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Continuing Education Course #168
Life Cycle Mechanical Integrity
Of Piping Systems

1. Mechanical Integrity is the process to assure the pipe is in satisfactory condition for continued safe and reliable operation. What is the correct statement about this definition?

- a. Legal requirements of "Safe operation" are provided in industry codes
- b. Owner/Operator must clarify "Satisfactory condition and safe and reliable operation".
- c. MI is just a Non Destructive Examination program.

2. Why is baseline condition documentation important?

- a. The trending of pipe support travel settings can be based off of the initial cold and hot settings.
- b. Calculated pipe stresses, pipe movements and pipe support loads are available based upon a known pipe condition.
- c. Changes in pipe stresses and pipe support loads can be calculated later when observations indicate pipe supports are different.
- d. All of the above.

3. Complete the 1st Law of Mechanical Integrity Documentation: If an inspection is not properly documented, then for all practical purposes __

- a. We can rely on the memory of the inspectors.
- b. the inspection was never performed.
- c. we can assume that the inspections have No Recordable Indications
- d. we can trust that the inspection was performed properly in the specified locations.

4. Complete the 3rd Law of Mechanical Integrity Documentation: "The ____ information available, the ___ costly the process to define a _____; or the ____ costly the solution will be."

- a. less, more, solution, more
- b. more, more, solution, more
- c. more, less, solution, less
- d. less, more, problem, less

5. A pipe support rod is broken. What is are possible root cause(s) of the problem?

- a. The support was installed improperly.
- b. There was a major dynamic event that overloaded the rod.
- c. The thermal loads were incorrectly calculated.
- d. None of the above.
- e. All of the above.

6. If a variable spring pipe support is bottomed out (spring is fully compressed), what statement is true.

- a. The load in the support assembly is no more than the maximum rated load of the spring.
- b. Bottoming out may be caused by an incorrectly sized spring
- c. Bottoming out may be caused by a deteriorated spring

- ○ d. All of the above
- ○ e. b&c only

7. Damage that leads to pipe failures is almost always visually observable long before actual failure, except
- ○ a. During a major dynamic event such as water hammer
- ○ b. When a pipe support fails
- ○ c. In a seam welded pipe operating at high temperature
- ○ d. All of the above
- ○ e. a&b Only
- ○ f. a&c only

8. Pipe support visual examination documentation includes:
- ○ a. Pipe temperature
- ○ b. Condition of steel attachment
- ○ c. Installation of travel stops
- ○ d. All of the above
- ○ e. b&c only

9. An individual variable spring should always be read
- ○ a. By the same method of percent, inches, or load from the indicator tab.
- ○ b. By the same method from the top of the indicator tab.
- ○ c. By inches or millimeters
- ○ d. By load

10. Variable spring travel stops
- ○ a. May consist of multiple parts
- ○ b. Are used for shipping and perhaps for hydrostatic testing
- ○ c. Make the spring act like a rigid rod if left installed during operation.
- ○ d. All of the above

11. On a constant support hanger the travel scale also is always read from 0 to 10.
- ○ a. True
- ○ b. False

12. The pipe visual inspection should be performed at the same time as both the ambient and operating condition pipe support visual inspection.
- ○ a. True
- ○ b. False

13. NDE of a pipe weld should be documented with
- ○ a. Inspection results
- ○ b. Photograph of location
- ○ c. Inspection method
- ○ d. Weld number
- ○ e. All of the above

14. When preparing initial isometrics and inspection sketches of insulated pipe, all of the weld locations are probably known.
- ○ a. True
- ○ b. False

15. The "Disposition" column on the disposition report

○ a. Should have an entry on every pipe inspected explaining the activity after inspection on that weld.
○ b. Should have an entry on every pipe inspected with an indication, explaining the activity after inspection on that weld.
○ c. Should have an entry on every pipe that was repair welded.
○ d. Should have an entry on every pipe that may need to be re-inspected.

16. On the Disposition Report, record of indications and disposition
○ a. Should always be left in the entries until the piping system is removed from service.
○ b. Should be left in the entries for 10 years, or until 2 more inspections are performed at that weld, whichever comes first
○ c. Should be erased after the 5 year or 10 year document retrieval rules for the Owner are exceeded
○ d. Should be placed in hidden files so that insurance companies cannot audit the work.

17. Evaluation of the results of the visual observations, NDE and any other inspection or adjustment activities
○ a. Is a simple, automatic step by step process.
○ b. Is best performed by the Plant Manager
○ c. May require a team approach by personnel who understand welding processes, pipe stress analysis, pipe supports & inspection methods
○ d. Represents the final step in the Mechanical Integrity process

18. Short Term Recommendations are intended to improve the observed problems to an acceptable level for at least 2 years.
○ a. True
○ b. False

19. Long Term Recommendations are documented in
○ a. Inspection Recommendations Table
○ b. Disposition Table
○ c. Pipe Support Visual Observations Table
○ d. Pipe Visual Observation Checklist

20. Mechanical Integrity of piping systems is a one time snapshot of the condition of the pipe.
○ a. True
○ b. False