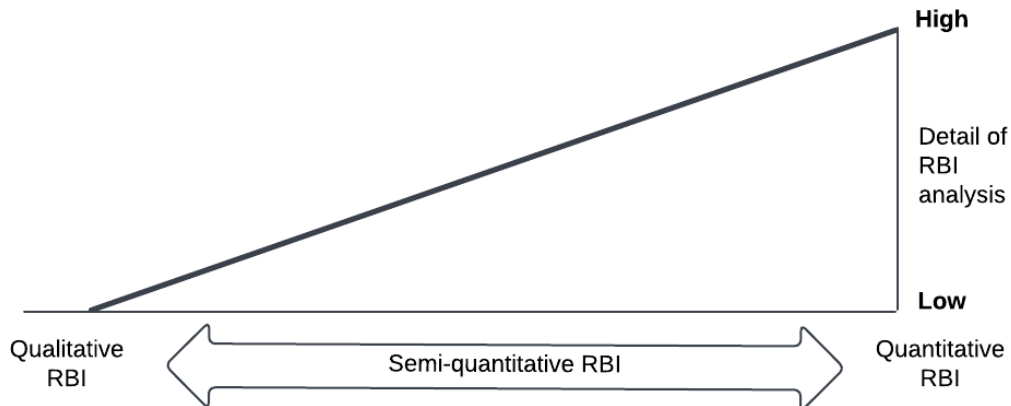


Date of Issue: March 2025

Affected Publication: API Recommended Practice 580, *Elements of a Risk-Based Inspection Program*, 4th Edition, August 2023

Addendum 1

Figure 3: The figure shall be replaced with the following:



Section 5.8.7: The third paragraph shall be deleted.

Section 6.7: The following shall be inserted as 6.7 and the current 6.7 shall be renumbered to 6.8:

6.7 Transitioning an RBI Program

Facilities transitioning an inspection program from one basis to another while implementing or managing an RBI program should have a transition plan. Examples of these transitions include:

- time-based to risk-based;
- one RBI software to another; and
- one RBI methodology to another (e.g., qualitative to semi-quantitative).

New inspection tasks, or proposed target dates of existing tasks, may change following the RBI transition due to changes in the assessment methodology. These changes should be managed in a way that conforms with the documented transition plan. Examples of changes might include:

- due dates in the past;
- inspections for newly identified damage mechanisms; and
- inspection coverage or scope.

The transition plan should include:

- a) a strategy for the effective implementation of the new inspection plans;
- b) transition period due dates for tasks categorized as past due that prioritize the order of completion;

- c) a communication strategy to inform and align stakeholders;
- d) tracking to ensure full implementation of the changes due to the new RBI program; and
- e) notification to regulators, if applicable.

Section 15: The section shall be replaced with the following:

15 Updating the RBI Assessment

15.1 In General

RBI is a dynamic tool used to determine the current and future risk. The RBI assessment results are based on the data and knowledge available when it is conducted. Over time, the risk can change as equipment ages, operational conditions change, inspection and maintenance practices evolve, or as new information becomes available. Organizations can make well-informed decisions regarding inspection planning, risk-mitigation strategies, and resource allocation by establishing a process to update the RBI assessment. The owner-operator shall establish processes and time frames for updating the RBI assessment.

Following the initial RBI assessment, there are two distinct considerations when updating. The first is an “event-based” update, and the second is a “time-based” update.

- a) An event-based update should occur within a reasonable time frame (e.g., typically 30–60 days) after any event that potentially changes the POF or the COF.

- 1) This should include events/occurrences such as an inspection, equipment failure, process change, IOW exceedance, turnaround activities, MOC, or risk policy changes.
- 2) The level of effort and disciplines involved in performing the update will depend on the nature and magnitude of the event resulting in the change.

EXAMPLE If an on-stream inspection occurs with no findings and the corrosion rate remains approximately the same, only the inspector may be sufficient to update the date and effectiveness. However, if an IOW exceedance occurs, that event may need additional disciplines, such as a process engineer and a corrosion specialist, to determine the potential change to the POF or COF.

NOTE The term “update” was referred to as “evergreening” in previous editions.

