subject matter expert signed off on a check sheet indicating the skillets had been removed but did not verify (there's that word again) in the field that the work was completed.

What areas were identified for improvement as a result of this incident?

Moving forward, the operator of the host asset will formally define the organizational structure including the level of oversight to manage third party contractors of partner operator-led projects.

Fabrication and commissioning team interfaces between the operator of a host asset and a partner-operator of a subsea tie-back well, should be managed to ensure the safe execution of projects and operations. This is inclusive of thorough and complete commissioning as there was a sign off that the skillets were removed, but this had not been verified in the field.

This is just one of the many Safety Shares available for free download from the COS website. We encourage you to download them and share them with your teams.

With that, to kick us off, please welcome Russ Holmes, the Senior Director of COS. Russ?



Thank you, Julia. Good morning, everyone, and may I take a moment this Veterans Day to recognize all those with us who have served our nation. Thank you. And welcome everyone joining us to hear about the new COS guidance document, COS-THREE-OH-EIGHT Guidance on Verifying Existing Barriers. Before we dive into the details, I'd like to provide a little bit of background about the Center for Offshore Safety.

COS was established 10 years ago and to this day demonstrates the industry's commitment to advancing a culture of safety in offshore operations. Our collective efforts can be broken down into four main pillars, listed on this slide, to promote systems that drive offshore safety progress; analyze offshore safety data to identify opportunities for improvement; and facilitate development and sharing of good practices that advance safety and environmental protection.

Related to these pillars, COS also serves as the Accreditation Body, recognized by the Bureau of Safety and Environmental Enforcement, to accredit third party SEMS audit service providers.

The work for today's document was developed under the Good Practices pillar, consisting of a group of industry experts that collaborated to address an area where more guidance was clearly needed – as evidenced by the Safety Share Julia just reviewed.



Last week COS hosted a webinar to promote the set of Process Safety Fundamentals developed by the International Association of Oil and Gas Producers, or IOGP. For those joining us today who did not attend last week's webinar, a recording will be posted to the COS website in the near future. If you'd like to be notified when it's posted and available for viewing, please contact Julia FitzGerald.

The webinar last week went in depth into each of the ten Process Safety Fundamentals.



One of the fundamentals presented was SUSTAIN BARRIERS. You can see here the IOGP language that accompanies this fundamental:

- We discuss the purpose of hardware and human barriers at our location.
- We evaluate how our tasks could impact process safety barriers.
- We speak up when barriers don't feel adequate.
- We perform our roles in maintaining barrier health and alert supervision to our concerns.
- We use an approval process for operations with degraded barriers.

So, how is this fundamental applied?

- By knowing what the Process Safety barriers are at the location.
- By understanding how a task might affect these barriers.
- Ensuring that systematic barrier management processes are in place and that necessary resources are allocated to test and maintain barriers.
- And Implementing approved risk reduction measures for degraded or failed barriers and restoring barrier functionality as soon as practical.

The COS document being discussed today – COS-THREE-OH-EIGHT Guidance for Verifying Existing Barriers – is a deep dive into this specific fundamental.



To present the first portion of the new document, please welcome the Chair of the COS Process Safety Subcommittee, Tricia Grant from Hess. Tricia?



Thank you, Russ. And please let me second Russ's recommendation that, if you weren't able to attend last week's webinar on the Process Safety Fundamentals, you visit the COS website to watch the recording once it's been posted.

As many of you likely know, oftentimes the biggest challenge in developing a new guidance document can be reaching an agreement on the definition of key words. There are countless documents in our industry and others that define words such as "barrier," "risk control," "safeguards," etc.

For this document – and trust me, there was a lot of debate that went into reaching this consensus - "A Risk Control is the actions, equipment, or administrative measures to be established, implemented, or maintained to eliminate, reduce, or mitigate the risk. Safeguard is another term used by industry and is generally interchangeable with Risk Control. Barriers are a subset of Risk Controls with specific characteristics:

- They are Capable meaning they can fully prevent the unintended event or effectively mitigate the specified undesired consequence(s)
- They are Independent meaning they can function independent of the initiating event and the design or operation of any other Barriers
- And they are Verifiable evidence exists that the barrier is real, present, and will function as intended"

