

NOX GAS INCIDENT

What happened?

- An orange gas cloud was observed after shift change.
- NOx gases were released when the Lamont boiler outlet sample point, which is a 2-inch stub, broke off from the (Heat affected zone) welding seam.
- Upon investigation it was found that the concrete floor below the line was found to be damaged, it cannot be confirmed if it was because of this incident.
- The plant was decommissioned to assess the leak, in the compressor house.
- Outlet line is part of the corrosion loop, which was inspected during the May 2023 shutdown, but confirmation whether the two” stub was inspected is yet to be done.
- Outlet line was last worked on during the May 2023 shutdown, the flange on the stub was unbolted as the outlet elbow was lowered to the ground for access to the Lamont boiler.

Causes

- The damaged area was confined to the internal welded area and the immediate surrounding flange and pipe base material of the stub.
- Intergranular corrosion was present on the flange and pipe base material with preferential delta ferrite corrosion in the weld metal. The stub failure occurred due to internal intergranular corrosion.
- Stainless steel type 304L or 321 is not immune to intergranular corrosion by nitric acid. Internal corrosion observed in the stub is due to the expected corrosion resistance degradation of the material due to operating conditions.

Learnings

- Ensure appropriate RBI risk ratings are assigned to austenitic stainless-steel components operating above 370 °C which are in NO_x gas / nitric acid service, due to the risk of intergranular corrosion because of sensitization.
- Update the RBI on this corrosion loop as soon as possible to include all the probable and existing damaged mechanisms and update the maintenance task sheet and strategy.
- The entire corrosion loop is compromised because internal corrosion is not specified on the maintenance task sheet, hence there are no appropriate inspection techniques identified for internal corrosion.
- Perform RBI and review the maintenance task sheets at the first available opportunity. Due to the size of the stub and localised nature of the internal corrosion noted thus far, digital radiography may be considered for wall loss due to internal corrosion.

Questions