Wyodak Power Plant

Plant Data

- 380 Gross MW/340 Net
- B&W natural circulation boiler
- General Electric Turbine/Generator
- 2.6 Million lb/hr steam flow through turbine
- Original ACC designed by GEA
- Replaced in 2011 with SPX design
- Plant commissioned in 1978 with "The Worlds Largest Air Cooled Condenser"

Additional Plant Data

- Dry Scrubber (Joy/Niro) commissioned 1986
- Hamon Baghouse commissioned 2011
  - ID fans oversized for future SCR (12,000 HP motors)
- B&W Low NOx Burner Upgrade commissioned 2011

Air Permit Limits

Nox

- 0.23 lbs/mm-BTU (30 boiler operating day average)

SO2

- 0.16 lbs/mm-BTU (30 boiler operating day average)
- 0.5 lbs/mm-BTU (fixed three block average

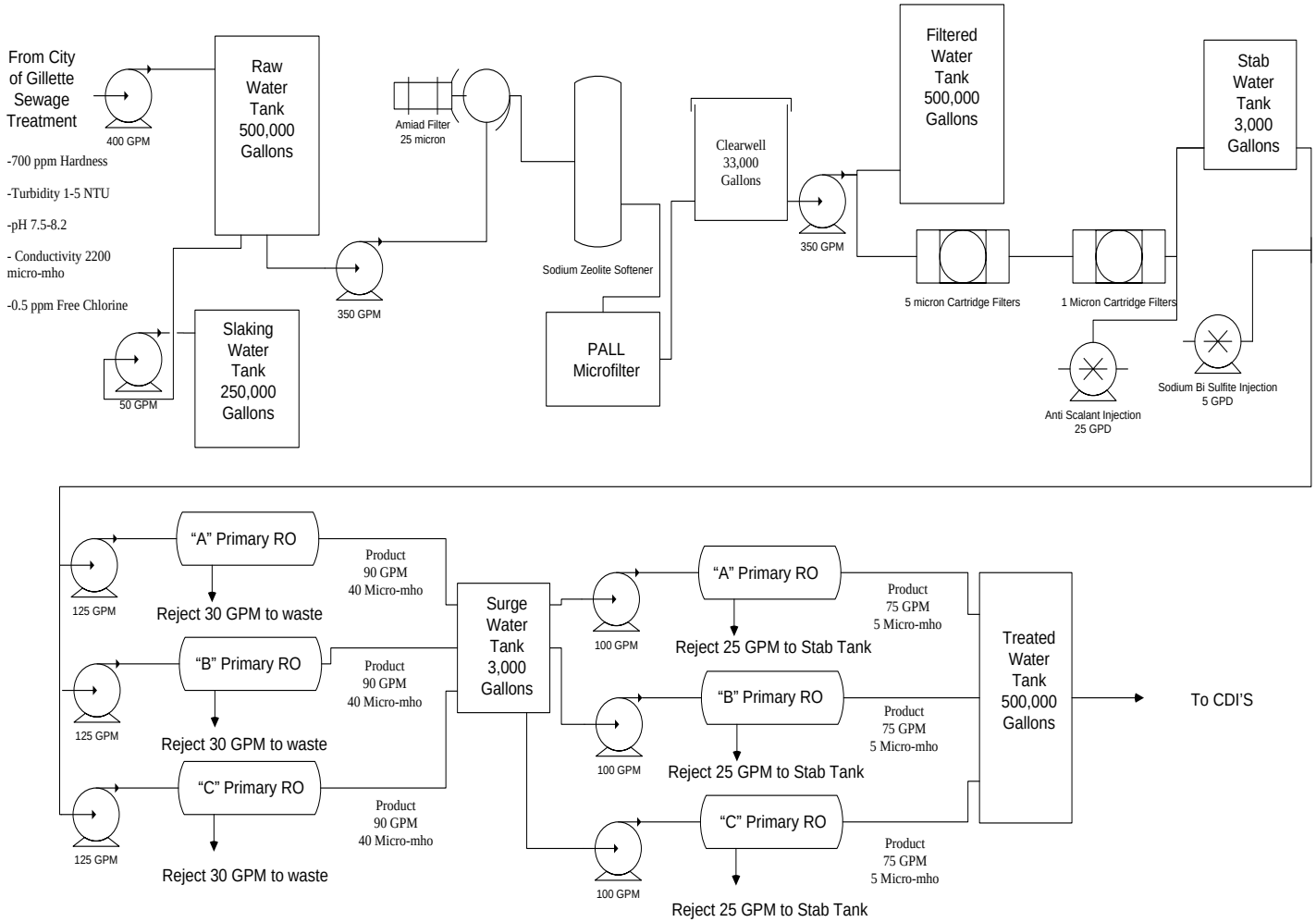
CO

- 0.25 lbs/mm-BTU (30 boiler operating day average)
- 1175 lbs/hr (30 boiler operating day average)

ACC Benefits

- Wyodak receives make up water from the City of Gillette waste treatment plant
- Approximate water balance as follows:
  - 300 GPM for water treatment (condensate make up process)
  - 60 GPM for slaking water for lime hydration scrubber
  - 40 GPM miscellaneous fire water

Water Treatment



Original ACC Construction

- LP Turbine built to withstand high back pressure (TRIP 17”Hg)
- 2 Million lb/hr steam flow through the ACC
- 69 Fans
- 12 Rows of fans
- Rows 2-12 each contain 6-125 HP fans, 20 ft 8in diameter
- Row 1 contains 3-300 HP fans, 32 ft 10 in diameter

