

Pre-Planning for Leachate Treatment/Disposal

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Agenda – Leachate Pre-Planning

- What could you do now?

- Collect Leachate Quality Data
- Collect Leachate Quantity Data
- Reduce Leachate Generation
- Address Leachate “Issues”
- Assess Leachate Disposal Options



- What might you need?

- Adequate Storage of Raw/Treated Leachate
- Additional Leachate Disposal Options
- Economically Viable Treatment Options
- Viable Treated Leachate Discharge Options
- Assess Future Expansion and/or Closure Plans

Leachate Pre-Planning

What could you do now?

Collect Leachate Quality Data

- **Leachate quality challenges:**

- Sampling/analysis frequency (lack of seasonal variation)
- Only analyzing for select constituents: NH_3 , BOD_5 , TSS, pH
- Un-sampled sources of leachate/condensate
- Precipitation = Quality can vary

- **Collect This Information:**

- Periodically collect composite and grab samples (quarterly)
- Analyze composite and grab samples for multiple parameters



Collect Leachate Quality Data

What constituents do you need to analyze to assess leachate for wastewater treatment (not a comprehensive list)?

- pH
- Temperature
- Ammonia as Nitrogen
- Nitrite + Nitrate
- Total Kjeldahl Nitrogen (TKN)
- Total Suspended Solids (TSS)
- Total dissolved solids (TDS)
- Biochemical Oxygen Demand (BOD)
– 5 day
- Chemical Oxygen Demand (COD)
- RCRA Metals
- Alkalinity (as CaCO_3)
- Non-RCRA Metals
- Iron
- Sulfate
- Total Phosphorus + O-Phosphate as P
- Hardness: Ca, Mg, Mn
- Fats, oil and grease (FOG)
- Volatile Organic Compounds (VOCs)
- Polynuclear Aromatic Hydrocarbons (PAHs)



New and Revised EPA PFAS Health Advisories (as of June 15, 2022)

- Perfluorobutane sulfonic acid and its potassium salt (**PFBS**): 0.002 mg/L = 2,000 ppt
- Hexafluoropropylene oxide (HFPO) dimer acid and its ammonium salt ("**GenX chemicals**"): 0.00001 mg/L = 10 ppt
- Interim Updated Health Advisories

Regulatory PFAS Recommendation/Resources

- Do your special waste screening programs address concentrated PFAS?
- Incineration of DOD waste banned.

- SWANA [Applied Research Foundation](#)
- NWRA Letter to Congress
- EPA [Roadmap and Actions](#)
- EREF [Research and Studies](#)
- [SCS Engineers](#) Tech Bulletins, Learning Center, Publications
- [Waste Dive](#), Waste Advantage, Waste Today, [Waste 360](#) articles.

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Collect Leachate Quantity Data

- **Leachate flow rate data challenges:**

- Flow meter(s) – Reliable? (Endres & Hauser, Rosemont, etc.)
- Undocumented sources of leachate?
- Fouling of the leachate/condensate pipes/meters?
- Is leachate/condensate piping the correct size?
- Variability of precipitation – can your system handle it?

- **Do Collect This Information:**

- Truck loads hauled for disposal – (Daily Basis)
- Discharge flows to Publicly Owned Treatment Works (POTW)
- Costs to dispose (hauling/piping, pre-treatment, surcharges)
- Any other accurate leachate quantity information

Reduce Leachate Generation

- **Challenges That Can Affect Leachate Generation?**
 - Abundance of precipitation
 - Large working face areas
 - Leachate seeps – contaminated stormwater is “leachate”
 - Side-slope erosion - exposed solid waste
- **What Can Be Done to Reduce Leachate Quantity?**
 - Temporary rain covers and limit working face areas
 - Permanent caps (on closed landfill cells)
 - Limit exposure of precipitation to waste
 - Separate storm water from leachate

Address Leachate “Issues”



Reduce Leachate Generation – Temporary Rain Covers



Existing Leachate Disposal Options

- **How Do You Current Dispose of Leachate?**
 - Direct pipe leachate to a local POTW
 - Haul leachate to a local POTW
 - Recirculate leachate
 - Treat leachate on-site: Biological, Physical-Chemical
- **Challenges That Can Affect Future Disposal?**
 - PFAS and emerging contaminant regulations
 - Being cut-off or other issues from local POTW:
 - Ultra-violet Transmittance (UV-254) Issues at POTWs
 - Changes to POTW's discharge permit requirements
 - Changes to POTW's cost to dispose (surcharges)

POTW: Publicly Owned Treatment Works

Pre-Planning for Leachate Treatment

What might you need?

