targeting HEAVY METALS

By Matthew Sullivan

A heavy metal factory in China uses electrocoagulation for wastewater treatment

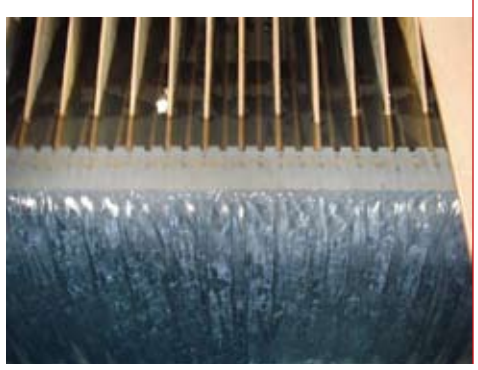
By mid-2007, the Shuikoushan nonferrous metal factory in Hunan Province, China, faced a crisis. As part of its 11th Five-Year Plan (2005-2010), the Chinese government was closing down high-polluting factories, and the Shuikoushan factory was among those at risk. The 110-year-old state-owned factory, with a gross annual income of more than $1 billion USD and 12,000 employees, was emitting high levels of heavy metals into the local water supply. This polluted water was flowing directly into the nearby XiangJiang River and affecting the drinking supply for millions of people within the nearby city of Changsha.

ARTICLE SUMMARY

Challenge: China's Shuikoushan metal factory faced forced closure due to excessive heavy metals pollution that affected drinking water quality. Conventional treatment did not produce water that met regulation standards.

Solution: A consulting firm introduced the factory to a unique EC water treatment system that could remove the problematic heavy metals.

Conclusion: The factory was able to reduce the amount of heavy metals by almost 99% and meet all water pollution standards.



Far more metals were removed from the water by using an electrochemical process than by conventional treatment.

Despite several attempts to remove the heavy metals by using a conventional chemical treatment, the heavy metal contained in the wastewater could not be removed to meet government standards, and the factory continued to emit dangerous levels of pollution.

EC Consulting

In late 2007, US-Pacific Rim Intl. Inc. (USPRI)—a U.S. consulting company that assists U.S. companies in marketing and selling their products and technologies in China—began to promote the electrocoagulation (EC) water treatment system of one of its client companies, Kaselco, to the factory. By working with a local sales agent, USPRI marketed the technology to the factory.

During the process, USPRI highlighted the EC system's unique electrochemical process to remove heavy metals from water. The consulting company explained how the system process works when it passes contaminated water in a layer between metal plates made of aluminum, iron charged with a direct electrical current. The plate material is discharged, dissolved as hydroxyl ion into the stream, where ionic and nonionic contaminants are subjected to the electrical charge, electrolysis products and plate elements. Over voltage, hydrogen, hydroxyl ion and, in some cases, hydroxyl free radicals drive reactions in wastewater that do not occur with standard coagulant/flocculant chemistry.

The process produces a number of effects depending on the species present, but generally contaminants are reacted to their most stable state and then removed from the wastewater by physical means—typical solids separation methods such as clarification or dissolved-air flotation may be employed. This results in solids (sludge and filter cake) of heavy metal that pass the U.S. Environmental Protection Agency Toxic Characteristic Leachate Procedure.

After staff learned the unique features of EC and faced with the risk of closure, the Shuikoushan factory decided to try the technology.

Cleaner Water

During a pilot test of the system in late 2007, the factory found that it could eliminate the heavy metals that it was emitting almost completely. After three months of further tests and negotiations, the factory decided to purchase and install the EC system.

The EC system began operating in November 2008, and the results were dramatic. The factory was able to reduce the amount of heavy metals it discharged by almost 99%, meet the highest national water pollution emission standard and treat 4,100 tons of water a day. Deputy Director of the Hunan Provincial Environmental Protection Bureau Xie Lishuai inspected the EC system and praised the project as a model for wastewater treatment. In the space of several months, the Shuikoushan factory had gone from being a dangerous polluter to a socially responsible enterprise.

This system also brought a number of other benefits to the Shuikoushan factory. Far more metals were removed from the water by using EC than the standard chemical treatment. This occurred because EC technology is not bound by the rules of hydroxide solubility curves. In addition, because there was no need to pay for chemical reagents, the plant was able to save money on initial costs and earn an excellent return on investment.

Challenges & Opportunities in China

Even as China faces enormous environmental challenges, success stories like Shuikoushan's EC system reveal an excellent opportunity for U.S. wastewater companies to export their advanced technologies to China. This case demonstrates that American companies can play an important role in helping China address its enormous problems with wastewater.

A review of some of China's wastewater statistics demonstrates that as China continues its rapid growth, it also faces significant waster and wastewater challenges. Currently, 70% of the country's rivers, lakes and reservoirs are not safe for human use. In

2008, China generated 57.2 billion tons of wastewater, but the overall treatment rate was less than 70% (vs. 95% for developed countries).

According to the JLJ Group, the central government intends to invest more money in wastewater treatment by building more than 1,000 wastewater treatment plants by the end of 2010 at a cost of 330 billion RMB. In addition, the 4-trillion-RMB stimulus plan for 2008 set aside 370 billion for infrastructure, including water supply, and 350 billion for environmental protection, including wastewater treatment. At the same time, the government is beginning to enforce environmental regulations more strictly. All of this governmental attention to wastewater treatment means there will be increasing opportunities for U.S. wastewater treatment companies with unique technologies to export to China.

As the installation of this EC technology at the Shuikoushan nonferrous metal factory demonstrates, exporting wastewater technologies to China holds enormous potential for small and large U.S. companies. By increasing U.S. wastewater exports to China, U.S. companies will not only expand their market, but also help raise China's living standards. WWD

Matthew Sullivan is director of business development and communications for US-Pacific Rim Intl. Inc. Sullivan can be reached at matthew.sullivan@us-pacific-rim.com or +86.108.447.7758.

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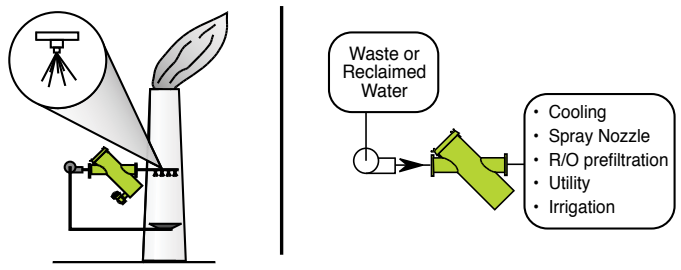

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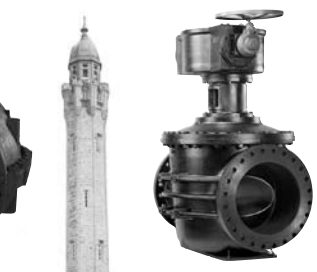

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