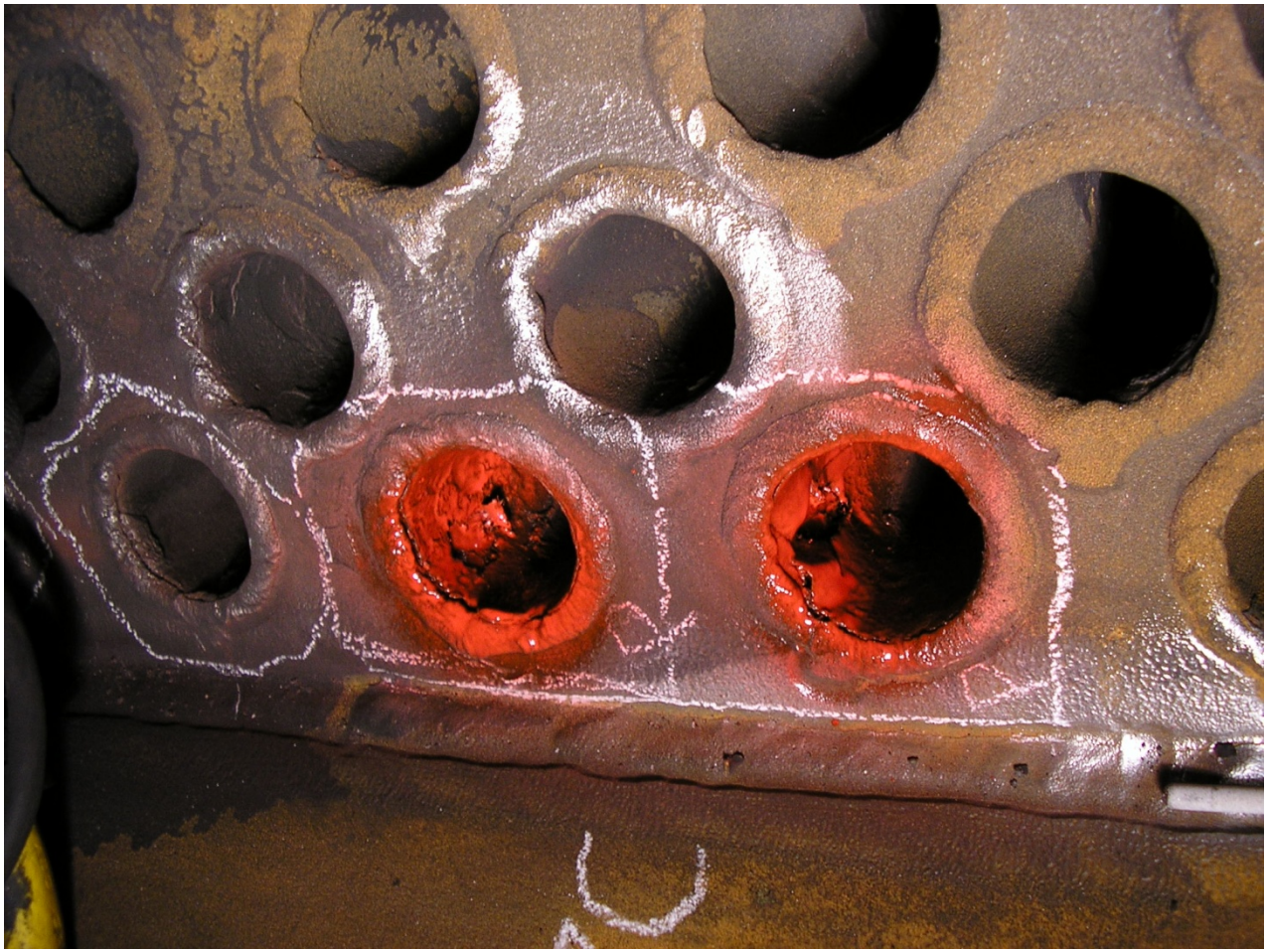
Original ACC Construction

- Fans originally configured with two speed motors and later converted to VFD's
- Ovation DCS controls fan speed with several controllers
- Potential for savings with turbine back pressure optimization algorithm

