



## TOXIC AIR CONTAMINANTS - DEMONSTRATING COMPLIANCE WITH RULE 225

### General Instructions

Air Pollution Control Rule R 336.1225 (Rule 225) applies to sources of toxic air contaminants (TACs) and requires a demonstration that the emissions of any TAC shall comply with a health-based screening level. Rule 225(1) states that emissions of a TAC shall not exceed the maximum allowable emission rate which results in a predicted maximum ambient impact (PAI) that is more than the initial threshold screening level (ITSL) or the initial risk screening level (IRSL) or both. Rule 225(2) allows an applicant to demonstrate compliance with a Secondary Risk Screening Level (SRSL); however the TAC emissions from the proposed new or modified process must be combined with the TAC emissions from all existing emission units at the stationary source.

Rule 225(3) provides an alternative to complying with requirements in subrules (1) or (2), if the ambient impacts of a carcinogen occur on industrial property or public roadways. For more information on demonstrating compliance with Rule 225(3), or for additional assistance regarding any Rule 225 requirements, contact Mr. Mike Depa, at 517-355-6988.

The emissions of each individual TAC must be evaluated for compliance with Rule 225. Three different methods are available and any or all methods may be used for different TACs within the same permit application. An applicant may demonstrate compliance with the health based screening level requirements of Rule 225 using any of the following methods:

- I. Rule 227(1)(a) Allowable Emission Rate Methodology
- II. Rule 227(1)(b) Air Matrix Methodology
- III. Rule 227(1)(c) Dispersion Modeling Methodology

The Air Quality Division (AQD) Toxics Unit has developed an electronic Microsoft Excel spreadsheet which may be used for any of the three methods. The spreadsheet contains a separate worksheet for each method. The "Toxic Air Contaminants Spreadsheet" is available on the AQD web site at <http://www.michigan.gov/deqair> (Click "Air Toxics", see "Laws & Rules"). If you do not have access to the Internet, a copy may be obtained by contacting Ms. Lorraine Hickman at 517-241-9059. Although the AQD does not require the use of the electronic spreadsheet, submittal of the data in this format will help facilitate a timely toxics review pursuant to Rules 225-232. All of the information identified on the worksheet and accompanying instructions is required as part of a complete permit application, regardless of the format of submittal.



**Demonstrating Compliance with Rule 225**

**I. Allowable Emission Rate Methodology - Rule 227(1)(a)**

The following information is needed for each toxic air contaminant (TAC) to demonstrate compliance with the health based screening level requirements of Rule 225 using the Allowable Emission Rate Methodology of Rule 227(1)(a). An electronic Microsoft Excel spreadsheet (Toxic Air Contaminants Spreadsheet) is available at <http://www.michigan.gov/deqair> (Click "Air Toxics", see "Laws & Rules"). If you do not have access to the Internet, copies of all referenced documents may be obtained by contacting Ms. Lorraine Hickman at 517-241-9059. A copy of the TAC Spreadsheet is also provided in Appendix A. The AQD does not require the use of the electronic spreadsheet however; submittal of the data in this format will help facilitate a timely toxics review pursuant to Rules 225-232. All of the information identified below is required as part of a complete permit application, regardless of the submittal format. Provide the information in the specified columns of the TAC spreadsheet. For technical assistance regarding Rule 225 requirements, contact Mr. Mike Depa at 517-355-6988.

Column	Heading
A	Chemical Name
B	CAS No.
C	ITSL( $\mu\text{g}/\text{m}^3$ )
D	ITSL Avg Time
E	IRSL or SRSL ( $\mu\text{g}/\text{m}^3$ )
F	AQD Screening Level?
G	AQD Footnote
H	ITSL Allowable Emission Rate (Screening level specific)
I	ITSL Maximum Allowable Emission Rate (lbs/hr)
J	IRSL or SRSL Allowable Emission Rate (lbs/month)
K	IRSL or SRSL Maximum Allowable Emission Rate (lbs/hr)
L	Proposed Emission Rate (ER)
M	Proposed Emission Rate Units
N	Proposed Maximum Hourly Emission Rate (lbs/hour)
O	Is Proposed ER Less than Allowable?
P	Is Proposed Maximum Hourly ER Less than Allowable?

- A. **Chemical Name** - List all Toxic Air Contaminants (TACs), as defined in Rule 120(f), that are emitted from the process. If a chemical or compound in the process is made up of a mixture, list all chemicals in that mixture. If a mixture has been given a Chemical Abstract Service (CAS) Number, identification of the individual constituents of the mixture is not necessary. An example of this is Stoddard Solvent which is a mixture of hydrocarbons, with a CAS number of 8052-41-3.
- B. **CAS No.** - List the Chemical Abstract Service Number for each TAC emitted. The CAS number is a unique number that accurately identifies a compound or mixture. Because chemicals and chemical mixtures often have several synonyms, CAS numbers must be provided to correctly identify each constituent emitted. Chemicals or mixtures without an identified CAS number may significantly delay completion of the AQD review of the permit application. More information about CAS and CAS Registry numbers can be found at <http://www.cas.org/>.

