Lemberger Transport and Recycling and Lemberger Landfill Array Briefing

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AGENDA

- Site History
- Nature and Extent of Contamination
- Conceptual Site Model
- Site Risks
- RAOs, PRGs and ARARs for Site
- Proposed Remedial Alternatives
- Community/State Perspective
- Feedback from Panel

FOIA Exempt/Deliberative Process/Attorney Work Product

Site History

- Two sites – Lemberger Landfill (LL) and Lemberger Transport and Recycling (LTR)

LL

- 21 acre gravel pit used as township dump and sanitary landfill (1940s-70s)

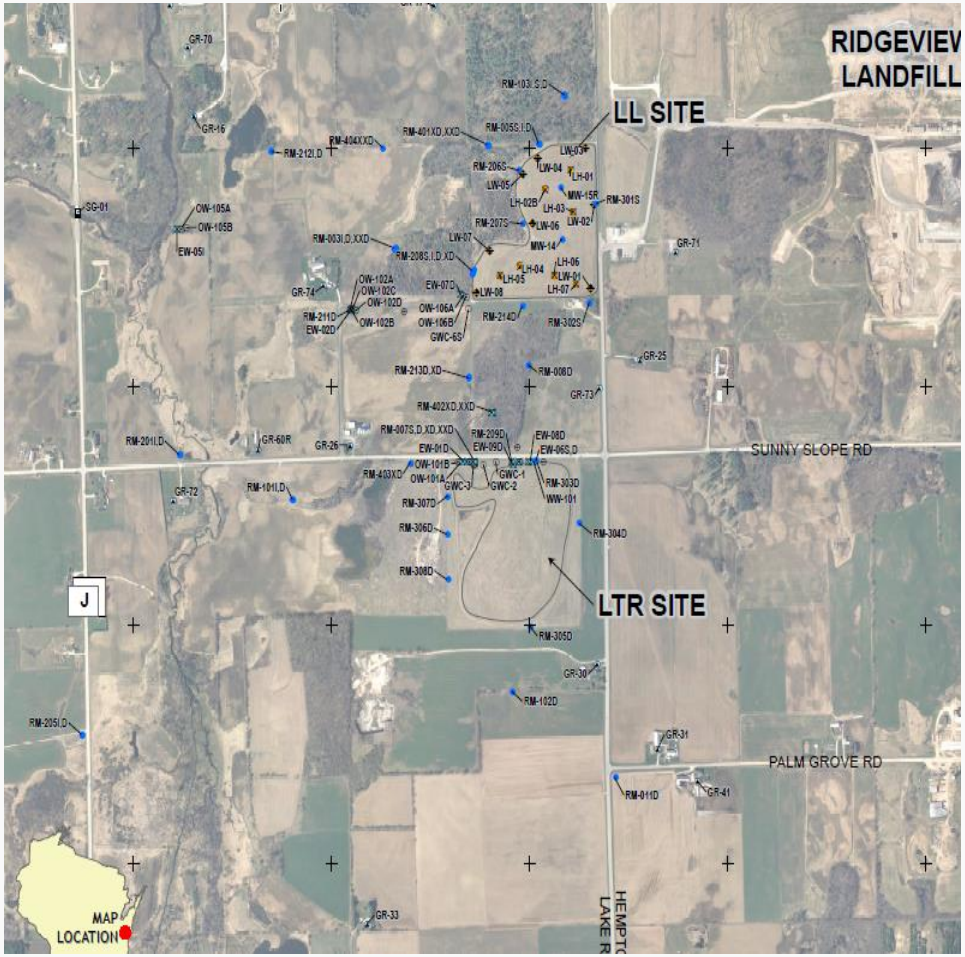
LTR

- 16 acre unlined disposal area (1970-1976)

Placed on NPL in 1984

Residential use of groundwater

- Groundwater flow toward Branch R.
- VOCs detected in wells
- Residential wells sampled detected high VOCs in 7 wells –
- these were replaced with deeper wells



Site History OU1

Due to the complex conditions at the Lemberger sites, the work was divided into two OUs. OU1 addressed the groundwater contamination resulting from both sites as well as source contamination at the LL site. OU2 addressed source contamination at the LTR site. The ROD for OU1, signed in 1991, included the following:

- installation of extraction wells and a groundwater treatment system to restore groundwater in the upper and lower aquifers;
- construction of a Subtitle D landfill cap per State of Wisconsin landfill closure regulations for the LL site;
- construction of a slurry wall around the perimeter of the LL;
- installation of leachate withdrawal wells in the interior of the LL and a leachate storage system with transport of leachate to a publicly owned treatment plant;
- construction of an outfall pipe from the on-site groundwater treatment plant with final discharge to the Branch River;
- construction of a six-foot security fence around the LL and the groundwater treatment facility;
- a contingency plan to provide an alternative water supply to any residential well owners, whose water supply is disrupted by the pumping; and
- ICs and monitoring

