Fort Nelson Stainless Steel Air-Cooled Condenser

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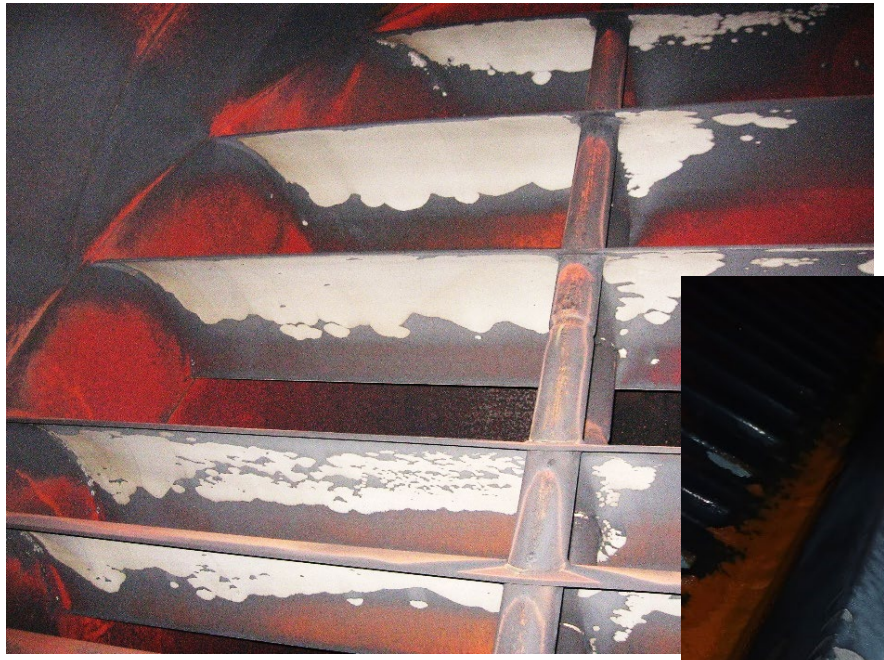
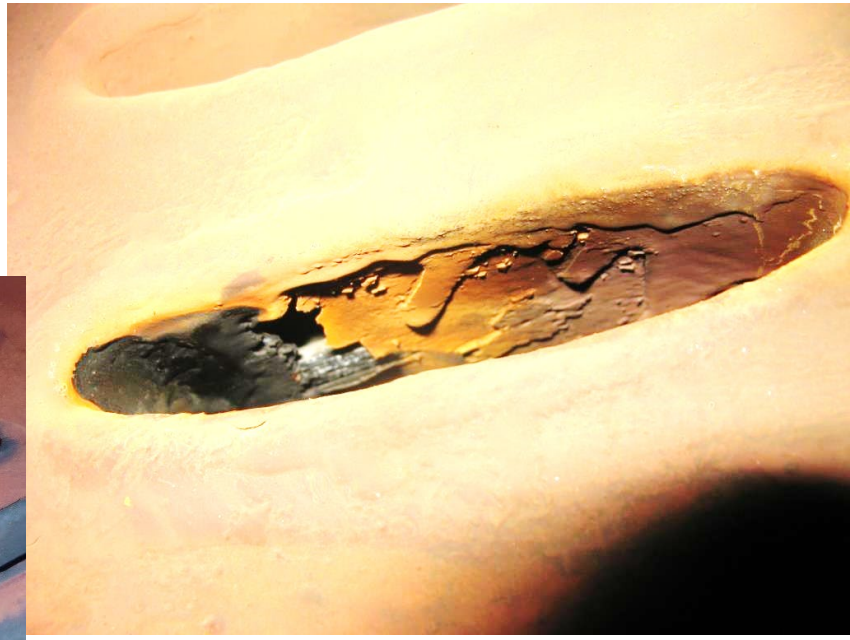
Corrosion risk for steam-side carbon steel components in high-purity wet steam





Corrosion mechanism - ?????

