

MTBE & Other Gasoline Oxygenates: Trends in LUST Sites

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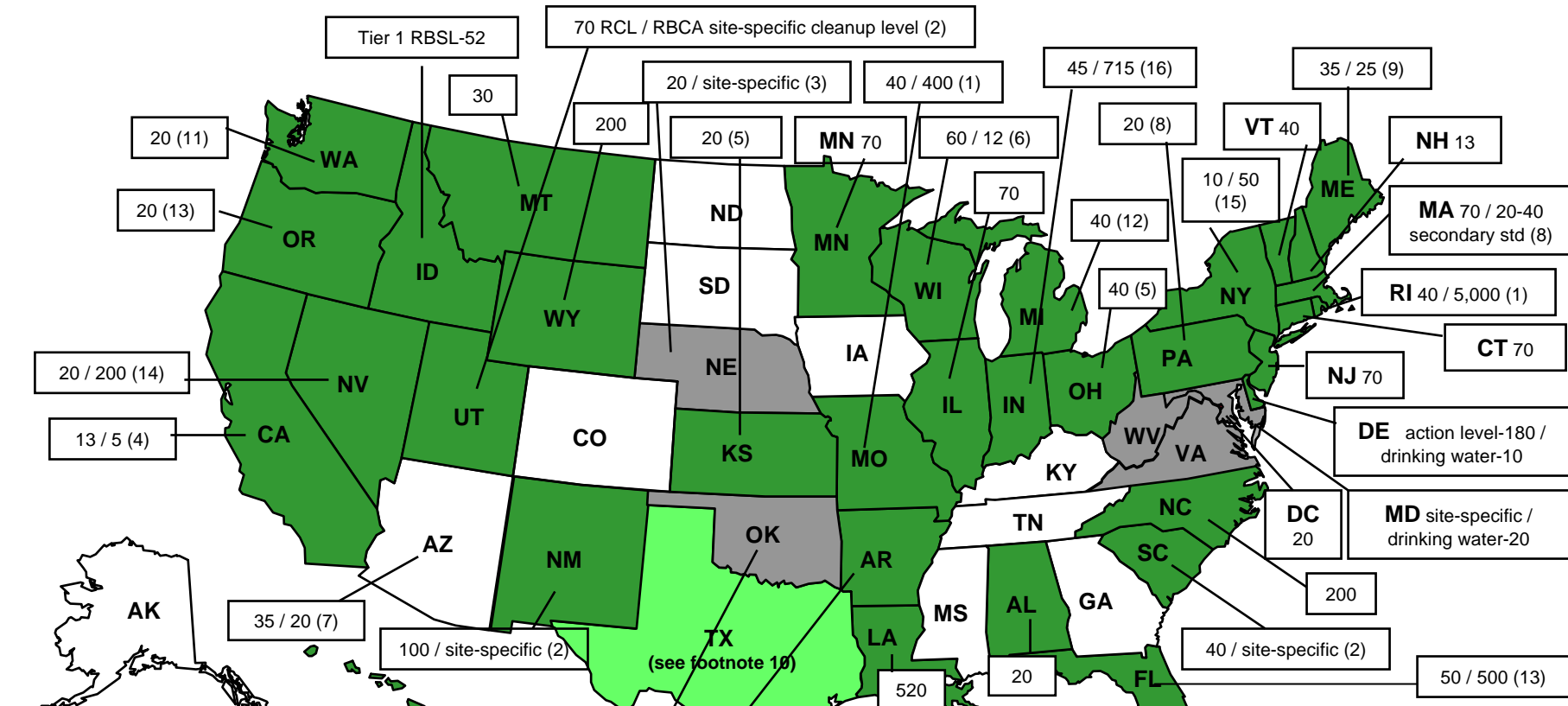
October 21, 2002

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Groundwater Oxygenate Cleanup Levels for LUST Sites - 2002 Survey

- State UST/LUST regulatory data were collected by Delta in email & phone surveys during August-September 2002
 - Updated September 2002 version of Delta's map:
"MTBE Groundwater Clean-up Levels for LUST Sites: Current & Proposed"
 - Summary table of all oxygenate data collected:
"Groundwater Oxygenate Cleanup Levels for LUST Sites"
 - Both documents posted at EPA-OUST web-site:
<http://www.epa.gov/swerust1/mtbe/index.htm>
- State data table summarizes:
 - Current levels for individual oxygenates
 - Pending changes for oxygenates in 2002-2003

MTBE Groundwater Clean-up Levels for LUST Sites: Current & Proposed



September 2002 v092502

MTBE Cleanup / Action Level (ug/L)
Site-Specific MTBE Clean-up Level (ug/L)
Projected 2003 MTBE Cleanup Level (ug/L)
Waiting for EPA MCL