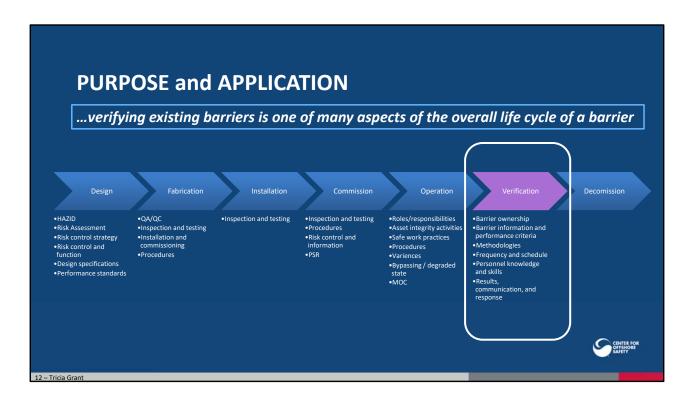
And, although this document focuses on verifying whether existing barriers that are intended for major incident prevention and mitigation have integrity and/or will be effective, the elements of this guidance can be applied to all barriers.

APPROACH Barrier Verification Aspects Barrier Information Barrier Ownership Leadership and SEMS Interface Management Barrier Inspections and Testing Procedures and Asset Design & Integrity Certain Mitigative Barriers Barrier Verification Emergency Preparedness & Response Barrier Verification Evaluation & Improvement and Knowledge & Skills Risk Assessment and Risk Controls

This document is aligned with the 4th Edition of API Recommended Practice 75, Safety and Environmental Management System for Offshore Operations and Assets, published in 2019, and is intended to support companies as they implement, maintain, and improve their SEMS.

Shown here is a partial list of the topics in the document and how they link to SEMS elements.

This document assumes that a company has defined and identified its barriers according to their SEMS and that there will be some variability between companies in the number and type of barriers. With those assumptions, the document is intended to help companies systematically and reliably verify the integrity and effectiveness of those existing barriers.

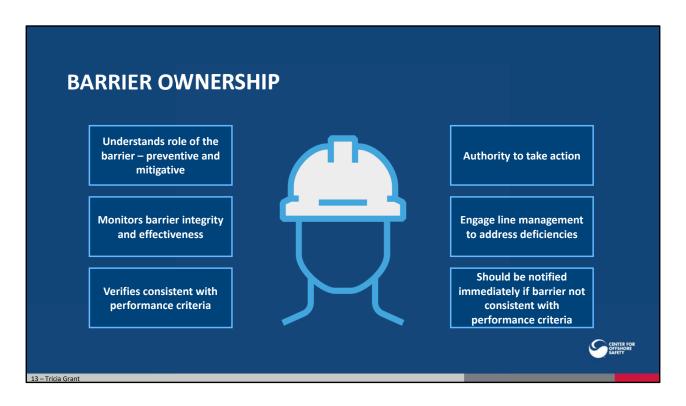


There are many stages to the life cycle of a piece of equipment, including barriers, as seen in the diagram here. Starting with design – and progressing through fabrication, installation, commission, and operation – there are multiple phases and tasks associated with each stage. And while all of these stages are important, this document focuses on the Verification portion.

The elements listed here under Verification are:

- Barrier ownership
- Barrier information and performance criteria
- Methodologies
- Frequency and schedule
- Personnel knowledge and skills, and
- Results, communication, and response

Let's take a closer look at Barrier Ownership.



Each barrier should have a designated owner.

The owner should have the ability to actively monitor the barrier and the authority to take action to address any deficiencies, for example, a site supervisor.

The owner is responsible for:

- understanding the role of the barrier in preventing or mitigating a major incident,
- regularly monitoring the integrity and effectiveness of the barrier, and
- engaging line management to address any deficiencies.

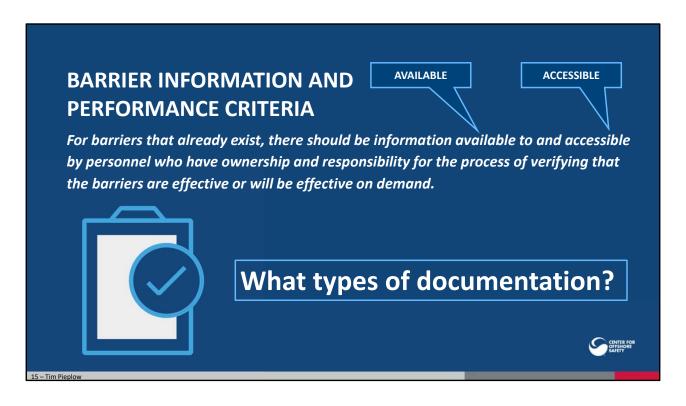
The barrier owner is not necessarily the OIM, although the OIM does have Ultimate Work Authority for the facility.