Adequate Storage of Raw Leachate

Example – Landfills in arid areas can also have issues



- Not much precipitation at this landfill facility
- Major leachate issues still exist
- Addressed by recirculation, evap. ponds, dust control
- High moisture in wet waste
 - Wastewater bio-solids
 - H₂O gets squeezed out
- Is even more storage needed?

Leachate Treatment Options

- Leachate Treatment
 - Biological (Membrane Bioreactor, Seq. Batch Reactor)
 - Physical (Evaporation, Reverse Osmosis, Deep Inj. Well)
 - Chemical (Breakpoint Chlorination, pH neutralization)



Landfill Leachate Treatment

- Aeration/Equalization Pond
- Aeration Tank
- Ultra Filtration
- Reverse Osmosis
- Discharge to River
- Background:
 - Constructed wetlands
 - River



Landfill Leachate Pre-Treatment

- Aeration pond with multiple aerators
- Equalization



Landfill Leachate Pre-Treatment

Aeration tank with coarse bubble aerators



Landfill Leachate Treatment

- Two Ultra Filtration Units (semi-permeable membrane)
- Pore size range:
 - 0.1 micron to 0.003 micron
- Pressure: 30-150 psi
- Removes:
 - Colloidal particles
 - Polymers
 - Smallest TSS
 - No TDS removal



