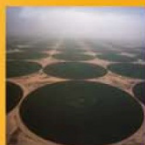




The Treatment of Heavy Metal and
Oil based Contamination using
ClearEarth Technology

ClearEarth Ltd

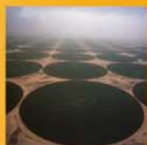
A Zander Corporation Enterprise





Introduction

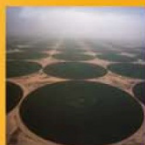
- ClearEarth and its family of products promotes a more holistic treatment method to conventional methods
- The processes are not labour intensive and do not require extensive capital or operational expenditure.
- Low cost maintenance.
- The processes have a low carbon footprint and are wholly organic
- Deployment is simple and can be carried out on an industrial scale





Overview of ClearEarth material

- Organic deposit
- Extracted and amended as required
- Sustainable reserves
- Material properties and applications scientifically researched by leading academic institutions
- Available in either solid or liquid base products
- Adaptable for most heavy metals and oil waste streams





Unique ClearEarth Properties

Humic Substances	40%
Amino Acids	10%
Carotenoids	10%
Plant Hormones	12%
Micro-algae	8%
Crystalline Minerals	16%
Calcium Carbonate	4%

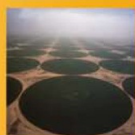
Typical Composition





ClearEarth Research

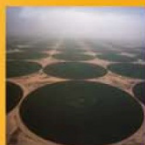
- Waste water filtration from industrial metal processing plants
- Remediation of topsoil and other surfaces contaminated with heavy metals
- Microfiltration and digestion of PAHs, PCBs and other organic residues
- Crude oil and sand remediation
- Oil based mud drill cuttings remediation
- Thermally processed oil based mud drill cuttings remediation
- Growth trials in treated and non thermally treated drill cuttings
- Oily water filtration
- Highly polluted process water filtration





Highly contaminated waste water treatment at an old Zinc Smelter

- Heavy metal binding kinetics acceptable to provide a suitable filtration medium
- All heavy metals are bound by chelating and are stable above pH2





Toxic metal remediation

- The ClearEarth material acts as permanent sorbent for eco-toxic metals
- Proven in the field and independently verified
- Benefit of removal of these metals from water courses and 'hot spots' improves overall ecological wellbeing
- Extensive successful testing carried out on the binding and stabilisation of radioactive nuclei by a leading UK institution





ClearEarth

Decontamination applications:

- Effluent Treatment
- Removal of metal ions from aqueous solutions
- Land Remediation



Metals treatment results:

- Zinc: 99.7% uptake
- Cadmium: 99.9%
- Lead: 100%
- Mercury: 100%
- Thallium: 99.0%
- Aluminium: 99.8%
- Nickel: 100%
- Copper: 100%
- Arsenic: 99.6%
- Uranium salts 99.5%



Effluent

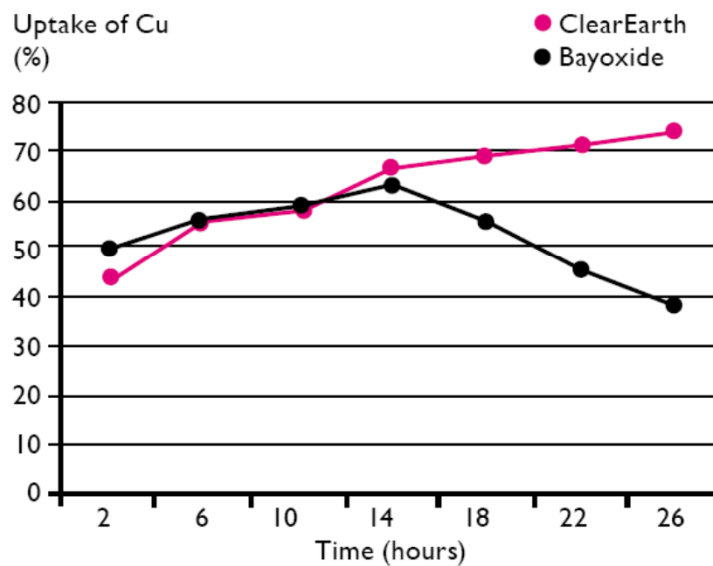
- Effluent concentrations up to 25 times above the consent discharge levels.
- For 1,000 m³ of effluent treated to consent level the ClearEarth filtration medium does not require changing in the three tank system demonstrated



Removal of metal ions

- Treatment of:
 - Organo-copper compound in an aqueous solution
 - Lead chloride at a concentration of 1000 ppm in saline solution

