Vetiver System for Landfill Leachate Treatment

Vetiver grass was first used for landfill leachate control in Queensland, Australia in 1994.

Since then it has been used in Australia, China, India, Mexico, Nigeria, Philippines, South Africa, Thailand, USA and Vietnam.

The following unique attributes make Vetiver suitable for leachate treatment, which highly contaminated with heavy metals and salt.
Extraordinary Physiological Features

Vetiver is highly:

- Tolerant to soil high in alkalinity, acidity (pH 3.5-11.5), and salinity (EC 17.5 mS/cm).
- Tolerant to elevated levels of heavy metals such as Arsenic, Cadmium, Copper, Chromium, Lead, Mercury, Nickel, Selenium and Zinc in the soil and water.
- Efficient in absorbing dissolved N and P in polluted water and soil.
- Effective in breaking down organic compounds associated with pesticides and herbicides.
- Tolerant to flooded soil conditions making it ideal for use in wetlands.
- Efficient in taking up water under wetland conditions or high water supply.
- Resistant to pests and diseases.
Australia: This leachate seepage is highly contaminated with Chromium, Cadmium, Copper, Lead and Zinc
Within a year vetiver planting has completely stopped the leachate seepage
Australia: Overhead irrigation with leachate

3 months after planting

Eight months after planting

Eleven months after planting
Vetiver growth was over 3m in the second summer

Growing in highly saline and polluted leachate pool
FIFTEEN MONTHS AFTER PLANTING
SINGAPORE - LORONG HALUS WETLAND

A complex of 5 ponds (3 of 6000 m$^2$ and 2 of 10,000 m$^2$ totaling 38,000 m$^2$) to treat 2,900 m$^3$/day (= 33.6 L/s)

- BOD 2.0 - 336mg/L
- COD 37 - 823mg/L
- Total N 0.7 - 1.04 mg/L
- Total P 0.08 - 5.7mg/L
- Total NH$\text{3}$ 0.06 - 743mg/L
SINGAPORE - LORONG HALUS WETLAND

One month after planting
Six months after planting
One year after planting
Mexico: Disposal of industrial landfill leachate at Poza Rica
One year after planting
USA: Disposal of leachate at a closed landfill, Biloxi, Mississippi.

- Installed in 2011
- ~75,000 vetiver on 3 acres
- Subsurface irrigation
- As of December 2017, the system has processed over 6.3 million gallons

Leachate Management Specialists, LLC
Active Landfill in Needville, Texas, USA

- Installed in Summer 2017
- ~65,000 vetiver on 4.7 acres
- Subsurface irrigation
- As of December 2017, the system has processed over 150,000 gallons
Vetiver slips planted in June 2017

Significant growth by September 2017

Leachate Management Specialists, LLC