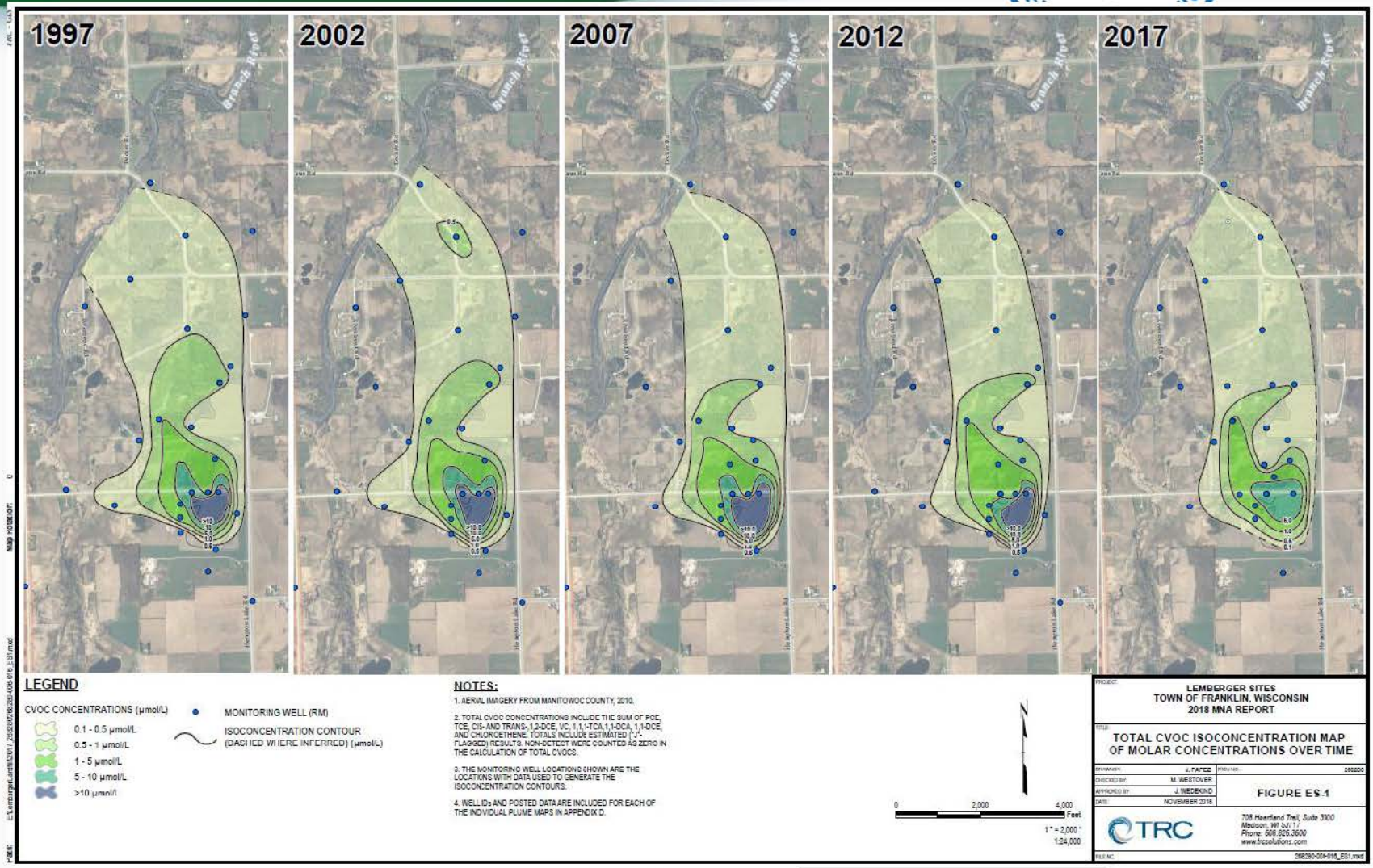
Site History OU2

A source control action for the LTR site was not included in the 1991 ROD because further characterization was required. LTR site warranted emergency removal actions. In July 1993, EPA signed an AOC with the PRPs to perform removal activities at LTR. Removal activities required by the AOC included:

