Interstitial Monitoring as a Whole System: Containment, Sensing, Monitoring

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Three Release Detection Concepts

- **Internal**
  - Inventory Control
  - SIR
  - Automatic Tank Gauging
  - Manual Tank Gauging

- **Interstitial**
  - Secondary Containment

- **External**
  - Soil Vapor and Groundwater Monitoring
Containment

✓ Tank
✓ Piping
✓ Sumps
✓ Fittings

Single-Walled System
Double- or Single-Walled system?

Not Interstitial!
No Under Dispenser Containment

Double-Walled System

© Petroleum Training Solutions
Secondary Containment
Ducted Double-Wall Pipe
Secondary Containment Piping

(Graphic courtesy of PEI)
Interstitial Sensing Options

- Dry
  - Electronic
    - Float/Magnetostrictive
    - Optical
    - Conductive
      - Manual
- Wet
- Vacuum
- Pressure
Dry Sensor - FRP Tank

Interstitial Sensor – Steel Tank
Types of Sensors

Non-Discriminating

Discriminating
Manual Monitoring System
“Wet” Interstitial Sensor

Hydrostatic Reservoir Sensor
Liquid Petroleum Sensor - Electrical Conductivity

No | Yes
---|---
Petroleum Present? | | Petroleum Present? |

No | Yes
---|---

| | |
**Liquid Sensor - Electrical Conductivity**

Which Liquid is Present?

Water  Petroleum

Water  Petroleum
Sensor Terms

- **Float Sensor**- responds to presence of liquid—fuel, water or both—in dry interstice
- **Hydrostatic Sensor**- responds to change in cumulative liquid level in wet interstice
- **Conductive Sensor**- responds to liquid interference on or between contact points in dry interstice
- **Optical Sensor**- responds to interruption of continuous light prism by liquid in dry interstice
- **Vacuum Sensor** (gauge) – responds to loss of vacuum in airtight interstice
- **Pressure Sensor** (gauge) - responds to loss of pressure in airtight interstice
## Sensors: What They Can and Cannot Do

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Can detect introduction of liquid in tight interstice</th>
<th>Can detect breach in inner or outer wall of interstice</th>
<th>Can distinguish between product and water</th>
<th>Is compatible with ethanol fuels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Float, Discriminating</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
<td>E10 probably, E85 no</td>
</tr>
<tr>
<td>Float, Non-Discriminating</td>
<td>Yes</td>
<td></td>
<td></td>
<td>E10 probably, E85 no</td>
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<tr>
<td>Hydrostatic</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Optical</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
<td></td>
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<tr>
<td>Conductive, Discriminating</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
<td></td>
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<tr>
<td>Conductive, on-Discriminating</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
<td></td>
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<tr>
<td>Pressure</td>
<td></td>
<td></td>
<td>Yes</td>
<td>NA</td>
</tr>
<tr>
<td>Vacuum</td>
<td></td>
<td></td>
<td>Yes</td>
<td>NA</td>
</tr>
</tbody>
</table>
Most Sensors are Connected to ATGs

Sensors May be Connected to Dedicated Leak Detection Console
Need Monthly Documentation of Sensor Operation

Manual Sump Sensor Check Log

Tank interstitial space check---------tank moisture check

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Reading</th>
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<tbody>
<tr>
<td>1-2000</td>
<td>1-2.00</td>
</tr>
<tr>
<td>2-2000</td>
<td>2-2.00</td>
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<tr>
<td>3-2000</td>
<td>3-2.00</td>
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<tr>
<td>4-2000</td>
<td>4-2.00</td>
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<tr>
<td>5-2000</td>
<td>5-2.00</td>
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<td>6-2000</td>
<td>6-2.00</td>
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<tr>
<td>7-2000</td>
<td>7-2.00</td>
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<tr>
<td>8-2000</td>
<td>8-2.00</td>
</tr>
<tr>
<td>9-2000</td>
<td>9-5.00</td>
</tr>
</tbody>
</table>
**Problems**

- Failure to respond to alarms
- Failure to respond to alarms
- Failure to respond to alarms
- Water in sumps
- Sensors not properly positioned
- Documentation of sensor operation not kept
- Leaky sumps and fittings

**Summary**

- Interstitial Monitoring is the sum of containment, sensors, monitoring components
- Variety of monitoring principles
- Variety of materials, makes and models of each part