“Landfills and Groundwater” A Case Study of Impact in North Carolina

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Presenter:
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Outline:

- Introduction/Purpose
- NC Landfill Groundwater Monitoring
- Focus of Study
- Groundwater Quality Results
- Leachate Vs. Groundwater Results
Introduction/Purpose

- NC Landfill Monitoring Database
- NC GW Standards vs. MCLs
  - 15A NCAC 2L.0100 (et.seq)
  - GWP’s
  - No Standard
- Purpose: Evaluate Statewide Landfill Monitoring Data for Trends/Exceedances
NC Water Quality Monitoring for Landfills

- Semi-Annual Monitoring since 1993
- NCDEQ Mandated Format in 2007
- Required Data includes:
  - Permit #, Well ID, CAS #, Parameter, Results, Units, Qualifier, Method, MDL, MRL, SWS Limit, etc.
- Only State in Region Using Database
- Trend Evaluation – Great in Theory!
- Data Management/Required Reporting = KEY
Focus of Study

- Database includes data from various landfill types: Unlined MSW, Lined MSW, C&D, and LCID
- NC – A Mineral Rich State
- Focus=Organic Constituents at Unlined MSW and C&D
- Evaluated Data by Physiographic Province/Statewide
C&D Landfill Results (>10 Exceedances)

Blue Ridge C&D Exceedances (9 Facilities)

Piedmont C&D Exceedances (23 Facilities)

Coastal Plain C&D Exceedances (11 Facilities)
Statewide C&D Landfill Results (>10 Exceedances)
Unlined MSW Results (>49 Exceedances)

Blue Ridge MSW Exceedances (26 Facilities)

Piedmont MSW Exceedances (60 Facilities)

Coastal Plain MSW Exceedances (6 Facilities)
Statewide Unlined MSW Results (>49 Exceedances)
Landfills and Groundwater

- **Landfill Leachate**
  - Changes Strength Over Time
  - Varies Based on Industry, Compaction, Climate, Etc.

- **Leachate Constituents Vs. Detected**
### Detected GW Constituent

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<tr>
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<tbody>
<tr>
<td>1,1 Dichloroethane</td>
<td>39.12%</td>
<td>48%</td>
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<tr>
<td>1,2 Dichloroethane</td>
<td>13.91%</td>
<td>9%</td>
</tr>
<tr>
<td>1,2 Dichloropropane</td>
<td>6.54%</td>
<td>13%</td>
</tr>
<tr>
<td>1,4 Dichlorobenzene</td>
<td>30.74%</td>
<td>24%</td>
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<tr>
<td>Benzene</td>
<td>43.29%</td>
<td>56%</td>
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<tr>
<td>Methylene Chloride</td>
<td>42.90%</td>
<td>71%</td>
</tr>
<tr>
<td>Trichloroethylene</td>
<td>14.68%</td>
<td>38%</td>
</tr>
<tr>
<td>Tetrachloroethylene</td>
<td>10.51%</td>
<td>24%</td>
</tr>
<tr>
<td>Vinyl Chloride</td>
<td>21.07%</td>
<td>19%</td>
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</tbody>
</table>

1988 High Leachate Detections Not prevalent in GW exceedances: Trans 1,2 Dichloroethylene (55%), Isophorone (43%), Naphthalene (52%), Toluene (83%)
Conclusions

- Limited Subset of Appendix I Parameters Seen in GW near C&D/MSW Landfills
- Data Management Varies by Provinces Making Trend Analysis Difficult
- Leachate Parameters Line Up With Detections
- Some High Detection Leachate Parameters Not Seen at Corresponding Rate in Groundwater
- Incredible Opportunity to Refine Future Monitoring But Data Must Be Managed/Collected Properly
- Long Term Decisions Could Be Influenced by Data
The Future is Already Here, It’s Just Not Evenly Distributed
– William Gibson

Questions?

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