



NEWS RELEASE

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FOR IMMEDIATE RELEASE

Envirogen Enters Selenium Treatment Market for Coal Mining Wastewaters

**“Best-in-Class” Fluidized Bed Reactor Technology Offers Dramatically Lower Costs for
Initial Construction, Improved Operations and Reliable Treatment to <5 µg/L**

Kingwood, TX, 3 August 2011 -- Envirogen Technologies, Inc. (Envirogen) announced today that it has entered the market for treatment of selenium-containing coal mining wastewaters with a portfolio of treatment solutions, highlighted by the company’s fluidized bed reactor (FBR) biological treatment systems and augmented, where appropriate, with its High Efficiency Ion Exchange technology. Envirogen FBR technology has features that make it ideally suited for selenium and nitrate treatment in the coal mining industry, and combined with the decades of FBR experience held by the Envirogen team, allows the design and installation of systems with capital, operating and lifecycle costs that are significantly lower than competitive fixed-film biological systems – such as packed bed bioreactors.

The noteworthy features of Envirogen FBR technology include its ability to consistently reduce selenium levels to less than 5 µg/L, shorter required residence times for treatment and a smaller overall footprint. Its flexibility in the choice of electron donor chemicals can translate into capital and operating cost savings with reduced solids generation. It also responds well to changes in feed flow and composition, consistently achieving discharge limit conditions. In addition, these systems can be modular, with all-weather protection where desired. The company has recently completed several long-term operational studies with FBR systems in coal mining operations, demonstrating the effectiveness of the technology in the field.

According to Michael M. Stark, CEO of Envirogen, the coal mining industry is in need of proven, effective technology immediately, as new pressures are brought to bear by environmental groups and regulatory agencies on selenium discharges. “With new regulations either in place or being developed, it appears that the ability to deal with selenium wastes will increasingly become a limiting factor on the ability of the coal mining industry to grow,” he said. “Envirogen has technology that can be designed and deployed immediately to handle a broad range of selenium-containing wastewaters – with varying flow rates, concentrations and water qualities. Both our own and independent studies show that our FBR systems’ small-footprint and steady-state operation allows us to meet very stringent clean-up guidelines, consistently, at dramatically lower costs than competitive alternatives,” he added. Selenium is commonly found in mining wastewaters in concentrations ranging from 3 to >12,000 µg/L. The U.S. National Primary Drinking Water Standard MCL is 50 µg/L for selenium. The National Fresh Water Quality Standard is 5 µg/L. The U.S. Fish and Wildlife Service has recommended that the National Fresh Water Quality Standard be lowered to 2 µg/L to protect fish, waterfowl and endangered aquatic species. Several states have followed with enforcement actions at these low levels. In Canada, permits may require stakeholders to monitor levels in water or biota, or to address the Canadian Water Quality Guidelines of 1 µg/L in surface waters.

The Fluidized Bed Reactor – “Best-in-Class” Technology

Envirogen’s FBR is an active, fixed-film bioreactor that fosters the growth of microorganisms on a hydraulically fluidized bed of fine media. In this type of reactor, a fluid is passed through a granular solid medium at velocities sufficient to expand or fluidize the media. Envirogen FBR installations typically feature one or more vessels, depending on influent water characteristics and discharge limits. Pre-fabricated FBR vessels range from 2 to 14 feet in diameter and up to 30 feet in height. This vertical orientation is one of the factors that contribute to the FBR’s higher treatment bed volume and smaller footprint than other biological treatment systems.

FBRs have been shown to have some significant advantages over packed bed reactors in coal mining environments. First, they operate in a steady-state ‘plug flow’ manner that avoids channeling and gas binding. This ensures that the microorganisms in the system are optimally utilized. They do not require periodic backwash, as do packed bed reactors. These features allow for significantly higher treatment efficiency, resulting in much lower hydraulic residence times (1/5 to 1/10 as long as packed bed). This efficiency results in smaller overall systems and a smaller system footprint – both of which contribute to the dramatically lower costs of construction of the FBR compared to the packed bed reactor.

