Groundwater Flow
comparison of MtBE and Benzene Dilution Factors

- **benzene**
  - $C_{source} = S \cdot MF = (1750 \text{ mg/L} \cdot 0.02) = 35 \text{ mg/L}$
  - $C_{receptor} = 0.005 \text{ mg/L}$
  - $C_{source} / C_{receptor} = 7000$

- **MtBE**
  - $C_{source} = S \cdot MF = (42000 \text{ mg/L} \cdot 0.15) = 6300 \text{ mg/L}$
  - $C_{receptor} = 0.02 \text{ mg/L}$
  - $C_{source} / C_{receptor} = 315 000$

$MF$ - mole fraction, $S$ - pure chemical solubility.
Residual-Phase Source.
THIS PAGE INTENTIONALLY LEFT BLANK
MTBE OVERVIEW

- MTBE is a motor fuel additive (late '70s)
- Lead replacement in Gasoline up to 8%
- Oxygenate per USEPA reformulated to 15%
- MTBE does escape thru Gasoline releases
- Typically from U/G tanks or flow lines
- MTBE much more soluble/H2O than BTX
- MTBE very resistant/microbial degradation
MTBE Risk (C&L) 100X BTX

- Combination of high mobility/not biodegradable
- Travels further in groundwater than BTX
- More likely to impact private/public wells
- Worst case event impacts municipal H2O
- Next level is drinking H2O potential threat
- $5-50MM 1.5/yr vs 1-10MM@$ 100/year
- MTBE Station Release vs Refinery problem
- Lake Tahoe, San Amonica & 2 cycle Ski's
MTBE Risk Reduction

Alternatives

- Eliminate MTBE from Gasoline Blending
- Reduce MTBE levels in our gasoline
- Inventory control/inspection & maintenance
- Tank upgrade design/installation prevents
- Stations not in sensitive drinking H2O areas
- Ensure gaso releases don’t migrate off-site
- Better quantify Drinking H2O contaminants
First Pass at Premises......

MtBE Risk Assessment

- MTBE from gaso leaks at stations will NOT result in ground H2O contamination such that municipal H2O (>1000gpm) supplies in vicinity of site are S/D (or alternately NOT result in exceedance of conc criteria @ compliance monitoring points at property boundary.

- Equilon will strive to comply w/all Envir Laws OR work towards changing laws if deemed appropriate and necessary for long term sustainability of net ROI of business.

- Have flexibility to use MTBE and/or Alkylates...
MTBE selection criterion

- **Must** meet H2O LAWS (NPDES, permits)
- Want to maintain image/benefits of Ozone and CO reduction with reformulated gaso
- Want to avoid the need for U/G remediation
- Want high REF flexibility in gaso produced
- Want to minimize $ gaso processing costs
- Want sound reputation (local & corporate)
- Want to generate business opportunities
Methyl Tertiary Butyl Ether

- Most Things Biodegrade Easier
- Menace Threatening our Bountiful Environment
- Major Threat to Better Earnings
- Movement towards Bureaucratic Entrenchment
- MONEY TO BE EXTRACTED
- MGMT Towards a Better ENVIRONMENT
Process Selection

Performance Issues

Setting Priorities

Selection Criteria

Priority Matrix

- Issue A: 1
- Issue B: 2
- Issue C: 3

Determine Appropriate Process to apply to each issue

Need to Know: What is happening and why?

R.C.A

Need to Determine: How to Proceed?

Solution Development

Planning and Implementation

Need to develop an implementation plan.

Performance Improvement

Root Cause Analysis

SH 007994

RCA - 31
The Four Stage Structured Solution Development Process

Stage 1: Common Understanding

Stage 2: Generation

Stage 3: Refinement

Stage 4: Decision Making
Working the Generation Process
olution Development - Four-Stage Structured Decision Making Process

DEVELOP UNDERSTANDING
- Cause and effect?
- Correlations?
- Other data?

PROBLEM REVIEW
- "Get the Facts Straight"
- Object/defect/impact

SELECTED PROBLEMS

Solution Statement

Review and Revise Solution Statement

Idea and Solutions

Definitive Alternatives

Limited and Concerns

Validated Limits

Desired Ends

Musts and Wants

Risk Assessment

Mitigation Steps for Risk

Assess Risk For Selected Alternative(s)

4 - Decision Making

DECISION MATRIX

Solution Statement

Minimum Expectation

Alternatives

A0 A1 A2 A3 A4 A5 A6 A7

Musts

Wants

Totals
Stage 4: Decision Making

What is the desired outcome of this activity?

- Best Balanced Solution(s)
  - Solutions that represent the best means to achieve desired ends (all musts and most wants)
Decision Making
Making Choices

Desired Premised Outcome:

<table>
<thead>
<tr>
<th>Threat</th>
<th>Original Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Decision Objective:

**Decision Matrix**

<table>
<thead>
<tr>
<th></th>
<th>AR #1</th>
<th>AR #3</th>
<th>AR #5</th>
<th>AR #7</th>
<th>AR #9</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Musts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Wants</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Evaluation = scores times weight

<table>
<thead>
<tr>
<th></th>
<th>Weight</th>
<th>Evaluate horizonality for consistency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Foot Notes
MTBE Leak Prevention Mtg - 5/11/98

- Improved Decision Making - what & why?
- Why Use Octane Enhancers/oxygenates?
- What MTBE Leak Rate Is Acceptable?
- Current History on Releases, how frequent, what are remediation costs and IMPACTS?
- Let's reach "common understanding" of the PROBLEM, define it and refine it together!