ER ID 098048

TA-3 Cogeneration Plant Operations, Interview with Bob Prindle and Joe Ortiz, May, 2006

Kay Birdsell's discussion with Bob Prindle and Joe Ortiz on May 4, 2006 and some follow up information. Joe Ortiz has been the Water Treatment Specialist at the TA-3 cogeneration plant since the early 1980's with KSL or its predecessors. Bob Prindle is an environmental engineer with Eberline and is deployed to the plant.

Background

The TA-3 cogeneration plant produces steam and electrical power. The steam that is produced in the plant's boilers is used in the steam turbines to generate electricity or is distributed through a pipe network within TA-3 and TA-43 for various uses, primarily heating.

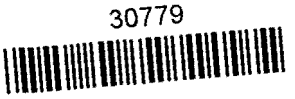
Chromium is known to have been used to inhibit corrosion in the plant's cooling towers during the period from the mid-1950s through the early 1970s. The cooling towers at the plant are operated only when electrical power is being generated; they are not operated when the plant is producing only steam. Joe Ortiz believes that, during the period when chromium was being used, all three of the plant's steam turbines were operated daily to generate electrical power.

Discharges from the plant to Sandia Canyon through NPDES Outfall 01A-001 have historically been made up primarily of cooling tower blowdown, boiler blowdown, and treated wastewater resulting from the purification of raw water for boiler makeup. Since the TA-46 Sanitary Wastewater Treatment Plant was built in the early 1990s, treated effluent from that facility has also been discharged at Outfall 01A-001. The SCC and LDCC cooling towers currently both discharge to Sandia Canyon as well: SCC to the south arm (NPDES Outfall 03A-027), and LDCC to the north arm (NPDES Outfall 03A-199).

Cooling Tower Discharge Data

Historically, when the plant was generating large amounts of electrical power, cooling tower blowdown was the largest component of the plant's total discharges to Outfall 01A-001. Because of the continuous operation of the turbines and the resulting large cooling loads, blowdown from the cooling towers would have been a nearly continuous process to maintain acceptable levels of silica and other minerals in the cooling tower water.

The plots below show water usage at the plant's cooling towers for the calendar year 1983. Specifically, the information is for cooling tower blowdown (Fig.1), evaporation (Fig. 2), and total makeup water (Fig. 3). In 1983, all three of the plant's steam turbines were being operated daily to supply electrical power to the Laboratory. Therefore, cooling load and water use during 1983 are likely to be representative of the period from the mid-1950s through the early 1970s when large amounts of electrical power were being generated on a daily basis. We can then use the blowdown volumes along with estimated chromium concentrations to estimate the total mass of chromium that the plant discharged into Sandia Canyon.



Other Discharges from the Cogeneration Plant

Historically, the volume of wastewater produced from purifying water for boiler makeup was a relatively small component of the plant's total discharge to Outfall 01A-001. However, as the steam-distribution and condensate-return systems have aged, there has been a substantial decrease in the quantity of condensate return water, which has increased the demand for boiler makeup water.

In 2004, the plant began switching from demineralization to reverse osmosis (RO) to produce boiler makeup water. The volume of RO reject water is substantially larger than the volume of regeneration waste that had been produced from the demineralizers. For the recovery efficiency at which the RO process is being operated, the reject water volume is equal to approximately 25% of the total feed to the RO units, or approximately 33% of the total demand for boiler makeup water.

In recent years, the discharge of cooling tower blowdown to Outfall 01A-001 decreased substantially because of limited power generation. But in the past two years, the total discharge from the plant to Outfall 01A-001 has begun to increase again because of the rising demand for boiler makeup water and because of the change to the RO process.

TA-46 Sanitary Wastewater Effluent Discharges

Effluent from the TA-46 SWSC plant is pumped to tank TA-3-336 at the power plant site, usually during the day shift. The effluent is dechlorinated and discharged to Outfall 01A-001. Some of the effluent was previously used to supply makeup water to the plant's cooling towers. However, during the past several years, the TDS in the effluent has increased significantly making it a marginal source for makeup water.

The Sanitary Effluent Reclamation Facility (SERF) is located in TA-3 adjacent to the cogeneration plant. SERF was built as an industrial water treatment facility to reclaim and purify the effluent from the TA-46 SWSC plant for use in the SCC cooling towers. To date, the SERF has operated for only a few months, but it is expected to resume operation in June 2006.

