The Compiled Results of the Survey of State Experiences with M*t*BE and Other Oxygenate Contamination at LUST Sites (March-April 2003)

A Project of the New England Interstate Water Pollution Control Commission (NEIWPCC)

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This document is a compilation of state responses to the NEIWPCC "Survey of State Experiences with M*t*BE and Other Oxygenate Contamination at LUST Sites." A summary report of this survey can be found at the NEIWPCC Web site at www.neiwpcc.org. All 50 states responded to the survey; not all states answered all questions.

Preliminary notes from three states:

CA The SWRCB has program responsibility at the statewide level. However, it is the 9 regional boards, the 20 local oversight program agencies, and the other local agencies that oversee site cleanup. SWRCB staff have responded on behalf of these agencies, based on available information and estimates.

KY The UST Branch is certain that MTBE is added to gasoline used in KY. It is unsure about other oxygenates, however. Analytical data have shown that MTBE is present in soil and GW and its occurrence is not limited to non-attainment areas (Louisville and northern KY). MTBE contamination appears to be primarily associated with LUST sites. It has been detected in soil and GW in urban and rural areas across the state.

KY presently does not require the submittal of MTBE analyses for soil and GW at LUST sites. However, the UST Branch is keeping track of sites that have MTBE detections (a handful of labs always report MTBE results w/BTEX analyses).

KY is waiting for an EPA MCL. Until the MCL is established, KY requires MTBE sampling of DW sources located within a certain distance from a LUST. An alternative WS is required for MTBE impacts >50 ppb. If MTBE is detected in a DW source above 50 ppb, the UST Branch will require that an alternative source be supplied.

TX We have answered the survey below regarding oxygenates to reflect the current rules governing cleanup of petroleum storage tank sites in Texas under 30 Texas Administrative Code (TAC) 334. Currently, we do not specifically address cleanup of oxygenates under the rules governing petroleum storage tanks (PSTs). Changes in our rules that will take effect on September 1, 2003, for new releases of product from petroleum storage tanks may include cleanup of the oxygenate compounds that are the subject of this survey. Releases after that date will have to be cleaned up under 30 TAC 350, the Texas Risk Reduction Program (TRRP), which already covers cleanup for other types of contamination in the state.

Our current interim policy is to not require cleanup of groundwater for MtBE except when a drinking water well is impacted or imminently threatened. When that is the case, we are requiring that the cleanup be to the organoleptic level of 15 ppb. In almost all cases, with very rare exceptions, we find that benzene drives the cleanup of groundwater for contamination resulting from PST releases.

I. State Oxygenate Standards

Definitions:
• **Action level**: The level at which some type of remediation or investigation must be undertaken.

• **Cleanup level**: The goal for remediation.

• **Drinking water standard**: The level that drinking water supplies must not exceed (primary, secondary, advisory).

Abbreviations:
DW drinking water
GW groundwater
RB risk-based
SS sight specific

1a. Does your state have action levels, cleanup levels, or drinking water standards for M*t*BE?

- **Yes** –AL, AZ, CA, CT, DE, FL, HI, ID, IL, IN, KS, KY, LA, MA, ME, MD, MI, MN, MO, MT, NE, NV, NH, NJ, NM, NY, NC, ND, OH, OR, PA, RI, SC, SD, TX*, UT, VA, VT, WA, WV, WI, WY
- **No** – AK, AR, GA, IA*, MS, OK, TN
- **Proposed** – CO

AZ* Soil: residential/non-residential; GW: receptor threatened/no receptor threatened.

DE* State may require further investigation even if soil or groundwater detections are *less than* the action levels if there is an extremely close receptor. The action levels were not set lower so that they would not trigger at every site.

HI* DW threatened/DW not threatened.

IA* Laboratories analyzing samples for MTBE must meet a minimum "detection level" of 15 ppb for MTBE and must run standards for other oxygenates to be certain of their identification should they be detected.

IN* Residential/industrial.

MA* Action levels are referred to as "reportable concentrations."

NE* Site specific levels are determined through RBCA.

NV* The determination of 20 or 200 ppb for GW cleanup is based on potential risk to receptors. 200 ppb is used when no or little risk is apparent.

NC* Or alternate SS levels based on risk-based analysis.

OH *This Tier 1 action level range depends on soil type and depth to GW for "soil to DW pathway." ** This Tier 1 action level is for the "direct contact pathway."

OR* The applicable risk-based concentration for a given site is based on the relevant exposure pathway(s).

RI* GA GW can be used for DW without treatment; GB GW is presumed to not be drinkable without treatment.

TX* Only if a DW well is impacted or imminently threatened.

VA* The action levels listed in 1b are reporting requirements. DEQ decides if further investigation is warranted. Lab detection limits usually run 2-5 ppb for MTBE.

WV *Residential cleanup; ** Volunteer Remediation Program.

WY* Secondary.

1b. If yes, please fill in the appropriate box(s) with levels and applicable units.

M*t*BE

Medium	**Action Level(s)**	**Cleanup Level(s)**	**Drinking Water Standard**			
			Primary (health-based)	Secondary (taste & odor)	EPA advisory 20-40 ug/L	State (or other) advisory

Soil	**AL** - 0.008 mg/Kg; **AZ** - Method reporting level; **CT** - 2 ppm; **DE*** - 130 ppb; **FL** - 0.2 mg/Kg; **HI*** - 0.005/20 ppm; **IL** - 320 ppb; **IN** - 0.35 mg/Kg; **LA** - 20 ppm; **MA*** - 0.3 mg/Kg; **MD, NE** - SS; **MI** - 800 ppb; **MO** - 60 ppm; **NM** - risk-based; **NY** - any amount; **NC** - 0.92 mg/Kg; **OH** - 0.530-6.43 ppm*, 130 ppm**; **PA** - 2 mg/Kg; **UT** - 0.3 mg/L; **VA** - >lab detection limit*; **WV**** - 97 mg/Kg*; **WY** - SS	**AZ** * - 320/3,300 mg/Kg; **CT** - 2 ppm**;** **DE, ID, MD, NE** - SS **FL** - 0.2 mg/kg; **HI*** - 0.005/20 ppm; **IN** - 0.35 mg/Kg residential subsurface soil & 5.6 mg/Kg industrial subsurface soil; **IL** - 320 ppb; **LA** - determined by risk evaluation; **MA** - 0.3 ug/g; **MI** - 800 ppb; **MO** – SS: 60, 140, 280 ppm; **MT** - 30 ppb; **NH** - 0.13 mg/Kg; **NJ** - 3.1 ppm; **NM, VA** - risk-based; **NY** - 012 mg/Kg;; **NC*** - 0.92 mg/Kg; **OH** - Tier 2, SS target levels; **OR*** - 0.16 ppm – 319,000 ppm; **PA** - 2 mg/Kg; **UT** - 0.3 mg/Kg; **WA** - 0.1 mg/Kg; **WY** - SS				
Groundwater	**AL** - 20 ug/L; **AZ** - 20 ug/L; **CA**-13 ppb; **CT** -70 ppb; **DE*** -180 ppb; **FL** - 50 ug/L; **HI***- 20/202,000 ppb; **IL** - 70 ppb; **IN** - detection limit; **KS** - any; **KY** - 50 ppb (for DW sources); **LA** - 0.52 ppm; **MA*** - 0.07 mg/L; **ME** - 25 ppb; **MD** - SS; **MI** - 40 (aesthetic) ppb, 240 ppb	**AZ** * - 20/94 ug/L; **CT** - 70 ppb; **DE, MD, NE** - SS; **FL** - 50 ug/L; **HI*** - 20/202,000 ppb; **IL** - 70 ppb; **ID** - 52 ppb; **IN*** - 45 ppb/720 ppb; **KS** - 20 ug/L; **LA** - determined by risk evaluation; **MA** - 70 ug/L; **ME** - 35 ppb; **MI** - 40 ppb (aethetic), 240 ppb (health); **MO** - <400 ppb;	**CA** - 13 ppb; **CO** - 15 ug/L; **DE** - 10 ppb; **IL**,; **KS** - any; **ME** - 35 ppb; **MI** - 240 ppb; **MO** - 20 ppb; **NJ** - 70 ppb; **NH** - 13 ug/L; **NY**-50	**CA** - 5 ppb; **WA, MI** - 40 ppb; **MO** - 400 ppb; **NH** - 20 ug/L; **NM** - 100 ppb; **TX** - 15 ppb	**CA** - 20 ppb; **IN** - voluntary reporting; **GA, ME, NV, NC, ND, OR, SD** - 20-40 ppb; **OH** - 40 ppb; **PA** - 20 ug/L	**CT, MA, MN**-70 ppb; **IN** - voluntary reporting; **MD** - 20 ppb; **AZ, IL;** **ME** - 35 ppb; **MO, RI** - 40 ppb; **NC** - 200 ug/L; **PA, VA** - 20 ug/L

	(health); **MO** - 400 ppb; **NE*** - 20 ppb+; **NV*** - 20 & 200 ppb; **NM** - 100 ppb; **NY** - any amount; **NC** - 200 ug/L; **OH** - 40 ppb (DW); **PA** - 20 ug/L; **RI*** - GA-20 ppb; **SC** - 40 ug/L; **UT** - 0.07 mg/L; **VA** >lab detection limit*; **WV** ** - 20 ug/L; **WI** - 12 ppb; **WY*** - 40 ug/L	**MT** - 30 ppb; **NV***- 20 & 200 ppb; **NJ** - 70 ppb; **NM** - 100 ppb; **NY** - 10 ug/L; **NC** - 200 ug/L; **OH** - Tier 2, SS target levels; **OR*** - 20 ppb – 51,000,000 ppb; **PA** - 20 ug/L; **RI*** - GA-40 ppb, GB 5000 ppb; **SC** - 40 ug/L; **TX** - 15 ppb*; **UT** - Tier1- 0.20 mg/L, RCL- 0.07 mg/L; **VA** - risk based; **VT** - 40 ppb; **WA** - 20 ug/L; **WI** - 12 ppb; **WY*** - 40 ug/L	ug/L; **OR** - 20 ppb; **VT** - 40 ppb			

2a. Does your state have action levels, cleanup levels, or drinking water standards for *tertiary*-butyl alcohol (TBA)?

- **Yes**– CA, DE, MA, MI, NJ, NY, VA
- **No** – AZ, AK, AL, AR, CT, FL, GA, HI, ID, IL, IN, IA, KS, KY, LA, ME, MD, MN, MO, MS, MT, NE, NV, NH, NM, NC, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VT, WA*, WV, WI
- **Proposed** – CO, NH (40ug/L), WY (220 ug/L) primary action and cleanup.

WA* Currently evaluating toxicity data and may require testing in near future.

2b. If yes, please fill in the appropriate box(s) with levels and applicable units.

TBA (*tertiary*-butyl alcohol)

Medium	**Action Level(s)**	**Cleanup Level(s)**	**Drinking Water Standard**			
			Primary (health-based)	Secondary (taste & odor)	EPA advisory	State (or other) advisory
Soil	**DE –** 50 ppb; **MA** - 100.0 mg/Kg; **MI** - 78,000 ppb; **NY** - any amount; **VA** > lab detection	**DE, IN, NY** - SS; **MI** - 78,000 ppb; **NJ** - 4.1 ppm				

	limit					
Groundwater	**CA** -12ppb; **DE** - 140 ppb **MA** - 1.0 mg/L; **MI** - 3,900 ppb; **NY** - any amount; **VA** > lab detection limit	**DE, IN, NY**-SS; **MI** - 3,900 ppb; **NJ** - 100 ppb	**CO**-15ug/L; **MI**-3,900 ppb; **NY** - 50 ug/L			**DE** - 12 ppb

3a. Does your state have action levels, cleanup levels, or drinking water standards for Ethanol?

- **Yes** – MA, MI, NY, VA
- **No** – AZ, AK, AL, AR, CA, CO, CT, DE, FL, GA, HI, ID, IL, IN, IA, KS, KY, LA, ME, MD, MN, MO, MS, MT, NE, NV, NH, NJ, NM, NC, ND, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VT, WA, WV, WI, WY

3b. If yes, please fill in the appropriate box(s) with levels and applicable units.

Ethanol

Medium	**Action Level(s)**	**Cleanup Level(s)**	**Drinking Water Standard**			
			Primary (health-based)	Secondary (taste & odor)	EPA advisory	State (or other) advisory
Soil	**MA** - 100.0 mg/Kg; **MI** - $3.8x10^7$ ppb; **NY** - any amount; **VA** - > lab detection limit	**MI** - $3.8x10^7$ ppb; **NY** - SS				
Groundwater	**MA** - 1.0 mg/L; **MI** - $1.9x10^6$ ppb; **NY** - any amount; **VA** - > lab detection limit	**MI** - $1.9x10^6$ ppb; **NY** - SS	**MI** - $1.9x10^6$ ppb; **NY** - 50 ug/L			

4a. Does your state have action levels, cleanup levels, or drinking water standards for *tert*-amyl methyl ether (TAME)?

- **Yes** – DE, MI, NY, VA
- **No** – AZ, AK, AL, AR, CA, CO, CT, FL, GA, HI, ID, IL, IN, IA, KS, KY, LA, MA, ME, MD, MN, MO, MS, MT, NE, NV, NH, NJ, NM, NC, ND, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VT, WA, WV, WI
- **Proposed** – WY (128 ug/L) secondary action and cleanup

4b. If yes, please fill in the appropriate box(s) with levels and applicable units.

TAME (*tert*-amyl methyl ether)

Medium	**Action Level(s)**	**Cleanup Level(s)**	**Drinking Water Standard**			
			Primary (health-based)	Secondary (taste & odor)	EPA advisory	State (or other) advisory
Soil	**DE** - 3,600 ppb; **MI** - 3,900 ppb; **NY** - any amount; **VA** - > lab detection limit	**DE, NY**-SS; **MI** - 3,900 ppb				
Groundwater	**DE** -750ppb; **MI** - 190 ppb (aesthetic), 910 ppb (health); **NY** - any amount; **VA** - > lab detection limit	**DE, NY** - SS; **MI** - 190 ppb (aesthetic), 910 ppb (health)	**MI** -910 ppb; **NY** - 50 ug/L	**MI** - 190 ppb		

5a. Does your state have action levels, cleanup levels, or drinking water standards for ethyl *tertiary*-butyl ether (E*t*BE)?

- **Yes** – MI, NY, VA
- **No** – AZ, AK, AL, AR, CA, CO, CT, DE, FL, GA, HI, ID, IL, IN, IA, KS, KY, LA, MA, ME, MD, MN, MO, MS, MT, NE, NV, NJ, NM, NC, ND, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VT, WA, WV, WI
- **Proposed** – NH (40 ug/L), WY (190 ug/L) primary action and cleanup

5b. If yes, please fill in the appropriate box(s) with levels and applicable units.

E*t*BE (ethyl *tertiary*-butyl ether)

Medium	**Action Level(s)**	**Cleanup Level(s)**	**Drinking Water Standard**			
			Primary (health-based)	Secondary (taste & odor)	EPA advisory	State (or other) advisory
Soil	**MI** - 980 ppb; **NY** - any amount; **VA** - > lab detection limit	**IN, NY** - SS; **MI** - 980				
Groundwater	**MI** - 49 ppb (aesthetic); **NY** - any amount;	**IN, NY** - SS; **MI** - 49 ppb (aesthetic)	**NY** - 50 ug/L	**MI** - 49 ppb		

	VA - > lab detection limit					

6a. Does your state have action levels, cleanup levels, or drinking water standards for diisopropyl ether (DIPE)?

- **Yes** – MA, MI, NJ, NY, NC, VA
- **No** – AZ, AK, AL, AR, CA, CO, CT, DE, FL, GA, HI, ID, IL, IN, IA, KS, KY, LA, ME, MD, MN, MO, MS, MT, NE, NV, NM, ND, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VT, WA, WV, WI
- **Proposed** – NH (120 ug/L), WY (1,200 ug/L) primary GW action and cleanup

6b. If yes, please fill in the appropriate box(s) with levels and applicable units.

DIPE (diisopropyl ether)

Medium	**Action Level(s)**	**Cleanup Level(s)**	**Drinking Water Standard**			
			Primary (health-based)	Secondary (taste & odor)	EPA advisory	State (or other) advisory
Soil	**MA** - 100 mg/Kg; **MI** - 600 ppb; **NY** - any amount; **NC** - 0.37 mg/Kg; **VA** - > lab detection limit	**IN, NY** - SS; **MI** - 600 ppb; **NC** - 0.37 mg/Kg				
Groundwater	**MA** - 1.0 mg/L; **MI** - 30 ppb; **NY**–- any amount; **NC** - 0.07 mg/L **VA** - > lab detection limit	**IN, NY** - SS; **MI** - 30 ppb; **NJ** - 20 ppm; **NC** - 0.07 mg/L	**MI** - 30 ppb; **NY** - 50 ug/L			**NC** - 0.07 mg/L

7. Does your state have action levels, cleanup levels, or drinking water standards for any other oxygenates (e.g., Methanol, TBF, ETBA)?

