REPORT ON PUBLIC HEARING HELD ON AUGUST 10, 2022, BY THE AIR POLLUTION CONTROL BOARD OF THE CITY OF PHILADELPHIA REGARDING PROPOSED AMENDMENTS TO AIR MANAGEMENT REGULATION VI

Dated: May 3, 2023

DocuSigned by:
Eddie Battle
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Air Pollution Control Board
Eddie R. Battle
Chair of the Board

Dated: May 2, 2023

Approved:

DocuSigned by:
Vijya Patel
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City of Philadelphia Law Department
Vijya Patel
Divisional Deputy City Solicitor
Regulatory Law Unit

A. Legal Authority

The Air Pollution Control Board ("APCB") was created via an ordinance of the City of Philadelphia ("City") on June 25, 1948, and is empowered to promulgate regulations regarding, *inter alia*, the substances to be considered toxic air contaminants under the City's Air Management Code and reporting emissions of these toxic air contaminants to the Philadelphia Department of Public Health, Air Management Services ("AMS"). *See* Philadelphia Home Rule Charter § 3-902; *see also* Philadelphia Code §§ 3-302, 3-401.

B. Procedural Summary

The APCB followed the procedures set forth in Home Rule Charter Section 8-407 when promulgating these amendments to Air Management Regulation ("AMR") VI (Control of Emissions of Toxic Air Contaminants). On April 28, 2022, the APCB voted to approve the posting of the proposed amendments to AMR VI at the City of Philadelphia Department of Records. The Law Department approved the proposed amendments to AMR VI for public comment posting, and on May 2, 2022, the APCB filed the proposed amendments to AMR VI with the Department of Records. The APCB scheduled a public hearing via Zoom on the proposed amendments to AMR VI for August 10, 2022. Notice of the public hearing was posted on the Department of Records' website on June 8, 2022; on June 20, 2022, notice of the public hearing was advertised in the Philadelphia Inquirer, the Daily News, and the Legal Intelligencer; and notice of the public hearing was posted prominently on the APCB's website and the social media channels of the Philadelphia Department of Public Health. Additionally, as part of the above public notice, the APCB accepted written testimony regarding the amendments to AMR VI through September 9, 2022.

Through this report on the August 10, 2022, public hearing and the written testimony received through September 9, 2022, the APCB modifies the proposed amendment to AMR VI and adopts it as modified. A clean copy of AMR VI as amended is attached hereto as Exhibit 1 and shall become law eleven (11) days after the filing of this Report with the Department of Records. A markup showing all changes made to AMR VI by the regulatory process initiated on May 2, 2022, and being approved by the APCB through this Report, is attached hereto as Exhibit 2.

C. Summary of Modifications to AMR VI and its Exhibits

In summary, the following modifications have been made to AMR VI and its exhibits in response to public comment:

- The Department removed Appendix B – Emission Sources That Do Not Require a Risk Analysis from the Technical Guidelines for Air Management Regulation VI. For additional information, please see Response to Comment 1.

- The Department modified the Technical Guidelines to clarify that the risk assessment process applies to both initial and renewal Title V operating permit applications. For additional information, please see Response to Comment 7.

- The Department modified how background risk is analyzed. The Department modified AMR VI Section III.B(3) to apply only to Title V Operating Permits. The Department modified Section III.D. of the Technical Guidelines to explain how background risk is calculated. The Department removed reference to AirToxScreen and added a new process for measuring background emissions surrounding the facility. Additional explanation was added regarding how the Department will use this data in the permitting process for Title V facilities. Please see Response to Comment 8 for additional information.

- The Department modified Section III.C and III.D of the Technical Guidelines to state that a mitigation plan is not required if the source in a construction permit application itself has an air toxics cancer risk below 1 in a million or a Title V facility has a facility-wide risk of less than 10 in a million.

- The Department modified Section III.A.1. of the Technical Guidelines to clarify that stack height means the height above grade. Please see Response to Comment 9 for additional information.

- The Department modified the Technical Guidelines at Section III.C. and Section III.D to use 50 in-a-million as the upper limit for cancer risks. Please see Response to Comment 12.

- The Department expanded Section IV of the Technical Guidelines to provide more information about Risk Mitigation Plans. For additional information, please see Response to Comment 22.

- The Department modified the Technical Guidelines at Section III.C and Section III.D to reflect that a mitigation plan is not required if the source in a construction permit application itself has an air toxics risk below 1 in a million or if a Title V facility itself has a risk of less than 10 in a million. For additional information, please see Response to Comment 8.

- The Department modified the effective date of AMR VI from immediately upon passage to January 1, 2024.

D. <u>The August 10, 2022, Hearing</u>

The public hearing was conducted by Eddie R. Battle, Chair of the Air Pollution Control Board, along with APCB members Cheryl Bettigole, Arthur Frank, CarolAnn Gross-Davis, Richard Pepino, and Terry Soule. India McGhee, Deputy City Solicitor, attended on behalf of the Law Department. The hearing transcript is attached hereto as Exhibit 3.

Additionally, written testimony was submitted to the APCB through September 9, 2022. All written testimony is attached hereto as Exhibit 4.

The combined list of commenters is as follows:

Commenter Number	Commenter Name / Organization	Type of Comment
1	Amani Reid on behalf of Pennsylvania Interfaith Power & Light	Written/Oral
2	The Chamber of Commerce for Greater Philadelphia	Written
3	Joseph Otis Minott, Esq. on behalf of Clean Air Council Amani Reid on behalf of Pennsylvania Interfaith Power & Light Jessica R. O'Neill & Adam Nagel on behalf of Citizens for Pennsylvania's Future Charles McPhedran, Emma Cheuse, Michelle Mabson, Ebony Griffin, & Robyn Winz on behalf of Earth Justice	Written
4	Elise Kucirka Salahub	Written
5	Katlyn Connor	Written/Oral
6	Lisa Hastings on behalf of PA League of Women Voters	Written/Oral
7	Lynn Robinson on behalf of Neighbors Against the Gas Plant	Written/Oral
8	Matthew Page on behalf of Eco Energy Distribution Services - Philadelphia	Written/Oral
9	Peter Furcht	Written/Oral
10	Sierra Club of Southeastern Pennsylvania	Written
11	Temple University	Written
12	Vicinity Energy	Written
13	Abha Saini	Written
14	Adam Nagel on behalf of Citizens for Pennsylvania's Future	Oral
15	Allison Saft	Written
16	Alston on behalf of ASEYOGA	Written
17	André Dhondt	Written
18	Anne Bonn	Written
19	Barb Segura	Written
20	Brendan K. Collins on behalf of Constellation Energy	Written
21	Brent Groce	Written

22	Charles Best	Written
23	Cheryl Haeberlein	Written
24	Christina Rosan	Written
25	Thomas P. Hogan on behalf of Cocoa Merchants' Association of America	Written
26	Coryn Wolk	Oral
27	Courtney Bragg	Written
28	Dakota	Written
29	Deborah James	Written
30	Douglas Kingsbury	Written
31	Eileen Ryan	Written
32	Ellen Fleishman	Written
33	Emily Davis	Written
34	Epsilon Associates	Written
35	Eric Gjertsen	Written
36	Florence Buckley	Written
37	Jared Krueger	Written
38	Jason Puglionesi	Written
39	Jeff Theobald on behalf of PhilaPort	Written
40	Jonathan Chase	Oral
41	Jonathan Leibovic	Written
42	Karen Melton	Written
43	Kevin Esposito	Written
44	Kimberly Allen	Written
45	Kristina Littell	Written
46	Kyle Rosato on behalf of University of Pennsylvania	Written
47	Lauren Powers	Written
48	Lindsay Christinees	Oral

49	Loretta Dunne	Written
50	Mara Baileys	Written
51	Marcus Ferreiras	Written
52	Marilyn V. Howarth on behalf of Philadelphia Regional Center for Children's Environmental Health	Written
53	Marlena Santoyos	Written
54	Mary Fox	Written
55	Matt Vrazo	Written
56	Matt Walker on behalf of Clean Air Council	Oral
57	Maurice Sampson (No comment; observing the hearing)	N/A
58	Michelle Mabson on behalf of Earth Justice	Oral
59	Mike Ewall on behalf of Energy Justice	Written
60	Mitch Chanin	Oral
61	Neely Tang	Written
62	Pamela Roy	Written
63	POWER	Written
64	Rachael Salahub	Written
65	Roberta Camp	Written
66	Rosemary A. Barbera	Written
67	Russell Hicks	Oral
68	Sage Lincoln	Oral
69	Philip Giles on behalf of Philadelphia Ship Repair	Written
70	Aaron Lockhart on behalf of Ship Repair Workers Union	Written
71	Steve Kratz	Oral
72	Tom Volkert	Written
73	Walter Tsou on behalf of Physicians for Social Responsibility Pennsylvania	Written
74	David Schogel	Written

75	Max Ojserkis	Written
76	Francis Fedoroff	Written
77	Jason Volpe	Written
78	Paul Hagedorn	Written
79	Sheila Erlbaum	Written
80	Alicia Clifton	Written
81	Alan Ankeny	Written
82	Timothy Duncan	Written
83	Tamara Cohen	Written
84	Serena Levingston	Written
85	Mark Barbash	Written
86	David Szczepanik	Written
87	Karen Spanton	Written
88	Anna Tangi	Written
89	Jada Ackley	Written
90	Bonnie Eisenfeld	Written
91	Dana Weidig	Written
92	Daniel Adair	Written
93	Megan LeCluyse	Written
94	William Haegele	Written
95	Camille Orman	Written
96	Vicki Jenkins	Written
97	Robert DuPlessis	Written
98	Jim Black	Written
99	Henry Frank	Written
100	Daniel Safer	Written
101	Deirdre DeVine	Written
102	Brandon Robilotti	Written

103	Susan Morris	Written
104	Joanna Ward	Written
105	Spencer Koelle	Written
106	Mary Ann Leitch	Written
107	Michael Miller Jr.	Written
108	Patricia Libbey	Written
109	Rose Paddison	Written
110	Jessica Know	Written
111	Annette Ballard	Written
112	Mary McKenna	Written
113	Vincent Prudente	Written
114	John Johnson	Written
115	Boris Dirnbach	Written
116	Linda Granato	Written
117	Susan Babbitt	Written
118	Cindy Dutka	Written
119	Harrison Mace	Written
120	Meagan Cusack	Written
121	Michael Bourg	Written
122	Brandon Tubby	Written
123	Gail Mershon	Written
124	Will Fraser	Written
125	Jessica Bellwoar	Written
126	Heather Knizhnik	Written
127	Richard Johnson	Written
128	Amanda Ruffner	Written
129	Rebecca Ackley	Written
130	Claire Byrnes	Written

131	Marta Guttenberg	Written
132	Sheila Siegl	Written
133	Charles Reeves	Written
134	William Piccinni	Written
135	Jill Turco	Written
136	Marlene Adkins	Written
137	Susan Saltzman	Written
138	Cody Cowper	Written
139	Gayle Cowper	Written
140	Steven Denisevicz	Written
141	Robert Artez	Written
142	Sheldon Issac	Written
143	Dana Dentice	Written
144	Kathleen Card	Written
145	Jennifer Parkhurst	Written
146	Beatice Zovich	Written
147	Morgan Doyle	Written
148	Derek Menaldino	Written
149	Julia Koprak	Written
150	Ana Montalban	Written
151	Laura Herndon	Written
152	Ellen Franzen	Written
153	Jennifer Valentine	Written
154	K Danowski	Written
155	Deborah Fexis	Written
156	Fern Hagedorn	Written
157	Barabara Hoffman	Written
158	Sandra Folzer	Written

159	Walter Bilderback	Written
160	Joyce Packer	Written
161	Julie Shapiro	Written
162	Alexis Brzuchalski	Written
163	William Ewing	Written
164	Johnny Buckley	Written
165	Gretchen Lohse	Written
166	Marille Lerner	Written
167	C Day	Written
168	Susan Bloch	Written
169	Paul Wade	Written
170	Vaughn Campbell	Written
171	Norman Koerner	Written
172	Judith Parker	Written
173	Claudia Salcedo	Written
174	Meredith Jones	Written
175	Louis Kyle	Written
176	Michael Zuckerman	Written
177	Susan Patrone	Written
178	Wesley Merkle	Written
179	Margaret Sayvetz	Written
180	Jay Tarler	Written
181	Tina Horowitz	Written
182	Susanna Martin	Written
183	Howard Spodek	Written
184	Theresa Heinsler	Written
185	Ben Levin	Written
186	Robert Cohen	Written

E. Response to Testimony and Comments Received

Comment 1: Twenty-seven commenters (3, 4, 6, 7, 9, 16, 22, 26, 27, 28, 29, 30, 31, 35, 36, 38, 41, 43, 49, 53, 54, 55, 59, 61, 62, 64, 66) stated that the proposed amendments to AMR VI have too many exemptions for risk assessments and/or requested that the APCB remove all exemptions.

APCB Response:

Since AMS receives around 800 pre-construction permit applications per year, AMS planned to pre-determine risk for certain common source categories. For example, if calculations show that the risk is low for one new 10 MMBTU/hr gas-fired boiler with a 10-foot stack that is 20 feet from the property boundary and has no operating limits, the risk will be low for any other new boiler with the same parameters. AMS also wanted to remove the burden from many smaller facilities that submit applications to install or operate air pollution sources with predictable risk and operative parameters. However, the APCB believes that AMS can achieve the goal of reducing the burden on small businesses using model spreadsheets and templates for performing the risk assessment. Therefore, the APCB has removed Appendix B – Emission Sources That Do Not Require a Risk Analysis from the Technical Guidelines for Air Management Regulation VI.

Exemptions are based on such pre-performed risk assessments that satisfy the risk benchmarks.

Pre-construction permits allow a facility to install new equipment or modify existing equipment (ex. increase the capacity of an existing process). All pre-construction permit applications must include Toxic Air Contaminant (TAC) emissions and all with the potential to emit a TAC at or above the listed reporting threshold must include risk analysis. This applies to minor facilities as well as Title V facilities. For example, a pre-construction permit application for an engine at a facility with a Synthetic Minor operating permit and a boiler for a facility below operating permit requirements would both require risk analysis if the potential emissions for a TAC were at or above the threshold.

Operating permits cover the operation of all existing equipment at a facility. They must be renewed every 5 years. Only Title V operating permit (TVOP) applications, which cover facilities that are considered major sources of emissions by EPA definitions, must include a risk analysis for the entire facility. This includes both the initial operating permit application and the following renewal applications. Synthetic Minor and Natural Minor operating permit applications, which cover facilities that are considered minor under EPA definitions, are not required to include a risk assessment at renewal. Facility-wide risk analysis requires complex modeling that is very time-consuming and expensive for facilities. Requiring this for minor operating permits would be burdensome for facilities that have lower emissions, which includes some small businesses and schools. The APCB believes this requirement should be limited to large-emitting facilities with the biggest impact on the environment.

Dust Control permits required under Air Management Regulation (AMR) II cover the potential dust emission from certain construction and demolition projects. Since these are short-term projects, it is not very relevant to conduct a cancer risk analysis, which evaluates the health impact from exposure over a person's lifetime (assumed 70 years). Additionally, it is difficult to accurately calculate the potential TACs from a construction or demolition project.

Complex Source permits required under AMR X cover the traffic emissions from a project that increases the number of parking spots by a certain amount. The added traffic emissions are evaluated to make sure they will not create a new exceedance in a National Ambient Air Quality Standard. These permits do not cover stationary air pollution sources like boilers and engines and do not cover TAC emissions.

Installation permits and licenses are issued under AMR XII to certain enclosed or partially enclosed automotive facilities to make sure that they do not have Carbon Monoxide build-up to dangerous levels. These permits do not cover stationary sources or TAC emissions.

Exemptions (4) and (5) apply to operating permits and air pollution licenses to operate equipment, not pre-construction permits to install new equipment. Pre-construction permit applications with the potential to emit one or more TAC at the reporting threshold level require risk assessment, regardless of whether the facility is a Title V. Only Title V operating permit applications are required to contain facility-wide risk analysis. These are the largest emitting facilities. There are over 200 facilities with operating permits and over 1000 air pollution licenses. The majority of these are considered minor-emitting facilities under EPA definitions. As is mentioned above, requiring facility-wide risk analysis for all of these would result in a large financial burden for many small facilities that do not have a big environmental impact.

Comment 2: Eight commenters (8, 11, 20, 25 34, 40, 46, 71) requested that the exemptions in the unamended version of AMR VI be retained. Two commenters (11, 46) requested that research laboratories be exempted from having to perform a risk assessment.

APCB Response:

The exemptions in the prior version of AMR VI are mostly about notification regarding what is being emitted, and these exemptions do not make sense for the amendments to AMR VI, which are more stringent and require a risk assessment in many cases. Some of these sources can potentially emit TACs that are higher than some of the reporting threshold levels in the proposed amendments. For example, under the current exemptions, a large boiler that burns commercial fuel is exempt and does not need to report TACs under the regulation, since the current regulation is mostly a reporting requirement and Department can look up the types of TACs the boiler emits. But these large boilers will typically have potential TAC emissions well above some of the thresholds and could have a negative risk impact on the surrounding community. The Philadelphia Department of Public Health (the Department) believes they should be applicable to the risk analysis requirements and has therefore decided to remove these exemptions.

Some commenters particularly want to keep the exemption for laboratory-scale operations. Laboratory-scale operations typically do not require a pre-construction permit, and the Department believes their TAC emissions are typically below the reporting threshold levels as described in the amendments to AMR VI. Therefore, the Department does not believe that a risk assessment will be required under most circumstances for laboratory-scale operations. However, if a facility does install a laboratory-scale operation that can emit a TAC in excess of the reporting thresholds, it is appropriate to require the facility to apply for a permit and perform a risk analysis.

Comment 3: Nineteen commenters (4, 7, 22, 27, 28, 29, 30, 31, 35, 38, 41, 53, 54, 55, 59, 61, 62, 64, 66) opposed removing Section III.C(3) in the existing AMR VI and requested that this paragraph be reinstated.

APCB Response:

The existing language in Section III.C(3) was originally written in 1981, when installation permits did not always include permit conditions such as allowable emissions rates. The "maximum allowable emission rates" described in Section III.C(3) was based on guidelines applicable in 1981. Since 1981, permit applications have developed over time to include specific permit conditions. These days, any emission rate that is considered relevant when determining the applicable requirements for a permit application will be established as an emission limit in the permit itself. This will include any TAC emission rates used in risk assessments under the amendments to AMR VI. As a result, a facility will need to apply for a permit modification if it wants to increase the allowable emission rate. In other words, the new risk assessment requirement provides higher levels of stringency and public health protection than the removed clause in the 1981 AMR VI. It does not make sense to keep both.

Comment 4: One commenter (7) stated that the regulation is not in compliance with Chapter 127.45(a) of the Pennsylvania Code and that the removed paragraph, Section II.A(4), in the existing regulation be reinstated.

APCB Response:

AMS's programs, including the amendments to AMR VI, are in compliance with Chapter 127.45(a) of the Pennsylvania Code. AMS enforces federal and state statutes and regulations through delegations of authority from the Environmental Protection Agency and the Pennsylvania Department of Environmental Protection. Through these delegations of authority, AMS "steps into the shoes" of the EPA and/or PADEP to enforce such requirements. Therefore, elements of federal and state regulations, including elements of Chapter 127.45(a) of the Pennsylvania Code, need not be restated in AMR VI. Rather, AMR VI sets standards that are more stringent than the floors set by federal and state regulations regarding risk assessments.

Please note that the amendments require facilities to submit potential TAC emissions as part of most pre-construction permit applications. They do not have any impact on existing requirements for facilities to submit TAC emissions, such as the requirement for Title V and Synthetic Minor facilities to submit an emission inventory each year. Permit applications and emission inventory data are publicly available.

Comment 5: Eight commenters (2, 12, 13, 25, 34, 39, 46, 71) stated that there was not enough time or opportunities for them to provide input.

APCB Response:

The proposal for an air toxics risk assessment was first presented during a public meeting of the APCB on January 24, 2019. The APCB held additional meetings that included presentations and discussions on AMR VI and risk assessments between the APCB and the public on August 29, 2019; November 14, 2019; October 22, 2020; January 28, 2021; October 21, 2021; and April 28, 2022. APCB meetings are open to the public, and their schedules and agendas are advertised

publicly in advance. E-mails about the proposed amendments were sent to each facility with an operating permit on December 20, 2021 and April 18, 2022. E-mails were also sent to these facilities on May 11, 2022, notifying them that the amendments were passed and with information about the comment period.

Following adoption of the amendments on April 28, 2022, the APCB provided notice of the amendments and the opportunity to comment in accordance with the City's Home Rule Charter. The public comment period was extended from August 10, 2022 to September 9, 2022, at the request of stakeholders. All written and oral comments were taken into consideration.

***Comment 6*:** Three commenters (34, 69, 71) stated that facilities subject to AMR VI are already regulated under federal and state regulations and asked the APCB to explain its rationale for implementing the new requirements under AMR VI. The commenters also asked how these new requirements will result in added reductions beyond what is already required under federal and state regulations.

APCB Response:

It is necessary for Philadelphia to implement air toxics control measures beyond what is required by federal and Pennsylvania regulations such as MACT, NESHAP and Pennsylvania RACT rules. Applicability to one of these regulations does not mean a source cannot potentially emit high levels of TACs. Only NESHAP and MACT deal directly with HAPs/TACs. The amendments will cover many sources that are not covered by either of these regulations. While NESHAP and MACT often require measures that reduce emissions, it is possible for a source to be applicable to one of these regulations and still emit TACs above the thresholds in the amendments. As a result, AMS does not believe they should automatically be exempt from the requirements of this amendment.

Philadelphia is a densely populated city with large portions of its population living in overburdened and disadvantaged areas according to EPA's EJSCREEN tool. Data in EPA's AirToxScreen (formerly NATA) tool indicates that cancer risks attributed to air toxics in the ambient air in Philadelphia are higher than the Pennsylvania and national averages.

The air toxics reporting thresholds and risk assessment requirements, which do not exist in current federal or Pennsylvania regulations, will help reduce the health risks from air toxics emissions from stationary sources in Philadelphia.

Comment 7: Three commenters (8, 12, 34) asked for clarification about Title V permit renewal requirements.

APCB Response:

The risk assessment requirement applies to both initial and renewal Title V operating permit applications. For renewals, a new risk assessment is required if there are changes in sources or emission amounts. If there is no change, the facility may submit the same assessment as in the previous application. This has been clarified in the Technical Guidelines to AMR VI.

Comment 8: Four commenters (8, 11, 20, 69) a) asked for clarification about background air toxics cancer risk, b) asked about the intent of adding background or opposed adding background in the risk assessment, and/or c) stated that the assessment would always result in a risk level

above the negligible level after adding the background even if the source itself has a negligible impact.

APCB Response:

a) Risks are collectively known as the background risk, meaning the sum of the risks to which we are exposed excluding the risks of additional activities being evaluated. The Department is conducting further research to create and improve processes for determining background air toxics cancer risk.

b) There is a lot of public interest in the cumulative impact of air pollutants, particularly HAPs/TACs. Measuring background risk is important because the public are exposed to the total risk, not only the incremental risk from the source. In response to comments regarding the Department's methodology for calculating background risk using EPA's AirToxScreen, the Department has modified its methodology for calculating background risk. These changes are reflected in the Technical Guidance Document in Section III.D. Instead of using AirToxScreen to identify the background cancer risk surrounding a facility, AMS will instead use EPA TO-15 methodology to take representative, 24-hour, ambient air canister samples in the area surrounding the facility. AMS maintains a Standard Operating Procedure (SOP) for TO-15 sampling and analysis and finds the method effective in measuring common air toxics in urban areas. The Department will then analyze the samples for existing air toxics concentrations using Gas Chromatography/Mass Spectrometry (GC/MS). The Department will estimate an annual average concentration of each TAC based on the measured 24-hour concentrations. The background cancer and noncancer risk for each TAC will be calculated using the measured air pollutant concentration, cancer Unit Risk Factors (URFs), and noncancer reference concentration (RfC).

   The Department will use a similar equation as initially proposed to calculate a facility's total risk. For a specific toxic air contaminant, the total risk is the combined risk of background risk and incremental risk by an emission source or a facility that applies for permitting:

   $$\textbf{Total Risk} = \textbf{Background Risk}_{\text{ambient air}} + \textbf{Incremental Risk}_{\text{facility}}$$

   This method will apply only to Title V facility-wide risk assessments, so the Department is modifying AMR VI Section III.B(3) to remove reference to plan approvals. The Department made this change in response to public comment and because Title V facilities pose the greatest risk to public health. The Department believes that the risk mitigation process for plan approvals will adequately protect the environment and the public health without incorporating a background risk analysis at this time.

   A Title V permit application is unacceptable if the total cancer risk is above 100 in a million, based on EPA cancer risk upper limit guidelines, unless the facility reduces the total cancer risk to no more than 100 in a million using mitigation measures. For a Title V facility itself, an upper limit of 50-in-a-million incremental cancer risk is used (see Response to Comment 12 and the AMR VI Technical Guidelines).

   When calculating a facility's Incremental Risk, the Department will only consider sources

that are not captured in the existing Background Risk at the facility. Therefore, Incremental Risk would only encompass newly planned sources at the facility for TVOP renewals and applications.

As the technology and EPA guidance evolve, AMS may adopt new methods to determine the background risk.

c) The Technical Guidelines have been modified at Section III.C and III.D to state that a mitigation plan is not required if the source in a construction permit application itself has an air toxics cancer risk below 1 in a million or a Title V facility itself has a facility-wide risk of less than 10 in a million.

Comment 9: One commenter (8) raised the following detailed questions and suggestions about performing air quality modeling and calculating health risks: a) whether a permit applicant can skip the risk screening step and go directly to refined AERMOD air modeling; b) whether an applicant can use alternative toxicity standards; c) requesting that an applicant should be able to modify the toxicity data in the Risk Screening Workbook; d) requesting clarification about the stack height.

APCB Response:

a) This can be discussed with AMS prior to submitting the application or in the permit review process with the principle that the stringency of the risk assessment and other permitting requirements stays the same.

b) Periodically, the Department will review the latest scientific findings and update the cancer URFs and the noncancer RfCs as well as the reporting thresholds accordingly. Significant changes may need APCB approval.

c) The reference data (cancer URFs and noncancer RfCs) and the calculation methods for risk assessments must be kept uniform for all permit applications. See (b) above.

d) The stack height means the height above grade. This has been clarified in the Technical Guidelines at Section III.A.1.

Comment 10: One commenter (46) raised concerns about: a) permitting backlog and delays when the new requirements take effect, b) not having a phased-in implementation schedule, and c) inconsistency with New Jersey regulation Title 7, 27-17.8(a)3 on overall exemptions levels.

APCB Response:

a) The Department has the capacity to implement this regulation.

b) The Department intends to start the regulation implementation in a timely manner. The amendments will be applicable to applications received on or after January 1, 2024.

c) While the amendments are similar to New Jersey's regulation, they are not intended to be the exact same.

Comment 11: One commenter (34) stated that it is unclear whether the risk assessment is based on potential or actual emissions.

APCB Response:

Risk assessments must be based on the potential emissions. Facilities can take new mitigation measures to their potential emissions during the permitting process and factor them into the risk analysis.

Comment 12: One-hundred-forty-eight commenters (3, 4, 7, 9, 15, 16, 21, 24, 27, 28, 29, 30, 35, 36, 37, 38, 41, 42, 44, 47, 49, 51, 53, 54, 55, 56, 58, 59, 61, 62, 64, 65, 66, 68, 72, 74 through 186) requested that the APCB change the upper limit of cancer risk benchmarks from 100-in-a-million to 25-in-a-million.

APCB Response:

The 50 in-a-million upper limit for cancer risks will be used, and AMS has modified the Technical Guidelines at Section III.C and III.D to reflect this change. The determination of whether the proposed risk mitigation plan is sufficiently protective of public health will be based on case-by-case considerations, including the presence of overburdened communities, emission sources, and cancer/non cancer risks at the area of the facility.

Comment 13**:** One-hundred-thirty-eight commenters (1, 3, 5, 6, 13, 14, 15, 16, 17, 18, 19, 21, 23, 24, 36, 37, 42, 44, 45, 47, 48, 49, 51, 65, 72, 74 through 186) requested that the AMR VI amendment be strengthened and made more stringent in general.

APCB Response:

The amended AMR VI significantly improves and strengthens the current version of AMR VI, which was established in 1981. It includes some of the most stringent measures to protect public health in the State. The number of regulated air toxics increases from 99 to 217 chemical compounds/compound groups. It is the first regulation in Pennsylvania that requires air toxics health risk assessments based on worst-case scenario screening, source emission conditions, air dispersion modeling and air toxics cancer and noncancer risk factors. The new requirements for pollutants reporting, reporting thresholds, and health risk assessments, which are based on recent scientific findings and methods, will decrease the health risks of air toxics emitted into the ambient air. These requirements do not exist in the current 1981 AMR VI. Permit review requirements have been enhanced to account for existing burdens in communities.

Table 4 in AMR VI Technical Support Document contains such examples as:

TAC:	*Recommended Ambient Air Concentration Limit (1981)*	*Ambient Concentration based on 1-in-a-million risk*
Benzene:	76.6 µg/m^3	0.13 µg/m^3
Chromium (VI):	0.12 µg/m^3	0.00008 µg/m^3

For further information, see the Amended AMR VI and Exhibits A, B, and C here: http://regulations.phila-records.com/

Comment 14: One-hundred-twenty-seven commenters (15, 21, 24, 26, 36, 37, 42, 44, 47, 49, 51, 59, 65, 72, 74 through 186) requested that requirements for ambient air monitoring, fence line monitoring, record keeping, and additional reporting be added.

APCB Response:

Routine ambient air monitoring is outside of the scope of these amendments.

Fence line monitoring, stack tests, and continuous emission monitors (CEMS) are included as permitting conditions when appropriate. These are very expensive to install and maintain. They have been required by certain regulations and/or permits, but only for the largest emission units and facilities. Record keeping and reporting requirements are included as permitting conditions when appropriate, and consider such factors as overburdened communities, emission source types and magnitude, maximum pollutant concentrations, downwind directions, etc. where necessary and appropriate. AMS routinely inspects operational records and reporting from permitted facilities.

Comment 15: One commenter (32) expressed general support for the AMR VI amendments.

APCB Response:

Thank you for your support!

Comment 16: One-hundred-fifty-five commenters (1, 3, 4, 6, 7, 9, 14, 15, 21, 24, 27, 28, 29, 30, 31, 33, 35, 36, 37, 38, 42, 47, 48, 49, 51, 52, 53, 54, 55, 56, 58, 59, 60, 62, 63, 64, 65, 66, 67, 68, 72, 73, 74 through 186) stated that a cumulative impact analysis should be required as part of the risk assessment.

APCB Response:

The Department is conducting research to create processes for calculating cumulative background risk. These risk data would include estimates of existing air toxics cancer risks contributed by over 70 pollutants in the ambient air, from not only existing stationary point sources but also mobile sources, non-point sources, secondary formation, and biogenic sources. Currently facility-wide assessments are required to account for emissions from all release points of the facility for each regulated TAC.

A highly comprehensive cumulative impact assessment would involve many health stressors, environmental media (air, water, solid waste, etc.) and factors, and exposure pathways, which would require joint efforts by multiple jurisdictions and disciplines. Such an undertaking is beyond the scope of these amendments and the capability of AMS alone.

For the risks contributed by a facility (aggregating risk), currently we do not add up the risk values of different TACs because:

- We calculated the worst-case scenario for each TAC by using the maximum potential TAC emissions and worst-case air dispersion conditions. During risk assessments, the TAC with the highest risk value often dominates the total risk.

- In Title V facility-wide risk assessments, AMS will determine the total risk of each TAC including the background. This is a significant step towards a comprehensive cumulative impact analysis. See Response to Comment 8.

- Different chemicals affect different organs. It would be difficult to agree on an accurate total risk value contributed by the facility by simple addition without sufficient and clear scientific conclusions. It is not scientifically accurate to add up the risk levels of all pollutants.

- EPA does not have complete data about which chemicals attack which organs.

- EPA does not have complete data for most chemicals for slope factors (SF) and RfC.

- EPA currently does not have detailed guidance on integrated assessment with various toxics considering multiple exposure pathways and other factors. This level of comprehensive and accurate assessments is out of the current scope of AMR VI.

The Department has used the most recent scientific findings in available literature. However, it is beyond the Department's capacity to conduct its own studies of toxicological thresholds for humans and animal species. Nevertheless, the Department intends to move towards more comprehensive risk analysis as more scientific evidence and more resources become available.

Comment 17: Two commenters (25, 39) stated that sulfuryl fluoride, a fumigant, is not a HAP and should not be included in the TAC list of AMR VI.

APCB Response:

Sulfuryl Fluoride is an odorless gas that targets the nervous system. It has been identified by a number of governmental, regulatory, and health research entities as having toxic effects in humans. In cases of overexposure, sulfuryl fluoride may cause respiratory irritation, nausea, abdominal pain, vomiting, numbness of extremities, seizures, and death. See references below[1,2,3,4,5].

Based on these and other references, the Department has decided to add Sulfuryl Fluoride to the list of Toxic Air Contaminants in AMR VI. With the same references, the Department also decided to use a long-term noncancer RfC of 60 $\mu g/m^3$ and a short-term noncancer RfC of 1700 $\mu g/m^3$. The reporting threshold of 2000 lbs/year was established based on such data. No data of cancer risk factors was found available. Also see Response to Comment 24.

[1]. https://www.nj.gov/dep/aqm/currentrules/Sub%2017.pdf
[2]. https://www.state.nj.us/dep/aqpp/archived/RSWorksheet/Risk%20Screening%20Worksheet%20Fact%20Sheet_June%202022.pdf
[3]. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6603922/
[4]. https://www.cdpr.ca.gov/docs/risk/rcd/establishing_sulfuryl_fluoride.pdf
[5]. https://www3.epa.gov/pesticides/chem_search/ppls/062719-00004-20100609.pdf

Comment 18: One commenter (73) stated that sulfuryl fluoride is highly toxic, and its reporting threshold should be lowered. The commenter also suggested that the reporting thresholds of several other TACs should be lowered.

APCB Response:

See Responses to Comments 17 and 24.

Comment 19: Nine commenters (6, 13, 16, 17, 45, 43, 48, 52, 73) requested that the Department include TAC information and emission data in public notices for permits, publicize such information on the Department website, and maintain high levels of transparency regarding TAC emissions.

APCB Response:

The Department will maintain high levels of transparency regarding TAC emissions. Public notices for pre-construction permits include emission information and will include TACs when significant. The pre-construction permit application and review memo will include more information about TAC emissions and are available to the public upon request. AMS has also put these documents on its website for some applications with high public interest and will continue to do this in the future.

Please note that while certain process information may be kept confidential if justified and protected by law, emissions cannot be kept confidential.

Title V and Synthetic Minor facilities submit annual emission inventories which include TAC emissions above a certain level. These emissions are available to the public online. For more information, please see https://www.dep.pa.gov/DataandTools/Reports/Pages/Air-Quality-Reports.aspx.

Comment 20: Seven commenters (6, 13, 18, 60, 63, 67, 73) stated that the Department should take into account such issues as mobile sources, ultrafine particles, greenhouse gases, electric buses, and renewable energy.

APCB Response:

Mobile sources will be considered indirectly as part of the background risk that the Department will measure for Title V facilities. See Section III.D. of the Technical Guidelines for details. Regarding ultrafine particles, there is no data available about emission factors to calculate the ultrafine particle emissions from processes or recommended ambient concentrations to stay below. This makes it impossible to regulate ultrafine particles at this time. Greenhouse gases, electric buses, and renewable energy are outside the scope of AMR VI.

Comment 21: One-hundred-twenty-nine commenters (3, 15, 21, 24, 36, 37, 42, 44, 47, 49, 51, 56, 58, 65, 68, 72, 74 through 186) requested that AMR VI be reviewed, and updated if needed, every five years.

APCB Response:

The APCB agrees and will review AMR VI every five years from the effective date of the relevant amendments.

Comment 22: One-hundred-thirty-one commenters (3, 6, 7, 9, 15, 21, 24, 36, 37, 42, 44, 47, 49, 51, 58, 65, 68, 72, 74 through 186) asked for more details about the risk mitigation requirements for facilities.

APCB Response:

A risk mitigation plan is required when the risk analysis for the application is higher than a negligible risk and lower than an unacceptable risk. Risk mitigation plans will be submitted by the facility owners and/or operators and are subject to Department review and approval. The risk mitigation plan must be well-defined and result in emissions reductions. This is a case-by-case determination because the situations can vary drastically, so there is no “one-size-fits-all" solution. Both an installation permit for a new small boiler at a school and a Title V operating permit application for a large chemical plant can require risk mitigation. The primary goal of a mitigation plan is to reduce emissions and health risks; the emission reductions can be quantified.

The Department has expanded Section IV of the Technical Guidelines to provide more information about Risk Mitigation Plans.

See also Response to Comments 14 and 31.

Comment 23: Six commenters (2, 25, 39, 69, 70, 71) expressed concerns regarding the economic impacts associated with AMR VI.

