Biotechnology
Environmental Biotechnology
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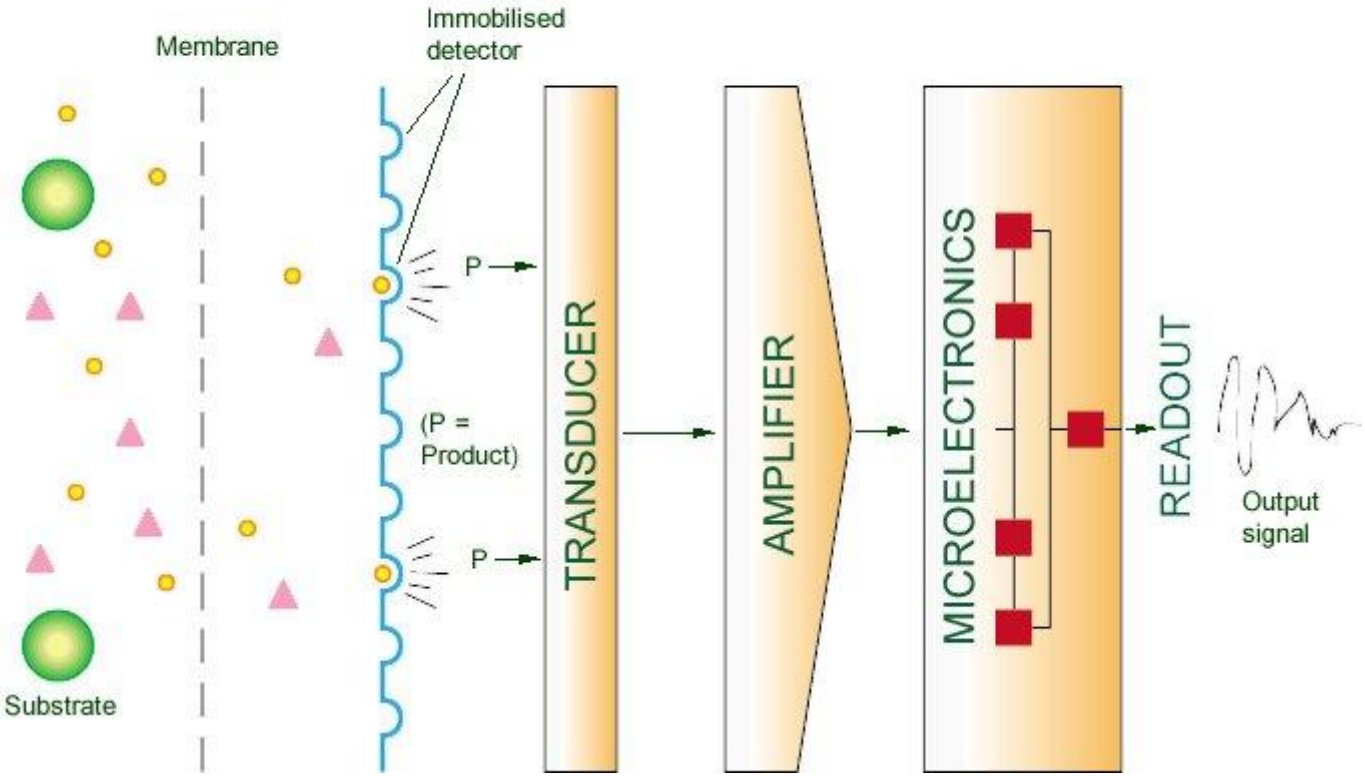
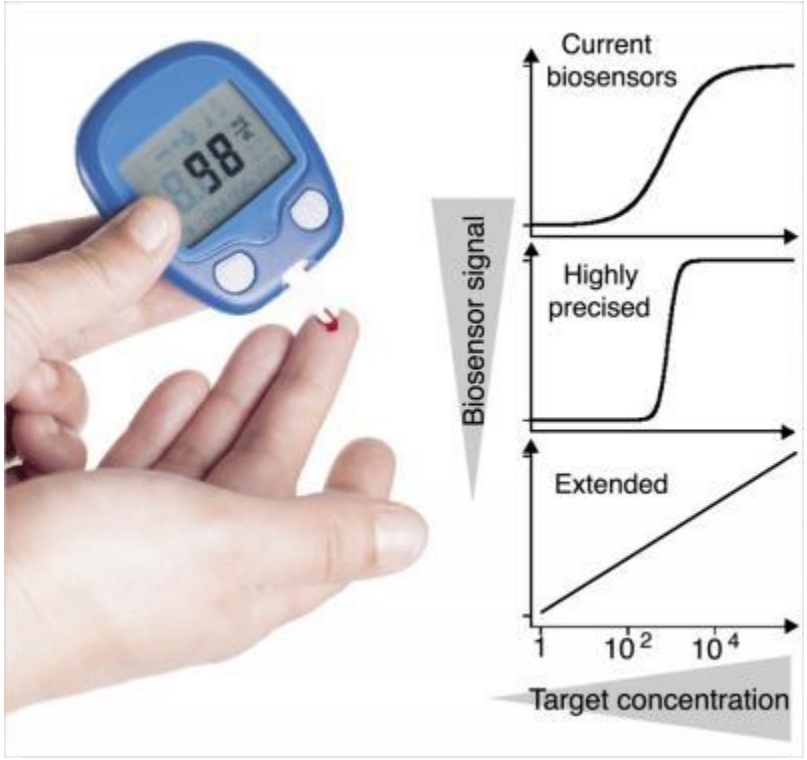
Biosensor