The barrier owner – and/or delegate(s) – should verify that barrier integrity and effectiveness is consistent with the performance criteria specific for that barrier. This might include testing, routine surveillance or inspections, etc. We'll touch more on performance criteria in a little bit.

When personnel discover that a barrier does not meet the performance criteria, the barrier owner should be notified immediately. This discovery could be made by an employee, a partner, or a contractor, so it's important that all entities understand the need and mechanism to notify the barrier owner.



And now I'll hand it over to Tim Pieplow from ExxonMobil and let him take us through the next several elements. Tim?



Thank you, Tricia. And thanks to all of you who have joined us today.

As Tricia mentioned, there should be information available for each barrier and that information should be accessible by all personnel who have ownership and responsibility for verifying that those barriers are effective, or will be effective, on demand.

This information, including performance criteria, can come in many forms, not all of which will apply to every barrier.

BARRIER INFORMATION AND PERFORMANCE CRITERIA

- Role or function of barrier and relationship to other barriers
- How the barrier prevents a threat or mitigates a consequence
- The systems the barrier depends on to function
- · How the barrier is operated and its operating limits
- How the barrier is maintained
- How to respond if the barrier is:
 - · Compromised, defective or degraded
 - Placed out-of-service
 - Changed
 - Bypassed
- History of barrier learnings from failures and management of barrier changes
- Interface agreements



16 – Tim Pieplow

Here we see examples of information for barriers – much of which is generated or obtained through elements of SEMS – that should be available and readily accessible to barrier owners and their delegates.

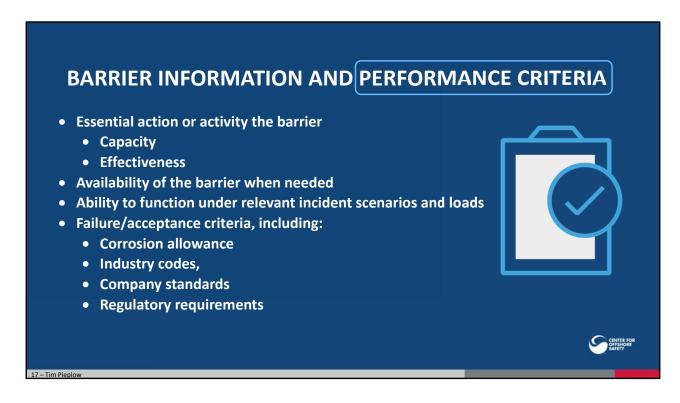
This information ranges from

- the role or function of a barrier and its relationship to other barriers
- how this particular barrier acts to prevent a threat or mitigate a consequence
- what other systems this barrier is dependent on
- the barrier's operating limits this, by the way is another of the IOGP Process Safety Fundamentals, "STAY WITHIN OPERATING LIMITS"

The information will also usually include

- how to maintain the barrier
- how to respond if the barrier is compromised, out-of-service, or bypassed
- the history of this barrier any previous failings or changes?
- and, finally, any interface agreements that might impact the ownership or responsibility for this barrier.

As you'll recall, this last one was one of the areas for improvement highlighted in the COS Safety Share that Julia presented earlier.



In addition to the examples listed on previous slide, one type of information of particular importance is the Performance Criteria for any given barrier.