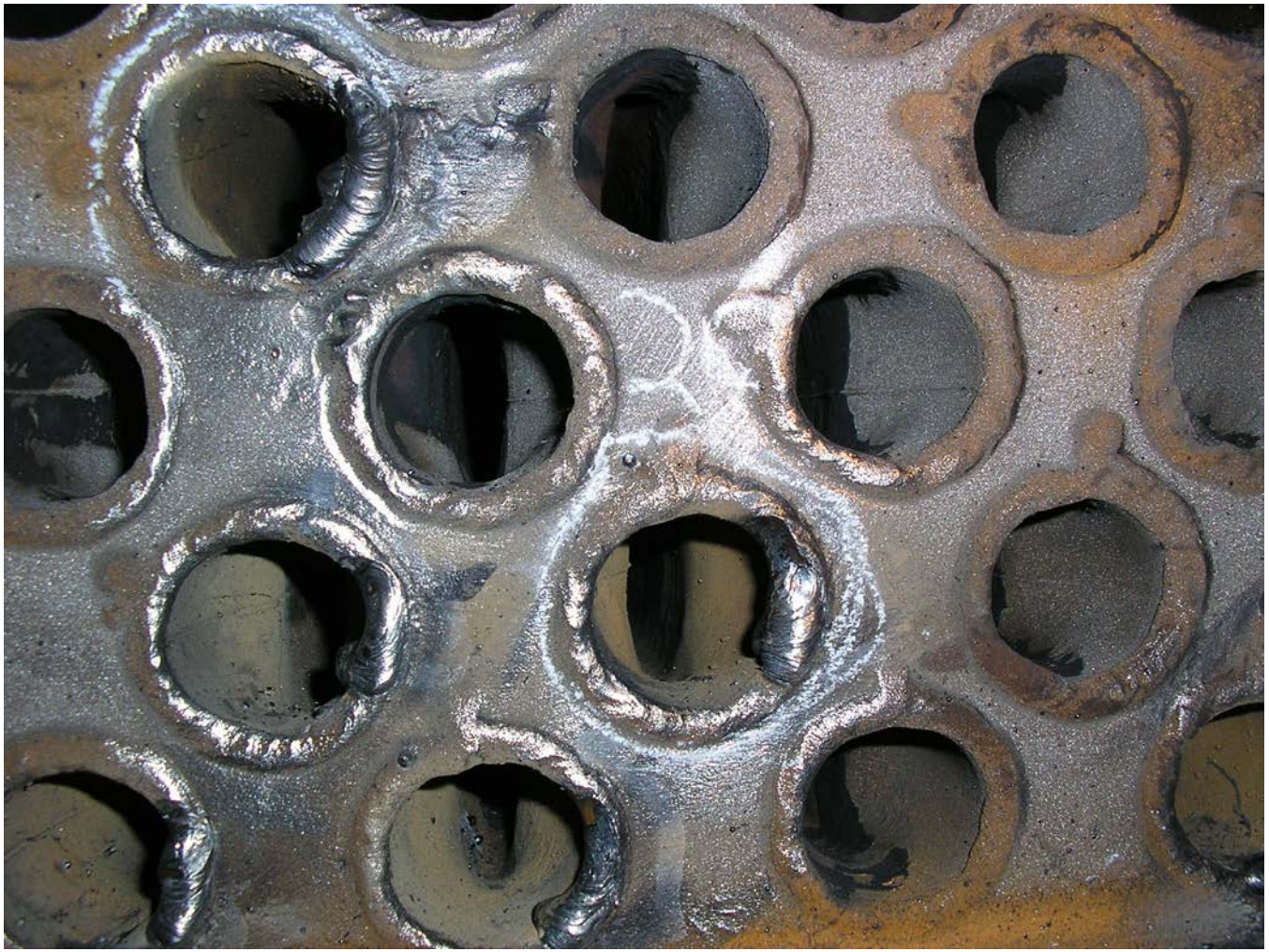
ACC End of Life Issues

- DO levels at condensate pump discharge
- Air in leakage causes air binding of condenser
- Winter operations especially tricky
- Methods to patch leaks

