Groundwater Monitoring at SOLID AND HAZARDOUS WASTE FACILITIES

LDEQ Solid Waste Division
Geological Services Section
Dru Trahan, Geologist
• Hydrogeological Characterization

• Groundwater Monitoring System Configuration

• Groundwater Analysis and Reporting
Monitoring Phases

• Detection Monitoring
  – Impact has not been indicated
  – Statistical Analyses

• Assessment Monitoring
  – Impact is indicated but protective
  – RECAP

• Corrective Action
  – Impact is not protective
  – Remediation
GROUNDWATER MONITORING PARAMETERS

- Type I: Waste Analysis then Table 1
- Type II: Table I then Table 2
- Hazardous Waste: Table 2
MAJOR CATIONS/ANIONS IN GROUNDWATER

8 IONS OR COMPOUNDS ACCOUNT FOR 90% OF DISSOLVED MATERIAL IN GROUND WATER

<table>
<thead>
<tr>
<th>CATIONS</th>
<th>ANIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Na</td>
<td>Cl</td>
</tr>
<tr>
<td>K</td>
<td>HCO₃</td>
</tr>
<tr>
<td>Ca</td>
<td>CO₃</td>
</tr>
<tr>
<td>Mg</td>
<td>SO₄</td>
</tr>
</tbody>
</table>

Note: HCO₃ = *Alkalinity*; CO₃ = *Hardness*
OTHER CHEMICAL CONSTITUENTS IN GROUNDWATER

• Trace Metals (e.g. Cu, Pb, Cd, Cr, Hg,…..)
• Natural organic compounds (DOC)
• Anthropogenic
  ▪ Pesticides
  ▪ Nutrients
  ▪ Hydrocarbons etc.
CRITERIA FOR SELECTING PARAMETERS

- Types, Quantities, and Concentrations
- Mobility, Stability, and Persistence
- Detectability
- Concentrations or Values and Coefficients of Variation
Detection Monitoring

MONITORED UNIT

FLOW

COMPLIANCE

BACKGROUND
Detection Monitoring

\[ r_1 = \frac{\sum_{i=1}^{n-1} (x_i - \bar{x})(x_{i+1} - \bar{x})}{\sum_{i=1}^{n} (x_i - \bar{x})^2} \]
• Lab or Sampling Error
• Natural Variability
  – Spatial
  – Temporal
• Alternate Source
Figure 14-1. Seasonal Fluctuations
Assessment Monitoring

Risk Evaluation/
Corrective Action Program
Assessment Monitoring
GROUNDWATER MONITORING PARAMETERS

- Types, Quantities, and Concentrations
- Mobility, Stability, and Persistence
- Detectability
- Concentrations or Values and Coefficients of Variation