Performance criteria should include:

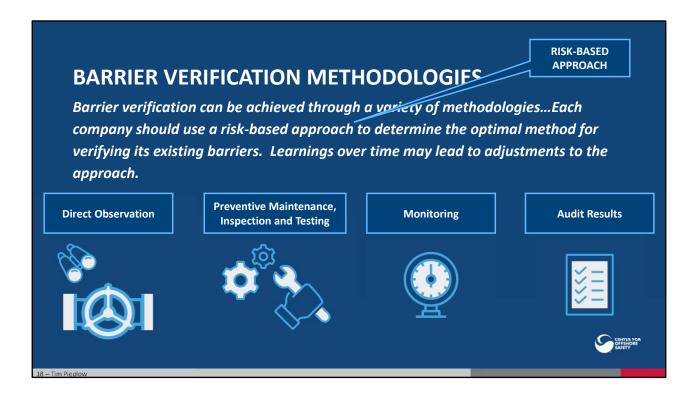
- The essential action or activity the barrier is expected to perform along with details of expected capacity and effectiveness, such as operator expertise or "bubble-tight" valve closure
- Availability of the barrier when needed, such as expected reliability or survivability
- The barrier's ability to function under relevant incident scenarios and loads, and
- The barrier's failure or acceptance criteria, such as corrosion allowance, industry codes, company standards, and/or regulatory requirements

For hardware barriers, the performance criteria might include items such as:

- integrity status, for example, acceptable piping wall thickness,
- maintenance, including last scheduled Preventive Maintenance performed per schedule, and
- availability

For a human barrier, the performance criteria can include items such as

- training, for example, training on procedures completed on time,
- collective competency assuring sufficient skills to maintain and operate the barrier is present on the facility,
- independent verification having a supervisor present during a critical task, and
- Emergency Response drill completion assuring drills have been executed on schedule and per plan.



Once the barrier information and performance criteria are established, barrier verification can be performed.

Barrier verification can be achieved through a variety of methodologies, some of which are shown here. Each company should use a risk-based approach to determine the optimal method for verifying its existing barriers.

The first one listed here is direct human observation. An example of this would be an individual on rounds making a weekly check that a specific relief valve is in the open position and car sealed open, not simply relying on a P&ID to verify the valve is available.

Another verification method is preventative maintenance, inspection, and testing. Examples of this include firewater pump maintenance, blast wall structural inspection, and BOP pressure and function tests.

When these activities are performed on time and per procedure, it provides verification that hardware barriers have integrity and are expected to perform as intended.

Other barriers can be verified by monitoring, such as a fluid column that can be monitored during well intervention activity.

SEMS audits and other inspection results may also serve as a gauge of management system elements related to maintaining barriers.

BARRIER VERIFICATION FREQUENCY AND SCHEDULE

The frequency of verification will be specific to each particular barrier. These frequencies should be established by subject matter experts and approved by management, and consider SEM recommendations and industry standards, as applicable. Frequency chedules shy ld also comply with applicable regulatory requirements,

SPECIFIC FOR EACH BARRIER

ESTABLISHED BY SME & APPROVED BY MANAGEMENT CONSIDER OEM RECS AND INDUSTRY STANDARDS

COMPLY WITH APPLICABLE REGS

Prior to barrier verification being deferred from the established schedule, the barrier owner should be informed to determine if a risk assessment is needed and whether the operation should continue with the deferral.

19 – Tim Pieplow

Verification frequency will be specific to each barrier – hardware and human - and should be established by subject matter experts and approved by management. When determining frequency, a company should consider OEM recommendations and industry standards, and applicable regulatory requirements.

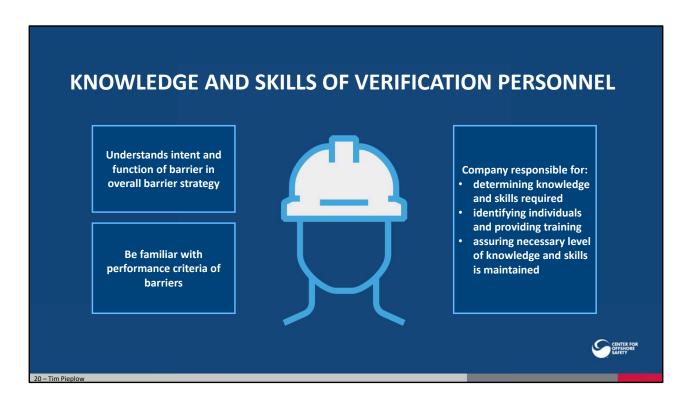
And, as mentioned earlier, these frequencies should be based on risk and may vary from pre-use, daily, weekly, monthly, yearly, or multi-year.

As we all know, it's not uncommon for work teams and facilities to face unforeseen challenges. When this happens, scheduled plans are routinely rationalized and adjusted, and work reprioritization often occurs.