APCB Response:

The Department does not expect the amendments to AMR VI to have a significant adverse economic impact on jobs or a facility in general. The economic impact will vary depending on the permit application. Facilities may need to submit emissions data of potential air toxics that were not required in the past. This should not typically add significantly more time or cost when preparing an application. The Department intends to create spreadsheets that automatically perform emission calculations for certain common sources such as smaller boilers and emergency generators. Facilities may need to hire consultants to assist with more complicated projects or for Title V operating permit applications. Some facilities may need to modify their application for it to be approvable. The Department expects that in many cases, the facilities will be able to resolve this by installing a higher stack than originally planned, moving the project further from the property line, and/or implementing changes or restrictions on operation timings that can reduce ambient pollutant concentrations (most processes do not operate 8,760 hours per year). In these instances, the cost should be low. It is possible that a facility may need to install a control device to have an approvable application. The cost to install and operate control devices for air toxics will vary between facilities, industries, and specific air toxics.

The EPA has a webpage and a model dedicated to helping facilities estimate the cost of various control devices. This webpage also includes spreadsheets that calculate a cost estimate for installation and operation based on different input variables. The spreadsheets and guidelines can be found here: https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution. The EPA also has a cost analysis tool, CoST, available here: https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-analysis-modelstools-air-pollution. This tool is a free downloadable program that can model emission reductions and operating costs for various control devices and strategies.

In some cases, reducing air toxics emissions can save money for the industry. In a study of the furniture industry, for example, changing the design and manufacturing process reduced the use of materials emitting formaldehyde, resulting in lower emissions as well as a lower cost of materials.

Comment 24: Twenty-four commenters (4, 6, 7, 16, 25, 27, 28, 29, 30, 34, 35, 38, 39, 48, 53, 54, 55, 59, 61, 62, 66, 69, 71, 73) asked about the science, methodology, and determination of the reporting thresholds, or opposed the methodology used. In addition, four commenters (29, 34, 39, 69) expressed concerns about the conservative nature of the reporting thresholds or of the air modeling protocols.

APCB Response:

Details of the methodology for the risk assessment and reporting threshold establishment are described in Exhibit B of the AMR VI Amendments (Risk Assessment Technical Support Document). Air quality modeling utilizing the EPA designated model was performed to evaluate worst-case (98th percentile) atmospheric dispersion scenarios. The model input used highly conservative parameters to account for minimal dispersion (high concentration scenarios). The model's "urban" settings were used to account for surface conditions in Philadelphia. The latest scientific findings in air toxics cancer and non-cancer risk factors and the 98th percentile pollutant concentrations were used to derive the reporting thresholds. The cancer risk benchmark 1-in-a-million was used for the air toxic at issue in establishing reporting thresholds. The risk factors vary in great ranges, depending on the toxicity of the chemical compound. A chemical with very high toxicity will have an accordingly low reporting threshold and vice versa. For example, Chromium (VI) has a reporting threshold of 0.0045 lbs./year while benzene has a reporting threshold of 7 lbs./year. (See AMR VI Exhibit A). The air quality modeling followed the EPA protocols described in Appendix W of 40 CFR Part 51 – Guidance on Air Quality Models.

The reporting thresholds for Philadelphia may be slightly different from those in another city or state, even if the same methods were used. This is mainly because the atmospheric dispersion conditions differ between locations. Atmospheric dispersion is partly determined by local weather patterns, represented by 5-year meteorological statistics. Periodically, the Department will use recent meteorological data to update the air quality modeling, which may result in minor changes in reporting thresholds.

A small number of the listed air toxics have a reporting threshold of 2000 lbs./year. The reasons are:

- No cancer or non-cancer toxicology data were found available to establish a reporting threshold using the methods described in Exhibit B of the AMR VI Amendments. Therefore, 2000 lbs./year was used based on other references available; or

- The calculated allowable emission rate (under worst-case air dispersion conditions) would be higher than 2000 lbs./year (e.g., toluene). Then the reporting threshold is capped at 2000 lbs./year.

The Department will review the latest scientific findings periodically and update the reporting thresholds based on new data for cancer and non-cancer risk factors.

Regarding the conservative nature of the reporting thresholds, the thresholds are meant to be established in a very conservative manner, accounting for worst-case scenarios, because they will be used in the screening phase of the risk assessment. If a source cannot pass the screening, a refined air dispersion modeling can be performed using the actual emission conditions (such as exit gas velocity and temperatures) at the facility. Regarding the conservative nature of the air modeling protocols, AMS follows the EPA's Appendix W in the review of air modeling for permit applications. For evaluating impacts of surrounding sources or the background, see Response to Comment 8.

For further information, see AMR VI Amendments Exhibits A and B. See also Response to Comment 26.

Comment 25: Two commenters (23, 45) expressed general opposition to the AMR VI amendments.

APCB Response:

See Response to Comment 13.

Comment 26: Six commenters (3, 7, 26, 34, 63, 69) asked about the air quality modeling methods and the exclusion of background concentrations, or opposed the methodology used.

APCB Response:

During the establishment of the reporting thresholds and the Risk Screening Workbook, the Department's air quality modeling followed the EPA protocols described in Appendix W of 40 CFR Part 51 – Guidance on Air Quality Models. A protocol must be followed when a permit applicant is required to undergo a refined air quality modeling.

When establishing the reporting thresholds, the primary goal of the air quality modeling is to capture and examine the worst-case scenarios of atmospheric dispersion. Therefore, it is crucial to model shorter stacks using highly conservative input data – this does not mean only smaller facilities/stacks were considered. Adding the background in this context does not serve a purpose. When a specific facility's risk assessment is performed, then the actual stack height, the actual maximum emission rate, and other parameters are applied.

The air modeling examined both annual average and maximum short-term emission scenarios. Philadelphia-specific meteorological data and "urban" settings were used in the modeling.

Periodically, the Department will use recent meteorological data to update the air quality modeling, which may result in minor changes in reporting thresholds.

For nonpoint sources or in the event where the Risk Screening Workbook cannot be used, the risk screening will be performed using the EPA AERSCREEN air quality model.

When appropriate, the Department may provide additional guidance in technical aspects of air quality modeling. For further information, see AMR VI amendments Exhibits A and B, as well as references on the EPA website: https://www.epa.gov/scram/air-quality-dispersion-modeling. See also Response to Comment 24.

Comment 27: Nineteen commenters (4, 7, 16, 27, 28, 29, 30, 31, 35, 38, 49, 53, 54, 55, 59, 61, 62, 64, 66) asked what entity performs the risk assessment or requested that the Department perform the assessment.

APCB Response:

The risk assessment is part of the permit application, which is prepared by the permit applicant (facility). The applicant will submit its initial risk assessment. This is subject to Department review, as are all other parts of the application. AMS, the Department's air management division, will provide guidance and feedback, verify emission quantities and risk calculations, correct errors, and ensure that the risk assessment is done following the regulation and the guidelines. AMS may require modifications where necessary, which is similar to requiring modifications to emission calculations or other aspects of the permit application, before the application is approved. AMS does not have the resources to draft the initial application or assessment for applicants.

Comment 28: One-hundred-thirty-four commenters (1, 3, 6, 7, 9, 15, 21, 24, 36, 37, 42, 44, 47, 49, 51, 58, 65, 68, 72, 73, 74 through 186) asked about or requested further public involvement, specifically during the permit process.

APCB Response:

The Department currently issues approximately 800 pre-construction permits per year, many of which will include a risk analysis in the future. It is not practical to have public comment periods for all of them. The public will be able to review the risk assessments for Plan Approvals and Title V operating permits during the existing public notice and comment periods required under Pennsylvania regulations. These would include the installation of new processes with large emissions and the ongoing operation of facilities that are considered major emission sources. The public will not be able to review risk analyses associated with applications that do not have public notice and comment requirements, such as installation permit applications, which cover lower emitting sources. See also Responses to Comments 19 and 29.

Comment 29: Eleven commenters (1, 3, 6, 7, 14, 36, 45, 48, 52, 56, 73) expressed environmental justice concerns.

APCB Response:

The EPA's EJSCREEN tool will be used to screen for the most disadvantaged or overburdened communities in the City in various aspects of the work at AMS, Department of Public Health.

Environmental Justice is a topic larger than the scope of AMR VI. The Department will need further guidance in light of the revised Pennsylvania Environmental Justice Policy being finalized. The Department will adjust our process based on the final guidelines.

Comment 30: Two commenters (6, 7) asked about the EPA HAPs not included on the AMR VI TAC list and requested that they be added to AMR VI.

APCB Response:

Two compound groups in the Clean Air Act HAP list are not included in AMR VI: Radionuclides and Fine Mineral Fibers. Note that "Fine Mineral Fibers" are separate from Asbestos, which is included in AMR VI. Philadelphia also has an asbestos control regulation that the Department enforces. For these two compound groups: 1) no reference data were found available to establish their reporting thresholds; 2) no ambient air emission sources currently exist in Philadelphia; and 3) radioactive materials are regulated by the U.S. Nuclear Regulatory Commission. Also note that additional chemical compounds and compound groups beyond the Clean Air Act HAP list are included in this AMR VI amendment where appropriate and reliable data exists.

Comment 31: One-hundred-thirty-five commenters (15, 21, 24, 36, 37, 42, 44, 47, 49, 51, 65, 72, 74 through 186) asked about emission control measures and stated that they should be included in the mitigation plan requirements.

APCB Response:

The regulation cannot specify control or monitoring requirements because the source and process of emissions vary too widely for a one-size-fits-all approach to be feasible. An application to install a large utility boiler and an application to install a small boiler at a school each could have potential emissions large enough to require risk analysis but will have drastically different risk impacts and should have different requirements. The measures taken can also be impacted by the surrounding area, such as if there is a sensitive facility like a daycare center nearby.

Comment 32: One commenter (3) requested risk assessments with full demographics, considering different demographic groups (e.g., use of age-dependent adjustment factors and child-specific reference concentrations).

APCB Response:

As described in the Technical Guidelines, air quality modeling will capture worst-case scenarios of air quality. These include the maximum pollutant ambient concentrations and where they occur. The Department will specifically assess risks at "sensitive receptors" within the modeling domain, especially those at or near the locations where the maximum concentrations occur. Sensitive receptors may include schools, daycare centers, nursing home, hospitals, etc. The Technical Guidelines contain more guidance on hazard quotient rounding near vulnerable receptors.

F. Approval

At a public meeting on April 27, 2023, the Board voted 8-0 to approve the proposed amendments to AMR VI as modified and to approve this Hearing Report. AMR VI as amended is attached hereto as Exhibit 1.

EXHIBIT 1 – Clean Version of AMR VI and its Exhibits as Approved by the Air Pollution Control Board on April 27, 2023

CITY OF PHILADELPHIA
DEPARTMENT OF PUBLIC HEALTH
AIR POLLUTION CONTROL BOARD

AIR MANAGEMENT REGULATION VI
CONTROL OF EMISSIONS OF TOXIC AIR CONTAMINANTS

Originally Approved By:

Air Pollution Control Board.....June 9, 1981
Board of Health.....July 1, 1981
Department of Law.....July 2, 1981
Department of Records..... August 7, 1981

Approved by Air Pollution Control Board.....April 28, 2022
Approved by Law Department.....April 29, 2022
Filed with the Department of Records.....May 2, 2022
Legal Notice of Public Hearing..... July 11, 2022
Public Hearing.....August 10, 2022

Subsequent to the Public Hearing, the proposed Regulation was adopted with modification:
Approved by Air Pollution Control Board.....April 27, 2023
Approved by Law Department.....May 2, 2023
Filed with the Department of Records.....May 3, 2023
Effective Date..... January 1, 2024

PREAMBLE TO
AIR MANAGEMENT REGULATION VI
Control of Emissions of Toxic Air Contaminants

This Regulation is adopted pursuant to Title 3, Air Management Code, of the Philadelphia Code which reads in part as follows:

SECTION 3-201. GENERAL PROVISIONS

* * *

*** * ***

(3) (a) No person shall emit any toxic air contaminant unless, within six months of the adoption of regulations by the Air Pollution Control Board listing toxic air contaminants, he provides notice to the Department including a Material Safety Data Sheet as described in Section 3-301(24) in accordance with the requirements and procedures established in regulations promulgated by the Air Pollution Control Board pursuant to this subsection.

If a person discharges a toxic air contaminant on the list established by the Air Pollution Control Board for the first time, that person shall provide the Department with proper notice no more than thirty days after its emission into the atmosphere.

The person responsible for any source of air contaminants affected by any subsequent additions to the list of toxic substances established in the regulations of the Air Pollution Control Board shall similarly file notice with the Department within ninety days of the effective date of any revision to such list.

(b) The Department shall maintain a file of all notices relating to toxic air contaminants and shall make the file available for public inspection and reproduction during normal business hours.

(c) Within six months of the adoption of this subsection by the City Council, the Air Pollution Control Board shall promulgate regulations establishing a list of toxic air contaminants to which the provisions of this subsection shall be applicable, the form of the notice and request to be provided to the Department by any affected source of air contaminant emissions, and the reporting requirements and procedures related thereto.

The following factors may be considered by the Board in establishing the list of toxic air contaminants:

(.1) risk of immediate acute or subacute harm to human health, at concentrations likely to be encountered in the community;

(.2) proven carcinogenicity through epidemiological studies in both human and animal populations;

(.3) suspected carcinogenicity as shown in human epidemiological studies or in

laboratory studies of animals and other experimental media;

(.4) mutagenicity and teratogenicity as proven through human, animal, and experimental media;

(.5) bioaccumulative effects in humans and the environment;

(.6) findings of the Environmental Protection Agency, the Occupational Safety and Health Administration or other such agencies regarding toxicity;

(.7) extent to which the substance is likely to be found in Philadelphia industries;

(.8) other such factors necessary for the proper regulation of toxic air contaminants.

The Air Pollution Control Board shall, as appropriate, update and revise the list of toxic air contaminants subject to the provisions of this subsection on the basis of the latest available relevant scientific information."

*** * ***

SECTION 3-301. POWERS AND DUTIES OF THE DEPARTMENT OF PUBLIC HEALTH.

The Department of Public Health shall have the following powers and duties:

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* * *

(24) The Department shall obtain a Material Safety Data Sheet (MSDS) for each toxic air contaminant subject to the notice requirement. Such MSDS shall be provided to the Department by the person responsible for the affected source of emission as part of the notice requirements in subsection 3-201(3)(c). The Department shall include these MSDS in the file of notices regarding the emission of toxic air contaminants and shall make this file available to the public for inspection and reproduction during normal business hours. The MSDS shall conform to the format and contain the type of information required by the U.S. Department of Labor form OSHA 20, Material Safety Data Sheet (latest edition).

(25) The Department shall have the authority to require persons subject to Section 3-201(c)(1) to take all necessary measure to bring their emission of toxic air contaminants into compliance with the Code and regulations promulgated thereunder."

SECTION 3-302. POWERS AND DUTIES OF THE AIR POLLUTION CONTROL BOARD.

The Air Pollution Control Board shall have the following powers and duties:

(1) To promulgate regulations, implementing this Title, preventing degradation of air quality, preventing air pollution nuisances, and limiting, controlling, or prohibiting the emission of air contaminants to the atmosphere from any sources. Such regulations may include, but are not limited to, the following:

(a) the concentration, volume, weight, and other characteristics of emissions of air contaminants to the atmosphere, the circumstances under which

such emissions are permitted, and the degree of control of emissions of air contaminants required;

(b) the emissions of air contaminants to the atmosphere and related actions which are prohibited;

(c) the types and kinds of control measures and actions, equipment, storage and handling facilities, processes and systems, including specifications and/or performance requirements which may be required to control or eliminate emissions of air contaminants to the atmosphere;

* * *

*** * ***

(i) the substances to be considered toxic air contaminants under this Title and regulations for reporting the emission of these toxic air contaminants to the Department."

A. Pursuant to the above citations, this Regulation establishes a list of toxic air contaminants to which this Regulation is applicable; prescribes notice requirements for emitters of listed toxic air contaminants; provides for public access to information concerning the emission of toxic air contaminants; and limits, controls or prohibits the emission of toxic air contaminants.

AIR MANAGEMENT REGULATION VI

CONTROL OF EMISSIONS OF TOXIC AIR CONTAMINANTS

SECTION I. DEFINITIONS

The following definitions are in the Air Management Code, Title 3 of the Philadelphia Code, and apply to this Regulation:

1. *Air Contaminant* – Any smoke, soot, flyash, dust, cinders, dirt, noxious or obnoxious acids, fumes, oxides, gases, mists, aerosols, vapors, odors, toxic or radioactive substances, water, particulate, solid, liquid or gaseous matter, or any other materials in the outdoor atmosphere.

2. *Board* – Means the Air Pollution Control Board.

3. *Department* – The Department of Public Health, Health Commissioner or any authorized representative thereof.

4. *Facility* – The area, buildings, and equipment used by any person at a single location in the conduct of business.

5. *Person* – Any individual, natural person, syndicate, association, partnership, firm, corporation, institution, agency, authority, department, bureau, or instrumentality of federal, state or local government or other entity recognized by law as a subject of rights and duties.

6. *Toxic Air Contaminant* – A chemical substance or material the discharge of which into the atmosphere, based upon relevant available scientific evidence establishing the toxic, mutagenic and/or carcinogenic effects of such substance or material, may pose a potential hazard to the community in terms of a significant increase in risk of acute or long-term health effects. As used in this Regulation, toxic air contaminant shall mean any substance or material listed in the appendix to this Regulation.

SECTION II. NOTICE REQUIREMENTS

A. Notice of Emission

No person shall cause, suffer, allow or permit to escape or to be discharged into the atmosphere, from any facility for which a permit or license is required by the Air Management Code or any regulation promulgated thereto any toxic air contaminant except where written notice has been filed with the Department. Notice in accordance with this Section shall be filed at the time a permit or license, required by Air Management Code or any regulation promulgated thereto, is sought.

(1) Notice shall be made on a form as prescribed by the Department and may require applicants to identify the toxic air contaminants emitted; the associated areas or operations within the facility from which the toxic air contaminants are emitted; and provide estimates of the maximum hourly, daily and annual emission rates for each toxic air contaminant emitted from the specified areas or operations within facility.

B. Public Access

The Department shall establish and maintain, for a minimum of 30 years, a file of notices concerning the emission of toxic air contaminants and shall make the file available to the public subject to Section IV(B)(2) for inspection and reproduction during normal business hours. The Department may charge a reasonable fee for the cost of reproduction.

C. Exemptions

Facilities seeking permits or licenses for the following sources or activities, as required by Air Management Code or any regulation promulgated thereto, are exempted from the notice requirements set forth in this Section:

(1) Any demolition, implosion, earthworks, or other activity for which a Dust Control Permit is required pursuant to Air Management Regulation II. § IX.B.

(2) Any construction or modification of a parking facility or other Complex Source for which a Complex Source Permit is required pursuant to Air Management Regulation X. Section II.

(3) Any construction, modification, or operation of an automotive facility for which an installation permit or license is required pursuant to Air Management Regulation XII. Section II.

(4) Operation of a facility pursuant to a permit for non-Title V sources issued by the Department pursuant to 25 Pennsylvania Code Chapter 127, Subchapter F as adopted by reference in Air Management Regulation XIII.

(5) Operation of sources at a facility pursuant to an annual or indefinite license issued pursuant to the Air Management Code.

SECTION III. REGISTRATION, REVIEW AND APPROVAL REQUIREMENTS

A. Permits and Licenses

(1) The person responsible for any facility affected by this Regulation shall comply with all applicable permit and license requirements as specified by the Air Management Code and the Air Management Regulations promulgated thereunder.

(2) The Department shall require the applicant for, or holder of, any permit or license, or the person responsible, for any facility affected by this Regulation to take all necessary measures to prevent, control or limit the discharge or escape of toxic air contaminants so that the emissions do not pose a health hazard.

(3) For facilities subject to the notice of emission requirements of Section II of this Regulation, the Department shall grant or deny any permit or license sought pursuant to the Air Management Code and the Air Management Regulations promulgated thereunder in accordance with the conditions set forth in (C) below.

B. Review of Toxic Air Contaminant Emissions

(1) The Department shall establish or approve procedures, guidelines and methods to be used in the review and evaluation of toxic air contaminant emissions. The Board hereby approves the reporting thresholds for toxic air contaminants as set forth in the Technical Guidelines for Air Management Regulation VI attached as Exhibit A to this Regulation and the procedures for conducting health risk assessments for said toxic air contaminants as set forth in Exhibit A and in the Health Risk Assessment Technical Support Document for Air Management Regulation VI Amendment attached as Exhibit B. The Department is hereby authorized to update the documents as necessary, provided that substantial changes are submitted to the Board for approval.

(2) The Department shall verify all notices of emission filed pursuant to Section II of this Regulation and may require from the person responsible for any source of toxic air contaminant emissions such additional information as may be necessary to perform the evaluation required in (C) below.

(3) The Department shall review the existing air toxics concentrations surrounding the emissions source at issue prior to approving or disapproving a Title V operating permit.

C. Conditions of Approval

(1) Approval of any permit or license pursuant to this Section is contingent on a determination by the Department that such emission or discharge will not pose an undue health hazard, as per the Technical Guidelines for Air Management Regulation VI.

(2) The Department shall require the applicant for any permit or license for any source of toxic air contaminants affected by this Regulation to submit an assessment of health risk or hazard if the source has the potential to emit at least one toxic air contaminant in an amount above reporting thresholds established in the Department's guidelines. Assessments of health risk or hazard shall be compiled

using the Risk Screening Workbook attached as Exhibit C. Exhibit C may be updated at the discretion of the Department.

(3) The Department's determination shall be based upon an evaluation of the quantity, concentration and duration of the emission relative to the latest available information regarding health effects, guidelines or standards associated with the toxic air contaminant, or upon such other information the Department considers relevant to the evaluation.

Based on this evaluation, the Department shall:

(a) Approve a permit or license application, or license renewal, as submitted; renew said permit or license, subject to adoption of work practices, emission controls, emission limits, process changes, and other conditions necessary to address the health hazard posed by the toxic air contaminants; or

(b) disapprove a permit or license application, or license renewal of said permit or license.

SECTION IV. ADDITIONAL REPORTING REQUIREMENTS

A. Information Reporting

(1) In addition to the Notice requirements of Section II, the person responsible for any source of emission of a listed toxic air contaminant shall, upon notification from the Department, provide such information as will disclose the quantity, concentration and duration of such emissions, which are or may be discharged, or any other technical data as may be required by the Department to determine compliance with applicable emission guidelines, standards, limitations or control measures established by the Department.

(2) The required information shall be submitted by the responsible person on reporting forms supplied by the Department and shall be complete. The required information shall be submitted to the Department within 30 days from the receipt of the notice and form, unless a written request for an extension has been made and granted by the Department.

(3) Information recorded on or copies of reporting forms submitted to the Department shall be retained by the responsible person for two years after the date on which the pertinent report was submitted.

B. Availability of Information

(1) Information obtained from reporting forms submitted to and verified by the Department shall be correlated with applicable emission guidelines, standards, limitations or control measures established by the Department. All such emissions data shall be available for public inspection at the Department during normal business hours.

(2) Any records, reports, information, or particular part thereof, other than emissions data, relating to secret processes, methods of manufacture or production, or otherwise entitled to protection as trade secrets, provided to, required or obtained by the Department shall be kept confidential.

SECTION V. APPLICABILITY

A. The provisions of this Regulation shall be applicable in addition to any other provisions set forth elsewhere in the Regulations of the Air Pollution Control Board, unless an exemption has been provided herein.

B. Nothing contained in this Regulation shall be taken to excuse or relieve any person from complying with other applicable provisions of the Philadelphia Code and regulations adopted pursuant thereto, or with applicable laws of Pennsylvania or the United States.

SECTION VI. SEVERABILITY

The provisions of this Regulation are severable. If any provision or part thereof is held to be unenforceable, the remaining provisions or parts thereof shall remain in effect. It is hereby declared to be the intent of the Board that this Regulation would have been adopted if the unenforceable provision or part had not been included.

SECTION VII. EFFECTIVE DATE

This Regulation shall become effective on January 1, 2024.

APPENDIX TO AIR MANAGEMENT REGULATION VI

Control of Emissions of Toxic Air Contaminants

The following substances and materials shall be considered toxic air contaminants for the purpose of this Regulation and shall be subject to the provisions and requirements set forth therein.

No.	CAS Number	Toxic Air Contaminant / Hazardous Air Pollutant
1	75070	Acetaldehyde
2	60355	Acetamide
3	75058	Acetonitrile
4	98862	Acetophenone
5	53963	2-Acetylaminofluorene
6	107028	Acrolein
7	79061	Acrylamide
8	79107	Acrylic acid
9	107131	Acrylonitrile
10	107051	Allyl chloride
11	92671	4-Aminobiphenyl
12	62533	Aniline
13	90040	o-Anisidine
14	140578	Aramite
15	1332214	Asbestos (1)
16	71432	Benzene
17	92875	Benzidine (4,4'-Biphenyldiamine)
18	98077	Benzotrichloride
19	100447	Benzyl chloride (Chloromethylbenzene)
20	92524	Biphenyl
21	117817	Bis(2-ethylhexyl) phthalate (DEHP)
22	542881	Bis(chloromethyl)ether
23	75252	Bromoform

24	106945	1-Bromopropane (n-Propyl Bromide)
25	106990	1,3-Butadiene
26	156627	Calcium cyanamide
27	133062	Captan
28	63252	Carbaryl
29	75150	Carbon disulfide
30	56235	Carbon tetrachloride (Tetrachloromethane)
31	463581	Carbonyl sulfide
32	120809	Catechol
33	133904	Chloramben
34	57749	Chlordane
35	7782505	Chlorine
36	79118	Chloroacetic acid
37	532274	2-Chloroacetophenone
38	108907	Chlorobenzene
39	510156	Chlorobenzilate (Ethyl-4,4'-dichlorobenzilate)
40	67663	Chloroform (Trichloromethane)
41	107302	Chloromethyl methyl ether (CMME)
42	126998	Chloroprene (2-Chloro-1,3-butadiene)
43		Cresols (Cresylic acid, Cresol mixers)
44	95487	o-Cresol
45	108394	m-Cresol
46	106445	p-Cresol
47	98828	Cumene
48	72559	DDE (Dichlorodiphenyldichloroethylene)
49	50293	DDT/DDD
50	334883	Diazomethane
51	132649	Dibenzofurans
52	96128	1,2-Dibromo-3-chloropropane
53	84742	Dibutylphthalate

54	106467	1,4-Dichlorobenzene
55	91941	3,3-Dichlorobenzidine
56	111444	Dichloroethyl ether (Bis(2-chloroethyl) ether)
57	542756	1,3-Dichloropropene
58	62737	Dichlorvos
59	60571	Dieldrin
60	111422	Diethanolamine
61	121697	N,N-Dimethylaniline
62	64675	Diethyl sulfate
63	119904	3,3-Dimethoxybenzidine
64	60117	4-Dimethyl aminoazobenzene
65	119937	3,3′-Dimethyl benzidine (o-Tolidine)
66	79447	Dimethyl carbamoyl chloride
67	68122	Dimethyl formamide
68	57147	1,1-Dimethyl hydrazine (Asymmetric dimethyl hydrazine)
69	131113	Dimethyl phthalate
70	77781	Dimethyl sulfate
71	534521	4,6-Dinitro-o-cresol
72	51285	2,4-Dinitrophenol
73	121142	2,4-Dinitrotoluene
74	123911	1,4-Dioxane (1,4-Diethyleneoxide)
75	122667	1,2-Diphenylhydrazine
76	106898	Epichlorohydrin (1-Chloro-2,3-epoxypropane)
77	106887	1,2-Epoxybutane
78	140885	Ethyl acrylate
79	100414	Ethyl benzene
80	51796	Ethyl carbamate (Urethane)
81	75003	Ethyl chloride (Chloroethane)
82	106934	Ethylene dibromide (1,2-Dibromoethane)

83	107062	Ethylene dichloride (1,2-Dichloroethane)
84	107211	Ethylene glycol
85	151564	Ethylene imine (Aziridine)
86	75218	Ethylene oxide
87	96457	Ethylene thiourea (1,3-Ethylene-2-thiourea)
88	75343	Ethylidene dichloride (1,1-Dichloroethane)
89	50000	Formaldehyde
90	76448	Heptachlor
91	118741	Hexachlorobenzene
92	87683	Hexachlorobutadiene (Hexachloro-1,3-butadiene)
93	608731	Hexachlorocyclohexane [technical grade]
94	58899	*gamma*-Hexachlorocyclohexane (Lindane)
95	77474	Hexachlorocyclopentadiene
96	67721	Hexachloroethane
97	822060	Hexamethylene-1,6-diisocyanate
98	680319	Hexamethylphosphoramide
99	110543	Hexane
100	302012	Hydrazine (Diamine)
101	7647010	Hydrogen chloride (Hydrochloric acid)
102	7664393	Hydrogen fluoride (Hydrofluoric acid)
103	123319	Hydroquinone
104	78591	Isophorone
105	108316	Maleic anhydride
106	67561	Methanol
107	72435	Methoxychlor
108	74839	Methyl bromide (Bromomethane)
109	74873	Methyl chloride (Chloromethane)
110	71556	Methyl chloroform (1,1,1-Trichloroethane)
111	60344	Methyl hydrazine

112	74884	Methyl iodide (Iodomethane)
113	108101	Methyl isobutyl ketone (MIBK; Hexone)
114	624839	Methyl isocyanate
115	80626	Methyl methacrylate
116	1634044	Methyl tert butyl ether (MTBE)
117	101144	4,4-Methylene bis(2-chloraniline)
118	75092	Methylene chloride (Dichloromethane)
119	101779	4,4'-Methylene dianiline
120	101688	4,4-Methylene diphenyl diisocyanate (MDI)
121	91203	Naphthalene
122	98953	Nitrobenzene
123	92933	4-Nitrobiphenyl
124	100027	4-Nitrophenol
125	79469	2-Nitropropane
126	55185	N-Nitrosodiethylamine
127	62759	N-Nitrosodimethylamine
128	59892	N-Nitrosomorpholine
129	684935	N-Nitroso-N-methylurea
130	56382	Parathion
131	82688	Pentachloronitrobenzene (Quintobenzene)
132	87865	Pentachlorophenol
133	108952	Phenol
134	106503	p-Phenylenediamine
135	75445	Phosgene
136	7803512	Phosphine
137	7723140	Phosphorus
138	85449	Phthalic anhydride
139	1336363	Polychlorinated biphenyls (PCBs; Aroclors)
140	1120714	1,3-Propane sultone (3-Hydroxyl-1-propane sulfonic acid sulfone)

141	57578	*beta*-Propiolactone (3-Hydroxypropanoic acid lactone)
142	123386	Propionaldehyde
143	114261	Propoxur (Baygon)
144	78875	Propylene dichloride (1,2-Dichloropropane)
145	75569	Propylene oxide (1,2-Epoxypropane)
146	75558	1,2-Propylenimine (2-Methyl aziridine)
147	91225	Quinoline
148	106514	Quinone
149	100425	Styrene
150	96093	Styrene oxide
151	2699798	Sulfuryl fluoride
152	1746016	2,3,7,8-Tetrachlorodibenzo(p)dioxin (2,3,7,8-TCDD; Dioxin)
153	79345	1,1,2,2-Tetrachloroethane
154	127184	Tetrachloroethylene (Perchloroethylene)
155	7550450	Titanium tetrachloride
156	108883	Toluene
157	95807	2,4-Toluene diamine (2,4-Diaminotoluene)
158	584849	2,4-Toluene diisocyanate
159	95534	o-Toluidine
160	8001352	Toxaphene
161	120821	1,2,4-Trichlorobenzene
162	79005	1,1,2-Trichloroethane
163	79016	Trichloroethylene
164	95954	2,4,5-Trichlorophenol
165	88062	2,4,6-Trichlorophenol
166	121448	Triethylamine
167	1582098	Trifluralin
168	540841	2,2,4-Trimethylpentane

169	108054	Vinyl acetate
170	593602	Vinyl bromide (Bromoethene)
171	75014	Vinyl chloride
172	75354	Vinylidene chloride (1,1-Dichloroethylene)
173		Xylenes (mixed isomers)
174	95476	o-Xylenes
175	108383	m-Xylenes
176	106423	p-Xylenes
177		Antimony compounds (2)
178	7783702	Antimony pentafluoride
179	1309644	Antimony trioxide
180	1345046	Antimony trisulfide
181		Arsenic compounds (2)
182	7784421	Arsine
183		Beryllium compounds (2)
184		Cadmium compounds (2)
185	130618	Cadmium oxide
186		Chromium VI (Total) (2)
187	744084	Cobalt metal and compounds (2)
188	10210681	Cobalt carbonyl
189	62207765	Fluomine
190		Coke oven emissions (2)
191		Cyanide compounds (including Hydrogen cyanide) (2)
192	94757	2,4-D, salts and esters (2)
193		Glycol ethers (2)
194	111762	Ethylene glycol monobutyl ether (2-Butoxyethanol; EGBE)
195	110805	Ethylene glycol monoethyl ether (2-Ethoxy ethanol)

196	111159	Ethylene glycol monoethyl ether acetate
197	109864	Ethylene glycol monomethyl ether (2-Methoxy ethanol)
198		Lead and compounds (2)
199	78002	Tetraethyl lead
200	7439965	Manganese and compounds (2)
201	12108133	Methylcyclopentadienyl manganese
202		Mercury compounds (2)
203	7439976	Mercury (inorganic)
204		Nickel compounds (2)
205	13463393	Nickel carbonyl
206	1313991	Nickel oxide
207		Polycyclic organic matter (POM) & Polycyclic aromatic hydrocarbons (PAHs) (2)
208	56553	Benz(a)anthracene
209	225514	Benz(c)acridine
210	50328	Benzo(a)pyrene (3,4-benzopyrene)
211	205992	Benzo(b)fluoranthene
212		Selenium compounds (2)
213	7783075	Hydrogen selenide
214	7488564	Selenium sulfide (mono- and di-)
215	13410010	Sodium selenate
216	10102188	Sodium selenite
217		Total dioxin and furans (3)

(1) Also see Philadelphia Department of Public Health Asbestos Control Regulation.

(2) Indicating a chemical compound group; some compounds or subgroups included in this group may also be individually named in this table.

(3) As defined in Interim Procedures for Estimating Risks Associated with Exposure to Mixtures of Chlorinated-p- Dioxins and Dibenzofurans (CDDs and CDFs) and 1989 Update by U.S. Environmental Protection Agency.

Technical Guidelines for
Air Management Regulation VI

By

Air Management Services

Department of Public Health

City of Philadelphia

April 28, 2022
Revised April 27, 2023

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I. Toxic Air Contaminants and Reporting Thresholds

Toxic air contaminants, also known as air toxics, are man-made or natural pollutants that when emitted into the air may have adverse health effects as determined from human and animal exposure studies. Air Management Regulation (AMR) VI, as amended, incorporates a list of two hundred and seventeen (217) air pollutants and pollutant groups that are designed as air toxics by the Air Pollution Control Board pursuant to Phila. Code Sec. 3-201(3). This list incorporates nearly all one hundred eighty-eight (188) pollutants that are classified as hazardous air pollutants (HAPs) by U.S. EPA pursuant to Section 112 of the Clean Air Act, and includes additional air pollutants that have been determined to have adverse health effects by Air Management Service (AMS), Department of Public Health, City of Philadelphia.

As per AMR VI Sec. III.C.(2), AMS is required to establish a reporting threshold for each of the designated air toxics. The reporting threshold is the annual emission rate level (tons per year or pounds per year), that when exceeded, a health risk analysis is necessary. The reporting thresholds for all the designated air toxics are provided in Table 1 below. The *Health Risk Assessment Technical Support Document for Air Management Regulation VI Amendment* describes how these reporting thresholds were established.