- **Yes** – AZ, FL, MA, MI, NJ, NY, NC, VA, VT, WY
- **No** – AK, AL, AR, CO, CT, DE, GA, HI, ID, IL, IN, IA, KS, KY, LA, ME, MD, MN, MO, MS, MT, NE, NV, NH, NM, ND, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, WA, WV, WI
- **Don't know** – CA

If yes, please specify:

AZ Methanol – Soil: 33,000 mg/Kg residential / 340,000 mg/Kg non-residential.
FL Methanol – 5,000 ug/L health based.
MA Reportable concentrations – methanol soil: 1,000.0 mg/Kg. GW: 10.0 mg/L.
MI Methanol – GW/DW: 3,700 ppb. Soils: 74,000 ppb.
NJ Methanol – 4,000 ppb Interim Specific GW Standard.
NY NYS Dept. of Health DW standard of 50 ug/L for unspecified organic contaminants.
NC Methanol – 3.5 mg/L.
VA The concentration of any fuel constituent> the lab detection limit must be reported to DEQ.
VT Any concentration of oxygenate compounds in a DW supply would trigger state actions.
WY Methanol – Groundwater 18 mg/L.

8. Where in your state could regulators from other states find out how action levels, cleanup levels, and drinking water standards for any of the oxygenates were determined? Is there a contact person who has this information? Is it referenced (e.g., on a Web site, state policy on oxygenates)?

AL Dorothy Malaier, (334) 270-5613, "Alabama Risk-based Corrective Action" Guidance Manual.
AZ Wil Humble, AZ Dept. of Health Services, (602) 230-5941.
CA John Marshack, (916) 255-3000, www.dhs.ca.gov or www.swrcb.ca.gov/rwq85 (link to "Available Documents" and scroll down to "Water Quality Goals").
CO Marilyn Hajicek, (303) 318-8530.
CT Elsie Patton, (860) 424-3705.
DE Patricia Ellis (action levels, cleanup levels), (302) 395-2500, www.dnrec.state.de.us/dnrec2000/divisions/awm/ust/Download/pdf/DERBCAP.pdf; Drinking Water: Edward Hallock, (302) 739-5410, Gerald Llewellyn (302) 744-4540.
FL Tom Conrardy, (850) 245-8899, www.dep.state.fl.us/waste/quick_topics/publications/pages/techtables.htm.
GA For USTs only, Lisa Lewis (404) 362-2596, for DW Program (404) 362-2687.
HI Barbara Brooks, (808) 586-4249, Risk-Based Corrective Action and Decision Making at Sites with Contaminated Soil and Groundwater, revised June 1996.
ID Bruce Wicherski, (208) 373-0246, RBCA Guidance for Petroleum Releases (DEQ, 1997).
IL LUST staff person on call, (217) 782-6762, www.epa.state.il.us, regulations Part 742.
IN Rod Thompson (action/cleanup levels), (317) 233-1514; Pat Carroll (drinking water), (317) 308-3339, www.in.gov./idem/land/risc/techguide/index.html.
KS Greg Hattan, (785) 296-5931.
KY Al Westerman, (502) 564-6120, Division of Environmental Services.
LA Steve Chustz, LDEQ (action and cleanup levels) (225) 765-0581. Louis Wales, LA Dept. of Health and Hospitals (DW) (504) 568-5359. LDEQ Web site

(deq.state.la.us), Risk Evaluation/Corrective Action Program (RECAP), for action and cleanup levels.

MA www.state.ma.us/dep/bwsc.

ME Andy Smith, State Toxicologist, (207) 287-5189.

MD Mick Butler, (410) 537-3386, MTBE Fact Sheet at www.mde.state.md.us.

MI Christine Flaga, Environmental Toxicologist, (517) 373-0160, www.mi.gov/deq.

MN Hillary Carpenter, (651) 215-0928, MN Dept. of Health.

MO Matt Alhalabi or Terry Timons, (573) 526-0504, www.dnr.state.mo.us/mtbe/homemtbe.htm.

MT Jeff Kuhn, (406) 444-5976.

NE David Chambers, (402) 471-4258, david.chambers@ndeq.state.ne.us, www.deq.state.ne.us – publications – LUST/RA – Guidance documents – RBCA.

NV Todd Croft, (702) 486-2871, http://ndep.state.nv.us. Then click on "corrective actions." Then look for oxygenate guidance document.

NH Frederick McGarry, (603) 271-4978, DIPE – 1/27/03 Technical Support Document (TSD), ETBE – 1/8/03 TSD, MTBE – Assessment of the Proposed Revision to the DW Standards for MTBE (December 1999).

NJ Soils: Linda Cullen (609) 984-9778; GW: Gary Czock (609) 292-3956; Drinking Water: Gloria Post (609) 984-5312.

NM Stephen Reuter, (505) 841-9477, Stephen_reuter@nmeny.state.nm.us, 20 NMAC 12.1226.

NY Jim Harrington (soil), (518) 402-9764; Scott Stoner (GW), (518) 402-8250.

NC Luann Williams, (919) 715-6429, http//gw.ehnr.state.nc.us/rules.htm.

ND Dave Glatt, (701) 328-5150, www.health.state.nd.us/ndhd/environ/.

OH Kelly J. Gill, (614) 752-7941.

OK Neil Garrett, (405) 522-5266, www.occ.state.ok.us/TEXT_Files/rulesfrm.htm (Select Chapter 29 – Remediation Rules).

OR Michael R. Anderson, (503) 229-6764, www.deq.state.or.us/wmc/tank/rbdm.htm. Proposed changes can be viewed at: www.deq.state.or.us/wmc/tank/rbdm-tph.htm.

PA James Shaw, (717) 783-7816.

RI Robert Vanderslice, Dept. of Health (DW health advisory), (401) 222-3424. The DEM's GW regulations use MCLs and health advisories as standards for GA GW—these are our cleanup levels. Contact Paula Therrien, (401) 222-2797 X7125) for any further info.

SC Art Shrader, (803) 896-6249, www.scdhec.net/eqc/admin/html/eqforms.html#ust_RBCADocument.

TX Toxicology & Risk Assessment Section, (512) 239-1795, tnrcc.state.tx.us/permitting/trrp.htm (Protective Concentration Level tables contain standards).

UT Doug Hansen, (801) 536- 4454, Tier 1 document: www.undergroundtanks.utah.gov.

VA James Barnett, (804) 698-4289, Storage Tank Program Technical Manual (available on DEQ Web page – www.deq.state.va.us).

VT Chuck Schwer, (802) 241-3876.

WA Charles San Juan, (306) 407-7191, www.ecy.wa.gov/programs/tcp/ust-lust/MTBE.html.
WV Ken Ellison, (304) 558-2508, MTBE standard.
WI Bill Phelps, (608) 267-7619, Water Supply.
WY Leroy Feusner, (307) 777-7096, LAUST Remediation Program, WYDEQ.WQD.

- **Don't know** – IA, MS

9. Which of the above levels/standards is enforceable by state law?

AL, **CT, ME, NM, OH, PA, WI** - MTBE
AZ Soil levels only.
AR We impose an "action level" of 20 ppb for MTBE, but our authority to do so is questionable.
CO None, currently. The risk-based numbers have been presented to the CO Water Quality Control Commission for adoption into the State Water Quality Regs.
DE Numbers are in guidance documents. Laws and regulations require cleanup but do not have specific numbers. MTBE DW is officially enforceable for public wells.
FL In the petroleum cleanup program, the only oxygenate required to be analyzed for is MTBE. There is a GW standard for methanol, but analysis of samples is not required for petroleum-contaminated sites.
HI, ND None.
IL MTBE soil and GW numbers.
IN None directly. IC13-12-3-2 says that remediation objectives must be risk-based.
GA The state relies on USEPA to set DW standards for chemicals. Other standards in the UST are derived from federal DW and In-Stream Water Quality Standards. Without an enforceable federal DW or In-Stream WQ Standard our hands are tied. GA generally does not set WQ standards that are stricter then federal standards.
KY If MTBE is found in a DW source and its concentration is more than 50 ppb, an alternative DW supply is to be provided.
LA Action and cleanup levels.
MD Any standard established as part of an approved corrective action plan is enforceable by state law.
MA Failure to notify the Department within the required time frame (2 hr, 72 hr, or 120 days) of a release of oil or hazardous materials to the environment that exceeds published reportable quantity (RQ) or reportable concentrations (RC) in soil or GW is subject to criminal enforcement. Example: a sudden release of petroleum from a UST equal to or greater than 10 gallons w/in 24 hours must be reported ASAP but no later than 2 hours from knowledge of release, headspace reading of greater than 100 ppm w/in 10 ft from UST at removal must be notified no later than 72 hrs from knowledge. PRP must hire Licensed Site Professional to shepherd through MA cleanup regulations, process is contained in MCP (310 CMR 40.0000). Within one year from notification,

O/O must achieve a level of no significant risk (RAO) or tier classify their LUST site based on risk, per MCP, and then must proceed on a 5 year schedule to closure until achieving level of no significant risk. There are some penalties for non-responders (those that ignore deadlines and/or are not proceeding with cleanup).

MI Michigan criteria are promulgated standards and are enforceable under both Part 213, Leaking Underground Storage Tanks, and Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Where aesthetic criteria exist that are lower than health based criteria, the aesthetic criteria control. Michigan Criteria are land use-based. Criteria noted above are residential criteria which are used to define scope of impact. Some commercial/industrial settings may be able to use less stringent criteria for determining remedial endpoints.

MO These standards are only advisable levels, not enforceable.

MT The cleanup standard for MTBE, 30 ppb, is listed in the state Water Quality laws.

NE RBCA authorities are enforceable, but site-specific requirements are implemented through guidelines. We have not been challenged concerning site-specific MTBE levels.

NV The MTBE cleanup levels of 20 and 200 ppb are based upon state laws and regulations that allow NDEP to determine appropriate cleanup levels for pollutants that lack federal MCL determination or other legally enforceable standards.

NH MTBE soil and GW cleanup standards.

NJ Ground Water Quality Standards (NJAC 7:9-6); state and federal MCLs.

NY NYS Dept. of Health DW standard of 50 ug/L for unspecified organic contaminants, such as MTBE and other oxygenates, is enforceable by law.

NC MTBE, DIPE.

OK No established levels.

OR Cleanup levels.

RI DEM's MTBE cleanup level is enforceable; the Dept. of Health's advisory is not.

SC State action level is listed in *South Carolina Risk-based Corrective Action for Petroleum Releases.*

SD Site specific.

TX The standards associated with 30 TAC 350 (Texas Risk Reduction Program rule) are enforceable. As of Sept. 1, 2003, remediation for all new releases of petroleum products must meet the requirements of TRRP (30 TAC 350). The constituents of concern that will be required to be analyzed will be set by the individual programs, which has not been determined for new PST sites yet. But, the rule does have cleanup values for the oxygenate compounds. (See Web site above.)

UT Tier 1, RCL.

VA The reporting requirements are enforceable. Persons are required to report petroleum releases to the DEQ.

VT All.

WA MTBE GW level of 20 ppb and soil level 0.1 ppm.

WV MTBE standard (soil/GW) is part of our Voluntary Remediation Program but not LUST program.

WY All, if enforcement actions are filed by AG's office. Chapter 17 may be scheduled for revision in 2003 or later. If EPA or other federal WQ/human health organization publishes toxicological RfD or CPF data, Chapter 17 has procedures to calculate state GW standards. State soil standards are calculated to protect GW quality on a site-by-site basis.

- **Don't know –** CA, ID, KS

10a. Has your state recently changed any of these standards?

- **Yes** – AZ, AR, CT, DE, FL, MI, NE, NH, OR, TX, WA, WY
- **No** – AL, AK, CA, CO, GA, HI, ID, IL, IN, KS, KY, LA, MA, ME, MD, MN, MO, MT, NV, NJ, NM, NY, NC, ND, OH, OK, PA, RI, SC, SD, TN, UT, VA, VT, WV, WI

10b. If yes, what was the change(s)?

AZ MTBE guidance levels for GW.
AR Reduced the MTBE "action level" from 200 ppb to 20 ppb.
CT Reduced MTBE from 100 ppb to 70 ppb.
DE DW std. for MTBE effective 5/2002. TAME and TBA added ~June 2001. ETBE and DIPE in process of being added to chemicals of concern.
FL MTBE used to be 35 ug/L and was changed to 50 ug/L about a year and a half ago.
MI Changes were made to some criteria for several contaminants, but did not affect oxygenate criteria.
NE In 2001 we added MTBE as a chemical of concern in RBCA.
NH We have proposed guidelines for DIPE, ETBE, and TBA. We have not formally adopted these guidelines but are using them unofficially to screen DW threats.
OR Risk-based concentrations for contaminants of concern, including MTBE, were established in April 1996; risk-based rules, which included more protective cleanup levels for MTBE, were adopted November 2, 1998: a revised guidance document was prepared in September 1999.
TX See question 9.
WA Added standard for MTBE in August 2001. Rule revision.
WY The LAUST Remediation Program has made several proposed changes to implement fuel oxygenate concentrations in GW.

10c. If yes, was the change(s):

- **Health-based** – AZ, MI, NH, OR, TX
- **Aesthetic** – AZ, FL, NE, WA
- **Other**

AR EPA "noise making."

DE MTBE DW std. health-based; TBA action level health-based; TAME, ETBE, and DIPE action levels aesthetics-based.

- **Don't know** – CT

11a. Is your state considering making any change(s) with regard to state action levels, cleanup levels, or drinking water standards for the above-mentioned oxygenates?

- **Yes** – CO, DE, FL, ID, IA, LA, MA, MD, MO, NH, NY, NC, OR, WA, WY
- **No** – AK, AL, AR, CA*, CT, GA, HI, IL, IN, KY, MN, MT, NE, NV, NM, ND, OH, OK, PA, SD, TN, UT, VA, VT, WI
- **Don't know –** AZ, KS, ME, MI, MS, NJ, RI, SC, TX, WV

CA* Not that the SWRCB is aware of; however, DHS is responsible for this (contact DHS at www.dhs.ca.gov)

11b. If yes, what is the proposed change(s)?

CO The risk-based numbers have been presented to the CO Water Quality Control Commission for adoption into the State Water Quality Regs.

DE Will finalize ETBE and DIPE action levels soon.

FL MTBE is proposed to be changed again from 50 ug/L to 20 ug/L in GW and from 3,200 to 4,400 mg/Kg in soil. The new standard is organoleptic-based. A new standard will be adopted for TBA in GW of 1,400 ug/L, which is health-based.

ID Lower standards in GW for MTBE.

IA Adding MTBE as a chemical of concern under the state's RBCA program (although not likely to occur in the near future). This would entail establishing action levels and adopting a DW standard/MCL.

LA MTBE action levels for soil of 0.077 ppm, and for GW, 0.02 ppm, based on EPA taste/odor advisory. Cleanup levels will continue to be derived using risk evaluation based on these values.

MA Soil Reportable Concentrations and cleanup standards are proposed to be lowered (i.e., made more stringent).

MD Evaluating need to establish a maximum exposure level for TBA in DW receptors impacted by a petroleum release.

MO Risk-Based Decision Process/GW Rule, Risk-Based Corrective Action.

NH We are considering implementing DW standards or action levels for TAME, DIPE, ETBE, and TBA.

NY The NYS Dept. of Health plans to lower the current DW standard of 50 ug/L for MTBE.

NC MTBE – proposed lowering to 11.6 ug/L.

OR Residential tap water cleanup level would be reduced from 20 ppb to 12 ppb. For details see: http://www.deq.state.or.us/wmc/tank/rbdm-tph.htm.

WA If MTBE is detected, then you must test for Diisopropyl ether (DIPE), Ethanol, Ethyl tertiary butyl ether (ETBE), Methanol, Tert butyl alcohol (TBA), Tertiary amyl alcohol (TAA), Tertiary amyl ethyl ether (TAEE), and Tertiary-amyl methyl ether (TAME).

WY Proposed GW concentration changes will be presented to the Water & Wastewater Advisory Board, WDEQ, in 2003 or later for adoption into Chapter 17, WY Water Quality Rules & Regulations.

11c. If no, could EPA provide any assistance with regard to making any changes?

- **Yes** AL, AR, CO, DE, IN, IA, GA, KY, ME, MD, MO, MS, NV, NH, NJ, NM, OH, OR, PA, RI, SD, TN, UT, VA, VT, WA, WV
- **No** CT, KS, MI, NE, ND, OK
- **Don't know –** AK, CA, HI, IL, MN, SC*, WI

If yes, what kind of assistance?

- **MCL** AL, AR, CO, GA*, IN, IA, KY, ME, MO, MS, MT, NV, NJ, NM, OH, OR, PA, RI, SD, UT, WV
- **Technical assistance** – AL, CO, IA, MD, MS, NH, NJ, TN, VA*
- **Other** (please explain):

CO Any settling or agreement on toxicological RfDs and slope factors would be helpful, as would a uniform set of exposure factors.

DE Need additional health-based information on the oxygenates. Need additional toxicity data on MTBE. Need more physical and chemical property information on the other oxygenates so that action levels can be more easily developed.

GA* EPA has been promising an MTBE MCL for years but has not produced one. We now face questions from EPA regarding other oxygenates for which there are not even enforceable MCLGs. The absence of an MCL deprives the USTMP of any enforcement authority on oxygenates.

IA Establishment of an MCL would significantly support our ability to adopt regulations/justify requiring investigation and cleanup of MTBE at LUST sites. Funding for staff and consultant training, modeling software development.

MD If the state turned over the cleanup of a LUST site to EPA, how would EPA evaluate what portions of the dissolved-phase plume they would allow the off-site neighbors of the LUST site drink in their domestic wells. EPA knows that if states define the total extent of the release, the state will find the oxygenates. A Health Advisory for all oxygenates is needed.

MT An MCL for MTBE; a DW advisory for TBA and other oxygenates.

NH More health effects research is needed for the oxygenates.