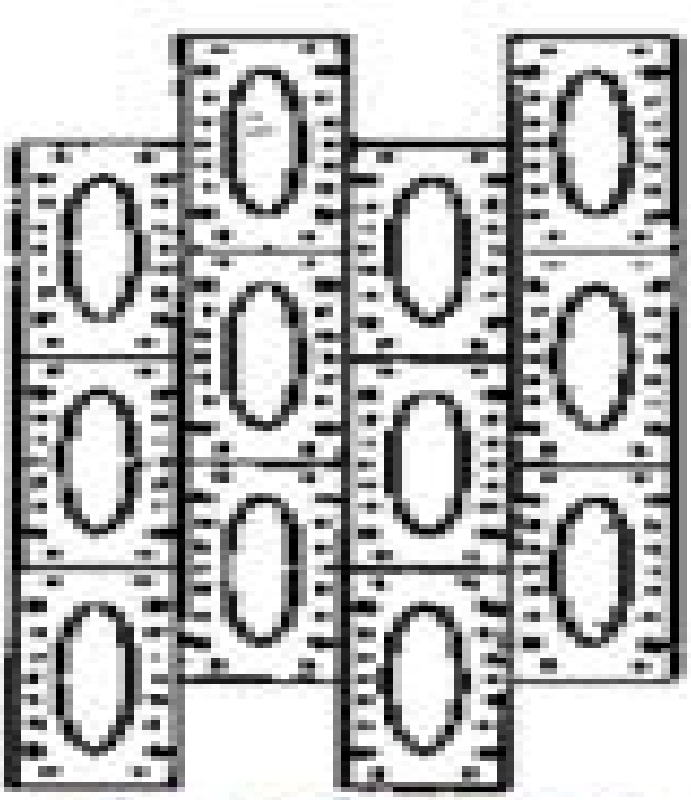
Typical Tube Failure



Single Tube Replacement

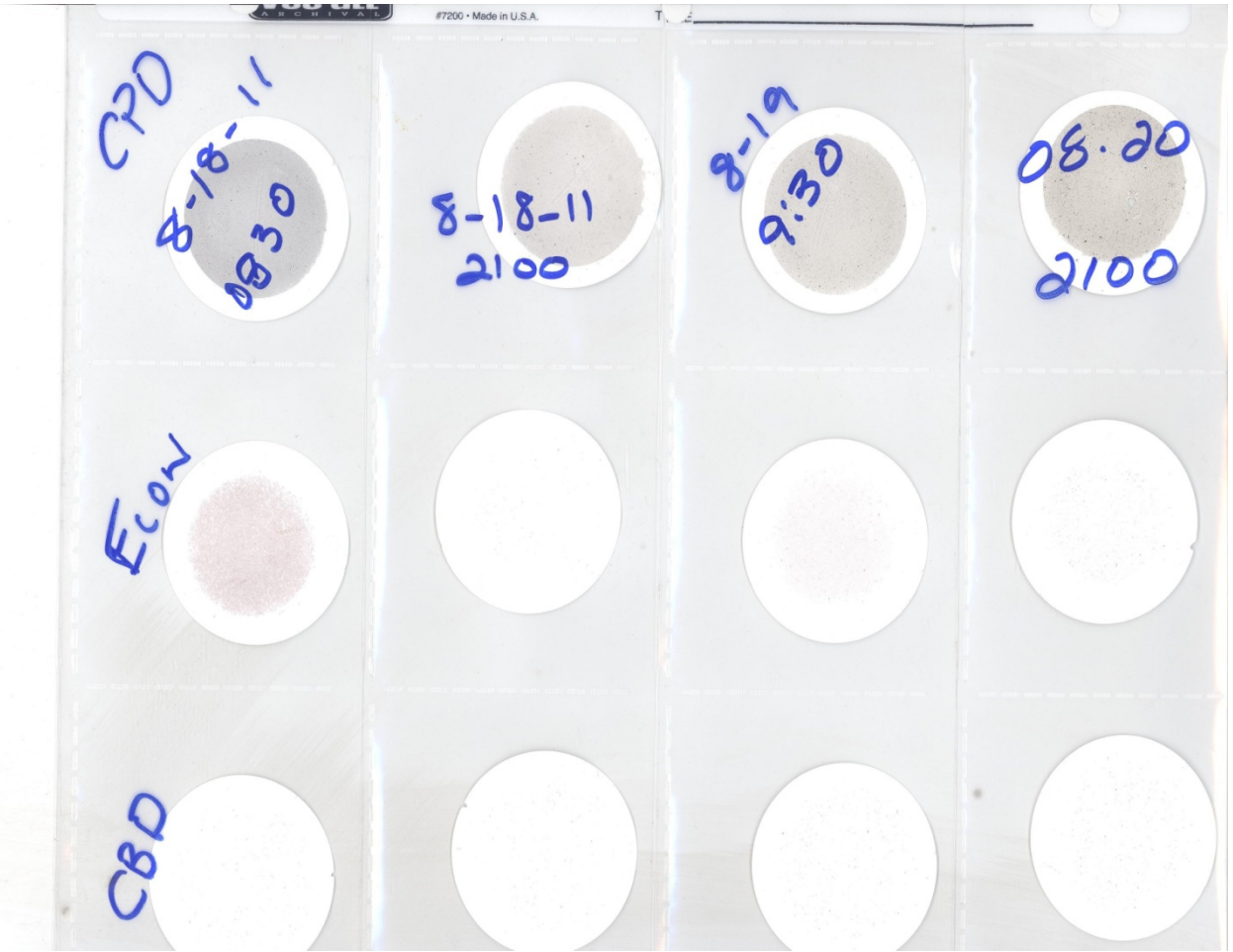


Original Three Tube Row Design



Condensate Filter

Condensate Filter



Project Schedule

- Accelerated Project Execution Schedule
  - CEO Project Approval in Mid July 2010
  - Project Award End of August 2010
  - Mobilization October 2010
  - Planned Outage 28 hr Outage November 13, 2010
    - Isolated 6 Half Streets (Rows 7-12)
  - Unplanned 22 hr Outage January 22, 2011
    - Tied in 2 Half Streets (Rows 11&12)
    - Isolated Row 1 (Proto-Type)
  - 42 Day Overhaul March-April 2011
    - All additional rows removed and replaced on schedule.