- 3) Events with a unit or system-wide impact may lead to an RBI revalidation.
- b) A time-based update occurs at a set interval.
 - 1) Time-based updates may include any scope or timing set by the owner-operator.
 - 2) A time-based revalidation shall occur at an interval not exceeding the interval permitted by the governing code (e.g., API 510, API 570, API 653). It will validate the current RBI assessment parameters.
 - i. The revalidation should include assigned assumptions, operating premise, assigned cost factors, operating conditions (including startup, shutdown, upsets, MOCs, IOW exceedances, etc.), any updates to inspection, corrosion rates (measured or predicted), etc. This revalidation should examine all parameters used to evaluate the POF and COF and consider changes that have occurred over the prior operating history since the last RBI assessment.
 - ii. Revalidation requires similar disciplines and personnel (i.e., a team) used in the initial RBI assessment.

RBI revalidations require a much larger resource commitment because the scope of the review is more comprehensive. Though more resources are required for revalidations, all revalidations are updates, but not all updates are revalidations.

Figure 9 provides a visual depiction of how revalidations and updates should work together. The “X” spots are typical occurrences at which an update should occur. Revalidations, marked by the “slashed” boxes, indicate the fixed time period at which these occur in relation to the updates.

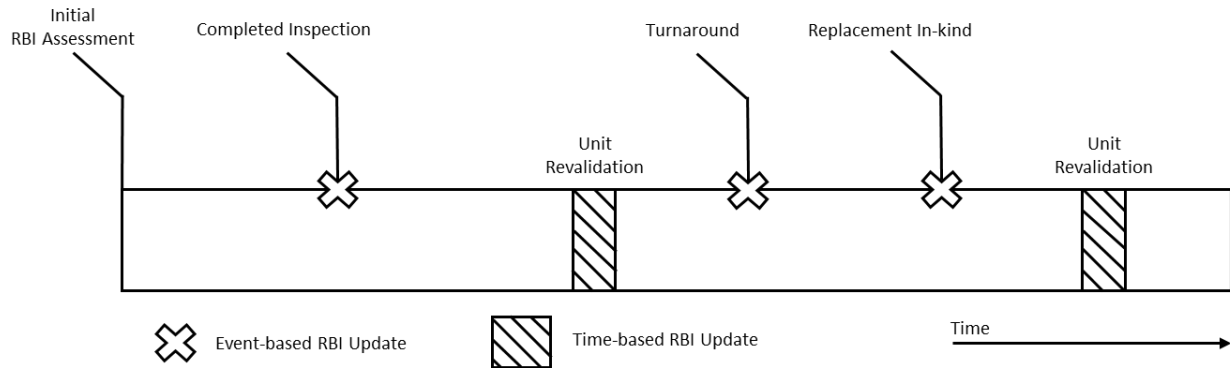


Figure 9—Relationship of Updates and Revalidations

Table 9 demonstrates the connection between RBI assessment updates and revalidations with respect to event-based and time-based triggers.

Table 9—Examples of RBI Assessment Updates

Update Scope	Event-based Triggers	Time-based Triggers	Level of Review
Individual Equipment or Component Level	— completed inspections — metallurgy or hardware changes without broader implications — replacement in kind — repair or recoating — before and after a major turnaround to aid in inspection planning	— change in plan date has occurred — per owner/operator risk management policy	Risk analyst supported by other SMEs
Unit, Area, System, or Site Level (Revalidations)	— time-independent process condition exceedances — process and hardware changes with implications beyond a single asset (e.g., debottlenecking project, feedstock change) — RBI premise changes — change in mitigation strategy	— jurisdictional requirements — governing inspection code limits (e.g., 10-year maximum) — per owner/operator risk-management policy	Multidiscipline team, similar to the initial assessment.

Some owner-operators may have different levels of updating concepts defined in their RBI program. Table 9 and the remainder of this section intend to provide the owner-operator with an example set of concepts for updating and maintaining their RBI program.