NJ We await EPA's MTBE risk assessment.

OH We need an MCL for MTBE in DW.

PA Standard must be state/federal MCL or HAL.

SC* If EPA would issue advisories for taste and odor thresholds for other oxygenates, states might adopt these values.

VA* We could use risk information (e.g., slope factors, reference doses) for oxygenates.

VT Toxicological data.

WA Would love to work w/EPA.

II. Oxygenate Analysis

12a. Please indicate (Ō) whether your state requires sampling and analysis for the oxygenates listed in the following table in <u>groundwater</u> at LUST sites.

Groundwater

Oxygenate	All suspected releases	Gasoline only	Heating oil	Jet fuel	Diesel fuel
M*t*BE	AR, CO*, FL*,IN (petro), IA, KS, MD, MI, MN, MO, MT, NM, RI*, SC, TN, WV, WI	AL, AZ, CA, CT, DE, GA, HI, ID, IL, LA, ME, MS, NE, NV, NH, NJ, NY, NC, ND, OH, OK, OR, PA, RI*, SD*, TX*, UT, VA, VT, WA, WY	CT, NC, NJ, RI*, VA*, VT	DE, GA, NE, NJ, NC, RI*, VA*, WY*	CT, NJ, NC, RI*, VA*, VT, WY* Waste oil – DE, OH Kerosene - DE
TBA	IN-SS, IA, KS*, MD, MI	CA, DE(1), ME, MS, MT, NH, NJ, SC, WA*, WV, WY*		DE(1), NJ, SC, WY*	SC, WY*
Ethanol	MI	CA, MS, SC, WA*, WY*		SC, WY*	SC, WY*
TAME	IN-SS, IA, MD, MI	CA, DE*, ME, MS, NH, SC, WA*, WY*		DE(1), SC, WY*	SC, WY*
E*t*BE	IN-SS, IA, MD, MI	CA, DE**, ME, MS, NH, SC, WY*		DE(2), SC, WY*	SC, WY*
DIPE	IN-SS, IA, MD, MI	CA, DE(2), ME, MS, NH, NC, SC, WA*, WY*	NC, SC	DE(2), NC, SC, WY*	NC, SC, WY*
Other (e.g., TBF, Methanol, ETBA)	IN-SS, MI	CA – If gasohols were used, applicable alcohols are sampled for. MS, SC, WA*		SC	SC

AK EDB, EDC, MTBE, and other volatile solvents must be sampled if required by the project manager, on a case-by-case basis.

CO* Requested.

DE* Once a site goes to investigation. **DE**** - Done once to see if present. Dropped after that if not detected.

FL* Sampling for MTBE is generally discontinued at diesel, jet fuel, etc. sites after the initial sampling events once it is determined that MTBE is not present.

GA Only at sites where DW wells are suspected to be impacted or are threatened to become impacted and are being sampled for BTEX.

KS* Most.

KY MTBE sampling is required only for DW sources.

MA DEP has published guidance (all documents are accessible on DEP web site) for site assessment, sampling and analytical protocols for use by Licensed Site Professionals (LSP). The LSP may choose which of these methodologies to use to evaluate each site for risk and to demonstrate whether they have achieved cleanup levels appropriate for their particular site. The LSP attests to his/her approach and submits that the site has reached a level of "no significant risk" as determined by the DEP (published cleanup standards including institutional controls). DEP does not approve this document but is required to audit a number of these sites, and if the audit determines deficiencies such that the Dept. does not feel the conclusions can be justified, this can cause the site to be reopened and may forward deficient findings to the LSP Board for their review and disciplinary actions.

MI Michigan has never been a Reformulated Gasoline (RFG) state. Consequently, while significant oxygenate levels have been detected at some releases, they have not been widely found in Michigan. Parties responding to releases are required to perform initial sampling/analysis for oxygenates to determine if they are present at levels that pose a potential concern. In the majority of the releases, this has not been the case and further analyses are not required.

NE Sampling and analysis are required for all orphan sites during initial (Tier 1) investigation for the following: MTBE, TBA, ethanol, TAME, ETBE, DIPE, acetone, acetaldehyde, formaldehyde, 1,2 dibromoethane, 1,2 dichloroethane, methyl acetate.

NV On occasion, at select sites, we require sampling and analysis for TBA, TAME, ETBE, DIPE, and other oxygenates.

RI* Complete analysis by 8260 is required for all the listed products and MTBE is always reported in 8260 analysis. This applies to soil and GW sampling.

SD* MTBE testing is not required by rules but is requested by sampling guidance.

TX* MtBE analysis is also required for sites where the source of the release is unknown.

VA* MTBE analysis is usually required by staff when a release poses a potential threat to a potable water supply.

WA* We can also require testing for these.

WY* Sampling for all fuel oxygenates is required for all fuel tanks sites during initial site investigation, expanded site investigation during engineering design, and project closure.

12b. Please indicate (Õ) whether your state requires sampling and analysis for the oxygenates listed in the following table in <u>soil</u> at LUST sites.

Soil

Oxygenate	All suspected releases	Gasoline only	Heating oil	Jet fuel	Diesel fuel
M*t*BE	FL*, IN (petro), IA, MD*, MI, MO, MT, NM, OH, RI, TN, WV	AL, AZ, CA, CT, DE(3), HI, ID, IL, LA, MS, NE, NH, NJ, NY, NC, OR, PA, RI, UT, VA*, WA, WI	CT, NJ, NC, RI	DE(3), NE, NJ, NC, RI	CT, NJ, NC, RI Waste oil - OH
TBA	IN-SS, IA, MI	CA, DE(1), MS, NH, NJ, WA*, WV		DE(1), NJ	NJ
Ethanol	MI	CA, MS, WA*			
TAME	IN-SS, IA, MI	CA, DE(1), MS, NH, WA*		DE(1)	
E*t*BE	IN-SS, IA, MI	CA, DE(2), MS, NH, WA*		DE(2)	
DIPE	IN-SS, IA, MI	CA, DE(2), MS, NH, NC	NC	DE(2), NC	NC
Other (e.g., TBF, Methanol, ETBA)	IN-SS, MI	CA - alcohols are sampled for as they relate to gasoline. MS, WA*			

AK EDB, EDC, MTBE, and other volatile solvents must be sampled if required by the project manager, on a case-by-case basis.

DE Used oil and kerosene also. DE(1) Once a site goes to investigation. DE(2) Done once to see if present. Not done initially, such as at a tank removal. DE (3) Done, starting with tank removal or other soil investigation.

FL* Sampling for MTBE is generally discontinued at diesel, jet fuel, etc. sites after the initial sampling events once it is determined that MTBE is not present.

ME No oxygenates required for soil analysis. I don't expect they would be found unless the spill is very recent.

MD* Site-specific requirement.

VA* Sampling and analysis of oxygenates in soil may be required at the discretion of the DEQ case manager.

WA* Can require testing for these.

13a. If yes to any of the oxygenates in question 12a, how often is analysis requested? (Please check appropriate box.)

Groundwater

Percentage (of the time)	M*t*BE	TBA	Ethanol	TAME	E*t*BE	DIPE	Other oxygen-ates
0 - 20%	GA, OK, SD	MS, MT, NE*, NV, NY, OR, SC (10%), VT , WV	MS, NE*, NV, NY, OR, SC (10%), VT	MS, NE*, NV, NY, OR, SC (10%), VT	MS, NE*, NV, NY, OR, SC (10%), VT	MS, NE*, NV, NY, OR, SC (10%), VT	MS, NE*, NV, NY, SC (10%), VT
20 - 40%							
40 - 60%	IN,	KS					
60 - 80%	ID, VT		MI				
80 - 100%	AL, AZ, AR, CA, CO, CT, DE(1), FL*, HI, IL, IA, KS, LA, ME, MD, MI, MN, MO, MS, MT, NE, NV, NH, NJ, NM, NY, NC, ND, OH, OR, PA, RI, SC (100%), TN, TX, UT, VA*, WA*, WV, WI, WY	CA, CT, DE(1), IA, ME, MD, MI, NH, NJ, WY	CA, CT, WY	CA, CT, DE(1), IA, ME, NH, WY	CA, CT, DE(2), IA, ME, NH, WY	CA, CT, DE(2), IA, ME, NH, NC, WY	

Please indicate if these percentages are based on:

- **Hard data** – HI, IL, MS, NM, OH, PA, SC, TN, UT, WY
- **Estimates** – AL, AZ, CA, CO, CT, DE, FL, GA, ID, IN, IA, KS, LA, ME, MD, MI, MN, MO, MT, NE, NV, NH, NJ, NY, NC, ND, OK, OR, RI, SD, TX, VA, VT, WV, WI

DE Answers are for the products listed in question 12a. DE(1) Required if GW is sampled. DE(2) Will be required at least once on all sites that go to GW investigation.

FL As stated earlier, analysis for MTBE at non-gasoline petroleum sites is generally discontinued if initial sampling indicates MTBE is not present.

IA All samples collected for a LUST site investigation must be analyzed for MTBE. When results show MTBE is not present at a site, MTBE analysis is no longer required on subsequent samples collected at that site.

NE* Required for all orphan sites during initial (Tier 1) investigation.

VA* Gasoline releases.

WA* This is a policy decision. Must always test for MTBE in gasoline. Testing for other oxygenates is a site-specific decision.

13b. If yes to any of the oxygenates in question 12b, how often is analysis requested? (Please check appropriate box.)

Soil

Percentage (of the time)	**M*t*BE**	**TBA**	**Ethanol**	**TAME**	**E*t*BE**	**DIPE**	**Other oxygen-ates**
0 - 20%	MD, VA	MS, MT, NY, WV	MS, NY	MS, NY,	MS, NY	MS, NY	MS, NY
20 - 40%							
40 - 60%	WI						
60 - 80%	ID	NH	MI	NH	NH	NH	
80 - 100%	AL, AZ, CA, CT, DE, FL*, HI, IL, IA, LA, MI, MO, MS, MT, NE, NH, NJ, NM, NY, NC, OH, OR, PA, RI, TN, UT, WA*, WV	CA, CT, DE(1), IA, MI, NJ	CA, CT	CA, CT, DE(1), IA	CA, CT, DE(2), IA	CA, CT, DE(2), IA, NC	

Please indicate if these percentages are based on:

- **Hard data** – HI, IL, MS, NM, OH, PA, TN, UT
- **Estimate**s – AL, AZ, CA, CT, DE, FL, ID, IA, LA, MD, MI, MO, MT, NE, NH, NJ, NY, NC, RI, VA, WV, WI

DE Answers are for the products listed in question 12a. DE(1) Beyond the tank removal phase (soil & GW investigation). D(2) Will be requiring in at least the core-area soil

samples. If not found there, will probably be dropped in subsequent soil sampling. Currently analyzing for ETBE and DIPE in relatively few soil samples.

FL As stated earlier, analysis for MTBE at non-gasoline petroleum sites is generally discontinued if initial sampling indicates MTBE is not present.

IA See comment under 13a.

WA* See response to 12b.

14a. If your state conducts analysis for oxygenates in <u>groundwater</u>, what analytical methods are used? (Check as many as apply.)

Groundwater

Method	**MtBE**	**TBA**	**Ethanol**	**TAME**	**EtBE**	**DIPE**	**Other Oxygen-ates**
US EPA SW-846 Method 8020/8021 (GC/PID)	AL, AK*, AR, DE(1), FL,GA, ID, KS, KY, MN, MO, MS, NM, NY, NC, ND, RI, TN, TX, UT, VA, VT, WA	WA	WA	WA	WA	WA	WA
US EPA SW-846 Method 8240/8260 (GC/MS)	AL, AK**, AZ, AR, CO, DE, FL, GA, ID, IA, KS, KY, LA, MD, MO, MS, NE, NV, NJ, NM, NY, NC, PA*, RI, SC*, TX, UT, VA, VT, WA, WY	DE, IA, KS, MD, NV, NJ, NY, SC*, VT, WA. WY	NV, NY, SC*, VT, WA, WY	DE, IA, MD, NE, NV, NY, SC*, VT, WA, WY	DE, IA, MD, NE, NV, NY, SC*, VT, WA, WY	DE, IA, MD, NE, NV, NY, SC*, VT, WA, WY	NE, NY, SC*, WA
A combination of 8020/21 and 8240/60	CA,CO, CT, DE, HI, IL, IN, KS, MI, MT, NC, OH, OK, OR, RI, TX, UT, WV, WI	CA, CT, DE, IN, MI, MT, OR, WV	CA, CT, IN, MI	CA, CT, DE, IN, MI, OR	CA, DE, IN, MI, OR	CA, DE, IN, MI, OR	IN, MI

US EPA Drinking Water Method 502 (GC/PID)	KS, NJ, NY, VA	NJ					
US EPA Drinking Water Method 524 (GC/MS)	AL, CT, DE, IN, KS, MD, MO, NJ, NY, PA, TX*, VA	CT, DE, IN, NJ, NY	CT, IN	CT, DE, IN, MD	DE, IN, MD	DE, IN, MD	IN
A combination of 502/524							
ASTM D4815	DE(2)	DE(2)		DE(2), MS	DE(2), MS	DE(2), MS	
Other (please specify) **IA:** GC/MS version of Iowa method OA-1; **ME**: Modified 8260; **MO**: 8015; **NE** : SW-846 Method 5031; **NH** : All EPA methods that meet the quantitation limits specified in the Dec. 2002 VOC "long list" of analytes documents; **NY** - US EPA 602; **NC** – 6210 D, EPA 602;	IA, ME, MO, NH, NY, NC	IA, ME, NE, NH	NE	IA, ME, NH	IA, ME, NH	IA, ME, NH	ME

AK* 8021 (initial screening), AK** -8260 (final results)

DE 8021, 8260 for environmental samples, 502, 524 for DW samples only. **DE** (1) Allow, but do not recommend. DE(2) Allow, but have never seen it used.

PA* 8260. **SC*** - 8260B for all but TBA, which is 8260.

TX Drinking water systems serving greater than 10,000 are required to analyze for MtBE in 2001, 2002, or 2003. Those deriving water from groundwater are required to analyze it for two quarters during one of those years.

14b. If your state conducts analysis for oxygenates in <u>soil</u>, what analytical methods are used ? (Check as many as apply.)

Soil

Method	**M*t*BE**	**TBA**	**Ethanol**	**TAME**	**E*t*BE**	**DIPE**	**Other Oxygen -ates**
US EPA SW-846 Method 8021 (GC/PID)	AL, AZ, AK*, DE(1), ID, MO, MS, NY, NC, RI, TN, TX*, UT, VA,	WA	WA	WA	WA	NC, WA	WA

	WA						
US EPA SW-846 Method 8260 (GC/MS)	AL, AK** , DE, ID, IA, LA, MO, MS, NE, NJ, NM, NY, NC, PA, RI, TX*, UT, VA, WA	IA, NJ, NY, WA	NY, WA	DE, IA, NY, WA	DE, IA, NY, WA	DE, IA, NY, NC, WA	NY, WA
A combination of 8021 and 8260	CA, CT, DE, FL, HI, IL, IN, MD, MI, MT, NC, OH, OR, RI, TX*, UT, WV, WI	CA, CT, DE, IN, MI, MT, WV	CA, CT, IN, MI	CA, CT, DE, IN, MI	CA, DE, IN, MI	CA, DE, IN, MI, NC	IN, MI
US EPA Drinking Water Method 502 (GC/PID)							
US EPA Drinking Water Method 524 (GC/MS)	IN	IN	IN	IN	IN	IN	IN
A combination of 502/524							
ASTM D4815	DE(2)	DE(2)		DE(2), MS	DE(2), MS	DE(2), MS	
Other (please specify) **IA:** GC/MS version of Iowa method OA-1. **MO** – 8015. **NH** : All EPA methods that meet the quantitation limits specified in the Dec. 2002 VOC "long list" of analytes documents. **NJ**: Modified method 624 (MTBE found as non-target)	IA, MO, NH, NJ	IA, NH		IA, NH	IA, NH	IA, NH	

AK* Initial screening AK** - final results

DE (1) Allow, but do not recommend. DE(2) Allow, but have never seen it used.

TX* MtBE may be analyzed in soils at sites where work is being performed by state contractors, but it is not required of responsible parties conducting their own investigations.

III. Site Assessment

15a. Do you investigate your M*t*BE or other oxygenate plumes differently from BTEX plumes because of the potential for "diving" plumes?

- **Yes** – DE, MT, NE, NY*
- **No** – AK, AZ, AR, CT, GA, HI, ID, IA, KY, LA, ME*, MN*, MO, MS, NV, NH, NJ, ND, OK, SC, TN, TX, WA*, WI, WY
- **Most of the time**
- **Rarely –** AL, CO, FL*, IL, IN, KS*, MD, MI*, NM, NC, OH, OR, RI, SD, UT, VA, VT
- **In some cases -** PA
- **Don't know –** CA, WV

FL* Our technical reviewers are sensitive to this potential, but we do not routinely put deep wells beyond the edge of the contaminant plume to look for a diving MTBE plume.

KS* All sites w/receptors must be remediated. For sites in remediation, we look for MTBE and we require deep wells as needed. In our monitoring program, we don't have receptors and we handle all sites in the same way.

ME* Most old plumes "dive," including BTEX.

MA A comprehensive site assessment is expected of the LSP, who must use his/her professional judgment as to for what to test and where to test. DEP has published guidance to assist in site assessment and risk characterization (available on web).

MI* Rare only because we don't frequently encounter them.