Comparison of Copper uptake by ClearEarth and Bayoxide

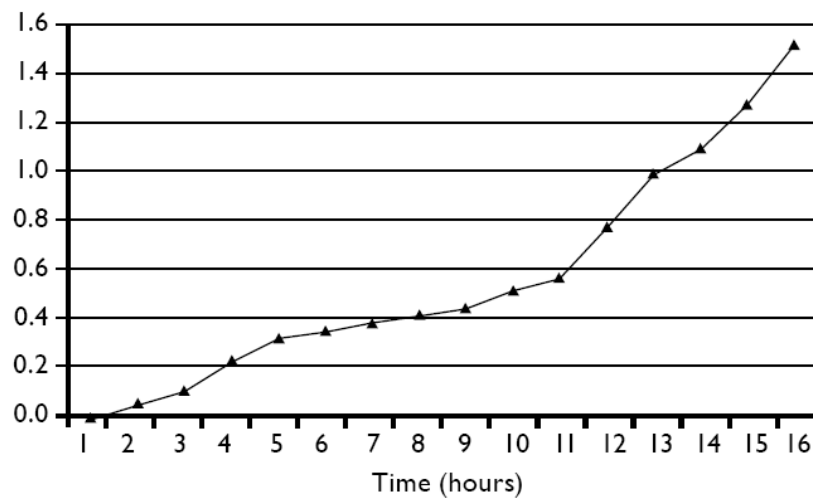




ClearEarth affinity with lead

Gradual adsorption of Lead onto ClearEarth

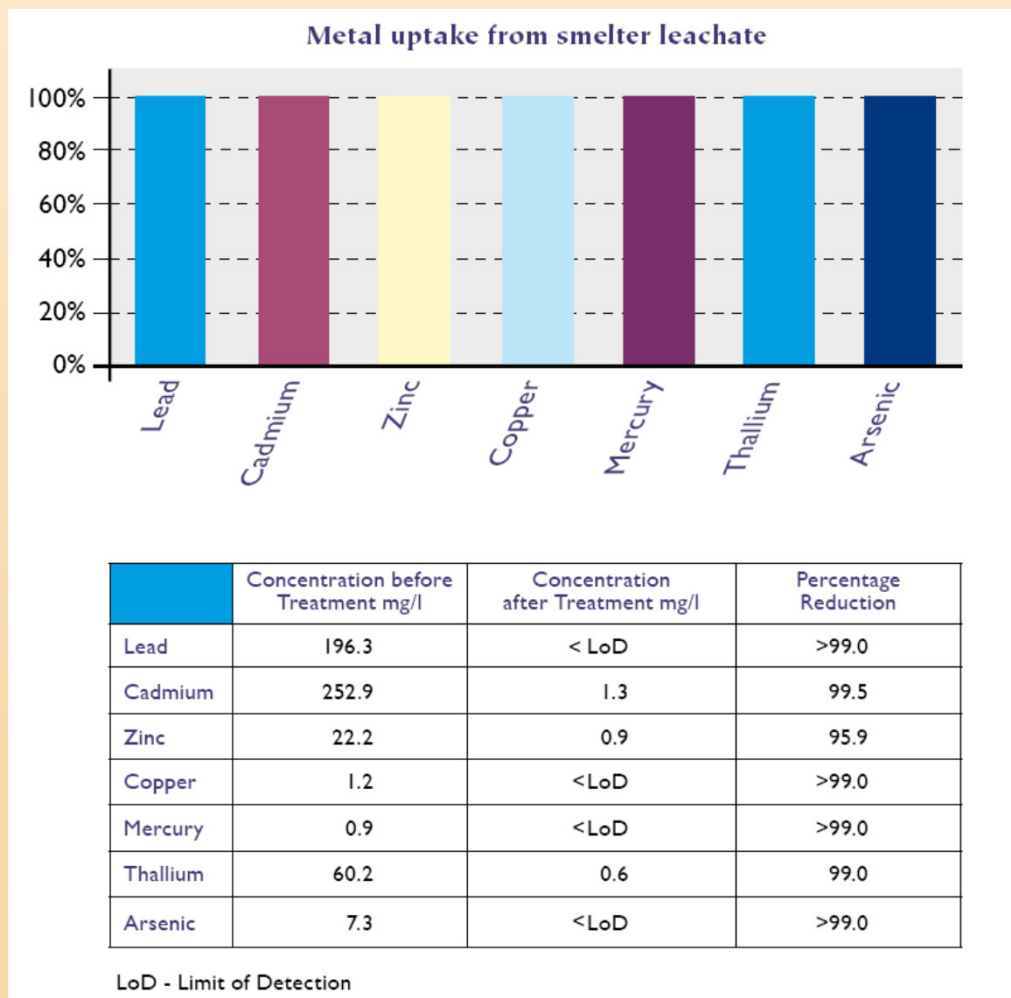
Weight of Pb on
ClearEarth (%)



Graph showing the cumulative capture of lead onto a body of ClearEarth, in this case 100 kg ClearEarth adsorbed 1.55 kg metal.