**Screening Levels (C - G)**

A list of all screening levels which have been developed by the AQD can be found on the AQD website at [http://www.michigan.gov/deq/0,1607,7-135-3310\\_4105---,00.html](http://www.michigan.gov/deq/0,1607,7-135-3310_4105---,00.html). Under the heading "Screening Levels" links are provided to screening level lists sorted by chemical name or CAS number. "Online Services" provides a query to search for screening levels by chemical name or CAS number. Some TACs may have more than one screening level. If there is more than one screening level for a TAC, list each on a separate line of the electronic spreadsheet. (Multiple screening levels listed on the same line will not provide all of the appropriate comparisons to the allowable emission rate.) If an AQD screening level does not exist for a

TAC, columns C – D may be left blank. The applicant may develop a proposed screening level or the AQD will develop a screening level during the permit review process.

A proposed screening level is optional, but may expedite the permit review time. If the applicant chooses to develop a proposed screening level for consideration by the AQD, proper procedures must be followed and adequate documentation must be provided. The methodologies specified in Rule 229 for developing screening levels, and the AQD “Procedures for Developing Screening Levels” dated May 23, 2002 (<http://www.deq.state.mi.us/documents/deq-aqd-toxics-slprocede.pdf>) should be followed. For additional assistance contact Mr. Mike Depa at 517-355-6988. Supporting documentation for the proposed screening level should be provided to the AQD. This information includes: identification of all references and databases searched for information, the results of the literature search, copies of relevant studies, and a summary of the data and methodology used to develop the screening level.

- C. **ITSL** ( $\mu\text{g}/\text{m}^3$ ) - Identify the applicable Initial Threshold Screening Level (ITSL) for each TAC emitted, in micrograms per cubic meter. The ITSL is the concentration of a TAC in the ambient air which is used to evaluate non-carcinogenic health effects pursuant to Rule 225. If the TAC does not have an ITSL, proceed to Column E.
- D. **ITSL Avg Time** - Provide the appropriate averaging time for the ITSL identified in Column C. The averaging times are provided in the AQD list of screening levels. Averaging times include 1-hr, 8-hr, 24-hr, and annual. When using the electronic spreadsheet, select the appropriate averaging time from the drop down box.
- E. **IRSL or SRSL** ( $\mu\text{g}/\text{m}^3$ ) - Identify the applicable Initial Risk Screening Level (IRSL) or Secondary Risk Screening Level (SRSL) for TACs which are carcinogenic compounds, in micrograms per cubic meter. If the TAC also has an ITSL, list the IRSL or SRSL on a separate line of the spreadsheet. The IRSL is the concentration of a TAC in the ambient air used to evaluate emissions of carcinogenic compounds pursuant to Rule 225(1). It is defined as an increased cancer risk of one in one million ( $10^{-6}$ ). All IRSLs have annual averaging times.

The SRSL should be provided if the provisions of Rule 225(2) are being used as an alternative to complying with the IRSL. The emission rates provided in Columns L and N should be based on the combined emissions of the TAC from the proposed new or modified process **and** all other existing emission units at the stationary source. The SRSL is the concentration of a TAC in the ambient air used to evaluate emissions of carcinogenic compounds pursuant to Rule 225(2). It is defined as an increased cancer risk of one in one hundred thousand ( $10^{-5}$ ). All SRSLs have annual averaging times.

- F. **AQD Screening Level?** - Indicate whether the screening levels provided in Columns C or E are from the AQD list of screening levels, or have been proposed by applicant. Type a “Y” if the screening level was developed by the AQD. Type an “N” if the screening level is a proposed value. When using the electronic spreadsheet, select the appropriate response from the drop down box.
- G. **AQD Footnote** - Provide the footnote number for the applicable screening level from the AQD list of screening levels, if applicable. The footnotes contain important information that must be considered in determining compliance with the requirements of the air toxic rules. The footnotes can be found at the bottom of the AQD list of screening levels on the website, or will appear with a chemical when using the query function of the web based screening level database.

#### **Allowable Emission Rate (AER) (H – K)**

Refer to Appendix B for Rule 227(1)(a) and Table 21 - Algorithms for determining allowable emission rates. Determine the allowable emission rates (AER) for each TAC using Table 21 and enter it in the appropriate column (H – K). NOTE: The table provides two AERs for screening levels with annual, 24-hour and 8-hour averaging times. Compliance with both emission rates is required. If the electronic spreadsheet is used, the AERs will be auto filled in Columns H – K after the screening level and appropriate averaging time for each TAC is entered.

- H. **ITSL AER** (lbs per month, 24-hr, 8-hr or 1-hr) – This is the allowable emission rate based on the ITSL and the appropriate averaging time. If the ITSL is based on an annual averaging time, the AER should be in

pounds per month. Any other AER should correspond to the ITSL averaging time (i.e., 24-hour, 8-hour, or 1-hour).