MN* This survey seems to imply that only MTBE plumes dive. In fact, all contaminant plumes in dissolved phase have the potential to dive, and all should be evaluated as such.

NY* When the SS conditions warrant.

WA* We've yet to discover MTBE in private or public water supply wells.

15b. If yes, do you require three-dimensional characterization of these plumes?

- **Yes** – CO, DE, IN, ME, MI, MN, MT, NE, NY, VT, WA
- **No** – FL, GA, KS, NM, VA
- **Sometimes** - RI
- **Don't know** – CA

FL We almost always put in at least one deeper well at petroleum-contaminated sites to determine the vertical extent of contamination but not usually a deep down gradient well for the explicit purpose of looking for a downgradient diving MTBE plume.

MD Site specific.

15c. How many cases of diving plumes has your state documented?

- **1 – 5:** CO, GA, IL, IN, MD, NE, NH, NM, OR, RI, SD, UT, WI
- **5 – 10:** 0
- **10 – 15:** KS, MN, VT
- **>15:** AK, DE, ME, NJ, NY, SC
- **Don't know:** AL, AR, CA, CT, FL, HI, ID, IA, KY, LA, MA, MI, MO, MS, MT*, NC, ND, OH, PA, TN, TX, VA, WV, WY

MT* One possible site being evaluated.
WA None yet; however, there's probably a few out there that we don't know about.

16a. Are you taking any extra steps to make sure oxygenates are not migrating beyond standard monitoring parameters (e.g., installing deeper wells, multi-level sampling)?

- **Yes** – AK, AL, CA, CO, DE, FL, IN, KS, MI, MN, MT, NE, NH, NJ, NM, NY, NC, SC, SD, VT, WA
- **No** – AZ, AR, GA, HI, ID, IL, IA, KY, LA, ME, MA, MO, MS, NV, ND, OK, OR, TN, TX, UT, VA*, WV, WI, WY
- **Don't know –** CT,

MD – site specific; **OH** – rarely; **PA** – in some cases; **RI** - sometimes

16b. If yes, what kinds of steps?

AK Not sampling for oxygenates, but doing it for gasoline (MTBE) w/ nested wells.
AL We determine the vertical extent by installing deeper wells when the vertical extent is not already delineated by the BTEX assessment. (This also applies to question 15a.)
CA By installing wells with shorter screens at and below the point of impact.
CO Potentially installing deeper wells, multi-level sampling, possibly using tracers in plume analysis.
DE Multi-level sampling, determining full length of plume.
FL Sometimes, MTBE may be at the leading edge of the plume, either vertically or horizontally, such that the furthest downgradient well at the site or the deepest well at the site may be placed to define the boundary of the MTBE plume rather than BTEX.
HI Monitoring DW wells downgradient of an MTBE release.
IN Installing deeper wells as well as using geoprobes to investigate GW plumes at multi levels.
KS All of the above when we feel it is necessary.
MI Careful attention to vertical profiling, multiple screen depths, etc. We use these same techniques for BTEX components of plumes as well.
MN We require deep GW sampling at all site investigations to check for plunging plumes.

MT Installation of nested wells or multi-level sampling wells.

NE We are requiring, at a minimum, one deeper well during Tier 1 if vertical migration is suspected.

NH We are doing extensive private well sampling when we find MTBE in DW wells.

NJ Well clusters and multi-level sampling in certain circumstances.

NM If the plume is in an aquifer suspected of having a significant vertical gradient (i.e., within the effective radius of a pumping well) then deeper wells with multiple-zone sampling would be requested. Rarely has such a plume been identified.

NY 3-D site characterization utilizing techniques, such as cluster and multi-level wells and expedited site assessment techniques, including direct push sampling and mobile labs.

NC Deeper wells and wells at edge of plume.

OH If there is a medium to high probability that a private or public DW well may be impacted, nested wells may be required for multi-level sampling.

RI, VT Deeper wells.

SC We have increased the number of deep or pit-cased monitoring wells and requested that additional deep-screening samples be collected as part of each assessment. GW samples from the three most down-gradient screening points are being sent to a certified laboratory for analysis, because most field-screening methods do not detect oxygenates.

SD It depends on site conditions.

VA* Although the DEQ does not routinely require additional steps for evaluating oxygenates, the DEQ case managers may require this work if they believe it is necessary. This is site-specific and up to the judgement of the case manager. Nested wells and sampling from different depths may be used to further evaluate the plume should the case manager believe it is necessary.

WA We are going to publish tech memo on fuel oxygenates: "Sites with significant vertical gradients may need to be carefully depth-profiled for MTBE and other alcohols / ethers."

17. For oxygenate compounds with no state standard, what factors do you use to determine when to test for them?

- **Depth to groundwater**
- **Groundwater flow rate**
- **Proximity to drinking water receptor** – AK, AL, CO, GA, IL, KY, MD, NY, NC, ND, OK, OR, SD, TX (only MTBE), VA, WV
- **General vulnerability analysis** – AL, CO, CT, MD, OR, TN, VT
- **All of the above** – AZ, AR, CA, DE, IN, MA, MI, MN, MT
- **Other factors** (please explain)

AK Other receptors.

CO When we suspect presence of other compounds in release product.

DE Now trying to look for the oxygenates at least once. Usually drop them from future analysis if not detected at least somewhere.

FL We do not test for oxygenates for which there is no state standard. In order to assess the potential for the presence of other oxygenates we did a study of approximately 40 petroleum-contaminated sites in which other oxygenates were analyzed for in GW samples. The results generally indicated that the occurrence of other oxygenates is infrequent and in the instances where they did occur, the concentrations were relatively low compared to proposed cleanup target levels and the other contaminants present, particularly BTEX and MTBE.

HI Since January 1, 1999, Hawaii Dept. of Health has required (recommended) testing of MTBE at active leaking UST facilities and other sites where a regulated compound is released in gasoline.

ID We just don't test for them.

IA Iowa regulations require analysis for MTBE and other oxygenates in soil and GW samples collected during LUST investigations. When sample results indicate MTBE/oxygenates are not present (<detection limit), analysis is no longer required.

KS We don't test for oxygenates with no standard.

KY For MTBE, the UST Branch requires analysis of water samples for domestic-use wells, springs, and cisterns proximal to UST systems.

LA Not applicable, testing for other oxygenates is not required.

ME Our goal is to measure for oxygenates at all sites. The test costs only $90.

MA Factors are determined by the LSP and must be made based on risk assessment, site conditions, and other professional judgment factors.

MO To determine the age of the release and any other oxygenate constituents.

MS MTBE at all gasoline sites. Other oxygenates at federal LUST sites only, at this time.

MT Presence of a large MTBE plume and anaerobic GW conditions will trigger a test for TBA.

NE We only test for them at orphan sites. We test for MTBE at nearly all sites.

NV Typically, we request full oxygenate analyses once or twice a year on select sites with very high MTBE concentrations. Also, if those sites use in-situ biodegradation methods, we monitor the other oxygenated periodically.

NH Whenever gasoline sites are present.

NJ Research planned on the ability/effectiveness of GC/MS methods to identify other oxygenates.

NM We don't require testing for oxygenates other than MTBE.

PA We don't test for them.

SC Presence of MTBE is used as the trigger to sample for other oxygenates and ethanol.

SD Risk-based approach.

UT If no standard exists, sampling is not required.

WA No current policy on this other than you must test for MTBE if you have a post-1996 gasoline release.

WI None.

WY Don't test for presence if no GW cleanup level can be established. BTEX parameters continue to drive remediation.

18. Do you allow for dynamic work plans (i.e., field-determined based on site conditions) with respect to well placement and screen positions?

- **Yes –** AL, AZ, AK, CT, FL, GA, HI, ID, IN, KS, ME, MD, MA, MI, MN, NE, NV, NJ, NM, NY, NC, ND, OK, OR, PA, RI, SC, TN, TX, UT, VA, VT, WA, WI, WY
- **No**
- **Sometimes** – AR, CA, CO, DE, IL, KY, LA, MO, MS, MT, NH, OH, SD, WV
- **Don't know** - IA

DE Would like to encourage it more, but many consultants don't understand the idea behind them yet, or how to write a work plan in this manner.

MT Flexibility is inherent in most workplans to allow for this. If a significant change in scope is required, MT requests that consultants complete a workplan modification form.

WA Allowed but rarely done.

19a. Of the oxygenates that you sample and analyze in <u>groundwater</u>, what were the percent detections during 2002?

Please indicate whether your percentages are based on:

- **Hard data** - CO, DE (somewhat), MI, NE, NJ, NM (with projections), OH, SC, UT
- **Estimates** – AL, AK, AZ, AR, CA, FL, GA, HI, ID, IL, IN, ME, MD, MN, MO, MT, NV, NH, NC, ND, OR, SD, TN, TX, VA, VT, WI

Groundwater

Oxygenate	All suspected Releases (%)	Gasoline only (%)	Heating oil (%)	Jet fuel (%)	Diesel fuel (%)

M*t*BE	**MI** - 3.5 **OH** - 22 **NE** - 25 **ID, MT** - 30 **UT** - 36 **NM** - 43 **GA, MN, ME** -50 **NH*** - 60 **NJ*** - 63 **CO** - 66 **MD** - 70 **SC** - 72 **AR** ->75 **IN, MO** - 80 **KS** - 86 **TN** - 100	**ND** - 0-20 **WY** - <5 **IL** -<10 **HI** -<20 **OR** - 20 (of samples), 48 (of sites) **SD** - ~20 **OH** - 22 **ME, MN** - 50 **NV** - 60-80 **AL** -70 **AZ** - 75 **CA, NC, TX, WI** - 80 **VT, FL** - >90 **DE, NH** - 95	**DE**-*** **NH** - 10 **VA** - 20	**DE**-100*	**NH** - 10 **VA** - 20
TBA	**MT** - < 1 **CO, ME** -1 **MD** - 30 **NJ*** - 32	**ME** -1 **NH, VT** - 10 **SC** - 28 **CA** - 60 **NV** - 60-80 **DE** - 75			
Ethanol		**SC** – 11			
TAME	**ME** - 4 **MD** - 10 **NH*** - 15	**ME** - 4 **NH** - 20 **SC** - 38 **NV, VT** - 40 **DE** -50			
E*t*BE	**NH*** - 3 **MD** - 10	**DE**-** **NH** - 5 **VT** - 10 **NV** - 40			
DIPE	**NH*** - 3 **MD** -10	**DE**-** **NH** - 5 **NV, VT** - 10 **SC** - 43 **NC** - 50			
Other oxygenates (e.g., methanol, TBF, ETBA)		**SC**: ETBA-31, TBF-7, TAA-47			

AK Only a random sampling of sites was completed in 2001. Study on Web site URL http:www.state.ak.us/dec/dspar/stpl/documents/mtbe.pdf.

DE *We have one jet fuel release and it has MTBE. **Little data yet. Few analyses, no detects at LUST sites, one unexplained detect in a public well. *** Two or three sites.
NH* All suspected releases at petroleum sites.
NJ* Hard data from electronic sample data submittals for a subset of cases with the bureau of USTs only. Data do not represent "all" suspected releases or distinguish tank content.
WA* See our '02 MTBE study – 26 of 62 (42%) sites had detectable levels of MTBE.

Don't know – CT, IA. KY, LA, MA, MS, NY, PA, RI, WA*, WV

19b. Of the oxygenates that you sample and analyze in <u>soil</u>, what were the percent detections during 2002?

Please indicate whether your percentages are based on:

- **Hard data** – MI, NE, NJ, OH, UT
- **Estimates** – AZ, HI, IL, IN, MO, MT, NH, NC, OR, TN, WI

Soil

Oxygenate	All suspected Releases (%)	Gasoline only (%)	Heating oil (%)	Jet fuel (%)	Diesel fuel (%)
M*t*BE	**MI** - 3.4 **NE** - 11 **NM** - 14 **ID** <20 **NJ*** - 22 **UT** - 29 **MD, MT** - 40 **OH** - 47 **MO** - 80 **TN** - 100	**AZ, IL, OR** <10 **HI** <20 **AL, WI** - 40 **OH** – 47 **NH*, NC** - 50 **CA**-80 **FL** >90 **DE**-90			
TBA	**NJ** *- 10	**CA**-60, **DE***			
Ethanol					
TAME	**MD**–10	**DE***			
E*t*BE					
DIPE		**NC** - 20			

DE* Not enough data.
NH* When some type of contaminant is present.
Don't know – CT, IA, IN, LA, MA, MS, NY, PA, RI, WA, WV

20a. Is your state considering reopening any sites to look for:
M*t*BE?

- **Yes** – CA, IN, MD*, MT, NH, RI
- **No** – AK, AL, AR, CO, DE, FL, GA, HI, ID, IA, KS, KY, LA, ME, MA, MI, MN, MO, MS, NE, NV, NJ, NM, NY, NC, ND, OH, OK, OR, PA, TN, TX, UT, VA, VT, WV, WI, WY
- **Don't know** – AZ*, CT, IL, SC, SD, WA

TBA?

- **Yes** – IN, MT
- **No** – AL, AK, AZ, AR, CO, DE, FL, GA, HI, ID, IL, IA, KS, KY, LA, ME, MA, MI, MN, MO, MS, NE, NV, NH, NJ, NM, NY, NC, ND, OH, OK, OR, RI, TN, UT, VA, VT, WV, WI, WY
- **Don't know** – CA, CT, MD, SC, SD, TX, WA

AZ* SS determination.
MD* Pending ongoing investigation.

20b. If yes, what are the criteria?

AZ SS usually related to known impacts to receptors.
CA MTBE was suspected to be a chemical used on site but had not been sampled.
DE Only if some new evidence (e.g., an impacted well) should cause us to consider reopening a site where it hadn't been analyzed for before. We have reopened a few sites where a site assessment done for a property transfer detected MTBE. Further investigation was then required to determine if the site was hot enough to require additional assessment or remediation.
IN Suspected or known receptor (DW). We have required MTBE sampling since 1994.
MD Generally, LUST sites closed prior to 1996 were not assessed for MTBE. Current MIP geoprobe investigation of a limited number of these sites is underway to determine the prevalence and persistence of MTBE at these sites.
MT Based on SS conditions and presence of MTBE detected in a nearby monitoring network.
NH GW contamination exceeds ambient GW quality standards.
RI A site is reopened based on discovery of MTBE (e.g., by real estate transfer assessment) at a closed site – suspect new releases.

21a. How many previously closed sites have been reopened because of post-closure detection of oxygenates?

- **None** – AK, AR, GA, HI, ID, IL, IN, KS, KY, LA, MN, MS, NE, NM, NC, ND, OK, SD, TX, UT, VA, WY
- **Very few** – CA
- **CO** 1; **DE** 2-3; **MT** 1; **NH** >7 sites; **OH** <5; **OR** 0-5%; **VT** 10-20
- **Don't know** – AL, AZ, CT, FL, IA, ME, MD, MA, MI, MO, NV, NJ, NY, RI, SC, TN, WA, WV, WI

21b. If you've had to reopen any, please provide examples of reasons why.

CA Regulatory agencies have reopened sites that were suspected of using MTBE and MTBE would likely be present. To date, very few required additional corrective action.

CO MTBE was detected in a downgradient drinking water well.

DE Impacts to nearby wells, Phase II site assessment done for property transfer submitted to state.

FL Generally, someone will do an environmental audit of a site that had previously been issued NFA status by the department and may find low concentrations of one or more of the contaminants from gasoline that were supposedly cleaned up, including potentially MTBE.

IL We would if >70 ppb migrated off site and there was a potential impact to potable water above 70 ppb.

IA If a hazardous condition were identified (e.g., contaminants found in a receptor), we would look for the origin of the contaminants and may require corrective action measures or point-of-use treatment. This may necessitate reopening closed sites.

KS We have had analytical on most of our sites since the early 1990s, so we don't have many surprises. However, if we find a receptor that has been impacted, we will review all sites in the area.

MD A detection of MTBE in GW discovered during a Phase II audit of a downgradient property or an MTBE impact in a downgradient domestic well have been the primary reasons to revisit previously closed sites.

MT At this one site, wells were maintained on-site after closure. The wells were reopened and MTBE was detected above current cleanup standards.

NH Most were related to ExxonMobil sale of properties resulting from a merger. The due-diligence efforts discovered releases from previously closed sites.

OH Real estate phase 2 performed.

OR Taste and odor complaints in nearby DW wells.

RI Sites were reopened based on discovery of MTBE (e.g., by real estate transfer assessment) at a closed site – suspect new releases.

SC Cases are reopened based on new analytical data that provides previously unknown information about a release. Cases that have received a NFA letter have been reopened by the UST program; however, the number of reopened cases is not tracked by the UST Program.

TN New spill occurs on the site; vapors are detected; receptors are detected.

VT Site closed before MTBE testing required; Phase II assessment completed due to real estate transaction.

22a. Approximately how many sites were closed before you began to require analysis of M*t*BE or other oxygenates?