- A **biosensor** is an analytical device, used for the detection of an analyte, that combines a biological component with a physicochemical**detector**.

Biosensor

Model of biosensor




98
Current biosensors
Highly precised
Extended
Biosensor signal
1
10 2
10 4
Target concentration

Bioremediation

- **Bioremediation** is a “treatment that uses naturally occurring organisms to break down hazardous substances into less toxic or non toxic substances”.

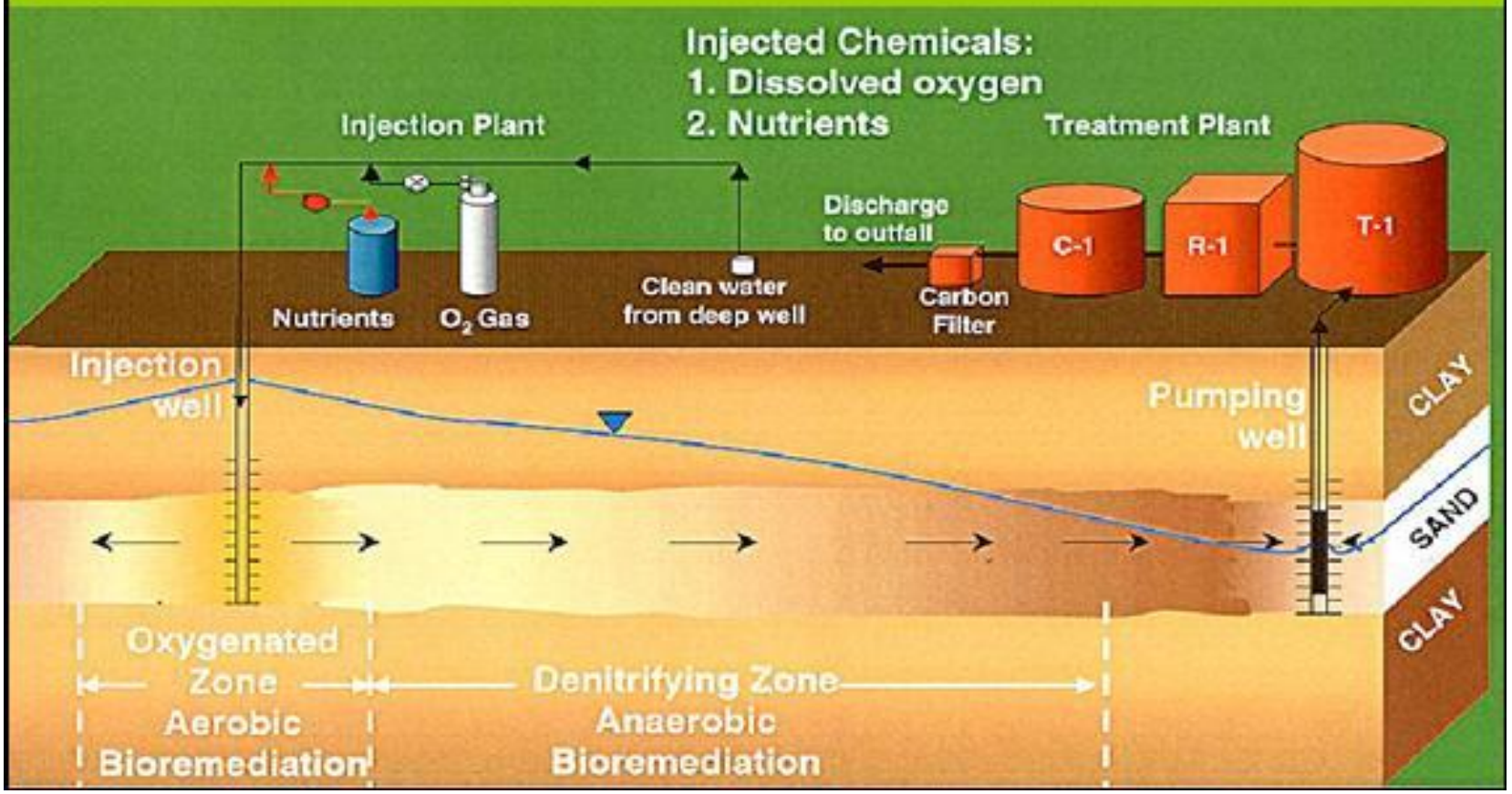
A) SOIL

- In situ:

