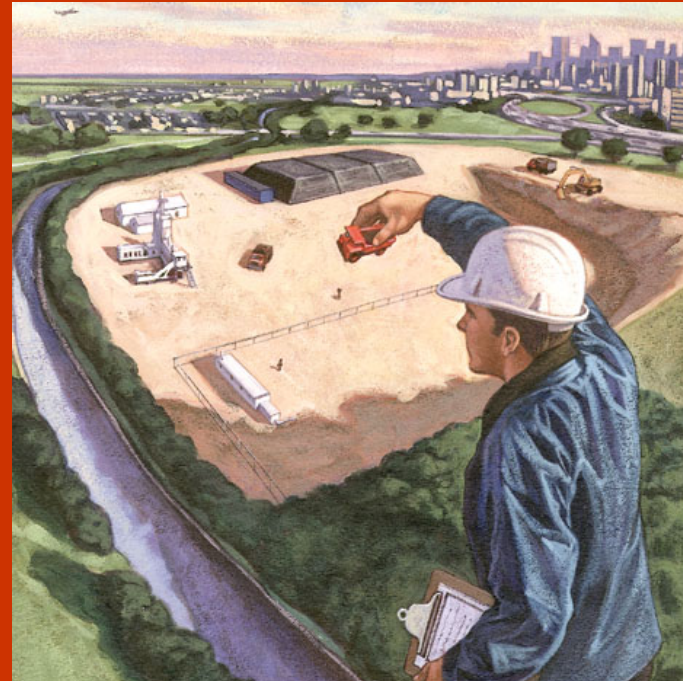


# BIOGENIE'S CONTAMINATED SOIL TREATMENT FACILITIES

NATO CCMS Pilot  
Study – Athens, GR.



Guaranteed Site Remediation Solutions



# International Presence



United Kingdom  
France  
Canada  
United States



# Oil Refinery



# Railway Storage Yard



# Manufactured Gas Plant



# What About Small Urban Sites?

- Most industrial sites are located in urban areas
- Cities are getting larger (Mega Cities)
- Landfill costs are prohibitive (limited space)
- Backfill material is limited
- Trucking is a problem in cities and expensive
- Limited incentives to developers to clean-up old contaminated sites



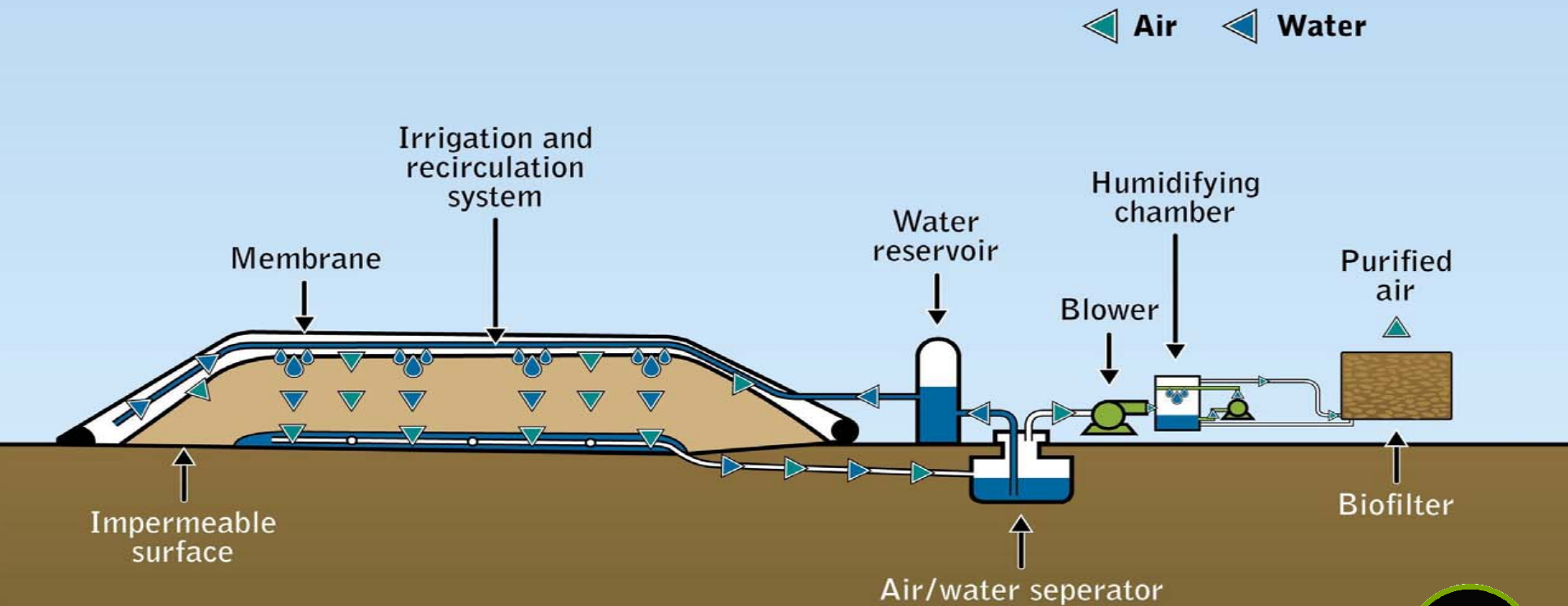
# Soil Management Facility (SMF)