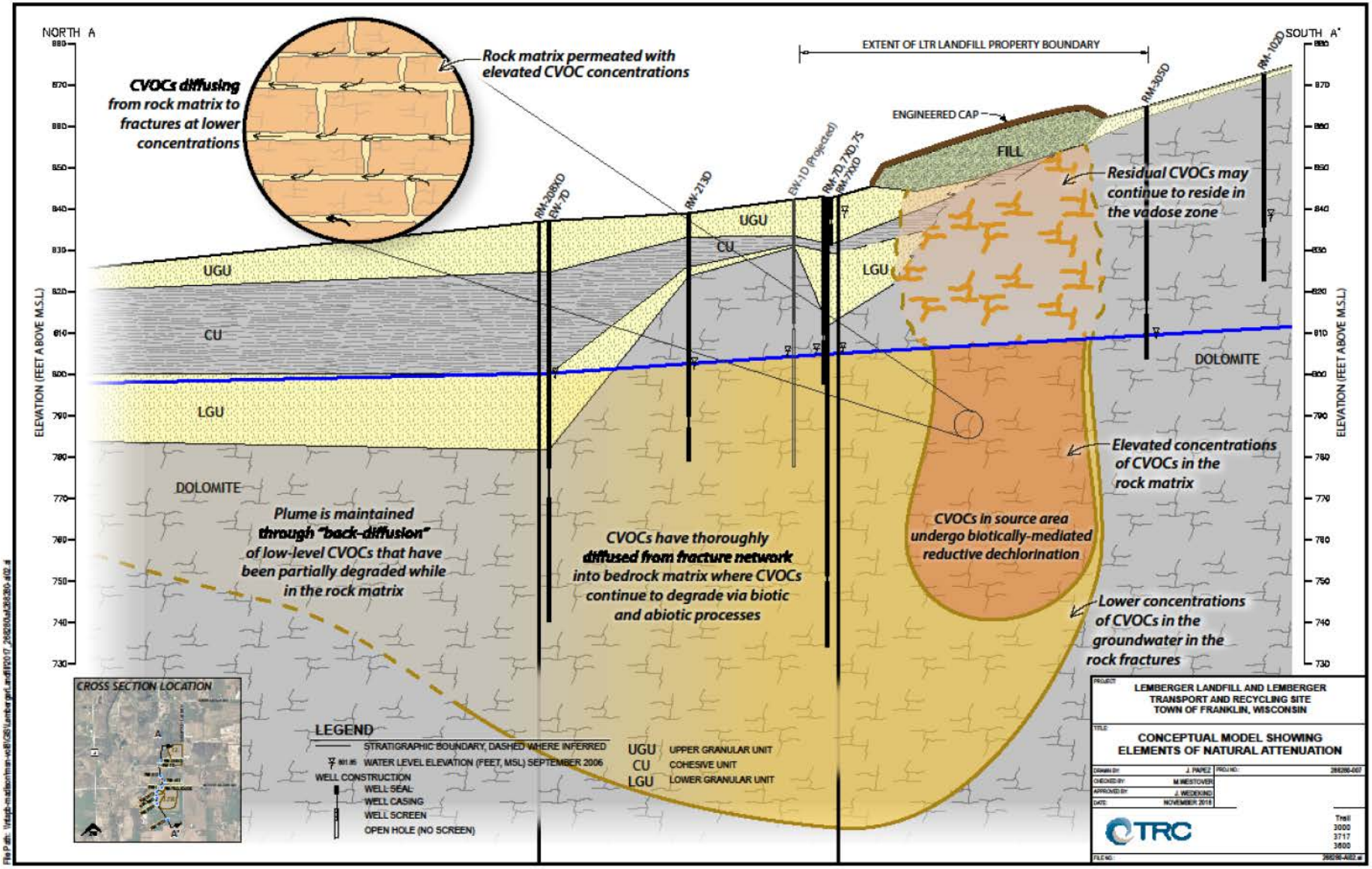
- construct a site fence around the perimeter of the LTR;
- conduct a geophysical survey to delineate areas that could contain buried drums;
- excavate and dispose of drums;
- Dispose of other wastes and contaminated soil;
- use soil vapor extraction to treat contaminated soils adjacent to the drums and identified landfill hotspots (this was determined not needed); and
- submit a work plan to install a vapor extraction system for further source removal and, at a minimum, a Subtitle D landfill cap per State of Wisconsin landfill closure regulations.

In September 1994, EPA subsequently issued a ROD for the LTR source control (OU2) which recommended no further action because it was determined that, once all removal activities required by the AOC were complete, there would be no further risk at the LTR.

Nature and Extent of Contamination



Conceptual Site Model



Site Risks

- Exposure to drinking water through various routes, including direct ingestion, dermal contact (drinking water/shower exposure) or inhalation of VOCs in the groundwater by residents or others using contaminated groundwater;

- Direct contact with, or ingestion of contaminated soil by site workers, farmers, hunters or trespassers; and

- Indicted exposures to contaminants from ingestion of animals that feed on contaminated crops (current and future).

Remedial Action Objectives

Ground Water

- Prevent the ingestion of ground water with contaminant concentrations greater than a level associated with a 1 x 10^6 excess cancer risk level, a noncarcinogenic health hazard, the USEPA MCL, the USEPA MCLG, or the Wisconsin Preventive Action Limit (PAL), whichever is lowest;

- Prevent the migration of contaminants within the ground water to prevent further degradation of the lower groundwater system;

Soils

- Prevent the ingestion of or direct dermal contact with soils at the LL site with contaminant concentrations greater than a level associated with a 1 x 10^6 excess cancer risk level or a noncarcinogenic health hazard; and

- Prevent the migration of contaminants from the soils and wastes at the LL site that would result in contamination in excess of the ground water cleanup goals.

Cleanup Levels

Cleanup Goals for Chlorinated Volatile Organic Compounds
Lemberger Landfill Sites - 2018 MNA Report

PARAMETER	FORMULA WEIGHT (g/mol)	WDNR 140.10 ENFORCEMENT STANDARD (ES)		
		µg/L	Ln (µg/L)	µmol/L (or µM)
Chlorinated Ethanes				
1,1,1-Trichloroethane	133.396	200	5.30	1.499
1,1-Dichloroethane	98.954	850	6.75	8.590
1,1-Dichloroethene	96.938	7	1.95	0.072
Chloroethane	64.512	400	5.99	6.200
Chlorinated Ethenes				
Tetrachloroethene (PCE)	165.822	5	1.61	0.030
Trichloroethene (TCE)	131.38	5	1.61	0.038
cis-1,2-Dichloroethene	96.938	70	4.25	0.722
trans-1,2-Dichloroethene	96.938	100	4.61	1.032
Vinyl chloride	62.496	0.2	-1.61	0.003

Notes:
g/mol = grams per mole.
µg/L = micrograms per liter.
Ln = natural log.
µmol/L = micromoles per liter.

