

Ash Pond Clean-up Pilot Success



Challenge

An East Coast based coal burning Power Plant* required a water treatment system for a Coal Combustion Residual (CCR) pond to comply with Federal EPA and state regulations. This “Ash Pond” was contaminated with a mix of heavy metals such as lead, copper, thallium, arsenic and selenium. To cap and close the Ash Pond, free and interstitial water, as well as any contact water from rain events, had to be treated to remove these heavy metals prior to discharge to the local river. The General Contractor contracted Envirogen to validate and optimize Envirogen’s treatment approach for this water.

Step 1 - Prior to designing the CCR water treatment pilot system, the water was sampled to determine concentrations of the target contaminants. As expected, the interstitial water contained significantly higher concentrations of heavy metals (as much as 100x) compared to the surface water. This necessitated the design of a system that was not only effective at the higher contaminant concentrations, but also one with flexibility to operate economically over the range of conditions.

Step 2 - Envirogen’s staff conducted on-site bench-scale chemical dosage and pH optimization experiments.

* Client and location confidential.

Step 3 - Continuous flow-through piloting ran for four weeks, using the sequence of unit operations proposed for the full-scale system, as follows:

- (1) Oxidant Addition
- (2) Metals Precipitation with Iron
- (3) Clarification
- (4) Filtration
- (5) Advanced Metals Removal System (AMRS)
- (6) Final Filtration.

Step 4 - Envirogen also conducted “worst case scenario” testing by spiking the feed water with elevated levels of arsenic and selenium, including the more difficult arsenite (AsO_3^{-3}) and selenate (SeO_4^{-2}) forms, respectively. This testing was done over a range of pH values.

Results

Envirogen’s treatment system design was shown to remove all the regulated constituents present in the Ash Pond bulk (free) water to below permit limits, including lead, copper, thallium, arsenic and selenium.

The “worst case scenario” tests showed that selenate could not be removed with conventional iron co-precipitation, but could be removed to below the permit limits using the Envirogen Advanced Metals Removal System (AMRS) featuring Zero Valent Iron technology at influent selenate concentrations as high as 300 ug/L. Envirogen’s spiking tests also showed that arsenic at concentrations as high as 3,000 ug/L could be removed to below permit limits using iron co-precipitation and filtration, but that the Envirogen AMRS provided an enhanced level of safety, effectively removing residual arsenic, e.g., while chemical dosages are optimized.



The effluent water produced from Envirogen's pilot system was also tested for both acute and chronic toxicity and was found to meet the permit requirements for Whole Effluent Toxicity discharge (100% survival rates).

Conclusions

- (1) The Envirogen Advanced Metals Removal System (AMRS) featuring Zero Valent Iron technology removed arsenic and selenium consistently to non-detect values, even at elevated concentrations and range of pH.
- (2) Envirogen's treatment system allows Power plants to meet EPA and more stringent local regulations for removal of lead, copper, thallium, arsenic and selenium.
- (3) Treated water can be safely discharged to local waterways with no toxicity impact.



About Envirogen Technologies

Envirogen Technologies, Inc. (Envirogen) is a life cycle performance based company that combines the supply of water treatment technologies and equipment with process expertise and operating services. Our U.S. based company has over 25 years of experience providing technologies and services for site remediation to numerous owners, consultants, contractors and EPCM (Engineering, Procurement, Construction and Management) firms.



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(USA Headquarters)
- East Windsor, New Jersey
- Memphis, Tennessee
- Rancho Cucamonga, California

Europe

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- Ledbury
(European Headquarters)
 - Derby
(European Manufacturing & Service)
- Netherlands, Amsterdam
(European Distribution Centre)

South East Asia

Malaysia, Sarawak

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