Table 1. List of Toxic Air Contaminants (Air Toxics) and Reporting Thresholds

No.	CAS Number	Toxic Air Contaminant / HAP	Reporting Threshold (pounds/year)
1	75070	Acetaldehyde	24
2	60355	Acetamide	2.7
3	75058	Acetonitrile	2000
4	98862	Acetophenone	1
5	53963	2-Acetylaminofluorene	0.04
6	107028	Acrolein	1
7	79061	Acrylamide	0.5
8	79107	Acrylic acid	53
9	107131	Acrylonitrile	1
10	107051	Allyl chloride	9
11	92671	4-Aminobiphenyl	0.01
12	62533	Aniline	33
13	90040	o-Anisidine	1.3
14	140578	Aramite	7.5
15	1332214	Asbestos (1)	0.007
16	71432	Benzene	7

17	92875	Benzidine (4,4’-Biphenyldiamine)	0.001
18	98077	Benzotrichloride	0.015
19	100447	Benzyl chloride (Chloromethyl benzene)	1
20	92524	Biphenyl	21
21	117817	Bis(2-ethylhexyl) phthalate (DEHP)	22
22	542881	Bis(chloromethyl)ether	0.001
23	75252	Bromoform	48
24	106945	1-Bromopropane	2000
25	106990	1,3-Butadiene	1.8
26	156627	Calcium cyanamide	2000
27	133062	Captan	80
28	63252	Carbaryl	2000
29	75150	Carbon disulfide	2000
30	56235	Carbon tetrachloride (Tetrachloromethane)	9
31	463581	Carbonyl sulfide	530
32	120809	Catechol	1000
33	133904	Chloramben	200
34	57749	Chlordane	0.5
35	7782505	Chlorine	10
36	79118	Chloroacetic acid	20
37	532274	2-Chloroacetophenone	1.6
38	108907	Chlorobenzene	2000
39	510156	Chlorobenzilate (Ethyl-4,4’-dichlorobenzilate)	1.7
40	67663	Chloroform (Trichloromethane)	2.3
41	107302	Chloromethyl methyl ether (CMME)	0.08
42	126998	Chloroprene (2-Chloro-1,3-butadiene)	0.12
43		Cresols (Cresylic acid, Cresol mixers)	2000
44	95487	o-Cresol	2000
45	108394	m-Cresol	2000
46	106445	p-Cresol	2000
47	98828	Cumene	2000
48	72559	DDE (Dichlorodiphenyldichloroethylene)	0.5

49	50293	DDT/DDD	0.5
50	334883	Diazomethane	200
51	132649	Dibenzofurans	1000
52	96128	1,2-Dibromo-3-chloropropane	0.03
53	84742	Dibutylphthalate	2000
54	106467	1,4-Dichlorobenzene	4.8
55	91941	3,3-Dichlorobenzidine	0.16
56	111444	Dichloroethyl ether (Bis(2-chloroethyl) ether)	0.16
57	542756	1,3-Dichloropropene	13
58	62737	Dichlorvos	0.6
59	60571	Dieldrin	0.012
60	111422	Diethanolamine	160
61	121697	N,N-Dimethylaniline	200
62	64675	Diethyl sulfate	200
63	119904	3,3-Dimethoxybenzidine	20
64	60117	4-Dimethyl aminoazobenzene	0.04
65	119937	3,3′-Dimethyl benzidine (o-Tolidine)	2
66	79447	Dimethyl carbamoyl chloride	0.014
67	68122	Dimethyl formamide	1600
68	57147	1,1-Dimethyl hydrazine (Asymmetric dimethyl hydrazine)	0.1
69	131113	Dimethyl phthalate	2000
70	77781	Dimethyl sulfate	0.013
71	534521	4,6-Dinitro-o-cresol	20
72	51285	2,4-Dinitrophenol	200
73	121142	2,4-Dinitrotoluene	0.6
74	123911	1,4-Dioxane (1,4-Diethyleneoxide)	11
75	122667	1,2-Diphenylhydrazine	0.25
76	106898	Epichlorohydrin (1-Chloro-2,3-epoxypropane)	44
77	106887	1,2-Epoxybutane	1060
78	140885	Ethyl acrylate	425
79	100414	Ethyl benzene	21
80	51796	Ethyl carbamate (Urethane)	0.18
81	75003	Ethyl chloride (Chloroethane)	2000

82	106934	Ethylene dibromide (1,2-Dibromoethane)	0.09
83	107062	Ethylene dichloride (1,2-Dichloroethane)	2
84	107211	Ethylene glycol	2000
85	151564	Ethylene imine (Aziridine)	0.003
86	75218	Ethylene oxide	0.01
87	96457	Ethylene thiourea (1,3-Ethylene-2-thiourea)	4
88	75343	Ethylidene dichloride (1,1-Dichloroethane)	33
89	50000	Formaldehyde	4
90	76448	Heptachlor	0.04
91	118741	Hexachlorobenzene	0.12
92	87683	Hexachlorobutadiene (Hexachloro-1,3-butadiene)	2.4
93	608731	Hexachlorocyclohexane [technical grade]	0.1
94	58899	*gamma*-Hexachlorocyclohexane (Lindane)	0.17
95	77474	Hexachlorocyclopentadiene	11
96	67721	Hexachloroethane	4.8
97	822060	Hexamethylene-1,6-diisocyanate	0.5
98	680319	Hexamethylphosphoramide	2
99	110543	Hexane	2000
100	302012	Hydrazine (Diamine)	0.01
101	7647010	Hydrogen chloride (Hydrochloric acid)	1060
102	7664393	Hydrogen fluoride (Hydrofluoric acid)	200
103	123319	Hydroquinone	200
104	78591	Isophorone	2000
105	108316	Maleic anhydride	37
106	67561	Methanol	2000
107	72435	Methoxychlor	2000
108	74839	Methyl bromide (Bromomethane)	265
109	74873	Methyl chloride (Chloromethane)	29
110	71556	Methyl chloroform (1,1,1-Trichloroethane)	2000
111	60344	Methyl hydrazine	0.05

112	74884	Methyl iodide (Iodomethane)	200
113	108101	Methyl isobutyl ketone (MIBK; Hexone)	2000
114	624839	Methyl isocyanate	53
115	80626	Methyl methacrylate	2000
116	1634044	Methyl tert butyl ether (MTBE)	200
117	101144	4,4-Methylene bis(2-chloraniline)	0.12
118	75092	Methylene chloride (Dichloromethane)	2000
119	101779	4,4'-Methylene dianiline	0.12
120	101688	4,4-Methylene diphenyl diisocyanate (MDI)	4.5
121	91203	Naphthalene	1.6
122	98953	Nitrobenzene	1.3
123	92933	4-Nitrobiphenyl	200
124	100027	4-Nitrophenol	1000
125	79469	2-Nitropropane	0.02
126	55185	N-Nitrosodiethylamine	0.001
127	62759	N-Nitrosodimethylamine	0.004
128	59892	N-Nitrosomorpholine	0.03
129	684935	N-Nitroso-N-methylurea	0.002
130	56382	Parathion	20
131	82688	Pentachloronitrobenzene (Quintobenzene)	60
132	87865	Pentachlorophenol	10
133	108952	Phenol	2000
134	106503	p-Phenylenediamine	2000
135	75445	Phosgene	16
136	7803512	Phosphine	16
137	7723140	Phosphorus	3.7
138	85449	Phthalic anhydride	1060
139	1336363	Polychlorinated biphenyls (PCBs; Aroclors)	0.5
140	1120714	1,3-Propane sultone (3-Hydroxyl-1-propane sulfonic acid sulfone)	0.08
141	57578	*beta*-Propiolactone (3-Hydroxypropanoic acid lactone)	0.01

142	123386	Propionaldehyde	425
143	114261	Propoxur (Baygon)	2000
144	78875	Propylene dichloride (1,2-Dichloropropane)	5.3
145	75569	Propylene oxide (1,2-Epoxypropane)	14
146	75558	1,2-Propylenimine (2-Methyl aziridine)	0.6
147	91225	Quinoline	0.05
148	106514	Quinone	1000
149	100425	Styrene	93
150	96093	Styrene oxide	1.2
151	2699798	Sulfuryl fluoride	2000
152	1746016	2,3,7,8-Tetrachlorodibenzo(p)dioxin (2,3,7,8-TCDD; Dioxin)	0.0000014
153	79345	1,1,2,2-Tetrachloroethane	0.9
154	127184	Tetrachloroethylene (Perchloroethylene)	9
155	7550450	Titanium tetrachloride	5.3
156	108883	Toluene	2000
157	95807	2,4-Toluene diamine (2,4-Diaminotoluene)	0.05
158	584849	2,4-Toluene diisocyanate	3.7
159	95534	o-Toluidine	1
160	8001352	Toxaphene	0.17
161	120821	1,2,4-Trichlorobenzene	106
162	79005	1,1,2-Trichloroethane	3.3
163	79016	Trichloroethylene	10
164	95954	2,4,5-Trichlorophenol	200
165	88062	2,4,6-Trichlorophenol	17
166	121448	Triethylamine	370
167	1582098	Trifluralin	24
168	540841	2,2,4-Trimethylpentane	1000
169	108054	Vinyl acetate	2000
170	593602	Vinyl bromide (Bromoethene)	1.7
171	75014	Vinyl chloride	6
172	75354	Vinylidene chloride (1,1-Dichloroethylene)	2000

173		Xylenes (mixed isomers)	2000
174	95476	o-Xylenes	2000
175	108383	m-Xylenes	2000
176	106423	p-Xylenes	2000
Chemical Compound Groups			
177		Antimony compounds (2)	1000
178	7783702	Antimony pentafluoride	20
179	1309644	Antimony trioxide	11
180	1345046	Antimony trisulfide	20
181		Arsenic compounds (2)	0.01
182	7784421	Arsine	0.01
183		Beryllium compounds (2)	0.02
184		Cadmium compounds (2)	0.01
185	130618	Cadmium oxide	0.01
186		Chromium VI (Total) (2)	0.0045
187	744084	Cobalt metal and compounds (2)	0.006
188	10210681	Cobalt carbonyl	0.006
189	62207765	Fluomine	0.006
190		Coke oven emissions (2)	0.09
191		Cyanide compounds (including Hydrogen cyanide) (2)	42
192	94757	2,4-D, salts and esters (2)	2000
193		Glycol ethers (2)	2000
194	111762	Ethylene glycol monobutyl ether (2-Butoxyethanol; EGBE)	2000
195	110805	Ethylene glycol monoethyl ether (2-Ethoxy ethanol)	1800
196	111159	Ethylene glycol monoethyl ether acetate	685
197	109864	Ethylene glycol monomethyl ether (2-Methoxy ethanol)	455
198		Lead and compounds (2)	2
199	78002	Tetraethyl lead	2
200	7439965	Manganese and compounds (2)	0.8
201	12108133	Methylcyclopentadienyl manganese	0.8
202		Mercury compounds (2)	2

203	7439976	Mercury (inorganic)	1.6
204		Nickel compounds (2)	0.2
205	13463393	Nickel carbonyl	0.2
206	1313991	Nickel oxide	0.2
207		Polycyclic organic matter (POM) & Polycyclic aromatic hydrocarbons (PAHs) (2)	2
208	56553	Benz(a)anthracene	0.4
209	225514	Benz(c)acridine	2
210	50328	Benzo(a)pyrene (3,4-benzopyrene)	0.05
211	205992	Benzo(b)fluoranthene	0.4
212		Selenium compounds (2)	1060
213	7783075	Hydrogen selenide	25
214	7488564	Selenium sulfide (mono- and di-)	20
215	13410010	Sodium selenate	20
216	10102188	Sodium selenite	20
217		Total dioxin and furans (3)	0.00012

(1) Also see Philadelphia Department of Public Health Asbestos Control Regulation.

(2) Indicating a chemical compound group; some compounds or subgroups included in this group may also be individually named in this table.

(3) As defined in Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and Dibenzofurans (CDDs and CDFs), March 1989 update, EPA-625/3-89/016, available from www.epa.gov/nscep; https://archive.epa.gov/raf/web/html/cdd-cdf.html

II. Overview – Toxic Air Contaminants Health Risk Assessment

A health risk assessment is a scientific process used to estimate the probability of adverse health effects resulting from human exposure to a hazardous substance or hazardous substances. AMS utilizes health risk assessments to evaluate any remaining health risk, known as residual health risk, posed by air toxic emissions from certain air pollution sources that have otherwise implemented emission controls, work practices, and other requirements specified by applicable City, Commonwealth, and Federal authorities.

As per AMR VI. Secs. II and III, a health risk assessment may be required along with any Installation Permit application[1] or Plan Approval application received on and after August 1,

[1] Note: As per AMR VI. Sec. II.C., no air toxics notice and health risk assessment is required for the following Installation Permits Applications: Complex Source Permits, Mechanical Ventilation System for Automotive Facilities Permits, and Dust Control Permits.

2023, for the construction / modification of air pollution sources where the emission of air toxics will exceed specified reporting thresholds. A facility-wide health risk assessment is also required for any initial or renewal Title V operating permit application received on and after August 1, 2023, if the facility-wide potential emission of at least one toxic air contaminate is above the reporting threshold. A Title V operating permit modification application only requires a risk assessment if the potential emissions of at least one toxic air contaminant due to the modification increases above the reporting threshold. See AMR VI. Secs. II, III.

Instructions on how to perform the required health risk assessment; calculate the cancer risks and non-cancer health quotients; and interpret the results of the assessments are provided in Section III of the Guidelines below, and in Appendix A. Appendix B contains a glossary of the various terms used in these Guidelines.

III. Health Risk Assessment

A. Risk Screening

An initial risk screening analysis must be performed for any new or modified air pollution source that will emit air toxics in excess of the reporting thresholds provided in Table I in Section I. This risk screening analysis can be performed by using: 1) AMS's Risk Screening Workbook; 2) EPA's air quality screening model, AERSCREEN; or (3) an alternative air screening model approved by the Department on a case-by-case basis.

Note: Risk screening is required for new or modified sources where an applicant seeks Installation Permits or Plan Approvals from AMS. Applicants seeking an initial or renewal Title V permit should proceed to Section III.D.

A.1. Risk Screening – Using the Risk Screening Workbook

The Risk Screening Workbook is a Microsoft Excel workbook that calculates the worst-case cancer risks and non-cancer health hazard quotients from a source's air toxics emissions, based on applicant-inputted data. The Risk Screening Workbook incorporates assumptions derived from air quality dispersion modeling and dose response factors to produce conservative risk assessment estimates for a particular emission point. It is an easy-to-use tool that simplifies the risk assessment screening process for the permit applicants. **The risk screening workbook should not be used for the following sources:** (1) sources without an exhaust stack or release point, (2) sources with stacks with a horizontal or downward discharge direction, or (3) sources with stack heights less than 15 feet (above grade). For these sources, applicants must use either the EPA air quality screening model AERSCREEN or another screening model approved by the Department, as described in III.A.2 below.

The Risk Screening Workbook consists of three separate worksheets, as indicated by the tabs at the bottom of the workbook. The first worksheet contains instructions. The second worksheet, called the Risk worksheet, handles the risk screening data input and calculations. The third worksheet, called the CAS Index, contains a numerical listing of all the Chemical

Abstracts Service (CAS) numbers for the designated air toxics. The CAS Index worksheet also contains synonyms for certain air toxics. The applicant must complete a Risk Screening Workbook for each exhaust stack or emissions point to be included in the newly constructed or modified air pollution source.

For a particular exhaust stack or emission point, the applicants must enter the stack height (ft), the distance from the stack to the closest facility property line (ft), the pollutant-specific annual emission rate Q (tons/year) and the pollutant-specific maximum short-term emission rate Q_h (lbs/hr) in the risk worksheet. All source-specific information entered by the applicant must be consistent with the information provided in the attendant Installation Permit, Plan Approval, or Title V permit application. Screening results will be calculated automatically and displayed in the risk worksheet.

The screening results provided for each exhaust stack or emission point will indicate whether any further risk assessment will be required. If the screening results for any air toxic emitted by a particular stack is "Negl" (Negligible), no further evaluation is needed[2]. If the screening result shows "FER," further evaluation in the form of a refined risk assessment as described in Section III.B. below is required.

A.2. Risk Screening – Air Quality Modeling

In the event where the Risk Screening Workbook cannot be used, the required risk screening must be performed via AERSCREEN or another Department-approved screening model. The latest AERSCREEN modeling program and attendant instructions for running the modeling program can be found on U.S. EPA's website:

https://www.epa.gov/scram/air-quality-dispersion-modeling-screening-models

Applicants must use AERSCREEN or another Department-approved screening model to estimate the worst-case, ambient air concentrations of air toxics that will be emitted from the source, and then calculate the attendant cancer risk and non-cancer hazard quotients. All source-specific information entered into AERSCREEN by the applicant to perform this analysis must be consistent with the information provided in the attendant Installation Permit or Plan Approval application. Formulas for the cancer health risk and non-cancer hazard quotients calculation are provided in Appendix A, Step 4, Equations 1, 2 and 3. Unit Risk Factor **(**URF) and Reference Concentration (RfC) values needed to perform these calculations are found in the Risk Screening Workbook, Risk worksheet.

Note: In the event that an air toxic has both long-term and short-term non-cancer RfCs listed in the risk worksheet, then –

1) An annual pollutant emission rate should be used to model the maximum annual (long- term) ambient concentration, and calculate the long-term hazard quotient

[2] A "Negl" result means the cancer risk from the emission of an air toxic from a particular stack or emission point is $\leq$ 1 in a million (1×10^{-6}) and the non-cancer hazard quotient is $\leq$ 1.

using the long-term RfC; and

2) A short-term, hourly pollutant emission rate should be used to model the maximum short-term ambient concentration and calculate the short-term hazard quotient using the short-term RfC.

If the cancer risk for each air toxic emitted from the source is $\leq$ 1 in a million (1×10^{-6}) AND the applicable non-cancer hazard quotient is $\leq$ 1, the health risk for the source is considered negligible and no further evaluation is necessary. In the event that cancer risks for any air toxic emitted is > 1 in a million (1×10^{-6}) AND / OR the applicable non-cancer hazard quotient is > 1, then a refined risk assessment must be performed as specified in Section B of these Guidelines.

B. Refined Risk Assessment

Note: Refined Risk Assessment is required for new or modified sources where an applicant seeks Installation Permits or Plan Approvals from AMS and: 1) received an "FER" result in the risk screening step using the Risk Screening Workbook, or 2) cancer risks for any air toxic is > 1 in a million (1×10^{-6}) and/or the applicable non-cancer hazard quotient is > 1 using the AERSCREEN model or other Department-approved screening model. Applicants seeking an initial or renewal Title V permit should proceed to Section

The refined risk assessment consists of a refined atmospheric dispersion modeling analysis for air pollution sources that estimates ambient air concentrations of emitted air toxics more accurately than the methods described in Section III.A. This analysis relies on using stack- and source-specific data as well as representative meteorological data, as input into U.S. EPA's AERMOD air quality dispersion model. All source-specific information inputted into the model for this analysis must be consistent with the information provided by the applicant in the attendant Installation Permit or Plan Approval application.

The refined risk assessment process evaluates cancer risk, as well as short- and long-term non-carcinogenic risks, and must be calculated in accordance with Appendix A for each air toxic emitted from a source. These health risks must be determined:

1) at the modeling receptor with the highest predicted air concentration based on 5 years of meteorological data (AERMOD modeling); and

2) at sensitive or vulnerable receptors (such as nearest residence, daycare centers, hospitals, nursing homes, playgrounds, etc.) located within the defined modeling grid.

All applicants must submit an atmospheric dispersion modeling protocol in accordance with procedures outlined by U.S. EPA for AERMOD air quality dispersion modeling. Program files and instructions for performing AERMOD modeling can be found on U.S. EPA's website:
https://www.epa.gov/scram/air-quality-dispersion-modeling

Note: Other air quality dispersion models (for example, EPA's AERSCREEN model if it was not used in the risk screening step) or use of source-specific ambient air monitoring / fenceline

monitoring data, may only be used in the refined risk assessment evaluation if first approved by AMS.

C. Risk Management Guidelines – New and Modified Sources (Installation Permits / Plan Approvals)

AMS's risk management guidelines for individual new or modified sources, pursuant to AMR VI, are summarized below in Tables 2 and 3.

Table 2. Cancer Risk Guidelines for New or Modified Sources

Risk Level	Outcome
Risk ≤ 1 in a million ($1x10^{-6}$)	Negligible risk.
1 in a million < Risk < 50 in a million	Case-by-case review (See Section IV).
Risk ≥ 50 in a million ($5x10^{-5}$)	Unacceptable risk; source poses an undue health hazard

Table 3. Long-and Short-Term Non-Cancer Hazard Quotient Guidelines for New or Modified Sources

Risk Level	Outcome
Hazard Quotient ≤ 1	Negligible risk.
Hazard Quotient > 1	Risk Mitigation Plan required (See Section IV).

If all cancer risk and non-cancer hazard quotients calculated for all the air toxics emitted are deemed "negligible" pursuant to Tables 2 and 3, no further action is required. See Appendix A, Step 4 for rounding of the hazard quotient value.

Figure 1 illustrates the workflow of health risk assessment for individual sources in Installation Permit and Plan Approval applications.

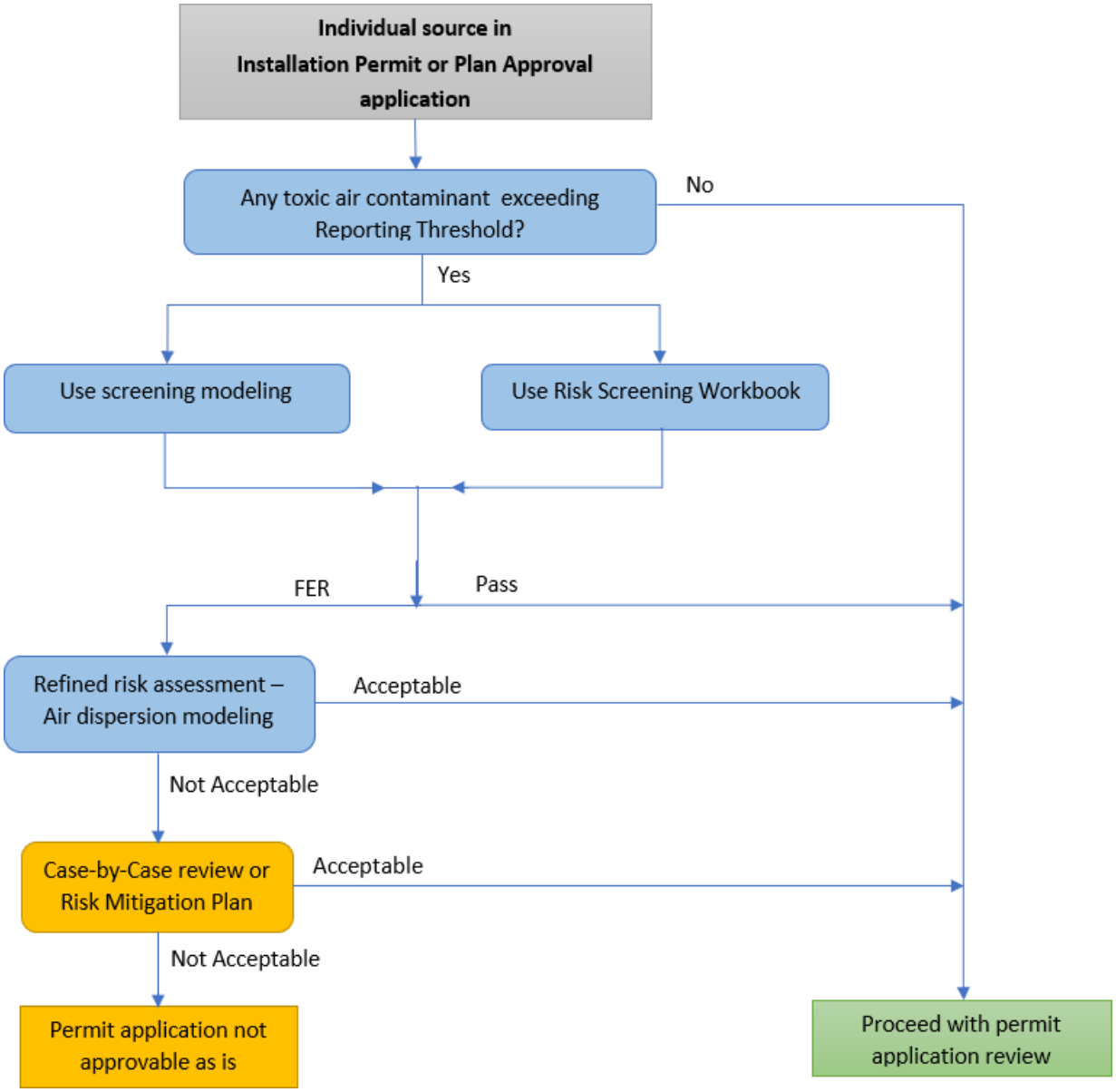

Figure 1. Workflow of air toxics health risk assessment for individual sources in Installation Permit and Plan Approval applications

D. Title V Facility-Wide Risk Assessment

A facility-wide heath risk assessment is required for all air toxics emitted from all air pollution sources operated as part of a Title V facility. This analysis must be performed anytime an applicant seeks an initial Title V permit for a facility or seeks to renew a Title V permit for an existing facility where air toxics will be emitted in excess of the reporting thresholds.

Applicants performing a facility-wide risk assessment must submit an atmospheric dispersion modeling protocol to AMS that is in accordance with procedures outlined in the U.S. EPA's air quality dispersion modeling guidelines available at https://www.epa.gov/scram/air-quality- dispersion-modeling. This modeling protocol must estimate the impact of each toxic air contaminant that will be emitted from all stacks / emission points within the facility in accordance with the cancer risk and non-cancer hazard quotient methodology provided in Appendix A to these Guidelines.

All source-specific information entered by the applicant to perform the facility-wide health risk assessment must be consistent with the information provided in the attendant Title V permit application. Applicants may opt to use Risk Screening Workbook discussed in Section III.A.1 when applicable, as a preliminary tool to conduct screening for facility-wide risk assessment of air toxic emissions.

Note: The atmospheric dispersion modeling protocol required by this section must be approved by AMS before the facility-wide health risk assessment is performed.

D.1. Title V Facility-Wide Risk Assessment Guidelines

AMS's risk management guidelines for Title V facilities are summarized below in Tables 4 and 5.

Table 4. Title V Facility-Wide Cancer Risk Guidelines

Risk Level	Outcome
Risk ≤ 10 in a million ($1x10^{-6}$)	Negligible risk.
10 in a million < Risk < 50 in a million	Risk Mitigation Plan required (see Section IV).
Risk ≥ 50 in a million ($5x10^{-5}$)	Unacceptable risk; facility poses an undue health hazard

Table 5. Title V Facility-Wide Long- and Short-Term Non-Cancer Risk Guidelines

Risk Level	Outcome
Hazard Quotient ≤ 1	Negligible risk.
Hazard Quotient > 1	Risk Mitigation Plan required (see Section IV).

If all cancer risk and non-cancer hazard quotients calculated for all the air toxics emitted are deemed "negligible" pursuant to Tables 4 and 5, no further action is required. Figure 2 illustrates the workflow of facility wide risk assessment. See Appendix A, Step 4 for rounding of the hazard quotient value.

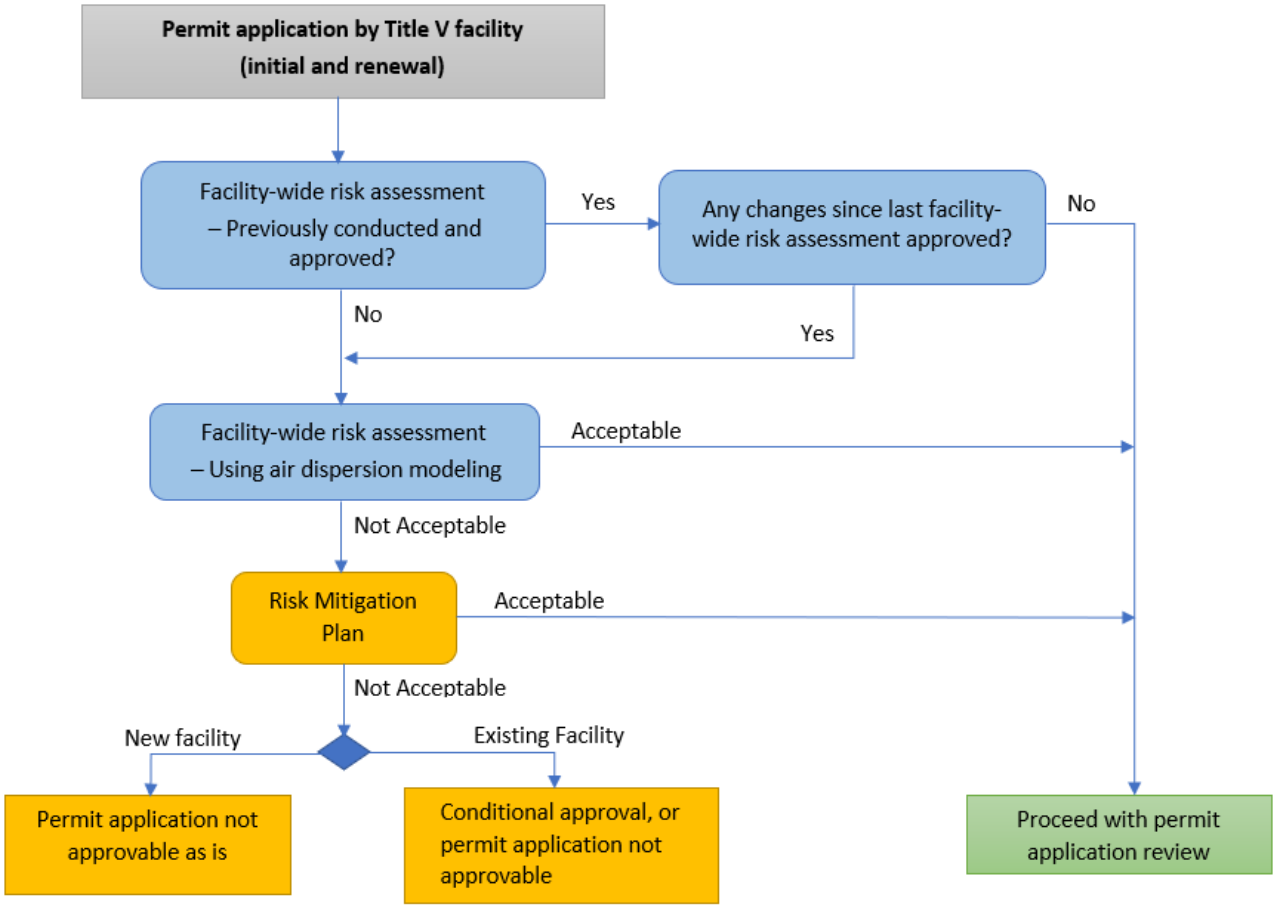

Figure 2. Workflow of facility-wide air toxics health risk assessment for Title V permit applications

D.2. Determining Total Risk Including Background

The Department will determine the Total Risk by combining the Background Risk (by ambient air pollutant concentrations) and the Incremental Risk from the facility, as below:

Total Risk = Background Risk $_{\text{ambient air}}$ + Incremental Risk $_{\text{facility}}$

The Department will measure the Background Risk by measuring the ambient air concentrations surrounding the facility. The Department will use EPA's TO-15 method to capture 24-hour grab samples and will analyze the samples for TAC concentrations using Gas Chromatography/Mass spectrometry (GC/MS). The sample analysis will produce a 24-hour average concentration, and the Department will use the 24-hour average to estimate an annual average concentration for TACs in the ambient air surrounding the facility.

The Department will calculate cancer and noncancer Background Risk for each TAC using the estimated annual air concentration, cancer URFs, and noncancer RfCs. Formulas for the cancer health risk and non-cancer hazard quotients calculation are provided in Appendix A, Step 4, Equations 1, 2 and 3.

When calculating a facility's Incremental Risk, the Department will only consider sources that are not captured in the existing Background Risk at the facility. Therefore, Incremental Risk would only encompass newly planned sources at the facility for TVOP renewals and applications.

A permit application is unacceptable if the total cancer risk is above 100 in a million, based on EPA cancer risk upper limit guidelines, unless the facility reduces the total cancer risk to no more than 100 in a million using mitigation measures (see Section IV). See III.D.1 for facility incremental risk.

As the technology and EPA guidance evolve, AMS may adopt new methods to determine the background risk.

IV. Risk Mitigation Plan

A risk mitigation plan is required when the risk analysis for the application is higher than a negligible risk and lower than an unacceptable risk. Risk mitigation plans will be submitted by the facility owners and/or operators and are subject to Department review and approval. The risk mitigation plan must be well-defined and result in health risk reductions. This is a case-by-case determination because the situations can vary drastically, so there is no "one-size-fits-all" solution. Both an installation permit (for example, for a new small boiler at a school) and a Title V operating permit application for a large chemical plant can require risk mitigation. The primary goal of a mitigation plan is to reduce emissions and health risks; the emission and risk reductions should be quantified.

In the event that Risk Mitigation Plan is called for, the applicant must develop a plan that

documents and describes how the health risks posed by air toxics emissions from a new / modified air pollution source, or Title V facility, will be minimized and managed. This Risk Mitigation Plan must account for locations where the modeled, maximum air toxic(s) concentrations occur as demonstrated by the refined risk assessment / Title V facility-wide risk assessment, the presence of overburdened communities, and the overall impact of such emissions on the sensitive receptor population. The Risk Mitigation Plan must also account for the uncertainties associated with the health risk assessment procedures; applicant's / operator's compliance history if any; and include a cost benefit analysis of any adopted health risk mitigation measures. Such risk mitigation measures can include, but are not limited to –

- Adoption of additional air pollution controls to lower air toxic emissions that are not otherwise required by other air pollution authorities;

- Adoption of changes in operation hours and schedules to reduce short-term maximum pollutant concentration;

- Modifying stack / emission point parameters to increase dispersion (for example, increase the stack height); and / or

- Adoption of changes in operation in a manner to eliminate or reduce the inhalation pathway for sensitive receptors.

If approved by AMS, the relevant details of the Risk Mitigation Plan will be incorporated into the respective Installation Permit, Plan Approval, or Title V permit. AMS may require changes to the Risk Mitigation Plan if AMS believes it is not sufficient. Failure to develop an acceptable Risk Mitigation Plan will result in the denial of the respective Installation Permit, Plan Approval, or Title V permit.

When reviewing Risk Mitigation Plans, AMS will consider information such as the following:

- How high is the cancer risk level? AMS will push harder for changes if the risk level is 95-in-a-million than if it is 5-in-a-million.

- What is near the facility, particularly near the area with the highest projected risk? Are there residences or sensitive sources like hospitals and day care centers nearby? AMS will be more concerned if the highest risk is projected to be near a residence than if it is in the middle of a street.

- How difficult is it to improve the risk level? AMS is more likely to push for the raising of a stack that will lead to a small improvement than the installation of an expensive control device that will only lead to a small improvement.

When preparing a Risk Mitigation Plan, the facility should consider the following:

- Can the emission rate be lowered through the installation of a control device?

- Can the potential emissions be reduced by accepting a throughput limit (i.e. limit operation of the process to 4,000 hours per year instead of 8,760 hours per year)?

- Can the risk level be improved by changing the location or exhaust? Raising the stack, increasing the stack exhaust velocity, or locating the process further from the property line may lower the risk level.

APPENDIX A

THE RISK ASSESSMENT PROCESS

In 1986, the U.S. EPA established risk assessment guidelines in order to provide consistency and technical support between U.S. EPA and other regulatory agencies. The guidelines were based on recommendations from the National Research Council (NRC 1983). NRC divided the risk assessment process into four steps, which are described below.

Step 1 - Hazard Identification

Hazard identification is the process used to determine the potential human health effects from exposure to an air toxic. This is based on information provided by the scientific literature. For air toxics sources, hazard identification involves identifying whether a hazard exists, and if so, identifying the exact pollutants of concern. Hazard identification takes into consideration whether a pollutant is a potential human carcinogen or is associated with other types of adverse health effects. For hazard identification in relation to an air permit, the following are considered:

A. Which contaminants will be emitted from the source;
B. Which of these contaminants have known health effects; and
C. The specific toxicological effects of these air toxics.

Step 2 - Dose-Response Assessment

Dose-response assessment is the characterization of the relationship between a chemical (air toxic) exposure, or dose, and the incidence and severity of an adverse health effect. It takes into consideration factors that influence this relationship, including intensity and pattern of exposure, and age and lifestyle variables that may affect susceptibility. It may also involve extrapolation from high-dose to low-dose responses, and from animal to human responses. This information is gathered from epidemiological or laboratory studies done by federal or state agencies, health organizations, academic institutions, and others.

Dose-response assessment as utilized in the air permitting process involves the quantification (in terms of severity or likelihood) of toxicological effects of individual chemicals on humans. The dose-response relationship is evaluated differently for carcinogenic (cancer-causing) and non- carcinogenic substances.

For carcinogens, it is assumed that there is a linear relationship between an increase in dose or exposure concentration and an increase in cancer risk. This is expressed as a **potency slope** or **slope factor** (SF), in units “per milligram (of chemical) per kilogram (of body weight) per day” or (/mg/kg/day).

To evaluate health risks from inhalation of carcinogenic substances, U.S. EPA and other

regulatory agencies use potency slopes to develop **unit risk factors** (URFs). A URF can be defined as the upper-bound excess probability of contracting cancer as the result of a lifetime of exposure to a carcinogen at a concentration of 1 $\mu g/m^3$ in air. URF units are "per microgram (of chemical) per cubic meter (of air)" or $(\mu g/m^3)^{-1}$.

For inhalation effects from non-carcinogens, dose-response data are used to develop **reference concentrations** (RfCs), for both long-term (chronic) and short-term exposures. Unlike carcinogens, non-carcinogens are assumed to have thresholds for adverse effects, meaning that injury does not occur until exposure has reached or exceeded some concentration (a threshold). An RfC is derived from a no-observed adverse effect level (NOAEL) or lowest-observed adverse effect level (LOAEL) determined through human or animal exposure studies. Since actual thresholds for the general population cannot be precisely determined, uncertainty or safety factors are applied to the NOAEL or LOAEL. This assures that the RfC is set at a level that is expected to be protective of sensitive populations (the elderly, infirm, or very young). Short-term RfCs are developed to prevent health effects from exposure periods of 24 hours or less. RfCs are expressed in units of $\mu g/m^3$ (Note: California's air program refers to these values as "Reference Exposure Levels (RELs)," while U.S. EPA uses the term RfC.).