- Landfill is still the most popular method of remediation (+/- 80%)
- Innovative approach to treat soil via a Soil Management Facility



# Treatment Process

## Ex Situ Biopile Treatment Process





# Treated Contaminants

- Volatile petroleum hydrocarbons (BTEX);
- Petroleum Hydrocarbons (Oil and Grease);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Chlorinated compounds (Pentachlorophenol – PCP, PCE, TCE);
- Creosote;
- Energetic compounds (TNT, HMX and RDX);
- Poly chlorinated biphenyls (PCBs);
- Sodium and Chloride (Salinity);
- Heavy Metals (Mercury);
- Hazardous Sludge (Oil and Grease);
- Research & Development



# R&D Services



# Treatability Evaluation



# Why Biological Treatment?

- Natural process enhanced by an engineering system (greater social acceptance)
- Treated soil is biostabilized:
  - Complies with leachate tests
  - Odorless
  - Homogeneous
- Recycling/Beneficial use of Processed Soil:
  - Landfill cover material
  - Mine, quarry, brownfield reclamation







# Environmental Protection

- Ground:
  - Protected by layers of:
    - Asphalt
    - Gravel
    - Geotextile - 1
    - Sand
    - Geomembrane
    - Geotextile - 2



# Environmental Protection

- Water:
  - All leachate is collected and sent to an air/water separator prior to being stored in a water reservoir
  - Storm water run-off and run-on are diverted away from the piles, collected and sent to an air/water separator prior to being stored in a water reservoir
  - Water is reused to humidify the piles. Excess water is discharged according to each facility permit.





# Environmental Protection

- Air:
  - Soil is covered with an impermeable geomembrane to prevent volatilization of contaminants from the pile and stormwater from entering the pile
  - The air is recirculated in the pile by using a piping network and vacuum system
  - Process air is treated with a compost-based biofilter and/or activated carbon system



# Off site Remedial Solution: Contaminated Soil Treatment Facilities

- Biogenie currently owns/operates several facilities in Canada, France and the United Kingdom
  - Montreal facility: the largest of its kind in Canada
  - Paris facility: the largest of its kind in France
  - Manchester facility: permitted in the UK
    - following the enactment of the European Landfill Directive
- Over 3 million tonnes of impacted material successfully treated over the past 13 years for brownfield redevelopment, environmental consultants and industrial clients



# Montreal Soil Treatment Facility



# Montreal Soil Treatment Facility



Biogenie

# Paris Soil Treatment Facility



Biogenie

# Paris Soil Treatment Facility



Biogenie

# Manchester Soil Treatment Facility











# Benefits to clients

SMF, a solution which is:

- Rapid:
  - The site is quickly cleared of contaminated soil and is made available for redevelopment
- Cost-efficient:
  - Competitive pricing
  - No long term liability associated with landfill
- Final:
  - Contaminants are destroyed
  - Treatment efficiency is guaranteed



# Benefits to the Community

- As a cost-efficient remediation and recycling option, our soil treatment facilities stimulate redevelopment of contaminated properties while saving valuable landfill space
- Processed soil is beneficially used as landfill cover material or as clean fill to improve degraded sites or landscapes



# Revi-Sols (Montreal, Canada)

- From 1998 – 2005
- 75\$ Million Dollar
- 50% of remediation costs
- Up to 70% of cost if soil treatment



# Revi-Sols (Montreal, Canada)

- 260 Proposal presented
- 215 Million Dollar spend at remediating sites
- 2 392 000 m<sup>2</sup> of remediated land
- Estimated Investment of 2,6 Billion Dollar





