

Air Toxics Screening Levels: How does AQD establish, modify, and use them?

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Topics We Will Cover

- What are Air Toxics
- What are Screening Levels
- How Screening Levels are Used
- How Screening Levels are Developed
- How Screening Levels are Modified
- How Screening Levels are Accessed
- Obstacles Encountered by AQD and Customers

What are Air Toxics

- “Air toxics” is a general term for air pollutants not included in EPA’s six “criteria pollutants” which have national standards (NAAQS)
- Different agencies regulate different sets of air toxics.
- MDEQ regulates air toxics under “toxic air contaminants” (Rule 120f): open-ended definition with 42 exempt substances.

What are air toxics

- Approximately 30 states regulate air toxics in permitting proposed new and modified sources, via human health risk assessment.
- Some states regulate a defined list; some have an open-ended list like MDEQ.

Why regulate air toxics?

- Goal: To help ensure public health protection.
- Why not just regulate EPA’s 187 Hazardous Air Pollutants (HAPs)? This is not a sufficient or appropriate list to achieve the Goal.

What are Screening Levels

- Health-based screening Levels (SLs) provide a level of protection to the public from *inhalation (only)* exposure. Units: $\mu\text{g}/\text{m}^3$.
- Noncancer effects: Initial Threshold Screening Levels (ITSLs)
- Cancer effects: Initial Risk Screening Levels (IRSLs) and Secondary Risk Screening Levels (SRSLs)
- IRSL: 1 in 1 million risk; SRSL: 1 in 100,000

What are Screening Levels

- Averaging time: each screening level (SL) has an associated averaging time: annual, 24 hrs, 8 hrs, or 1 hr.
- SLs intended for chronic health protection (annual averaging time), short-term protection (1 hr averaging time), or, both chronic and acute.
- Air toxics may have one or two ITSLs, and if carcinogenic may also have an IRSL and SRSL.

How Screening Levels are Used

Primary Uses:

- DEQ AQD’s Permit to Install program, for permitting new and modified air emission sources.
 - Note: permit exemptions, Rules 278-291
- Computer dispersion modeling determines potential ambient air impacts (with various averaging times).
- Impacts cannot exceed screening levels (unless an exemption is met (Rule 226)).

Secondary use:

- interpreting the public health significance of ambient air monitoring data or levels estimated by modeling other than permit review (e.g., EPA multi-source modeling; AQD assessment of exemptions).
NOTE: screening levels are NOT ambient air quality standards.

How Screening Levels are Developed

- AQD Toxicologists develop screening levels.
 - You may estimate screening levels if none exist (e.g., for permit exemptions or permit applications)....at your own risk.
- AQD Toxicologists review toxicology literature and evaluate other agencies' health-based limits and their basis.
Goal: screening levels are the most appropriate and defensible values and averaging times for AQD's permitting program.
- AQD Rules 229-233 provide general methods and equations for deriving SLs.
- Well-conducted human studies are generally preferred over animal studies.
- Large studies of sensitive toxicology endpoints are preferred.
- Multiple dose groups showing dose-response relationships and modes of action are preferred.
- Critical effects = the most sensitive demonstrated toxicity endpoints of a chemical.
- "Point of Departure" = a calculated human dose for the most sensitive slight effect or no-effect.
- Extrapolation: dividing the Point of Departure by uncertainty factors, or modeling lower doses.
 - Why extrapolate? The Goal is to derive SLs protective of public health, to prevent noncancer effects and minimize potential cancer risk.

General Examples:

- ITSLs may be based on animal or human study results, divided by uncertainty factors of 1 to 1000.
- ITSLs may be based on Occupational Exposure Limits \div 100.
- ITSLs may be based on rodent 50% mortality, divided by a LARGE extrapolation factor of up to 2 million.
- No adequate data? Default ITSL = $0.1 \mu\text{g}/\text{m}^3$.

Specific Example: Sulfuric acid: acute toxicity and chronic toxicity

- Key acute study #1: healthy male humans had symptoms of respiratory irritation after 2 hours at $230 \mu\text{g}/\text{m}^3$.
- Key acute study #2: 17 human asthmatic subjects had (slight) decreased airway conductance at $450 \mu\text{g}/\text{m}^3$ for 16 minutes.
- Acute ITSL = $120 \mu\text{g}/\text{m}^3$ (1 hr AT) based on study #2, time adjustment, and uncertainty factor = 1.
- Chronic ITSL = $1 \mu\text{g}/\text{m}^3$ (annual AT). Basis: 9 mky per dose, 78 weeks, lung effects and \downarrow oxygenation at lowest dose. Uncertainty factor = 300.
- AQD Toxicologists develop and finalize SLs and justification documents, with internal review.
- Justification document:
 - date
 - lit review
 - key studies
 - calculations
 - uncertainty factors
- Since 2016, all SLs must undergo formal public comment within 6 months (Rule 230).
- AQD must respond to comments within 60 days.

How Screening Levels are Modified

- SLs for over 1200 air toxics.
- SLs do not “sunset” after a certain age; many are quite old (1990s).
- Some substances are high priority for routine SL updates.
- PTI review can compel an updated assessment.
- Awareness of significant new key toxicity findings can prioritize a reassessment.
- Goal: the screening levels are the most appropriate and defensible values and averaging times for AQD’s permitting program.
- Recall: Why regulate air toxics? To help ensure public health protection.
- Regulated community can alert AQD - at any time - that a SL is outdated or otherwise not meeting “the Goal.”

How Screening Levels are Accessed

- Get monthly updates on SL changes and chemicals under review by joining our listserv:
 - www.Michigan.gov/air, click the red envelope
- AQD webpage: under “Permits”, select “Air Toxics Screening Levels”
 - SL lists and footnotes
 - SL query
 - SL justification documents

Obstacles

- A permit to install application does not satisfy the SL provisions of Rule 225.
- Screening levels are not available and are needed for a permit application review or for a company to qualify for a permit exemption.
- More efficiency is needed in permit application review for air toxics.
- Public opposition to a proposed Permit to Install.

A PTI application does not satisfy Rule 225. What can you do?

- Rule 226(a) small quantity exemption.
- Rule 227 demonstration methods: use *any* of: AER matrix, AIR matrix, AERSCREEN, AERMOD.
- Rule 227(2) intermittent emission credit.
- Modify the proposal, in order to reduce ambient air impacts.
- Rule 226(d) exemption from a SL (infrequent).

SLs are not available and are needed for a PTI application review or for a permit exemption.

What can you do?

- PTI: Permit engineer refers it to Toxics Unit. Either: SL is derived, or, modeled impact is OK’d.
- Exemption: company may estimate and use a “SL”, at their own risk.
- Need more PTI review efficiency in air toxics. What can we do? Since 1992, efficiencies developed:
- Permit exemptions (e.g., Rules 290-291).
- Rule 226 SL exemptions, and Rule 227 options.
- Rule 226(e): clean fuels exemption (2016); to be expanded (in progress).
- Vapor intrusion mitigation systems: permit exemption (in progress).
- Limit regulated air toxics to a defined list? Proposal was rejected in 2016.

Public opposition to a proposed PTI. What can we do?

- Enhanced public participation activities.
- Improved risk communication.
- MI’s rigorous air toxics regulations enable AQD to more strongly support a project.
- Share the story of air quality improvements over time (the Big Picture).