To establish URFs, RfCs, and SFs, toxicological studies are evaluated by groups assigned for this purpose within U.S. EPA and other agencies. These risk values are then usually peer-reviewed and gathered into databases. U.S. EPA maintains the Integrated Risk Information System (IRIS), which is available on-line at http://www.epa.gov/iris. Another primary source of risk data is the California Office of Environmental Health Hazard Assessment (OEHHA). Their data is available on-line at http://www.oehha.ca.gov/.

Step 3 - Exposure Assessment

The exposure assessment step determines the extent (intensity, frequency, and duration, or dose) of human exposure to a chemical in the environment. There are three components to the exposure assessment:

A. Estimation of the maximum quantity of each pollutant emitted from the source of concern (based on data from previously existing sources or engineering estimates);

B. For each contaminant emitted from a source, estimation of the resulting maximum annual average and (where applicable) maximum short-term average ambient air concentrations, using dispersion models, or air impact values based on dispersion models; and

C. Estimation of the amount of contaminant taken in by a human

Step 4 - Risk Characterization

Risk characterization is the final step in risk assessment. At this step, human health risk is calculated and described based on the information gathered in the first three steps. The risk characterization also includes some consideration of uncertainty, scientific judgment, and the major assumptions that were made, especially regarding exposure.

Human health risk estimates for inhalation of a carcinogen are based on the following calculation:

Cancer Risk = C x URF -

Equation 1 where:

C = Annual maximum ambient air concentration of the pollutant ($\mu g/m^3$), based on annual emission rate;

URF = pollutant-specific inhalation unit risk factor $(\mu g/m^3)^{-1}$

Human health risk estimates for inhalation of a non-carcinogen are based on the following calculations:

For long-term non-cancer risk:

Hazard Quotient = C/RfC -

Equation 2 where:

C = Annual maximum ambient air concentration of the pollutant ($\mu g/m^3$), based on annual emission rate;

RfC = Long-term pollutant-specific reference concentration ($\mu g/m^3$).

For short-term non-cancer risk:

Hazard Quotient $_{(ST)}$ = C_{st}/RfC_{st} -

Equation 3 where:

C_{st} = Short-term maximum ambient air concentration of the pollutant ($\mu g/m^3$), based on short-term emission rate;

RfC_{st} = Short-term pollutant-specific reference concentration ($\mu g/m^3$).

The averaging time for non-carcinogen concentrations can be long-term (annual) and/or short-term (a specific number of hours), depending on the basis of the reference dose. Both a long-term and a short-term non-cancer hazard quotient should be evaluated for an air toxic if it has both long-term and short-term RfC values established.

The hazard quotient is commonly rounded to one significant figure. The rounding should be done only in the final results, not in the intermediate calculations (see U.S. EPA reference). However, AMS may require that the first decimal place in the value be kept (for example, 1.4) when health risks at sensitive or vulnerable receptors (such as nearest residence, daycare centers, hospitals, nursing homes, playgrounds, etc.) are evaluated.

APPENDIX B

ACRONYMS & GLOSSARY

Air Toxics: Also known as toxic air pollutants, toxic air contaminants, or hazardous air pollutants. These are chemicals that cause or may cause serious effects in humans and may be emitted into the air in quantities that are large enough to cause adverse health effects. These effects cover a wide range of conditions from lung irritation to birth defects to cancer. Health concerns may be associated with both short and long-term exposures to these pollutants. Many are known to have respiratory, neurological, immune or reproductive effects, particularly for more susceptible sensitive populations such as children.

Background Risk: The sum of the risks to which the public is exposed, excluding the risk of additional activities being evaluated.

Carcinogen: A chemical for which there is some evidence (either in animals or humans) that it may cause cancer.

CAS Number: A unique number used to identify a particular chemical substance, established by the Chemical Abstracts Service of the American Chemical Society.

Department: City of Philadelphia Department of Public Health.

Exposure: Contact with a substance through inhalation, ingestion, or some other means for a specific period of time.

Hazardous Air Pollutant (HAP): In general, a hazardous air pollutant is an "air toxic." Specifically, this also refers to any of the 188 air toxic pollutants listed in the 1990 federal Clean Air Act amendments.

Hazard Quotient: An estimate of the potential for a detrimental non-cancer health effect from exposure to a chemical.

Non-carcinogen: A pollutant that can cause adverse health effects other than cancer.

Reference Concentration (RfC): An estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure (expressed as an air pollutant concentration) to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of harmful effects during a lifetime. It can be derived from various types of human or animal data, with uncertainty factors generally applied to reflect

limitations of the data used.

Slope Factor (SF): An upper-bound, approximating a 95% confidence limit, on the increased cancer risk from a lifetime exposure to an agent. This estimate is usually expressed in units of proportion (of a population) affected per mg/kg-day.

Unit Risk Factor (URF): The upper-bound excess lifetime cancer risk estimated to result from continuous exposure to a chemical at a concentration of 1 µg/m^3 in air. For example, if a chemical's URF is 2 x 10^{-6} (per µg/m^3), then a person exposed daily for a lifetime to 1 µg of the chemical in 1 cubic meter of air would have an increased risk of cancer equal to 2 in a million.

U.S. EPA: The United States Environmental Protection Agency.

Health Risk Assessment Technical Support Document for Air Management Regulation VI Amendment

By

Air Management Services
Department of Public Health
City of Philadelphia
April 28, 2022

I. List of Toxic Air Contaminants (Hazardous Air Pollutants)

The 1981 Air Management Regulation (AMR) VI lists 99 Toxic Air Contaminants (or Hazardous Air Pollutants (HAPs)). Over time, more air pollutants were found to cause cancer and other serious health effects. Under the 1990 federal Clean Air Act (CAA) Amendments, the original list of Hazardous Air Pollutants included 189 pollutants. Since then EPA has modified the list through rulemaking to include 188 HAPs [1].

This AMR VI amendment aims to regulate an updated list of Toxic Air Contaminants originally in the Appendix to the 1981 AMR VI. The updated list of Toxic Air Contaminants (HAPs) is in the Appendix to the amended AMR VI. This list incorporates nearly all one hundred eighty eight (188) pollutants that are classified as hazardous air pollutants (HAPs) by U.S. EPA pursuant to Section 112 of the Clean Air Act, and includes additional air pollutants that have been determined to have adverse health effects by Air Management Service (AMS), taking into consideration the hazardous air pollutants listed by the New Jersey Department of Environmental Protection. It contains 217 chemical compounds and compound groups in total. The *Technical Guidelines for Air Management Regulation VI* document specifies the Reporting Threshold for each of chemical compounds (compound groups).

II. Establishing Hazardous Air Pollutants Reporting Thresholds

The objective of this section is to establish HAP Reporting Thresholds which can be used, as part of the AMS permitting process, in a health risk assessment to determine if there is the potential of HAP emissions to cause a significant health risk. A Reporting Threshold is an air pollutant emission rate (tons per year, or pounds per year) where The Philadelphia Department of Public Health (Department) has determined a health risk analysis is necessary. The methodology described below is used to determine the reporting thresholds. It is also used to establish the Risk Screening Workbook that will be used as a preliminary risk screening tool (also see Section III of *Technical Guidelines for Air Management Regulation VI*) in the permitting process. The methodology consists of the following three parts: Part 1: Modeling methodology; Part 2: Processing the modeling results; and Part 3: Identifying proposed threshold values.

2.1 <u>Modeling Methodology</u>

Instead of setting a reporting threshold for each HAP in an arbitrary way, air quality modeling was used to estimate highly conservative or worst-case scenarios of allowable emission rates of a HAP at which the health risks caused by the pollutant concentrations can be kept at a level that is considered negligible. These highly conservative or worst-case scenario allowable emission rates provide the basis to establish the reporting threshold.

2.1.1 Dispersion Model

A recent version of the American Meteorological Society/United States Environmental Protection Agency Regulatory Model (AERMOD, Version 18081) was used for this evaluation. AERMOD is

the US EPA preferred model for regulatory modeling applications. AERMOD is a steady-state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrains.

2.1.2 Land Use

To consider different land use types (dispersion environments) in Philadelphia, AERMOD was run in both the rural and urban modes. In the urban mode, a population parameter of 1,570,000 was used. This is approximately the population of the City of Philadelphia in 2017.

2.1.3 Meteorological Data

Meteorological data sets include ground level weather observation data and upper air profile data. Data collected in the years 2010-2014 were used. The ground level data were the Philadelphia International Airport data sets; the concurrent upper air data were from the Sterling, Virginia station according to EPA air modeling protocols. Figure 1 shows the five-year wind rose based on ground level data from the Philadelphia International Airport weather station.

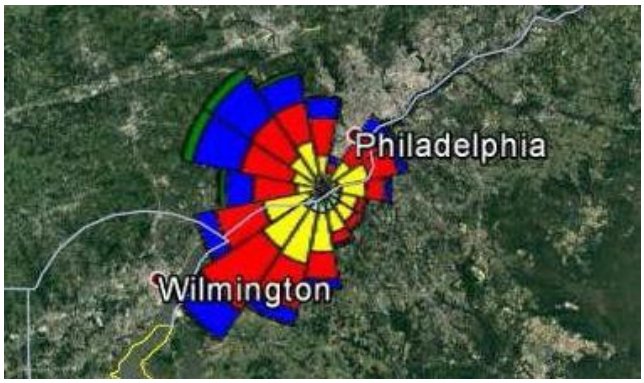

Figure 1: Wind Rose based on Philadelphia International Airport data

2.1.4 Stack Parameters and Emission Rates

Hypothetical emission points and structures were entered into the model to represent a range of pollutant release and aerodynamic downwash scenarios for stacks. The stack parameters and emission rates used to generate the normalized air impact values (micrograms per cubic meter ($\mu g/m^3$) /pound per hour of HAP emitted for short term impacts, $\mu g/m^3$ / ton per year of HAP emitted for long term impacts) are listed in Table 1. The stack gas exit velocity and exit temperature values were selected so that plume rise would be minimal to provide highly conservative estimates. Emissions were assumed to occur 24 hours per day, 365 days per year. Each modeled stack is located in the middle of a group

of hypothetical buildings that are modeled for building downwash of the plume.

Table 1. Stack Parameters and Emission Rates

Parameter	Value
Normalized Annual Emission Rate	1 ton per year (normalized)
Normalized 1-Hour Emission Rate	1 pound per hour (lb/hour) (normalized)
Modeled Stack Heights (ft)	15, 20, 25, 30, 40, 50, 75, 100, 150, 200, 250
Modeled Stack Diameter	1 foot
Exit Velocity	0.33 feet per second
Exit temperature	80 degrees Fahrenheit (^{o}F)

2.1.5 Building Downwash

The building dimensions were selected so that the plume was subjected to aerodynamic downwash in all wind directions. The building dimensions used, including assumed horizontal dimensions, are listed in Table 2. To consider conservative plume downwash scenarios, all stacks were assumed below the Good Engineering Practice (GEP) stack height of 2.5 times the building height. For stack heights of 15 ft and 20 ft, the stack was assumed to be a factor of 1.25 times the building height. For all other stack heights (25 ft through 250 ft), the stack was assumed to be a factor of 1.5 times the building height. For stack heights between 15 and 50 ft, the building's horizontal dimensions were assumed constant at 50 ft. As stack heights increase above 50 ft, the building's horizontal dimensions also increase. The assumed building's horizontal dimensions are also shown in Table 2.

The US EPA's Building Profile Input Program (BPIP-PRIME) was used to generate building downwash parameters for input into AERMOD.

Table 2. Stack Heights and Assumed Building Dimensions

Stack Height (ft)	Building Height (ft)	Building Width and Length (ft)
15	12	50 x 50
20	16	50 x 50
25	16.7	50 x 50
30	20	50 x 50
40	26.7	50 x 50
50	33.4	50 x 50
75	50	75 x 75
100	66.7	100 x 100
150	100	150 x 150
200	133.4	200 x 200
250	166.7	200 x 200

2.1.6 Receptor Grid

Modeling was performed assuming flat terrain within the modeled distance range. A polar receptor grid with 864 receptors was used that was centered on the stack (midpoint of the buildings) with 36 radials spaced every 10 degrees. The spacing of receptors along the radials were as follows to provide 24 distances: 20 ft, 30 ft, 40 ft, 50 ft, 60 ft, 70 ft, 80 ft, 90 ft, 100 ft, 150 ft, 200 ft, 250 ft, 300 ft, 400 ft, 500 ft, 600 ft, 700 ft, 800 ft, 900 ft, 1000 ft, 1500 ft, 2000 ft, 2500 ft, 3000 ft.

2.1.7 Model Input and Output

The AERMOD model was run with EPA's regulatory default parameters and the parameters discussed above. AERMOD was run to calculate hourly, daily (24-hour), and annual concentrations at each receptor location.

2.2 Processing Modeling Results

The above modeling methodology resulted in the following number of scenarios (impacts) being modeled:

2 dispersion environments x 5 sets of MET data x 2 normalized emission rates x 3 averaging times x 11 stack heights x 864 receptors = **570,240** impacts

In order to process such a large amount of data results, the AERMOD output files were reformatted and merged using a DOS batch processing script, then imported into Microsoft Excel. Statistical and pivot table functions in Excel were used to process the data. For each averaging time and each combination of stack height and receptor distance, the maximum normalized concentration was identified. For stack heights and distances not explicitly modeled (e.g. stack height 21 feet), linear interpolation across stack heights for a specified distance was performed to generate estimated concentration values. Similarly, concentrations at distances not explicitly modeled (e.g. 110 feet) were also estimated using linear interpolation.

Using this process, tables of worst-case hourly and annual impacts by stack height and distance were created for stacks from 15 ft to 250 ft and distances from 20 ft to 3,000 ft, including interpolated values. This resulted in 2,550 values in one table (Figure 2, normalized annual impacts). Each value represents the maximum concentration for a particular stack height and distance combination. However, for the purpose of setting HAP reporting threshold values, it is expected that the overall worst-case impacts will occur from shorter stacks at distances closer to the stack. Review of the AMS permitting and emission inventory data showed that at least 57% of approximately 1100 stacks (or release points) permitted in Philadelphia (not including small sources that are not reported in the emission inventories) are no more than 40 feet high. Of these stacks, at least 43% are located 150 feet or less from the closest facility property line. Based on this analysis, only hourly and annual impacts

for stacks no more than 40 ft and within 150 ft from the property line were considered. Again, this was meant to use more conservative scenarios in establishing reporting thresholds. In Figure 2, the area bounded by the blue box represents the subset of values used to establish the HAP reporting thresholds.

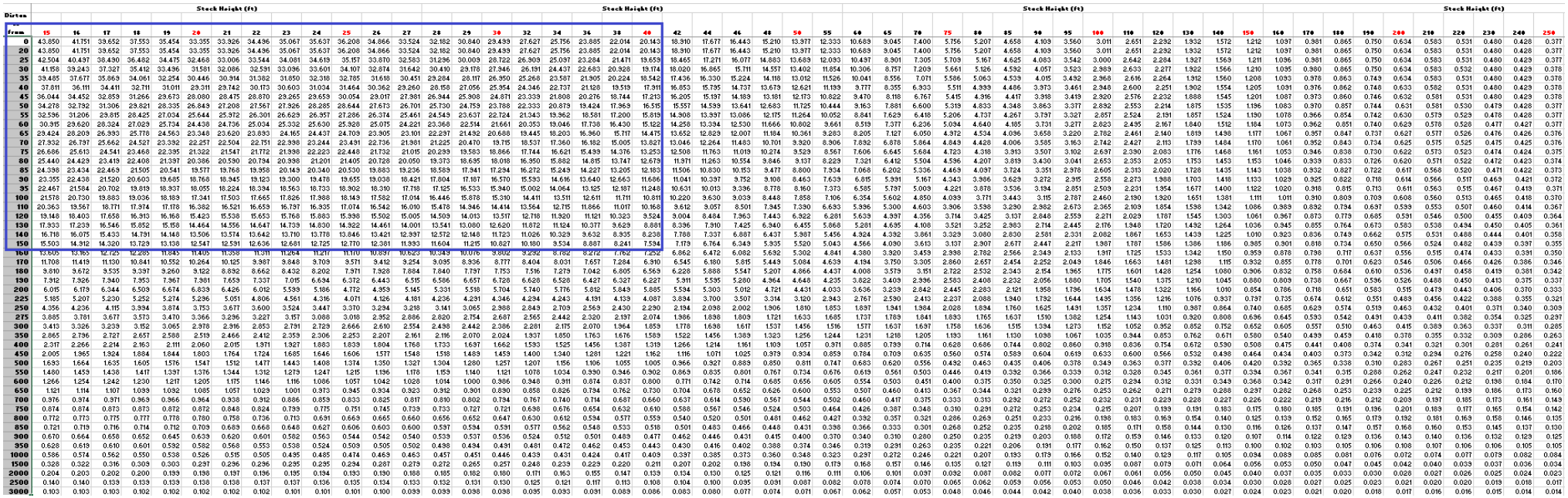

Figure 2. Modeling Results (Annual) Table: maximum concentration for each combination of stack height and distance -- HAP reporting thresholds to be based on concentrations caused by stacks no more than 40 feet high and within a distance of no more than 150 feet from stack to property line

2.3 Identifying Proposed Reporting Threshold Values

2.3.1 Concentration Percentile-based Threshold Values

Rather than arbitrarily basing the proposed HAP reporting thresholds on a single stack height/property-line combination, a robust statistical approach was utilized. This approach considered all modeled stack height/property-line distance combinations predicted for stacks no more than 40 ft high and property lines no more than 150 ft from the stack. A percentage frequency distribution of the modeled impacts was evaluated. The resulting percentiles represent conservative concentration scenarios that could reasonably be expected to occur for multiple stack property-line combinations. This subset of data contains normalized air concentration values for more than 570 combinations of stack heights and receptor distances. To generate candidate values of HAP reporting thresholds, the 85th, 90th, 95th and 98th percentiles of the modeled concentrations of this dataset were evaluated. Figure 3 shows the distribution of modeled normalized annual impacts. A percentile identifies the normalized air concentration value where the percentage of modeled impacts in the dataset are less than the indicated air concentration value. Based on this chart, the 98th percentile of normalized annual concentrations is at 37.7 µg/m^3 per ton/year pollutant emission, which represents a highly conservative scenario. Figures 4 shows the data table of combinations of stack height and distances with the 85th, 90th, 95th and 98th percentiles. They are 29.3, 31.6, 34.3 and 37.7 µg/m^3 per ton/year respectively.

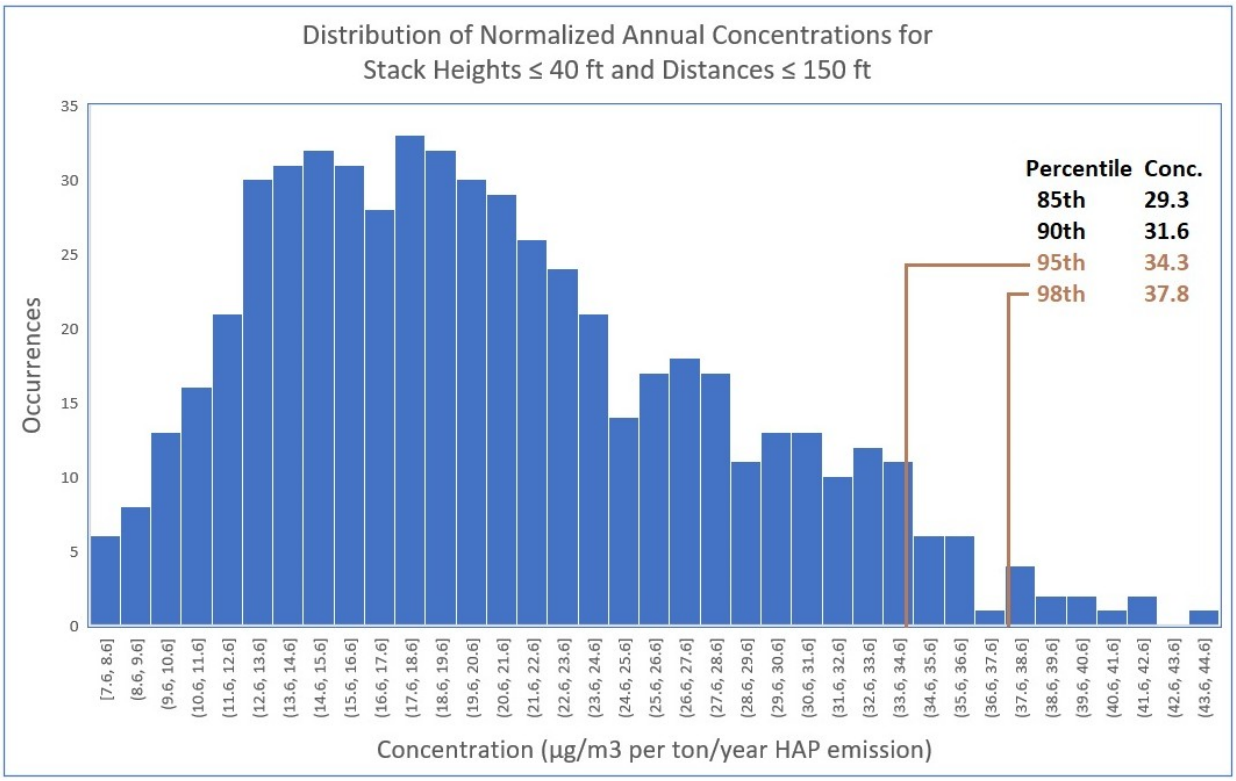

Figure 3. Percentage distribution of normalized annual concentrations

Distance (ft)	Stack Height (ft)																									
	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
20	43.85	41.75	39.65	37.55	35.45	33.36	33.93	34.50	35.07	35.64	36.21	34.87	33.52	32.18	30.84	29.50	28.56	27.63	26.69	25.76	24.82	23.89	22.95	22.01	21.08	20.14
25	42.50	40.50	38.49	36.48	34.48	32.47	33.01	33.54	34.08	34.62	35.16	33.87	32.58	31.30	30.01	28.72	27.82	26.91	26.00	25.10	24.19	23.28	22.38	21.47	20.56	19.66
30	41.16	39.24	37.33	35.41	33.50	31.58	32.09	32.59	33.10	33.60	34.11	32.87	31.64	30.41	29.18	27.95	27.07	26.19	25.31	24.44	23.56	22.68	21.81	20.93	20.05	19.17
35	39.48	37.68	35.87	34.06	32.25	30.45	30.91	31.38	31.85	32.32	32.79	31.62	30.45	29.28	28.12	26.95	26.11	25.27	24.43	23.59	22.75	21.91	21.06	20.22	19.38	18.54
40	37.81	36.11	34.41	32.71	31.01	29.31	29.74	30.17	30.60	31.03	31.46	30.36	29.26	28.16	27.06	25.95	25.15	24.35	23.54	22.74	21.93	21.13	20.32	19.52	18.71	17.91
45	36.04	34.45	32.86	31.27	29.67	28.08	28.48	28.87	29.26	29.66	30.05	29.02	27.98	26.94	25.91	24.87	24.11	23.34	22.57	21.81	21.04	20.28	19.51	18.74	17.98	17.21
50	34.28	32.79	31.31	29.82	28.33	26.85	27.21	27.57	27.93	28.28	28.64	27.67	26.70	25.73	24.76	23.79	23.06	22.33	21.61	20.88	20.15	19.42	18.70	17.97	17.24	16.51
55	32.60	31.21	29.82	28.42	27.03	25.64	25.97	26.30	26.63	26.96	27.29	26.37	25.46	24.55	23.64	22.72	22.03	21.34	20.65	19.96	19.27	18.58	17.89	17.20	16.51	15.82
60	30.92	29.62	28.32	27.03	25.73	24.44	24.74	25.03	25.33	25.63	25.93	25.07	24.22	23.37	22.51	21.66	21.01	20.35	19.70	19.05	18.39	17.74	17.08	16.43	15.78	15.12
65	29.42	28.21	26.99	25.78	24.56	23.35	23.62	23.89	24.16	24.44	24.71	23.91	23.10	22.30	21.49	20.69	20.07	19.45	18.82	18.20	17.58	16.96	16.34	15.72	15.10	14.47
70	27.93	26.80	25.66	24.53	23.39	22.26	22.50	22.75	23.00	23.24	23.49	22.74	21.98	21.23	20.47	19.72	19.13	18.54	17.95	17.36	16.77	16.18	15.59	15.00	14.42	13.83
75	26.69	25.61	24.54	23.47	22.39	21.32	21.55	21.77	22.00	22.22	22.45	21.73	21.02	20.30	19.58	18.87	18.31	17.74	17.18	16.62	16.06	15.50	14.94	14.38	13.81	13.25
80	25.44	24.43	23.42	22.41	21.40	20.39	20.59	20.79	21.00	21.20	21.41	20.73	20.05	19.37	18.70	18.02	17.48	16.95	16.42	15.88	15.35	14.81	14.28	13.75	13.21	12.68
85	24.40	23.43	22.47	21.51	20.54	19.58	19.77	19.96	20.15	20.34	20.53	19.88	19.24	18.59	17.94	17.29	16.78	16.27	15.76	15.25	14.74	14.23	13.72	13.20	12.69	12.18
90	23.36	22.44	21.52	20.60	19.69	18.77	18.95	19.12	19.30	19.48	19.66	19.04	18.42	17.80	17.19	16.57	16.08	15.59	15.10	14.62	14.13	13.64	13.15	12.66	12.17	11.69
95	22.47	21.58	20.70	19.82	18.94	18.05	18.22	18.39	18.56	18.73	18.90	18.31	17.72	17.13	16.53	15.94	15.47	15.00	14.53	14.06	13.59	13.13	12.66	12.19	11.72	11.25
100	21.58	20.73	19.88	19.04	18.19	17.34	17.50	17.66	17.83	17.99	18.15	17.58	17.01	16.45	15.88	15.31	14.86	14.41	13.96	13.51	13.06	12.61	12.16	11.71	11.26	10.81
110	20.36	19.57	18.77	17.97	17.18	16.38	16.52	16.66	16.80	16.94	17.07	16.54	16.01	15.48	14.95	14.41	13.99	13.56	13.14	12.72	12.29	11.87	11.44	11.02	10.59	10.17
120	19.15	18.40	17.66	16.91	16.17	15.42	15.54	15.65	15.77	15.88	16.00	15.50	15.01	14.51	14.01	13.52	13.12	12.72	12.32	11.92	11.52	11.12	10.72	10.32	9.92	9.52
130	17.93	17.24	16.55	15.85	15.16	14.46	14.56	14.65	14.74	14.83	14.92	14.46	14.00	13.54	13.08	12.62	12.25	11.87	11.50	11.12	10.75	10.38	10.00	9.63	9.25	8.88
140	16.72	16.08	15.43	14.79	14.15	13.51	13.57	13.64	13.71	13.78	13.85	13.42	13.00	12.57	12.15	11.72	11.37	11.03	10.68	10.33	9.98	9.63	9.28	8.93	8.59	8.24
150	15.50	14.91	14.32	13.73	13.14	12.55	12.59	12.64	12.68	12.73	12.77	12.38	11.99	11.60	11.22	10.83	10.50	10.18	9.86	9.53	9.21	8.89	8.56	8.24	7.92	7.59

Percentile:	
98%	37.68
95%	34.28
90%	31.62
85%	29.31

Figure 4. Annual concentrations for stack height/property line distance combinations at the 85th, 90th, 95th, and 98th percentiles

Normalized hourly concentrations were processed in a similar way to evaluate short-term impacts.

2.3.2 Evaluation Methodology

Equations 1 and 2 below were used to calculate proposed reporting thresholds for emissions of HAP with available inhalation exposure toxicity data [2]. The normalized annual air impact values (C' in the equations) were obtained from Figure 3. Impact values at the 85th, 90th, 95th and 98th percentiles were used in calculations. These percentile impact values represent the concentrations from multiple combinations of stack heights and distances to property line that are expected to occur in conservative scenarios when one ton per year of a HAP is emitted. Unit risk factors (URF) and reference concentrations (RfC) used in the equations are based on toxicity data from the latest updates of US EPA Integrated Risk Information System [3], CalEPA Toxicity Criteria Database [4], and Agency for Toxic Substances and Disease Registry "Minimal Risk Levels for Hazardous Substances" [5]. Refer to the Department's Risk Screening Workbook for the URF and the RfC values. Using the normalized annual impacts (C') and the HAP specific URF and/or RfC, the candidate value of the reporting threshold (Q) was calculated.

Cancer based Threshold

Equation 1: $$Q = \frac{CR}{URF \times C'}$$

Non-Cancer based Threshold

Equation 2: $$Q = \frac{HQ \times RfC}{C'}$$

where:

Q = maximum annual emission rate, ton/yr – Threshold

CR = cancer risk; capped at1 x 10^{-6}

URF = pollutant-specific inhalation Unit Risk Factor, $(\mu g/m^3)^{-1}$

HQ = non-cancer risk Hazard Quotient; capped at 1

RfC = pollutant-specific Reference Concentration, $\mu g/m^3$

C' = normalized annual concentration, $(\mu g/m^3)/(ton/yr)$; for example, use the value at 95th percentile.

2.3.3 Risk Guidelines for the Proposed HAP Reporting Thresholds

The cancer risk (CR) guideline for a HAP from a single source was determined as a risk of less than or equal to **one in a million (0.000001)**. The non-cancer risk guideline for a HAP was determined as a Hazard Quotient **(HQ) less than or equal to one (1)**. Risks at and below these levels are considered negligible. Cancer risk-based threshold candidate values were compared to long-term non-cancer risk threshold candidate values for those HAPs that have both carcinogenic and non-carcinogenic impacts in order to select a more stringent value. These values were also analyzed to ensure that no threshold would cause a short-term non-cancer risk with HQ above 1 if a HAP has short-term non-cancer toxicology data available.

The following principles were followed to develop the HAP reporting thresholds.

1. The maximum HAP reporting threshold is capped at 2000 pounds per year for any HAP even if the calculations by Equation 1 or 2 give a value above 2000.
2. 13 HAPs have reporting thresholds based on short-term toxicity data as these either showed a non- negligible risk for a short-term exposure when compared to long-term values or do not have long-term toxicity data available. See Appendix A for this list.
3. Certain HAPs, such as arsenic, cadmium, and chromium, are listed as "Chemical Compound Groups" (classes). These listings are defined as including any unique chemical substance that contains the named chemical (i.e., antimony, arsenic, etc.) as part of that chemical's molecular structure. When a compound or subgroup is individually listed under a group, the reporting threshold for the compound or subgroup takes precedence over the threshold listed for the chemical group. Also, no individual compound or subgroup within a chemical group should have a higher reporting threshold than its chemical group.

Table 3 shows examples of HAPs with percentile-based candidate threshold values and how a value for the reporting threshold is proposed.

Table 3. Examples of Proposed Reporting Thresholds

HAP	Percentile Based Thresholds (lbs/year)				Candidate Value for Reporting Threshold (lbs/year)
	85th	90th	95th	98th	
Benzene	8.7	8.1	7.5	6.8	**7.0**
Carbon Tetrachloride	11.4	10.5	9.7	8.8	**9.0**
Chloroform	3	2.75	2.5	2.3	**2.3**
Formaldehyde	5.3	4.9	4.5	4.1	**4.0**
Hydrogen Fluoride	955	885	816	743	**740**
Methyl Bromide	341	316	292	265	**265**
Vinyl Chloride	7.8	7.2	6.6	6.0	**6.0**
Vinyl Acetate	13647	12650	11669	10616	**2000**

2.3.4 Comparison with Current AMR VI Guidelines

The current AMR VI (1981) does not have HAP reporting thresholds. In the guideline document for this version of the regulation, however, recommended ambient concentrations were established for the HAPs. For comparison, the maximum ambient concentration for a HAP was calculated based on the new methodology described above (Section 2.3.2). For example, if a HAP has cancer Unit Risk Factor (URF) equal to 0.0000002 /(µg/m^3) and if the negligible cancer risk (CR) level is set at 0.000001 (1 in a million), the maximum annual ambient concentration of this HAP is: C = CR/URF = 0.000001 / 0.0000002 = 5 (µg/m^3).

Table 4 shows examples of how the recommended ambient concentrations in the current AMR VI guidelines are compared with the maximum concentrations based on the new methodology.

Table 4. Recommended ambient concentrations in current AMR VI (1981) guidelines compared with maximum concentrations based on new methodology

HAP	Current AMR VI - Recommended Annual Ambient Concentration		Max. Annual Concentration (µg/m3) by a source based on new methodology -- cancer risk at 1/million & non-cancer HQ at 1
	(ppb)	(µg/m3)	
Benzene	24	76.6	0.13
Methyl Bromide	120	466	5.0
Formaldehyde	4.8	5.9	0.077
Carbon tetrachloride	12	75.6	0.17
Chloroform	24	116.8	0.043
Vinyl chloride	2.4	6.1	0.11
Chromium/compounds (VI)		0.12	0.00008

These and other comparisons indicate that the new methodology provides higher levels of protection than the recommended ambient concentrations in the current AMR VI guidelines.

2.3.5 Comparison with New Jersey Reporting Thresholds

The methodology used here to establish the reporting thresholds is very similar to that used by the New Jersey Department of Environmental Protection to determine HAPs reporting thresholds in the New Jersey air toxics regulation. Understandably the threshold values selected for Philadelphia are quite similar to those in the New Jersey regulation, as shown in Table 5.

Table 5. Example of Philadelphia HAP Reporting Thresholds Compared with New Jersey Thresholds

HAP	Threshold Value based on Philadelphia Scenarios (lbs/year, at 98th percentile)	New Jersey Reporting Threshold (lbs/year)
Benzene	6.8	6
Methyl bromide	265	230
Formaldehyde	4.1	3.5
Hydrogen fluoride	743	600
Carbon tetrachloride	8.8	8
Chloroform	2.3	2
Vinyl Acetate	2000	2000
Vinyl Chloride	6	5
Acetaldehyde	24	21

III. Risk Screening Workbook

The above-described methodology was also used in developing the *Risk Screening Workbook*. It is a Microsoft Excel workbook that calculates the worst-case scenario cancer and non-cancer risks based on user input data, built-in worst-case HAP concentrations derived from air quality modeling, and URF and RfC values of the HAPs. Therefore, it is an easy-to-use tool that simplifies the screening process for the permit applicant. See Section III of the *Technical Guidelines for Air Management Regulation VI* and the spreadsheet file for more information.

References:

1. US EPA HAP list: https://www.epa.gov/haps/initial-list-hazardous-air-pollutants-modifications
2. New Jersey DEP Guidance on Risk Assessment for Air Contaminant Emissions" (http://www.state.nj.us/dep/aqpp/downloads/techman/1003.pdf)
3. US EPA Integrated Risk Information System (IRIS, www.epa.gov/iris)
4. CalEPA Toxicity Criteria Database (oehha.ca.gov/tcdb/index.asp)
5. Agency for Toxic Substances and Disease Registry "Minimal Risk Levels for Hazardous Substances" (MRLs, https://www.atsdr.cdc.gov/minimalrisklevels/index.html).

Appendix A

List of Reporting Thresholds Based on Short-Term Toxicity Data

CAS #	Chemical Compound	Proposed Threshold (lbs/year)
75150	Carbon disulfide	2000
75003	Ethyl chloride	2000
111762	Ethylene glycol monobutyl ether	2000
110805	Ethylene glycol monoethyl ether (2-Ethoxy ethanol)	1800
111159	Ethylene glycol monoethyl ether acetate	685
109864	Ethylene glycol monomethyl ether (2-Methoxy ethanol)	455
7783075	Hydrogen selenide	25
	Manganese and compounds	0.8
67561	Methanol	2000
71556	Methyl chloroform	2000
108101	Methyl isobutyl ketone	2000
108883	Toluene	2000
79016	Trichloroethylene	10

PHILADELPHIA AIR MANAGEMENT SERVICES - AMR VI RISK SCREENING WORKBOOK

For Long-Term Carcinogenic & Noncarcinogenic Effects and Short-Term Effects

April 28, 2022

Read these instructions carefully before completing the Risk spreadsheet

This workbook is used in screening for the worst-case operating scenario for an air pollution source operation that has a potential to emit one or more air toxics (or HAPs) above the reporting threshold. Based on the methodology used, the following sources may not use this workbook: (1) sources without a stack as the sole point of air contaminant discharge, such as certain dry cleaners, degreasers, certain storage tanks, and gasoline stations, (2) sources with stacks with a horizontal or downward discharge direction, or (3) sources with stack heights less than **15 feet**. Sources that cannot use this workbook may be subject to AERSCREEN modeling analysis or Refined Health Risk Assessment. See the AMR VI Techincal Guidelines document and instructions below for more information on AERSCREEN modeling and Refined Health Risk Assessment.

To see a listing of air toxics by CAS number, click on the "CAS Index" tab at the bottom of this workbook

This is a protected file. Changes are allowed only to cells highlighted in yellow on the Risk tab. To save the data you input, select "File" on the menu above, then "Save as" in your own files, under the name of your choice. Input data only to yellow fields. Incremental cancer risk (IR) and hazard quotient (HQ) will calculate automatically when you type in the stack parameters (stack height and distance to property line) and an emission rate.