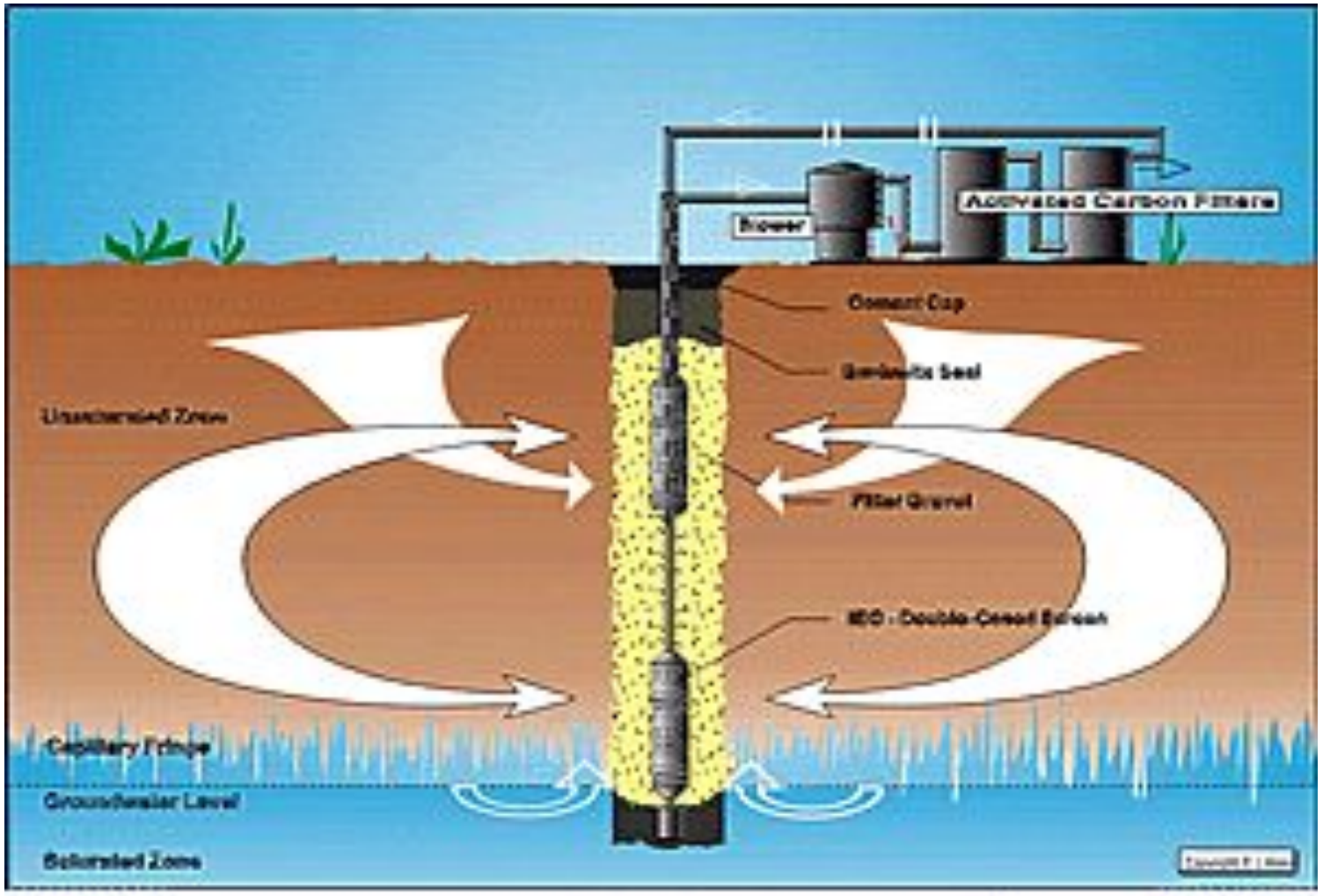
*Bioventing

*Hydrogen peroxide

In-Situ Bioremediation, Schematic System Layout