Other Power Generation Information

Currently the plant continuously produces steam but only occasionally generates electrical power. Most of the electrical power for the Laboratory is purchased through the Western Area Power Administration, as the cost is less than generating it onsite. The TA-3 power plant is available for backup power generation. The Laboratory is currently installing a gas-turbine generator at the plant to provide additional backup generation capacity.

Additives

I received a handwritten description concerning cooling tower additives and the dates of their use at the TA-3 Power Plant that was written by Joe Ortiz. The note is attached and is addressed to a person named "Lind." Joe does not recall when he wrote it, but thinks it was in the 1980s. It is attached. He no longer had the supporting information that he used to write this note.

Memos from Betz Laboratories

Joe also supplied copies of 4 memos from Betz Laboratories – 2 from 1972 discussing the replacement of chromates with other Betz chemicals, 2 from 1975 discussing some water sampling results and an analysis of deposits in the cooling towers. Those are also attached to this summary.

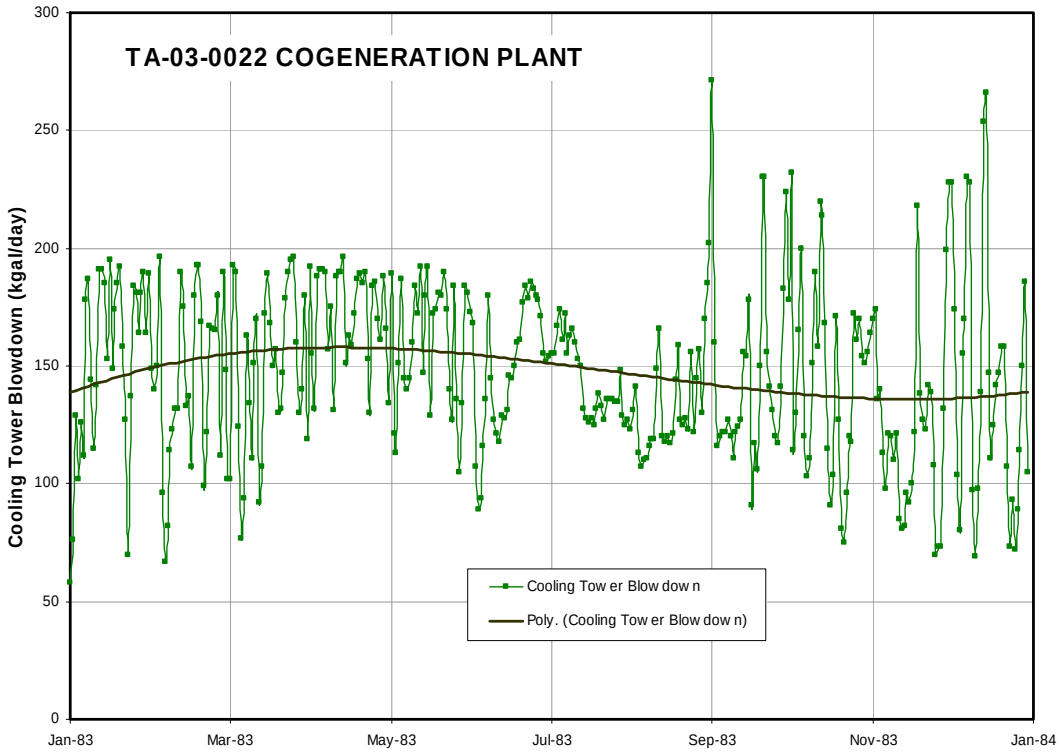


Figure 1. 1983 Blowdown volumes for cooling towers associated with the TA-3 power plant.

* The data in Figures 1 through 3 are from daily, handwritten, operator's logs on cooling tower operations associated with the TA-3 power plant from 1983. Bob Prindle entered the data into an Excel spreadsheet and made these plots.

