Coiled Tubing Storage

It is never ideal to store coiled tubing for long periods of time due to continuous corrosion of the material. However, situations do arise where storage is necessary. When these situations do arise, proper practices are critical to maximizing asset life of the investment. This best practice document will discuss ways to mitigate the main corrosion threats to coiled tubing strings in storage on the OD and the ID.

Corrosion occurs when aqueous fluids and oxygen contact metallic surfaces. The process of corrosion reduces the local wall thickness of the tubing and causes pitting, creating a stress concentration point for low-cycle fatigue cracking. Pitting and reduced wall thickness are common causes of premature and catastrophic tubing failure.

It is very difficult to detect corrosion on the inside of the tubing as the readily available inspection methods cannot detect these small tubing imperfections.

The key to protecting your coiled tubing investment is to prevent any type of corrosion from occurring while the string is not in use.

Best practices

OD protection

- Prevent the OD of the string from getting wet
  - Indoor storage of the coiled tubing is preferable to outdoor storage
  - If indoor storage is not feasible, loosely cover the entire reel and tubing with a non-water-permeable cover with an open bottom to allow condensation to drain.
- Periodic reapplication of OD corrosion protection (typically every 6 months) is needed to prevent excessive surface corrosion.

ID protection

- Remove any fluids from the tubing ID (Refer to NOV's **Coiled Tubing Purging Best Practices** for ways to avoid fluids resting inside the tubing post job.)
- Store strings with water-soluble corrosion inhibitor coating and nitrogen pressure on the inside of the tubing with the ends capped

Summary

- Immediate steps to implement after coiled tubing use (≤ 3 days of storage anticipated): Conduct purging operations per NOV's **Coiled Tubing Purging Best Practices**.
- Short-term storage (> 3 days - 6 months) should include:
  1. Ensure purging has been conducted per NOV's **Coiled Tubing Purging Best Practices**.
  2. Coat the OD of the entire tubing string with a surface corrosion preventative that meets your local environmental standards.
  3. Prevent the OD of the string from getting wet.
  4. Monitor internal nitrogen pressure monthly. Re-purge if nitrogen pressure if found to have reached 4 psi (0.25 Atm) or below.
- Long-term storage (≥ 6 months) should include:
  1. Ensure short-term storage best practices have been conducted, which includes the use of internal inhibitor.
  2. After 6 months of storage, re-inspect the OD of the tubing and re-apply the external anti-corrosion coating.

Further reading: *SPE 189932-MS "Long Term Storage of Coiled Tubing: Industry Best Practices and Conclusions Based on Evaluation of Stock Strings"*

Storage Summary

<table>
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(> 3 days - 6 months)</th><th>Long-term storage
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