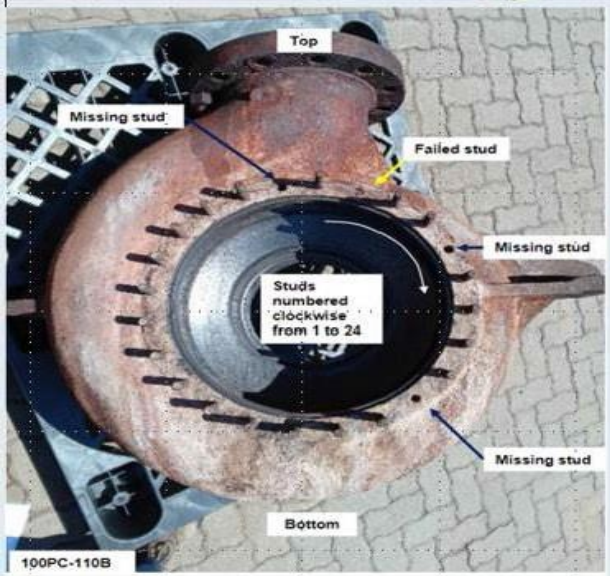
# Incident Learning: What happened?

- A boiler feed water pump failure occurred at the nitro plant resulting in an energy release.


Location of missing studs on pump B


Lack of markings showing nut not tightened or missing

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# Learnings

- The importance and associated risks of boxing up of equipment, being one of the process safety fundamentals
- Should be understood on artisan level and should be done in accordance with the design:
  - When boxing up ensure all bolts and nuts are installed
  - Ensure that bills of materials are in place and include spares as specified by original equipment manufacturer.
  - Artisans are to be trained on the bill of materials, associated risks of poor boxing up practices and the importance of bolted joint configurations is done before returning equipment back to service.

# Learnings

- Quality control plans (QCPs):
  - Quality control plans must be applicable to specific plant conditions and include original equipment manufacturer specifications.
  - Quality control plans should include, amongst other requirements, to inspect the condition of studs and nuts, correct material specification, thread engagement and completeness of boxing up requirements.

# Learnings

- Original equipment manufacturer and plant design:
  - Review bills of materials to ensure that bills of materials include all specified original equipment manufacturer spare parts.
  - When maintaining equipment ensure that the original equipment manufacturer specification is followed
  - When making changes from original equipment manufacturer specifications or design ensure the management of change process is followed.
  - Remote starting and stopping of equipment must be considered as far as practically or the position of local stop / start switches to be assessed to reduce the probability of team members being in the line of fire should unexpected failure of equipment occur.

# Learnings

- Risk perception:
  - All pumps in various applications, especially boiler feed water pumps (operating at high pressure and temperature) should be revisited in terms of risk assessments, adequacy of maintenance strategies and quality control plans. Pumps in hot water service should be regarded as high-risk process equipment and mitigating controls must be put in place.
  - Although focus is always placed on high-risk tasks / equipment / chemicals, toolbox-talks and safety conversations should also focus on the tasks that are routine, where complacency and norms could develop and without realising lead to incidents.

# Learnings

- Emergency response:
  - Ensure that team members know their plant's safe making requirements and procedures to ensure safe plant decommissioning during an emergency.

- Alarm and trips response:
  - After a trip on equipment, a fault analysis or investigation should be conducted prior to restart – do not be complacent with alarms/ trips.