Further Evaluation Required (FER)

If the Risk Worksheet generates a “FER” result for any air toxic, the facility should evaluate if the health risk level can be reduced through mitigating actions. Mitigating actions that could lower health risk levels include, but are not limited to, the following:

1. Reducing air toxic emissions through:

   i. Installation of an APC device or improving the efficiency of an existing APC device.
   ii. Replacing the air toxic substance with a non-toxic or less toxic substance.
   iii. Decreasing the annual operative hours.
   iv. Decreasing the annual or hourly throughput.

2. Increasing the stack height.

3. Relocation of the source to a location further from the property line.

If the health risk levels need further review after this evaluation, Refined Health Risk Assessment must be conducted. Only those air toxics with a “FER” result need to undergo a Refined Health Risk Assessment.

Refined Health Risk Assessment

The refined risk assessment consists of a refined atmospheric dispersion modeling analysis for air pollution sources that estimates ambient air concentrations of emitted air toxics more accurately. This analysis relies on using stack- and source-specific data as well as representative meteorological data, as input into U.S. EPA’s AERMOD air quality dispersion model. All source-specific information for this analysis must be consistent with the information provided in the attendant Installation Permit or Plan Approval application.

Applicants must submit an atmospheric dispersion modeling protocol in accordance with procedures outlined by U.S. EPA for AERMOD air quality dispersion modeling. Program files and instructions for performing AERMOD modeling can be found on U.S. EPA’s website: https://www.epa.gov/scram/air-quality-dispersion-modeling

Note: Other air quality dispersion models or use of source-specific ambient air monitoring / fenceline monitoring data may only be accepted in the refined risk assessment evaluation if first approved by the Department.

Refer to the Department's Technical Guidelines for Air Management Regulation VI or contact your permit evaluator for further details.

Notes

The emission points, stack parameters, short-term emission rates (lb/hr) and annual emission rates (tpy) entered in the Worksheet and provided in the protocol must be consistent with your permit application. If changes to your permit are needed, please contact your permit evaluator.

[For Storage Tanks] Short-term emission rates (lb/hr) for storage tanks must be based on the worst-case operating scenario, which may result from scenarios like breathing, filling, roof landing, tank cleaning, or tank degassing as applicable. Short-term emission rates for storage tanks are only required to be permitted for air toxics for which there is a short-term reference concentration (RfC). Please indicate any HAPs listed in your permit that do not have short-term reference concentrations in the health risk assessment submitted with the permit application.

PHILADELPHIA AIR MANAGEMENT SERVICES - AMR VI RISK SCREENING WORKBOOK
For Long-Term Carcinogenic and Noncarcinogenic Effects and Short-Term Effects

April 28, 2022

Read the Instructions tab carefully before completing this Risk spreadsheet

Date	
Facility ID No.	
Activity ID No.	
Facility name	
Facility location	
File name (.xls)	

Emission Unit/Batch Process ID No.		Stack height		ft
Emission Point ID No.		Distance to property line		ft
Equipment ID No(s).		**Annual air impact value, C'**		**(µg/m^3)/(ton/yr)**
Operating Scenario(s)		**1-hour air impact value, C'$_{st}$**		**(µg/m^3)/(lb/hr)**

Long-Term Effects

- **Q =** Annual emission rate (in tons per year)
- **C =** C' x Q = Annual average ambient air concentration
- **URF =** Unit risk factor (for carcinogenic risk)
- **IR =** C x URF = Incremental risk (for carcinogen)
- **RfC =** Reference concentration (for noncarcinogenic effects)
- **HQ =** C/RfC = Hazard quotient (for noncarcinogenic risk)
- **RsIt =** The result of comparing the IR or HQ to the negligible threshold (FER if > threshold, Negl. if <= threshold)
- **FER =** Further Evaluation Required (See Notes for thresholds)
- **Negl. =** Negligible (See Notes for thresholds)

Short-Term Effects

- **Q_h =** Hourly emission rate (in pounds per hour)
- **C_{st} =** C'_{st} x Q_h = Short-term average ambient air concentration
- **RfC_{st} =** Short-term reference concentration (for noncarcinogenic effects)
- **HQ_{st} =** C_{st}/RfC_{st} = Hazard quotient for short-term noncarcinogenic effects
- **RsIt =** The result of comparing the HQ_{st} to the negligible threshold (FER if > threshold, Negl. if <= threshold)
- **FER =** Further Evaluation Required (See Notes for thresholds)
- **Negl. =** Negligible (See Notes for thresholds)

				LONG-TERM EFFECTS								SHORT-TERM EFFECTS				
						Cancer Risk			Non-cancer Risk							
	HAP	CAS No.	Air Toxic (HAP) Name	Q (ton/yr)	C (µg/m^3)	URF [(µg/m^3)$^{-1}$]	IR	RsIt	RfC (µg/m^3)	HQ	RsIt	Q_h (lb/hr)	C_{st} (µg/m^3)	RfC_{st} (µg/m^3)	HQ_{st}	RsIt
1	*	75070	Acetaldehyde			2.2E-06			9					470		
2	*	60355	Acetamide			2.0E-05										
3		67641	Acetone						31000					62000		
4		75865	Acetone cyanohydrin						2							
5	*	75058	Acetonitrile						60							
6	*	98862	Acetophenone						0.02							
7	*	53963	Acetylaminofluorene (2-)			1.3E-03										
8	*	107028	Acrolein						0.02					2.5		
9	*	79061	Acrylamide			1.0E-04			6							
10	*	79107	Acrylic acid						1					6000		
11	*	107131	Acrylonitrile			6.8E-05			2							
12		309002	Aldrin			4.9E-03										
13	*	107051	Allyl chloride			6.0E-06			1							
14		117793	Aminoanthraquinone (2-)			9.4E-06										
15	*	92671	Aminobiphenyl (4-)			6.0E-03										
16		7664417	Ammonia						100					3200		
17	*	62533	Aniline			1.6E-06			1					3000		

18	*	90040	Anisidine (o-)			4.0E-05											
19	**	1309644	Antimony trioxide						0.2								
20		140578	Aramite			7.1E-06											
21	*		Arsenic (inorganic)			4.3E-03			0.015					0.2			
22	**	7784421	Arsine						0.05								
23	*	1332214	Asbestos			7.7E-03											
24		103333	Azobenzene			3.1E-05											
25			Barium											0.5			
26	*	71432	Benzene			7.8E-06			3					27			
27	*	92875	Benzidine			6.7E-02											
28	**	50328	Benzo(a)pyrene			1.1E-03											
29	*	98077	Benzotrichloride			3.7E-03											
30	*	100447	Benzyl chloride			4.9E-05								240			
31	*		Beryllium			2.4E-03			0.02								
32	*	92524	Biphenyl (1,1-)						0.4								
33		108601	Bis(2-chloroisopropyl)ether			1.0E-05											
34	*	117817	Bis(2-ethylhexyl)phthalate			2.4E-06											
35	*	542881	Bis(chloromethyl)ether			6.2E-02											
36		7440428	Boron (elemental)						20								
37		7637072	Boron trifluoride						0.7								
38		74975	Bromochloromethane						40								
39		75274	Bromodichloromethane			3.7E-05											
40	*	75252	Bromoform			1.1E-06											
41	*	106945	1-Bromopropane						101					5030			
42	*	106990	Butadiene (1,3-)			3.0E-05			2					660			
43	*		Cadmium			4.2E-03			0.02								
44		105602	Caprolactam						2.2					50			
45	*	133062	Captan			6.6E-07											
46	*	75150	Carbon disulfide						700					6200			
47	*	56235	Carbon tetrachloride			6.0E-06			40					1900			
48	*	463581	Carbonyl sulfide						10					660			
49	*	57749	Chlordane			1.0E-04			0.7								
50		108171262	Chlorinated paraffins			2.0E-05											
51	*	7782505	Chlorine						0.2					210			
52		10049044	Chlorine dioxide						0.2					28			
53		75683	Chloro-1,1-difluoroethane (1-) (HCFC-142b)						50000								
54	*	532274	Chloroacetophenone (2-)						0.03								
55	*	108907	Chlorobenzene						1000								
56	*	510156	Chlorobenzilate			3.1E-05											
57		75456	Chlorodifluoromethane (HCFC-22)						50000								
58	*	67663	Chloroform			2.3E-05			300					150			
59	*	107302	Chloromethyl methyl ether			6.9E-04											
60		95830	Chloro-o-phenylenediamine (4-)			4.6E-06											
61		95692	Chloro-o-toluidine (p-)			7.7E-05											
62		76062	Chloropicrin						0.4					29			
63	*	126998	Chloroprene			5.0E-04			20								
64		75296	Chloropropane (2-)						100								
65	**		Chromic acid mists (Cr VI)						0.008								
66	**	18540299	Chromium VI (total)			1.2E-02											
67	**		Chromium VI dissolved aerosols						0.008								
68	**		Chromium VI particulates						0.1								
69	*		Cobalt			9.0E-03			0.006								
70	*	8007452	Coke oven emissions			6.2E-04											
71			Copper											100			
72		120718	Cresidine (p-)			4.3E-05											

73	*		Cresol mixtures						600								
74		98828	Cumene						400								
75		135206	Cupferron			6.3E-05											
76		110827	Cyclohexane											6000			
77	*	72559	DDE			9.7E-05											
78		50293	DDT			9.7E-05											
79		615054	Diaminoanisole (2,4-)			6.6E-06											
80		124481	Dibromochloromethane			2.7E-05											
81	*	96128	Dibromo-3-chloropropane (1,2-)			2.0E-03			0.2								
82		764410	Dichloro-2-butene (1,4-)			4.2E-03											
83		95501	Dichlorobenzene (1,2-)						200								
84	*	106467	Dichlorobenzene (1,4-)			1.1E-05			800								
85	*	91941	Dichlorobenzidine (3,3'-)			3.4E-04											
86		75718	Dichlorodifluoromethane						100								
87	*	111444	Dichloroethyl ether			3.3E-04											
88	*	542756	Dichloropropene (1,3-)			4.0E-06			20								
89	*	62737	Dichlorvos			8.3E-05			0.5								
90		77736	Dicyclopentadiene						0.3								
91		60571	Dieldrin			4.6E-03											
92			Diesel particulate matter			3.0E-04			5								
93	*	111422	Diethanolamine						3								
94		112345	Diethylene glycol monobutyl ether						0.1								
95		75376	Difluoroethane (1,1-)						40000								
96	*	77781	Dimethyl sulfate			4.0E-03											
97	*	60117	Dimethylaminoazobenzene (4-)			1.3E-03											
98	*	79447	Dimethylcarbamyl chloride			3.7E-03											
99	*	68122	Dimethylformamide (N,N-)						30								
100	*	57147	Dimethylhydrazine (1,1-)						0.002								
101		540738	Dimethylhydrazine (1,2-)			1.6E-01											
102	*	121142	Dinitrotoluene (2,4-)			8.9E-05											
103	*	123911	Dioxane (1,4-)			5.0E-06			30					3000			
104	*		Dioxin	See footnote "a"													
105	*	122667	Diphenylhydrazine (1,2-)			2.2E-04											
106	*	106898	Epichlorohydrin			1.2E-06			1					1300			
107	*	106887	Epoxybutane (1,2-)						20								
108	*	140885	Ethyl acrylate						8								
109	*	100414	Ethylbenzene			2.5E-06								1000			
110	*	51796	Ethyl carbamate			2.9E-04											
111	*	75003	Ethyl chloride											10000			
112	*	106934	Ethylene dibromide			6.0E-04			0.8								
113	*	107062	Ethylene dichloride			2.6E-05			400								
114	*	107211	Ethylene glycol						400								
115	*	111762	Ethylene glycol monobutyl ether						1600					14000			
116	**	110805	Ethylene glycol monoethyl ether						200					370			
117	**	111159	Ethylene glycol monoethyl ether acetate						300					140			
118	**	109864	Ethylene glycol monomethyl ether						20					93			
119	**	110496	Ethylene glycol monomethyl ether acetate						90								
120	*	75218	Ethylene oxide			3.0E-03			30					42			
121	*	96457	Ethylene thiourea			1.3E-05											
122	*	151564	Ethyleneimine			1.9E-02											
123	*	75343	Ethylidene dichloride			1.6E-06			500								
124		16984488	Fluoride						13								
125	*	50000	Formaldehyde			1.3E-05			9					55			
126		98011	Furfural						50								
127			Gasoline vapors			1.0E-06			15								

128		111308	Glutaraldehyde						0.08								
129		765344	Glycidaldehyde						1								
130	*	76448	Heptachlor			1.3E-03											
131		1024573	Heptachlor epoxide			2.6E-03											
132	*	118741	Hexachlorobenzene			4.6E-04											
133	*	87683	Hexachlorobutadiene			2.2E-05											
134	**	319846	Hexachlorocyclohexane (alpha-)			1.8E-03											
135	**	319857	Hexachlorocyclohexane (beta-)			5.3E-04											
136	*	58899	Hexachlorocyclohexane (gamma-) (Lindane)			3.1E-04											
137	**	608731	Hexachlorocyclohexane (technical grade)			5.1E-04											
138	*	77474	Hexachlorocyclopentadiene						0.2								
139		19408743	Hexachlorodibenzo-p-dioxin, mixture			1.3E+00											
140	*	67721	Hexachloroethane			1.1E-05			30								
141	*	822060	Hexamethylene diisocyanate						0.01								
142	*	110543	Hexane (N-)						700								
143	*	302012	Hydrazine			4.9E-03			0.2					10			
144		10034932	Hydrazine sulfate			4.9E-03											
145	*	7647010	Hydrogen chloride (Hydrochloric acid)						20					2100			
146	**	74908	Hydrogen cyanide (& cyanide coumpounds)						0.8					340			
147	*	7664393	Hydrogen fluoride (Hydrofluoric acid)						14					240			
148	**	7783075	Hydrogen selenide											5			
149		7783064	Hydrogen sulfide						2					42			
150	*	78591	Isophorone						2000								
151		67630	Isopropanol											3200			
152	*		Lead			1.2E-05								0.1			
153	*	108316	Maleic anhydride						0.7								
154	*		Manganese						0.05					0.17			
155	*		Mercury (elemental)						0.3								
156	*	7439976	Mercury (inorganic)						0.03					0.6			
157		126987	Methacrylonitrile						0.7								
158	*	67561	Methanol						4000					28000			
159	*	74839	Methyl bromide						5					3900			
160	*	74873	Methyl chloride			1.8E-06			90								
161	*	71556	Methyl chloroform						1000					9000			
162		78933	Methyl ethyl ketone						5000					13000			
163	*	108101	Methyl isobutyl ketone											3000			
164	*	624839	Methyl isocyanate						1								
165	*	80626	Methyl methacrylate						700								
166		25013154	Methyl styrene (mixed isomers)						40								
167	*	1634044	Methyl tert butyl ether			2.6E-07			3000								
168		108872	Methylcyclohexane						3000								
169	*	101144	Methylene bis(2-chloroaniline) (4,4'-)			4.3E-04											
170	*	75092	Methylene chloride			1.3E-08			600					14000			
171	*	101779	Methylenedianiline (4,4-)			4.6E-04			20								
172	*	101688	Methylene diphenyl diisocyanate (4,4'-)						0.08					12			
173	*	60344	Methylhydrazine			1.0E-03			0.02								
174		90948	Michler's ketone			2.5E-04											
175	*		Mineral fibers (<1% free silica)						24								
176	*	91203	Naphthalene			3.4E-05			3								
177	*		Nickel and compounds			2.4E-04			0.014					0.2			
178	**	1313991	Nickel oxide						0.02								
179	**		Nickel, soluble salts						0.2								
180		7697372	Nitric acid											86			
181		88744	Nitroaniline (o-)						0.05								
182	*	98953	Nitrobenzene			4.0E-05			9								

183	*	79469	Nitropropane (2-)			2.7E-03			20								
184		55185	Nitrosodiethylamine (N-)			4.3E-02											
185	*	62759	Nitrosodimethylamine (N-)			1.4E-02											
186		924163	Nitrosodi-n-butylamine (N-)			1.6E-03											
187		621647	Nitrosodi-n-propylamine (N-)			2.0E-03											
188		86306	Nitrosodiphenylamine (N-)			2.6E-06											
189		156105	Nitrosodiphenylamine (p-)			6.3E-06											
190		10595956	Nitrosomethylethylamine (N-)			6.3E-03											
191	*	59892	Nitrosomorpholine (N-)			1.9E-03											
192		759739	Nitroso-n-ethylurea (N-)			7.7E-03											
193	*	684935	Nitroso-n-methylurea (N-)			3.4E-02											
194		100754	Nitrosopiperidine (N-)			2.7E-03											
195		930552	Nitrosopyrrolidine (N-)			6.1E-04											
196	*	87865	Pentachlorophenol			5.1E-06											
197	*	108952	Phenol						200					5800			
198	*	75445	Phosgene						0.3					4			
199	*	7803512	Phosphine						0.3								
200	*	7664382	Phosphoric acid						10								
201	*		Phosphorus (white)						0.07								
202	*	85449	Phthalic anhydride						20								
203	*	1336363	Polychlorinated biphenyls (PCBs)			1.0E-04											
204	*		Polycylic aromatic hydrocarbons (PAHs)	See footnote "b"													
205	*		Polycylic organic matter (POM)	See footnote "b"													
206		7758012	Potassium bromate			1.4E-04											
207	*	1120714	Propane sultone (1,3-)			6.9E-04											
208	*	57578	Propiolactone (beta-)			4.0E-03											
209	*	123386	Propionaldehyde						8								
210		115071	Propylene						3000								
211	*	78875	Propylene dichloride			1.0E-05			4								
212		107982	Propylene glycol monomethyl ether						2000								
213	*	75569	Propylene oxide			3.7E-06			30					3100			
214	**		Selenium and compounds						20								
215		7631869	Silica (crystalline, respirable)						3								
216		1310732	Sodium hydroxide											8			
217	*	100425	Styrene			5.7E-07			1000					21000			
218	*	96093	Styrene oxide			4.6E-05											
219			Sulfates											120			
220		7664939	Sulfuric acid						1					120			
221		2699798	Sulfuryl fluoride						60					1700			
222	*	1746016	Tetrachlorodibenzo(p)dioxin (2,3,7,8-)			3.8E+01			0.00004								
223		630206	Tetrachloroethane (1,1,1,2-)			7.4E-06											
224	*	79345	Tetrachloroethane (1,1,2,2-)			5.8E-05											
225	*	127184	Tetrachloroethylene			5.9E-06			40					20000			
226		811972	Tetrafluoroethane (1,1,1,2-)						80000								
227		109999	Tetrahydrofuran						2000								
228		62555	Thioacetamide			1.7E-03											
229	*	7550450	Titanium tetrachloride						0.1								
230	*	108883	Toluene						5000					37000			
231	*	584849	Toluene diisocyanate (2,4-)			1.1E-05			0.07					2			
232	*	26471625	Toluene diisocyanate (2,4-/2,6-)			1.1E-05			0.07					2			
233	*	91087	Toluene diisocyanate (2,6-)			1.1E-05			0.07					2			
234	*	95807	Toluene-2,4-diamine			1.1E-03											
235	*	95534	Toluidine (o-)			5.1E-05											
236	*	8001352	Toxaphene			3.2E-04											
237		76131	Trichloro-1,2,2-trifluoroethane (1,1,2-)						30000								

238	*	120821	Trichlorobenzene (1,2,4-)						2								
239	*	79005	Trichloroethane (1,1,2-)			1.6E-05											
240	*	79016	Trichloroethylene			4.8E-06			2					2			
241		75694	Trichlorofluoromethane						700								
242	*	88062	Trichlorophenol (2,4,6-)			3.1E-06											
243	*	121448	Triethylamine						7					2800			
244	*	1582098	Trifluralin			2.2E-06											
245		95636	Trimethylbenzene (1,2,4-)						7								
246		7440622	Vanadium						0.1					0.8			
247		1314621	Vanadium pentoxide											30			
248	*	108054	Vinyl acetate						200								
249	*	593602	Vinyl bromide			3.2E-05			3								
250	*	75014	Vinyl chloride			8.8E-06			100					180000			
251	*	75354	Vinylidene chloride						200								
252	*		Xylene (m-,o-,p-, or mixed isomers)						100					22000			

If any calculated long-term or short-term effects for an air toxic result in "Further Evaluation Required" (FER) on this Risk Screening Worksheet, a Refined Risk Assessment is required for that air toxic.

NOTE:

* **Clean Air Act hazardous air pollutant (HAP)**

** **Clean Air Act hazardous air pollutant, but not listed individually (part of a group)**

a Dioxins may be considered to be all 2,3,7,8-tetrachlorodibenzo(p)dioxin, or separated into congeners.

b PAH or POM may be considered to be all benzo(a)pyrene, or separated into individual PAHs.

The results are determined by comparing the long-term and short-term effects to the single-source thresholds, listed below.
The threshold value of negligible risk for incremental cancer risk is 1 in a million (1.0E-06). A risk value less than or equal to 1 in million is considered negligible.
The threshold value of negligible risk for long-term hazard quotient (HQ) for non-carcinogenic risk is 1.0. An HQ less than or equal to 1.0 is considered negligible.
The threshold value of negligible risk for short-term hazard quotient (HQ_{st}) for non-carcinogenic risk is 1.0. An HQ_{st} less than or equal to 1.0 is considered negligible.

PHILADELPHIA AIR MANAGEMENT SERVICES - AMR VI RISK SCREENING WORKBOOK

For Carcinogenic and Long-Term and Short-Term Noncarcinogenic Effects

Air Toxics (HAPs) on the Risk Screening Worksheet in Order of CAS Number

To search for an air toxic by name, select the "Find" menu item and type in part of name.

Those marked with an asterisk (* or **) are HAPs under Section 112(b) of the 1990 Clean Air Act Amendments.

	CAS No.	Air Toxic	Synonym
*	50000	Formaldehyde	
	50293	DDT	
**	50328	Benzo(a)pyrene	
*	51796	Ethyl carbamate	Urethane
*	53963	Acetylaminofluorene (2-)	
	55185	Nitrosodiethylamine (N-)	
*	56235	Carbon tetrachloride	
*	57147	Dimethylhydrazine (1,1-)	
*	57578	Propiolactone (beta-)	
*	57749	Chlordane	
*	58899	Hexachlorocyclohexane (gamma-)	Lindane
*	59892	Nitrosomorpholine (N-)	
*	60117	Dimethylaminoazobenzene (4-)	
*	60344	Methylhydrazine	
*	60355	Acetamide	
	60571	Dieldrin	
*	62533	Aniline	
	62555	Thioacetamide	
*	62737	Dichlorvos	
*	62759	Nitrosodimethylamine (N-)	
*	67561	Methanol	
	67630	Isopropanol	
	67641	Acetone	
*	67663	Chloroform	
*	67721	Hexachloroethane	
*	68122	Dimethylformamide (N,N-)	
*	71432	Benzene	
*	71556	Methyl chloroform	1,1,1-Trichloroethane
*	72559	DDE	
*	74839	Methyl bromide	Bromomethane
*	74873	Methyl chloride	Chloromethane
**	74908	Hydrogen cyanide	
	74975	Bromochloromethane	Chlorobromomethane
*	75003	Ethyl chloride	
*	75014	Vinyl chloride	
*	75058	Acetonitrile	
*	75070	Acetaldehyde	
*	75092	Methylene chloride	Dichloromethane

*	75150	Carbon disulfide	
*	75218	Ethylene oxide	
*	75252	Bromoform	
	75274	Bromodichloromethane	
	75296	Chloropropane (2-)	
*	75343	Ethylidene dichloride	1,1-Dichloroethane
*	75354	Vinylidene chloride	1,1-Dichloroethylene
	75376	Difluoroethane (1,1-)	HCFC-152a
*	75445	Phosgene	
	75456	Chlorodifluoromethane	HCFC-22
*	75569	Propylene oxide	
	75683	Chloro-1,1-difluoroethane (1-)	HCFC-142b
	75694	Trichlorofluoromethane	
	75718	Dichlorodifluoromethane	
	75865	Acetone cyanohydrin	
	76062	Chloropicrin	
	76131	Trichloro-1,2,2-trifluoroethane (1,1,2-)	Freon 113
*	76448	Heptachlor	
*	77474	Hexachlorocyclopentadiene	
	77736	Dicyclopentadiene	
*	77781	Dimethyl sulfate	
*	78591	Isophorone	
*	78875	Propylene dichloride	1,2-Dichloropropane
	78933	Methyl ethyl ketone	MEK
*	79005	Trichloroethane (1,1,2-)	
*	79016	Trichloroethylene	
*	79061	Acrylamide	
*	79107	Acrylic acid	
*	79345	Tetrachloroethane (1,1,2,2-)	
*	79447	Dimethylcarbamyl chloride	
*	79469	Nitropropane (2-)	
*	80626	Methyl methacrylate	
*	85449	Phthalic anhydride	
	86306	Nitrosodiphenylamine (N-)	
*	87683	Hexachlorobutadiene	
*	87865	Pentachlorophenol	
*	88062	Trichlorophenol (2,4,6-)	
	88744	Nitroaniline (o-)	
*	90040	Anisidine (o-)	
	90948	Michler's ketone	
*	91087	Toluene diisocyanate (2,6-)	
*	91203	Naphthalene	
*	91941	Dichlorobenzidine (3,3'-)	
*	92524	Biphenyl (1,1-)	
*	92671	Aminobiphenyl (4-)	
*	92875	Benzidine	
	95501	Dichlorobenzene (1,2-)	

*	95534	Toluidine (o-)	
	95636	Trimethylbenzene (1,2,4-)	
	95692	Chloro-o-toluidine (p-)	
*	95807	Toluene-2,4-diamine	2,4-Diaminotoluene
	95830	Chloro-o-phenylenediamine (4-)	
*	96093	Styrene oxide	
*	96128	Dibromo-3-chloropropane (1,2-)	
*	96457	Ethylene thiourea	
	98011	Furfural	
*	98077	Benzotrichloride	
	98828	Cumene	
*	98862	Acetophenone	
*	98953	Nitrobenzene	
*	100414	Ethylbenzene	
*	100425	Styrene	
*	100447	Benzyl chloride	Chloromethylbenzene
	100754	Nitrosopiperidine (N-)	
*	101144	Methylene bis(2-chloroaniline) (4,4'-)	
*	101688	Methylene diphenyl diisocyanate (4,4'-)	
	101779	Methylenedianiline (4,4-)	
	103333	Azobenzene	
	105602	Caprolactam	
*	106467	Dichlorobenzene (1,4-)	
*	106887	Epoxybutane (1,2-)	
*	106898	Epichlorohydrin	
*	106934	Ethylene dibromide	1,2-Dibromoethane
*	106945	1-Bromopropane	n-Propyl bromide
*	106990	Butadiene (1,3-)	
*	107028	Acrolein	
*	107051	Allyl chloride	
*	107062	Ethylene dichloride	1,2-Dichloroethane
*	107131	Acrylonitrile	
*	107211	Ethylene glycol	
*	107302	Chloromethyl methyl ether	
	107982	Propylene glycol monomethyl ether	
*	108054	Vinyl acetate	
*	108101	Methyl isobutyl ketone	MIBK
*	108316	Maleic anhydride	
	108601	Bis(2-chloroisopropyl)ether	
	108872	Methylcyclohexane	
*	108883	Toluene	
*	108907	Chlorobenzene	
*	108952	Phenol	
**	109864	Ethylene glycol monomethyl ether	2-Methoxyethanol
	109999	Tetrahydrofuran	
**	110496	Ethylene glycol monomethyl ether acetate	
*	110543	Hexane (N-)	

**	110805	Ethylene glycol monoethyl ether	2-Ethoxyethanol
	110827	Cyclohexane	
**	111159	Ethylene glycol monoethyl ether acetate	
	111308	Glutaraldehyde	
*	111422	Diethanolamine	
*	111444	Dichloroethyl ether	Bis(2-chloroethyl)ether
*	111762	Ethylene glycol monobutyl ether	2-Butoxyethanol; EGBE
	112345	Diethylene glycol monobutyl ether	
	115071	Propylene	
	117793	Aminoanthraquinone (2-)	
*	117817	Bis(2-ethylhexyl)phthalate	Di(2-ethylhexyl)phthalate; DEHP
*	118741	Hexachlorobenzene	
	120718	Cresidine (p-)	
*	120821	Trichlorobenzene (1,2,4-)	
*	121142	Dinitrotoluene (2,4-)	
*	121448	Triethylamine	
*	122667	Diphenylhydrazine (1,2-)	
*	123386	Propionaldehyde	
*	123911	Dioxane (1,4-)	
	124481	Dibromochloromethane	Chlorodibromomethane
	126987	Methacrylonitrile	
*	126998	Chloroprene	2-Chloro-1,3-butadiene
*	127184	Tetrachloroethylene	Perchloroethylene
*	133062	Captan	
	135206	Cupferron	
	140578	Aramite	
*	140885	Ethyl acrylate	
*	151564	Ethyleneimine	Aziridine
	156105	Nitrosodiphenylamine (p-)	
*	302012	Hydrazine	
	309002	Aldrin	
**	319846	Hexachlorocyclohexane (alpha-)	
**	319857	Hexachlorocyclohexane (beta-)	
*	463581	Carbonyl sulfide	
*	510156	Chlorobenzilate	Ethyl-4,4'-dichlorobenzilate
*	532274	Chloroacetophenone (2-)	
	540738	Dimethylhydrazine (1,2-)	
*	542756	Dichloropropene (1,3-)	
*	542881	Bis(chloromethyl)ether	
*	584849	Toluene diisocyanate (2,4-)	
*	593602	Vinyl bromide	Bromoethene
**	608731	Hexachlorocyclohexane (technical grade)	
	615054	Diaminoanisole (2,4-)	
	621647	Nitrosodi-n-propylamine (N-)	
*	624839	Methyl isocyanate	
	630206	Tetrachloroethane (1,1,1,2-)	
*	684935	Nitroso-n-methylurea (N-)	

	759739	Nitroso-n-ethylurea (N-)	
	764410	Dichloro-2-butene (1,4-)	
	765344	Glycidaldehyde	
	811972	Tetrafluoroethane (1,1,1,2-)	
*	822060	Hexamethylene diisocyanate	
	924163	Nitrosodi-n-butylamine (N-)	
	930552	Nitrosopyrrolidine (N-)	
	1024573	Heptachlor epoxide	
*	1120714	Propane sultone (1,3-)	
**	1309644	Antimony trioxide	
	1310732	Sodium hydroxide	
**	1313991	Nickel oxide	
	1314621	Vanadium pentoxide	
*	1332214	Asbestos	
*	1336363	Polychlorinated biphenyls (PCBs)	
*	1582098	Trifluralin	
*	1634044	Methyl tert butyl ether	MTBE
*	1746016	Tetrachlorodibenzo(p)dioxin (2,3,7,8-) (2,3,7,8-TCDD)	Dioxin
	2699798	Sulfuryl fluoride	
*	7439976	Mercury (inorganic)	
	7440428	Boron (elemental)	
	7440622	Vanadium	
*	7550450	Titanium tetrachloride	
	7631869	Silica (crystalline, respirable)	
	7637072	Boron trifluoride	
*	7647010	Hydrogen chloride	Hydrochloric acid
*	7664382	Phosphoric acid	
*	7664393	Hydrogen fluoride	
	7664417	Ammonia	
	7664939	Sulfuric acid	
	7697372	Nitric acid	
	7758012	Potassium bromate	
*	7782505	Chlorine	
	7783064	Hydrogen sulfide	
**	7783075	Hydrogen selenide	
**	7784421	Arsine	
*	7803512	Phosphine	
*	8001352	Toxaphene	
*	8007452	Coke oven emissions	
	10034932	Hydrazine sulfate	
	10049044	Chlorine dioxide	
	10595956	Nitrosomethylethylamine (N-)	
	16984488	Fluoride	
**	18540299	Chromium VI (total)	
	19408743	Hexachlorodibenzo-p-dioxin, mixture	
	25013154	Methyl styrene (mixed isomers)	
*	26471625	Toluene diisocyanate (2,4-/2,6-)	

108171262 Chlorinated paraffins

***EXHIBIT 2* – Markup of All Changes Approved to AMR VI and its Exhibits by Air Pollution Control Board on April 27, 2023**

Strikethrough indicates matter removed; <u>bold underline</u> indicates new matter.

CITY OF PHILADELPHIA
DEPARTMENT OF PUBLIC HEALTH
AIR POLLUTION CONTROL BOARD

AIR MANAGEMENT REGULATION VI
CONTROL OF EMISSIONS OF TOXIC AIR CONTAMINANTS

Originally Approved By:

Air Pollution Control Board.....June 9, 1981
Board of Health.....July 1, 1981
Department of Law.....July 2, 1981
Department of Records..... August 7, 1981

Approved by Air Pollution Control Board.....April 28, 2022
Approved by Law Department.....April 29, 2022
Filed with the Department of Records.....May 2, 2022
Legal Notice of Public Hearing..... July 11, 2022
Public Hearing.....August 10, 2022

Subsequent to the Public Hearing, the proposed Regulation was adopted with modification:
Approved by Air Pollution Control Board.....April 27, 2023
Approved by Law Department.....May 2, 2023
Filed with the Department of Records.....May 3, 2023
Effective Date..... January 1, 2024

Air Management Regulation VI ("Control of Emissions of Toxic Air Contaminants") of the Air Pollution Control Board is hereby amended as follows:

Deletions in ~~Strikethrough~~
Additions in **Bold Underline**

PREAMBLE TO
AIR MANAGEMENT REGULATION VI
Control of Emissions of Toxic Air Contaminants

A. This Regulation is adopted pursuant to Title 3, Air Management Code, of the Philadelphia Code which reads in part as follows:

"SECTION 3-201. GENERAL PROVISIONS

* * *

* * *

~~1.~~

~~(1)~~ **(3) (a)** No person shall emit any toxic air contaminant ~~unless~~ **unless,** within six months of the adoption of regulations by the Air Pollution Control Board listing toxic air contaminants, he provides notice to the Department including a Material Safety Data Sheet as described in Section 3-301(24) in accordance with the requirements and procedures established in regulations promulgated by the Air Pollution Control Board pursuant to this subsection.

If a person discharges a toxic air contaminant on the list established by the Air Pollution Control Board for the first time, that person shall provide the Department with proper notice no more than thirty days after its emission into the atmosphere.

The person responsible for any source of air contaminants affected by any subsequent additions to the list of toxic substances established in the regulations of the Air Pollution Control Board shall similarly file notice with the Department within ~~90~~ **ninety** days of the effective date of any revision to such list.

~~(2)~~ **(b)** The Department shall maintain a file of all notices relating to toxic air contaminants and shall make the file available for public inspection and reproduction during normal business hours.

~~(3)~~ **(c)** Within six months of the adoption of this subsection by the City Council, the Air Pollution Control Board shall promulgate regulations establishing a list of toxic air contaminants to which the provisions of this subsection shall be applicable, the form of the notice and request to be provided to the Department by any affected source of air contaminant emissions, and the reporting requirements and procedures related thereto.

The following factors may be considered by the Board in establishing the list of toxic air contaminants:

~~(a)~~**(.1)** risk of immediate acute or ~~substance~~ **subacute** harm to human health, at concentrations likely to be encountered in the community;

~~(b)~~**(.2)** proven carcinogenicity through epidemiological studies in both human and animal populations;

~~(c)~~**(.3)** suspected carcinogenicity as shown in human epidemiological studies or in laboratory studies of animals and other experimental media;

~~(d)~~**(.4)** mutagenicity and teratogenicity as proven through human, animal, and experimental media;

~~(e)~~**(.5)** bioaccumulative effects in humans and the environment;

~~(f)~~**(.6)** findings of the Environmental Protection Agency, the Occupational Safety and Health Administration or other such agencies regarding toxicity;

~~(g)~~**(.7)** extent to which the substance is likely to be found in Philadelphia industries;

~~(h)~~**(.8)** other such factors necessary for the proper regulation of toxic air contaminants.

The Air Pollution Control Board shall, as appropriate, update and revise the list of toxic air contaminants subject to the provisions of this subsection on the basis of the latest available relevant scientific information."

*** * ***

"SECTION 3-301. POWERS AND DUTIES OF THE DEPARTMENT OF PUBLIC HEALTH.

The Department of Public Health shall have the following powers and duties:

* * *

* * *

(24) The Department shall obtain a Material Safety Data Sheet (MSDS) for each toxic air contaminant subject to the notice requirement. Such MSDS shall be provided to the Department by the person responsible for the affected source of emission as part of the notice requirements in ~~Section 3-201(c)(3).~~ **subsection 3-201(3)(c).** The Department shall include these MSDS in the file of notices regarding the emission of toxic air contaminants and shall make this file available to the public for inspection and reproduction during normal business hours. The MSDS shall conform to the format and contain the type of information required by the U.S. Department of Labor form OSHA 20, Material Safety Data Sheet (latest edition).

(25) The Department shall have the authority to require persons subject to Section 3-201(c)(1) to take all necessary measure to bring their emission of toxic air contaminants into compliance with the Code and regulations promulgated thereunder."