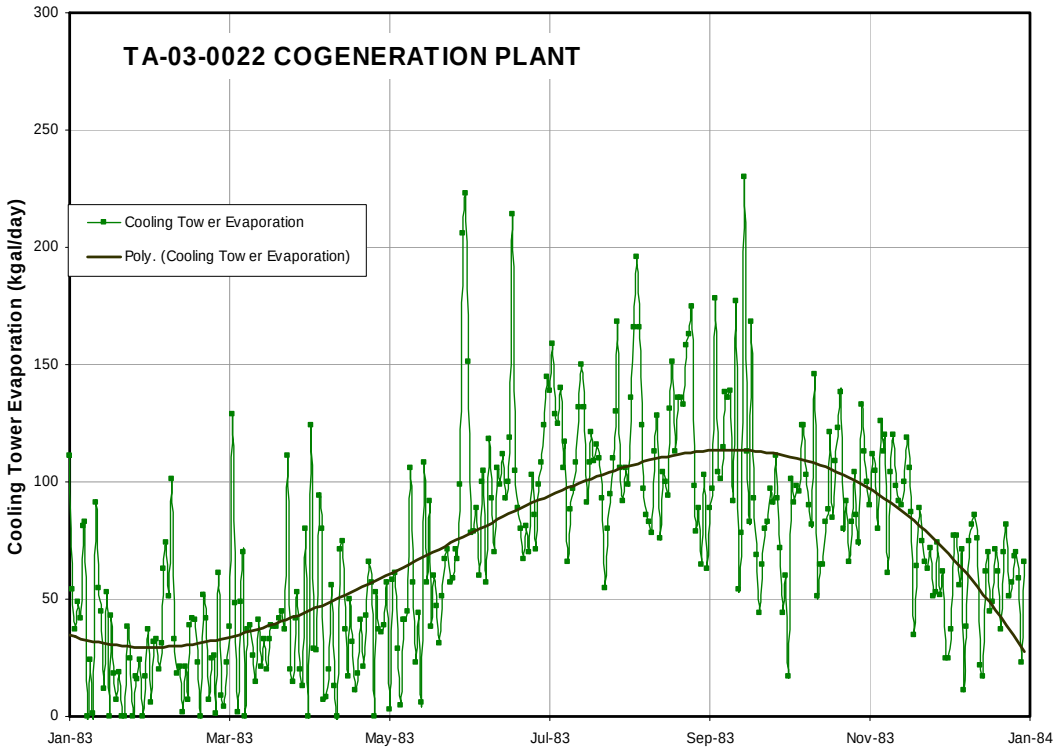


Figure 2. 1983 evaporative losses for cooling towers associated with the TA-3 power plant.

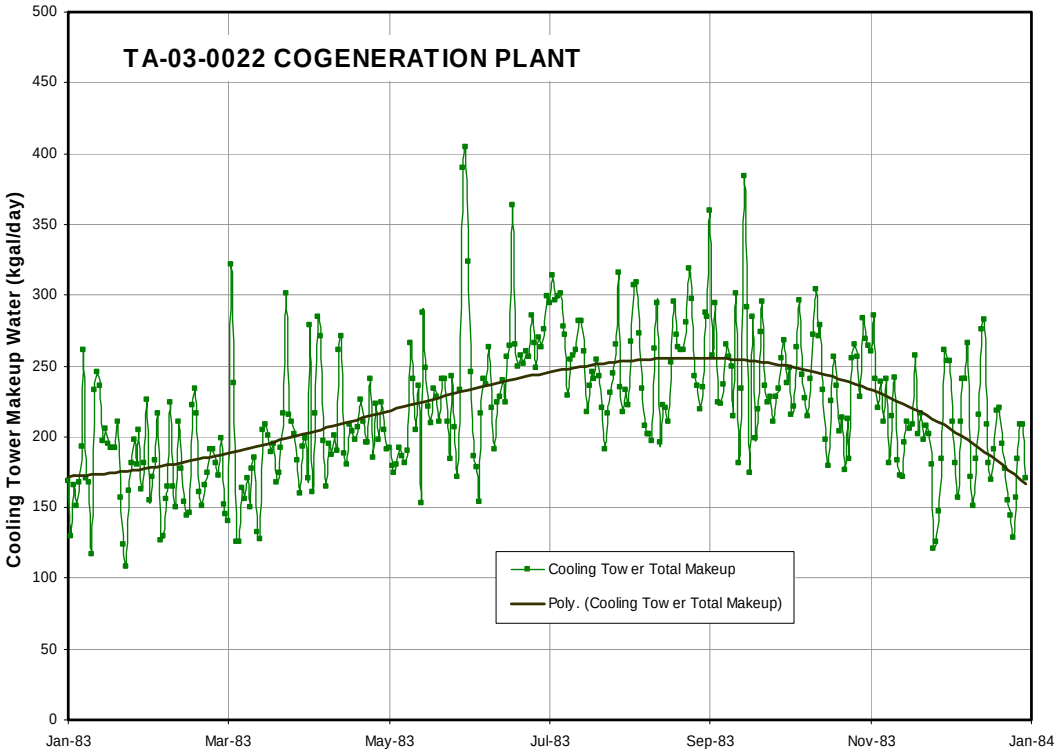


Figure 3. 1983 makeup water volume for cooling towers associated with the TA-3 power plant.