Bioventing

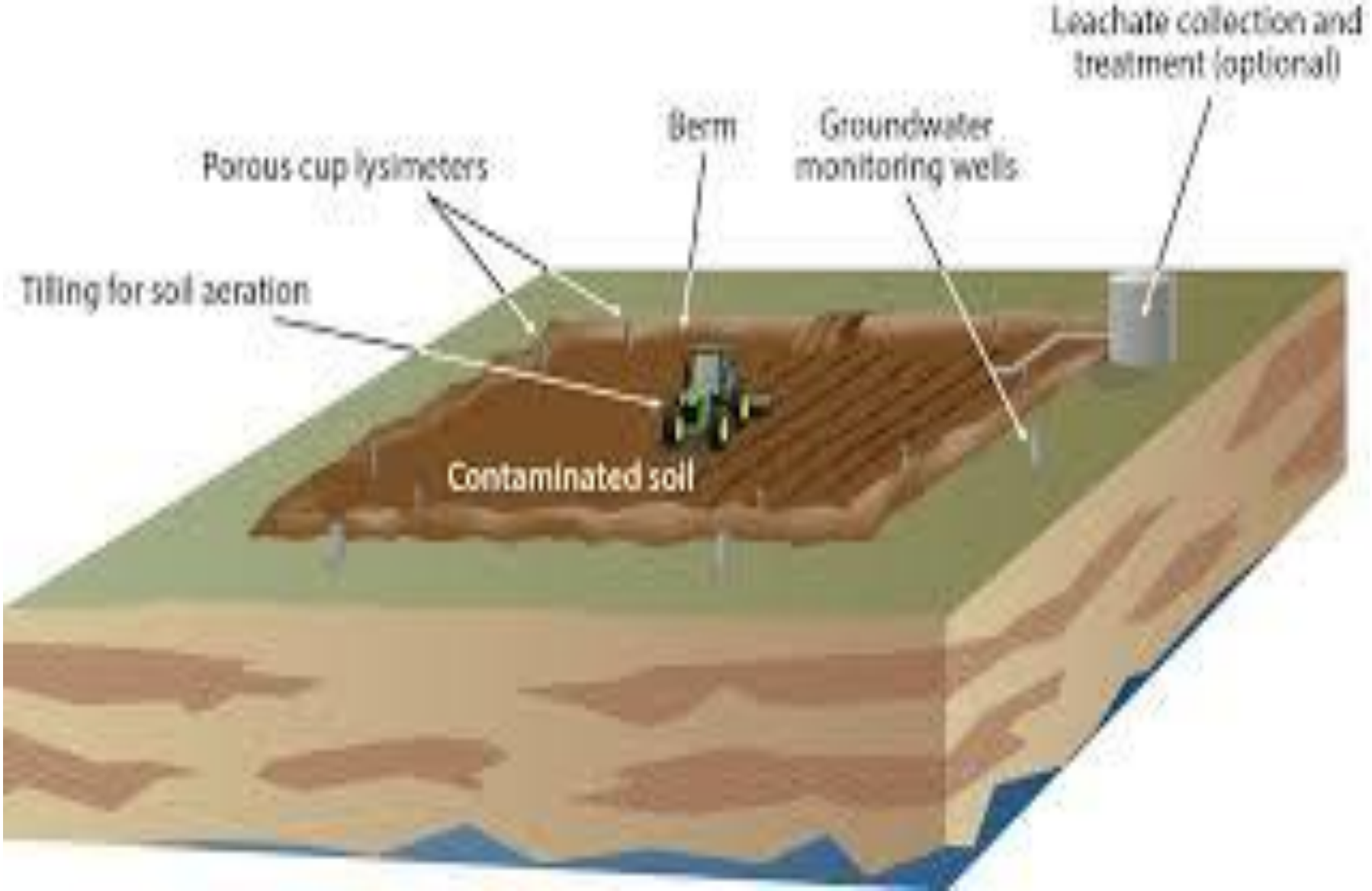


IEG Soil Air Circulation-Vacuum Vapour Extraction™ System
(IEG SAC-VVE™ Process)