CA -10,000; **CO** – 4,755; **DE** – 1020 sites w/documented gasoline releases; **HI** – 600; **ID** – hundreds; **IL** – 10,000; **IN** – 180; **IA** – nearly 2,150 sites; **LA** – several thousand; **MD** – 5,500; **MT** – 1,225; **NE** – 2,300; **NV** – ~ 2,000; **OH** – 4,500; **OK** – 1,400; **PA** – 2,000; **SC** – 1,311; **TX** – 9,000-10,000; **UT** – 1,930; **VA** >5,000; **VT** – 360 before 1991; **WA** - ~5,000; **WY** - 400

FL Hardly any, MTBE has been a required analysis in FL for almost 15 years.
KY 8,975 sites were closed before the Division requested MTBE sampling at any sites.
ME None. We have tested for MTBE since the mid 1980s.
MN About 100. We have required full VOC sampling at all sites since at least 1989.
MS We only started sampling for these last year. Approximately 5,770 sites.
NH 4 sites; however, many sites were closed when the standard was much higher.
NJ None known. GW sampling required back to June 1988 for MTBE and TBA.
NM MTBE analysis was required very early in the program.
RI MTBE has been analyzed in LUST samples since the 1980s (not long after the program began), so very few LUST sites were closed before these criteria applied.

- **Don't know** – AL, AZ, AR, CT, KS, MA, MI, MO, NY, NC, ND, OR, SD, TN, WV, WI

22b. If yes, do you anticipate that more information will need to be gathered at some of those sites?

- **Yes –** CO, IA, MD, MT*
- **No –** DE, FL, HI, ID, KY, MS, NE, NH, ND, OH, OK, OR, TX, UT, VT, WY
- **Don't know** – CA, IL, LA, MA, MO, NV, NY, SC, TN, VA, WA

MT* Staffing cuts due to budget deficits and negative fund balances have idled low priority sites. Receptor impacts caused by inactive (low priority) or closed sites will be addressed as they occur.

23. Of the <u>groundwater</u> sites, how often do oxygenate levels exceed your action levels?

Percent (of the time)	M*t*BE	TBA	Ethanol	TAME	E*t*BE	DIPE

0 - 20%	GA, HI, IL, ME, MI, MN, MT, NE, NJ, ND, OH (14%), OK, OR, SD, TX, WY	IA, ME, NH, NJ, VT	NH*, VT	IA, ME, NH*, VT	IA, ME, NH*, VT	IA, ME, NH*, VT
20 - 40%	ID, IN, LA, SC (32%), UT					
40 - 60%	AZ, IA*, MD, NM, RI*, WI	DE		DE		
60 - 80%	AL, AR, CA, DE, FL*, NV	CA				
80 - 100%	CO, CT, KS, MO, NH, NY*, NC, VA*, VT					
Don't know	KY, MS, PA, TN, WA	AL, KY	AL, CA, KY	AL, CA, KY	AL, CA, KY	AL, CA, KY

Please indicate whether your percentages are based on:

- Hard data – CO, HI, IL, IN, MI, NJ*, NY, OH, SC
- Estimates – AL, AZ, AR, CA, CT, DE, FL, GA, ID, KS, LA, ME, MD, MN, MO, MT, NE, NV, NH, NC, ND, OK, OR, RI, SD, TX (based on action level only being applied if there is an actual drinking water receptor), UT, VT, WI, WY

DE Percentages based on gasoline release sites only.

FL* Most of the time other chemicals are also present above our action levels at these sites, so this data item (i.e., 60-80% of petroleum-contaminated sites have MTBE above action level) should not be interpreted that MTBE is a significantly bigger problem than the other chemicals.

IA* Percentages are based on a subset of data, and because IA has no action level, data represent sites where the detection level (15 ppb) is exceeded.

NH* The action levels for these compounds have not been finalized.

NJ* Based on electronic data submittals for a subset of cases within the Bureau of USTs in 2002. Data represent sample results above action levels, not sites.

NY* In a 1998 survey of GW sites w/MTBE detected, 82 percent exceeded the cleanup level of 10 ug/L.

RI* Many of our sites are in GB GW areas, where the MTBE standard is high. The GA GW standard is exceeded at most gasoline LUST sites in GA or GAA areas.

VA* Gasoline releases.

WV We have no action level for the LUST program.

24. In your experience, what has been the highest concentration of oxygenate in the hot spot/core of an oxygenate plume and at the receptor?

Oxygenate	Hot spot/core of plume (ppb)	Receptor (ppb)
M*t*BE	**AK**–10,300; **AZ** – 68,000; **AR** >10,000; **CA**– 2,000,000; **CO** –170,000; **CT** – 100,000; **DE** – 300,000; **GA**– 300; **ID –** 50,000; **IA**– 99,400; **KS** –500,000; **LA** – 25,000; **ME** – 1,000,000; **MD** – 500,000; **MI** – 344,000; **MN** – 73,000; **MT** – 19,800; **NE** – 38,610; **NV** – 220,000; **NH** – 180,000/170,000; **NM** – 450,000; **NJ** >500,000; **NY** – 4,400,000; **NC** >10,000; **OH** – 265,000; **OR** – 250,000; **RI** - 2,200,000; **SC** – 2,500,000*; **SD** – 200; **TN** – 200; **TX** – 9,131,994; **UT** – 101,000; **VA** – 1,240,000; **VT** – 536,000; **WA** – 7,150; **WV** – 5,000; **WI** – 4,000*; **WY** – 4,300	**AR** – 350; **CT** – 25,000; **DE** – 25,000; **IN** – 450; **IA** – 98; **GA** – 50; **KS** – 1,300; **LA** – 1,000; **ME –** 6,500; **MD** – 1,000+; **MN** – 50; **MO** – 335; **MT** – 30; **NE** – 5.5; **NV** ~10; **NH** – 10,000; **NJ** – 1,000-4,500; **NY** – 28,000; **NC** – 800; **OH** – 360; **OR** – 185; **RI** – 1,100; **SC** – 1,000*; **SD** – 200; **TN** – 70-80; **TX** – 2,000-3,000 (est.); **UT** – 6; **VA** – 44,144*; **VT** – 27,000; **WV** <20; **WI** – 1,700**, **WY** – 2,250
TBA	**CA**– 99,000; **ME –** 215; **NV** – 50,000; **NH** – 200,000; **NJ** >250,000; **SC** – 39,400; **VT** – 811	**DE** – 1,000 (est.); **ME** – 215; **NH** – 48; **VA** – ~500*, **VT** – 12
Ethanol	**SC** – 9,800,000	
TAME	**DE** -170,000; **ME** – 41; **MD** –50-100; **NV** – 240; **NH** – 4,500; **SC** – 1,700; **VT** – 20,300	**DE** – 1,000 (est.); **ME** – 41; **MD** – 5 or less; **NH** – 70; **VT** – 14
E*t*BE	**ME, NV** ~20; **NH** – 10s-100s; **SC** – 60; **VT** – 622	**MD** – 5 or less; **NH** – 2.1
DIPE	**MD** – 5-100; **NH** – 10s-100s; **SC** – 8,700; **VT** – 296	**MD** – 5 or less; **NH** – 0.68; **VT** – 1
Other oxygenates (e.g., methanol, TBF, ETBA)	**SC**: ETBA – 7,940, TBF – 20,800, TAA – 76,000	

DE Receptor being a public or private well, not a compliance point.

FL There are thousands of petroleum-contaminated sites for which assessment has been performed in FL. Data on MTBE contamination can be found in the individual site files. We do not have the GW concentration data in a database that can be conveniently

queried to find which of those sites had the highest concentrations and which had receptor wells w/MTBE contamination.

MI Concentrations at receptors not independently tracked. Water wells have been impacted at 22 sites. Approximately 700 sites have MTBE impacts over 40 ppb in groundwater.

NH A Mobil facility had 56,000 TBA and 2,240 TAME.

SC* Listed values for MTBE are not from the same release at the same site but are the highest values reported as of March 15, 2003.

VA* In sample collected from water supply well.

WI *Estimate at monitoring well; **actual at water supply well.

Don't know – AL, HI, IL, KY, MA, MS, ND, OK, PA,

IV. M*t*BE Plume Lengths

25a. Have you tracked M*t*BE plume lengths from gasoline releases?

- **Yes** – AK, AR, CA, DE, KS, MD, MN, MO, NV, NH, NM, NY, NC, OR, RI, SC, TN, WV
- **No** – AL, AZ, FL*, GA, ID, IA, KY, LA, MS, NE, NJ, ND, OH, OK, PA, TX
- **Sometimes** – CO, CT, HI, IL, IN, ME, MA, MI, MT, SD*, UT, VA, VT, WI, WY
- **Don't know -** WA

FL* By tracking I assume you mean some kind of database that summarizes plume lengths for various sites. We do not have such a database. All sites that have assessments completed and approved will have determined the downgradient extent of both BTEX and MTBE plumes. This data can be found in individual site files.

SD* Only in conjunction w/BTEX plumes.

25b. If yes, please indicate your <u>average</u> M*t*BE plume lengths.

- **10 – 50 feet**
- **51 – 100 feet** – AK, CT, MO
- **101 – 250 feet –** IN, KS, MD, MI, MN, NH, OR, RI, TN, VA, WV, WY
- **251 – 500 feet** – AR, CA, DE, ID, MT, NV, NM, NC, SC, VT
- **>500 feet –** ME, NY
- **Don't know –** CO, FL, HI, IL, LA, MA, WA, WI

25c. Are these plumes longer than typical BTEX plumes?

- **Often** – AZ, AR, CA, CT, DE, IN, ME, MT, NH, NJ, NM, NY, NC, SC, TN, VA
- **Sometimes** – AK, AL, CO, ID, IL, KS, MO, NV, OH, OR, PA, RI, TX, VT, WV, WI
- **Rarely** – MD, MN, WY
- **Don't know –** HI, IA, KY, LA, MA, MI, MS, NE, ND, SD, UT, WA

FL Our experience (not based on firm statistics) is that MTBE plumes are about 25 percent longer than BTEX plumes on the average.

25d. Please indicate the <u>maximum</u> length of any M*t*BE plume observed in your state.

- **50 – 250 feet** – AK
- **250 – 500 feet** – MN, MO, WY
- **500 – 1000 feet** – CO, ID

- **1000 – 5000 feet –** AR, CA, CT, DE, FL, IL, IN, KS, ME, MD, MI, MT, NV, NH, NJ, NM, NC, OH, OR, RI, SC (4,400 feet), TX (est.), UT, VA, VT, WI
- **If greater than 5000, please explain – NY** – East Patchogue site, Long Island. MTBE plume over 9,000 feet. Spill due to a gasoline release at a service station. For more info, visit: www.epa.gov/ada/research/patchogue.html.
- **Don't know –** AL, AZ, GA, HI, IA, KY, LA, MA, MS, NE, ND, PA, SD, TN, WA, WV

25e. If the M*t*BE plume is in bedrock, what is the maximum length observed in your state?

- **50 – 250 feet**
- **250 – 500 feet** – CO, ID, OH
- **500 – 1000 feet –** DE (longest documented that we can find a source for), MD, MO
- **1000 – 5000 feet –** AR, CT, ME, NH, NY, NC, RI, SC (4,400 feet), TX*, VA, VT
- **If greater than 5000, please explain**
- **Don't know** – AL, AZ, AK, CA, FL, GA, HI, IL, IN, IA, KY, LA, MA, MI, MN, MS, MT, NE, NV, NJ, NM, ND, OR, PA, SD, TN, UT, WA, WV, WI

KS No bedrock sites.

TX* Plume cited in question 25d is in fractured bedrock.

V. M*t*BE Drinking Water Impacts

26a. Does your state drinking water program require routine analysis for M*t*BE?

- **Yes** – AR, CA, DE, IN, LA, ME, MD, MA, MI, MN, MO, MS, MT, NE, NH, NJ, NM, NY, RI, SC, TX, VA, VT, WV, WI
- **No** – AK, AL, CO, FL, HI, ID, IA, KS, NC, ND, OH, OK, OR, PA, TN, UT, WY
- **Don't know** – AZ, CT, GA, IL, NV, SD, WA
- **KY –** All DW questions can be answered by Jeff Pratt of the KY Division of Water (502) 564-3410.

26b. If yes, when was M*t*BE analysis initiated?

CA – In 1995, but was initially detected in 1989; **DE** – June 2000; **IN** – January 2000 (voluntary reporting); **KS** – Early 1990s; **LA** – February 2001; **ME** – 1998; **MD** – 1995; **MN** – 1989; **MO** – 1996; **MT ,WI** – 2000; **NE** – February 2000; **NH** – All labs were required to report in 1998; state labs began in 1987; **NJ** – 1997; **NM** – Mid to late 1980s; **NY** – 1998 for public water supplies serving >10,000 people; **RI** – Late 1980s; **SC** – May 2001; **VA, VT** – Late 1990s; **WV** – 2002. Only larger systems as required by EPA. The majority of systems are not routinely sampled.

- **Don't know** – AR, MA, MI, MS, TX

26c. If yes to question 26a, does your LUST program routinely review M*t*BE data from the drinking water program?

- **Yes** – CA(to some extent), IN, KS, ME, MD, MI, MN, MO, NE, NH, NJ*, NY*, TN, VT, WV*, WI
- **No** – AZ, AR, DE*, IA, LA, MA, MS, MT, NM, RI*, SC, TX, VA*, WA

DE* They will usually notify us when they get an analysis that exceeds the DW standard, but they won't always notify us if it is close to but below the standard.
NJ* When results are found above standards.
NY* Only the detections.
RI* DW program is in the Dept. of Health.
VA* The Health Dept. notifies DEQ when their advisory of 20 ug/L M*t*BE has been exceeded.
WV* The DEP sampled all public DW supplies in 2001-2002.

27. Approximately how many public and private drinking water wells in your state have been contaminated by M*t*BE at any level? (Public wells are defined by groundwater supply systems that serve >25 households.)

- **Don't know** – AZ, FL, GA, IL, LA, MA, MS, MT, ND, OH, PA, SD, TN

# of wells	Private	Public
1 - 10	AL, ID, IN, IA*, MN, NV, NM, OR, UT	AL, AR, CO, IN, MO, NE, NV, NM, NC, OK (1), OR, RI, UT
11 - 50	AR, CO, MI,	CT, IA*, KS, NY*, SC (49), VT (45)
51 - 100	DE (95), MO, NC, RI, SC (75), TX*,	CA, WV (75)
101 - 500	CA, CT, KS, ME, MD(360), NJ*, VA*, VT (~200), WI (108)	DE* (250-300), ME, MD(125), NH (350), NJ**
> 500, provide an estimate	NH – 30,000-40,000, NY* – 866;	

DE* From three separate studies, an estimated 25-30% of public wells have MTBE detected. There are about 1,000 public wells in the state. From this I would estimate that 250-3,000 public wells should have MTBE detections. From the three studies, approximately 5 wells of 128 exceeded the 10 ppb DW standard (3% of public wells, which would give an estimate of about 30 public wells exceeding the DE DW standard. Many wells are in the 5-10 ppb range.

HI, ID None.

IA* That we know of.

NJ *Estimate. **Number based on MTBE detections in samples collected post treatment (facility) or raw water entering treatment plant from 1999-2001.

NY* From a 1998 survey of state-funded petroleum spill projects.

TX* The state is currently providing filtration systems on about 30 private drinking water wells contaminated with MtBE. There are an unknown number of wells that may have been impacted after 1998 and are being handled by responsible parties and their insurance companies. An estimate of 50 – 100 total is our best guess.

VA* These are wells that are currently impacted.

WY None have been reported to the department.

28. How many private well users have you provided with bottled water or point-of-use treatment because of oxygenate problems?

- **None** – HI, NE, OH, OK, TN, UT, WY

- **1 – 10** – AL(includes BTEX), CO, GA, IN, IA, MN, MT, NC, OR
- **11 – 50** – AR, SC (37), TX
- **51 – 100 –** DE, KS, PA*, RI*
- **101 – 500 –** CA, CT, MD*, NH*, NJ*, VA*, VT
- **>500 –** ME, NY
- **Don't know –** AZ, FL, ID, IL, LA, MA, MI*, MO, MS, NV, NM, ND, WA, WV, WI

MD* Provided by both responsible party and state program.
MI* Response can include extension/connection to municipal water supplies.
NH* This includes water supplied by DES and by RPs at LUST sites.
NJ* Estimate.
PA* As a result of state-lead actions.
RI* Provided by the state, some such systems have been provided by the RP.
SD Don't know of any solely for oxygenates.
VA* DEQ currently provides point-of-use treatment to approximately 220 residences that have petroleum-impacted wells.

VI. Oxygenate Remediation

29. How often does M*t*BE drive the cleanup or investigation activities at LUST sites?

➢ **Never** – AK, AR, GA, IA, KY, MN, MS, ND, OK, SD, TN, WY	➢ **60 – 80% -** CA, NV, NH
➢ **Less than 20% -** AL, CO, FL, HI**,** ID, IL, IN, KS, LA, MI, MT, NE, NM, NC, OH, OR, SC, TX, VA, WV, WI	➢ **Greater than 80% -** ME, NY
➢ **20 – 40% -** MD, RI, UT, VT	➢ **Don't know –** AZ, MO, NJ, PA, WA
➢ **40 – 60% -** CT, DE, MA	

30. **Of your LUST sites, what percentage are undergoing remediation for:**

• **M*t*BE:**
KY, MN, MS, ND, OK – 0; **TX, WY** <1%; **CO, HI** – 1%; **WV*** – 2%; **MI** – 3.4%; **NC** – 5%; **IL, NE, VA** <10%; **NH** – 10%; **OH** – 14%; **TN, UT** – 15%; **LA** <20%; **ID, OR** – 20%; **VT** – 20-40%; **KS**, **MT** – 30%; **NM** – 43%; **DE** – 50%**; AZ** >50%; **IN** – 57%; **CA, NV** – 60-80%; **ME, RI** – 80%; **SC** – 85%; **FL** – 90%*;

• **TBA: MT** <1%; **NV –** 10%; **DE** – 20%
• **Ethanol:** 0
• **TAME: NV** – 1%; **DE** – 20%
• **E*t*BE: NV** – 1%;
• **DIPE: NV** – 1%;

- ➢ **Don't know** – AK*, AL, AR, CT, IA, LA, MD, MA, MN, MO, NJ, NY, NC, PA, WA

AK* In 2001 study, 7 percent of sites sampled (4 out of 60) had a detection limit of >5ug/L, 5 percent of sites (3 out of 60) exceeded EPA Drinking Water Advisory lower limit of 20 ug/L.

