

Alameda County Water District

Water Treatment Plant #2

March 11, 2014

Baywork

Power Facility:

Purpose: Control of plant flow through the use of hydroelectric power generation.

Distribution of power to the plant processes.

Control the high head of the supply water.

Reduce electrical cost to operate the ozone system and the treatment processes.

Technical: Converts 335 ft of hydraulic head to usable power.

Two 125 KW turbine generators

Four 250 KW turbine generators

One back-up 500 KW diesel generator

Bypass valve sized for full plant flow

Uninterruptable Power Supply for plant controls and computers

Design issues:

Variable flow requirements of the treatment plant

Synchronous generators verses outside excitation on induction generators.

Proper sizing of the bearings and location of the counterweight

Good air flow for cooling

Power production well within the curve

The best type of generator for the application

Service life of the generator

Cost savings:

At \$0.15 per KWh, the company saves approximately:

\$1620/day at 14 MGD

\$2430/day at 21 MGD

\$2790/day at 24.5MGD

At 21 MGD nominal water plant production, enough power is generated to operate WTP2 and 25% of MSJWTP current needs. The treatment plant becomes self-proficient at 10.5 to 14 MGD.

At 21 MGD nominal water plant flow, nearly 6 million kilowatt hours is generated per year enough power to supply 450 four person homes. If this power was generated through an oil burning generator, 9000 barrels of crude oil would need to be used.

Bromate Control Strategies:

pH Suppression:

CO2 or Sulfuric Acid

Safety

Cost

Feeding CO₂ of mixing it first with a carriage water flow

Added value in maintaining a constant pH for coagulation

Low pH issues. Extra chemical cost

Multiple Feed Points:

Low cost

Works on the principles of pre-mixing with lower ozone concentrations

10 to 25% reduction with air prep generated ozone.

Pre-chloramination:

Chlorine, ammonia, or both

Ties up the bromide forming bromine

Does not require a low pH

Can be combined with a low pH for additional bromate reduction

Generally bromate is reduced to less than 1 ppb

Additional operator sampling is needed

Additional chlorine and ammonia cost are off-set by the reduction in caustic and carbon dioxide

Chloramine effects on downstream operation might be an issue.

Still being evaluated