Air Toxics Workgroup
"Consistency With Other States" Discussion Paper — DRAFT
April 10, 2013

ORR (2011) Report Recommendation A-1(7):
R 336.1225 should be amended and specifically include the following:
Make the acceptable exposure limits consistent with other nearby states.

ATW discussion
Discussion with the ATW indicates that some members have concerns for a lack of consistency between MDEQ and the nearby states with regard to the air toxics screening level values and/or averaging times, which can contribute to an un-level playing field. AQD staff committed to developing some information and comparisons to help inform the discussion.

AQD impressions
There are differences between states' air toxics health-based screening levels for several possible reasons, which may be summarized as follows:

1. States may use different target risk level for carcinogens (e.g., 1E-5 vs. 1E-6). WDNR applies a 1E-6 target risk per chemical (and 1E-5 for cumulative risk), while MPCA and MDEQ allow 1E-5 per chemical (see **Table 3** cancer risk values and risk levels).

2. States may use different methods for deriving a benchmark. For example, OEL/100 vs. OEL/42. States have different methods to address (or not address) data-poor situations; see the discussion below.

3. States may adopt their screening levels from benchmarks provided by other recognized sources. Many substances have multiple applicable benchmarks already available from recognized sources, such as EPA-IRIS values, EPA-PPRTVs (from the Superfund program office), ATSDR MRLs, and CalOEHHA RELs, and Texas TCEQ ESLs. The benchmarks available from these sources are often different. A state may review all of those available, or utilize a hierarchy, and choose to adopt any one of these available benchmarks as-is or with modification. States may vary in their choices. Also, states establish their screening levels at different points in time, when different key studies and different benchmarks may be available. Many of DEQ's screening levels were developed in the 1990s and 2000s. See **Table 1** for general hierarchies utilized by States for establishing chronic inhalation screening levels. See the **Table 3** manganese example; the DEQ ITSL is based on the EPA-IRIS RfC (1993), while the MPCA screening level was derived in the 2000s by MDH.

4. Different critical effects may be addressed by the different state's benchmarks. For example, see the styrene example in **Table 3**: DEQ regulates it as a carcinogen, while MPCA and WDNR do not.

5. States may establish acute screening levels in addition to chronic noncancer screening levels. These can be derived by the agency or adopted from a recognized agency source; as with #3 above, such values may differ. There are some widely accepted sources of acute benchmarks: acute inhalation Minimum Risk Levels (MRLs) from the ATSDR; Acute Exposure Guidance Levels (AEGLs) from EPA's National Advisory Committee; and, California OEHHA's Acute Reference Exposure Levels (ARELs). Texas TCEQ also derives acute ESLs.

Occupational Exposure Levels (TLVs, Ceiling Limits, Short Term Exposure Limits) are also used by MDEQ and other agencies to derive acute benchmarks, with the application of an uncertainty factor to help ensure protection of sensitive individuals.

6. States may have different conventions for setting averaging times for their screening levels. **Table 3** has examples of different states having the same screening level value, but different ATs for this reason.

Data-Poor Situations

One of the most significant programmatic differences between DEQ and the other R5 State agencies is in the treatment of data-poor situations for noncancer risk assessment. Based on the recommendations from the 1981, 1989, and 1997 stakeholder workgroup reports, MDEQ has adopted rules and algorithms for utilizing short-term study results (short-term NOAELs and LOAELs; LC50s and LD50s) to derive ITSLs (with annual ATs) that are presumptively protective from chronic noncancer exposure and adverse effects, when the preferred studies or ITSL bases are not available (Rule 232). Ohio, Wisconsin and Minnesota would not extrapolate to derive chronic benchmarks, although they may address such limited datasets by setting acute screening levels. Texas TCEQ is an example of another state agency that utilizes LC50 data to derive acute and chronic benchmarks; their acute benchmark method is more restrictive than the DEQ approach.