- I. **ITSL Maximum AER** (lbs per hour) – This is the maximum allowable hourly emission rate based on the ITSL. For an ITSL based on a 1-hour averaging time, this will be identical to Column H.
- J. **IRSL or SRSL AER** (lbs per month) - This is the allowable monthly emission rate based on the IRSL or SRSL.
- K. **IRSL or SRSL Maximum AER** (lbs per hour) - This is the maximum allowable hourly emission rate based on the IRSL or SRSL.
- L. **Proposed Emission Rate (ER)** - Provide the proposed emission rate of the TAC which will be emitted by the proposed new process or modification under review. The units should correspond to the appropriate averaging time for the AER in Column H or J. For an ITSL based on an annual averaging time and any IRSL or SRSL, a monthly emission rate should be provided. For an ITSL based on any other averaging time, the emission rate should correspond to the ITSL averaging time.
- M. **Proposed Emission Rate Units** – Provide the emission rate units in pounds per averaging time (i.e., lbs/month, lbs/24-hr, lbs/8-hr or lbs/1-hr). The units should correspond to the appropriate averaging time for the AER in Column H or J. For an ITSL based on an annual averaging time and any IRSL or SRSL, a monthly emission rate should be provided. For an ITSL based on any other averaging time, the emission rate should correspond to the ITSL averaging time. When using the electronic spreadsheet, select the appropriate units from the drop down box.
- N. **Maximum Hourly ER** (lbs/hour) – Provide the proposed maximum hourly emission rate of the TAC which will be emitted by the proposed new process or modification under review.
- O. **Is the Proposed Screening Level Specific Emission Rate Less than Allowable?** - Compare the proposed emission rate of the TAC in Column L to the maximum allowable emission rate based on the ITSL in Column H or J. If  $L < H$  or  $J$ , the TAC emissions are acceptable. The electronic spreadsheet will auto fill “Yes” or “No”.
- P. **Is the Proposed Maximum Hourly Emission Rate Less than Allowable?** – Compare the proposed maximum hourly emission rate of the TAC in Column N to the maximum hourly allowable emission rate in Column I or K. If  $N < I$  or  $K$ , the TAC emissions are acceptable. The electronic spreadsheet will auto fill “Yes” or “No”.

#### **Additional Instructions for Emissions of Mercury and Dioxins**

Information for mercury emissions should include the following additional items:

- The emission rate of mercury reported as pounds per hour and pounds per year.
- The maximum predicted ambient concentration, based on a 24-hour averaging time period, determined pursuant to Rule 227(1)(c) and in accordance with the provisions of Rule 240 or Rule 241, or both.
- The percentage of mercury emitted as elemental vapor, mercury +2 vapor, and particle bound mercury (if available).

Information for dioxin emissions should include the following additional items:

- The annual emission rate in grams per year of all polychlorinated dibenzodioxins and dibenzofurans emitted, expressed as an equivalent concentration of 2,3,7,8-tetrachlorobenzo-p-dioxin.
- The maximum predicted ambient concentration, based on an annual averaging time period, determined pursuant to Rule 227(1)(c) and in accordance with the provisions of Rule 240 or Rule 241, or both.



**Demonstrating Compliance with Rule 225**

**II. Air Matrix Methodology - Rule 227(1)(b)**

The following information is needed for each toxic air contaminant (TAC) to demonstrate compliance with the health based screening level requirements of Rule 225 using the Air Matrix Methodology of Rule 227(1)(b). An electronic Microsoft Excel spreadsheet (Toxic Air Contaminants Spreadsheet) is available at <http://www.michigan.gov/degair> (Click "Air Toxics", see "Laws & Rules"). If you do not have access to the Internet, copies of all referenced documents may be obtained by contacting Ms. Lorraine Hickman at 517-241-9059. A copy of the TAC Spreadsheet is also provided in Appendix A. The AQD does not require the use of the electronic spreadsheet however; submittal of the data in this format will help facilitate a timely toxics review pursuant to Rules 225-232. All of the information identified below is required as part of a complete permit application, regardless of the submittal format. Provide the information in the specified columns of the TAC spreadsheet. For technical assistance regarding Rule 225 requirements, contact Mr. Mike Depa at 517-355-6988.

Column	Heading
A	Chemical Name
B	CAS No.
C	ITSL ( $\mu\text{g}/\text{m}^3$ )
D	ITSL Avg Time
E	IRSL or SRSL ( $\mu\text{g}/\text{m}^3$ )
F	AQD Screening Level?
G	AQD Footnote
H	Proposed Emission Rate (lbs/hr)
I	Stack Height ( $H_s$ ) in feet
J	Influential Building Height ( $H_b$ ) in feet
K	Property Line Distance in feet
L	$(H_s)/(H_b)$ Ratio of Stack Height to Influential Building Height
M	Table 22 Annual Ambient Impact Ratio (AIR) in (lbs/hr) ( $\mu\text{g}/\text{m}^3$ )
N	Maximum Emission Rate (ER) (lbs/hr) based on ITSL
O	Maximum Emission Rate (ER) (lbs/hr) based on IRSL or SRSL
P	Is Proposed Emission Rate Less than ITSL Maximum ER?
Q	Is Proposed Emission Rate Less than IRSL/SRSL Maximum ER?

- A. **Chemical Name** - List all Toxic Air Contaminants (TACs), as defined in Rule 120(f), that are emitted from the process. If a chemical or compound in the process is made up of a mixture, list all chemicals in that mixture. If a mixture has been given a Chemical Abstract Service (CAS) Number, identification of the individual constituents of the mixture is not necessary. An example of this is Stoddard Solvent which is a mixture of hydrocarbons, with a CAS number of 8052-41-3.
- B. **CAS No.** - List the Chemical Abstract Service Number for each TAC emitted. The CAS number is a unique number that accurately identifies a compound or mixture. Because chemicals and chemical mixtures often have several synonyms, CAS numbers must be provided to correctly identify each constituent emitted. Chemicals or mixtures without an identified CAS number may significantly delay completion of the AQD review of the permit application. More information about CAS and CAS Registry numbers can be found at <http://www.cas.org/>.

