OPERATING EXPERIENCE WITH DIFFERENT WEAK BASE ANION RESINS IN THE FOLLOWING CONFIGURATION: WAC-WBA-SAC-DEGAS-SBA

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ABSTRACT

There remains a challenge in the treatment of boiler feedwater to adequately remove dissolved organics. This paper deals with some actual in plant experience in using weak base anion [WBA] resins to remove organics. Results are presented for weak base resins supplied by three different manufacturers. Also discussed are the problems and benefits derived from locating the weak base unit in front of the strong acid cation [SAC] unit. The paper draws two main conclusions. Weak base anion resins provide a viable means of removing organics while at the same time assisting in reducing the ionic loading on the strong base anion [SBA] unit at the end of the train configuration. Care has to be exercised in the selection of the type of weak base resin.

INTRODUCTION

In 1978, Syncrude Canada Ltd, a consortium of major oil companies and the government of Alberta, began the operation of the world's second and largest synthetic crude oil mining and processing operation. Located in Northern Alberta, where
temperatures go as low as -40°C, the steam/power generation complex, which supports the mining and processing operations, comprises an eight train demineralizer operation. Each train is configured as WAC-WBA-SAC-DEGAS-SBA. The degassifier is common to all eight trains. Each train has a design capacity of approximately 4.0 m³/s. Normal operating configuration is six trains in service and two in regeneration mode. This gives a sustained capacity of approximately 24 m³/s. The rather unusual location of the weak base unit after the weak acid unit and before the strong acid unit has a history.

HISTORY

Midway during construction of the plant it was realized that problems of organic fouling of the strong base anion resin would be encountered. The reason for this being that the raw water source was from the Athabasca River which contained high levels of humic substances. As a result, organic screen vessels were incorporated into the design. It was expected that there would be sodium leakage and consequently these vessels were placed in front of the strong acid cation units which would take care of any leakage.

RESIN TYPES

The organic screen vessels at start-up contained an adsorbent resin which was designed specifically for the removal of organics and had very little ability to remove chlorides and sulphates. Around 1984, resin manufacturers approached Syncrude with advice to switch the adsorbent resin to true weak base resins and enjoy the benefits of not only organic removal, but also both sulphate and chloride removal. Syncrude was informed that the optimum organic removal would be achieved if the influent water to the weak base units had a high free mineral acidity [FMA]. This meant locating the weak base units after the strong acid units. To do this for the existing seven trains [eighth train was added later] required considerable redesign of the control logic and major re-piping. It was decided, therefore, to evaluate the reconfiguration in a pilot plant.