

# Niagara Blower Company

(Since 1904)

 **RESORCON inc.**

WET SURFACE AIR COOLERS (WSAC)

## POWER PLANT APPLICATIONS



Thermal Products, Inc.  
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249 MW Combined Cycle Power Plant  
660,000 lbs/hr Steam Condensing @ 2.8" HgA  
8,000 gpm Auxiliary Water  
@ 80°F Wet Bulb

The **Niagara/Resorcon** Wet Surface Air Cooler (WSAC) is used in a wide range of power plant heat transfer applications:

- **TURBINE VACUUM STEAM CONDENSING**
- **AUXILIARY LOOP FLUID COOLING**
- **REFRIGERANT CONDENSING (TURBINE INLET AIR COOLING SYSTEMS)**

The **advantages** of the Wet Surface Air Cooler are:

▶ **SIGNIFICANTLY LOWER PARASITIC ENERGY USE**

- 75% less horsepower than a typical dry cooler application
- 25% less horsepower than a typical cooling tower and surface exchanger

**MORE AVAILABLE POWER**

▶ **LESS WATER CONSUMPTION**

- WSAC can operate at much higher cycles of concentration than a standard cooling tower
- Blowdown is reduced by up to 50%
- Discharge, brackish, or sea water can be used as makeup water

**REDUCED WATER USE AND DISCHARGE RATE**

▶ **LOWER MAINTENANCE REQUIREMENTS**

- WSAC design allows easy access to the system components, even while unit is in operation.
- No fill or packing to clean or replace
- No louvers or mist eliminators to maintain

**REDUCED MAINTENANCE COSTS**

▶ **RUGGED INDUSTRIAL CONSTRUCTION**

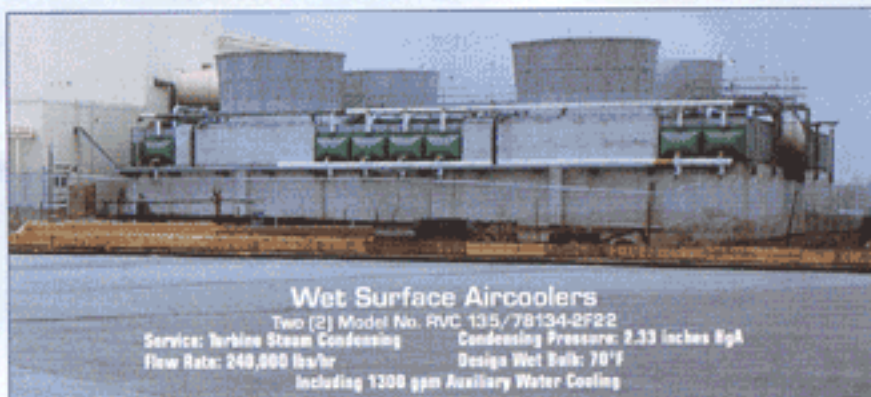
- No plastic fill or wood to foul, clog or deteriorate
- Less fouling with co-current flow design
- ASME Code construction available
- 10 & 12 gauge steel hot dipped galvanized after fabrication panels

**LONGER LIFE AND HIGHER RELIABILITY**

▶ **SINGLE SOURCE THERMAL RESPONSIBILITY**

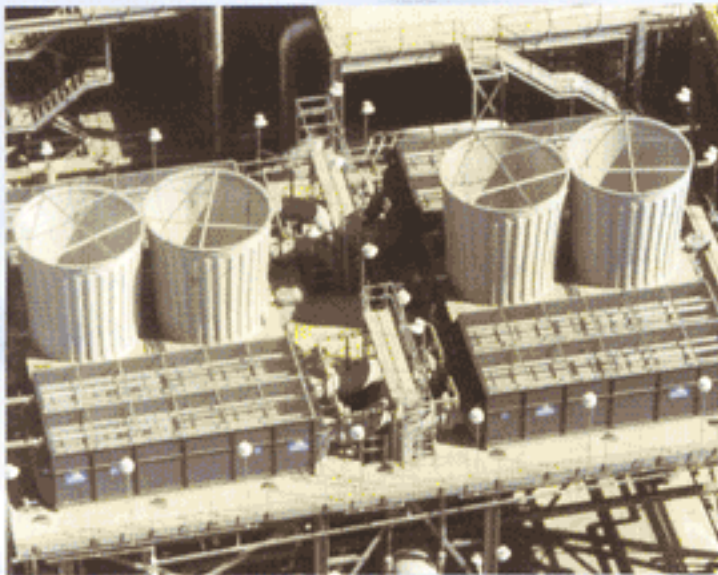
- The WSAC replaces the surface condenser/heat exchanger and cooling tower
- Single approach to wet bulb delivers the lowest attainable outlet temperature
- Circulating pumps and associated piping are no longer required

**LOWEST FLUID OUTLET TEMPERATURES**



**STEAM CONDENSING**

The back pressure of the steam turbine condenser has a significant effect on steam turbine efficiency. The WSAC can deliver the lowest steam condensing temperature and pressure conditions at the most economical total installed cost and lowest consumed horsepower.