"SECTION 3-302. POWERS AND DUTIES OF THE AIR POLLUTION CONTROL BOARD.

The Air Pollution Control Board shall have the following powers and duties:

(1) To promulgate regulations, implementing this Title, preventing degradation of air quality, preventing ~~air pollution, eliminating~~ air pollution **nuisances, and** ~~nuisances and,~~ limiting, controlling, or prohibiting the emission of air contaminants to the atmosphere from any sources. Such regulations may include, but are not limited to, the following:

(a) ~~The~~ **the** concentration, volume, weight, and other characteristics of emissions of air contaminants to the atmosphere, the circumstances under which

such emissions are permitted, and the degree of control of emissions of air contaminants required;

(b) the emissions of air contaminants to the atmosphere and related actions which are prohibited;

(c) the types and kinds of control measures and actions, equipment, storage and handling facilities, processes and systems, including specifications and/or performance requirements which may be required to control or eliminate emissions of air contaminants to the atmosphere;

* * *

* * *

(i) the substances to be considered toxic air contaminants under this Title and regulations for reporting the emission of these toxic air contaminants to the Department."

B. Pursuant to the above citations, this Regulation establishes a list of toxic air contaminants to which this Regulation is applicable; prescribes notice requirements for emitters of listed toxic air contaminants; provides for public access to information concerning the emission of toxic air contaminants; and limits, controls or prohibits the emission of toxic air contaminants.

AIR MANAGEMENT REGULATION VI
CONTROL OF EMISSIONS OF TOXIC AIR CONTAMINANTS

SECTION I. DEFINITIONS

The following definitions are in the Air Management Code, Title 3 of the Philadelphia Code, and apply to this Regulation:

1. *Air Contaminant* – Any smoke, soot, flyash, ~~dust~~ **dust,** cinders, dirt, noxious or obnoxious acids, fumes, oxides, ~~gases~~ **gases,** mists, aerosols, vapors, odors, toxic or radioactive substances, ~~waste,~~ **water,** particulate, solid, liquid or gaseous matter, or any other materials in the outdoor atmosphere.

2. *Board* – Means the Air Pollution Control Board.

3. *Department* – The Department of Public Health, Health Commissioner or any authorized representative thereof.

4. *Facility* – The area, buildings, and equipment used by any person at a single location in the conduct of business.

5. *Person* – Any individual, natural person, syndicate, association, partnership, firm, corporation, institution, agency, authority, department, bureau, or instrumentality of federal, state or local government or other entity recognized by law as a subject of rights and duties.

6. *Toxic Air Contaminant* – A chemical substance or material the discharge of which into the atmosphere, based upon relevant available scientific evidence establishing the toxic, mutagenic and/or carcinogenic effects of such substance or material, may pose a potential hazard to the community in terms of a significant increase in risk of acute or long-term health effects. As used in this Regulation, toxic air contaminant shall mean any substance or material listed in the appendix to this Regulation.

SECTION II. NOTICE REQUIREMENTS

A. Notice of Emission

No person shall cause, suffer, allow or permit to escape or to be discharged into the atmosphere, from any ~~facility,~~ **facility for which a permit or license is required by the Air Management Code or any regulation promulgated thereto** any toxic air

contaminant ~~listed in the appendix to this Regulation~~ except where written notice has been filed with the ~~Department~~ **Department**. **Notice** in accordance with ~~the following:~~ **this Section shall be filed at the time a permit or license, required by Air Management Code or any regulation promulgated thereto, is sought.**

~~(1) For any facility emitting a listed toxic air contaminant as of the effective date of this Regulation, notice shall be filed within six months from the effective date.~~

~~(2) For any facility emitting a listed toxic air contaminant for the first time after the effective date of this Regulation, notice in accordance with this Section shall be filed within 30 days from the date on which the emission first commenced. The new emission of a toxic air contaminant shall not commence without prior approval from the Department.~~

~~(3) For any facility affected by any subsequent addition to the list of toxic air contaminants, notice shall be filed within 90 days from the effective date of any revision to the list of toxic air contaminants.~~

~~(4)~~**(1)** Notice shall ~~include a list identifying~~ **be made on a form as prescribed by the Department, and may require applicants to identify** the toxic air contaminants emitted; the associated areas or operations within the facility from which the toxic air contaminants are emitted; **and provide** estimates of the maximum hourly, daily and annual emission rates for each toxic air contaminant emitted from the specified areas or operations within the ~~facility; and the date when the emission of each toxic air contaminant began or is expected to begin.~~ **facility.**

~~(5) Included with the notice shall be a Material Safety Data Sheet (MSDS) for each toxic air contaminant listed in the notice. The MSDS shall conform to the format and contain the type of information required by the U.S. Department of Labor form OSHA 20, Material Safety Data Sheet, latest edition.~~

B. Public Access

The Department shall establish and maintain, for a minimum of 30 years, a file of notices concerning the emission of toxic air contaminants and shall make the file available to the public subject to Section IV(B)(2) for inspection and reproduction during normal business hours. The Department may charge a reasonable fee for the cost of reproduction.

C. Exemptions

~~The requirements of this Section shall not apply to toxic air contaminants emitted from the following:~~

~~(1) Combustion process using only commercial fuel, including internal combustion engines;~~

~~(2) Retail dry cleaning operations;~~

~~(3) Retail and non-commercial storage and handling of motor fuels;~~

~~(4) Incineration of waste materials other than liquid, semi-liquid or solid by-~~ product ~~industrial wastes; and~~

~~(5) Incidental or minor sources including laboratory scale operations, fireplaces and household appliances, cooking appliances, general comfort ventilation of occupied spaces, housecleaning operations, residential-scale solvent use and pesticide application, and such other sources or categories of sources which are determined by the Department to be of minor significance for the purposes of this Regulation, or which the Department determines to be more appropriately evaluated by special survey methods.~~

Facilities seeking permits or licenses for the following sources or activities, as required by Air Management Code or any regulation promulgated thereto, are exempted from the notice requirements set forth in this Section~~.~~:

(1) Any demolition, implosion, earthworks, or other activity for which a Dust Control Permit is required pursuant to Air Management Regulation II. § IX.B.

(2) Any construction or modification of a parking facility or other Complex Source for which a Complex Source Permit is required pursuant to Air Management Regulation X. Section II.

(3) Any construction, modification, or operation of an automotive facility for which an installation permit or license is required pursuant to Air Management Regulation XII. Section II.

(4) Operation of a facility pursuant to a permit for non-Title V sources issued by the Department pursuant to 25 Pennsylvania Code Chapter 127, Subchapter F as adopted by reference in Air Management Regulation XIII.

(5) Operation of sources at a facility pursuant to an annual or indefinite license issued pursuant to the Air Management Code.

SECTION III. REGISTRATION, REVIEW AND APPROVAL REQUIREMENTS

A. Permits and Licenses

(1) The person responsible for any facility affected by this Regulation shall comply with all applicable ~~installation~~ permit and ~~operating~~ license requirements as specified by **the** Air Management Code and the Air Management ~~Regulation I.~~ **Regulations promulgated thereunder.**

(2) The Department shall require the applicant for, or holder of, any permit or license, or the person responsible, for any facility affected by this Regulation to take all necessary measures to prevent, control or limit the discharge or escape of toxic air contaminants so that the emissions do not pose a health hazard.

(3) ~~The~~ **For facilities subject to the notice of emission requirements of Section II of this Regulation, the** Department shall grant or deny ~~an installation~~ **any** permit or ~~operating~~ license ~~for any facility subject to this Regulation~~ **sought pursuant to the Air Management Code and the Air Management Regulations promulgated thereunder** in accordance with the conditions set forth in (C) below.

~~(4) Operating licenses for affected facilities shall be renewed annually.~~

B. Review of Toxic Air Contaminant Emissions

(1) The Department shall establish or approve procedures, guidelines and methods to be used in the review and evaluation of toxic air contaminant emissions. The Board hereby approves **the reporting thresholds for toxic air contaminants as set forth in the Technical Guidelines for Air Management Regulation VI attached as Exhibit A to this Regulation and the procedures for conducting health risk assessments for said toxic air contaminants as set forth in Exhibit A and in the Health Risk Assessment Technical Support Document for Air Management Regulation VI Amendment attached as Exhibit B. The Department is hereby authorized to update the documents as necessary, provided that substantial changes are submitted to the Board for approval.**

(2) The Department shall verify all notices of emission filed pursuant to Section II of this ~~Regulation,~~ **Regulation** and may require from the person responsible for any source of toxic air contaminant emissions such additional information as may be necessary to perform the evaluation required in (C) below.

(3) The Department shall review the existing air toxics concentrations surrounding the emissions source at issue prior to approving or disapproving a ~~plan approval or~~ Title V operating permit.

C. Conditions of Approval

(1) Approval of ~~an installation~~ **any** permit or ~~operating~~ license ~~for any facility to emit or discharge into the atmosphere any toxic air contaminant listed in the appendix~~ **pursuant** to this ~~Regulation shall be granted only upon~~ **Section is contingent on** a determination by the Department that such emission or discharge will not pose ~~a~~ **an undue** health ~~hazard.~~ **hazard, as per the Technical Guidelines for Air Management Regulation VI.**

(2) **The Department shall require the applicant for any permit or license for any source of toxic air contaminants affected by this Regulation to submit an assessment of health risk or hazard if the source has the potential to emit at least one toxic air contaminant in an amount above reporting thresholds established in the Department's guidelines. Assessments of health risk or hazard shall be compiled using the Risk Screening Workbook attached as Exhibit C. Exhibit C may be updated at the discretion of the Department.**

~~(2)~~**(3)** The Department's determination shall be based upon an evaluation of the quantity, concentration and duration of the emission relative to the latest available information regarding health effects, guidelines or standards associated with the toxic air contaminant, or upon such other information the Department considers relevant to the evaluation.

Based on this evaluation, the Department shall:

(a) Approve a permit or license application, or license renewal, as submitted; **renew said permit or license, subject to adoption of work practices, emission controls, emission limits, process changes, and other conditions necessary to address the health hazard posed by the toxic air contaminants; or**

~~(b) conditionally approve a permit or license application, or license~~

~~renewal, subject to an immediate emission reduction to a predetermined level; or~~

~~(c) conditionally approve a license renewal subject to compliance with an approved improvement plan and schedule to effect a predetermined emission reduction within a period not to exceed two (2) years; or~~

~~(d)~~ **(b)** disapprove a permit or license application, or ~~license~~ renewal of said permit or license.

~~(3) In approving an installation permit or operating license for any facility to emit or discharge a toxic air contaminant, the Department shall specify the maximum allowable emission rates and the other conditions under which approval is granted. Any increase in emissions over the approved maximum allowable emission rates, without first obtaining approval from the Department is prohibited.~~

SECTION IV. ADDITIONAL REPORTING REQUIREMENTS

A. Information Reporting

(1) In addition to the Notice ~~Requirements~~ **requirements** of Section II, the person responsible for any source of emission of a listed toxic air contaminant shall, upon notification from the Department, provide such information as will disclose the quantity, concentration and duration of such emissions, which are or may be discharged, or any other technical data as may be required by the Department to determine compliance with applicable emission guidelines, standards, limitations or control measures established by the Department.

(2) The required information shall be submitted by the responsible person on reporting forms supplied by the Department and shall be complete. The required information shall be submitted to the Department within 30 days from the receipt of the notice and form, unless a written request for an extension has been made and granted by the Department.

(3) Information recorded on or copies of reporting forms submitted to the Department shall be retained by the responsible person for two years after the date on which the pertinent report was submitted.

B. Availability of Information

(1) Information obtained from reporting forms submitted to and verified by the Department shall be correlated with applicable emission guidelines, standards, limitations or control measures established by the Department. All such emissions data shall be available for public inspection at the Department during normal business hours.

(2) Any records, reports, information, or particular part thereof, other than emissions data, relating to secret processes, methods of manufacture or production, or otherwise entitled to protection as trade secrets, provided to, required or obtained by the Department shall be kept confidential.

SECTION V. APPLICABILITY

A. The provisions of this Regulation shall be applicable in addition to any other provisions set forth elsewhere in the Regulations of the Air Pollution Control Board, unless an exemption has been provided herein.

B. Nothing contained in this Regulation shall be taken to excuse or relieve any person from complying with other applicable provisions of the Philadelphia Code and regulations adopted pursuant thereto, or with applicable laws of Pennsylvania or the United States.

SECTION VI. SEVERABILITY

The provisions of this Regulation are severable. If any provision or part thereof is held to be unenforceable, the remaining provisions or parts thereof shall remain in effect. It is hereby declared to be the intent of the Board that this Regulation would have been adopted if the ~~unforceable~~ **unenforceable** provision or part had not been included.

SECTION VII. EFFECTIVE DATE

This Regulation shall become effective ~~upon adoption~~ **on January 1, 2024**.

APPENDIX TO AIR MANAGEMENT REGULATION VI

Control of Emissions of Toxic Air Contaminants

The following substances and materials shall be considered toxic air contaminants for the purpose of this Regulation and shall be subject to the provisions and requirements set forth therein.

~~**Schedule A (See Note)**~~

1. ~~Acrylonitrile (Ala. 3): Propenenitrile; Vinyl Cyanide~~
2. ~~Aldrin (5.6)~~
3. ~~4--Aminodiphenyl (Alb): 4--Aminobiphenyl; P--Biphenylamine~~
4. ~~3--Amino--1,2,4--Triazole (A2): 5-(4-Acetaminodphenyl) --3--Amino--5-Triazole Hydrate~~
5. ~~Antimony and Compounds (A2)~~
6. ~~Arsenic and Compounds (A2, 3)~~
7. ~~Asbestos (Ala, 2, 3)~~
8. ~~Benzene (A2, 3)~~
9. ~~Benzidine (Alb, 3): 4,4'--Biphenyldiamine; 4,4'--Diphenylenediamine~~
10. ~~Benzo (a) Pyrene (A2, 3): 3, 4--Benzophrene; BAP~~
11. ~~Beryllium and Compounds (A2, 2, 3)~~
12. ~~BHC (6): 1, 2, 3, 4, 5, 6--Hexachlorocyclohexane~~
13. ~~Lindane & Isomers (6)~~
14. ~~Bis (2--Chloroethyl) Ether (3.5)~~
15. ~~Bis (Chloromethyl) (Ether (Ala. 3): Chloro (Chloroethoxy) Methane: BCME~~
16. ~~Bis (2-Hydroxyethyl)--Dithiocarbamic Acid, Potassium salt (5)~~
17. ~~Cadmium and Compounds (3)~~
18. ~~Captan (5.6)~~
19. ~~Carbaryl (6)~~
20. ~~Carbon Tetrachloride (A2, 3, 5): Tetrachloromethane~~
21. ~~Chloramben (5, 6)~~
22. ~~Chlordane (3, 4, 5, 6)~~
23. ~~Chlorobenzilate (3, 5, 6)~~
24. ~~Chloroform (A2, 3, 4, 5): Trichloromethane~~
25. ~~Chloromethyl Methyl Ether (A2, 3): CMME~~
26. ~~Chromium and Compounds (Hexavalent)(A2, 3)~~
27. ~~DDT/DDD (3, 5, 6)~~
28. ~~1,2--Dibromo--3--Chloropropane (3, 5, 6)~~
29. ~~3,3'--Dichlorobenzidine (A2,3): 3,3'Dichlorobiphenyl 4,4'--Diamine~~

30. 2,4--Dichlorophenoxy Acetic Acid (6): 2,4--D
31. Dieldrin (5,6)
32. Di (2--Ethyl Hexyl Phthalate) (7)
33. Dimethylcarbamyl Chloride (A2, 3): Dimethylcarbamic Acid Choride
34. 1,1--Dimethyl Hydrazine (A2, 3): Asymmetric Dimethyl Hydrazine
35. Dimethyl Sulfate (A2, 3)
36. Dioxane (3): 1,4--Diethylene Dioxide: Gylcole Ethylene Ether
37. Enfosulfan (6)
38. Endrin (6)
39. Ethylenebisdithiocarbamic Acid Salts (5)
40. Ethylene Dibromide (A2,3,5): 1,2--Dibromoethane
41. Ethylene Dichloride (3): 1,2--Dichloroethane
42. Ethylene Oxide (3): 1,2--Epoxyethane
43. Ethylene Thiourea (3): 2--Imidazolidinethione; 1,3--Ethylene--2--Thiourea; ETU
44. Epichlorohydrin (3): 1--chloro--2,3--Epoxypropane
45. Formaldehyde (3)
46. Heptachlor (4,5,6)
47. Hexachlorobenzene (3.4)
48. Hexachlorobutadiene (A2,3,4): Hexachloro--1,3--Butadiene
49. Hexamethyl Phosphoramide (A2); Tris (Dimethylamino) Phosphine Oxide
50. Hydrazine (A2,3): Diamine
51. Kelthane (6)
52. Kepone (5,6)
53. Lead and Compounds (7)
54. Manganese and Compounds (7)
55. Mercury and Compounds (2)
56. Methoxychlor (6)
57. Methyl Bromide (7)
58. Methyl Chloride (7)
59. 4,4'--Methylene Bis(2--Chloroaniline)(A2,3): 3,3' Dichloro--4,4'--Diaminodiphenyl--methane
60. Methylene Chloride (7): Dichloromethane
61. Methyl Iodide (A2,3)
62. Mirex (5,6)
63. Monomethyl Hydrazine (A2)
64. B-Naphthylamine (Alb, 3): 2--Aminonaphthalene
65. Nickel and Compounds (Ala, 3)
66. 4--Nitrodiphenyl (Alb)
67. Nitrofen (5)
68. 2-Nitropropane (A2,3)

69. n--Nitrosodimethylamine (A2,3)
70. Parathion (6)
71. Particulate Polycyclic Aromatic Hydrocarbons (Ala, 3): PPAH
72. Pentachlorophenol (4.6)
73. Perchloroethylene (5): Tetrachloroethylene
74. Phenol (7)
75. n-Phenyl--BNaphthylamine (A2): n--Phenyl--2--Naphthylamine
76. Polybrominated Biphenyls (7): PBB
77. Polychlorinated Biphenyls (3,4): PCB
78. Propane Sultone (A2, 3): 3-Hydroxy--1--Propanesulfonic Acid Sulfone
79. B--Propiolactone (A2): 3--Hydroxypropionic Acid Lactone
80. Propylene Imine (A2): 2--Methylaziridine
81. Propylene Oxide (7): 1,2--Expoxypropane
82. Quintozene (6): Pentachloronitrobenzene; PCNB
83. Strobane (6): Terpene Polychlorinates
84. 2--(p--Tert--butylphenoxy)--Isopropyl--2--Chloroethyl Sulfite (5)
85. Tetrachlorinated Dibenzo--P--Dioxins (4): TCDD, Dioxin
86. Tetrachloroethane (3, 5): 1, 1, 2, 2 -- Tetrachloroethane
87. Tetrachlorvinphos (5)
88. Thallium and Compounds (7)
89. O-Tolidine (A2,3): 3,3'--Dimethylbenzidine; Diaminoditolyl
90. Trichloroethylene (3,5): TCE
91. Trichlorophenol Isomers (3)
92. 2,4,5--Trichlorophenoxy Acetic Acid (6): 2,4,5--T
93. Trifluralin (5)
94. Toxaphene (4,6)
95. Vinyl Bromide (A2): Bromoethylene
96. Vinyl Chloride (Ala,3): Chloroethylene
97. Vinyl Cyclohexene Dioxide (A2): 1,2-Epoxy--4--(Epoxy ethyl) Cyclohexane
98. Vinylidene Chloride (3,4): 1,1--Dichloroethylene
99. Vinyl Trichloride (7): 1,1,2--Trichloroethane

Note: >Reference Sources= in parentheses, followed by chemical synonyms.

The substances listed in Schedule B are criteria pollutants as defined by the Environmental Protection Agency. These are toxic air contaminants for which national ambient air quality standards are established by Federal law. The Air Management Code and Regulations adequately address reporting and control of these substances. Therefore, the pollutants listed in Schedule B are excluded from the reporting provisions of Air Management Regulation VI.

Schedule B

~~Carbon Monoxide~~
~~Sulfur Dioxide~~
~~Ozone~~
~~Nitrogen Dioxide~~
~~Total Suspended Particulates.~~

~~Schedule A Reference Sources~~

1. ~~American Conference of Governmental Industrial Hygienists; Handbook Lists:~~
   ~~A(1) (a). Human Carcinogens – recognized carcinogenic or cocarcinogenic potential with assigned Threshold Limit Value (TLV).~~

   ~~A(1) (b). Human Carcinogens – recognized carcinogenic potential without an assigned TLV.~~

   ~~A(2) Industrial Substances Suspect of Carcinogenic Potential in Man - suspect of inducing cancer based on either (1) limited epidemiologic evidence, exclusive of clinical reports of single cases, or (2) demonstration of carcinogenesis in one or more animal species by appropriate methods.~~
2. ~~National Emission Standards for Hazardous Air Pollutants (NESHAPS) - U.S. EPA.~~
3. ~~TSCA Cancer Hazard Warning Label List - Toxic Substances Control Act - U.S. EPA.~~
4. ~~List of Organic Chemicals of Widespread Concern - U.S. EPA.~~
5. ~~Criteria for A Recommended Standard...Occupational Exposure During the Manufacture and Formulation of Pesticides - NIOSH.~~
6. ~~Selected Substances Table I (Pesticides) - N.J. Department of Environmental Protection.~~
7. ~~Special additions relative to local emission rates or concern.~~

No.	CAS Number	Toxic Air Contaminant / Hazardous Air Pollutant
1	75070	Acetaldehyde
2	60355	Acetamide
3	75058	Acetonitrile
4	98862	Acetophenone
5	53963	2-Acetylaminofluorene
6	107028	Acrolein
7	79061	Acrylamide
8	79107	Acrylic acid

9	107131	Acrylonitrile
10	107051	Allyl chloride
11	92671	4-Aminobiphenyl
12	62533	Aniline
13	90040	o-Anisidine
14	140578	Aramite
15	1332214	Asbestos (1)
16	71432	Benzene
17	92875	Benzidine (4,4'-Biphenyldiamine)
18	98077	Benzotrichloride
19	100447	Benzyl chloride (Chloromethylbenzene)
20	92524	Biphenyl
21	117817	Bis(2-ethylhexyl) phthalate (DEHP)
22	542881	Bis(chloromethyl)ether
23	75252	Bromoform
24	106945	1-Bromopropane (n-Propyl Bromide)
25	106990	1,3-Butadiene
26	156627	Calcium cyanamide
27	133062	Captan
28	63252	Carbaryl
29	75150	Carbon disulfide
30	56235	Carbon tetrachloride (Tetrachloromethane)
31	463581	Carbonyl sulfide
32	120809	Catechol
33	133904	Chloramben
34	57749	Chlordane
35	7782505	Chlorine
36	79118	Chloroacetic acid
37	532274	2-Chloroacetophenone
38	108907	Chlorobenzene

39	510156	Chlorobenzilate (Ethyl-4,4'-dichlorobenzilate)
40	67663	Chloroform (Trichloromethane)
41	107302	Chloromethyl methyl ether (CMME)
42	126998	Chloroprene (2-Chloro-1,3-butadiene)
43		Cresols (Cresylic acid, Cresol mixers)
44	95487	o-Cresol
45	108394	m-Cresol
46	106445	p-Cresol
47	98828	Cumene
48	72559	DDE (Dichlorodiphenyldichloroethylene)
49	50293	DDT/DDD
50	334883	Diazomethane
51	132649	Dibenzofurans
52	96128	1,2-Dibromo-3-chloropropane
53	84742	Dibutylphthalate
54	106467	1,4-Dichlorobenzene
55	91941	3,3-Dichlorobenzidine
56	111444	Dichloroethyl ether (Bis(2-chloroethyl) ether)
57	542756	1,3-Dichloropropene
58	62737	Dichlorvos
59	60571	Dieldrin
60	111422	Diethanolamine
61	121697	N,N-Dimethylaniline
62	64675	Diethyl sulfate
63	119904	3,3-Dimethoxybenzidine
64	60117	4-Dimethyl aminoazobenzene
65	119937	3,3′-Dimethyl benzidine (o-Tolidine)
66	79447	Dimethyl carbamoyl chloride
67	68122	Dimethyl formamide

68	57147	1,1-Dimethyl hydrazine (Asymmetric dimethyl hydrazine)
69	131113	Dimethyl phthalate
70	77781	Dimethyl sulfate
71	534521	4,6-Dinitro-o-cresol
72	51285	2,4-Dinitrophenol
73	121142	2,4-Dinitrotoluene
74	123911	1,4-Dioxane (1,4-Diethyleneoxide)
75	122667	1,2-Diphenylhydrazine
76	106898	Epichlorohydrin (1-Chloro-2,3-epoxypropane)
77	106887	1,2-Epoxybutane
78	140885	Ethyl acrylate
79	100414	Ethyl benzene
80	51796	Ethyl carbamate (Urethane)
81	75003	Ethyl chloride (Chloroethane)
82	106934	Ethylene dibromide (1,2-Dibromoethane)
83	107062	Ethylene dichloride (1,2-Dichloroethane)
84	107211	Ethylene glycol
85	151564	Ethylene imine (Aziridine)
86	75218	Ethylene oxide
87	96457	Ethylene thiourea (1,3-Ethylene-2-thiourea)
88	75343	Ethylidene dichloride (1,1-Dichloroethane)
89	50000	Formaldehyde
90	76448	Heptachlor
91	118741	Hexachlorobenzene
92	87683	Hexachlorobutadiene (Hexachloro-1,3-butadiene)
93	608731	Hexachlorocyclohexane [technical grade]
94	58899	*gamma*-Hexachlorocyclohexane (Lindane)

95	77474	Hexachlorocyclopentadiene
96	67721	Hexachloroethane
97	822060	Hexamethylene-1,6-diisocyanate
98	680319	Hexamethylphosphoramide
99	110543	Hexane
100	302012	Hydrazine (Diamine)
101	7647010	Hydrogen chloride (Hydrochloric acid)
102	7664393	Hydrogen fluoride (Hydrofluoric acid)
103	123319	Hydroquinone
104	78591	Isophorone
105	108316	Maleic anhydride
106	67561	Methanol
107	72435	Methoxychlor
108	74839	Methyl bromide (Bromomethane)
109	74873	Methyl chloride (Chloromethane)
110	71556	Methyl chloroform (1,1,1-Trichloroethane)
111	60344	Methyl hydrazine
112	74884	Methyl iodide (Iodomethane)
113	108101	Methyl isobutyl ketone (MIBK; Hexone)
114	624839	Methyl isocyanate
115	80626	Methyl methacrylate
116	1634044	Methyl tert butyl ether (MTBE)
117	101144	4,4-Methylene bis(2-chloraniline)
118	75092	Methylene chloride (Dichloromethane)
119	101779	4,4'-Methylene dianiline
120	101688	4,4-Methylene diphenyl diisocyanate (MDI)
121	91203	Naphthalene
122	98953	Nitrobenzene
123	92933	4-Nitrobiphenyl

124	100027	4-Nitrophenol
125	79469	2-Nitropropane
126	55185	N-Nitrosodiethylamine
127	62759	N-Nitrosodimethylamine
128	59892	N-Nitrosomorpholine
129	684935	N-Nitroso-N-methylurea
130	56382	Parathion
131	82688	Pentachloronitrobenzene (Quintobenzene)
132	87865	Pentachlorophenol
133	108952	Phenol
134	106503	p-Phenylenediamine
135	75445	Phosgene
136	7803512	Phosphine
137	7723140	Phosphorus
138	85449	Phthalic anhydride
139	1336363	Polychlorinated biphenyls (PCBs; Aroclors)
140	1120714	1,3-Propane sultone (3-Hydroxyl-1-propane sulfonic acid sulfone)
141	57578	*beta*-Propiolactone (3-Hydroxypropanoic acid lactone)
142	123386	Propionaldehyde
143	114261	Propoxur (Baygon)
144	78875	Propylene dichloride (1,2-Dichloropropane)
145	75569	Propylene oxide (1,2-Epoxypropane)
146	75558	1,2-Propylenimine (2-Methyl aziridine)
147	91225	Quinoline
148	106514	Quinone
149	100425	Styrene
150	96093	Styrene oxide

151	2699798	Sulfuryl fluoride
152	1746016	2,3,7,8-Tetrachlorodibenzo(p)dioxin (2,3,7,8-TCDD; Dioxin)
153	79345	1,1,2,2-Tetrachloroethane
154	127184	Tetrachloroethylene (Perchloroethylene)
155	7550450	Titanium tetrachloride
156	108883	Toluene
157	95807	2,4-Toluene diamine (2,4-Diaminotoluene)
158	584849	2,4-Toluene diisocyanate
159	95534	o-Toluidine
160	8001352	Toxaphene
161	120821	1,2,4-Trichlorobenzene
162	79005	1,1,2-Trichloroethane
163	79016	Trichloroethylene
164	95954	2,4,5-Trichlorophenol
165	88062	2,4,6-Trichlorophenol
166	121448	Triethylamine
167	1582098	Trifluralin
168	540841	2,2,4-Trimethylpentane
169	108054	Vinyl acetate
170	593602	Vinyl bromide (Bromoethene)
171	75014	Vinyl chloride
172	75354	Vinylidene chloride (1,1-Dichloroethylene)
173		Xylenes (mixed isomers)
174	95476	o-Xylenes
175	108383	m-Xylenes
176	106423	p-Xylenes
177		Antimony compounds (2)
178	7783702	Antimony pentafluoride

179	1309644	Antimony trioxide
180	1345046	Antimony trisulfide
181		Arsenic compounds (2)
182	7784421	Arsine
183		Beryllium compounds (2)
184		Cadmium compounds (2)
185	130618	Cadmium oxide
186		Chromium VI (Total) (2)
187	744084	Cobalt metal and compounds (2)
188	10210681	Cobalt carbonyl
189	62207765	Fluomine
190		Coke oven emissions (2)
191		Cyanide compounds (including Hydrogen cyanide) (2)
192	94757	2,4-D, salts and esters (2)
193		Glycol ethers (2)
194	111762	Ethylene glycol monobutyl ether (2-Butoxyethanol; EGBE)
195	110805	Ethylene glycol monoethyl ether (2-Ethoxy ethanol)
196	111159	Ethylene glycol monoethyl ether acetate
197	109864	Ethylene glycol monomethyl ether (2-Methoxy ethanol)
198		Lead and compounds (2)
199	78002	Tetraethyl lead
200	7439965	Manganese and compounds (2)
201	12108133	Methylcyclopentadienyl manganese
202		Mercury compounds (2)
203	7439976	Mercury (inorganic)

204		Nickel compounds (2)
205	13463393	Nickel carbonyl
206	1313991	Nickel oxide
207		Polycyclic organic matter (POM) & Polycyclic aromatic hydrocarbons (PAHs) (2)
208	56553	Benz(a)anthracene
209	225514	Benz(c)acridine
210	50328	Benzo(a)pyrene (3,4-benzopyrene)
211	205992	Benzo(b)fluoranthene
212		Selenium compounds (2)
213	7783075	Hydrogen selenide
214	7488564	Selenium sulfide (mono- and di-)
215	13410010	Sodium selenate
216	10102188	Sodium selenite
217		Total dioxin and furans (3)

(1) Also see Philadelphia Department of Public Health Asbestos Control Regulation.

(2) Indicating a chemical compound group; some compounds or subgroups included in this group may also be individually named in this table.

(3) As defined in Interim Procedures for Estimating Risks Associated with Exposure to Mixtures of Chlorinated-p- Dioxins and Dibenzofurans (CDDs and CDFs) and 1989 Update by U.S. Environmental Protection Agency.

Technical Guidelines for
Air Management Regulation VI

By

Air Management Services

Department of Public Health

City of Philadelphia

April 28, 2022
Revised April 27, 2023

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I. Toxic Air Contaminants and Reporting Thresholds

Toxic air contaminants, also known as air toxics, are man-made or natural pollutants that when emitted into the air may have adverse health effects as determined from human and animal exposure studies. Air Management Regulation (AMR) VI, as amended, incorporates a list of two hundred and seventeen (217) air pollutants and pollutant groups that are designed as air toxics by the Air Pollution Control Board pursuant to Phila. Code Sec. 3-201(3). This list incorporates nearly all one hundred eighty-eight (188) pollutants that are classified as hazardous air pollutants (HAPs) by U.S. EPA pursuant to Section 112 of the Clean Air Act, and includes additional air pollutants that have been determined to have adverse health effects by Air Management Service**s** (AMS), ~~taking into consideration the hazardous air pollutants listed by the New Jersey Department of Environmental Protection.~~**Department of Public Health, City of Philadelphia**.

As per AMR VI Sec. III.C.(2), AMS is required to establish a reporting threshold for each of the designated air toxics. The reporting threshold is the annual emission rate level (tons per year or pounds per year), that when exceeded, a health risk analysis is necessary. The reporting thresholds for all the designated air toxics are provided in Table 1 below. The *Health Risk Assessment Technical Support Document for Air Management Regulation VI Amendment* describes how these reporting thresholds were established.