flow + corrosion + carbon steel

clearly corrosion that is accelerated by flow –

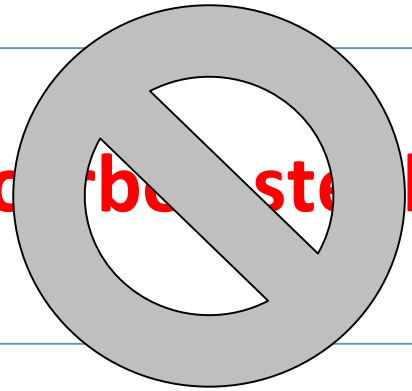
- but not identical to traditional FAC:

- temperature

- microstructure

Possible Resolution:

flow + corrosion + c rbo ste l stainless steel



Stainless Steel in LP Steam Turbine Exhaust Environment

Stainless Steel ACC Heat Exchanger

- **409 Stainless Steel tube / fins**
- **carbon steel tubesheet (A516)**
- **4 installations: Italy (2), Canada, Pennsylvania**
- **planned to roll out stainless steel HX with Al fins in 2013**

Fort Nelson Generating Station (BC Hydro)

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combustion turbine converted to combined cycle in 2012

4-cell ACC, 25 MW steam turbine

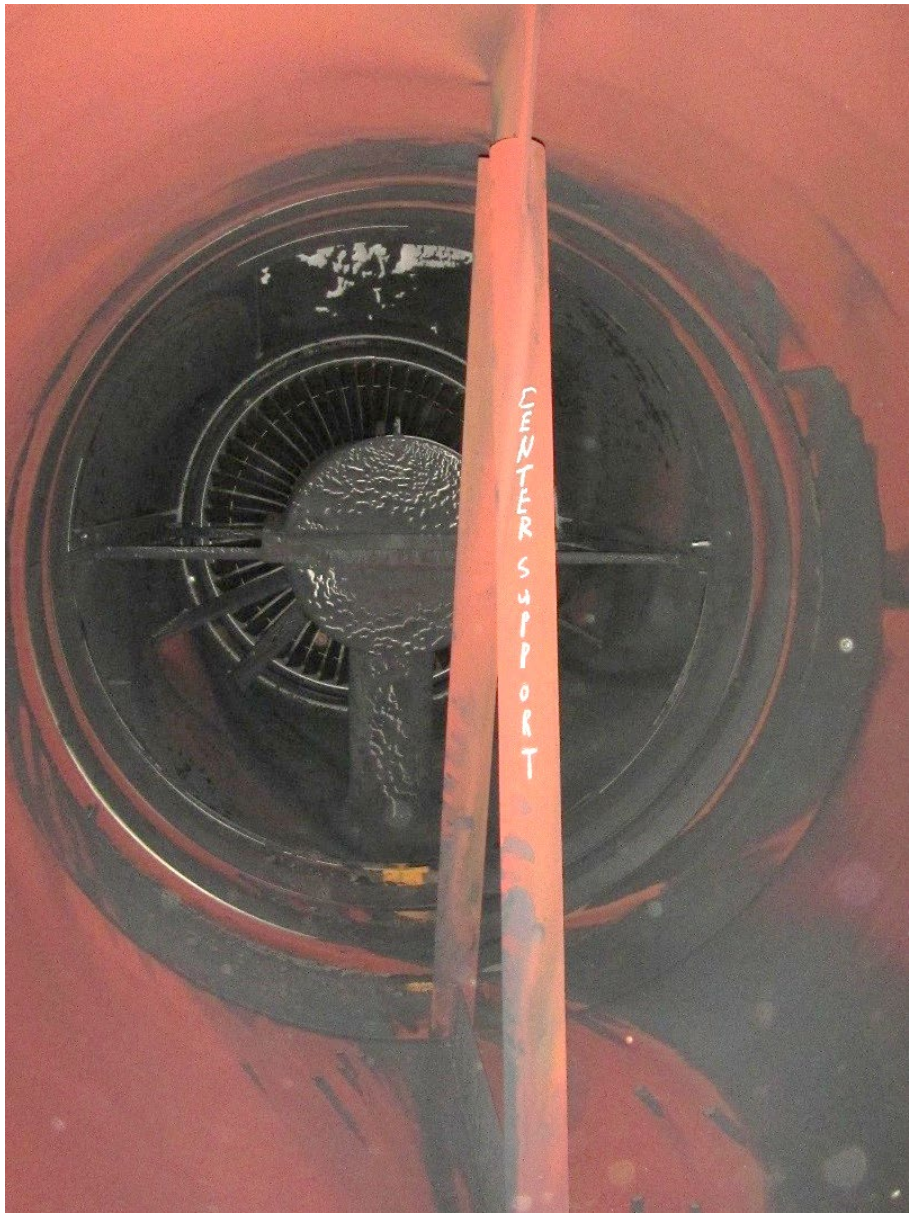
First internal inspection (September 2017)