Blanks Installed to Isolate ACC Streets

Row 7-12 South Removed and built in place.

Row 12 South "A" Frame in place waiting tube and header installation.

Row 1 South being constructed in place.

Complete ½ Street Modules being built on site.

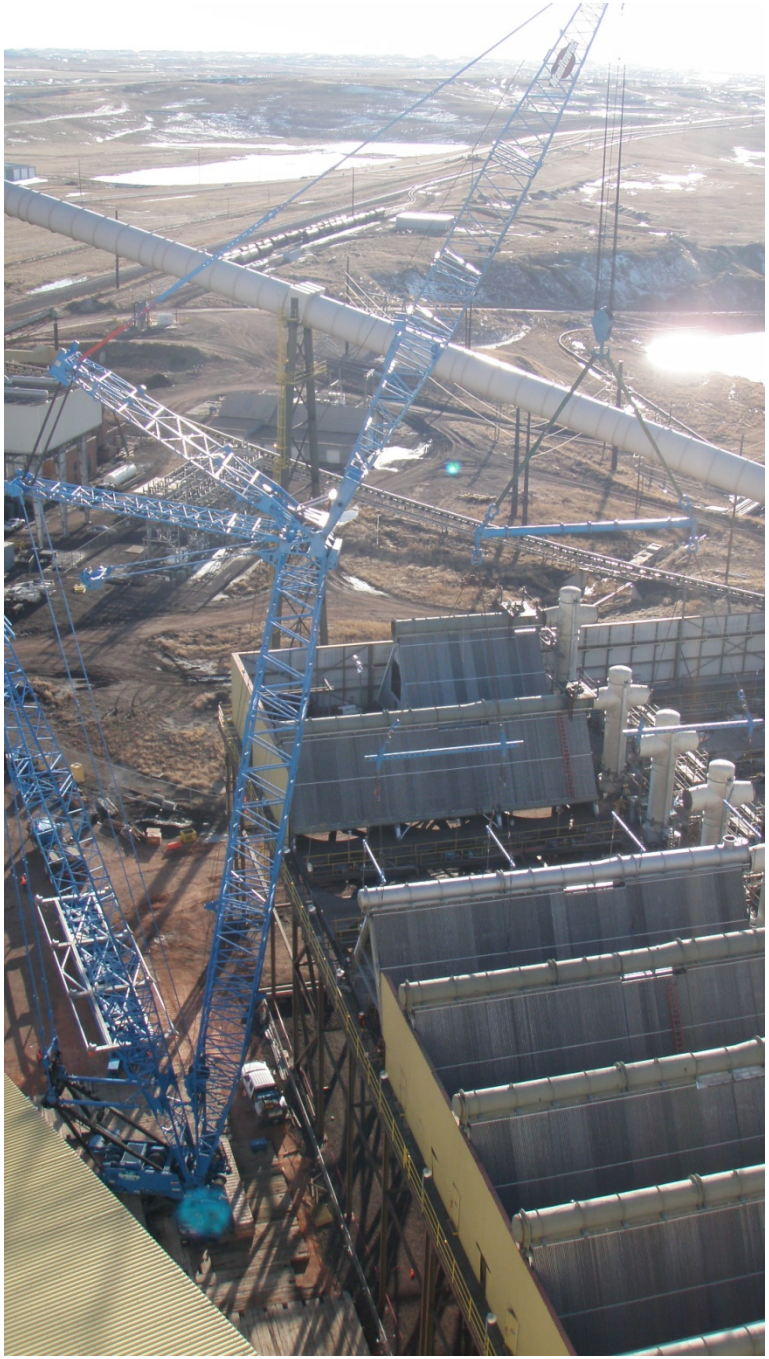
ACC Modules in Fabrication Yard.

Modules in FabricationYard.