Table 1. List of Toxic Air Contaminants (Air Toxics) and Reporting Thresholds

No.	CAS Number	Toxic Air Contaminant / HAP	Reporting Threshold (pounds/year)
1	75070	Acetaldehyde	24
2	60355	Acetamide	2.7
3	75058	Acetonitrile	2000
4	98862	Acetophenone	1
5	53963	2-Acetylaminofluorene	0.04
6	107028	Acrolein	1
7	79061	Acrylamide	0.5
8	79107	Acrylic acid	53
9	107131	Acrylonitrile	1
10	107051	Allyl chloride	9
11	92671	4-Aminobiphenyl	0.01
12	62533	Aniline	33
13	90040	o-Anisidine	1.3
14	140578	Aramite	7.5
15	1332214	Asbestos (1)	0.007

16	71432	Benzene	7
17	92875	Benzidine (4,4’-Biphenyldiamine)	0.001
18	98077	Benzotrichloride	0.015
19	100447	Benzyl chloride (Chloromethyl benzene)	1
20	92524	Biphenyl	21
21	117817	Bis(2-ethylhexyl) phthalate (DEHP)	22
22	542881	Bis(chloromethyl)ether	0.001
23	75252	Bromoform	48
24	106945	1-Bromopropane	2000
25	106990	1,3-Butadiene	1.8
26	156627	Calcium cyanamide	2000
27	133062	Captan	80
28	63252	Carbaryl	2000
29	75150	Carbon disulfide	2000
30	56235	Carbon tetrachloride (Tetrachloromethane)	9
31	463581	Carbonyl sulfide	530
32	120809	Catechol	1000
33	133904	Chloramben	200
34	57749	Chlordane	0.5
35	7782505	Chlorine	10
36	79118	Chloroacetic acid	20
37	532274	2-Chloroacetophenone	1.6
38	108907	Chlorobenzene	2000
39	510156	Chlorobenzilate (Ethyl-4,4’-dichlorobenzilate)	1.7
40	67663	Chloroform (Trichloromethane)	2.3
41	107302	Chloromethyl methyl ether (CMME)	0.08
42	126998	Chloroprene (2-Chloro-1,3-butadiene)	0.12
43		Cresols (Cresylic acid, Cresol mixers)	2000
44	95487	o-Cresol	2000
45	108394	m-Cresol	2000
46	106445	p-Cresol	2000
47	98828	Cumene	2000

48	72559	DDE (Dichlorodiphenyldichloroethylene)	0.5
49	50293	DDT/DDD	0.5
50	334883	Diazomethane	200
51	132649	Dibenzofurans	1000
52	96128	1,2-Dibromo-3-chloropropane	0.03
53	84742	Dibutylphthalate	2000
54	106467	1,4-Dichlorobenzene	4.8
55	91941	3,3-Dichlorobenzidine	0.16
56	111444	Dichloroethyl ether (Bis(2-chloroethyl) ether)	0.16
57	542756	1,3-Dichloropropene	13
58	62737	Dichlorvos	0.6
59	60571	Dieldrin	0.012
60	111422	Diethanolamine	160
61	121697	N,N-Dimethylaniline	200
62	64675	Diethyl sulfate	200
63	119904	3,3-Dimethoxybenzidine	20
64	60117	4-Dimethyl aminoazobenzene	0.04
65	119937	3,3′-Dimethyl benzidine (o-Tolidine)	2
66	79447	Dimethyl carbamoyl chloride	0.014
67	68122	Dimethyl formamide	1600
68	57147	1,1-Dimethyl hydrazine (Asymmetric dimethyl hydrazine)	0.1
69	131113	Dimethyl phthalate	2000
70	77781	Dimethyl sulfate	0.013
71	534521	4,6-Dinitro-o-cresol	20
72	51285	2,4-Dinitrophenol	200
73	121142	2,4-Dinitrotoluene	0.6
74	123911	1,4-Dioxane (1,4-Diethyleneoxide)	11
75	122667	1,2-Diphenylhydrazine	0.25
76	106898	Epichlorohydrin (1-Chloro-2,3-epoxypropane)	44
77	106887	1,2-Epoxybutane	1060
78	140885	Ethyl acrylate	425
79	100414	Ethyl benzene	21

80	51796	Ethyl carbamate (Urethane)	0.18
81	75003	Ethyl chloride (Chloroethane)	2000
82	106934	Ethylene dibromide (1,2-Dibromoethane)	0.09
83	107062	Ethylene dichloride (1,2-Dichloroethane)	2
84	107211	Ethylene glycol	2000
85	151564	Ethylene imine (Aziridine)	0.003
86	75218	Ethylene oxide	0.01
87	96457	Ethylene thiourea (1,3-Ethylene-2-thiourea)	4
88	75343	Ethylidene dichloride (1,1-Dichloroethane)	33
89	50000	Formaldehyde	4
90	76448	Heptachlor	0.04
91	118741	Hexachlorobenzene	0.12
92	87683	Hexachlorobutadiene (Hexachloro-1,3-butadiene)	2.4
93	608731	Hexachlorocyclohexane [technical grade]	0.1
94	58899	*gamma*-Hexachlorocyclohexane (Lindane)	0.17
95	77474	Hexachlorocyclopentadiene	11
96	67721	Hexachloroethane	4.8
97	822060	Hexamethylene-1,6-diisocyanate	0.5
98	680319	Hexamethylphosphoramide	2
99	110543	Hexane	2000
100	302012	Hydrazine (Diamine)	0.01
101	7647010	Hydrogen chloride (Hydrochloric acid)	1060
102	7664393	Hydrogen fluoride (Hydrofluoric acid)	200
103	123319	Hydroquinone	200
104	78591	Isophorone	2000
105	108316	Maleic anhydride	37
106	67561	Methanol	2000
107	72435	Methoxychlor	2000
108	74839	Methyl bromide (Bromomethane)	265
109	74873	Methyl chloride (Chloromethane)	29

110	71556	Methyl chloroform (1,1,1-Trichloroethane)	2000
111	60344	Methyl hydrazine	0.05
112	74884	Methyl iodide (Iodomethane)	200
113	108101	Methyl isobutyl ketone (MIBK; Hexone)	2000
114	624839	Methyl isocyanate	53
115	80626	Methyl methacrylate	2000
116	1634044	Methyl tert butyl ether (MTBE)	200
117	101144	4,4-Methylene bis(2-chloraniline)	0.12
118	75092	Methylene chloride (Dichloromethane)	2000
119	101779	4,4’-Methylene dianiline	0.12
120	101688	4,4-Methylene diphenyl diisocyanate (MDI)	4.5
121	91203	Naphthalene	1.6
122	98953	Nitrobenzene	1.3
123	92933	4-Nitrobiphenyl	200
124	100027	4-Nitrophenol	1000
125	79469	2-Nitropropane	0.02
126	55185	N-Nitrosodiethylamine	0.001
127	62759	N-Nitrosodimethylamine	0.004
128	59892	N-Nitrosomorpholine	0.03
129	684935	N-Nitroso-N-methylurea	0.002
130	56382	Parathion	20
131	82688	Pentachloronitrobenzene (Quintobenzene)	60
132	87865	Pentachlorophenol	10
133	108952	Phenol	2000
134	106503	p-Phenylenediamine	2000
135	75445	Phosgene	16
136	7803512	Phosphine	16
137	7723140	Phosphorus	3.7
138	85449	Phthalic anhydride	1060
139	1336363	Polychlorinated biphenyls (PCBs; Aroclors)	0.5

140	1120714	1,3-Propane sultone (3-Hydroxyl-1-propane sulfonic acid sulfone)	0.08
141	57578	*beta*-Propiolactone (3-Hydroxypropanoic acid lactone)	0.01
142	123386	Propionaldehyde	425
143	114261	Propoxur (Baygon)	2000
144	78875	Propylene dichloride (1,2-Dichloropropane)	5.3
145	75569	Propylene oxide (1,2-Epoxypropane)	14
146	75558	1,2-Propylenimine (2-Methyl aziridine)	0.6
147	91225	Quinoline	0.05
148	106514	Quinone	1000
149	100425	Styrene	93
150	96093	Styrene oxide	1.2
151	2699798	Sulfuryl fluoride	2000
152	1746016	2,3,7,8-Tetrachlorodibenzo(p)dioxin (2,3,7,8-TCDD; Dioxin)	0.0000014
153	79345	1,1,2,2-Tetrachloroethane	0.9
154	127184	Tetrachloroethylene (Perchloroethylene)	9
155	7550450	Titanium tetrachloride	5.3
156	108883	Toluene	2000
157	95807	2,4-Toluene diamine (2,4-Diaminotoluene)	0.05
158	584849	2,4-Toluene diisocyanate	3.7
159	95534	o-Toluidine	1
160	8001352	Toxaphene	0.17
161	120821	1,2,4-Trichlorobenzene	106
162	79005	1,1,2-Trichloroethane	3.3
163	79016	Trichloroethylene	10
164	95954	2,4,5-Trichlorophenol	200
165	88062	2,4,6-Trichlorophenol	17
166	121448	Triethylamine	370
167	1582098	Trifluralin	24
168	540841	2,2,4-Trimethylpentane	1000
169	108054	Vinyl acetate	2000

170	593602	Vinyl bromide (Bromoethene)	1.7
171	75014	Vinyl chloride	6
172	75354	Vinylidene chloride (1,1-Dichloroethylene)	2000
173		Xylenes (mixed isomers)	2000
174	95476	o-Xylenes	2000
175	108383	m-Xylenes	2000
176	106423	p-Xylenes	2000
		Chemical Compound Groups	
177		Antimony compounds (2)	1000
178	7783702	Antimony pentafluoride	20
179	1309644	Antimony trioxide	11
180	1345046	Antimony trisulfide	20
181		Arsenic compounds (2)	0.01
182	7784421	Arsine	0.01
183		Beryllium compounds (2)	0.02
184		Cadmium compounds (2)	0.01
185	130618	Cadmium oxide	0.01
186		Chromium VI (Total) (2)	0.0045
187	744084	Cobalt metal and compounds (2)	0.006
188	10210681	Cobalt carbonyl	0.006
189	62207765	Fluomine	0.006
190		Coke oven emissions (2)	0.09
191		Cyanide compounds (including Hydrogen cyanide) (2)	42
192	94757	2,4-D, salts and esters (2)	2000
193		Glycol ethers (2)	2000
194	111762	Ethylene glycol monobutyl ether (2-Butoxyethanol; EGBE)	2000
195	110805	Ethylene glycol monoethyl ether (2-Ethoxy ethanol)	1800
196	111159	Ethylene glycol monoethyl ether acetate	685
197	109864	Ethylene glycol monomethyl ether (2-Methoxy ethanol)	455
198		Lead and compounds (2)	2
199	78002	Tetraethyl lead	2

200	7439965	Manganese and compounds (2)	0.8
201	12108133	Methylcyclopentadienyl manganese	0.8
202		Mercury compounds (2)	2
203	7439976	Mercury (inorganic)	1.6
204		Nickel compounds (2)	0.2
205	13463393	Nickel carbonyl	0.2
206	1313991	Nickel oxide	0.2
207		Polycyclic organic matter (POM) & Polycyclic aromatic hydrocarbons (PAHs) (2)	2
208	56553	Benz(a)anthracene	0.4
209	225514	Benz(c)acridine	2
210	50328	Benzo(a)pyrene (3,4-benzopyrene)	0.05
211	205992	Benzo(b)fluoranthene	0.4
212		Selenium compounds (2)	1060
213	7783075	Hydrogen selenide	25
214	7488564	Selenium sulfide (mono- and di-)	20
215	13410010	Sodium selenate	20
216	10102188	Sodium selenite	20
217		Total dioxin and furans (3)	0.00012

(1) Also see Philadelphia Department of Public Health Asbestos Control Regulation.

(2) Indicating a chemical compound group; some compounds or subgroups included in this group may also be individually named in this table.

(3) As defined in Interim Procedures for Estimating Risks Associated with ~~Exposure~~ **Exposures** to Mixtures of Chlorinated **Dibenzo**-p-Dioxins and Dibenzofurans (CDDs and CDFs), March 1989 update, EPA-625/3-89/016, available from www.epa.gov/nscep; https://archive.epa.gov/raf/web/html/cdd-cdf.html

II. Overview – Toxic Air Contaminants Health Risk Assessment

A health risk assessment is a scientific process used to estimate the probability of adverse health effects resulting from human exposure to **a** hazardous substance **or hazardous substances**. AMS utilizes health risk assessments to evaluate any remaining health risk, known as residual health risk, posed by air toxic emissions from certain air pollution sources that have otherwise implemented emission controls, work practices, and other requirements specified by applicable City, Commonwealth, and Federal authorities.

As per AMR VI. Secs. II~~,~~ **and** III, a health risk assessment may be required along with any Installation Permit application[1] or Plan Approval application **received on or after January 1, 2024,** for the construction / modification of air pollution sources where the emission of air toxics will exceed specified reporting thresholds. A facility-wide health risk assessment is also required for any **initial or renewal** Title V operating permit application ~~(initial)~~ received on and after January 1, ~~2022~~**2024,** if the facility-wide potential emission of at least one toxic air contaminate is above the reporting threshold. **A Title V operating permit modification application only requires a risk assessment if the potential emissions of at least one toxic air contaminant due to the modification increases above the reporting threshold.** See AMR VI. Secs. II, III.

Instructions on how to perform the required health risk assessment; calculate the cancer risks and non-cancer health quotients; and interpret the results of the assessments are provided in Section III of the Guidelines below, and in Appendix A. ~~Sources that must submit an air toxics notice pursuant to AMR VI. Sec. II. but are otherwise exempt from a health risk assessment are listed in Appendix B of these Guidelines. This list consists of sources for which AMS has performed a general health risk assessment and determined that a risk assessment for these sources is not required. Appendix C~~ **Appendix B** contains a glossary of the various terms used in these Guidelines.

III. Health Risk Assessment

A. Risk Screening

An initial risk screening analysis must be performed for any new or modified air pollution source that will emit air toxics in excess of the reporting thresholds provided in Table I in Section I. This risk screening analysis can be performed by using ~~either~~: 1) AMS's Risk Screening Workbook~~, or via~~**;** 2) ~~running the EPA~~**EPA's** air quality screening model, AERSCREEN~~, for the source~~**; or (3) an alternative air screening model approved by the Department on a case-by-case basis**.

Note: Risk screening is required for new or modified sources where an applicant seeks Installation Permits or Plan Approvals from AMS. Applicants seeking an initial or renewal Title V permit should proceed to Section III.D.

A.1. Risk Screening – Using the Risk Screening Workbook

The Risk Screening Workbook is a Microsoft Excel workbook that calculates the worst-case cancer **risks** and non-cancer health **hazard** quotients from a source's air toxics emissions, based on applicant-inputted data. The Risk Screening Workbook incorporates assumptions

[1] Note: As per AMR VI. Sec. II.C., no air toxics notice and health risk assessment is required for the following Installation Permits Applications: Complex Source Permits, Mechanical Ventilation System for Automotive Facilities Permits, and Dust Control Permits.

derived from air quality dispersion modeling and dose response factors~~,~~ to produce conservative risk assessment estimates for a particular emission point. It is, therefore, an easy-to-use tool that simplifies the risk assessment screening process for the permit applicants. **The risk screening workbook ~~may only~~should not be used for ~~air pollution~~the following sources ~~that emit air toxics through~~: (1) sources without an exhaust stack or release point, (2) sources with** stacks ~~that are >~~**with a horizontal or downward discharge direction, or (3) sources with stack heights less than** 15 ~~ft in height.~~**feet (above grade).** For ~~lower stacks A.2 A screening,~~**these sources, applicants must use either the EPA** air quality ~~dispersion~~**screening** model ~~must be performed for all other sources~~ **AERSCREEN or another screening model approved by the Department,** as ~~provided~~**described** in Section III.A.2 **below**.

The Risk Screening Workbook consists of three separate worksheets, as indicated by the tabs at the bottom of the workbook. The first worksheet contains instructions. The second worksheet, called the ~~risk~~**Risk** worksheet, handles the risk screening data input and calculations. The third worksheet, called the CAS Index, contains a numerical listing of all the Chemical Abstracts Service (CAS) numbers for the designated air toxics. The CAS Index worksheet also contains synonyms for certain air toxics. The applicant must complete a Risk Screening Workbook for each exhaust stack or emissions point to be included in the newly constructed or modified air pollution source.

For a particular exhaust stack or emission point, the applicants must enter the stack height (ft), the distance from the stack to the closest facility property line (ft), the ~~chemical~~ **pollutant**-specific annual emission rate Q (tons/year) and the ~~chemical~~ **pollutant**-specific maximum short-term emission rate Q_h (lbs/hr) in the risk worksheet. All source-specific information entered by the applicant must be consistent with the information provided in the attendant Installation Permit, Plan Approval, or Title V permit application. Screening results will be calculated automatically and displayed in the risk worksheet.

The screening results provided for each exhaust stack or emission point will indicate whether any further risk assessment will be required. If the screening results for any air toxic emitted by a particular stack is "Negl" (Negligible), no further evaluation is needed[2]. If the screening result shows "FER," further evaluation in the form of a refined risk assessment as described in Section III.B. below is required.

A.2. Risk Screening – Air Quality Modeling (AERSCREEN)

In the event where the Risk Screening Workbook cannot be used, the required risk screening must be performed via AERSCREEN air quality dispersion modeling **or another Department-approved screening model**. The latest AERSCREEN modeling program~~,~~ and attendant instructions for running the modeling program can be found on U.S. EPA's website:

https://www.epa.gov/scram/air-quality-dispersion-modeling-screening-models

[2] A "Negl" result means the cancer risk from the emission of an air toxic from a particular stack or emission point is $\leq$ 1 in a million (1×10^{-6}) and the non-cancer hazard quotient is $\leq$ 1.

Applicants must use AERSCREEN **or another Department-approved screening model** to estimate the worst-case, ambient air concentrations of air toxics that will be emitted from the source, and then calculate the attendant cancer risk and non-cancer hazard quotients. All source-specific information entered **into AERSCREEN** by the applicant to perform this analysis **must be** consistent with the information provided in the attendant Installation Permit or Plan Approval application. Formulas for the cancer health risk and non-cancer hazard quotients calculation are provided in Appendix A, Step 4, Equations 1, 2 and 3. Unit Risk Factor **(**URF) and Reference Concentration (RfC) values needed to perform these calculations are found in the Risk Screening Workbook, ~~risk~~**Risk** worksheet.

Note: In the event that an air toxic has both long-term and short-term non-cancer RfCs listed in the risk worksheet, than –

1) An annual pollutant emission rate should be used to model the maximum annual (long- term) ambient concentration, and calculate the long-term hazard quotient using the long-term RfC; and
2) A short-term, hourly pollutant emission rate should be used to model the maximum short-term ambient concentration and calculate the short-term hazard quotient using the short-term RfC.

If the cancer risk for each air toxic emitted from the source is $\leq$ 1 in a million (1×10^{-6}) AND the applicable non-cancer hazard quotient **is** $\leq$ 1, the health risk for the source is considered negligible and no further evaluation is necessary. In the event that cancer risks for any air toxic emitted is > 1 in a million (1×10^{-6}) AND / OR the applicable non-cancer hazard quotient is > 1, then a refined risk assessment must be performed as specified in Section B of these Guidelines.

B. Refined Risk Assessment

Note: Refined Risk Assessment is required for new or modified sources where an applicant seeks Installation Permits or Plan Approvals from AMS~~. Applicants seeking an initial~~ and: 1) received an "FER" result in the risk screening step using the Risk Screening Workbook, or 2) cancer risks for any air toxic is > 1 in a million (1×10^{-6}) and/or the applicable non-cancer hazard quotient is > 1 using the AERSCREEN model or other Department-approved screening model. Applicants seeking an initial or renewal Title V permit should proceed to Section III.D.

The refined risk assessment consists of a refined atmospheric dispersion modeling analysis for air pollution sources that estimates ambient air concentrations of emitted air toxics more accurately than the methods described in Section III.A. This analysis relies on using stack- and source-specific data as well as representative meteorological data, as input into U.S. EPA's AERMOD air quality dispersion model. All source-specific information **inputted into the model** for this analysis must be consistent with the information provided **by the applicant** in the attendant Installation Permit or Plan Approval application.

The refined risk assessment process evaluates cancer risk, as well as short- and long-term non-

carcinogenic risks, and must be calculated in accordance with Appendix A for each air toxic emitted from a source. These health risks must be determined:

1) at the modeling receptor with the highest predicted air concentration based on 5 ~~years'~~**years of** meteorological data (AERMOD modeling); and

2) at sensitive or vulnerable receptors (such as nearest residence, daycare centers, hospitals, nursing homes, playgrounds, etc.) located within the defined modeling grid.

All applicants must submit an atmospheric dispersion modeling protocol in accordance with procedures outlined by U.S. EPA for AERMOD air quality dispersion modeling. Program files and instructions for performing AERMOD modeling can be found on U.S. EPA's website:
https://www.epa.gov/scram/air-quality-dispersion-modeling

Note: Other air quality dispersion models **(for example, EPA's AERSCREEN model if it was not used in the risk screening step)** or use of source-specific ambient air monitoring / fenceline monitoring data, may only be used in the refined risk assessment evaluation if first approved by AMS.

C. Risk Management Guidelines – New and Modified Sources (Installation Permits / Plan Approvals)

AMS's risk management guidelines for individual new or modified sources, pursuant to AMR VI, are summarized below in Tables 2 and 3.

Table 2. Cancer Risk Guidelines for New or Modified Sources

Risk Level	Outcome
Risk ≤ 1 in a million ($1x10^{-6}$)	Negligible risk.
1 in a million < Risk < ~~100~~**50** in a million	Case-by-case review (See Section IV).
Risk ≥ ~~100~~**50** in a million (~~$1x10^{-4}$~~**$5x10^{-5}$**)	Unacceptable risk; source poses an undue health hazard

~~Note: Cancer risk for a plan approval application under Section III.B.3 of the regulation shall be determined as follows:~~

~~Total Cancer Risk = Project Cancer Risk + Background Cancer Risk~~

~~where,~~

~~Total Cancer Risk = Cancer risk per million to be used when evaluating the risk level in Table 2 above.~~

~~Project Cancer Risk = The cancer risk per million for the project as determined by A.1, A.2, or B above.~~

~~Background Cancer Risk = The cancer risk for the census tract where the facility is located using the most recent EPA Air ToxScreen data.~~

Table 3. Long-and Short-Term Non-Cancer Hazard Quotient Guidelines for New or Modified Sources

Risk Level	Outcome
Hazard Quotient ≤ 1	Negligible risk.
Hazard Quotient > 1	Risk Mitigation Plan required (See Section IV).

If all cancer risk and non-cancer hazard quotients calculated for all the air toxics emitted are deemed "negligible" pursuant to Tables 2 and 3, no further action is required. See Appendix A, Step 4 for rounding of the hazard quotient value.

Figure 1 illustrates the workflow of health risk assessment for individual sources in Installation Permit and Plan Approval applications.

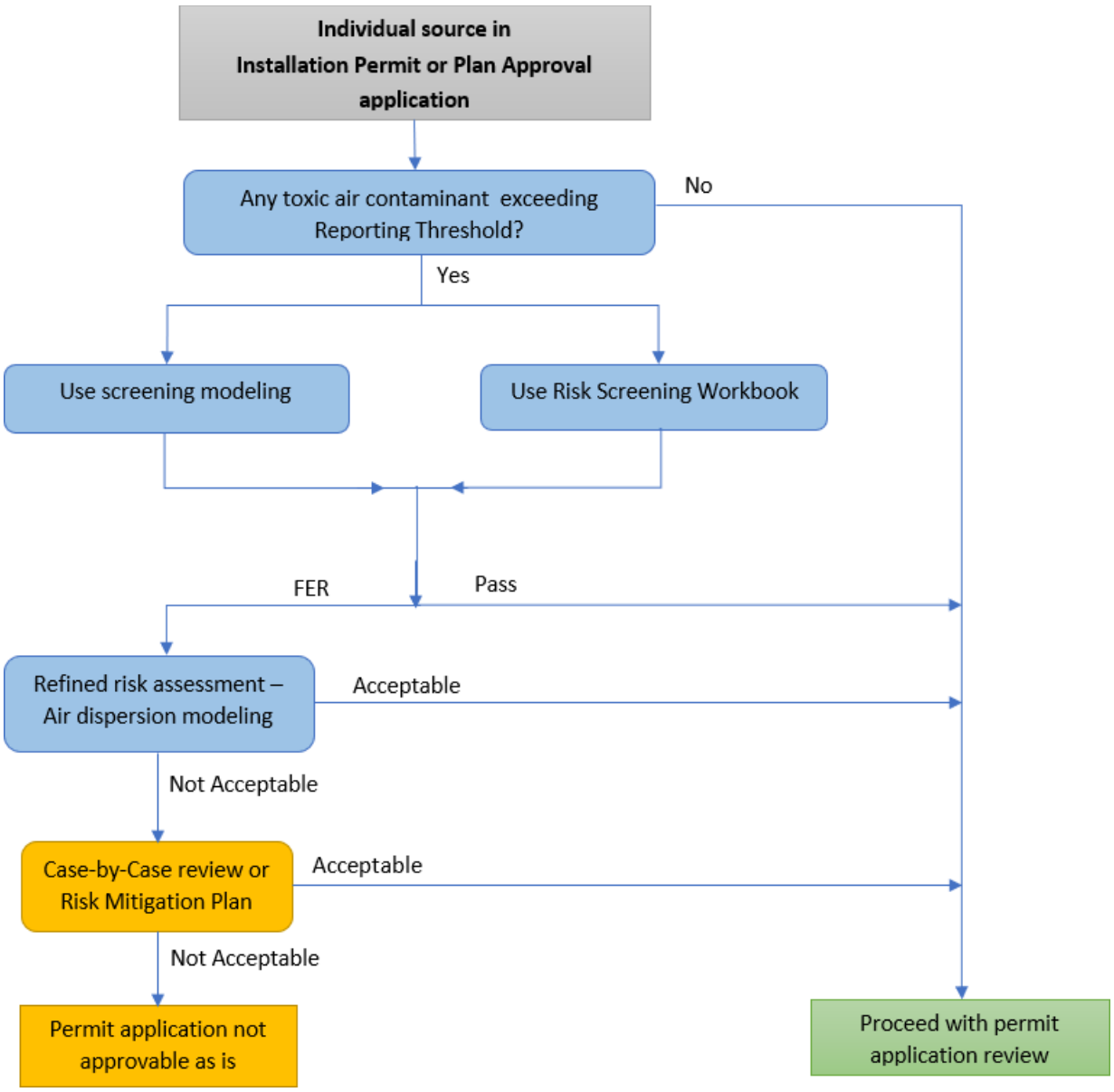

Figure 1. Workflow of air toxics health risk assessment for individual sources in Installation Permit and Plan Approval applications

D. Title V Facility-Wide Risk Assessment

A facility-wide heath risk assessment is required for all air toxics emitted from all air pollution sources operated as part of a Title V facility. This analysis must be performed anytime an applicant seeks an initial Title V permit for a facility **or seeks to renew a Title V permit for an existing facility** where air toxics will be emitted in excess of the reporting thresholds.

Applicants performing a facility-wide risk assessment must submit an atmospheric dispersion modeling protocol to AMS that is in accordance with procedures outlined in the U.S. EPA's air quality dispersion modeling guidelines available at https://www.epa.gov/scram/air-quality- dispersion-modeling. This modeling protocol must estimate the impact of each toxic air contaminant that will be emitted from all stacks / emission points within the facility in accordance with the cancer risk and non-cancer hazard quotient methodology provided in Appendix A to these Guidelines.

All source-specific information entered by the applicant to perform the facility-wide health risk assessment must be consistent with the information provided in the attendant Title V permit application. Applicants may opt to use Risk Screening Workbook discussed in Section III.A.1 when applicable, as a preliminary tool to conduct screening for facility-wide risk assessment of air toxic emissions.

Note: The atmospheric dispersion modeling protocol required by this section must be approved by AMS before the facility-wide health risk assessment is performed.

D.1. Title V Facility-Wide Risk Assessment Guidelines

AMS's risk management guidelines for Title V facilities are summarized below in Tables 4 and 5.

Table 4. Title V Facility-Wide Cancer Risk Guidelines

Risk Level	Outcome
Risk ≤ ~~1~~**10** in a million ($1x10^{-6}$)	Negligible risk.
10 in a million < Risk < ~~100~~**50** in a million	Risk Mitigation Plan required (see Section IV).
Risk ≥ ~~100~~**50** in a million (~~$1x10^{-4}$~~ **$5x10^{-5}$**)	Unacceptable risk; facility poses an undue health hazard

~~Note: Cancer risk under Section III.B.3 of the regulation shall be determined as follows: Total Cancer Risk = Title V Facility Risk + Background Cancer Risk~~

~~where,~~

~~Total Cancer Risk = Cancer risk per million to be used when evaluating the risk level in Table 4 above.~~

~~Title V Facility Cancer Risk = The cancer risk per million for the project as determined by D above.~~

~~Background Cancer Risk = The cancer risk for the census tract where the facility is located using the most recent EPA Air ToxScreen data.~~

Table 5. Title V Facility-Wide Long- and Short-Term Non-Cancer Risk Guidelines

Risk Level	Outcome
Hazard Quotient ≤ 1	Negligible risk.
Hazard Quotient > 1	Risk Mitigation Plan required (see Section IV).

If all cancer risk and non-cancer hazard quotients calculated for all the air toxics emitted are deemed "negligible" pursuant to Tables 4 and 5, no further action is required. Figure 2 illustrates the workflow of facility wide risk assessment. See Appendix A, Step 4 for rounding of the hazard quotient value.

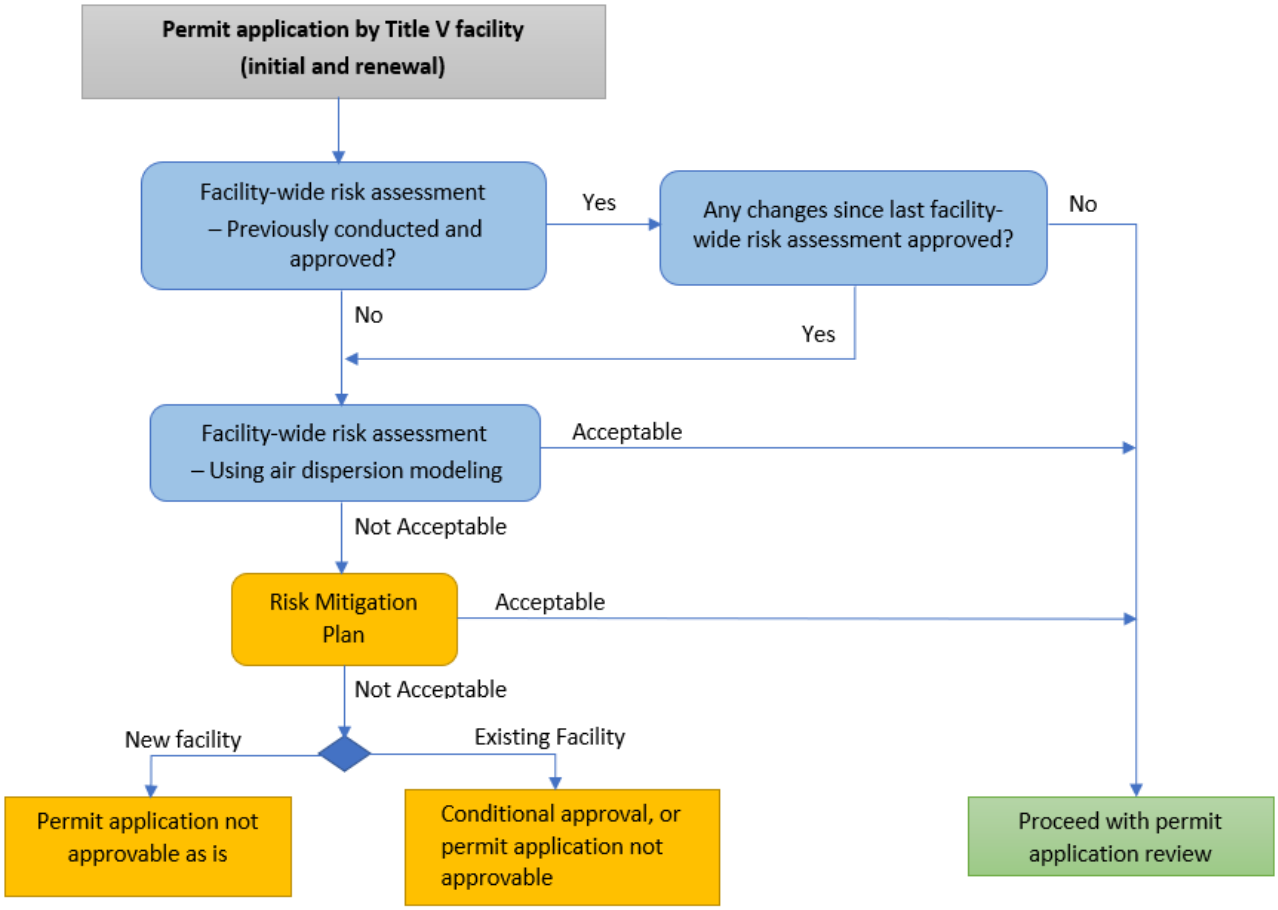

Figure 2. Workflow of facility-wide air toxics health risk assessment for Title V permit applications

D.2. Determining Total Risk Including Background

The Department will determine the Total Risk by combining the Background Risk (by ambient air pollutant concentrations) and the Incremental Risk from the facility, as below:

$$\text{Risk} = \text{Background Risk}_{\text{ambient air}} + \text{Incremental Risk}_{\text{facility}}$$

The Department will measure the Background Risk by measuring the ambient air concentrations surrounding the facility. The Department will use EPA's TO-15 method to capture 24-hour grab samples and will analyze the samples for TAC concentrations using Gas Chromatography/Mass spectrometry (GC/MS). The sample analysis will produce a 24-hour average concentration, and the Department will use the 24-hour average to estimate an annual average concentration for TACs in the ambient air surrounding the facility.

The Department will calculate cancer and noncancer Background Risk for each TAC using the estimated annual air concentration, cancer URFs, and noncancer RfCs. Formulas for the cancer health risk and non-cancer hazard quotients calculation are provided in Appendix A, Step 4, Equations 1, 2 and 3.

When calculating a facility's Incremental Risk, the Department will only consider sources that are not captured in the existing Background Risk at the facility. Therefore, Incremental Risk would only encompass newly planned sources at the facility for TVOP renewals and applications.

A permit application is unacceptable if the total cancer risk is above 100 in a million, based on EPA cancer risk upper limit guidelines, unless the facility reduces the total cancer risk to no more than 100 in a million using mitigation measures (see Section IV). See III.D.1 for facility incremental risk.

As the technology and EPA guidance evolve, AMS may adopt new methods to determine the background risk.

IV. Risk Mitigation Plan

A risk mitigation plan is required when the risk analysis for the application is higher than a negligible risk and lower than an unacceptable risk. Risk mitigation plans will be submitted by the facility owners and/or operators and are subject to Department review and approval. The risk mitigation plan must be well-defined and result in health risk reductions. This is a case-by-case determination because the situations can vary drastically, so there is no "one-size-fits-all" solution. Both an installation permit (for example, for a new small boiler at a school) and a Title V operating permit application for a large chemical plant can require risk mitigation. The primary goal of a mitigation plan is to reduce emissions and health risks; the emission and risk reductions should be quantified.

In the event that Risk Mitigation Plan is called for, the applicant must develop a plan that documents and describes how the health risks posed by air toxics emissions from a new / modified air pollution source, or Title V facility, will be minimized and managed. This Risk Mitigation Plan must account for locations where the modeled, maximum air toxic(s) ~~concentration~~**concentrations** occur as demonstrated by the refined risk assessment / Title V facility-wide risk assessment**, the presence of overburdened communities**, and the overall impact of such emissions on the sensitive receptor population. The Risk Mitigation Plan must also account for the uncertainties associated with the health risk assessment procedures; applicant's / operator's compliance history if any; and include a cost benefit analysis of any adopted health risk mitigation measures. Such risk mitigation measures can include, but are not limited to –

- Adoption of additional air pollution controls to lower air toxic emissions that are not otherwise required by other air pollution authorities;

- **Adoption of changes in operation hours and schedules to reduce short-term maximum pollutant concentration;**

- Modifying stack / emission point parameters to increase dispersion (for example, increase the stack height); and / or

- Adoption of changes in operation in a manner to eliminate **or reduce** the inhalation pathway for sensitive receptors**.**

If approved by AMS, **the relevant details of** the Risk Mitigation Plan will be incorporated into the respective Installation Permit, Plan Approval, or Title V permit. **AMS may require changes to the Risk Mitigation Plan if AMS believes it is not sufficient.** Failure to develop an acceptable Risk Mitigation Plan will result in the denial of the respective Installation Permit, Plan Approval, or Title V permit.

When reviewing Risk Mitigation Plans, AMS will consider information such as the following:

- **How high is the cancer risk level? AMS will push harder for changes if the risk level is 95-in-a-million than if it is 5-in-a-million.**

- **What is near the facility, particularly near the area with the highest projected risk? Are there residences or sensitive sources like hospitals and day care centers nearby? AMS will be more concerned if the highest risk is projected to be near a residence than if it is in the middle of a street.**

- **How difficult is it to improve the risk level? AMS is more likely to push for the raising of a stack that will lead to a small improvement than the installation of an expensive control device that will only lead to a small improvement.**

When preparing a Risk Mitigation Plan, the facility should consider the following:

- **Can the emission rate be lowered through the installation of a control device?**

- **Can the potential emissions be reduced by accepting a throughput limit (i.e. limit operation of the process to 4,000 hours per year instead of 8,760 hours per year)?**

- **Can the risk level be improved by changing the location or exhaust? Raising the stack, increasing the stack exhaust velocity, or locating the process further from the property line may lower the risk level.**

APPENDIX A

THE RISK ASSESSMENT PROCESS

In 1986, the U.S. EPA established risk assessment guidelines in order to provide consistency and technical support between U.S. EPA and other regulatory agencies. The guidelines were based on recommendations from the National Research Council (NRC 1983). NRC divided the risk assessment process into four steps, which are described below.

Step 1 - Hazard Identification

Hazard identification is the process used to determine the potential human health effects from exposure to an air toxic. This is based on information provided by the scientific literature. For air toxics sources, hazard identification involves identifying whether a hazard exists, and if so, identifying the exact pollutants of concern. Hazard identification takes into consideration whether a pollutant is a potential human carcinogen or is associated with other types of adverse health effects. For hazard identification in relation to an air permit, the following are considered:

A. Which contaminants will be emitted from the source;
B. Which of these contaminants have known health effects; and
C. The specific toxicological effects of these air toxics.

Step 2 - Dose-Response Assessment

Dose-response assessment is the characterization of the relationship between a chemical (air toxic) exposure, or dose, and the incidence and severity of an adverse health effect. It takes into consideration factors that influence this relationship, including intensity and pattern of exposure, and age and lifestyle variables that may affect susceptibility. It may also involve extrapolation from high-dose to low-dose responses, and from animal to human responses. This information is gathered from epidemiological or laboratory studies done by federal or state agencies, health organizations, academic institutions, and others.

Dose-response assessment as utilized in the air permitting process involves the quantification (in terms of severity or likelihood) of toxicological effects of individual chemicals on humans. The dose-response relationship is evaluated differently for carcinogenic (cancer-causing) and non- carcinogenic substances.

For carcinogens, it is assumed that there is a linear relationship between an increase in dose or exposure concentration and an increase in cancer risk. This is expressed as a **potency slope** or **slope factor** (SF), in units “per milligram (of chemical) per kilogram (of body weight) per day” or (/mg/kg/day).

To evaluate health risks from inhalation of carcinogenic substances, U.S. EPA and other

regulatory agencies use potency slopes to develop **unit risk factors** (URFs). A URF can be defined as the upper-bound excess probability of contracting cancer as the result of a lifetime of exposure to a carcinogen at a concentration of 1 $\mu g/m^3$ in air. URF units are "per microgram (of chemical) per cubic meter (of air)" or $(\mu g/m^3)^{-1}$.

For inhalation effects from non-carcinogens, dose-response data are used to develop **reference concentrations** (RfCs), for both long-term (chronic) and short-term exposures. Unlike carcinogens, non-carcinogens are assumed to have thresholds for adverse effects, meaning that injury does not occur until exposure has reached or exceeded some concentration (a threshold). An RfC is derived from a no-observed adverse effect level (NOAEL) or lowest-observed adverse effect level (LOAEL) determined through human or animal exposure studies. Since actual thresholds for the general population cannot be precisely determined, uncertainty or safety factors are applied to the NOAEL or LOAEL. This assures that the RfC is set at a level that is expected to be protective of sensitive populations (the elderly, infirm, or very young). Short-term RfCs are developed to prevent health effects from exposure periods of 24 hours or less. RfCs are expressed in units of $\mu g/m^3$ (Note: California's air program refers to these values as "Reference Exposure Levels (RELs)," while U.S. EPA uses the term RfC.).