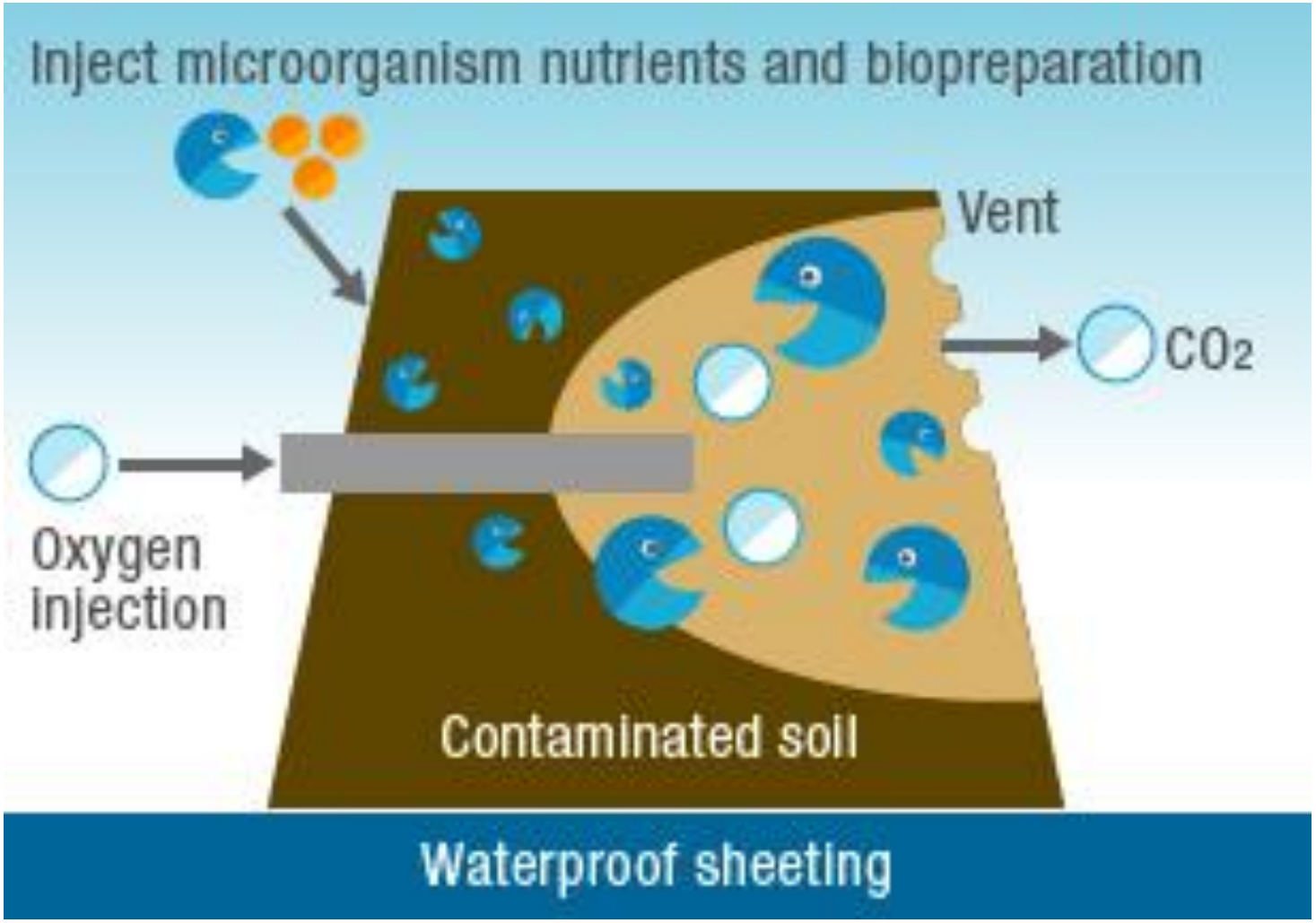
Exsitu

- Slurry phase
- Solid phase
- Landfarming
- Biopiling
- Composting

Land farming



