

**Michigan Air Toxics System**  
**Initial Threshold Screening Level (ITSL) / Initial Risk Screening Level (IRSL)**  
**Toxics Screening Level Footnotes**

Each note is applicable only to the chemical for which a corresponding number appears in the “Footnotes” column in the [MiEnviro Air Toxic Chemical](#) search results.

1. The **combined** ambient impact of all petroleum hydrocarbon materials with footnote #1 cannot exceed the ITSL of 3,500  $\mu\text{g}/\text{m}^3$  (8-hour average). If a chemical with this footnote has an ITSL other than 3,500  $\mu\text{g}/\text{m}^3$ , the ambient impact for that chemical also cannot exceed the chemical specific ITSL.
2. The **combined** ambient impact of all forms of xylene with footnote #2 cannot exceed the initial threshold screening level ITSL of 390  $\mu\text{g}/\text{m}^3$  (annual average).
3. These chemicals are very likely to meet the Rule 336.1103(c) definition of a carcinogen. The Air Quality Division (AQD) has insufficient access to data that enables it to evaluate and develop an IRSL/Secondary Risk Screening Level (SRSL).
4. The **combined** ambient impact of all subtilisins cannot exceed the ITSL of 0.0006  $\mu\text{g}/\text{m}^3$  (1-hour average).
5. The polycyclic aromatic hydrocarbons (PAH) with this footnote are carcinogenic and have potency equivalency factors (PEF) that quantitate their potency relative to that of [benzo\(a\)pyrene](#) (Chemical Abstract Service number (CAS# 50-32-8). Air emission mixtures of carcinogenic PAHs, including asphalt fumes, should be evaluated additively using these PEFs and the benzo(a)pyrene IRSL and SRSL. The ITSL for benzo(a)pyrene applies only to benzo(a)pyrene and none of the other PAHs.
6. The ITSL applies to pure tungsten carbide only. The ITSL for cemented tungsten carbide having a cobalt content >2%, based on the ITSL for cobalt, is 0.2  $\mu\text{g}/\text{m}^3$  based on an 8-hour averaging time. The IRSL for cemented tungsten carbide having a cobalt content <2% and a nickel content >0.3%, based on the IRSL for nickel, is 0.0042  $\mu\text{g}/\text{m}^3$ , based on an annual averaging time.
7. Besides the assessment of mercury ambient air impacts in comparison to the ITSLs, larger individual sources of mercury emissions undergoing permit review (e.g., greater than 5 to 10 lbs/yr) may be evaluated on a case-by-case basis to address concerns for deposition and bioaccumulation, taking into account site-specific factors such as the presence of nearby recreational fisheries and realistic exposure scenarios.
8. Alternate screening levels may be determined on a case-by-case basis depending on the source of polychlorinated biphenyls (PCB) emissions and which PCB isomers are being emitted following U.S. Environmental Protection Agency’s (EPA) guidance as described in the Integrated Risk Information System (IRIS).
9. The **combined** ambient impacts of sulfuric acid, sulfur trioxide, and oleum cannot exceed the ITSLs.
10. The **combined** ambient impact of these glycol ethers must be evaluated together so that their hazard index (HI) does not exceed a value of one (1).<sup>1</sup>
11. The **combined** ambient impact of all petroleum hydrocarbon materials with footnote #11 cannot exceed the ITSL of 50  $\mu\text{g}/\text{m}^3$  (8-hour average). If a chemical with this footnote has an ITSL other than 50  $\mu\text{g}/\text{m}^3$ , the ambient impact for that chemical also cannot exceed the chemical specific ITSL.