Site ARARs

- Main ARAR that is affected by changing to MNA is meeting WDNR's Preventative Action Limits (PALs)
- For MNA - recommend to change to WDNR's Enforcement Standards (ESs) which is equivalent to USEPA's MCLs.

Decision to Evaluate MNA

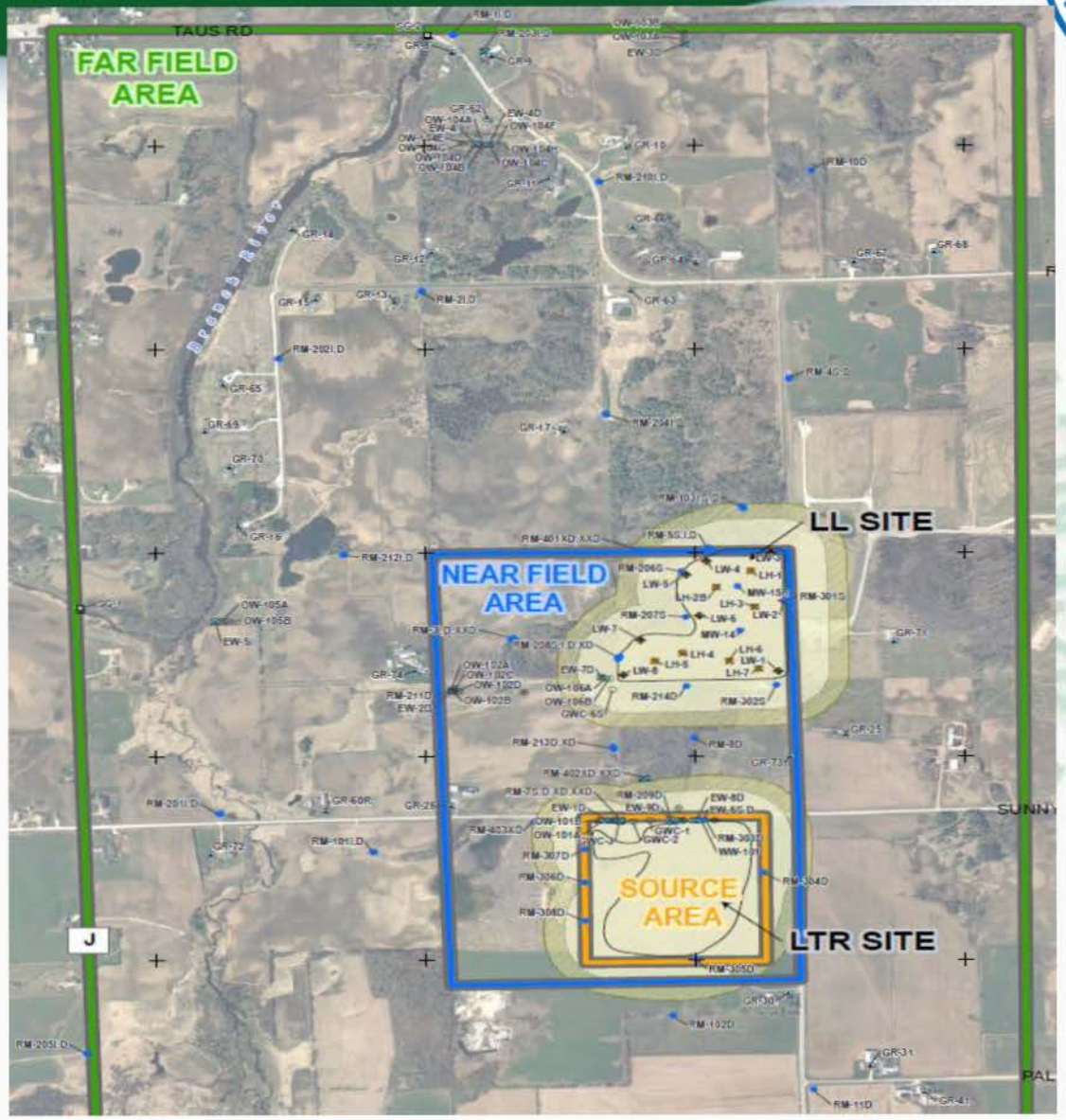
- Pump and treat operated from 1997 to 2006;
- Mass of contaminants was removed by pump and treat; however due to fractured bedrock, CVOC mass could not be reduced any further;
- CVOCs are breaking down due to aerobic and anaerobic processes;
- ICs are all in place and SWRAU was claimed in 2015;
- The maximum vertical extent of contamination is significantly above WDNR Special Casing Area Requirement (min. 250 ft below top of ground for newly constructed wells);
- WDNR issued memo in 2010 stating that – given the measured concentrations of CVOCs in groundwater – no potential impact to aquatic life in the Branch River is expected; and
- Groundwater data collected over more than 20 years shows either stable or reducing contaminant plume.

Two different MNA studies completed – an overall evaluation of MNA (2006-2008) and a near field evaluation of MNA (2013-2015).