**Screening Levels (C - G)**

A list of all screening levels which have been developed by the AQD can be found on the AQD website at [http://www.michigan.gov/deg/0,1607,7-135-3310\\_4105---,00.html](http://www.michigan.gov/deg/0,1607,7-135-3310_4105---,00.html). Under the heading "Screening Levels", links are provided to screening level lists sorted by chemical name or CAS number. "Online Services" provides a query to search for screening levels by chemical name or CAS number. Some TACs may have more than one screening level. If there is more than one screening level for a TAC, list each on a separate line of the electronic spreadsheet. (Multiple screening levels listed on the same line will not provide all of

the appropriate comparisons to the allowable emission rate.) If an AQD screening level does not exist for a TAC, columns C – D may be left blank. The applicant may develop a proposed screening level or the AQD will develop a screening level during the permit review process.

A proposed screening level is optional, but may expedite the permit review time. If the applicant chooses to develop a proposed screening level for consideration by the AQD, proper procedures must be followed and adequate documentation must be provided. The methodologies specified in Rule 229 for developing screening levels, and the AQD “Procedures for Developing Screening Levels” dated May 23, 2002 (<http://www.deq.state.mi.us/documents/deq-aqd-toxics-slprocede.pdf>) should be followed. For additional assistance contact Mr. Mike Depa at 517-355-6988. Supporting documentation for the proposed screening level should be provided to the AQD. This information includes: identification of all references and databases searched for information, the results of the literature search, copies of relevant studies, and a summary of the data and methodology used to develop the screening level.

- C. **ITSL** ( $\mu\text{g}/\text{m}^3$ ) - Identify the applicable Initial Threshold Screening Level (ITSL) for each TAC emitted, in micrograms per cubic meter. The ITSL is the concentration of a TAC in ambient air which is used to evaluate non-carcinogenic health effects pursuant to Rule 225. If the TAC does not have an ITSL, proceed to Column E.
- D. **ITSL Avg Time** - Provide the appropriate averaging time for the ITSL identified in Column C. The averaging times are provided in the AQD list of screening levels. Averaging times include 1-hr, 8-hr, 24-hr, and annual. When using the electronic spreadsheet, select the appropriate averaging time from the drop down box.
- E. **IRSL or SRSL** ( $\mu\text{g}/\text{m}^3$ ) - Identify the applicable Initial Risk Screening Level (IRSL) or Secondary Risk Screening Level (SRSL) for TACs which are carcinogenic compounds, in micrograms per cubic meter. If the TAC also has an ITSL, list the IRSL or SRSL on a separate line of the spreadsheet. The IRSL is the concentration of a TAC in the ambient air used to evaluate emissions of carcinogenic compounds pursuant to Rule 225(1). It is defined as an increased cancer risk of one in one million ( $10^{-6}$ ). All IRSLs have annual averaging times.  
  
The SRSL should be provided if the provisions of Rule 225(2) are being used as an alternative to complying with the IRSL. The emission rates provided in Columns L and N should be based on the combined emissions of the TAC from the proposed new or modified process **and** all other existing emission units at the stationary source. The SRSL is the concentration of a TAC in the ambient air used to evaluate emissions of carcinogenic compounds pursuant to Rule 225(2). It is defined as an increased cancer risk of one in one hundred thousand ( $10^{-5}$ ). All SRSLs have annual averaging times.
- F. **AQD Screening Level?** - Indicate whether the screening levels provided in Columns C or E are from the AQD list of screening levels, or have been proposed by applicant. Type a “Y” if the screening level was developed by the AQD. Type an “N” if the screening level is a proposed value. When using the electronic spreadsheet, select the appropriate response from the drop down box.
- G. **AQD Footnote** - Provide the footnote number for the applicable screening level from the AQD list of screening levels, if applicable. The footnotes contain important information that must be considered in determining compliance with the requirements of the air toxic rules. The footnotes can be found at the bottom of the AQD list of screening levels on the website, or will appear with a chemical when using the query function of the web based screening level database.
- H. **Proposed Emission Rate** – Provide the maximum hourly emission rate of the TAC which will be emitted by the proposed new process or modification under review.

#### **Stack Parameters (I - L)**

Provide the stack height and property line distance for the stack which will be emitting the TAC. If the TAC is emitted from multiple stacks, assume the total combined emissions from all affected stacks are emitted from one stack. Use the shortest height and the closest property line distance of the affected stacks for this single “worst case” stack. If the TAC emissions are not acceptable using the Air Matrix Method (results in Column P or Q), the Dispersion Modeling Method should be used to demonstrate compliance for the TAC. See page 8 for details on the Dispersion Modeling Method.