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12. The **combined** ambient impact of DDT; p,p'-DDE; and DDD that have footnote #12 cannot exceed the IRSL of 0.01  $\mu\text{g}/\text{m}^3$  (annual average) or SRSL of 0.1  $\mu\text{g}/\text{m}^3$  (annual average).
13. This chemical has two ITSLs with different averaging times. Ambient air impacts cannot exceed either ITSL. Both ITSLs also apply for determinations of permit to install exemptions under R 336.1290 (Rule 290).
14. The **combined** ambient impacts for the isomers of trimethylbenzene, or any mixture thereof, cannot exceed the screening level(s).
15. The **combined** impact of all butyl acetate isomers must be evaluated together such that the impacts cannot exceed 2,400  $\mu\text{g}/\text{m}^3$  with an 8-hour averaging time.
16. The asbestos IRSL and SRSL are based on a conservative conversion from the EPA-IRIS unit risk factor and one-in-one million cancer risk estimate of 4 E-6 fibers/mL (or 4 fibers/ $\text{m}^3$ ), to the units of  $\mu\text{g}/\text{m}^3$ . Less restrictive screening levels may be derived on a case-by-case basis depending on the fiber density, as discussed in the EPA-IRIS database.
17. See specific trivalent and hexavalent chromium compounds.
18. The **combined** ambient impact of turpentine and monoterpenes (a-pinene, b-pinene, and d-carene) listed with footnote #18 cannot exceed the ITSL of 1120  $\mu\text{g}/\text{m}^3$  (8-hour averaging time).
19. If the 4,6-dimethyl-2-heptanone is present as a component of commercial or technical grade diisobutyl ketone or DIBK (CAS# 108-83-8), then the ITSL of 0.1  $\mu\text{g}/\text{m}^3$  for 4,6-dimethyl-2-heptanone does not apply. In this case, the **combined** impacts of the 4,6-dimethyl-2-heptanone, and DIBK cannot exceed the screening level for DIBK of 1,500  $\mu\text{g}/\text{m}^3$  (8-hour average)
20. The **combined** ambient impact of meta-tolualdehyde (CAS# 620-23-5) and para-tolualdehyde (CAS# 104-87-0) cannot exceed the ITSL of 440  $\mu\text{g}/\text{m}^3$  with annual averaging time.
21. This chemical is very likely to meet the R 336.1103(c) definition of a carcinogen. The AQD has evaluated the data and determined it to be inadequate for IRSL/SRSL development. However, the ITSL provides adequate protection against potential cancer effects.
22. The **combined** ambient impact of butane (CAS# 106-97-8) and isobutane (CAS# 75-28-5) should be evaluated together so that the **combined** impact does not exceed an HI value of one.
23. The **combined** ambient impact of all propylene glycol n-butyl ethers (CAS# 5131-66-8, 15821-83-7, 29387-86-8, and 63716-40-5) cannot exceed the ITSL of 77  $\mu\text{g}/\text{m}^3$  (annual average).
24. The **combined** ambient impact of all chemicals with footnote #24 cannot exceed the ITSL of 93  $\mu\text{g}/\text{m}^3$  (annual average).
25. The **combined** ambient impact of all chemicals with footnote #25 cannot exceed the ITSL of 5,600  $\mu\text{g}/\text{m}^3$  (annual average).
26. This toxic air contaminant (TAC) is reasonably anticipated to exist as a particle in the ambient air. A toxicological review has determined that, in lieu of setting a screening level, the primary National Ambient Air Quality Standards (NAAQS) for particulate matter

less than or equal to 2.5 or 10 microns in diameter (PM<sub>2.5</sub>, PM<sub>10</sub>) are reasonable and appropriate health protective levels for the particulate. The **combined** ambient impact of all particulate TAC emissions from the process must be below the applicable PM primary NAAQS (PM<sub>2.5</sub>, PM<sub>10</sub>). The PM primary NAAQS for particulate matter may be used in permit to install exemption determinations for this TAC under Rule 290(2)(a)(iii) or Rule 291.