FL * Most sites that have had a gasoline discharge in FL will have had GW contamination by both BTEX and MTBE. So, our answer that 90 percent of sites are undergoing remediation for MTBE should not be interpreted to mean that MTBE is the only reason they are undergoing remediation. A very large percent of these sites also have BTEX and MTBE is the driver a small percentage of the time.

SD None solely for oxygenates.

WV* Although WV does not have an MTBE standard, a few RPs are voluntarily cleaning it up, even after BTEX has been remediated.

WI None exclusively.

31a. Of your LUST remediation cases, what percentage are at sites where M*t*BE is the only concern?

CA ~10%; **CO, HI, IN, MT, OR, SC** <1%; **DE** -20%; **FL, NC, UT, VA** <5%; **ID, TN, VT** <10%; **KS** -1%; **LA** <20%; **ME** -40%; **NV, OH** ~1%; **NH** ~5%; **RI** – rare;
TX - 0.05% (2-3 of 5,500); **WV** – 1%; **WI** – very few
None - AK, AR, GA, IL, IA, MN, MS, NE, NM, ND, OK, SD, WY

- **Don't know –** AL, AZ, CT, KY, MD, MA, ME, MO, NJ, NY, PA, WA

31b. How many sites does this represent?

AK 0%; **CA** – 1,350; **CO** –1; **HI** – 3; **ID** ~15; **IN, OR** <10; **KS, NV, SC** – 2;
ME 643; **MT** – 5; **NH*** – 40; **NC** ~3; **RI, WI** – very few; **TX** – 2-3; **VA** <100;
VT 10 – 20; **WV** – 10

NH* Looked over the 13 worst-case files and found 3 were MTBE only. There are about 80 worst-case sites (new releases or 2nd release sites). Extrapolated from there to entire population.

- **Don't know** – DE, FL, LA, TN, UT

32a. At what percent of sites has BTEX been successfully remediated but M*t*BE remains?

- **< 10%** – AK, AR, CA, DE, FL, HI, ID, IL, IN, KS, MA, MN, NE, NV, NM, NC, OH, OK, OR, SC, SD*, TN, UT, VA, VT, WV, WI, WY
- **20-30% -** NH, RI
- **30-50%** - ME
- **50-70%** - TX
- **70-90%** - 0
- **Don't know** – AL, AZ, CO, CT, GA, IA, KY, LA, MD, MI, MO, MS, MT, NJ, NY, ND, PA, WA

SD* MTBE may remain below health advisory levels.

32b. How many sites does this represent?

AK – 0; **AR, OR** <10; **CA** <1,350; **IN, VA** <100; **KS** – 3; **NV** ~5; **NH** ~150; **NM** <120; **NC, OK** – 1; **SC** – 9; **TX** – 5,000-7,000; **VT** >6; **WV** – 10; **WY** – 12

- **Don't know** – DE, FL, ID, IL, IA, MA, MN, RI, TN, UT

33. On average, how long does it take to clean up sites with M*t*BE levels:

- **>100 ppb:**

AL, NV- 3-5 yrs
CA - 10 yrs
CT - 4yrs
DE - 3-5 years, plus additional time for post-corrective action monitoring
KS - >2 yrs
ME - 5-10 yrs
MD - data not tracked, estimate 2-5 years
MT - > 5 yrs.
NH - these sites do not cleanup due to ongoing releases
OK - 6 months
RI - 5-10 yrs
SC - 3.5 yrs
TN - >3 yrs
WY - 5-7 yrs (site continues under remed. After 2 yrs)

- **< 100 ppb:**

CA - 5 yrs
CT, RI - 2yrs
DE - Would probably only do corrective action of wells threatened or impacted
KS - <2 yrs
ME - <5 yrs (3 on average)
MT - 1-5 yrs.
NV, TN - <3 yrs.
NH - 1-2 yrs.
SC - 2.5 yrs
WY - 5-7 yrs (average).

- **Don't know:**

AK, AZ, AR, FL, GA, HI, ID, IL, IN, IA, KY, LA, MA, MI, MS, NE, NJ, NM, NC, ND, OH, OR, PA, TX*, VA, WA, WV, WI

AL Sites often pass risk assessment w/MTBE <100 ppb, unless a well is close by.
MO Depends on site condition and remedial method.
NY Site-specific depending on geologic conditions and proximity to sensitive receptors.

SD Site dependent.

TX* The 2 – 3 current sites where MtBE is the driver are still undergoing remediation. No other sites have been cleaned up only for MtBE.

UT Most of the sites in the >100 ppb range meet Tier 1 criteria and are eligible for closure.

VT > 10 yrs in both cases in bedrock.

34. If your state <u>does not</u> have standards for any of the following oxygenates, please indicate if you require treatment for that oxygenate:

M*t*BE – AK*, AZ, AR, CA, CO, FL, GA*, IN, IA*, ME, TN, TX, VA **Ethanol** – AK, CA, NC, VA, VT **TBA** – AK, CA, CO, ME, NH, NC, VA, VT **TAME** – AK, CA, CO, ME, NC, VA, VT	**E*t*BE** – AK, CA, CO, DE*, ME, NC, VA, VT **DIPE** – AK, CA, CO, DE*, ME, VA, VT **Other oxygenates** (e.g., methanol,TBF, ETBA) – AK, CA, CO, ME, NC, VA, VT

AK* If it is causing a problem. We do have taste and odor requirements.

DE * We will if we find it at a level similar to that of the other oxygenates. We will have action levels soon and will base cleanup on a combination of the action levels and proximity to receptors.

GA* Replacement of water supply only.

IA* If MTBE were found in a DW supply, we would likely require point-of-use treatment; but Iowa does not require cleanup or assessment of MTBE at LUST sites.

NJ Treatment methods used for MTBE and TBA should address other oxygenates.

SD It depends upon the site and the associated risks.

35. What technologies have been used successfully to remediate oxygenates in soil and groundwater? Please answer using the following chart. To indicate degree of success, fill out the box for each technology using the following codes: poor (P), moderately good (MG), good (G), very good (VG).

- **Don't know –** AZ, IA, GA, HI, KY, LA, MI, MN, MS, NY, ND, PA, WA, WI

Medium	Technology	M*t*BE	Ethanol	TBA	TAME	E*t*BE	DIPE
Soil	**Soil vapor extraction**	**VG** - AL,CA, CT, IN, MO, MT, NV, NJ, RI, TX, UT, WY **G -** FL, KS, VT **MG** - DE, ID, MD, MA, NH, NM, NC, OH, OR, TN		**VG** - NJ **P** - DE	**MG** - MD		
	Low temperature thermal desorption	**VG** - CA,DE, NV **G** - FL		**VG** -DE	**VG** -DE		
	Biodegradation	**G** - KS, NJ, TN, WV **MG** - AL, MD, MO, OH, OR, VA **P** - CA, CT, DE, FL, IN, MA, MT, NH, NM, NC, TX, UT		**G** - NJ	**MG** - MD		
	Other technologies, or combinations of technologies	**VG** - AL, CA, CT, IL, ME, NE,		**VG** - NJ			

	Dual-phase extraction – AL Excavation – CA, CT, IL, ME, NE, NJ, VA ORC – MA <3% Hydrogen peroxide – NV Overexcavation - TN	MA, NV, NJ, TN **MG** - VA					
Groundwater	**Point-of-use treatment** (e.g., carbon, air stripping) pws = public water supply	**VG** - CA, CT, IN, ME, NJ, SC, TX, VT , KS(pws) **G** - CO, FL, MT, NH, NC, OK, OR, RI, VA - **MG/G** DE **MG** - IL, MD, NM, TN		**VG** - NJ **P** - DE	**MG/G** - DE **MG** - MD		
	Pump and Treat	**VG** – ME, NJ **G** - FL, IN, MT, NV, TN, UT, VT, WY **MG-G** DE **MG** - MD, MA, MO, NH, OH, OR, VA **P** - AR, AL, CA,CT, NM, NC, RI, SC, TX		**VG** - NJ	**MG** - MD		
	Air sparging	**VG** - CA, CT, MT, NJ, RI, SC, WY **G** Fl, IN,		**VG** - NJ	**MG** - MD		

		KS, MO, TN, VT - **MG/G** - DE – **MG** - AR, CO, ID, IL, ME, MD, MA, NV, NM, NC, OH, UT **P** - TX					
	Biosparging	**VG** - CA, NV, SC **G** CT, IN, KS, TN, WV CO, **MG** -MO, NC **P** - DE, FL, TX , UT		**VG** - NV			
	Bioreactor	**G** - CA **MG -** NC, TN **MG/P** - DE **P** - SC, TX					
	Monitored Natural Attenuation	**VG** - ME. NJ, TN, VT **G -** SC **MG** - AL, CO, CT, FL, MO, NH, NM, OH, OR, RI, VA, WV, WY **P/MG** - TX **P -** AR, CA, DE,		**VG** - NJ			

		IN, MT, NV, NC, UT					
	Dual-Phase Extraction/ Multi-Phase Extraction	**VG** - AL, CA, NV, NJ, TX, WY **G/VG -** DE **G -** CT, FL, IN, MD, MO, MT, OR, RI, SC, UT, VA, VT **MG -** AR, CO, NH, NM, NC, OH, TN		**VG** - NJ **MG/G -** DE	**G/VG** - DE **G** - MD		
	Soil Excavation	**VG** - AR, CA, CT, ME, MO, MT, NM, NJ, NC, OH, RI, TN, TX , WV **G -** FL, IN, KS, MD, NH, OR, UT, VT, WY **MG** -AL, ID, VA **P/MG** DE **P** -SC		**VG** - NJ **P/MG** - DE	**G** - MD **P/MG** - DE		
	Chemical oxidation	**VG** - CA **G/VG -** DE **G** - FL, MO, RI, SC **MG** ID, MD,			**MG** - MD		

		MT, NH, TN **P -** IN, ME, NM, TX, UT					
	Enhanced Aerobic Bioremediation (e.g., bugs and nutrients, oxygen sparging, ORC)	**VG** - MA, NV, SC, TN -**G** - CT, MO, MT, NJ, RI, VT, WV **MG** -MD, OH **P/MG** - DE **P** - CA, FL, IN, TX , UT		**VG** - NV **G -** NJ	**MG** MD		
	Other technologies, or combinations of technologies: **DE-**AS/SVE in combination w/chemical destruction. **MT** – Phytoremediation for low levels (<100 ppb). **VA** – Free product removal, fluid-vapor recovery	**VG** - DE **G** -MT **MG** -VA		**VG** - DE	**VG** - DE		

AK Use SVE for soil and air sparging for GW, in BTEX context mostly. Have not successfully remediated them. Have targeted for MTBE.

FL Treatment processes such as air stripping and activated carbon adsorption do not generally work as well on MTBE as they do with other chemicals, but we find that most of the time this doesn't matter. The reason is that most LUST sites in FL have both BTEX and MTBE, and since the benzene cleanup level is much lower than MTBE, the lower efficiency of the treatment equipment at treating MTBE does not become a significant handicap, and benzene generally continues to be the driver in the design of the equipment and the time it takes to reach cleanup completion.

SD No sites have been remediated solely for oxygenates.

36a. Has your state remediated to closure any sites with M*t*BE contamination?

- **Yes** – AL, AZ, AR, CA, CT, DE, FL, ID, IN, KS, LA, ME, MD, MO, NE, NV, NH, NJ, NM, NY, NC, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VA, VT, WI
- **No** – AK, HI, MA, MN, ND, WV, WY
- **Don't know –** CO, GA, IL, IA, KY, MI, MS, MT, WA

36b. If yes, approximately how many?

- **1 – 10 –** KS, NV, OH, OK, TX
- **11 – 50 –** DE, ID, NH, NC, RI, SC (34), UT
- **51 – 100 –** IN, NM
- **100 –** AL, AR, CA, ME, MD, MO, NJ, VA, VT, WI
- If greater than 100, please provide an estimate: **AL** ~400; **AR** ~250;
- **Don't know** – AZ, CT, FL, LA, NE, NY, OR, PA, SD, TN

37a. Is your state taking a more aggressive role in NAPL recovery to prevent M*t*BE plumes from migrating off site?

- **Yes** – AR, CA, CT, ME, MA, MO, MS, MT, NV, NH, NY, NC, OK, PA, SC, TN
- **No** – AZ, AK, CO, FL*, GA, HI, ID, IL, IN, KS, KY, LA, MI*, MN, NE, NJ, NM, ND, OH, OR, TX, UT, VA, VT, WV, WY
- **Have always been aggressive** – AL, DE, MD, RI, WI
- **Don't know –** IA, WA

37b. If yes, in what way?

AR Strict source control priority has been implemented—more digging, less skimming.

CA By over-excavating contaminated soil.

CT Treat as an "emergency response" as long as NAPL is present.

FL* We do emphasize the importance of NAPL recovery toward accomplishing overall cleanup objectives, but this emphasis is not particularly related to MTBE.

IA Free product recovery is required, at a minimum, by bailing or other passive means, and typically on a monthly basis. A more aggressive approach is required depending on the extent and thickness of the product plume. Recovery is required regardless of the risk-based evaluation results and MTBE presence.

MA Increase in follow-ups and pursuance of non-responders.

MI* All free product circumstances are dealt with in the same way.

MO Require proactive corrective action plans to address the extent of soil and GW contamination.

MS We are aggressive in free product recovery by bailing or vacuuming, but the reason is not related specifically to MTBE.

MT More aggressive project management and more aggressive cleanups drive fewer higher priority sites (e.g., those w/LNAPL) to closure faster.

NV Focus on recovering free product when it exists at a site. Use vacuum truck to remove to expedite free product recovery, as needed.

NH We are using enhanced LNAPL recovery techniques and are, in general, more aggressive in the use of remedial technologies due to the presence of MTBE.

NY Complete site characterizations and implementation of interim remedial measures (IRMs), including portable dual-phase extraction units.

NC More aggressive free product recovery due to MTBE.

OK We are always seeking new effective technologies to remove NAPL or dissolved contaminants.

PA, TN – Require recovery of free product to the maximum extent practicable.

SD Corrective actions are driven by site conditions and visits.

SC Free-phase product is being removed as soon as possible based on available revenue.

38a. If your state uses risk-based decision making (RBDM) in corrective action, does the process account for M*t*BE?

- **Yes** – AL, AZ, AK, CA, CO, DE, FL, HI, ID, IL, IN, KS, LA, ME, MD, MA, MI, MN, MO, MT, NE, NV, NH, NJ, NM, NC, OH, OK, OR, PA, SC, SD*, TN, UT, VA, VT, WI, WY
- **No** – AR, IA, KY, MS, ND, TX, WV
- **Don't know –** CT, WA

NY State doesn't have a formal RBCA program.

RI Don't use RBCA process.

SD* The process can be adjusted to include oxygenates.

Other oxygenates?

- **Yes** – AZ, CA, CO, DE, ME, MD, MA, MI, NJ, NC, OK, VT, WY
- **No** – AL, AR, FL, HI, ID, IA, KS, LA, MO, MS, MT, NE, NV, NH, NM, ND, OH, OR, PA, SC, TN, TX, UT, VA*, WV, WI
- **Don't know –** CT, WA

VA* Risk information (i.e., slope factors, reference doses) are not available for oxygenates other than MTBE. We will use a risk-based approach for these constituents when constituent-specific information becomes available.

38b. If yes, how?

AL It is a chemical of concern just like the BTEX compounds. Site-specific target levels are developed for soil & GW to protect DW wells, stream quality, ingestion/inhalation/dermal contact of soils, and vapor inhalation from soil & GW.

CA Source-Pathway-Receptor, risk analysis is applicable to MTBE as well as BTEX. RBCA or RBDM has not been formally adopted by the state. RBDM is a common-sense approach that is encouraged where applicable.

CO Using available data to arrive at site-specific levels for other oxygenates.

DE We established a pseudo-reference dose for MTBE, TAME, ETBE, DIPE based on taste and odor thresholds and back calculated action levels based on the same parameters used to calculate other chemicals of concern, except that we did not model biodegradation, Used Tier 2 Tool Kit for Chemical Releases (GSI), state-specific software. We have a fate and transport component (based on distance to receptor) for Tier 1 and 2 analyses, used a conservative coastal plain model for both coastal plain and piedmont sites and divided the resulting action level derived by this method by half to be more conservative in accounting for variability, such as soil types. TBA action levels began with California guidance standard of 12 ppb, and then calculated similarly.

FL Requirements to allow closure w/institutional controls in lieu of a complete cleanup apply to MTBE just as they do to other chemicals present.

ID Just like any other chemical of concern.

IL MTBE is treated like other gasoline parameters (BTEX) and must be modeled and addressed with remediation and/or institutional controls.

ME We base all of our corrective action decisions on estimated risk to receptors. So for all sites with oxygenates, we assume that a plume can travel over 600-1,000 feet.