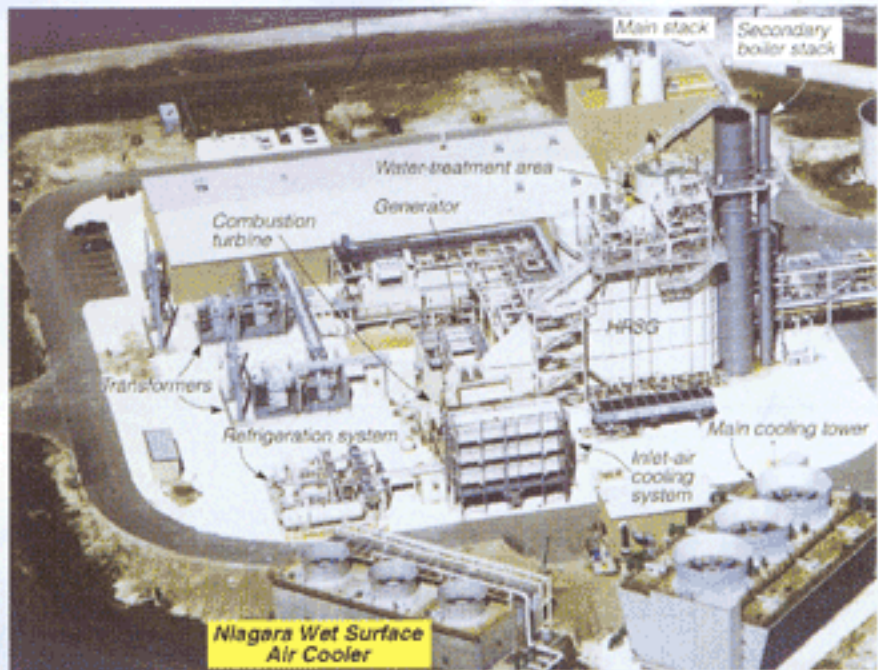
## AUX LOOP FLUID COOLING

Maintaining required aux loop temperature is important to the cooling efficiency and operation of auxiliary components (air compressor, lube oil cooler, generator, atomizer, support legs, etc.) The WSAC provides true closed loop cooling, resulting in greater reliability and reduced fouling of auxiliary components.

Regardless of water or glycol composition, Niagara engineers will optimize the most efficient solution for aux cooling requirements.

## GAS TURBINE INLET AIR COOLING

Lowering the ambient inlet air temperature entering the gas turbine is a proven method of increasing available power output. One of the most widely-used systems is an ammonia-based refrigeration system. This utilizes flooded ammonia or ammonia-to-chilled water through the inlet air evaporator coil. The WSAC is the most efficient condenser for these systems, delivering the optimal refrigerant condensing temperature and pressure at minimum HP consumption.



## INLET AIR COOLING PROJECT SUMMARY

|                     | Pawtucket, RI | Bartow, FL | Rumford, ME | Tiverton, RI | Westbrook, ME | Griffith, AZ |
|---------------------|---------------|------------|-------------|--------------|---------------|--------------|
| NomPlant Cap (MW)   | 110           | 110        | 240         | 240          | 520           | 520          |
| Turbine Qty/Type    | 1x7 EA        | 1x7 EA     | 1x7 FA      | 1x7 FA       | 2x7 FA        | 2x7 FA       |
| Inlet Air Temp (°F) | 55            | 55         | 50          | 50           | 55            | 45           |

# How Does the WSAC Work?

① Air is induced downward over tube bundles

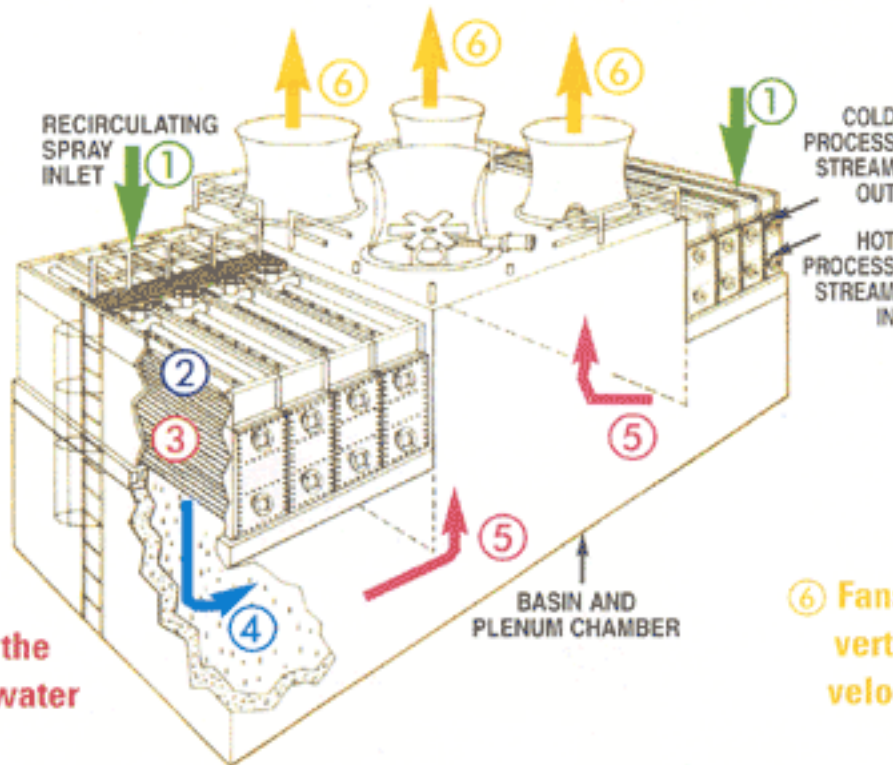
② Water flows downward along with the air

③ Heat from the process stream is released to the cascading water

④ Heat is transferred from the cascading water to the air stream via vaporization

⑤ Air stream forced to turn 180° providing maximum free water removal

⑥ Fans discharge air vertically at a high velocity preventing recirculation



## NIAGARA/RESORCON

Since 1904, Niagara/Resorcon has been known for the design and manufacture of high quality industrial heat transfer equipment. The highly specialized team of engineers and designers will ensure the best solution for each heat transfer application.

## Niagara Blower Company

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