27. The **combined** ambient impact of dimethyl adipate (CAS# 627-93-0), dimethyl glutarate (CAS# 1119-40-0), dimethyl succinate (CAS# 106-65-0), and the mixture of dimethyl adipate, dimethyl glutarate, and dimethyl succinate collectively known as dibasic ester (CAS# 95481-62-2) cannot exceed the ITSL of 1 µg/m<sup>3</sup> with annual averaging time.
28. The **combined** ambient impact of all amorphous silica compounds with the CAS# 60676-86-0, 61790-53-2, 69012-64-2, 112945-52-5, and 112926-00-8 cannot exceed the ITSL of 60 µg/m<sup>3</sup> (8-hour averaging time).
29. The ITSL for manganese is 0.3 µg/m<sup>3</sup> with an annual averaging time. This ITSL is most appropriately applied to PM<sub>10</sub>-Mn or PM<sub>2.5</sub>-Mn data rather than total suspended particles -Mn data. This ITSL applies to “manganese and manganese compounds,” therefore emissions of multiple forms of manganese must be accounted for additively to ensure that the combined ambient air impact does not exceed the manganese ITSL. This ITSL applies to ambient air impacts of the manganese atom, therefore the emissions and modeled impacts of various manganese compounds may be molecular weight-adjusted to the equivalent emission rate and ambient air impact of the manganese alone. Please note that potassium permanganate (CAS# 7722-64-7) also has a short-term ITSL = 0.6 µg/m<sup>3</sup> (8 hour averaging time).
30. The ITSL for mixed cresols (CAS# 1319-77-3) also applies to o-cresol (CAS# 95-48-7), p-cresol (CAS# 106-44-5), and m-cresol (CAS# 108-39-4).
31. Most processes that emit crystalline silica are exempt from the screening level requirement of Rule 225(1). Only sources of crystalline silica that are not exempt from the definition of a TAC (see Rule 120(f)(XVI)) need to comply with the ITSL.
32. The CAS# has been changed to 12185-10-3. Since the original number 7723-14-0, is still used by many organizations, it is listed as the primary CAS#.
33. With regards to the health-based screening levels for tetrachlorodibenzo(p)dioxin (CAS# 1746-01-6), R 336.1225(6)(a) states that all polychlorinated dibenzodioxins and dibenzofurans shall be considered as one toxic air contaminant, expressed as an equivalent concentration of 2,3,7,8-tetrachlorodibenzo(p)dioxin based on the relative potency of the isomers emitted from the emission unit or units. The current toxic equivalency factors (TEF) for use are those recommended by the World Health Organization (WHO, 2005), as provided in: Van den Berg, M. et al., 2006. The 2005 WHO Reevaluation of Human and Mammalian TEF for Dioxins and Dioxin-Like Compounds. Toxicological Sciences 93(2): 223-241.
34. The **combined** ambient impact of all selenium and inorganic selenium compounds with the CAS# 7446-08-4, 7446-34-6, 7488-56-4, 7783-00-8, 10102-18-8, and 13410-01-0 cannot exceed 2 µg/m<sup>3</sup> (8-hour averaging time).
35. The **combined** ambient impact of all barium and soluble barium compounds with the CAS# 543-80-6, 1304-28-5, 10022-31-8, 10361-37-2, 10553-31-8, 13477-00-4, 13718-50-8, 17194-00-2, and 21109-95-5 cannot exceed 5 µg/m<sup>3</sup> (8-hour averaging time).

36. The **combined** ambient impact of these chlorosilanes must be evaluated together so that their HI does not exceed a value of one (1).<sup>1</sup>
37. The **combined** ambient impact of diglycol amine (CAS# 929-06-6) and diethanolamine (CAS# 111-42-2) should be evaluated so that the combined impact does not exceed an HI value of one (1).<sup>1</sup>
38. The **combined** ambient impact of magnesium (CAS# 7439-95-4) and magnesium compounds, magnesium hydroxide, magnesium oxide, and magnesium nitrate (CAS#s 1309-42-8, 1309-48-4, and 10377-60-3, respectively), cannot exceed the ITSL of 100 µg/m<sup>3</sup> (8-hour average).
39. The **combined** ambient impact of ammonia (CAS# 7664-41-7) and ammonium hydroxide (CAS# 1336-21-6) must be evaluated together so that their HI does not exceed a value of one (1).<sup>1</sup>
40. The **combined** ambient impact of trimethyl borate (CAS# 121-43-7), boron oxide (CAS# 1303-86-2), sodium perborate (CAS# 7632-04-4), and boric acid (CAS# 10043-35-3) should be evaluated so that the combined impact does not exceed an HI value of one (1).<sup>1</sup>

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<sup>1</sup> Footnotes #10, #36, #37, #39, #40, #41, #45, #46, #48 and #49 refer to the calculation of an HI. For these cases only, the HI should be calculated as follows:

### HI Calculation Procedure

After the appropriate ITSLs are identified (all should have the same averaging time), an HI approach is used to determine additive impacts from a group of chemicals and their Predicted Ambient Impacts (PAI):

$$HI = \frac{PAI_1}{ITSL_1} + \frac{PAI_2}{ITSL_2} + \frac{PAI_3}{ITSL_3} + etc.$$

The acceptability of the combined impacts is demonstrated by an HI that is less than or equal to (1).

