

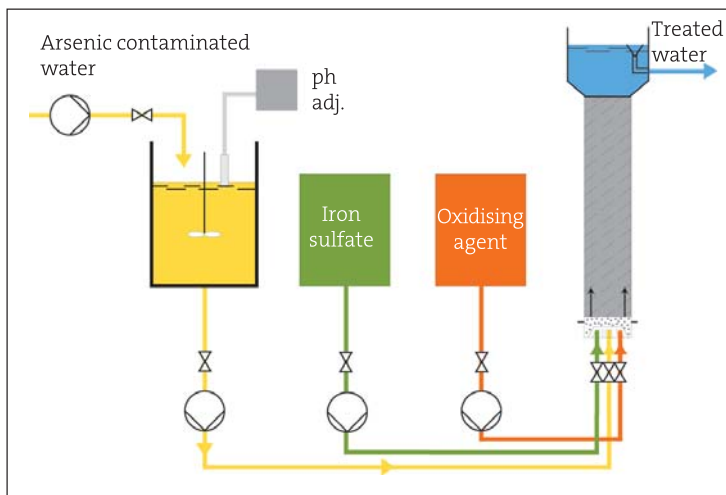
# METCLEAN™



## Heavy metals removal without sludge generation

### Operating principle

The waste stream is used to fluidise granules, typically quartz sand, in the reactor column. By adding iron and manganese and an oxidising agent to the wastewater, the metals are adsorbed on the granule surfaces and oxidised. This is an ongoing process and the metal coating increases the diameter of the granules which must be replaced eventually. These granules are the waste product of the process. They contain about 10% water and are easily dried and handled.



Process diagram

### Features and benefits

It has long been recognised that adsorption processes are capable of reducing the amount of many metals to a very low level in water/wastewater. Krüger – a Veolia Water Solutions & Technologies company – has patented METCLEAN™ technology that utilises the adsorption process in a fluidised bed reactor to remove a range of metals from solutions. Krüger's experience includes As and the following metals: Cd, Cr, Hg, Mo, Ni, Se, Zn, Cu, V, Ba and Sr.

Treatment efficiency is as high as 99% in a one process step 20 times less waste (by weight) is produced by using METCLEAN™. The waste product resulting from the treatment is a granule with a dry solids content of 80-90%. The savings in waste disposal cost will normally be sufficient to finance the capital and operating costs for a METCLEAN™ plant. The footprint of the METCLEAN™ process is relatively small, making it a very cost-effective solution for several applications.

Granules containing: Arsenic (iron process)



Chromium (chromate process)



Nickel (manganese process)



## Applications

**METCLEAN™ is capable of removing most metals from solutions.**

**Typical applications are:**

**Potable water** contaminated by arsenic or nickel as a result of pyrite oxidation. This problem can be solved by installing a METCLEAN™ treatment unit at the existing water supply facility.

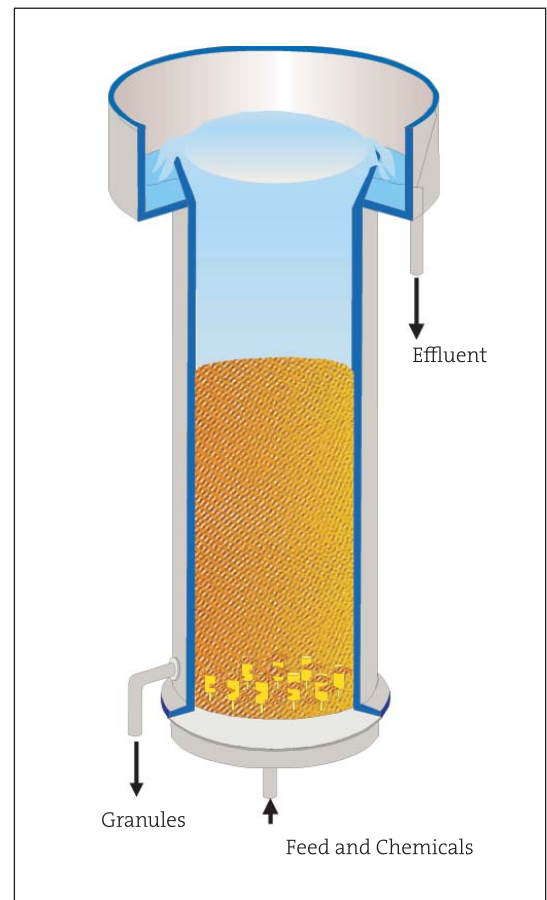
**Groundwater** contamination due to leaching of metals is easily eliminated by using a dedicated fluidised bed reactor accommodated in a standard container. A typical application is chromium removal from metal coating facilities or fly ash landfills.

**Industrial wastewater** from metal treatment industries, wood preservation, tanning... containing the metals already mentioned.

**Flue gas desulphurisation wastewater** from power plants is the field in which Krüger has gained most experience so far. METCLEAN™ is highly suited for this heavily contaminated wastewater and offers a substantial reduction in treatment and waste disposal costs. In fact, METCLEAN™ is capable of treating a range of metals to lower ppb levels than can be achieved in a traditional precipitation plant. In this application, the elimination of the sludge problem is a very obvious advantage.



A 30 m<sup>3</sup>/hr reactor under construction at Avedøre, Power Plant, Copenhagen - Danmark



METCLEAN™ reactor configuration