MD If MTBE is present and corrective action is required, it will address the presence of other oxygenates. For example, if a carbon treatment system is installed on a domestic well for MTBE levels at or above 20 ppb, the carbon in it will capture the other ethers. The alcohols remain a developing issue.

MA All site contaminants must be shown to pose "no significant risk" by comparison to standards or use of site-specific risk assessment.

MI Risk-based criteria have been developed for common oxygenates.

MN Contamination plume must be demonstrated to be defined and stable.

MO We conduct a complete site characterization, determine the source and type of release, and identify exposure pathways and receptors.

MT MT has only addressed MTBE in its RBSL lookup tables. The other oxygenates have not been addressed.

NV All known pollutants, including MTBE, are considered part of RBDM.

NH Soil and GW standards for MTBE have been developed.

NJ Calibration is required for TBA in water analytical methods; GC/MS sampling methods are used for contaminant identification. Note: Additional research is planned to help evaluate the effectiveness of GC/MS methods to identify additional oxygenates beyond MTBE, TBA, and TAME.

NC As chemicals of concern.

OK We evaluate (test) for MTBE when there are nearby wells.

OR MTBE analysis required. Risk-based concentrations established for MTBE.

SC South Carolina MtBE action level is listed in *South Carolina Risk-Based Corrective Action for Petroleum Releases*. MtBE is treated as a chemical of concern by requiring groundwater samples be analyzed for MtBE and the risk to human health be determined.

WI Look for stable or decreasing plumes.

WY Other oxygenates are investigated, evaluated, and remediated, as appropriate, in the same manner as MTBE.

VII. Remediation Cost Impacts

39a. Has M*t*BE had a noticeable impact on the cost of remediation in your state?

- **Yes** - AR, CA, CT, DE, IL, IN, KS, ME, MD, MI, MO, MT, NV, NH, NJ, NY, OR, RI, SC, UT, VA, VT, WV
- **No** – AK, FL, GA, HI, IA, KY, LA, MN, MS, NE, NM, NC, ND, OH, OK, SD, TN, TX, WI, WY
- **Don't know –** AL, AZ*, CO, ID, MA, PA, WA

AZ* Suspect it will.

39b. If yes, please indicate the percentage of the sites that fall into each category.

Effect of M*t*BE on Cleanup Costs	**Percentage of Sites**
No increased cost	DE, NH - 10; NV - 20; MT, KS, RI -40; IN, VT - 50; CT - 70; SC-80; FL - 90; IL >95;
Small increase in cost (< 20% more)	FL - 5; ME - 10; MT - 10-15; CT, NV, OR, RI, VT -20; AR, DE, IN, NH - 30; KS - 40; SC - 47; WV - 50; VA->95; MD, MO - 100
Significant increase in cost (20 – 50%)	FL - 3; MT <5; CT - 5; VT <10; IN, ME - 10; SC - 18; RI – 30; DE, NH - 40; NV - 45; WV - 50;NY - 100
Very significant increase in cost (50 – 100%)	OR <1; FL - 2; IL , VA <5; CT, SC - 5; RI - 9; VT <10; IN, KS, MT, NV, NH - 10; DE - 15; ME - 50
Cost more than doubled	IN <1; RI - 1; SC- 3; NV <5; DE - 5; VT <10; FL, KS, NH - 10; ME - 30; CA - 100

39c. If costs have increased, what factors have driven them up (e.g., longer plume, difficulty to air strip, inefficiency of carbon)?

AZ Longer plume, less retardation.

AR Poor design of groundwater treatment systems (air stripping problem mostly). Biomonitoring failure for surface discharges.

CA MTBE is more mobile and less biodegradable than BTEX.

CT Depends on whether the plume is in a high quality or a low quality GW area.

DE All of the above. Also, separate from remediation costs, investigation costs have increased significantly because of plume lengths, 3-D characterization, etc.

FL, MO All of the above.

IL, IN Difficulty to treat and longer plumes.

KS Impact to receptors, additional assessment, in situ plume remediation, sites needing remediation only because of MTBE, diving plumes, longer plumes.

ME All of the above, plus testing for MTBE, increased number of affected wells, and increased size of investigation.

MD More extensive delineation, resistance to natural attenuation, difficulty of extraction, and inefficiency of carbon.

MT Longer plumes, receptors. Recalcitrance of MTBE, increased number of monitoring wells, need for 3-D site characterization.

NV Time to remediate longer w/ MTBE present, compared to BTEX only (e.g., in-situ bio); the remedial method selected is selected because MTBE is present, and the method has a higher installation and O&M cost (e.g., dual phase); additional remedial methods/units are employed to keep the plumes from impacting receptors; carbon usage.

NH Some sites have become MTBE-only sites, so all costs are MTBE related. Costs that are significantly more expensive entail things like law suits and POE installations that are solely because of MTBE. Most sites have higher costs because additional monitoring wells and routine monitoring are required.

NJ Longer plumes. Receptor impacts, high MTBE concentrations, difficulty remediating, migration potential, carbon breakthrough, investigation of suspected releases.

NY Not readily biodegradable and mobility not significantly retarded in many hydrogeologic settings. Increased injection/extraction rates due to MTBE's physical and chemical properties.

OR Additional analysis costs, additional monitoring wells in some cases, additional remediation or time of operation, in some cases.

RI Longer plume, longer time to closure, so more monitoring.

SC Cost of any active corrective action is directly related to the size (length, width, and depth) of the plume.

UT Increases have been in the 20-50% range—exact data currently not available. Primary cost factor seems to have a correlation w/ the relative aggressiveness of the consultant on the job and the RP's desire for a speedy cleanup. Sites that are under control (i.e., stable or decreasing plume) may be remediated more aggressively than necessary to avoid the stigma of MTBE.

VA Larger plume, impacts to water supplies that are not reached by BTEX constituents, increased maintenance on point-of-use treatment systems.

VT Impacts to bedrock (DW supplies) if MTBE only, recalcitrance.

WV Longer time to clean up.

VIII. Long-Term Management of LUST Sites

40. Approximately what percentage of your sites has been closed at something other than a fixed cleanup level?

AZ, AK, HI, IN, KS, LA, NH, RI, WV, WY - 0%, **FL** <1%; **VT** <10%; **OH** - 10% (Tier 1); **TN** – 13%; **DE** - 30%; **NC** – 30% (risk based); **NV** – 40%; **ME**, **MD, WI** - 50%; **KY**, **MN** – 85%; **AR** >90%; **GA** - 90%; **ND** – 100%; **OK** – Cleanup based on RBCA;

AL 100%, since each site has a site-specific target level.

SC 4% of all closed cases (165 out of 4,557 closed with site-specific risk-based screening levels).

VA >95%. Our cleanup levels are site-specific and risk-based.

- **Don't know – CA, CO, CT, ID, IL, IA, MA, MI, MO, MS, MT, NE, NJ, NM, NY, OR, PA, SD, TX, UT, WA**

IA Under RBCA, sites develop their own site-specific target levels (SSTLs) based on modeling and proximity of receptors.

41. What does no further action (NFA) mean in your UST/LUST program for petroleum hydrocarbons and oxygenates in soil, water, and groundwater?

- Inactivation of the file or no further action at this time (with a possible re-opener in the future). **AL, AK, AZ, AR, CA, CO, CT, DE, FL, GA, HI, ID, IN, IA, KS, KY, LA, ME, MD, MA, MI, MN, MO, MS, MT, NE, NV, NH, NJ, NM, NY, NC, ND, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VA, VT, WV, WI, WY**

What conditions post-NFA can re-open a site?

AL Discovery of higher concentrations than noted previously. Discovery of a compound not previously sampled. Discovery of free product not previously noted.

AK Any impacts to human health, safety, and the environment.

AZ Impacts to receptors or new information.

AR Complaints, subsequent monitoring data.

CO Impact to a receptor. Discovery of previously unknown contamination.

CT New receptors found. GW concentrations increase.

DE Impacts to receptor at later time (water, vapor). New info about contamination discovered during a later investigation (e.g., a Phase 2 investigation done for property transfer).

FL Detection of concentrations of any chemicals above the cleanup target levels in soil or GW.

GA Concentrations increasing above alternate cleanup levels, impact to a receptor, installation or discovery of a new receptor, discovery of free product, or a rule change.

HI New information regarding contaminants at the facility.

ID New release.

IN Discovery of previously unknown contamination above closure levels or impacts to receptors.

IA Hazardous condition identified and linked to a site. Contamination found on site at levels higher than what was known at the time of site closure.

KS Any reason. The letter clearly states that if contamination is detected in the future, KDHE can reopen the site and the RP remains the RP unless there is new contamination.

KY An occurrence of free product, fumes, etc. can reopen a site.

LA The discovery of contaminants at levels that exceed the cleanup level.

ME GW contamination that rises above the action level.

MD Impact to nearby receptor, discovery off site-phase II results, off site impacts-discharge to surface waters or vapor intrusion problem.

MA Audit of Response Action Outcome Statement by DEP – random or targeted audit.

MI New data, previously unknown conditions, unacceptable exposure risks.

MN Other or new information that demonstrates that a plume is unstable or a risk is determined to be present that was previously unaccounted for.

MO Evidence of previous false information or evidence of new information that indicates that the contamination is substantial and more extensive than we already know.

MT Off-site migration of contaminants, impacts to receptors (DW, surface water discharge), exposure of contaminated soil during excavation.

NE Essentially, any reoccurrence of contamination.

NV Conditions change substantially from those at the time NFA was provided and our agency is apprised of those changed conditions.

NH New data becomes available indicating environmental problems at the site.

NJ New information not previously disclosed.

NM Any evidence that a threat to human health and the environment is present.

NY An impact or exposure to a sensitive receptor.

NC Discovery of a new release, change of laws, rules.

ND Identified impact to public health or safety.

OH Phase II Assessment performed by 3rd party and discovery of COCs above action levels; off-site impact and site is suspected as a source; modification of land use or land use restriction.

OK Discovery of contamination above risk-based cleanup levels; redevelopment of a site.

OR Additional contamination found that poses a risk.

PA When someone is interested in doing a cleanup of the property.

RI Discovery of contamination in excess of standards.

SC A new environmental assessment report supported by analytical data from a South Carolina certified laboratory that documents levels of one or more chemicals of concern above South Carolina risk-based screening levels.

SD New risks identified, change in site conditions.
TX Discovery of a change in circumstance, such as discovery of NAPL or groundwater contamination downgradient that can be attributed to the site.
UT Discovery of conditions other than existed at the time NFA was issued (e.g., change in land use) or additional contamination discovered.
VA Discovery of recoverable free product that was not addressed while the case was open. Discovery of impacts to a receptor that existed during the time that the case was open.
VT New data, new impacts, new receptors.
WV Determination that either soil or GW has not been remediated to action level or MCL.
WI New data, such as an impact to a private well.
WY Future regulated UST releases remain the total cleanup responsibility of the state under current state statute.

- **No further action at any future time** (i.e., release of responsibility for responsible party). IL

- **Don't know** - WA

41. Are NFA criteria or considerations different for sites impacted by BTEX versus M*t*BE?

- **No** – AL, AK, AZ, AR, CT, FL, GA, HI, ID, IL, IN, KS, KY, LA, MD, MA*, MI, MN, MO, MT, NE, NV, NH, NJ, NM, NY, NC, ND, OH, OR, PA, RI, SC, SD, TN, UT, VA, VT, WI, WY
- **Yes –** CO*, DE*, IA*, ME*, MS, OK*, TX*, WV

CA MTBE is more mobile and less biodegradable than BTEX, so there is less uncertainty about the fate and transport of BTEX.
CO* Under the proposed implementation of proposed standards, the property boundary would not be considered a point of exposure for oxygenates only.
DE* Not necessarily trying to clean up to a specific action level for MTBE, since most of the oxygenate action levels are based on aesthetics.
IA* MTBE is not evaluated for risk (i.e. NFA criteria do not exist for this chemical.)
ME* Benzene has a lower DW standard.
MA* Both must satisfy the requirement to pose "no significant risk of harm" to receptors for now and the foreseeable future.
OK* MTBE must be a threat to a receptor.
TX* Concentrations of BTEX must meet closure standards, whereas MtBE is only considered when there is an impact or imminent threat of impact to a drinking water well.
WV Since WV has no standard for MTBE in LUST, a site w/GW or soil contamination (MTBE) but not BTEX/TPH, will be closed (NFA).

- **Don't know** – WA

43. Does your UST program have any requirements/mechanisms for long-term management of petroleum hydrocarbon residual contamination (BTEX, TPH, or oxygenates) left in place at UST remediation sites?

- **No** - AR, CO, GA, MS, MT*, NE, NV, ND, OK, RI, SD, TX*, WV, WI*
- **Yes** - AL, AK, AZ, CA, CT, DE, FL, HI, ID, IN, IL, IA, KS, KY, LA, ME, MD, MA, MI, MN, MO, NH, NJ, NM, NY, NC, OH, OR, PA, SC, TN, UT, VA, VT, WY
- **Don't know** - WA

- **Institutional controls** (deed restrictions/notice to deed, etc) - AL(option for owners), AK, AZ, CT, DE, FL, ID, IL, IN, IA, LA, ME, MA, MI, MO, NH, NJ, NY, NC, OH, OR, PA, TX*, UT, VT

- **Regional or local land-use restrictions** (e.g., zoning) - AK, AL(zoning considered during RBCA eval.), CT, DE, IL, IN, IA, MI, NY, OH, UT

- **Site tracking database** - AL,AK, AZ, CA, CT, DE, FL, HI, ID (for institutional controls), IL, IN, IA, KS, MA, MI, MN, NJ, NM, NY, SC, TN, UT, VA, VT, WI, WY

Other:

DE Some sites will get deed restrictions or deed notices, some may get incorporated into a GW management zone (rare). Our well-permitting group has our database.

HI Exposure Prevention Management Plan.

IL Engineered barriers.

IA Notifications to utility companies (water and sanitary sewer) and to IDNR Water Supply Section/County well permitting authority.

KY RBDM sites may possibly have institutional controls.

ME Notification to Dept. of Transportation of contaminated soil left under a road.

MD Closure letter may require soil management plan if excavation activities take place at the site.

MA Temporary closure requires reevaluation w/in 5 yr intervals. Feasibility to achieve permanent closure.

NY Inactivated soil sites are classified as "Closed-Meets standards" or "Closed-Doesn't Meet Standards."

PA Engineering controls.

SC Registry of Releases lists all properties with contamination above action levels but with no documented risk to human health. Properties are listed on the Registry by county,

UST permit number, street address, tax map number, and latitude/longitude for the facility.

TN Public Participation Notice.

VA The DEQ has a GIS system that persons can access through our Web page that shows the locations of all leaking storage tank cases that have been investigated by the agency.

WY We'll continue MNA for a reasonable period of time until standards are achieved or a new release is discovered to restart the remediation process.

MT* We have no post-closure management approach other than a reopener clause should contaminated soil be exposed at a later time, creating a completed exposure pathway.

TX* ICs may be used as part of a corrective action, which would allow levels of contamination to be left above those for a site for which closure is given without ICs. ICs are not used very often.

WI* Listing only on site data base; no long-term management.

44. If your UST program does require long-term management of residual petroleum hydrocarbon contamination left in place or beyond NFA, is it:

- **Required for all sites?** AK, IL, MA, MN, NM, NY, VT
- **Required only for specific types of sites?** AZ, CT, ID, IA, KY, LA, MD, MI, MO, NH, NJ, NC, OH*, OR (exceeding applicable pathways), PA, UT
- **Required only for RNA or monitoring only sites?** TN, WY
- Required only for Groundwater sites? KS

Other:

AL We use mechanisms rather than requirements.

CO No monitoring required beyond NFA.

DE If we specify in the NFA letter, we can require prior notification of any future digging on site, with a soils management plan to be approved by the Department in advance.

FL Required only for those sites that received conditional NFA because contaminants remained in the soil or GW and the RP decided to use institutional controls in lieu of continuing the cleanup.

HI Options are NFA (Tier 1, 2, or 3) or Exposure Prevention Management Plan.

IN Required when institutional controls are used.

KS Once NFA, then no long-term monitoring.

ME Voluntary remediation program.

OH* These mechanisms are not required, but they are allowed when proposed by an RP/consultant.

SC Additional sampling and reporting of the existing monitoring well network is at the option of the tank owner.

TX Once closure is granted, no further monitoring is required.
VA The GIS showing all release sites is not mandated; however, it is something that DEQ maintains to provide information to the public.
WI Listing only on site data base; no long-term management.

Don't know – CA, WA

45. Do you think that your UST/LUST program's current or available mechanisms for long-term management of residual contamination are sufficient to protect receptors from potential future exposure?

- **Yes** – AL, AK, AZ, CA, CO, CT, DE (in most cases), FL, HI, IL, IN, KS*, LA, MA, MI, NV, NH, NJ, NM, NY, ND, OH, OK, OR, PA, RI*, TN, UT, VA, VT, WI, WY

- **No** – AR, IA (in some cases, yes, but not all), GA, ME, MD, NC

- **Don't know –** ID, KY, MN, MO, MS, MT, NE, SC*, TX, WA

KS* Probably. They do pass RBCA and our water receptors get routine analysis long term.
RI* Sites are not closed if future risks are possible; the GW standard must be met.
SC* Procedures appear to be working with no major problems, but too early to determine.
SD Have no mechanisms.

46a. Is additional long-term management guidance or legislation planned?