Table 1. General Hierarchy of Basis for Chronic Inhalation Health Benchmarks

Hierarchy / rank[1]	Michigan DEQ	Minnesota PCA	Ohio EPA	Wisconsin DNR
Relatively higher	IRIS RfC value. Rules have default AT of 24 hours, which can be overridden by staff for an annual AT.	MDH health-based value (hbv)	IRIS or other available appropriate benchmark from reputable agency. 1 hr AT.	EPA values and ACGIH TLVs.
↓	EPA RfD, ATSDR MRL, EPA PPRTV, Cal REL, or staff-derived RfC[2]. AT may be 24 hours (default in rules for RfD).	MDH health risk value (hrv)		
↓	OEL (TLV/100). AT is 8 hrs.	IRIS value	OEL (TLV/42). 1 hr AT.	
↓	Subchronic study (e.g., 2-week) with extrapolation to chronic. Annual AT.	Cal REL, EPA HEAST, ATSDR MRL		
↓	LC_{50} value with extrapolation to chronic. Annual AT.		Compare to other chemicals with similar structures, apply SAR.	
↓	LD_{50} value with extrapolation to chronic. Annual AT.	EPA Superfund PPRTV		
Relatively lower	Default ITSL = 0.1 ug/m3 (annual AT).	No default	No default	No default
Comments	Methods for deriving ITSLs from very limited data are protective, and have a long history at AQD.	Rarely use OELs (exception: ethanol facilities). Do not use short-term bioassay data to derive screening values. Chemicals with inadequate data are evaluated qualitatively in context with the entire facility.	Chemicals with inadequate data may be evaluated by comparison to similar compounds with better tox data (computational toxicology).	They do not address air toxics without benchmarks available from other reputable sources.

[1] MDEQ-AQD, and presumably the air toxics permitting agencies of the other EPA R5 states, utilizes a general hierarchy system that is not rigidly applied; professional judgment and consideration of the age and basis for the available benchmarks and methods are important factors in adopting health-based screening levels that are appropriate and defensible.

[2] Depending on the age and basis for the available benchmarks from other reputable agencies, AQD toxicologist staff may perform an updated literature review and utilize key studies differently than other available benchmarks in deriving an ITSL utilizing EPA's RfC methodology.

Table 2. Access to R5 State's Air Toxics Information and Screening Levels

State Agency	Location
Michigan DEQ	http://www.michigan.gov/deq/0,4561,7-135-3310_4105---,00.html
Ohio EPA	http://epa.ohio.gov/dapc/regs/3745_114.aspx (Toxics compound data sheets ONLY; NOT a list of benchmarks.)
Minnesota PCA	http://www.pca.state.mn.us/index.php/air/air-monitoring-and-reporting/air-emissions-modeling-and-monitoring/air-emission-risk-analysis-aera/risk-assessment-screening-spreadsheet-rass-and-q/chi-spreadsheet-aera.html Open the zipped file, "Protected RASS for 25 Stacks" Select the ToxValues tab to access the "Master Chemical List"
Wisconsin DNR	http://dnr.wi.gov/topic/airquality/toxics.html Select the tab for: Download the combined chemical spreadsheet tool (XLS).

Table 3. Comparison of R5 States' Health-Based Screening Levels for Select Air Toxics (acute and chronic noncancer; cancer at specified risk level, with annual AT; all values in ug/m^3).

Chemical	MDEQ-AQD	MPCA	Ohio EPA[1]	WDNR
Acetaldehyde #75-07-0	9 (24 hr AT) 5 (1E-5 cancer)	470 (1 hr AT) 9 (chronic) 4.5 (1E-5 cancer)		4504 (1 hr AT) 0.45 (1E-6 cancer)
Acrolein #107-02-8	5 (1hr AT) 0.02 (annual AT)	5 (1 hr AT) 0.4 (chronic)		22.9 (1 hr AT)
Ammonia #7664-41-7	100 (24 hr AT)	3200 (1 hr AT) 80 (chronic)		418 (24 hr AT) 100 (annual AT)
Benzene #71-43-2	30 (24 hr AT) 30 (annual AT) 1 (1E-5 cancer)	1000 (1 hr AT) 30 (chronic) 1.3 (1E-5 cancer)		0.13 (1E-6 cancer)
Benzo(a)pyrene #50-32-8	5E-3 (1E-5 cancer)	9.1 E-3 (1E-5 cancer)		9.1E-4 (1E-6 cancer)
Cadmium #7440-43-9	6E-3 (1E-5 cancer)	0.02 (chronic) 5.6E-3 (1E-5 cancer)		5.6E-4 (1E-6 cancer)
Chlorine #7782-50-5	500 (8 hr AT) 0.3 (annual AT)	290 (1 hr AT) 0.2 (chronic)		34.8 (24 hr AT)
Diethylene glycol monobutyl ether (butyl cellosolve) #112-34-5	20 (24 hr AT)	0.1 (chronic)		2320 (24 hr AT) 13000 (annual AT)
Epichlorohydrin #106-89-8	1 (24 hr AT) 8 (1E-5 cancer)	1300 (1 hr AT) 1 (chronic) 8.3 (1E-5 cancer)		45.4 (24 hr AT) 0.83 (1E-6 cancer)
Ethylene glycol #107-21-1	1000 (1 hr AT)	400 (chronic)		N/A
Ethylene oxide #75-21-8	0.3 (1E-5 cancer)	30 (chronic) 0.11 (1E-5 cancer)		1.1E-2 (1E-6 cancer)