From an operational standpoint, Envirogen FBR systems function effectively over a wide range of feed flow rates and influent composition. Compared to other fixed-film bioreactor systems, Envirogen's FBRs are far more tolerant of high feed water nitrate, suspended solids (TSS) and metals concentrations. They also have the ability to treat water with high total dissolved solids (TDS), and recover very quickly from upsets such as power outages and loss of chemical feeds.

In many cases, Envirogen FBR systems can be pre-fabricated for delivery to mining sites – compared with packed bed reactor systems which, because of their large size, are often built-in-place. Envirogen FBR systems are essentially modular and containerized – which allows for ease of transportation and rapid installation – even in bad weather conditions. Generally, it is expected that biological treatment systems suffer loss of efficiency in cold weather environments (<15° C). Recent tests on selenium-containing wastewater showed that the Envirogen FBR system performed effectively at influent water temperatures as low as 4° C.

According to Stark, Envirogen's offering for treating selenium-containing coal wastewaters has been designed to meet the real-world operating environments of coal mining operations and is ready today to start meeting those needs. "Recently, the coal mining industry has been examining a broad range of technologies for treating selenium. While many of these show promise, most are either cost prohibitive or untested – meaning they aren't yet ready for the field," he said. "With our FBR technology, we have the operating background and the understanding of the needs of this market to be able to offer our systems with performance guarantees – and we're ready to do this today," he added.

A technology with a two-decade track record

Envirogen's FBR technology has been in use for more than two decades, treating inorganic contaminants such as nitrate and perchlorate in dozens of applications. According to Dave Enegess, Vice President, East Region for Envirogen, this track record has been a foundation upon which the company's recent selenium work has been done. "Our FBR has been used in similar reductive applications for more than 10 years in applications where low perchlorate levels (<4 ppb) are consistently achieved at high flows (6,000 gpm) and in high total dissolved solids streams. The same anoxic operating regime is used at our nitrate installations, where nitrate is treated to non-detect levels. Envirogen is an industry leader in the use of bioreactor technology, with over 150 systems installed in the United States," he said. "In addition to this experience, Envirogen is willing to stand by our systems with what we call ELCAPs – Envirogen Lifecycle Cost Assurance Programs – that are designed to deliver the lowest lifecycle cost over the life of an FBR installation. Guarantees are provided for system performance, operating cost

components, asset life and overall lifecycle cost. In addition, Envirogen can also provide guarantees for cost elements such as utility consumption and chemical usage for the life of the contract. Through the resources and experience Envirogen Technologies brings to design, fabrication, installation and long-term operation, significant value can be realized via one of these programs,” he added.

In addition to its FBR technology, Envirogen has studied the use of ion exchange technology for treating selenium in coal mining wastewaters in situations where flow and concentrations are appropriate. Envirogen Technologies’ High Efficiency Ion Exchange process is based on a patented system design that addresses many of the challenges seen in real-world selenium removal applications. These systems are capable of removing selenium to very low levels – cost effectively. In addition, they have the advantages of a small footprint and automated operation, making them ideal for space-restricted treatment facilities and remote locations. They can operate in conjunction with the FBR technology or independently. For more information, visit www.envirogen.com.

About Envirogen Technologies, Inc.

Headquartered in the Houston suburb of Kingwood, Texas, Envirogen is a technology+services solutions provider that designs, builds and implements systems for business in municipal and industrial water and environmental treatment applications. A primary focus for Envirogen is the concept of ‘lifecycle performance,’ in which the company provides guaranteed, pay-for-performance, long-term contracts at predictable costs that offer customers the lowest total cost over the lifetime of an equipment installation. Primary applications for Envirogen’s systems include treatment of groundwater for the delivery of high-quality potable water, groundwater remediation, wastewater treatment, water re-use, nutrient removal, and odor and VOC control for municipal and industrial markets. In industrial markets such as mining, hydrocarbon processing and chemical processing, Envirogen also specializes in process water treatment, byproduct recovery and chemical purification. The company conducts business throughout the United States, with regional offices in Southern California, Illinois, New Jersey and Tennessee. For more information on the company, visit www.envirogen.com.

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