- **Yes** – FL, MI, MO, MT, NY, TN

- **No** – AL, AK, AZ, AR, CA (not by state water board), CO, DE, GA, HI, ID, IL, IN, KY, LA, ME, MD, NE, NH, NJ, NM, NC, ND, OH, OK, OR, PA, SC, SD, TX, UT, VA, VT, WI, WY

- **Maybe** - MS

- **Don't know –** CT, IA, KS, MA, MN, NV, RI, WA, WV

46b. If yes, what is the anticipated time frame for implementation?

FL We periodically reconsider and modify all our published guidance. The answer of "yes" to this question is not particularly more significant than many other guidances we expect to revise or revisit over the next year.

MI, **MT** 1-2 yrs.

MO We anticipate part of the RBCA guidance to be completed soon, and it will be implemented in the near future.

NY Don't know. Pending legislative action.

TN Don't know.

IX. Vapor-Intrusion Pathway

Context: DRAFT EPA guidance for evaluating the Vapor-Intrusion Pathway (November 29, 2002) has been published for comments and review from http://www.epa.gov/correctiveaction/eis/vapor.htm.
The Guidance is suggested for use at Brownfields, RCRA Corrective Action, and Superfund sites for evaluating the Environmental Indicators. The guidance is specific in stating that it should not be used at UST/LUST sites; however, Indiana and Pennsylvania have incorporated earlier versions in draft guidance for evaluating the pathway at all sites.

47a. Does your state have guidance for evaluating the vapor-intrusion pathway?

- **Yes** - AK (draft), AL, AR, CO, CT, GA, ID, IA, LA, ME, MA, MI, MN, NE, NH, NJ, NY, OK, OR, PA (draft), SC, SD, TN, WI, WY

- **No** – AZ, CA(vapors are primarily addressed at the local level), DE, FL, HI, IL, IN, KS, MD, MO, MS, MT, NV, NM, NC, ND, OH, RI, TX, UT, VA, VT, WV

- **Don't know** - DE

DE Superfund is currently evaluating several sites under the draft EPA Guidance.

GA It is part of the UST rules and guidelines, not separate.

KY For questions 47-49, contact Fazi Sherkat at (502) 564-6716 for Brownfields/Superfund responses and Mike Welch at (502) 564-6716 for RCRA responses.

MD Draft in development for LUST sites.

WA Work in progress. Contact Hun Seak Park, (360) 407-7189, hpar461@ecy.wa.gov.

47b. If yes to 47a, is the guidance applicable to UST/LUST sites?

- **Yes** – AK, AL, AR, CO, CT, GA, ID, IA, LA, ME, MA, MI, MN, NE, NH, NJ, NY, OK, OR, PA, SC, SD, TN, WA, WY

- **No** - DE
- **Sometimes** - WI

KS Probably not for UST because of background issues, but we do it on our own if we suspect a potential problem.

47c. If yes to 47a, is the guidance applicable to other programs?

- **Yes** – AK, AL, CT, LA, MD, MA, MI, NE, NH, NJ, NY, OR, PA, SC, SD, WA, WI
- **No** – DE, GA, ME, WY
- **Don't know** – AR, CO, ID, IA, MN, OK, TN

If yes, please list other known programs.

MD Brownfields and VCP programs consider vapor intrusion pathway.
MA State superfund, RCRA, and Solid Waste.
MI Part 201, Environmental Remediation.
NE Any petroleum cleanup.
NJ All other sites undergoing cleanup in the state.
NY Hazardous waste.
OR Environmental Cleanup Program (i.e., state superfund, site response, voluntary cleanup, and independent cleanup programs).
PA Voluntary cleanups.
SC Bureau of Water uses the same guidance document for assessment of petroleum from surface spills, releases from unregulated USTs, and aboveground storage tanks.
SD Superfund, Brownfields.
WI Wastewater, solid waste.

47d. If yes to 47a, is your state considering revisions to its vapor-intrusion pathway guidance?

- **Yes** – AK (still being developed), AL, CT, ID, LA, MA, MN, NH, NJ, NY, OK, OR, SC
- **No** – AR, CO, GA, IA, ME, NE, PA (guidance that is in draft should be final this summer), SD, WA, WI, WY
- **Don't know –** DE, MI

If yes, what is the anticipated time frame for revisions?

AL-Awaiting EPA guidance & other pertinent guidelines; **CT, OK –** Soon; **OR** – Public comment through May 15, 2003; **ID** Next 6 months. **LA** – Fall 2003. **MA** – end of 2003.

NH – 1-2 yrs. **NY** – Don't know. The guidance documents are in draft form and were being developed by the NYS Dept. of Health. **SC** - Within a year after EPA finalizes current draft vapor intrusion documents.

48. If no to 47a, is your state considering implementing vapor-intrusion pathway guidance?

- **Yes –** FL, IN, KS (but will exempt USTs), MD, TX, VA
- **No** – CA, DE, HI, IL, NM, ND, OH, UT, VT
- **Don't know** – AZ, AR, MO, MT, NV, NC, RI, WV
- **Maybe** - MS

If yes, what is the anticipated time frame for implementation?

DE, TX – Don't know. It is under evaluation.

FL Late 2003. I expect the initial guidance will be labeled as draft or interim as the published literature on evaluating this pathway was not established as a clear consensus as to the most appropriate procedure. We anticipate we will continue to revise our interim procedures as more info becomes available on the evaluation of this pathway.

IN Draft language should be completed in 2003.

KS Soon. **MD** – Late 2003.

MT Currently receiving EPA training on vapor intrusion.

VA This is something we are working on; however, additional guidance from EPA regarding the indoor air pathway of exposure to petroleum constituents is needed.

49. If state guidance exists on the Internet for the vapor-intrusion pathway, please provide the Web address:

AK Not available yet.

AL www.adem.state.al.us Look under Water Division, UST program, ARBCA Guidance.

CO http://oil.cdle.state.co.us/

CT www.epoc.org

IA www.iowadnr.wmad.org/lqbureau/ust/rbca.html

GA It is scattered through our guidance documents and other requirements are meant to build in a safety factor against vapor intrusion problems, such as our requirement to remove free product. Our rules and guidance documents can be found at http://www.dnr.state.ga.us/dnr/environ/

LA www.deq.state.la.us/technology/recap/recapfiles

MA www.mass.gov/dep/bwsc/files/standards/GW2/GW2.htm.

NE www.deq.state.ne.us – publications – LUST/RA – Guidance documents – RBCA

NH Part of our guidance is at www.des.state.nh.us/orcb/doclist/draft.pdf

NJ www.state.nj.us/dep/srp/ "Vapor Intrusion Pathway – Indoor Air Guidance"

OR www.deq.state.or.us/wmc/tank/rbdm.htm. Proposed changed can be reviewed at: www.deq.state.or.us/wmc/tank/rbdm-tph.htm

SC www.scdhec.net/eqc/admin/html/eqforms.html#ust

SD www.state.sd.us/denv/des/ground/lookuptables/lookuptables.htm

TN www.state.tn.us/environment/ust

X. Miscellany

50a. Has your state found any compatibility/functionality issues with the storage and use of gasolines that contain the various oxygenates?

- **Yes** – CA, DE*, NV
- **No** – AR, CO, FL, IN, LA, ME, MD, MN, NH, NJ, NM, ND, OK, RI, SC, SD, UT, VA, VT
- **Don't know -** AL*, AK, AZ, CT, GA, HI, ID, IL, IA, KS, KY, MA, MI, MO, MS, MT, NE, NY, NC, OH, OR, PA, TN, TX, WA, WV, WI, WY

AL*, **DE*** **-** We don't know if oxygenates are the cause of the failures we are seeing.

50b. If yes, please describe.

CA MTBE incompatibility w/ automatic tank gauging w/capacitance technology.
DE Elongation of flexible piping.
NV Anecdotal evidence suggests material incompatibility w/MTBE and fiberglass and rubber-type components. Several fiberglass USTs fell apart during removal. Other releases were tracked to fatigued single-walled fiberglass piping that failed as a hairline crack. Other failures have been observed also.

51a. Are you finding oxygenate contamination that you are unable to attribute to an UST release (e.g., AST, auto accident, lawn mower)?

- **Yes** – AL, AR, CT, DE, IN, IA, KY, ME, MD, MO, MT, NV, NH, NJ, NY, NC, OR, RI, SC, SD, VA, VT, WV
- **No** – AK, CO, FL, HI, LA, MA, MN, NM, ND, TN, UT, WY
- **Don't know –** AZ, CA, GA, ID, IL, KS, MI, MS, NE, OH, OK, PA, TX, WA, WI

51b. If yes, have you documented the sources and are they significant?

AL Don't know the source yet.
AR Persistent 1-2 ppb in surface waters, presumably from environmental washout.
CT Frequently surface spills due to accidents, sloppy housekeeping.
DE General low ppb concentrations statewide, not in proximity to any gasoline storage facility. Traffic accidents, sloppy gasoline handling. Many UST sites where the entire system tests tight, but MTBE is discovered in GW.
IN One significant case in Roselawn where a public water supply well is impacted, there is a private well that has impacts from an unknown source not related to the LUST. It is likely from a small spill in the area, possibly from auto maintenance or a lawnmower spill.

IA We've documented one case where MTBE was found in a private DW well. Source was traced to an AST.

KY Contact Jeff Pratt, KY Division of Water, at (502) 564-3410 for specific instances.

ME We have documented auto accidents, lawn mower and AST releases, and UST overfills. They are significant. We lost two public wells due to UST overfills; twenty-four private wells were contaminated by an auto accident.

MD MTBE impacts above 10 ppb have triggered source investigation in areas with no known UST release.

MO There are several AST releases throughout the state.

MT Numerous AST sites statewide.

NV Some have been traced to ASTs. The most significant release was traced to piping related to a vapor recovery and compression system at a fuel terminal.

NH Auto repair and wrecker companies, junk yards, residential dumping of gasoline, auto accidents, use of gasoline for brush pile burning.

NJ No, sources are unknown.

NY We have sites where MTBE impacts to DW supply wells were attributed to surface spills.

NC ASTs, auto accidents, some heating oil tanks.

OR Surface spills.

RI Sources suspected are not documented (e.g., road runoff) and contamination levels are not high.

SC We have documented two cases where gasoline was used to kill insects and the gasoline entered a potable water supply system. Gasoline vapors have been found in residences where gasoline was stored.

SD Sometimes they are associated w/ASTs.

VA Staff have observed MTBE contamination resulting from releases from ASTs containing gasoline and encountered MTBE in GW where there were no apparent sources in the vicinity.

VT Several sites w/ no documented source, leaking auto gas tanks, auto accidents.

WV Lawnmower or garage storage – not significant.

52a. Has your program documented any trends of oxygenate impacts in soil or groundwater from UST facilities where a product release has not been confirmed?

- **Yes** – CA, CT, DE, MD, MA, NH, RI, VA
- **No** – AL, AK, AZ, AR, CO, FL, HI, ID, IL, IN, LA, ME, MI, MN, MO, MS, NE, NV, NJ, NM, NY, ND, OH, OK, SC, SD, TN, UT, VT, WV, WI, WY
- **Don't know** – GA, IA, KS, KY, MT*, NC, OR, PA, TX, WA

MT* We have not looked for oxygenates at non-leaking facilities.

52b. If yes, what are the suspected mechanisms (e.g., vapor releases)?

CA Vapor releases.
CT Incidental surface spills on porous asphalt or cracked concrete.
DE Vapor releases, leaky sumps around pumps, no sumps under dispensers.
MD Spills during delivery and dispensing and vapor losses from the tank top, boat and auto repair, and auto salvage operations.
MA On-site migration – vapor release, indoor air.
NH Vapor releases have been documented in a number of cases.
RI Vapor releases, leaking sumps, housekeeping.
VA Staff have observed sites where MTBE vapors from state II vapor recovery systems caused MTBE contamination in GW at the site.

53a. Does your program perceive oxygenates other than M*t*BE to be:

- **A current problem?** – CA, DE*, MD, MT, NJ, NY
- **An impending problem? –** DE**, MD
- **A potential or unknown problem? –** AL, AK, AZ, AR, CO, CT, DE***, FL, GA, HI, ID, IN, IA, KS, KY, LA, ME, MA, MI, MN, MO, MS, NE, NH, NM, OK, PA, RI, SC, TN, TX, UT, VA, VT, WA, WV, WI, WY
- **Not a problem? –** ID, IL, NV, NC, ND, OH
- **Don't know** - SD

AK Haven't done analysis yet statewide. Found some in Fairbanks.
DE TBA, TAME), **ethanol, possibly DIPE, ETBE, ***depends on what they might pick to replace MTBE.
FL The results of our study on the occurrence of oxygenates indicated that though other oxygenates do appear occasionally at sites, they are not at concentrations of great concern compared with BTEX and MTBE. On this basis, we have not proposed the routine analysis for those other oxygenates, as such analysis would have a significant financial impact. The results of the limited survey were not conclusive enough , however, to respond categorically that other oxygenates are not a problem.
MT We know these oxygenates exist in GW at our LUST sites. But we have not begun comprehensive testing.

53b. If oxygenates are considered to be a current or an impending problem, what kind of information could your program use to better deal with oxygenate issues (e.g., compatibility, leak detection, remediation technologies, site characterization, costs)?

AL Clear information on physical/chemical characteristics. Need health-based data.

AK We need to analyze the issues and check sites.

AZ Remediation technologies, site characterization.

CO MCLs, toxicological data to develop our own standards, site characterization issues, remediation technologies.

DE All of the above, plus health information and chemical and physical properties.

FL Better information on what goes on at refineries and blending facilities as these oxygenates seem to appear in a somewhat random fashion at sites. It seems inappropriate that states are grappling with issues of whether they should spend hundreds of thousands or millions of dollars on additional sample analysis for oxygenates when there is little or no info available on what petroleum companies and blending and distribution networks are doing that results in the oxygenates appearing in gas and ultimately in GW at LUST sites in various areas of the country.

ME We need better health standards so we will know how to respond to detection of oxygenates besides MTBE.

MD EPA guidance on what GW concentrations of these oxygenates EPA will support an EPA UST/LUST-program-approved state permitting U.S. citizens to consume in their water. EPA has issued specific guidance requiring the full horizontal and vertical delineation of these oxygenate plumes but has not provided guidance to the states on what level of effort on receptor protection is needed.

MA Some chemicals require notification if they exceed concentration Thresholds Reportable Concentrations in soil and GW. DEP does not have cleanup standards promulgated. This means that the LSP must perform a risk assessment to determine risk and appropriate cleanup levels and allowable site use in the future.

MO We will need info such as: physical and chemical characteristics of the oxygenate (e.g., mobility, solubility, toxicity, Henry's law constant, degradability) in addition to the above list.

MT Toxicology of the other compounds; coordination w/federal/state DW groups to detect oxygenate occurrence in DW; better tools for site characterization; improved leak prevention/better leak detection systems.

NE Site characterization, analytical methods, daughter products—it is only an unknown or potential problem at this time—not enough data yet.

NH Cleanup standards are the key issue. We can't evaluate the problem without understanding what safe contaminants are.

NJ Information on vapor releases impacting GW; testing methods for spill buckets and piping sumps; new information on technologies and site characterization.

NY Cost-effective remedial solutions, health-based cleanup standards, recommended analytical methods.

OK We need more conclusive toxicity data on each of the oxygenates.

RI Standards.

SC If EPA would issue advisories for taste and odor thresholds for other oxygenates, states might adopt these or other risk assessment values.

UT Leak detection, remedial technologies, characterization, toxicology of oxygenates.

VA We need toxicological info (e.g., slope factors/reference doses) so that we can evaluate risks from these oxygenates and determine appropriate cleanup levels.

VT Toxicity, DW treatment, fate and transport.

WA We need toxicity data from EPA!

53c. If oxygenates are not perceived to be a problem in your state, please explain why not.

GA The extent of their occurrence in GW at UST sites in GA is still unknown, and there are no enforceable health-based standards for any of them. Without an enforceable standard, it will be difficult, if not impossible, to require their analysis and reporting to EPD, and without a health-based standard, the risk posed by oxygenate-contaminated sites to human health in GA is impossible to determine.

ID Use is down, numbers of problem oxygenate sites is low and trend is down, cleanups are not any more complicated than BTEX sites.

IL We have not seen a problem at this point.

IN Tests for VOCs have only shown TBA detections in one instance. No other oxygenates are being found.

IA Excluding MTBE, the other analyzed oxygenates are found at low levels and at a very low percentage of sites. Because we have not tested or looked for some oxygenates (e.g., ethanol), it is unknown whether a problem exists.

MI Again, Michigan has never received significant amounts of RFG and oxygenate issues, while occurring occasionally, are not generally significant drivers in remedial activities.

MN The primary oxygenate used in MN is ethanol. The human risks associated with ethanol are very low. Also, ethanol degrades very quickly.

NV From what we see at release sites, MTBE is the primary oxygenate historically. MTBE was replaced by ethanol several years ago. The other oxygenates (except TBA) seem to be in very low concentrations only at some sites and tend to remediate with the other constituents. We have not yet focused on ethanol. Many of our sites employ in-situ bio as part of the remediation effort. As such, ethanol would be remediated with the other constituents.

ND Ethanol is the oxygenate of choice in ND; ethanol will degrade naturally if released into the environment.

NC We haven't seen any circumstances where oxygenates are driving cleanups. Hopefully, these contaminants are getting cleaned up with the BTEX.

OH Oxygenates are not required in high amounts in this state. MTBE does not drive our cleanups, and oxygenates don't appear to be a big problem.

VT Low levels, chemical properties.

WY Oxygenates are not required in gasoline blends in WY.