- I. **Stack Height ( $H_s$ )** – Provide the height of the exhaust stack from ground level to the point of discharge, in feet.
- J. **Influential Building Height ( $H_b$ )** - Identify all buildings, both on and off site, located within a distance of five (5) times the height of that building to the exhaust stack identified in Column J. The influential building will be the tallest of these. Provide the height of the influential building, in feet.
- K. **Property Line Distance** – Provide the distance from the exhaust stack to the nearest secured property line, in feet.
- L.  **$(H_s)/(H_b)$**  - This is the ratio of the stack height to the influential building height.
- M. **Table 22 Annual AIR** – Determine the annual ambient impact ratio (AIR) from Table 22 (Appendix C). This is the ratio of the annual averaged hourly emission rate divided by the maximum annual ambient impact, in units of  $(\text{lbs/hr})(\mu\text{g}/\text{m}^3)$
- N. **Maximum ITSL Emission Rate** – Determine the maximum emission rate that would comply with the health based screening level by multiplying the ITSL from Column C by the AIR from Column M. If the TAC does not have an ITSL, proceed to Column O. If using the electronic spreadsheet, this value will be automatically calculated.
- O. **Maximum IRSL or SRSL Emission Rate** - Determine the maximum emission rate that would comply with the health based screening level by multiplying the IRSL or SRSL from Column E by the AIR from Column M. If using the electronic spreadsheet, this value will be automatically calculated.
- P. **Is the Proposed Emission Rate Less than the ITSL Maximum Emission Rate?** - Compare the proposed emission rate of the TAC in Column H to the maximum emission rate based on the ITSL in Column N. If  $H < N$ , the TAC emissions are acceptable. The electronic spreadsheet will auto fill “Yes” or “No”.
- Q. **Is the Proposed Emission Rate Less than the IRSL or SRSL Maximum Emission Rate?** - Compare the proposed emission rate of the TAC in Column H to the maximum emission rate based on the IRSL or SRSL in Column O. If  $H < O$ , the TAC emissions are acceptable. The electronic spreadsheet will auto fill “Yes” or “No”.

### Additional Instructions for Emissions of Mercury and Dioxins

Information for mercury emissions should include the following additional items:

- The emission rate of mercury reported as pounds per hour and pounds per year.
- The maximum predicted ambient concentration, based on a 24-hour averaging time period, determined pursuant to Rule 227(1)(c) and in accordance with the provisions of Rule 240 or Rule 241, or both.
- The percentage of mercury emitted as elemental vapor, mercury +2 vapor, and particle bound mercury (if available).

Information for dioxin emissions should include the following additional items:

- The annual emission rate in grams per year of all polychlorinated dibenzodioxins and dibenzofurans emitted, expressed as an equivalent concentration of 2,3,7,8-tetrachlorobenzo-p-dioxin.
- The maximum predicted ambient concentration, based on an annual averaging time period, determined pursuant to Rule 227(1)(c) and in accordance with the provisions of Rule 240 or Rule 241, or both.





**Demonstrating Compliance with Rule 225**

**III. Air Dispersion Modeling Methodology - Rule 227(1)(c)**

The following information is needed for each toxic air contaminant (TAC) to demonstrate compliance with the health based screening level requirements of Rule 225 using the Air Dispersion Modeling Methodology of Rule 227(1)(c). An electronic Microsoft Excel spreadsheet (Toxic Air Contaminants Spreadsheet) is available at <http://www.michigan.gov/deqair> (Click "Air Toxics", see "Laws & Rules"). If you do not have access to the Internet, copies of all referenced documents may be obtained by contacting Ms. Lorraine Hickman at 517-241-9059. A copy of the TAC Spreadsheet is also provided in Appendix A. The AQD does not require the use of the electronic spreadsheet however; submittal of the data in this format will help facilitate a timely toxics review pursuant to Rules 225-232. All of the information identified below is required as part of a complete permit application, regardless of the submittal format. Provide the information in the specified columns of the TAC spreadsheet. For technical assistance regarding Rule 225 requirements, contact Mr. Mike Depa at 517-355-6988.

Column	Heading
A	Chemical Name
B	CAS No.
C	ITSL ( $\mu\text{g}/\text{m}^3$ )
D	ITSL Avg Time
E	IRSL or SRSL ( $\mu\text{g}/\text{m}^3$ )
F	AQD Screening Level?
G	AQD Footnote
H	Proposed Emission Rate
I	Proposed Emission Rate Units
J	Predicted Ambient Impact (PAI) ( $\mu\text{g}/\text{m}^3$ )
K	Averaging Time
L	Derivation Method
M	Is Predicted Ambient Impact less than ITSL?
N	Is Predicted Ambient Impact less than IRSL or SRSL

- A. **Chemical Name** - List all Toxic Air Contaminants (TACs), as defined in Rule 120(f), that are emitted from the process. If a chemical or compound in the process is made up of a mixture, list all chemicals in that mixture. If a mixture has been given a Chemical Abstract Service Number (CAS), identification of the individual constituents of the mixture is not necessary. An example of this is Stoddard Solvent which is a mixture of hydrocarbons, with a CAS number of 8052-41-3.
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A proposed screening level is optional, but may expedite the permit review time. If the applicant chooses to develop a proposed screening level for consideration by the AQD, proper procedures must be followed and adequate documentation must be provided. The methodologies specified in Rule 229 for developing screening levels, and the AQD "Procedures for Developing Screening Levels" dated May 23, 2002 (<http://www.deq.state.mi.us/documents/deq-aqd-toxics-slprocede.pdf>) should be followed. For additional assistance contact Mr. Mike Depa at 517-355-6988. Supporting documentation for the proposed screening level should be provided to the AQD. This information includes: identification of all references and databases searched for information, the results of the literature search, copies of relevant studies, and a summary of the data and methodology used to develop the screening level.