- FOOTNOTE LEGEND:**
- (1) - Clean-up level for GW use as potable + health advisory / non-potable ground water
 - (2) - Recommended clean-up level / site-specific standard possible for drinking water
 - (3) - Tier 1-RBSL clean-up or action level / Tier 2 drinking water cleanup level
 - (4) - Primary MCL / enforceable Secondary MCL
 - (5) - Action level or level of concern
 - (6) - WDNR NR 140 Enforcement Standard / Preventative Action Limit goals
 - (7) - Health-risk guidance level - not enforced for LUST cleanup / site-specific level used
 - (8) - Groundwater resource used as residential drinking water
 - (9) - Cleanup level / action level (i.e., ME 35 / 25)
 - (10) - No LUST level unless DW impacted or immediately threatened (aesthetic @ 15 ug/L)
 - (11) - Method A MTBE groundwater clean-up level at 20 ug/L
 - (12) - Tier 1 RBSL level based on aesthetics
 - (13) - (OR): aesthetic drinking water standard; (FL): rule – potable / non-potable
 - (14) - MTBE action levels (i.e., NV 20 / 200)
 - (15) - Enforceable groundwater guidance value / enforceable drinking water standard
 - (16) - Closure level: residential / non-residential



Groundwater Oxygenate Cleanup Levels for LUST Sites

Data current as of September 2002. All values in ug/L (or ppb).									
State	MTBE	MTBE level or change in 2003?	TBA	DIPE	TAME	ETBE	EtOH	MeOH	Comments:
Alabama	20	No changes in 2002							No changes in any levels for 2002.
Alaska	None	Possible changes in 2003							Staff has option to require the compounds of concern to be sampled & analyzed.
Arizona	[35]	No changes in 2002							MTBE: 35 ppb = health-risk guidance level, not enforced for LUST cleanup; 20 ppb has been used on site-specific basis
Arkansas	20	No changes expected in 2003							MTBE: 20 ppb GW cleanup value. Groundwater discharge to surface water MTBE value = 7,000 ppb.
California	13 / 5	Unknown	12						MTBE: 13 ppb / 5 ppb = Primary MCL / Secondary MCL (both enforceable); TBA: 12 ppb = Provisional Action Goal (enforceable).
Colorado	Site-specific	Unknown							Cleanups are site-specific for ether and alcohol fuel oxygenate compounds.
Connecticut	70	Unknown							MTBE: 70 ppb
Delaware	140 / 10	Unknown	140	Possible changes in 2003	750				MTBE: 140 ppb / 10 ppb = action level / drinking water in public wells, respectively. TBA: 140 ppb action level. TAME: 750 ppb action level
District of Columbia	20	Unknown							MTBE: 20 ppb

MTBE: GAO May 2002 Report of Congressional Testimony

- Testimony by John Stephenson (Director, Natural Resources and Environment) to Subcommittee on Environment and Hazardous Materials, Committee on Energy and Commerce, House of Representatives
- **“Environmental Protection – MTBE Contamination From Underground Storage Tanks”**
- The Director and his agency testified on:
 - The extent to which these releases may contain MTBE, and whether the contaminant poses health risks or affects cleanups;
 - The progress states have made in cleaning up releases;
 - And, the party responsible for the cleanup costs.

Testimony Excerpts: Extent of MTBE Impacts

- The extent of MTBE contamination may be understated because some tank releases go undetected.
- In 2000, only 19 states were taking any extra steps [in site investigations & 3-D monitoring well networks] to make sure that MTBE was not migrating further from a tank site than other contaminants when a release has been detected.
 - **In September 2002, only 18 states have not investigated the distribution & occurrence of MTBE and other oxygenates**
- Parties might have to use more test wells around a leaking tank to determine if and where MTBE is present. If states do not conduct the extra tests, they may not detect the MTBE.

Source: NEIWPC, 2000

LUST Sites Closed Before MTBE Sampling Was Required

- Based on responses from 27 states, **over 91,000 LUST sites were closed prior to more stringent or comprehensive MTBE sampling & analytical requirements**
- **Top 5 states have closed over 53,400 sites (59% of the total sites)**
- **18 states have closed >1,000 sites each for a total of 86,000 closed sites (95% of total)**
- *18 states gave “don’t know” or no response*