When a site's schedule becomes challenged, it is normal to extend target dates for some planned activities.

Given the importance of barriers in preventing or mitigating major incidents, however, site leadership should prioritize barrier verification activities.

Prior to barrier verification being deferred from the established schedule, the barrier owner should be informed to determine if a risk assessment is needed and whether the operation should continue with the deferral.



Barrier verification should be performed by personnel with the appropriate knowledge and skills to be able to determine whether a barrier is meeting its performance criteria, or whether there are deficiencies. The verification personnel should understand:

- The purpose or basic intent of the barrier
- How the barrier is meant to function, and
- The role of the barrier in the overall barrier strategy.

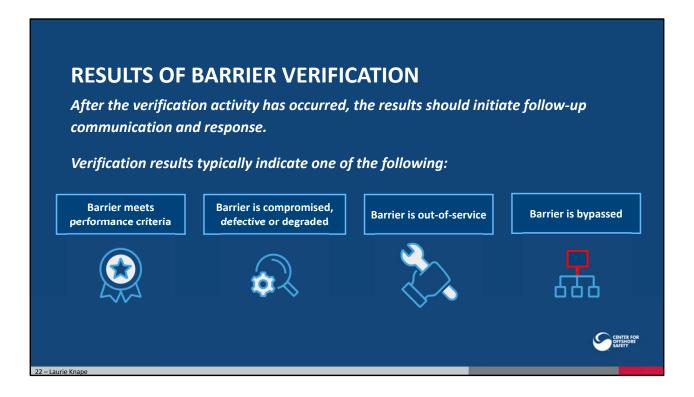
For example, if the barrier to be verified is a relief valve, the verifier should have knowledge of how the valve works, what results occur when the valve is activated, and the consequences of valve failure. In addition, the verifier should be familiar with performance criteria associated with this specific valve.

At a higher level, the company is responsible for:

- Determining what knowledge and skills are required to carry out verification activities,
- Identifying and training the personnel who will carry out those verifications, and
- Assuring that the appropriate level of knowledge and skill is maintained over the life of that barrier.



To take us through the remaining elements, I'll hand it off to Laurie Knape from Avetta. Laurie?



Thank you, Tim, and that you also Tricia and Russ. Happy to be here with you this morning.

Once verification activities have been completed, the results of those verifications should be documented and communicated to assure that any actions identified during the verification are carried out in a timely manner.

Barrier verifications will typically have one of four likely outcomes:

One – the barrier is determined to meet the performance criteria and no action is needed at that time.

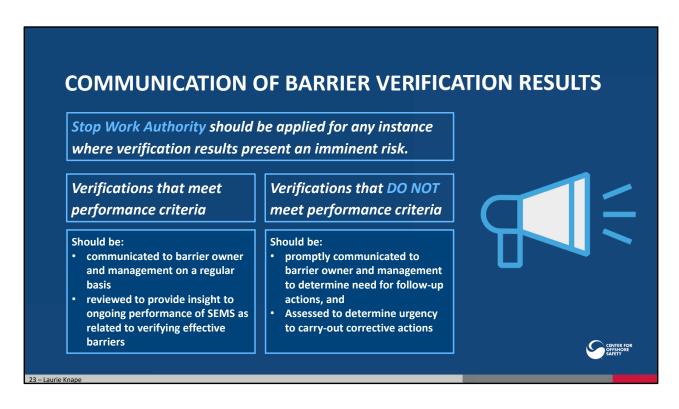
Two – the barrier is determined to be compromised, defective or degraded and, while it may still be kept in service, corrective action should be taken to restore it to full function.

Three – it is determined that the barrier should be placed out-of-service while corrective actions are taken, or

Four – it is determined that the barrier is no longer viable and it should be bypassed altogether.

The verification outcome should be documented to enable communication to the barrier owner and any other appropriate personnel. This documentation is also used to track completion of identified action items.

If a barrier is determined to not meet its performance criteria, it should be risk-assessed to determine the level of risk this poses to the operation. The timing and urgency of communications regarding the verification results should be determined based on this risk-assessment.



As mentioned on the previous slide, the communication of verification results will vary depending on whether the barrier did or did not meet its performance criteria.