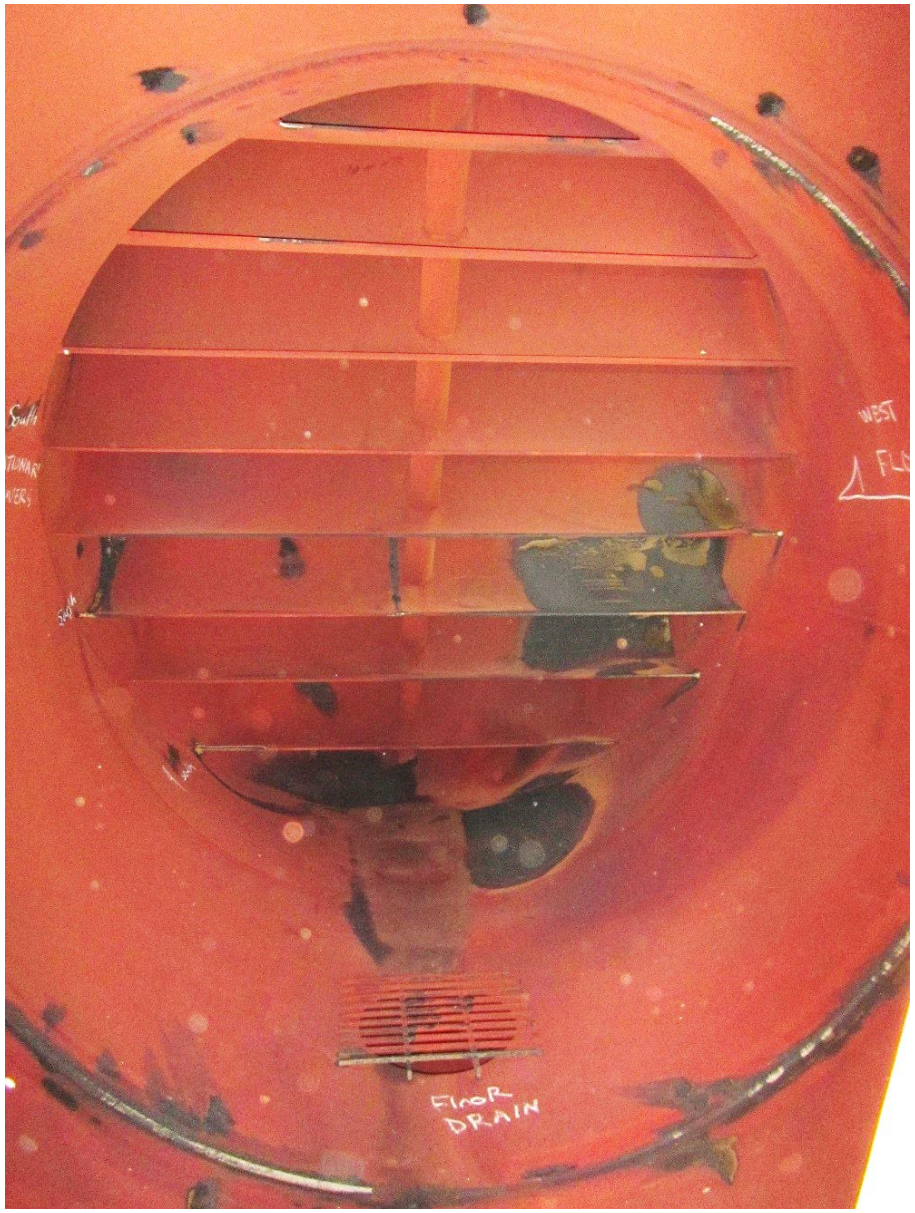
- ACC commissioned 2012 as part of conversion to combined cycle