Source: NEIWPC, 2000

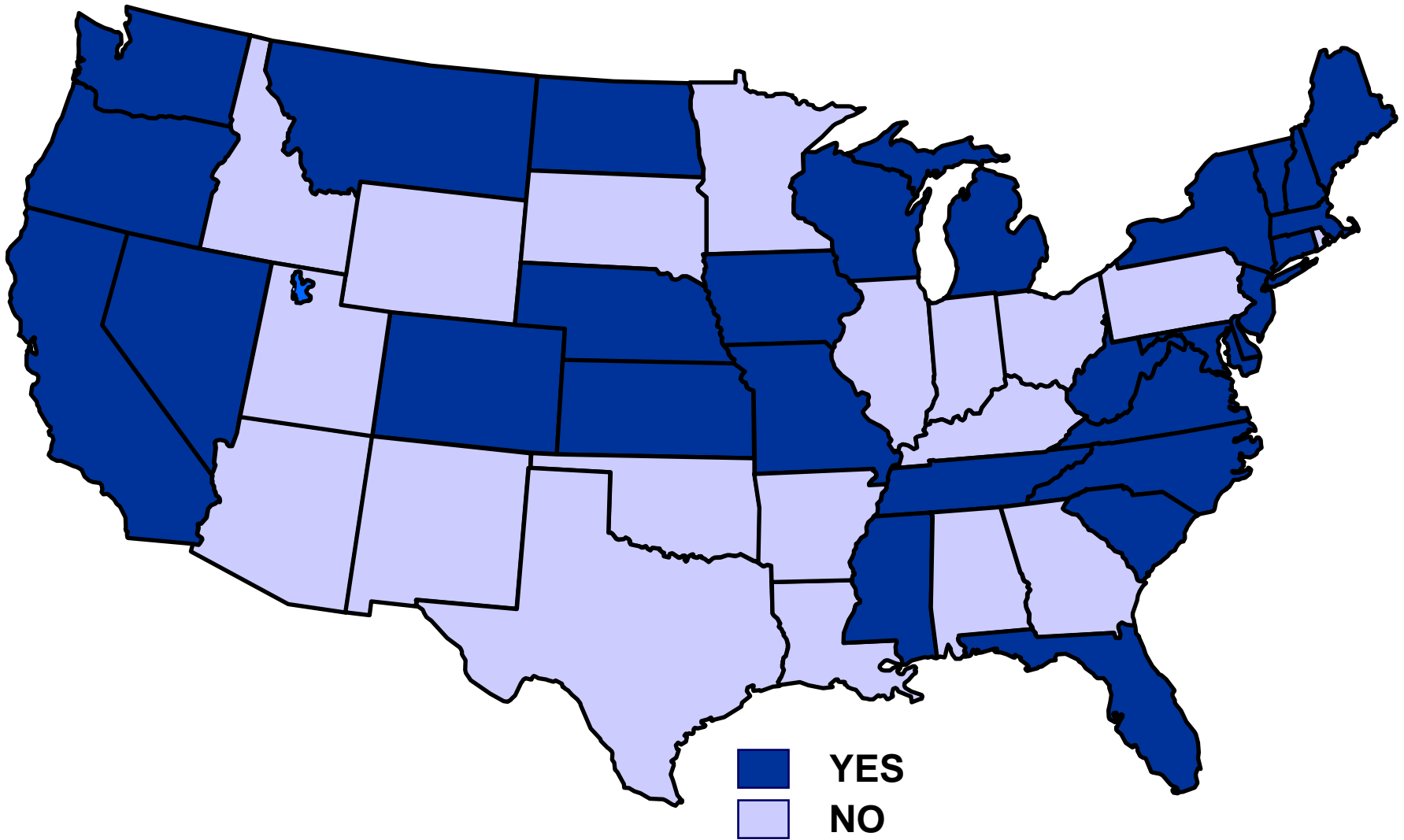
MTBE Summary: Cleanup Levels for LUST Sites

- 36 states currently have MTBE cleanup levels specified
- 5 states indicate site-specific cleanup levels
- 10 states waiting for EPA MCL on MTBE
 - AK
 - CO
 - IA
 - MI
 - SD
 - AZ
 - GA
 - KY
 - ND
 - TN
- 12 states are anticipating possible changes or adding MTBE cleanup levels in 2002-2003
 - AK
 - FL: 20 ppb (2003)
 - ID: 30 ppb (late 2002)
 - LA: proposed aesthetic levels
 - MO
 - NJ
 - NY
 - NC
 - TN
 - TX: 15 ppb (2003)
 - VT
 - WY

MTBE & Other Gasoline Oxygenates

- TBA occurrence fairly likely with MTBE detections; the relative concentration levels vary widely
- TBA chemical / physical properties may add to regulatory complexities for remediation or closure
- **MTBE and TBA are biodegradable**
 - Fastest degradation rates exist in the presence of O_2
 - TBA accumulates under oxygen-limited conditions
- **Increasing number of sites have been identified with MTBE degradation potential**
 - Few sites have sufficient data to demonstrate Natural Attenuation / Remediation by Natural Attenuation (RNA)
- **Other oxygenates distribution, detection frequency, and degradation not as extensively studied or understood, but natural degradation is likely (e.g, DIPE, TAME, ETBE, TAA)**

