

**Client:** Liaohe Oilfield  
**Location:** Liaoning Province, China  
**Type:** Heavy Oil Production  
**Application:** Produced Water Purification

The Liaohe Oilfield is the largest heavy oil production field in China with 10,000 oil wells and a production capacity of 250,000 BPD (12,500,000 T/year). Using a steam simulation process, the oilfields produce 20,000 m<sup>3</sup>/day of produced water. The objective of the produced water purification project was to provide water quality suitable for feed water to the high pressure, once-through steam generators.

**Requirements:** The strict treatment target requirements, specified by the Chinese National Industrial Standards, required boiler feed quality that achieves: <2 mg/l oil, <2 mg/l TSS and <0.1 mg/l hardness (as CaCO<sub>3</sub>). In addition to the standards required, other factors were taken into consideration for the design such as fluctuating flow rates in both TSS levels and oil levels.



**Solution:** After failed attempts with other produced water processes, a Liaohe delegation visited Canada to explore the latest technology for produced water. Eco-Tec designed and proposed a system to address the needs, and guidelines, specified by Liaohe officials. Through the minimization of risk, adherence to quality requirements, providing reliability and adaptability to fluctuations, and utilization of advanced technology and instrumentation, Eco-Tec has successfully implemented a large-scale produced water treatment system for heavy oil production.

**System Description:** The produced water treatment system was designed to include components such as: a dissolved air flotation (DAF) process, a clarifier, walnut shell filters followed by Spectrum Micro Media Filters™, and completing the process with Recoflo® Softeners.

Table 1

**System Performance:**

	PRODUCED FEEDWATER	PURIFIED BOILER FEEDWATER
Oil (not including dissolved oil)	300 - 1000 mg/l	< 2 mg/l
TSS	300 - 400 gm/l	< 2 mg/l
Hardness (as CaCO <sub>3</sub> )	80 - 100 mg/l	< 0.1 mg/l
SiO <sub>2</sub>	60 - 100 mg/l	< 50 mg/l



*For more details, contact Eco-Tec and request Technical Papers 161 and 165!*

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