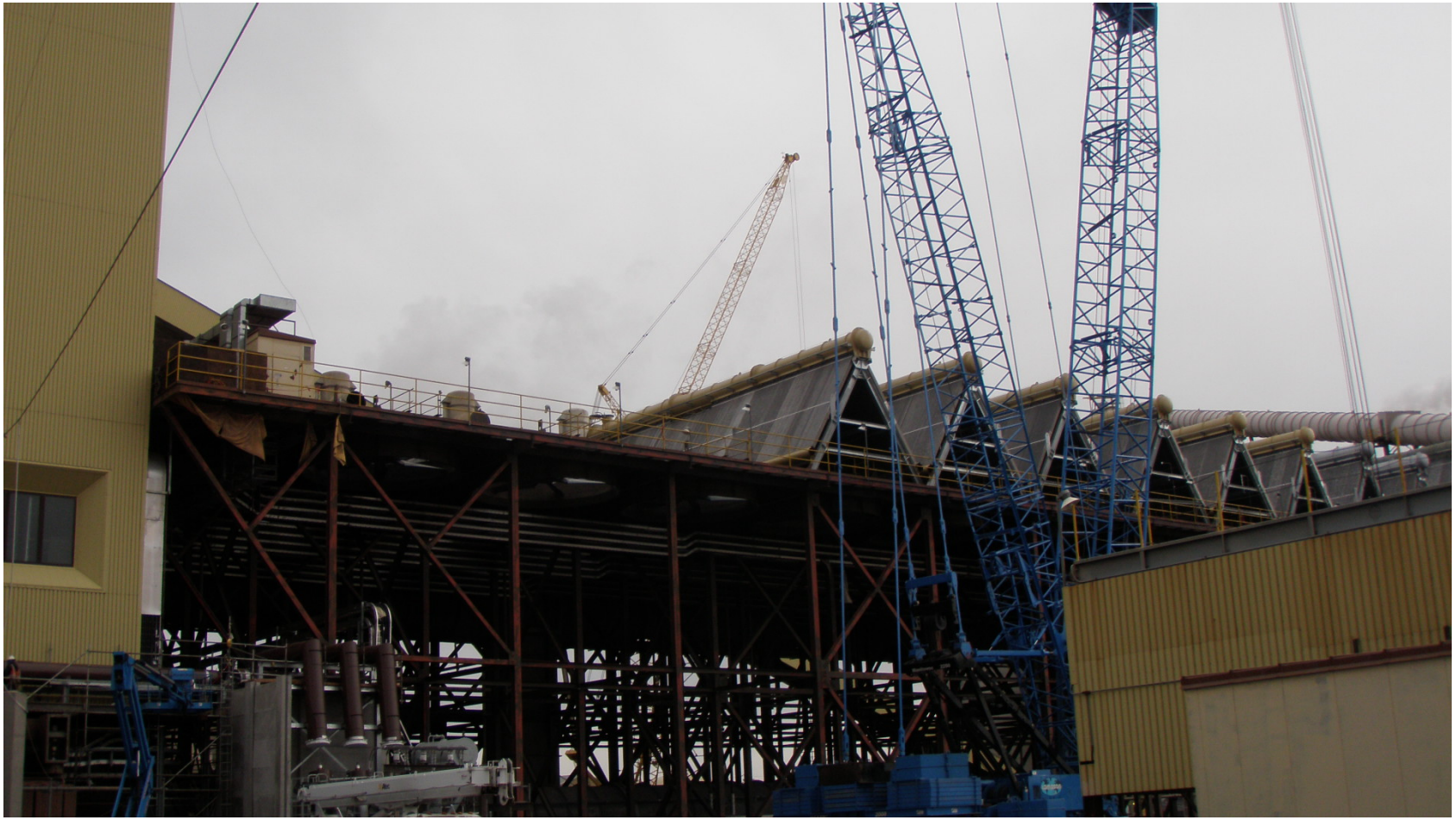
Partially completed modules.

Competed Modules ready to be moved to ACC deck.

Modules being moved around from fabrication yard to ACC deck.



View from North as Modules are being set.



Row 11 North ready to lift into place.

Row 12 North being set.

New wind wall be installed after all modules were set.