Groundwater Sampling/Analysis for Other Oxygenates



TBA Summary: Cleanup Levels for LUST Sites

- **7 states currently have TBA cleanup levels specified**
 - **CA: 12 ppb**
 - **DE: 140 ppb**
 - **MI: 3,900 ppb**
 - **NJ: 100 ppb**
 - **NY: 50 ppb**
 - **OK: site-specific**
 - **WY: 3,200 ppb**
- **Possible TBA cleanup levels for 2002-2003:**
 - **FL: 1,400 ppb**
 - **MD**
 - **MA**
 - **NH (12 ppb ??)**
 - **OH**
 - **OR**
 - **TX: (not until 9/1/03 for PST)**
 - **2,200 ppb**

Other Oxygenates Summary: Cleanup Levels for LUST Sites

- **Very limited number of states specifying levels:**
 - **DE:**
 - TAME: 750 ppb
 - **MO:**
 - Case-by-case for DIPE, TAME & ETBE
 - **NJ:**
 - DIPE: 20,000 ppb
 - **NY:**
 - DIPE: 50 ppb
 - TAME: 50 ppb
 - **OK:**
 - Site-specific for DIPE, TAME & ETBE
- **Possible changes for other oxygenates in 2003:**
 - **DE:**
 - DIPE: in 2002-2003
 - TAME: in 2002-2003
 - **MI:**
 - DIPE: 30 ppb
 - TAME: 190 ppb
 - ETBE: 49 ppb
 - **NH:**
 - TAME
 - **OR:**
 - DIPE, TAME & ETBE
 - **TX: (not until 9/1/03 for PST)**
 - DIPE: 2,400 ppb
 - TAME: 980 ppb
 - ETBE: 24 ppb

Alcohol Oxygenates Summary: Cleanup Levels for LUST Sites

- **Current levels specified:**
 - **FL:**
 - Ethanol: 10,000 ppb
 - Methanol: 5,000 ppb
 - **IL:**
 - Ethanol: 571,000 ppb
 - **MI:**
 - Ethanol: 1,900,000
 - **MN:**
 - Methanol: 3,000 ppb
 - **NJ:**
 - Methanol: 4,000 ppb
 - **NY:**
 - Ethanol: 50 ppb
 - Methanol: 50 ppb
 - **NC:**
 - Methanol: 3,500 ppb
 - **OK:**
 - Ethanol: site-specific
 - Methanol: site-specific
 - **PA:**
 - Methanol: 4,900 ppb
 - **TX: (not until 9/1/03 for PST)**
 - Ethanol: 806 ppb
 - Methanol: 12,000 ppb
 - **WY:**
 - Methanol: 16,000 ppb
- **Proposed changes for 2003:**
 - **FL, MI, OR**

Natural Attenuation of MTBE

Current Status

- Insufficient site-specific natural attenuation evidence exists for most sites (e.g., geochemical indicator data; adequate monitoring networks) although limited field evidence exists for natural attenuation
 - MTBE-specific indicator parameters are required
 - Degradation activity typically associated with:
 - aerobic conditions
 - methanogenic conditions
- Natural attenuation of MTBE is not widely accepted
- TBA accumulation from fuel product sources and from MTBE degradation present an additional hurdle for regulatory acceptance

Physicochemical Properties¹

Property	Benzene	MTBE	TBA
Pure Component Water Solubility (mg/L)	1780	43000 - 54000	316200 ²
Pure Component Vapor Pressure (mm Hg)	76 - 95	245 - 256	40 -42
Dimensionless Henry's Law Constant	0.22	0.023 - 0.12	0.00048 – 0.00059

1. “Strategies For Characterizing Subsurface Releases Of Gasoline Containing MTBE”, API #4699, 2000.
2. “Groundwater Chemicals Desk Reference”, Vol. 2. p 113, (Montgomery, 1991)

Summary: LUST Industry Trends

- **Site numbers / open release incidents**
 - **Industry & EPA/States: Over 145,000 existing sites as backlog**
 - **EPA: Cleanups Initiated & Cleanups Completed declining since 1998**
 - Many existing sites yet to commence cleanup (9% of total releases).
 - Assessment sites make up about one-third of the total active LUST sites.
 - On-going cleanup noted in about one-half of the total LUST sites.
- **Closures**
 - **Cleanups completed / closures: slowing or stable**
 - **MTBE, and potentially other oxygenates, complicate closures**
- **Costs**
 - **EPA/States:**
 - Costs are rising due to MTBE and other oxygenates' influences.
 - **Industry:**
 - Active or backlog LUST site numbers are remaining stable with significant cost increases noted for the past few years.
 - Future total LUST lifecycle cleanup costs continue to increase.