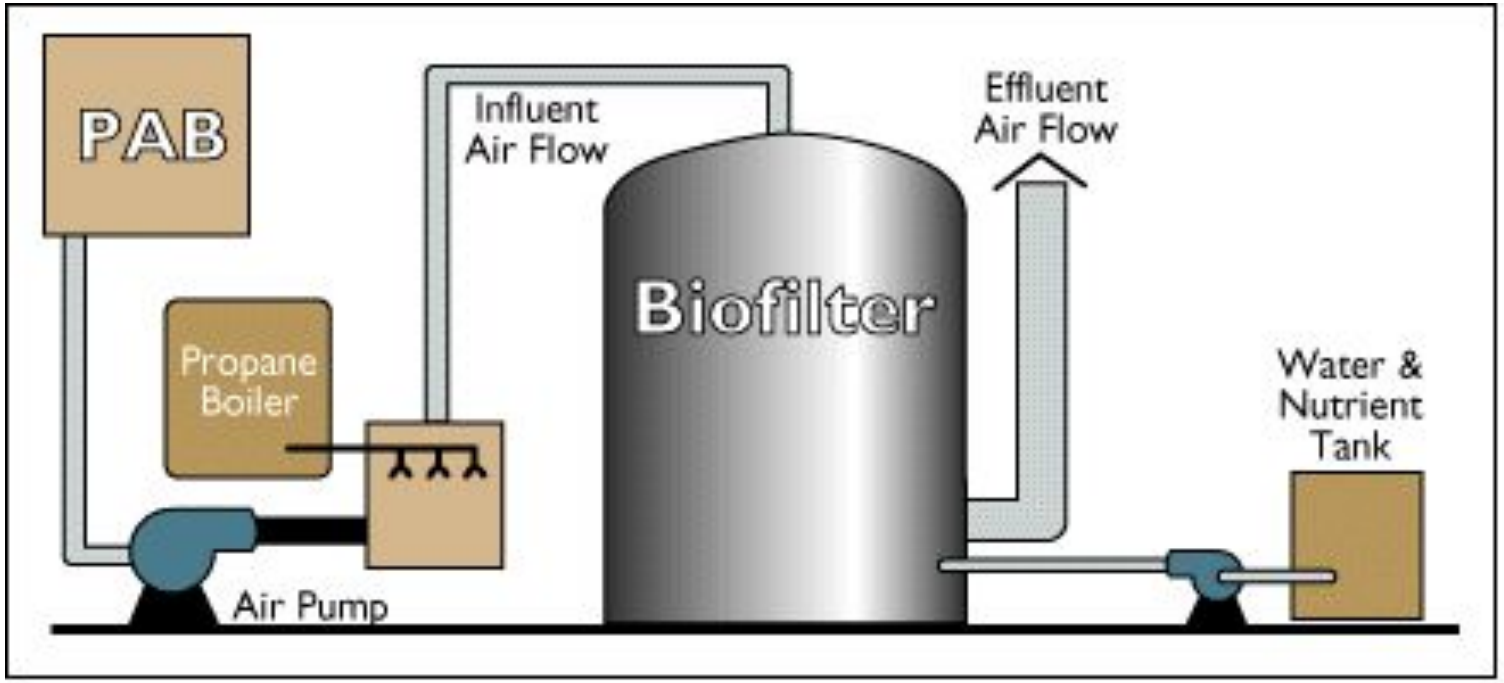
Biopile


Inject microorganism nutrients and biopreparation
Vent
CO_2
Oxygen
injection
Contaminated soil
Waterproof sheeting