MNA as a Remedy

- Need to return contaminated groundwaters to their beneficial use.
- Cleanup levels should be appropriate for the beneficial use and should be attained throughout the contaminated plume, or at and beyond the edge of the waste management area when waste is left in place.
    - Drinking water standard (MCL which is equal to ES).
    - Wisconsin DNR (Wis. Adm. Code § 140.22(3)(b)) Design Management Zone (DMZ) found - specific to the Lemberger sites - that the compliance boundary for meeting the ES is the current property boundaries.
- Cleanup to the “boundary” should happen within a reasonable amount of time.

Well Location Map and DMZs

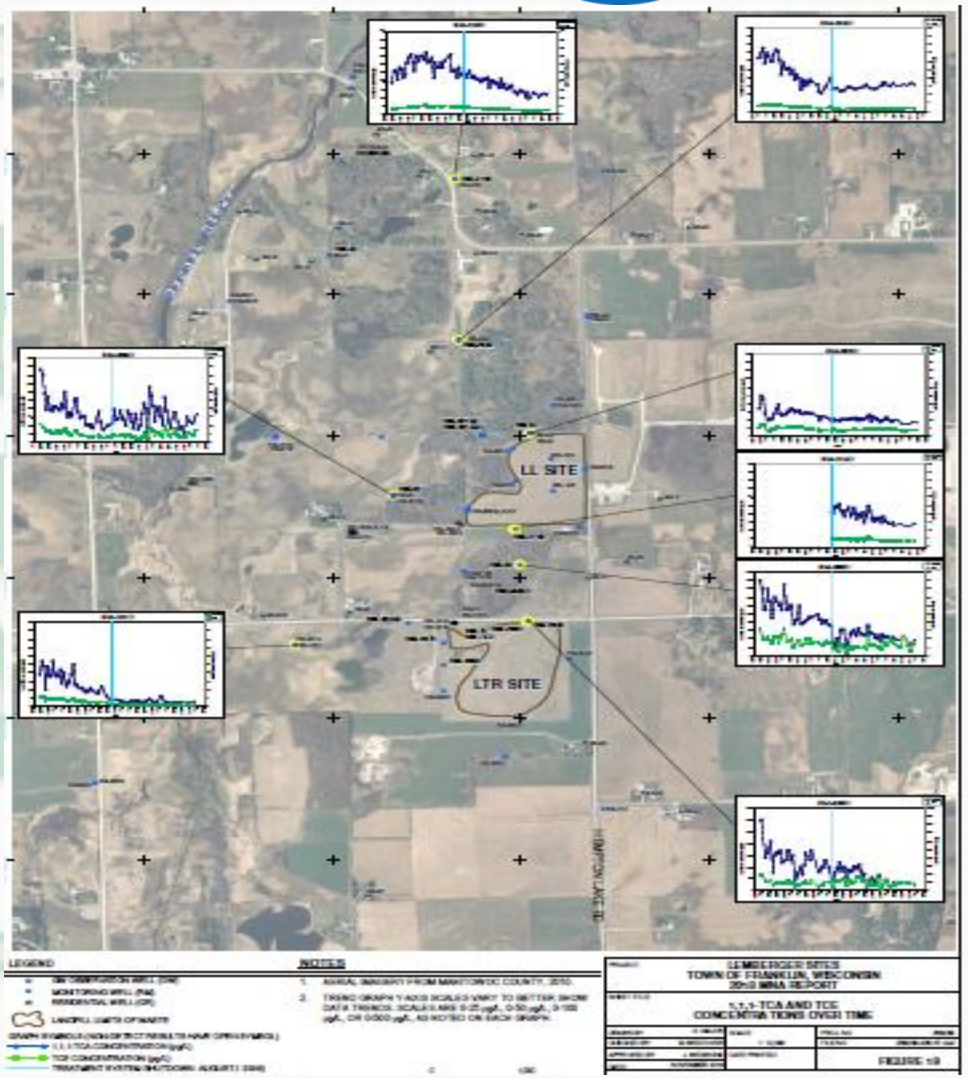


MNA Lines of Evidence

1. *Historical ground water and/or soil chemistry data that demonstrate a clear and meaningful trend of decreasing contaminant mass and/or concentration over time at appropriate monitoring or sampling points. (MUST BE PROVEN)*
2. *Hydrogeologic and geochemical data that can be used to demonstrate indirectly the type(s) of natural attenuation processes active at the site, and the rate at which such processes will reduce contaminant concentrations to required levels. (SHOULD ASO BE PROVIDED)*
3. *Data from field or microcosm studies (conducted in or with actual contaminated site media) which directly demonstrate the occurrence of a particular natural attenuation process at the site and its ability to degrade the contaminants of concern. (MAY BE NECESSARY)*

