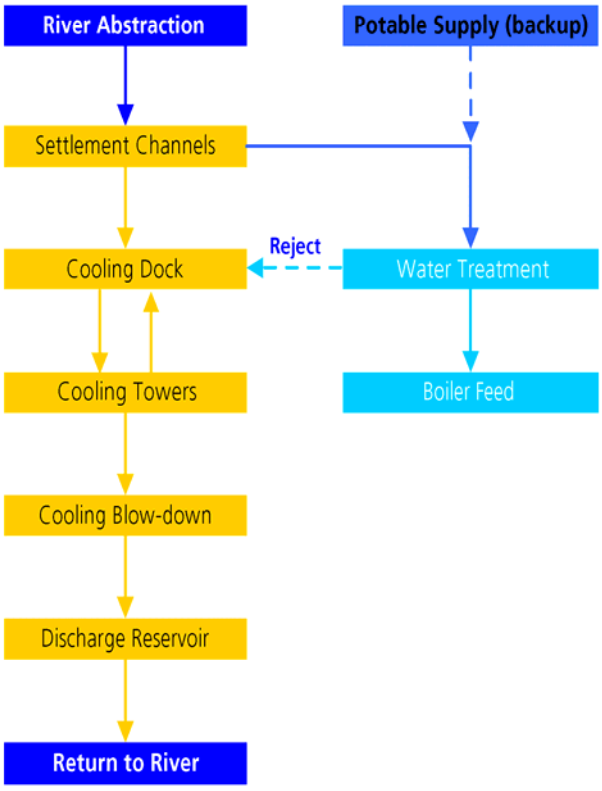
Power industry
Gas turbine power station

the production process



The customer operates a combined cycle gas turbine power station, which produces power for export to the national grid.

River water is abstracted for use in the site cooling system and within the water treatment plant. The quality of the river water varies considerably and it is often necessary to use a backup supply of potable water from Anglian Water to maintain operations.

The customer was concerned about a number of issues regarding the quality of river water, as this directly impacts the frequency on which the backup supply is required, namely:

- In recent years it has been necessary to use potable water in preference to river water for prolonged periods (up to 200,000m^3 per annum). The cost of potable water is greater than the cost of river water.
- The requirement for a backup supply has lead to high water charges due to the Maximum Daily Demand (MDD) component of the water tariff.
- Silt from the river water was passing into the cooling tower system resulting in increased maintenance activity and associated costs.
- Oil, which is retained by the silt, was passing through site water and effluent systems. This could lead to a breach of the site discharge consent, increasing the risk of prosecution by the Environment Agency.

Optimiser conducted a study to investigate these issues in detail and evaluate potential solutions.

study findings:

The Customer has 2 parallel settlement channels used to remove solids from the river water supply. The design of the channels was reviewed and confirmed as satisfactory, however physical inspection of the channels showed that very few solids were being removed.

A site water balance was established and it was identified that the rate at which water was abstracted from the river into the channels was 25% higher than was needed to meet demand. The channels were therefore operated in an on / off mode.

The higher flow rates resulted in solids having insufficient time to settle out. The on / off flows were also stirring up previously settled solids. This increased the number of solids in suspension and, therefore, the amount of solids passing through the settlement channels.

Pump efficiencies were calculated and it was identified that flows could be reduced without adversely affecting the operation of the pumps.

recommendations:

Reduce output of the raw water intake pumps to limit flows into the settlement channels, to minimise the on / off operation of the plant, thus reducing overall flows and increasing the time allowed for solids to settle.

During the trial - take samples of water from the inlet and outlet of the channels to determine the success of throttling back supplies.

Optimiser continued to provide technical support and completed the trial on behalf of the customer. This included the installation of automated samplers, and a complete analysis of the samples by a UKAS accredited laboratory.

The trial was conducted over a six-week period. During the first two weeks the flow to the settlement channels was unaltered. Over the following 4-week period, samples were taken with flows throttled back to determine the level of change.

benefits:

Optimiser identified a low cost solution with immediate cost and operational benefits to site, which included:

- Reducing flows resulting in more solids being removed from the raw water supply.
- Increased availability of raw water in preference to the potable supply, lowering site costs.
- Significantly reducing impact of silt passing through the site-wide water system, resulting in lower operating costs.
- Less frequent requirement to de-silt cooling towers and the site wide water system.
- Decreased potential for oil to be retained in the site water and effluent systems due to reduced solids, therefore lowering the risk of prosecution by the Environment Agency for breach of discharge consent.

All of the above was achieved using existing equipment, without the need for capital expenditure.