- plant was offline for 20 months with HRSG problems (overlapped the internal inspection)

2017 Internal Inspection: Steam Turbine Exhaust Main Duct

carbon steel





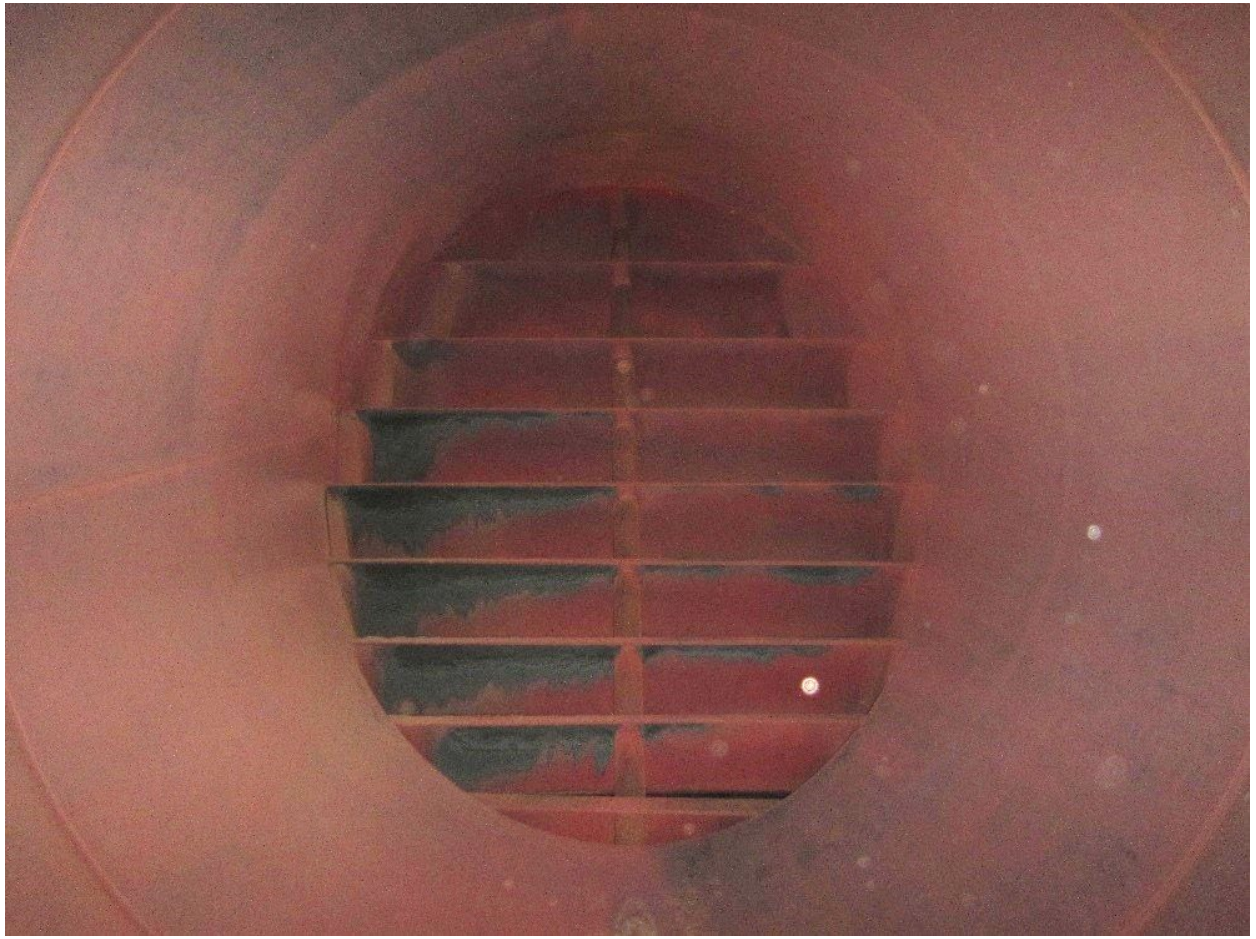
2017 Internal Inspection

Condensate Collection Header

Upper Duct Access

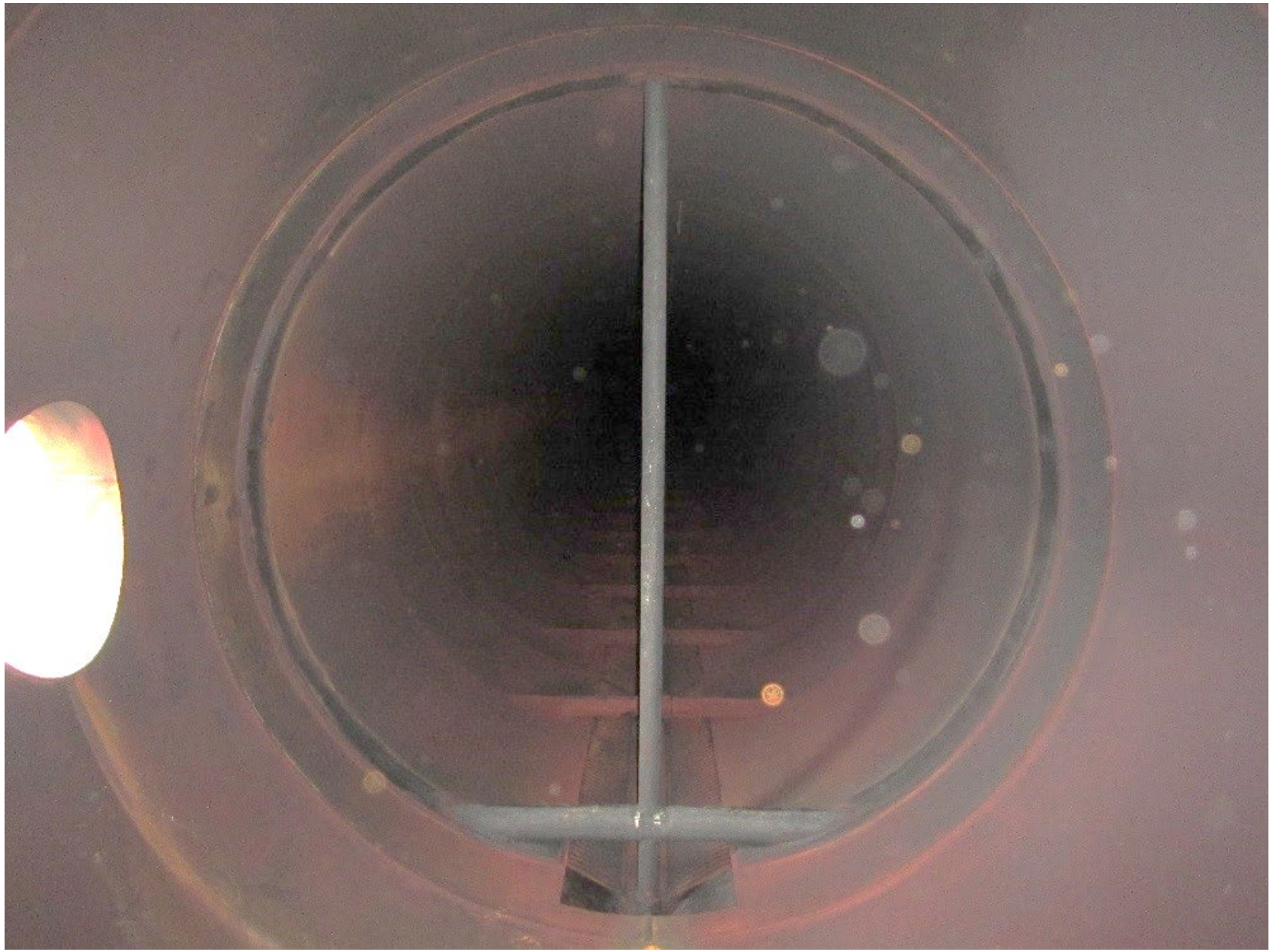
2017 Internal Inspection: Upper Duct carbon steel

