AMERICAN PETROLEUM INSTITUTE

API RP 581 – RISK BASED INSPECTION METHODOLOGY

BALLOT COVER PAGE

Ballot ID:

Title:	**Clarify the difference between inspection date and in-service date**
Purpose:	Make the PRD risk model more accurate.
Impact:	Changes in next inspection dates for certain PRV inspections may occur if the in-service date is used instead of the inspection date.
Rationale:	Many times, the valve is inspected (shop inspection/overhaul) but not returned to service but rather put back on a shelf as a spare. Also, if there is a long outage a valve could be inspected and not put back into service for multiple months.
Technical Reference(s):	*API RP 576 Inspection of Pressure-relieving Devices*

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Tracking Status					
Submitted to Task Group		**Submitted to SCIMI**		**Submitted to Master Editor**	
Date	***Resolution***	***Date***	***Resolution***	***Date***	***Added***
August 21, 2020	Ballot from old score card item				

Proposed Changes and/or Wording *{attach additional documentation after this point}*

The specific tracked changes are found below.

See attached word document is included showing the entire API RP 581 3rd Edition Addendum 1 Part 1 Section 7.

7.1.6 PRD Overhaul or Replacement Start Date

When a PRD is overhauled in the shop, the basic assumption is made that the PRD is placed back into service in an as-new condition. The original install date for the PRD remains the same, but the last inspection date is changed to reflect the date that the PRD was ~~overhauled.~~installed after the overhaul. In this way, the calculated inspection interval and subsequent new due date for the PRD is based on the ~~last inspection~~ date ~~on which~~ the ~~PRD~~PSV was ~~overhauled.~~installed following the most recent overhaul.

When a PRD is replaced in lieu of overhaul, the new install date for the replaced PRD and last inspection date are identical. The calculated inspection interval and subsequent new due date for the PRD are based on the new install date. The replaced PRD does not necessarily need to be a brand new valve, it could be a spare or refurbished and overhauled valve.

Often PRDs are pop-tested either in the field or in the shop without overhauling the PRD. In these instances, the PRD has not been returned to service in an as-new condition. Without an overhaul, the assumption is made that the PRD remains in the condition that it was in prior to testing. In these cases, the POFOD for the device may be adjusted based on the results of the field test (i.e. credit for inspection to reduce uncertainty); however, the last overhaul date remains unchanged and therefore the PRD will not get the full benefit of an overhaul. In this case, the inspection due date is determined by adding the recommended inspection interval to the last overhaul date and not the last ~~inspection date~~non-overhaul inspection date. For example, if PRD was pop-tested and overhauled in 2005, and then pop-tested, but not overhauled in 2010, and put back into service, the next inspection date is determined by adding the recommended inspection interval (say, 7 years) to 2005, the date of the last overhaul. The next inspection due date is therefore 2012.

It is important to note that there may be a delay between the time of inspection/overhaul and the time the PRD goes back into service. This time delay may happen because the PRD has a spare which is installed in its place. If there is such a delay between the time of shop inspection/overhaul and the time the PRD returns to service, consider using the date on which the PRD returns to service to calculate the inspection interval and the subsequent new due date. For example, if the last inspection date with shop inspection/overhaul was in the year 2015, and the PRD was not put back into service until 2018, then consider using 2018 to calculate the next inspection due date.

7.2.6 Calculation Procedure

The following calculation procedure may be used to determine the probability of a PRD failure to open at a specified inspection interval.

a) STEP 2.1—Select an inspection interval, t_{insp}.

b) STEP 2.2—Determine the default values for the Weibull parameters, β and η_{def}, using Table 7.6 and Table 7.7.

c) STEP 2.3—Determine the adjustment factor for conventional valves, F_c, using Section 7.2.4 g).

d) STEP 2.4—Determine the environmental adjustment factor for conventional valves, F_{env}, using Table 7.7.

e) STEP 2.5—Calculate the modified characteristic life, η_{mod}, using Equation (1.14) and the factors obtained from STEP 2.3 and STEP 2.4.

f) STEP 2.6—Assemble the PRD's inspection history. Grade each record using the inspection effectiveness table, Part 2, Annex 2.C, Table 2.C.3.1. Record the results of each inspection record; PASS/FAIL and NO LEAK/LEAK and determine the confidence factors, CF_i, as applicable, for each inspection history based on the results of the test. Determine the time duration, $t_{dur,i}$, of each inspection cycle.

1) STEP 2.6.1—Each inspection record must be graded using the PRD inspection effectiveness table,
Part 2, Annex 2.C, Table 2.C.3.1.

1) STEP 2.6.2—Record the PASS/FAIL and NO LEAK/LEAK in order to determine the confidence factors, CF_i, as applicable, for each inspection history where a test was conducted.

2) STEP 2.6.3—Determine the time duration, $t_{dur,i}$, between each inspection cycle.

3) STEP 2.6.4—Determine if the PRD was overhauled.

— If the PRD was shop inspection/overhauled, the date of the most recent overhaul becomes the earliest inspection record at which STEP 2.7 is started. If the inspection date is significantly different than the date on which the PRD is put back into service, consider using the return to service date instead of the inspection date to calculate the next inspection date.

— Refer to Section 7.7.2 and Section 7.7.3, as well as Figure 7.7, for more information.

g) STEP 2.7—Starting at the earliest inspection record, or if the PRD was overhauled, (see Step 2.6.4), update the modified characteristic life, η_{mod}, determined in STEP 2.5 as follows.

1) STEP 2.7.1—Calculate the prior POF, $P_{f,prior}^{prd}$, using Equation (1.17). The time period for use in Equation (1.17). is the time duration of the inspection cycle, $t_{dur,i}$, as determined in STEP 2.6. Note that for the first inspection record, the modified characteristic life, η_{mod}, is used. Subsequent inspection records will use the updated characteristic life, η_{upd}, from STEP 2.7.5.

2) STEP 2.7.2—Calculate the prior probability, $P_{p,prior}^{prd}$, of passing using Equation (1.18).

3) STEP 2.7.3—Determine the conditional POF, $P_{f,cond}^{prd}$, and the conditional POFOD with failed inspection, $P_{f,cond}^{prd}$, using Equation (1.19) and Equation (1.20), respectively.

4) STEP 2.7.4—Calculate the weighted POF, $P_{f,wgt}^{prd}$, using the appropriate equation from Table 7.10.

5) STEP 2.7.5—Determine the updated characteristic life, η_{upd}, using Equation (1.21) Weibull parameters β from STEP 2.2, and the weighted POF, $P_{f,wgt}^{prd}$, established in STEP 2.7.4.

6) STEP 2.7.6—Repeat these steps for each of the inspection records available for the PRD until a final updated value for the characteristic life, η_{upd}, is determined.