Table 3, continued…				
Chemical	**MDEQ-AQD**	**MPCA**	**Ohio EPA[1]**	**WDNR**
Formaldehyde #50-00-0	9 (8 hr AT) 0.8 (1E-5 cancer)	94 (1 hr AT) 9(chronic) 2 (1E-5 cancer)		7.7E-2 (1E-6 cancer)
Hexane #110-54-3	700 (24 hr AT)	2000 (chronic)		4320 (24 hr AT) 200 (annual AT)
Hydrogen chloride #7647-01-0	2100 (1 hr AT) 20 (annual AT)	2700 (1 hr AT) 20 (chronic)		746 (1 hr AT) 20 (annual AT)
Hydrogen sulfide # 7783-06-4	100 (24 hr AT) 2 (annual AT)	42 (1 hr AT) 2 (chronic)		335 (24 hr AT)
Manganese	0.05 (annual AT)	0.2 (chronic)		4.8 (24 hr AT)
Mercury #7439-97-6	(no ITSL; inhalation-only RfC= 0.3 ug/m3)	0.6 (1 hr AT) 0.3 (chronic)		Inorganic: 0.6 (24 hr AT); 0.3 (annual AT). Alkyl cpds: 0.24 (24 hr AT)
Methyl bromide #74-83-9	5 (24 hr AT)	2000 (1 hr AT) 5 (chronic)		93.2 (24 hr AT) 5 (annual AT)
Naphthalene #91-20-3	3 (24 hr AT) 0.8 (1E-5 cancer)	200 (1 hr AT) 9 (chronic) 0.29 (1E-5 cancer)		1258 (24 hr AT)
Nickel #7440-02-0	4.2E-2 (1E-5 cancer)	11 (1 hr AT) 0.014 (chronic) 2.1E-2 (1E-5 cancer)		3.8E-3 (1E-6 cancer)
Phenol #108-95-2	190 (8 hr AT)	5800 (1 hr AT) 200 (chronic)		462 (24 hr AT)
Styrene #100-42-5	1000 (24 hr AT) 17 (1E-5 cancer)	21000 (1 hr AT) 1000 (chronic)		2045 (24 hr AT) 1000 (annual AT)
Toluene #108-88-3	5000 (24 hr AT)	37000 (1 hr AT) 400 (chronic)		4522 (24 hr AT) 400 (annual AT)
Trichloroethylene #79-01-6	10000 (24 hr AT) 2 (annual AT) 2 (1E-5 cancer)	2000 (1 hr AT) 2 (chronic) 3 (1E-5 cancer)		0.5 (1E-6 cancer)
Vinyl chloride #75-01-4	100 (24 hr AT) 1.1 (1E-5 cancer)	180000 (1 hr AT) 100 (chronic) 1.1 (1E-5 cancer)		100 (annual AT) 0.11 (1E-6 cancer)
Xylenes #1330-20-7	100 (24 hr AT)	43000 (1 hr AT) 100 (chronic)		10421 (annual AT)

[1] Ohio EPA does not publish their air toxics benchmarks; no list is available. They have Toxic Compound Data Sheets available (see link in **Table 3**), however, these appear to be justifications for listing with a summary of known hazards and toxicity information sources (e.g., IRIS unit risk values and RfCs; ACGIH OELs). It is unclear how permit applicants and staff permit reviewers determine if modeled impacts are approvable.