15.2 RBI Assessment Updates

RBI assessment updating refers to keeping the data within an RBI assessment and its subsequent actions (e.g., inspection plan, risk-mitigation strategy, etc.) up to date as determined by the owner/operator's program. It is considered a continuous process of reviewing or modifying the RBI assessment and risk-based management plans based on the results of performing inspections, equipment replacements or modifications, or process changes.

The RBI assessment updating process may include, but is not limited to, the following changes or events when they occur:

- a) updating inspection results after an inspection is completed, including changes to the next planned inspection date and/or task;
- b) new information made available regarding a process or equipment change (such as an IOW limit is exceeded or changes are identified through an MOC, PHA, or other similar risk-management process);
- c) updating the RBI database before a turnaround (or shutdown) to establish new risk rankings and update inspection plans as a result of any pertinent changes that occurred during the current run;
- d) repairs, alterations, or replacements of equipment or components; and,
- e) after a turnaround (or shutdown) where inspections or equipment modifications occurred.

Updating the RBI assessment after such changes should be used to establish new risk rankings, update inspection plans, or set plans for monitoring or repair/replacement. RBI assessment updating, as long as it does not rise to the level of a revalidation, can be completed as needed by the risk analyst (see 7.2.9) to keep current with completed inspections or other plant events. Discovery of unanticipated damage or damage mechanisms should trigger a review of the impact on the RBI program (e.g., unit, equipment, component, etc.). It may suggest a need for a revalidation. RBI assessment updating can be completed on an individual or multiple pieces of equipment, independent of a complete unit-, area-, system-, or site-level review.

15.3 RBI Revalidations

15.3.1 General

An RBI revalidation is an update that takes into account the entire original scope of the RBI assessment, such as a unit or site, and is conducted by a team with personnel and expertise similar to those involved in the initial RBI assessment.

Revalidations examine the whole extent of the RBI assessment, including a holistic review of the inputs, assumptions, and scope of the current RBI assessment. While some types of RBI assessment updating may be completed at the individual asset or component level, revalidation is a more comprehensive review at the unit, area, system, or site level. Additionally, a revalidation may be mandated by a code, standard, or jurisdictional regulation. Regulatory documents may contain specific intervals or stricter requirements. The RBI program shall document all applicable RBI revalidation intervals.

The RBI revalidation is key to ensuring the continued integrity of the RBI assessment. Without revalidation, some equipment and components may not be reviewed for many years if the equipment/component does not experience an event that triggers an update (e.g., no inspection activities within the plan period). Minor changes may occur over time and cumulatively cause changes in the RBI assessment. The RBI revalidation is a holistic review of the RBI assessment intended to find and correct issues that may otherwise go unnoticed by individual assets or component updates. The owner-operator's RBI program shall have a work process to identify when revalidation is necessary.

15.3.2 Time-based Triggers for RBI Revalidation

Time-based intervals for RBI revalidations shall be set per the limits provided by the governing inspection codes (such as API 510, API 570, and API 653) and jurisdictional regulations. Owner-operators may set these more frequently as determined by internal risk tolerance.

Owner-operators may also set up time-based triggers for assessment updates other than revalidations. These may be at a smaller scope and shorter intervals than a revalidation but do not satisfy the requirements for a revalidation.

15.3.3 Event-based Triggers for RBI Revalidation

Events that have a unit or system-wide impact and benefit from a multidiscipline team review should trigger a revalidation to ensure that the RBI assessment reflects the current operating conditions and accurately models the credible damage mechanisms.

15.4 Other Events Triggering RBI Assessment Updates (Including Revalidations)

15.4.1 RBI Assessment Premise Changes

The premises for the current RBI assessment could change and impact the risk results. Some examples of the premise changes that may trigger the need for an RBI revalidation are as follows:

- a) increase or decrease in population density in the process unit;
- b) change in construction material and repair/replacement costs;
- c) change in the financial cost of unit downtime;
- d) revisions in safety and environmental laws and regulations;
- e) revisions in the users' risk-management plan (such as changes in risk criteria);
- f) changes in feed amount or composition;
- g) changes in operating conditions;
- h) changes in unit operating lengths between maintenance turnarounds;
- i) changes in inspection codes/standards (e.g., updates to API 510, API 570, API 653);
- j) changes in applicable methodology (e.g., API 581);
- k) changes in software methodology and/or version used to generate the previous RBI assessment; or
- l) increase in level of accuracy/detail in the RBI assessment brought about by replacing broad assumptions with more accurate data (e.g., updating the analysis with equipment covered by firewater deluge vs. assuming fire water monitor only for all equipment).