Smelter leachate: 2% mix, stirred for 24 hours





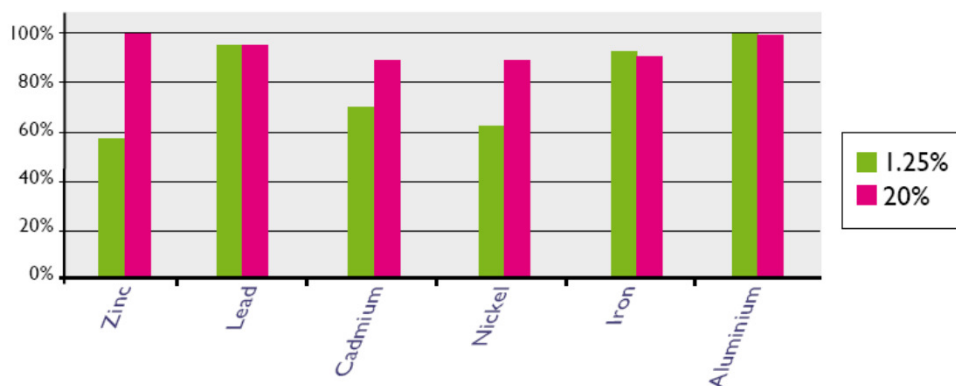
Lead mine in Wales

(Even in an acidic environment, effluent at low pH afforded very significant uptake of metals by ClearEarth)

Percentage metal adsorbance at three ratios of ClearEarth to effluent

	1.25%	5%	20%
Zinc	56.4	90.7	98.8
Lead	96.2	96.2	96.2
Cadmium	69.2	>90.0	>90.0
Nickel	62.1	87.5	90.0
Iron	94.0	91.0	91.8
Aluminium	99.6	99.5	99.1

Metal uptake from Welsh mine water

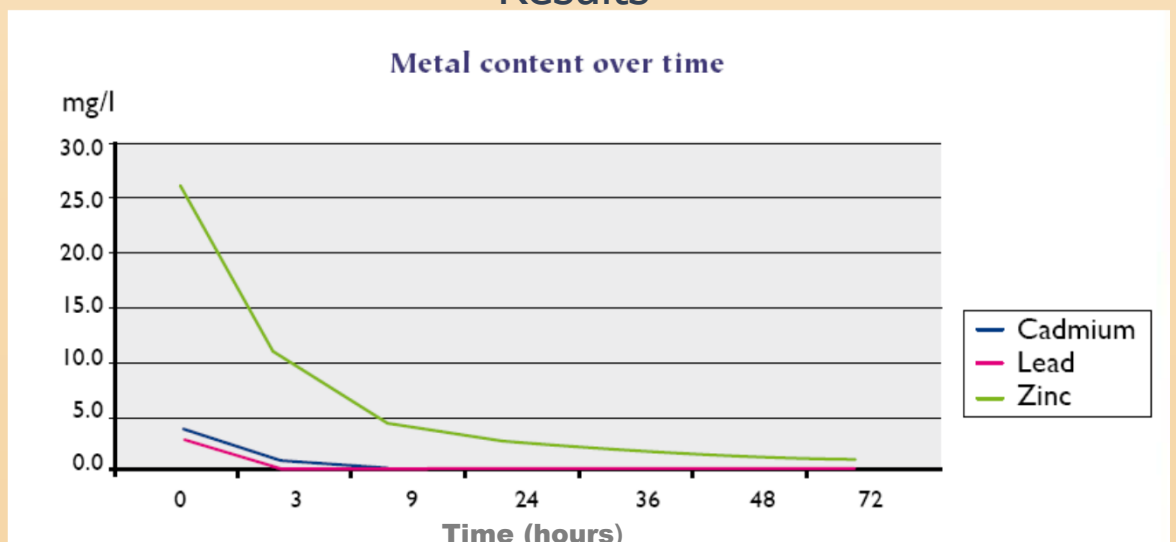




Metal Smelter Effluent

- ClearEarth treatment of metal smelter effluents in a passive application.
- A mix of 7.5% ClearEarth to effluent was used over time for metal concentration.

Results





Land Remediation

Surface contamination of land

Treated by

drenching the area with ClearEarth Humate Extract solution.

At a dilution that is determined by the level of heavy metal ions in the soil it is applied via a high volume tractor mounted sprayer.

Contamination to 600 mm depth:

The humate solution can be injected using air compression or by rotary cultivation with Humate Extract and Clear Earth Bio Humus

Hot Spot contamination

Treatment with Humate paste *in situ*

Deep level contamination and contaminated aquifers:

Containment by isolating the area (surrounding trench) or by filtering (drain/reed bed with Clear Earth Bio Humus + sand). Deep level injection within the area can also help to attenuate mobile heavy metal ions in solution.



Soil Washing

Where contamination levels are very high, ie above 5000 ppm it may be necessary to remove the soil and 'wash' by treatment with a solution of ClearEarth Humate Extract Paste.

This material contains very high levels of chelating humic and fulvic acids. At a dilution of one part to 1000 parts water it can be used to 'wash' contaminated soil and bring metal levels down to a harmless level



ClearEarth digests crude oil residues in soils and drill cuttings (Apply separately for details)



+ ClearEarth =



Gives.....