Inlet turning vane

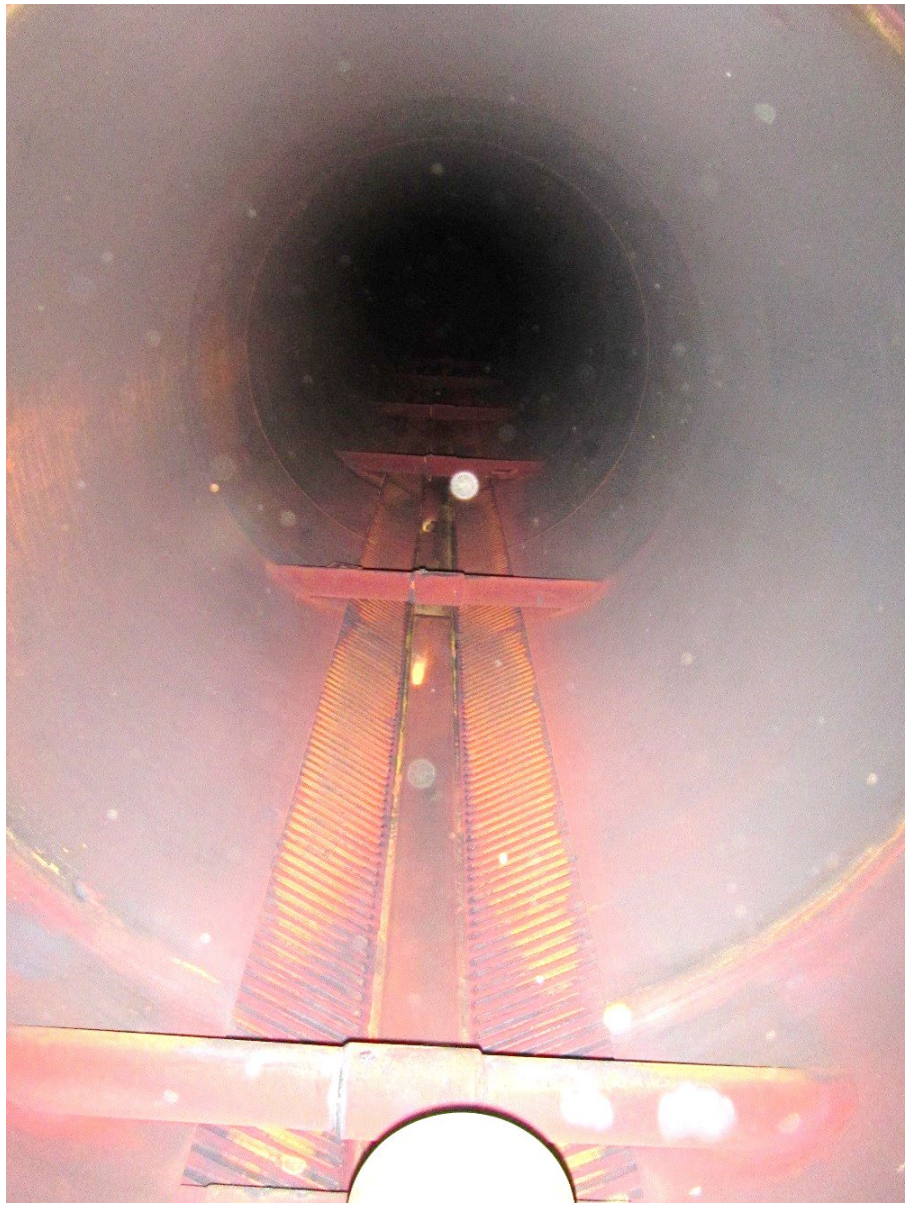


Duct wall

2017 Internal Inspection: Upper Duct



2017 Internal Inspection: Upper Duct



2017 Internal Inspection: HX Tube Entry

Conclusions

- **After 5 years' operation, no evidence of corrosion of stainless steel heat exchangers as is typically present with carbon steel tubes (no information / data on iron transport).**
- **No reported problems with fin denting, weld compatibility etc.**
- **Cost-benefit evaluation necessary for consideration of SS HX installation in new construction.**