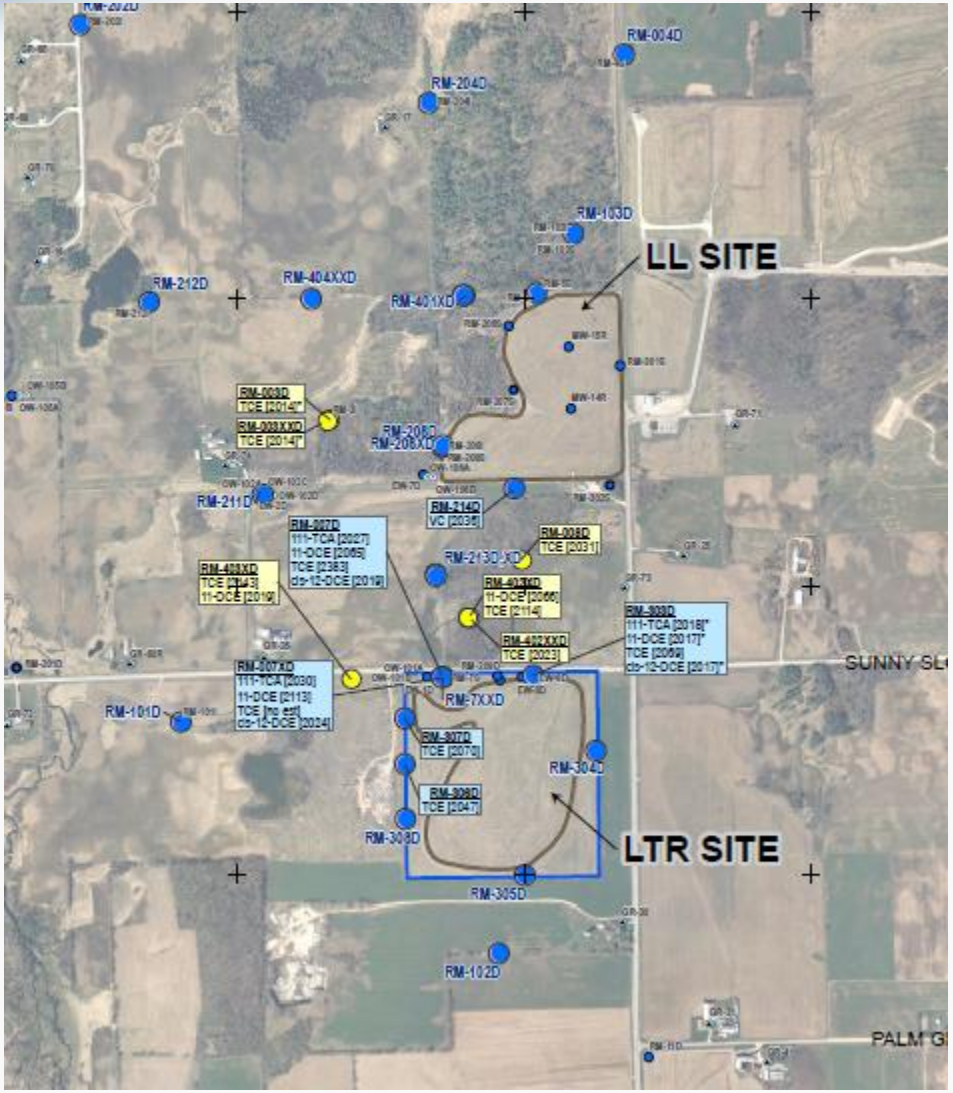
Primary Line of Evidence – Trends in CVOC Concentrations

- Concentration vs. time of CVOCs evaluated at all wells using Sen's Slope and linear regression to estimate time to cleanup at each well using ES numbers.
- Findings are that concentrations of parent compounds have decreased or remained stable at most wells and that TCE has substantially decreased at downgradient wells – that at one time all exceeded the ES.



Trends Analysis Summary

- Blue dots represent no ES exceedance and downward trend
- Yellow dot represents ES exceedance and stable or downward trend



Timeframe to Cleanup

WELL ID	LOCATION	COMPOUND	FULL RANGE		POST SHUTDOWN (August 2006 to Present)		STABLE RANGE**	
			TREND	PREDICTED DATE TO REACH ES	TREND	PREDICTED DATE TO REACH ES	TREND	PREDICTED DATE TO REACH ES
Wells In Current Design Management Zone (DMZ)								
RM-007D	Source Area	TCE	Up	N/A	Up	N/A	Stable to Decreasing [Beginning 1/2014]	2383
		cis-1,2-DCE	Down	2027	Down	2019	--	
		1,1,1-TCA	Down	2030	Down	2027	--	
		1,1-DCE	Down	2046	Stable to Decreasing	2065	--	
RM-007XD	Source Area	TCE	Up	N/A	Up	N/A	Stable [Beginning 10/2014]	N/A
		cis-1,2-DCE	Up	N/A	Stable to Decreasing	2024	--	
		1,1,1-TCA	Up	N/A	Up	N/A	Stable to Decreasing [Beginning 12/2014]	2030
		1,1-DCE	Up	N/A	Stable	N/A	Stable [Beginning 4/2013]	2113
RM-214D [installed in 2006]	Near LL	VC	NI		Down	2036	--	
RM-303D	Source Area	TCE	Stable to Decreasing	2263	Down	2069	--	
		cis-1,2-DCE	Down	2022	Down	2017	--	
		1,1,1-TCA	Down	2020	Down	2018	--	
		1,1-DCE	Down	2019	Down	2017	--	
RM-306D	Source Area	TCE	Down	2018	Stable to Decreasing	2047	--	
RM-307D	Source Area	TCE	Stable	N/A (rebound)*	Up	N/A (rebound)*	Stable to Decreasing [Beginning 7/2013]	2070
Wells in Potential Expanded DMZ								
RM-402XD [Installed in 2012]	Near Field	TCE	NI		Stable to Decreasing	2114	--	
		1,1-DCE	NI		Stable	2066	--	
RM-402XXD [Installed in 2012]	Near Field	TCE	NI		Down	2023	--	
RM-403XD [Installed in 2012]	Near Field	TCE	NI		Stable to Decreasing	2143	--	
		1,1-DCE	NI		Down	2019	--	
RM-003D	Near field	TCE	Down	N/A (rebound)*	Stable	N/A (rebound)*	Stable to Decreasing [Beginning 6/2011]	2014
RM-003XXD [Installed in 2012]	Near field	TCE	NI		Down	2014	--	
RM-008D	Near field	TCE	Down	N/A (rebound)*	Up	N/A	Stable to Decreasing [Beginning 6/2011]	2031