Or, for applying the Rule 227(1)(a) method:

$$HI = \frac{PER_1}{AER_1} + \frac{PER_2}{AER_2} + \frac{PER_3}{AER_3} + etc.$$

Where: The proposed emission rate (PER), and the allowable emission rate (AER) as determined by Rule 227(1)(a).

The acceptability of the combined impacts is demonstrated by an HI that is less than or equal to one (1). Rule 227(1)(a) requires that the proposed emissions comply with both the pounds per hour and the screening level specific emission rates. If the TAC has two ITSLs then a separate HI calculation must be done for each screening level.

41. The **combined** ambient impact of sodium fluoride (CAS# 7681-49-4), potassium fluoride (CAS# 7789-23-3), sodium aluminum fluoride (CAS# 15096-52-3), and sodium silicofluoride (CAS# 16893-85-9) should be evaluated so that the combined impact does not exceed an HI value of one (1).<sup>1</sup>
42. The **combined** ambient impact of cobalt and cobalt compounds cannot exceed the ITSL of 0.2 µg/m<sup>3</sup> (8-hour averaging time) and the IRSL of 0.0001 µg Co/m<sup>3</sup> or SRSL of 0.001 µg Co/m<sup>3</sup> (annual averaging time).
43. The default screening level for this chemical has been rescinded because it may not be health protective. This chemical will be evaluated on a case-by-case basis until chemical specific toxicity information is available to derive a screening level.
44. The **combined** impact of all kerosene-type petroleum distillates cannot exceed the acute ITSL of 2,000 µg/m<sup>3</sup> (8-hour averaging time) and the chronic ITSL of 200 µg/m<sup>3</sup> (annual averaging time). All kerosene ambient impacts are to be **combined** with the impacts of all petroleum hydrocarbon materials with footnote #1, and the total of these impacts cannot exceed the ITSL of 3500 µg/m<sup>3</sup> (8-hour averaging time).
45. When sodium methylate (CAS# 124-41-4) is co-emitted with sodium hydroxide (CAS# 1310-73-2), the **combined** impacts from both pollutants should not exceed an HI value of one (1).<sup>1</sup>
46. When copper propionate (CAS# 3112-74-1) is co-emitted with copper (CAS# 7440-508), the **combined** impacts from both pollutants should not exceed an HI value of one (1).<sup>1</sup>
47. The default screening level for this chemical has been rescinded because natural glycerol is not considered a toxic air contaminant under Rule 120(f)(ii) of the Air Pollution Control Rules. Synthetic glycerol will be evaluated on a case-by-case basis.
48. When 1,4-dichlorobenzene (CAS# 106-46-7) is co-emitted with dichlorobenzenes (CAS# 25321-22-6), the **combined** impacts from both pollutants should not exceed an HI value of one (1).<sup>1</sup>
49. The **combined** ambient impact of cyanide (CAS# 57-12-5) and hydrogen cyanide (CAS# 74-90-8) should be evaluated so that the combined impact does not exceed an HI value of one (1).<sup>1</sup>
50. The **combined** ambient impact of 2,4,6,8,10-pentamethylcyclotetrasiloxane (CAS# 6166-86-5) and 2,4,6,8-tetramethylcyclotetrasiloxane (CAS# 2370-88-9) cannot exceed the ITSL of 100 µg/m<sup>3</sup> (annual average).
51. The **combined** ambient impact of iodine and iodide compounds cannot exceed the ITSL of 0.1 µg/m<sup>3</sup> (8-hour averaging time).