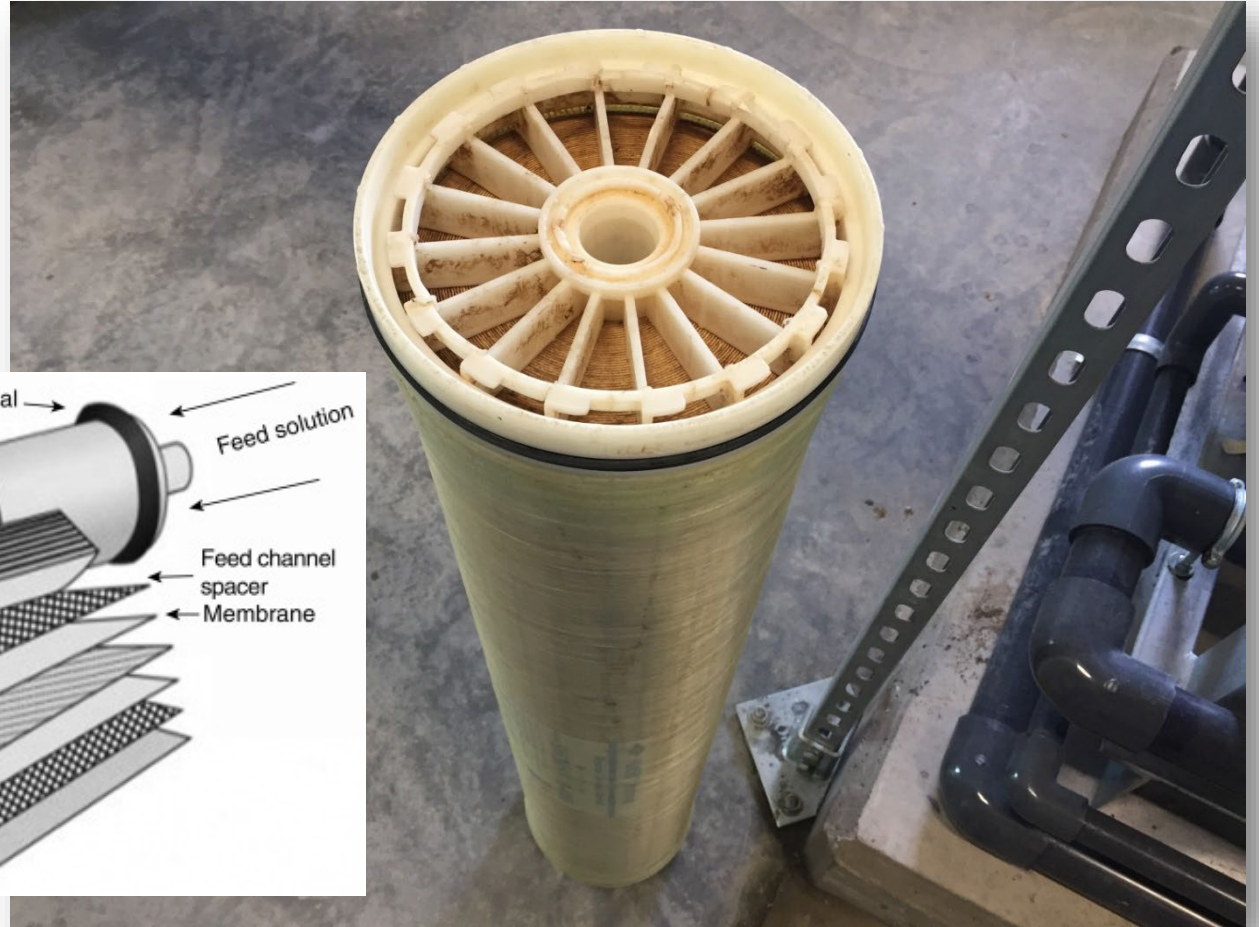
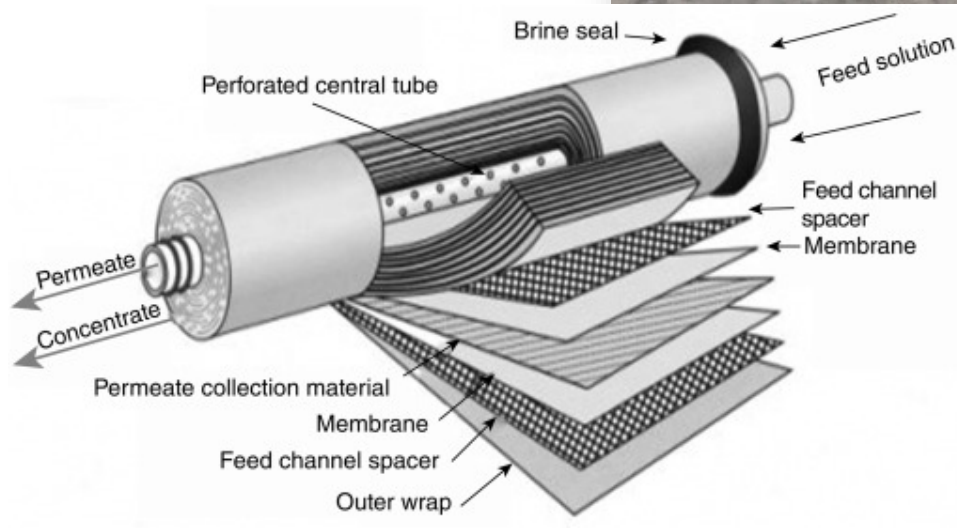
Landfill Leachate PFAS Treatment

- Two Reverse Osmosis Units
- Pore size range:
 - 0.0001 micron to 0.001 micron
- Pressure: up to 1,000 psi
- Removes:
 - PFAS
 - Bacteria
 - Viruses
 - TDS
 - 95% of organic salts
 - No ammonia removal (gas)



Landfill Leachate PFAS Treatment

- Series of reverse osmosis cartridges in each of the five RO stages
- Each cartridge membrane is spiral wound.



Additional Leachate Disposal Options

- **How Do You Currently Dispose of Leachate?**

- Direct pipe leachate to a local POTW
- Haul leachate to a local POTW
- Recirculate leachate
- Treat leachate on-site: Biological, Physical-Chemical

- **Consider Having a Solid “Plan B” (and “Plan C”)**

- Adequate raw leachate storage
- Additional approval from POTW (or other WWTP)
- Have approval for leachate recirculation
- Assess Economically Viable On-site treatment

Pre-Planning for Leachate Treatment:

Collect Quality & Quantity Info

**Reduce Leachate Generation and
Resolve Leachate “Issues”**

**Develop Multiple Leachate Disposal
and Treatment Options**

**Consider Storage, Recirculation,
Emerging Contaminants, etc.**

**Assess Treatment Solutions and
Plan for Future Expansion/Closure**

Summary

Thank You!

Questions and Comments

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