If a barrier *does* meet its performance criteria, that should be communicated to the barrier owner and management on a regular basis, and reviewed as part of management reviews of SEMS, as related to verifying effective barriers.

If a barrier *does not* meet its performance criteria, that should be *promptly* communicated to the barrier owner and management to determine follow-up actions, and, risk-assessed to determine the urgency for completing corrective actions.

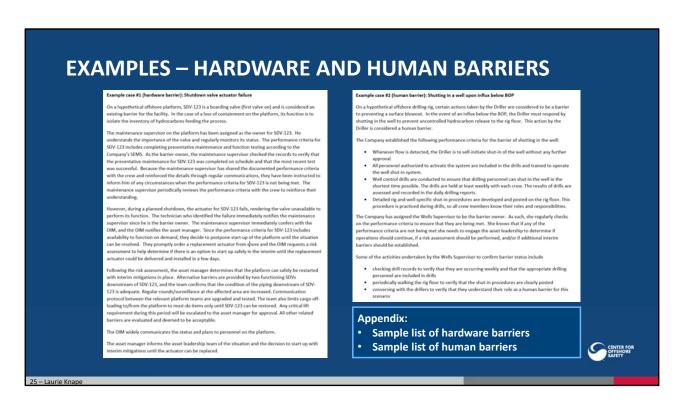


For verification results that *do not meet* performance criteria, the barrier owner should work with the appropriate technical, operations, and management representatives to determine action items to address any gaps.

Action items should be assigned to a responsible person and then stewarded to closure.

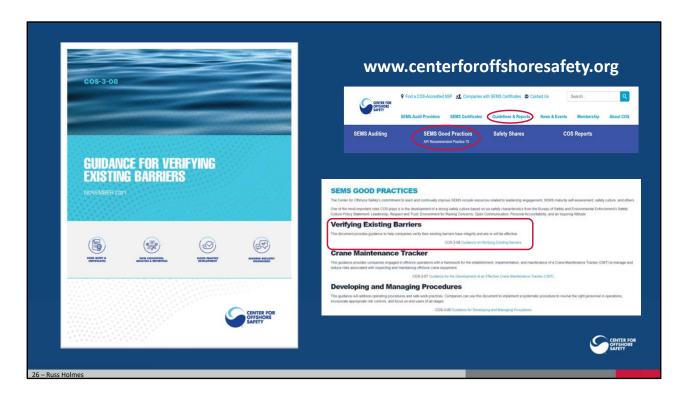
As part of a robust SEMS, verification results should be evaluated for opportunities to improve applicable documents, processes, and programs, such as:

- 1. Risk management
- 2. Barrier strategy, and
- 3. Barrier design



That takes us through the main elements of this guidance document. There is also an Appendix that provides a few examples – one for a hardware barrier, one for a human barrier. We won't take the time here to go through these examples, instead you'll need to download the document to read them for yourselves.

With that, I turn it back to Russ.



Thank you, Laurie, and thank you also Tricia and Tim.

As mentioned a few times this morning, a link to this new document, COS-THREE-OH-EIGHT Guidance on Verifying Existing Barriers has been posted. To download a free copy of the document, just visit the COS website, click on Guidelines & Reports and then again on SEMS Good Practices.

While on that page, be sure to check the full library of good practices and COS Safety Shares available.

And, with that, let's see if there are any questions that have been submitted via the chat box. Julia?



Q & A



COS - Become a Member!

- Annual Membership Fee
 - API Members \$0 additional annual fee to join COS
 - Non-API Members \$5000 annual membership fee
- For Additional Information:
- Russ Holmes holmesr@centerforoffshoresafety.org
- Julia FitzGerald fitzgeraldj@centerforoffshoresafety.org

And we can't let you go this morning without a plug for membership in COS. The mission of COS, to continually improve offshore safety and safety management, is only possible by the active participation and contributions of companies engaged in our industry.

We're happy to announce some big changes to the cost of membership in COS. Starting this year, current API members pay zero additional membership fees to become members of COS. And for non-API members, the annual membership fee is now only \$5000, regardless of company type or size.

For additional information on becoming a member of COS please reach out to me or Julia FitzGerald. Our contact information is on the screen.

Thank you for joining us this morning. From all of us at COS and today's speakers, We hope you all have a wonderful day.