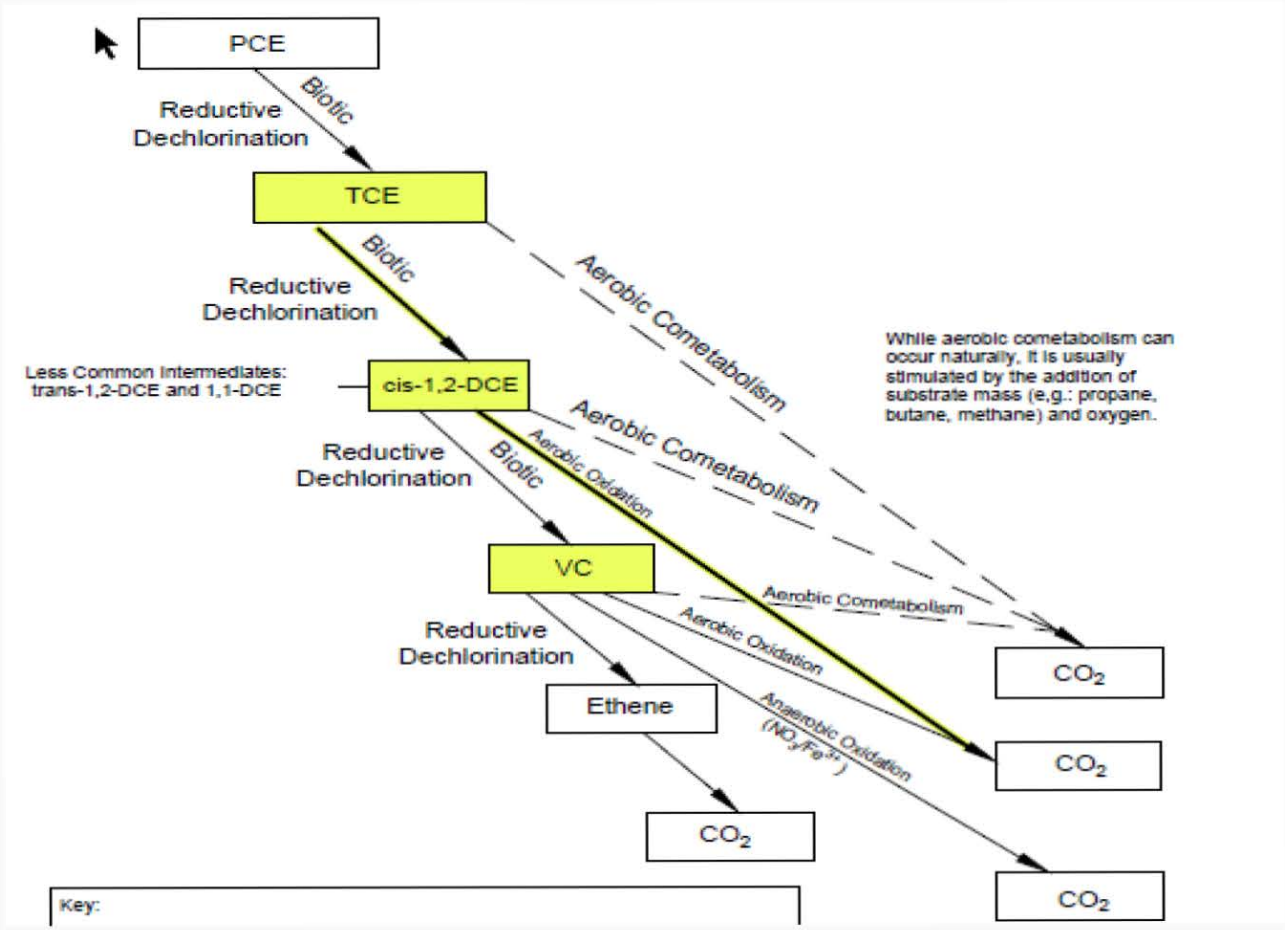
Secondary Line of Evidence - Indirect Evidence of MNA Processes

- Indicator parameters currently in the monitoring program include alkalinity, chloride, sulfate, nitrogen (as nitrate + nitrite), total iron, total manganese, total organic carbon (TOC), and field measurements of pH, temperature, specific conductance, DO, and oxidation-reduction potential (ORP).
- All of the indicator parameters measured at the site are consistent with the general requirements of MNA.