B) In situ bioremediation of Ground water

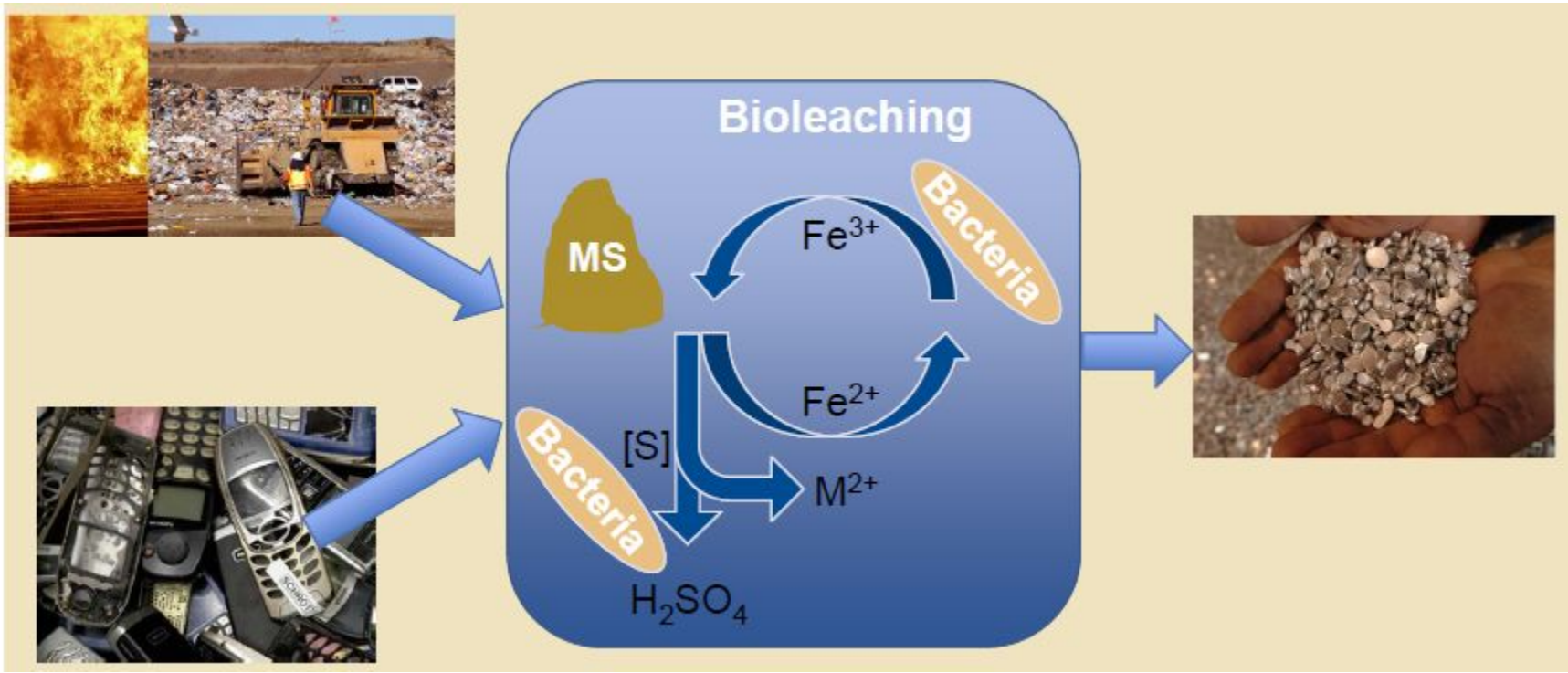
B) AIR

- Bio filtration

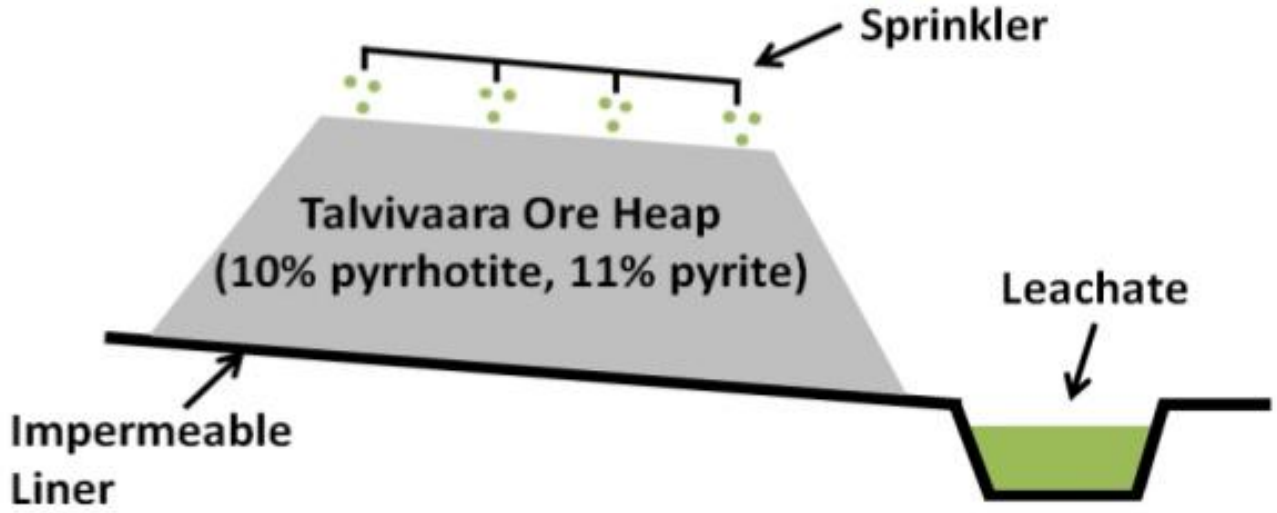


A propane-fired boiler heats and humidifies the VOC-contaminated air from the Pipe Assembling Building at Augusta Fiberglass Coatings. The air then passes through the biofilter where microorganisms degrade gas-phase VOCs to carbon dioxide and water.

Bioleaching



Commercial Ni Bioleaching Process



Talvivaara's Sotkamo mine heap-leach (Finland):

- The mine produced 12,000 t of Ni (along with Zn, Cu, Co, and U) from Ni grade of 0.23% via heap bioleaching
- The presence of pyrite enhances leaching

Bioleaching Mechanism