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- D. **ITSL Avg Time** - Provide the appropriate averaging time for the ITSL identified in Column C. The averaging times are provided in the AQD list of screening levels. Averaging times include 1-hr, 8-hr, 24-hr, and annual. When using the electronic spreadsheet, select the appropriate averaging time from the drop down box.
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- G. **AQD Footnote** - Provide the footnote number for the applicable screening level from the AQD list of screening levels, if applicable. The footnotes contain important information that must be considered in determining compliance with the requirements of the air toxic rules. The footnotes can be found at the bottom of the AQD list of screening levels on the website, or will appear with a chemical when using the query function of the web based screening level database.
- H. **Proposed Emission Rate** – Provide the maximum emission rate of the TAC which will be emitted by the proposed new process or modification under review.
- I. **Proposed Emission Rate Units** - Provide the units for the emission rate in Column H. Appropriate units include grams per second, pounds per hour, pounds per month, pounds per year, and tons per year.

#### **Air Dispersion Modeling – Predicted Ambient Impact (J - L)**

The Predicted Ambient Impact (PAI) is the maximum off-site ambient concentration, based on the maximum emission rate, as specified in Rule 227(1)(c), and in accordance with the provisions of Rules 240 and 241. The PAI is determined from dispersion modeling, which can be done by the applicant or the AQD. For additional information regarding dispersion modeling requirements, refer to the AQD "Guidelines for Dispersion Modeling" which is available on the AQD Permit Web Page at <http://www.deq.state.mi.us/aps>. If you do not have access to the Internet, or for questions regarding use of the various dispersion models, contact Mr. Jim Haywood at 517-241-7478 (haywoojg@michigan.gov).

- J. **PAI** ( $\mu\text{g}/\text{m}^3$ ) – Provide the Predicted Ambient Impact (PAI) of the TAC emitted, in micrograms per cubic meter. The PAI should use the same averaging time as the applicable screening level. If a TAC has more than one screening level, provide a PAI for each applicable averaging time.
- K. **Avg Time** – Provide the appropriate averaging time for the PAI. This should be the same averaging time as the applicable screening level.
- L. **Derivation Method** – Identify the air quality dispersion modeling method used to derive the PAI. Typical modeling software includes: AERMOD, ISCST3, and Screen3.
- M. **Is the Predicted Ambient Impact Less than the ITSL?** – Compare the proposed predicted ambient impact of the TAC in Column J to the screening level in Column C. If  $J < C$ , the TAC emissions are acceptable. The electronic spreadsheet will auto fill “Yes” or “No”.
- N. **Is the Predicted Ambient Impact Less than the IRSL or SRSL?** - Compare the proposed predicted ambient impact of the TAC in Column J to the screening level in Column E. If  $J < E$ , the TAC emissions are acceptable. The electronic spreadsheet will auto fill “Yes” or “No”.

#### **Additional Instructions for Emissions of Mercury and Dioxins**

Information for mercury emissions should include the following additional items:

- The emission rate of mercury reported as pounds per hour and pounds per year.
- The maximum predicted ambient concentration, based on a 24-hour averaging time period, determined pursuant to Rule 227(1)(c) and in accordance with the provisions of Rule 240 or Rule 241, or both.
- The percentage of mercury emitted as elemental vapor, mercury +2 vapor, and particle bound mercury (if available).

Information for dioxin emissions should include the following additional item:

- The annual emission rate in grams per year of all polychlorinated dibenzodioxins and dibenzofurans emitted, expressed as an equivalent concentration of 2,3,7,8-tetrachlorobenzo-p-dioxin.







## APPENDIX B

### R 336.1227 Demonstration of compliance with health-based screening level.

Rule 227 (1) Compliance with the health-based screening level provisions of R 336.1225 shall be determined by any of the following:

(a) The emission rate of each toxic air contaminant is not greater than the rates determined from the algorithms in Table 21. If Table 21 provides 2 allowable emission rates for a screening level specific averaging time, then compliance with both emission rates is required.

Table 21 - Algorithms for determining allowable emission rates (AER)

Screening Level (SL) Averaging Time	Monthly Emission Rate (lbs / month) <sup>1,2</sup>	24 Hour Emission Rate (lbs / 24-hrs) <sup>1,3</sup>	8 Hour Emission Rate (lbs / 8-hrs) <sup>1,4</sup>	1 Hour Maximum Emission Rate (lbs / per hr) <sup>1,5</sup>
Annual	SL X 40 = AER			SL X 0.54 = AER
24 hours		SL X 0.12 = AER		SL X 0.05 = AER
8 hours			SL X 0.02 = AER	SL X 0.02 = AER
1 hour				SL X 0.001 = AER

<sup>1</sup> All screening levels (SL) are in units of  $\mu\text{g}/\text{m}^3$ .

<sup>2</sup> The constant value of 40 is in units of  $\frac{\text{lbs} / \text{month}}{\text{mg} / \text{m}^3}$ .

<sup>3</sup> The constant value of 0.12 is in units of  $\frac{\text{lbs} / 24\text{hours}}{\text{mg} / \text{m}^3}$ .

<sup>4</sup> The constant value of 0.02 is in units of  $\frac{\text{lbs} / 8\text{hours}}{\text{mg} / \text{m}^3}$ .

<sup>5</sup> The constant values of 0.54, 0.05, 0.02, and 0.001 are in units of  $\frac{\text{lbs} / \text{hour}}{\text{mg} / \text{m}^3}$ .