15.4.2 Changes in Mitigation Strategies

Strategies to mitigate risk, such as installing additional safety systems (e.g., fire water deluge systems, emergency isolation systems), can impact the overall risk of a unit/system and may trigger an RBI revalidation. Changes to these mitigation strategies should be reflected in the RBI revalidation of the risk and appropriate updates in the documentation.

15.4.3 After an Abnormal Process Event

Abnormal process events often lead to changes in the damage mechanism. IOWs are helpful in identifying when these events may contribute to unexpected or accelerated damage. As a result, an RBI revalidation may be appropriate.

The scope of the RBI revalidation should include the equipment impacted by the abnormal process event. The RBI revalidation should include a review of the operating history over the past run, including operating limit exceedances and trends. Such a review can be used to better determine if unexpected damage has occurred or if expected damage mechanisms have accelerated.

Inspection activities may be planned to help confirm the condition of the equipment impacted by the event. The inspection results should be included as part of the RBI revalidation.

15.4.4 Hardware and Process Changes

Changes in the hardware of an asset (such as equipment modifications or replacement) or process conditions can alter the risks and dictate the need for an update to the RBI assessment.

Hardware changes (e.g., modifications, additions, deletions, or bypassing) can affect risk. For example:

- a) POF can be affected by changes in the design of internals in a vessel or the size and shape of piping systems that accelerate velocity-related corrosion effects;
- b) COF can be affected by the relocation of a vessel to an area near an ignition source; or,
- c) process conditions can be changed by hardware changes.

Process changes have been linked to equipment failure from rapid or unexpected corrosion or cracking. Typical examples include, but are not limited to:

- 1) chloride stress corrosion cracking of stainless steel;
- 2) wet H₂S cracking of carbon steel;
- 3) accelerated corrosion at points of salt deposition or dew points; and,
- 4) sour water corrosion.

In each example, a change in process conditions can affect the corrosion rate or cracking susceptibilities. When considering process changes, revalidation may be necessary to examine the whole unit for effects on risk and risk management.

Process changes (e.g., operating temperature, operating pressure, flow rate/regime, stream chemistry, etc.) can affect the risk assessment. For example:

- POF can be affected by a change in process stream chemistry that damages the pressure boundary materials (either activating damage mechanisms or accelerating the damage rate); or,
- COF can be affected by a change in the operating pressure.

An IOW program can be designed to specifically identify the process parameter changes that may affect risk and can identify the acceptable operating ranges within the premise time frame. IOW limit exceedances can trigger an update to the RBI assessment and may lead to a revalidation.

Changes to the hardware of an asset and process conditions are typically tracked within a MOC program and can trigger an RBI assessment update. Integrating the RBI program into the MOC process will help identify when an RBI assessment update may be needed and may lead to a revalidation.

15.4.5 Before and After Maintenance Turnarounds

As part of planning a maintenance turnaround, performing an RBI assessment update or revalidation may be useful near the beginning of the turnaround planning window. This helps ensure that the turnaround effort focuses on the higher-risk equipment items. Since many inspections, repairs, and modifications are performed during a typical maintenance turnaround, it may be useful to update an RBI assessment soon after the turnaround to reflect the new risk levels and help plan future inspections, monitoring, replacements, etc.

15.5 Keys for Success—Updating the RBI Assessment

The keys for the success of updating an RBI assessment include, but are not limited to, the following:

- a) Recognize the dynamic aspects of risk (i.e., it changes with time).
- b) Determine the basis for RBI assessment updates and when to do them.
- c) Understand the differences between updating and revalidating the RBI assessment and completing them as required by the owner-operator, jurisdiction, or code requirements.
- d) Recognize the triggers for RBI assessment updating (e.g., MOC, IOW, PHA).
- e) Recognize the impact of process and hardware changes on the current RBI assessment and risk-management plan.