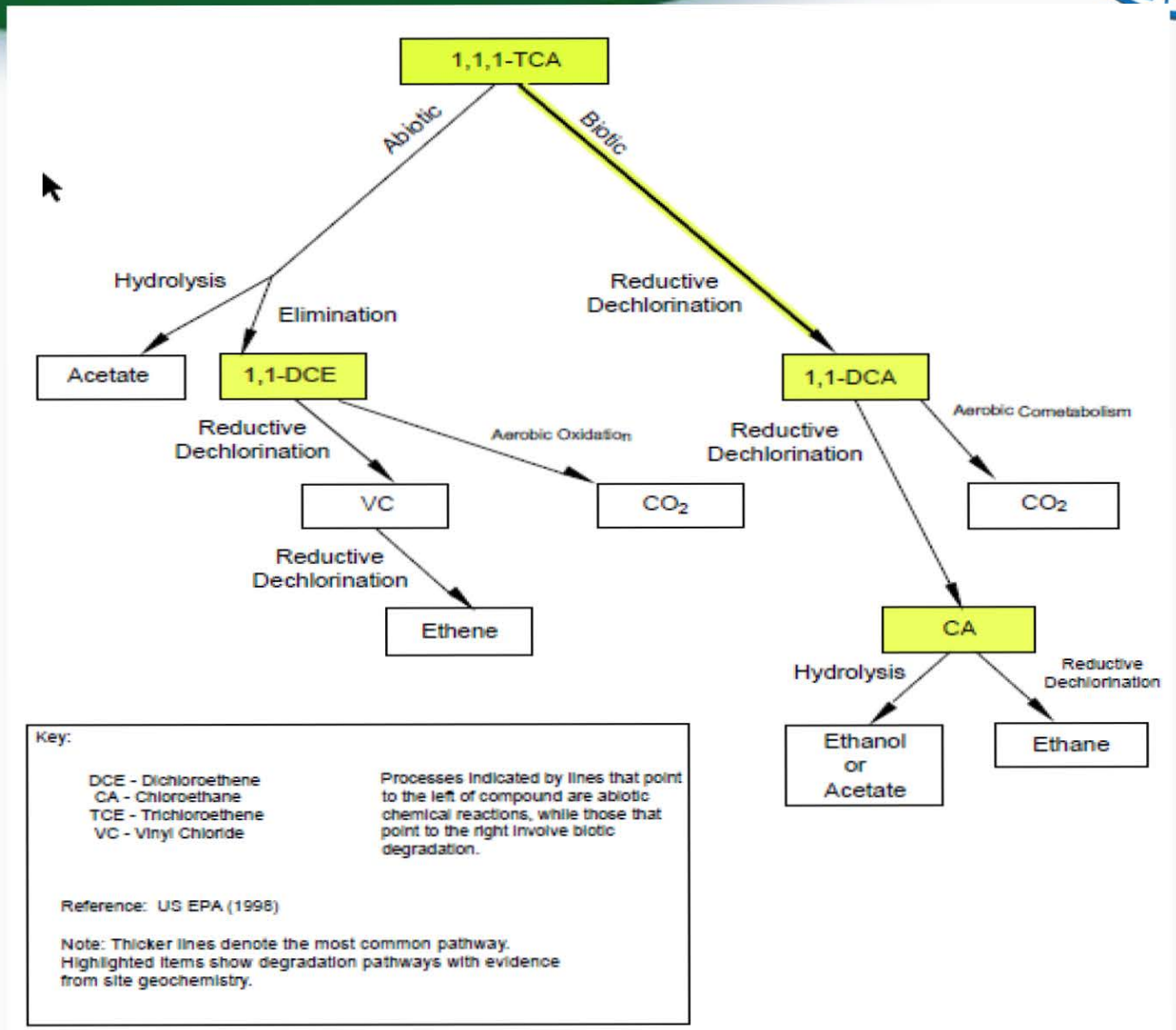
<u>Decay rates</u>

- Two different methods used to calculate decay rates – Buscheck-Alcantar Method and the BIOCHLOR model.
- Both methods showed that decay rates are much higher in the source area than in the downgradient plume – this is consistent with the CSM of biotic decay in the source area and abiotic decay in the rest of the plume.
- This also indicates that MNA is working across the entire site.

Degradation of Chlorinated Ethenes



Degradation of Chlorinated Ethanes



Tertiary Line of Evidence – Microbial Study

- DNA testing revealed that the genera of bacteria associated with 1,1,1-TCA degradation were detected at two wells that were studied around the LTR.
- This bacteria will continue to degrade 1,1,1-TCA where the population is viable, but is limiting to growth in other areas.
- However, other indicators such as the presence of biotically-produced 1,1,1-DCA and cis-1,2- DCE in the plume indicates that reductive dichlorination is occurring.

MNA Future at Lemberger Sites

1. Remove groundwater pump-and-treat as the preferred remedy for CVOCs in groundwater;
2. Incorporate and select an MNA remedy over the extent of the CVOC impacted area;
3. Develop a long-term groundwater monitoring and reporting program;
4. Continue enforcement and monitoring of existing institutional controls within the impacted area; and
5. Develop a contingency plan for identifying in the future suitable responses to unanticipated conditions or performance.

MNA Acceptance

- No community resistance to changing remedy to MNA
- USEPA's Region 5 and HQ experts believe MNA is the correct path forward for sites
- PRPS proposed MNA for the sites