See Appendix C for subpart (b). Refer to the entire rule for subpart (c).

## APPENDIX C

### R 336.1227 Demonstration of compliance with health-based screening level.

Rule 227 (1) Compliance with the health-based screening level provisions of R 336.1225 shall be determined by any of the following:

(b) The emission rate of each toxic air contaminant is not greater than the rate determined from the AIR matrix screening methodology in Table 22 or determined by any other screening method approved by the department.

Table 22 reads as follows:

**Table 22**  
**Ambient Impact Ratio (AIR) Matrix**

#### Description

The ambient impact ratio (AIR) matrix enables the determination of an emission rate of a toxic air contaminant (TAC) that would cause a maximum predicted ambient air impact equal to a screening level. This emission rate is derived by multiplying the screening level by the appropriate AIR value. Emission rates which do not exceed that rate are determined to be in compliance with the health-based screening level under R 336.1225.

Use of the AIR matrix requires information pertinent to the dispersion characteristics of the emission source, namely, the distance to the nearest secured property line and the height of the stack and the influential building. The AIR matrix shall not be used if any of the following provisions apply:

- (a) the stack height is less than 10 feet.
- (b) if the influential building height is more than 100 feet.
- (c) if there are terrain elevations that are more than 25% of the discharging stack height within a distance of 500 feet from the stack.
- (d) for the analysis of elevated receptors, for example, hospital air intakes.

Instructions for the use of the AIR matrix are as follows:

1. Determine the height of the discharging stack from ground level in feet ( $H_s$ ).
2. Determine the height of the influential building in feet ( $H_b$ ). This is done by first identifying all buildings, including buildings on-site and off-site, located within a distance of 5 times their height from the discharging stack. Then, determine which building is the highest. This is the influential building, with height ( $H_b$ ) in feet. If the stack is not attached to a building, then a building height 2.5 times lower than the stack height must be assumed.
3. Determine the ratio of the stack height to the influential building height by dividing the stack height, in feet, by the influential building height, in feet, for example,  $H_s/H_b$ .
4. Determine the minimum distance, in feet, from the discharging stack to the secured property line. If there is no secured property line, then a distance of 25 feet is used.
5. Determine the appropriate value from the AIR matrix. This is done by selecting the column with the appropriate influential building height and  $H_s/H_b$  ratio, and selecting the row with the appropriate minimum distance to the secured property line. If the influential building height is between values in the column headings, then use the lower value or interpolate between values in the column headings. If  $H_s$  is less than  $H_b$ , then set the influential building height equal to the stack height and use the 1.25  $H_s/H_b$  column. If  $H_s/H_b$  is between 1 and 1.25, then select the 1.25 column. If  $H_s/H_b$  is between 1.25 and 1.75, then use the 1.25 column or interpolate between the



## APPENDIX C

1.25 and 1.75 columns. If  $H_t/H_b$  is between 1.75 and 2.5, then use the 1.75 column or interpolate between the 1.75 and 2.5 columns. If  $H_t/H_b$  is greater than or equal to 2.5, then use the 2.5 column. If the minimum distance to the secured property line is between 2 distances in the row headings, then use the lower value, for example, if the distance is 250 feet, then use the 200 foot distance row in the matrix.

The value thus derived from the body of the matrix is the ratio of the annual averaged hourly emission rate divided by the maximum annual ambient impact, in units of (lbs/hr)/(ug/m<sup>3</sup>). This value is referred to as the annual AIR.

6. The annual averaged hourly emission rate ratio (annual AIR) is adjusted as necessary for shorter averaging times, consistent with the averaging times for the screening levels. This adjustment is done as follows:

$$24\text{-hr AIR (lbs/hr)/(ug/m}^3) = \text{annual AIR} \times 0.091$$

$$8\text{-hr AIR (lbs/hr)/(ug/m}^3) = \text{annual AIR} \times 0.046$$

$$1\text{-hr AIR (lbs/hr)/(ug/m}^3) = \text{annual AIR} \times 0.02$$

7. Determine the maximum emission rate that would comply with the health-based screening level and averaging time. This is done by multiplying the screening level, in ug/m<sup>3</sup>, by the AIR value for the appropriate averaging time. The result is the highest emission rate, averaged over the averaging time period that would be in compliance with the screening level. If a source's maximum hourly emission rate does not exceed this, then the screening level would not be exceeded. If the emission is intermittent, the emission rate can be averaged over the applicable averaging time, as long as the averaged emission rate is not less than 10% of the maximum hourly emission rate as specified in R 336.1227(2).
8. In the special case of TAC emissions from multiple stacks, determine the AIR value for each stack and select the lowest value among them. Then proceed as in step number 7.

**APPENDIX C**

Table 22 - Ambient Impact Ratio (AIR) Matrix  
Annual Averaged Hourly Emission Rate Ambient Impact Ratios (AIRs) in Units of (lbs/hr)/(μg/m<sup>3</sup>) for  
Toxic Air Contaminants (TACs) with Annual Averaged Screening Levels

D I S T R I B U T I O N	BLDG HT (ft) H <sub>s</sub> / H <sub>b</sub> Stack Height->	10			20			30			40			50		
		1.25	1.75	2.50	1.25	1.75	2.50	1.25	1.75	2.50	1.25	1.75	2.50	1.25	1.75	2.50
		12.5	17.5	25.0	25.0	35.0	50.0	37.5	52.5	75.0	50.0	70.0	100.0	62.5	87.5	125.0
	25	0.0085	0.022	0.159	0.032	0.084	0.679	0.075	0.220	1.603	0.152	0.421	2.941	0.263	0.736	4.630
	50	0.0087	0.022	0.159	0.032	0.084	0.679	0.075	0.220	1.603	0.152	0.421	2.941	0.263	0.736	4.630
	75	0.0096	0.022	0.159	0.032	0.084	0.679	0.075	0.220	1.603	0.152	0.421	2.941	0.263	0.736	4.630
	100	0.011	0.023	0.159	0.033	0.084	0.679	0.075	0.220	1.603	0.152	0.421	2.941	0.263	0.736	4.630
	200	0.020	0.040	0.159	0.042	0.084	0.679	0.082	0.220	1.603	0.157	0.421	2.941	0.266	0.736	4.630
	300	0.030	0.053	0.178	0.059	0.113	0.679	0.099	0.221	1.603	0.174	0.421	2.941	0.282	0.736	4.630
	400	0.040	0.065	0.171	0.077	0.140	0.679	0.126	0.268	1.603	0.200	0.421	2.941	0.312	0.736	4.630
	500	0.051	0.077	0.189	0.094	0.164	0.679	0.153	0.318	1.603	0.243	0.505	2.941	0.351	0.743	4.630
	600	0.063	0.091	0.222	0.112	0.188	0.746	0.181	0.368	1.603	0.287	0.588	2.941	0.409	0.838	4.630
	700	0.075	0.104	0.241	0.130	0.211	0.812	0.208	0.413	1.603	0.328	0.664	2.941	0.468	0.951	4.717
	800	0.089	0.119	0.257	0.148	0.235	0.768	0.235	0.459	1.608	0.370	0.740	2.941	0.528	1.064	4.803
	900	0.103	0.134	0.264	0.167	0.258	0.770	0.261	0.502	1.672	0.411	0.812	2.941	0.585	1.168	4.854
	1000	0.119	0.151	0.272	0.187	0.282	0.800	0.289	0.545	1.786	0.452	0.883	2.959	0.644	1.276	4.950
	1500	0.209	0.245	0.318	0.290	0.406	1.080	0.428	0.756	1.953	0.654	1.214	3.521	0.924	1.761	5.376
	2000	0.311	0.350	0.383	0.408	0.539	1.256	0.573	0.965	2.304	0.861	1.534	3.731	1.205	2.222	5.882

D I S T R I B U T I O N	BLDG HT (ft) H <sub>s</sub> / H <sub>b</sub> Stack Height->	60			70			80			90			100		
		1.25	1.75	2.50	1.25	1.75	2.50	1.25	1.75	2.50	1.25	1.75	2.50	1.25	1.75	2.50
		75.0	105.0	150.0	87.5	122.5	175.0	100.0	140.0	200.0	112.5	157.5	225.0	125.0	175.0	250.0
	25	0.412	1.114	6.098	0.606	1.656	8.621	0.839	2.242	8.333	1.126	3.049	13.514	1.458	3.876	14.286
	50	0.412	1.114	6.098	0.606	1.656	8.621	0.839	2.242	8.333	1.126	3.049	13.514	1.458	3.876	14.286
	75	0.412	1.114	6.098	0.606	1.656	8.621	0.839	2.242	8.333	1.126	3.049	13.514	1.458	3.876	14.286
	100	0.412	1.114	6.098	0.606	1.656	8.621	0.839	2.242	8.333	1.126	3.049	13.514	1.458	3.876	14.286
	200	0.413	1.114	6.098	0.606	1.656	8.621	0.839	2.242	8.333	1.126	3.049	13.514	1.458	3.876	14.286
	300	0.426	1.114	6.098	0.614	1.656	8.621	0.845	2.242	8.333	1.129	3.049	13.514	1.458	3.876	14.286
	400	0.455	1.114	6.098	0.641	1.656	8.621	0.868	2.242	8.333	1.147	3.049	13.514	1.475	3.876	14.286
	500	0.498	1.114	6.098	0.683	1.656	8.621	0.909	2.242	8.333	1.185	3.049	13.514	1.506	3.876	14.286
	600	0.545	1.114	6.098	0.741	1.656	8.621	0.967	2.242	8.333	1.244	3.049	13.514	1.563	3.876	14.286
	700	0.625	1.269	6.250	0.808	1.672	8.621	1.040	2.242	8.333	1.316	3.049	13.514	1.634	3.876	14.286
	800	0.705	1.429	6.410	0.901	1.825	8.621	1.111	2.242	8.333	1.404	3.049	13.514	1.730	3.876	14.286
	900	0.781	1.572	6.579	1.000	2.016	8.621	1.235	2.488	9.091	1.502	3.086	13.514	1.832	3.876	14.286
	1000	0.861	1.724	6.849	1.101	2.203	9.091	1.359	2.732	10.000	1.634	3.289	13.514	1.931	3.876	14.286
	1500	1.232	2.404	7.042	1.577	3.106	9.615	1.953	3.846	11.905	2.358	4.505	15.152	2.778	5.208	16.129
	2000	1.603	3.049	7.353	2.041	3.968	9.615	2.525	4.808	12.821	3.049	5.618	16.129	3.597	6.494	18.519