To establish URFs, RfCs, and SFs, toxicological studies are evaluated by groups assigned for this purpose within U.S. EPA and other agencies. These risk values are then usually peer-reviewed and gathered into databases. U.S. EPA maintains the Integrated Risk Information System (IRIS), which is available on-line at http://www.epa.gov/iris. Another primary source of risk data is the California Office of Environmental Health Hazard Assessment (OEHHA). Their data is available on-line at http://www.oehha.ca.gov/.

Step 3 - Exposure Assessment

The exposure assessment step determines the extent (intensity, frequency, and duration, or dose) of human exposure to a chemical in the environment. There are three components to the exposure assessment:

A. Estimation of the maximum quantity of each pollutant emitted from the source of concern (based on data from previously existing sources or engineering estimates);

B. For each contaminant emitted from a source, estimation of the resulting maximum annual average and (where applicable) maximum short-term average ambient air concentrations, using dispersion models, or air impact values based on dispersion models; and

C. Estimation of the amount of contaminant taken in by a human

Step 4 - Risk Characterization

Risk characterization is the final step in risk assessment. At this step, human health risk is calculated and described based on the information gathered in the first three steps. The risk

characterization also includes some consideration of uncertainty, scientific judgment, and the major assumptions that were made, especially regarding exposure.

Human health risk estimates for inhalation of a carcinogen are based on the following calculation:

Cancer Risk = C x URF -

Equation 1 where:

C = Annual maximum ambient air concentration of the pollutant ($\mu g/m^3$), based on annual emission rate;

URF = pollutant-specific inhalation unit risk factor $(\mu g/m^3)^{-1}$

Human health risk estimates for inhalation of a non-carcinogen are based on the following calculations:

For long-term non-cancer risk:

Hazard Quotient = C/RfC -

Equation 2 where:

C = Annual maximum ambient air concentration of the pollutant ($\mu g/m^3$), based on annual emission rate;

RfC = Long-term pollutant-specific reference concentration ($\mu g/m^3$).

For short-term non-cancer risk:

Hazard Quotient $_{(ST)}$ = C_{st}/RfC_{st} -

Equation 3 where:

C_{st} = Short-term maximum ambient air concentration of the pollutant ($\mu g/m^3$), based on short-term emission rate;

RfC_{st} = Short-term pollutant-specific reference concentration ($\mu g/m^3$).

The averaging time for non-carcinogen concentrations can be long-term (annual) and/or short-term (a specific number of hours), depending on the basis of the reference dose. Both a long-term and a short-term non-cancer hazard quotient should be evaluated for an air toxic if it has both long-term and short-term RfC values established.

The hazard quotient is commonly rounded to one significant figure. The rounding should be done only in the final results, not in the intermediate calculations (see U.S. EPA reference). However, AMS may require that the first decimal place in the value be kept (for example, 1.4) when health risks at sensitive or vulnerable receptors (such as nearest residence, daycare centers, hospitals, nursing homes, playgrounds, etc.) are evaluated.

APPENDIX B

~~TOXIC AIR CONTAMINANT EMISSION SOURCES THAT DO NOT REQUIRE A RISK ANALYSIS~~

~~AMS has determined that the potential toxic air contaminant emissions for the following sources are below the threshold levels in Table 1. Applicants seeking an Installation Permit, Plan Approval, or Title V permit for such sources who must submit the notice of air toxic emissions required by AMR VI Sec. II. but need not perform a health risk assessment are listed below:~~

~~(i) Gasoline stations with no more than 1,900,000 gallons per year throughput;~~

~~(ii) Internal combustion engines with a capacity rating of no more than 2500 horsepower that burn No. 2 oil (including diesel) and can operate no more than 500 hours per year;~~

~~(iii) Spray paint booths operated by auto body shops that use no more than 250 gallons per year of coatings and solvent combined that emit less than 21 pounds per year of ethyl benzene.~~

~~AMS has performed a health risk analysis in the following sources and determined that risk levels are acceptable. Applicants seeking an Installation Permit, Plan Approval, or Title V permit for such sources who must submit the notice of air toxic emissions required by AMR VI Sec. II. but need not perform a health risk assessment are listed below:~~

~~(iv) Boilers and heaters with no more than 50 million BTU per hour capacity, burning only natural gas, and with an exhaust stack at least 20-foot tall and at least 10 feet away from the facility property line.~~

~~APPENDIX C~~

ACRONYMS & GLOSSARY

Air Toxics: Also known as toxic air pollutants, toxic air contaminants, or hazardous air pollutants. These are chemicals that cause or may cause serious effects in humans and may be emitted into the air in quantities that are large enough to cause adverse health effects. These effects cover a wide range of conditions from lung irritation to birth defects to cancer. Health concerns may be associated with both short and long-term exposures to these pollutants. Many are known to have respiratory, neurological, immune or reproductive effects, particularly for more susceptible sensitive populations such as children.

Background Risk: The sum of the risks to which the public is exposed, excluding the risk of additional activities being evaluated.

Carcinogen: A chemical for which there is some evidence (either in animals or humans) that it may cause cancer.

CAS Number: A unique number used to identify a particular chemical substance, established by the Chemical Abstracts Service of the American Chemical Society.

Department: City of Philadelphia Department of Public Health.

Exposure: Contact with a substance through inhalation, ingestion, or some other means for a specific period of time.

Hazardous Air Pollutant (HAP): In general, a hazardous air pollutant is an "air toxic." Specifically, this also refers to any of the 188 air toxic pollutants listed in the 1990 federal Clean Air Act amendments.

Hazard Quotient: An estimate of the potential for a detrimental non-cancer health effect from exposure to a chemical.

Non-carcinogen: A pollutant that can cause adverse health effects other than cancer.

Reference Concentration (RfC): An estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure (expressed as an air pollutant concentration) to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of harmful effects during a lifetime. It can be derived from various types of human or animal data, with uncertainty factors generally applied to reflect

limitations of the data used.

Slope Factor (SF): An upper-bound, approximating a 95% confidence limit, on the increased cancer risk from a lifetime exposure to an agent. This estimate is usually expressed in units of proportion (of a population) affected per mg/kg-day.

Unit Risk Factor (URF): The upper-bound excess lifetime cancer risk estimated to result from continuous exposure to a chemical at a concentration of 1 µg/m^3 in air. For example, if a chemical's URF is 2 x 10^{-6} (per µg/m^3), then a person exposed daily for a lifetime to 1 µg of the chemical in 1 cubic meter of air would have an increased risk of cancer equal to 2 in a million.

U.S. EPA: The United States Environmental Protection Agency.

Health Risk Assessment Technical Support Document for Air Management Regulation VI Amendment

By

Air Management Services
Department of Public Health
City of Philadelphia
April 28, 2022

I. List of Toxic Air Contaminants (Hazardous Air Pollutants)

The 1981 Air Management Regulation (AMR) VI lists 99 Toxic Air Contaminants (or Hazardous Air Pollutants (HAPs)). Over time, more air pollutants were found to cause cancer and other serious health effects. Under the 1990 federal Clean Air Act (CAA) Amendments, the original list of Hazardous Air Pollutants included 189 pollutants. Since then EPA has modified the list through rulemaking to include 188 HAPs [1].

This AMR VI amendment aims to regulate an updated list of Toxic Air Contaminants originally in the Appendix to the 1981 AMR VI. The updated list of Toxic Air Contaminants (HAPs) is in the Appendix to the amended AMR VI. This list incorporates nearly all one hundred eighty eight (188) pollutants that are classified as hazardous air pollutants (HAPs) by U.S. EPA pursuant to Section 112 of the Clean Air Act, and includes additional air pollutants that have been determined to have adverse health effects by Air Management Service (AMS), taking into consideration the hazardous air pollutants listed by the New Jersey Department of Environmental Protection. It contains 217 chemical compounds and compound groups in total. The *Technical Guidelines for Air Management Regulation VI* document specifies the Reporting Threshold for each of chemical compounds (compound groups).

II. Establishing Hazardous Air Pollutants Reporting Thresholds

The objective of this section is to establish HAP Reporting Thresholds which can be used, as part of the AMS permitting process, in a health risk assessment to determine if there is the potential of HAP emissions to cause a significant health risk. A Reporting Threshold is an air pollutant emission rate (tons per year, or pounds per year) where The Philadelphia Department of Public Health (Department) has determined a health risk analysis is necessary. The methodology described below is used to determine the reporting thresholds. It is also used to establish the Risk Screening Workbook that will be used as a preliminary risk screening tool (also see Section III of *Technical Guidelines for Air Management Regulation VI*) in the permitting process. The methodology consists of the following three parts: Part 1: Modeling methodology; Part 2: Processing the modeling results; and Part 3: Identifying proposed threshold values.

2.1 <u>Modeling Methodology</u>

Instead of setting a reporting threshold for each HAP in an arbitrary way, air quality modeling was used to estimate highly conservative or worst-case scenarios of allowable emission rates of a HAP at which the health risks caused by the pollutant concentrations can be kept at a level that is considered negligible. These highly conservative or worst-case scenario allowable emission rates provide the basis to establish the reporting threshold.

2.1.1 Dispersion Model

A recent version of the American Meteorological Society/United States Environmental Protection Agency Regulatory Model (AERMOD, Version 18081) was used for this evaluation. AERMOD is

the US EPA preferred model for regulatory modeling applications. AERMOD is a steady-state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrains.

2.1.2 Land Use

To consider different land use types (dispersion environments) in Philadelphia, AERMOD was run in both the rural and urban modes. In the urban mode, a population parameter of 1,570,000 was used. This is approximately the population of the City of Philadelphia in 2017.

2.1.3 Meteorological Data

Meteorological data sets include ground level weather observation data and upper air profile data. Data collected in the years 2010-2014 were used. The ground level data were the Philadelphia International Airport data sets; the concurrent upper air data were from the Sterling, Virginia station according to EPA air modeling protocols. Figure 1 shows the five-year wind rose based on ground level data from the Philadelphia International Airport weather station.

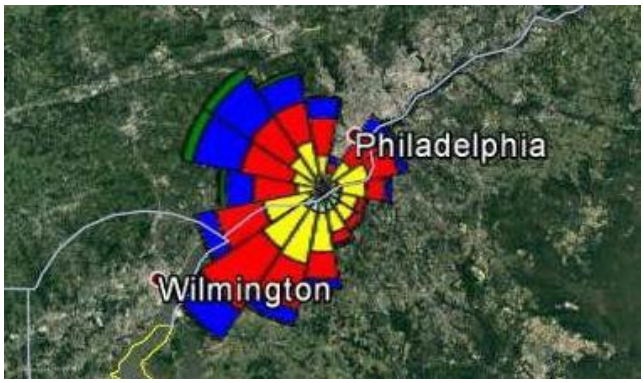

Figure 1: Wind Rose based on Philadelphia International Airport data

2.1.4 Stack Parameters and Emission Rates

Hypothetical emission points and structures were entered into the model to represent a range of pollutant release and aerodynamic downwash scenarios for stacks. The stack parameters and emission rates used to generate the normalized air impact values (micrograms per cubic meter ($\mu g/m^3$) /pound per hour of HAP emitted for short term impacts, $\mu g/m^3$ / ton per year of HAP emitted for long term impacts) are listed in Table 1. The stack gas exit velocity and exit temperature values were selected so that plume rise would be minimal to provide highly conservative estimates. Emissions were assumed to occur 24 hours per day, 365 days per year. Each modeled stack is located in the middle of a group

of hypothetical buildings that are modeled for building downwash of the plume.

Table 1. Stack Parameters and Emission Rates

Parameter	Value
Normalized Annual Emission Rate	1 ton per year (normalized)
Normalized 1-Hour Emission Rate	1 pound per hour (lb/hour) (normalized)
Modeled Stack Heights (ft)	15, 20, 25, 30, 40, 50, 75, 100, 150, 200, 250
Modeled Stack Diameter	1 foot
Exit Velocity	0.33 feet per second
Exit temperature	80 degrees Fahrenheit (^{o}F)

2.1.5 Building Downwash

The building dimensions were selected so that the plume was subjected to aerodynamic downwash in all wind directions. The building dimensions used, including assumed horizontal dimensions, are listed in Table 2. To consider conservative plume downwash scenarios, all stacks were assumed below the Good Engineering Practice (GEP) stack height of 2.5 times the building height. For stack heights of 15 ft and 20 ft, the stack was assumed to be a factor of 1.25 times the building height. For all other stack heights (25 ft through 250 ft), the stack was assumed to be a factor of 1.5 times the building height. For stack heights between 15 and 50 ft, the building's horizontal dimensions were assumed constant at 50 ft. As stack heights increase above 50 ft, the building's horizontal dimensions also increase. The assumed building's horizontal dimensions are also shown in Table 2.

The US EPA's Building Profile Input Program (BPIP-PRIME) was used to generate building downwash parameters for input into AERMOD.

Table 2. Stack Heights and Assumed Building Dimensions

Stack Height (ft)	Building Height (ft)	Building Width and Length (ft)
15	12	50 x 50
20	16	50 x 50
25	16.7	50 x 50
30	20	50 x 50
40	26.7	50 x 50
50	33.4	50 x 50
75	50	75 x 75
100	66.7	100 x 100
150	100	150 x 150
200	133.4	200 x 200
250	166.7	200 x 200

2.1.6 Receptor Grid

Modeling was performed assuming flat terrain within the modeled distance range. A polar receptor grid with 864 receptors was used that was centered on the stack (midpoint of the buildings) with 36 radials spaced every 10 degrees. The spacing of receptors along the radials were as follows to provide 24 distances: 20 ft, 30 ft, 40 ft, 50 ft, 60 ft, 70 ft, 80 ft, 90 ft, 100 ft, 150 ft, 200 ft, 250 ft, 300 ft, 400 ft, 500 ft, 600 ft, 700 ft, 800 ft, 900 ft, 1000 ft, 1500 ft, 2000 ft, 2500 ft, 3000 ft.

2.1.7 Model Input and Output

The AERMOD model was run with EPA's regulatory default parameters and the parameters discussed above. AERMOD was run to calculate hourly, daily (24-hour), and annual concentrations at each receptor location.

2.2 Processing Modeling Results

The above modeling methodology resulted in the following number of scenarios (impacts) being modeled:

2 dispersion environments x 5 sets of MET data x 2 normalized emission rates x 3 averaging times x 11 stack heights x 864 receptors = **570,240** impacts

In order to process such a large amount of data results, the AERMOD output files were reformatted and merged using a DOS batch processing script, then imported into Microsoft Excel. Statistical and pivot table functions in Excel were used to process the data. For each averaging time and each combination of stack height and receptor distance, the maximum normalized concentration was identified. For stack heights and distances not explicitly modeled (e.g. stack height 21 feet), linear interpolation across stack heights for a specified distance was performed to generate estimated concentration values. Similarly, concentrations at distances not explicitly modeled (e.g. 110 feet) were also estimated using linear interpolation.

Using this process, tables of worst-case hourly and annual impacts by stack height and distance were created for stacks from 15 ft to 250 ft and distances from 20 ft to 3,000 ft, including interpolated values. This resulted in 2,550 values in one table (Figure 2, normalized annual impacts). Each value represents the maximum concentration for a particular stack height and distance combination. However, for the purpose of setting HAP reporting threshold values, it is expected that the overall worst-case impacts will occur from shorter stacks at distances closer to the stack. Review of the AMS permitting and emission inventory data showed that at least 57% of approximately 1100 stacks (or release points) permitted in Philadelphia (not including small sources that are not reported in the emission inventories) are no more than 40 feet high. Of these stacks, at least 43% are located 150 feet or less from the closest facility property line. Based on this analysis, only hourly and annual impacts

for stacks no more than 40 ft and within 150 ft from the property line were considered. Again, this was meant to use more conservative scenarios in establishing reporting thresholds. In Figure 2, the area bounded by the blue box represents the subset of values used to establish the HAP reporting thresholds.

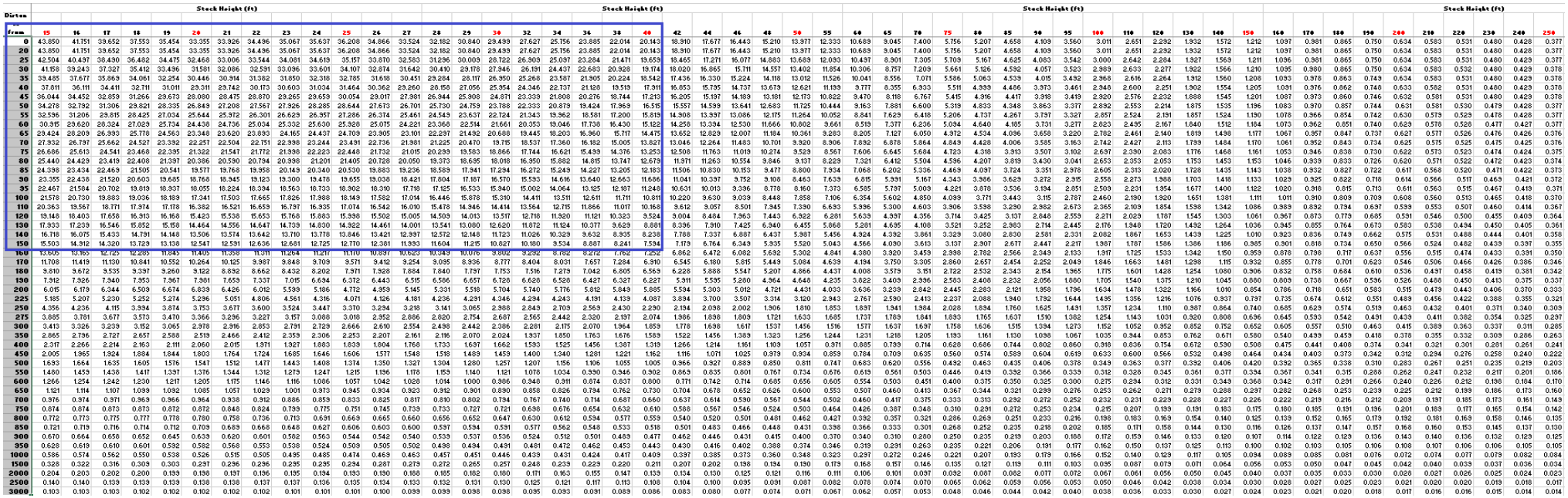

Figure 2. Modeling Results (Annual) Table: maximum concentration for each combination of stack height and distance -- HAP reporting thresholds to be based on concentrations caused by stacks no more than 40 feet high and within a distance of no more than 150 feet from stack to property line

2.3 Identifying Proposed Reporting Threshold Values

2.3.1 Concentration Percentile-based Threshold Values

Rather than arbitrarily basing the proposed HAP reporting thresholds on a single stack height/property-line combination, a robust statistical approach was utilized. This approach considered all modeled stack height/property-line distance combinations predicted for stacks no more than 40 ft high and property lines no more than 150 ft from the stack. A percentage frequency distribution of the modeled impacts was evaluated. The resulting percentiles represent conservative concentration scenarios that could reasonably be expected to occur for multiple stack property-line combinations. This subset of data contains normalized air concentration values for more than 570 combinations of stack heights and receptor distances. To generate candidate values of HAP reporting thresholds, the 85th, 90th, 95th and 98th percentiles of the modeled concentrations of this dataset were evaluated. Figure 3 shows the distribution of modeled normalized annual impacts. A percentile identifies the normalized air concentration value where the percentage of modeled impacts in the dataset are less than the indicated air concentration value. Based on this chart, the 98th percentile of normalized annual concentrations is at 37.7 µg/m^3 per ton/year pollutant emission, which represents a highly conservative scenario. Figures 4 shows the data table of combinations of stack height and distances with the 85th, 90th, 95th and 98th percentiles. They are 29.3, 31.6, 34.3 and 37.7 µg/m^3 per ton/year respectively.

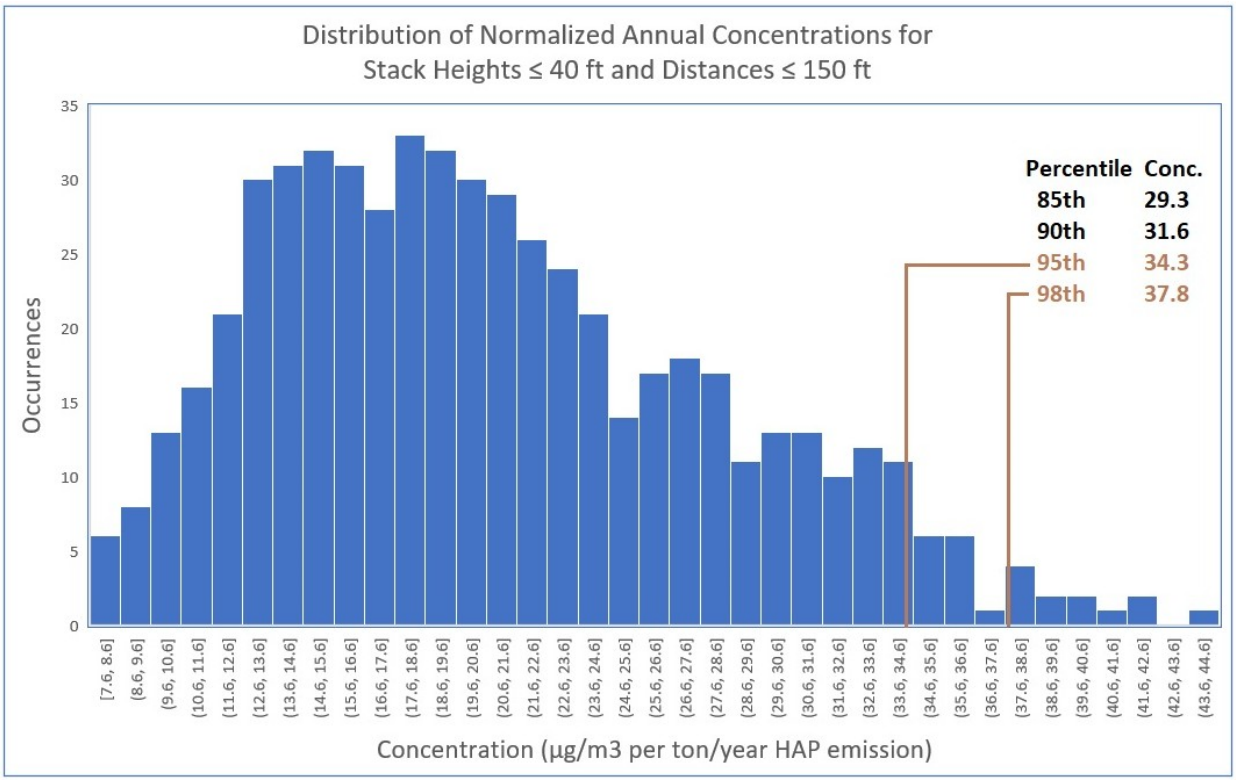

Figure 3. Percentage distribution of normalized annual concentrations

Distance (ft)	Stack Height (ft)																									
	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
20	43.85	41.75	39.65	37.55	35.45	33.36	33.93	34.50	35.07	35.64	36.21	34.87	33.52	32.18	30.84	29.50	28.56	27.63	26.69	25.76	24.82	23.89	22.95	22.01	21.08	20.14
25	42.50	40.50	38.49	36.48	34.48	32.47	33.01	33.54	34.08	34.62	35.16	33.87	32.58	31.30	30.01	28.72	27.82	26.91	26.00	25.10	24.19	23.28	22.38	21.47	20.56	19.66
30	41.16	39.24	37.33	35.41	33.50	31.58	32.09	32.59	33.10	33.60	34.11	32.87	31.64	30.41	29.18	27.95	27.07	26.19	25.31	24.44	23.56	22.68	21.81	20.93	20.05	19.17
35	39.48	37.68	35.87	34.06	32.25	30.45	30.91	31.38	31.85	32.32	32.79	31.62	30.45	29.28	28.12	26.95	26.11	25.27	24.43	23.59	22.75	21.91	21.06	20.22	19.38	18.54
40	37.81	36.11	34.41	32.71	31.01	29.31	29.74	30.17	30.60	31.03	31.46	30.36	29.26	28.16	27.06	25.95	25.15	24.35	23.54	22.74	21.93	21.13	20.32	19.52	18.71	17.91
45	36.04	34.45	32.86	31.27	29.67	28.08	28.48	28.87	29.26	29.66	30.05	29.02	27.98	26.94	25.91	24.87	24.11	23.34	22.57	21.81	21.04	20.28	19.51	18.74	17.98	17.21
50	34.28	32.79	31.31	29.82	28.33	26.85	27.21	27.57	27.93	28.28	28.64	27.67	26.70	25.73	24.76	23.79	23.06	22.33	21.61	20.88	20.15	19.42	18.70	17.97	17.24	16.51
55	32.60	31.21	29.82	28.42	27.03	25.64	25.97	26.30	26.63	26.96	27.29	26.37	25.46	24.55	23.64	22.72	22.03	21.34	20.65	19.96	19.27	18.58	17.89	17.20	16.51	15.82
60	30.92	29.62	28.32	27.03	25.73	24.44	24.74	25.03	25.33	25.63	25.93	25.07	24.22	23.37	22.51	21.66	21.01	20.35	19.70	19.05	18.39	17.74	17.08	16.43	15.78	15.12
65	29.42	28.21	26.99	25.78	24.56	23.35	23.62	23.89	24.16	24.44	24.71	23.91	23.10	22.30	21.49	20.69	20.07	19.45	18.82	18.20	17.58	16.96	16.34	15.72	15.10	14.47
70	27.93	26.80	25.66	24.53	23.39	22.26	22.50	22.75	23.00	23.24	23.49	22.74	21.98	21.23	20.47	19.72	19.13	18.54	17.95	17.36	16.77	16.18	15.59	15.00	14.42	13.83
75	26.69	25.61	24.54	23.47	22.39	21.32	21.55	21.77	22.00	22.22	22.45	21.73	21.02	20.30	19.58	18.87	18.31	17.74	17.18	16.62	16.06	15.50	14.94	14.38	13.81	13.25
80	25.44	24.43	23.42	22.41	21.40	20.39	20.59	20.79	21.00	21.20	21.41	20.73	20.05	19.37	18.70	18.02	17.48	16.95	16.42	15.88	15.35	14.81	14.28	13.75	13.21	12.68
85	24.40	23.43	22.47	21.51	20.54	19.58	19.77	19.96	20.15	20.34	20.53	19.88	19.24	18.59	17.94	17.29	16.78	16.27	15.76	15.25	14.74	14.23	13.72	13.20	12.69	12.18
90	23.36	22.44	21.52	20.60	19.69	18.77	18.95	19.12	19.30	19.48	19.66	19.04	18.42	17.80	17.19	16.57	16.08	15.59	15.10	14.62	14.13	13.64	13.15	12.66	12.17	11.69
95	22.47	21.58	20.70	19.82	18.94	18.05	18.22	18.39	18.56	18.73	18.90	18.31	17.72	17.13	16.53	15.94	15.47	15.00	14.53	14.06	13.59	13.13	12.66	12.19	11.72	11.25
100	21.58	20.73	19.88	19.04	18.19	17.34	17.50	17.66	17.83	17.99	18.15	17.58	17.01	16.45	15.88	15.31	14.86	14.41	13.96	13.51	13.06	12.61	12.16	11.71	11.26	10.81
110	20.36	19.57	18.77	17.97	17.18	16.38	16.52	16.66	16.80	16.94	17.07	16.54	16.01	15.48	14.95	14.41	13.99	13.56	13.14	12.72	12.29	11.87	11.44	11.02	10.59	10.17
120	19.15	18.40	17.66	16.91	16.17	15.42	15.54	15.65	15.77	15.88	16.00	15.50	15.01	14.51	14.01	13.52	13.12	12.72	12.32	11.92	11.52	11.12	10.72	10.32	9.92	9.52
130	17.93	17.24	16.55	15.85	15.16	14.46	14.56	14.65	14.74	14.83	14.92	14.46	14.00	13.54	13.08	12.62	12.25	11.87	11.50	11.12	10.75	10.38	10.00	9.63	9.25	8.88
140	16.72	16.08	15.43	14.79	14.15	13.51	13.57	13.64	13.71	13.78	13.85	13.42	13.00	12.57	12.15	11.72	11.37	11.03	10.68	10.33	9.98	9.63	9.28	8.93	8.59	8.24
150	15.50	14.91	14.32	13.73	13.14	12.55	12.59	12.64	12.68	12.73	12.77	12.38	11.99	11.60	11.22	10.83	10.50	10.18	9.86	9.53	9.21	8.89	8.56	8.24	7.92	7.59

Percentile:	
98%	37.68
95%	34.28
90%	31.62
85%	29.31

Figure 4. Annual concentrations for stack height/property line distance combinations at the 85th, 90th, 95th, and 98th percentiles

Normalized hourly concentrations were processed in a similar way to evaluate short-term impacts.

2.3.2 Evaluation Methodology

Equations 1 and 2 below were used to calculate proposed reporting thresholds for emissions of HAP with available inhalation exposure toxicity data [2]. The normalized annual air impact values (C' in the equations) were obtained from Figure 3. Impact values at the 85th, 90th, 95th and 98th percentiles were used in calculations. These percentile impact values represent the concentrations from multiple combinations of stack heights and distances to property line that are expected to occur in conservative scenarios when one ton per year of a HAP is emitted. Unit risk factors (URF) and reference concentrations (RfC) used in the equations are based on toxicity data from the latest updates of US EPA Integrated Risk Information System [3], CalEPA Toxicity Criteria Database [4], and Agency for Toxic Substances and Disease Registry "Minimal Risk Levels for Hazardous Substances" [5]. Refer to the Department's Risk Screening Workbook for the URF and the RfC values. Using the normalized annual impacts (C') and the HAP specific URF and/or RfC, the candidate value of the reporting threshold (Q) was calculated.

Cancer based Threshold

Equation 1: $$Q = \frac{CR}{URF \times C'}$$

Non-Cancer based Threshold

Equation 2: $$Q = \frac{HQ \times RfC}{C'}$$

where:

Q = maximum annual emission rate, ton/yr – Threshold

CR = cancer risk; capped at1 x 10^{-6}

URF = pollutant-specific inhalation Unit Risk Factor, $(\mu g/m^3)^{-1}$

HQ = non-cancer risk Hazard Quotient; capped at 1

RfC = pollutant-specific Reference Concentration, $\mu g/m^3$

C' = normalized annual concentration, $(\mu g/m^3)/(ton/yr)$; for example, use the value at 95th percentile.

2.3.3 Risk Guidelines for the Proposed HAP Reporting Thresholds

The cancer risk (CR) guideline for a HAP from a single source was determined as a risk of less than or equal to **one in a million (0.000001)**. The non-cancer risk guideline for a HAP was determined as a Hazard Quotient **(HQ) less than or equal to one (1)**. Risks at and below these levels are considered negligible. Cancer risk-based threshold candidate values were compared to long-term non-cancer risk threshold candidate values for those HAPs that have both carcinogenic and non-carcinogenic impacts in order to select a more stringent value. These values were also analyzed to ensure that no threshold would cause a short-term non-cancer risk with HQ above 1 if a HAP has short-term non-cancer toxicology data available.

The following principles were followed to develop the HAP reporting thresholds.

1. The maximum HAP reporting threshold is capped at 2000 pounds per year for any HAP even if the calculations by Equation 1 or 2 give a value above 2000.
2. 13 HAPs have reporting thresholds based on short-term toxicity data as these either showed a non- negligible risk for a short-term exposure when compared to long-term values or do not have long-term toxicity data available. See Appendix A for this list.
3. Certain HAPs, such as arsenic, cadmium, and chromium, are listed as "Chemical Compound Groups" (classes). These listings are defined as including any unique chemical substance that contains the named chemical (i.e., antimony, arsenic, etc.) as part of that chemical's molecular structure. When a compound or subgroup is individually listed under a group, the reporting threshold for the compound or subgroup takes precedence over the threshold listed for the chemical group. Also, no individual compound or subgroup within a chemical group should have a higher reporting threshold than its chemical group.

Table 3 shows examples of HAPs with percentile-based candidate threshold values and how a value for the reporting threshold is proposed.

Table 3. Examples of Proposed Reporting Thresholds

HAP	Percentile Based Thresholds (lbs/year)				Candidate Value for Reporting Threshold (lbs/year)
	85th	90th	95th	98th	
Benzene	8.7	8.1	7.5	6.8	**7.0**
Carbon Tetrachloride	11.4	10.5	9.7	8.8	**9.0**
Chloroform	3	2.75	2.5	2.3	**2.3**
Formaldehyde	5.3	4.9	4.5	4.1	**4.0**
Hydrogen Fluoride	955	885	816	743	**740**
Methyl Bromide	341	316	292	265	**265**
Vinyl Chloride	7.8	7.2	6.6	6.0	**6.0**
Vinyl Acetate	13647	12650	11669	10616	**2000**

2.3.4 Comparison with Current AMR VI Guidelines

The current AMR VI (1981) does not have HAP reporting thresholds. In the guideline document for this version of the regulation, however, recommended ambient concentrations were established for the HAPs. For comparison, the maximum ambient concentration for a HAP was calculated based on the new methodology described above (Section 2.3.2). For example, if a HAP has cancer Unit Risk Factor (URF) equal to 0.0000002 /(µg/m^3) and if the negligible cancer risk (CR) level is set at 0.000001 (1 in a million), the maximum annual ambient concentration of this HAP is: C = CR/URF = 0.000001 / 0.0000002 = 5 (µg/m^3).

Table 4 shows examples of how the recommended ambient concentrations in the current AMR VI guidelines are compared with the maximum concentrations based on the new methodology.

Table 4. Recommended ambient concentrations in current AMR VI (1981) guidelines compared with maximum concentrations based on new methodology

HAP	Current AMR VI - Recommended Annual Ambient Concentration		Max. Annual Concentration (µg/m3) by a source based on new methodology -- cancer risk at 1/million & non-cancer HQ at 1
	(ppb)	(µg/m3)	
Benzene	24	76.6	0.13
Methyl Bromide	120	466	5.0
Formaldehyde	4.8	5.9	0.077
Carbon tetrachloride	12	75.6	0.17
Chloroform	24	116.8	0.043
Vinyl chloride	2.4	6.1	0.11
Chromium/compounds (VI)		0.12	0.00008

These and other comparisons indicate that the new methodology provides higher levels of protection than the recommended ambient concentrations in the current AMR VI guidelines.

2.3.5 Comparison with New Jersey Reporting Thresholds

The methodology used here to establish the reporting thresholds is very similar to that used by the New Jersey Department of Environmental Protection to determine HAPs reporting thresholds in the New Jersey air toxics regulation. Understandably the threshold values selected for Philadelphia are quite similar to those in the New Jersey regulation, as shown in Table 5.

Table 5. Example of Philadelphia HAP Reporting Thresholds Compared with New Jersey Thresholds

HAP	Threshold Value based on Philadelphia Scenarios (lbs/year, at 98th percentile)	New Jersey Reporting Threshold (lbs/year)
Benzene	6.8	6
Methyl bromide	265	230
Formaldehyde	4.1	3.5
Hydrogen fluoride	743	600
Carbon tetrachloride	8.8	8
Chloroform	2.3	2
Vinyl Acetate	2000	2000
Vinyl Chloride	6	5
Acetaldehyde	24	21

III. Risk Screening Workbook

The above-described methodology was also used in developing the *Risk Screening Workbook*. It is a Microsoft Excel workbook that calculates the worst-case scenario cancer and non-cancer risks based on user input data, built-in worst-case HAP concentrations derived from air quality modeling, and URF and RfC values of the HAPs. Therefore, it is an easy-to-use tool that simplifies the screening process for the permit applicant. See Section III of the *Technical Guidelines for Air Management Regulation VI* and the spreadsheet file for more information.

References:

1. US EPA HAP list: https://www.epa.gov/haps/initial-list-hazardous-air-pollutants-modifications
2. New Jersey DEP Guidance on Risk Assessment for Air Contaminant Emissions" (http://www.state.nj.us/dep/aqpp/downloads/techman/1003.pdf)
3. US EPA Integrated Risk Information System (IRIS, www.epa.gov/iris)
4. CalEPA Toxicity Criteria Database (oehha.ca.gov/tcdb/index.asp)
5. Agency for Toxic Substances and Disease Registry "Minimal Risk Levels for Hazardous Substances" (MRLs, https://www.atsdr.cdc.gov/minimalrisklevels/index.html).

Appendix A

List of Reporting Thresholds Based on Short-Term Toxicity Data

CAS #	Chemical Compound	Proposed Threshold (lbs/year)
75150	Carbon disulfide	2000
75003	Ethyl chloride	2000
111762	Ethylene glycol monobutyl ether	2000
110805	Ethylene glycol monoethyl ether (2-Ethoxy ethanol)	1800
111159	Ethylene glycol monoethyl ether acetate	685
109864	Ethylene glycol monomethyl ether (2-Methoxy ethanol)	455
7783075	Hydrogen selenide	25
	Manganese and compounds	0.8
67561	Methanol	2000
71556	Methyl chloroform	2000
108101	Methyl isobutyl ketone	2000
108883	Toluene	2000
79016	Trichloroethylene	10

PHILADELPHIA AIR MANAGEMENT SERVICES - AMR VI RISK SCREENING WORKBOOK

For Long-Term Carcinogenic & Noncarcinogenic Effects and Short-Term Effects

April 28, 2022

Read these instructions carefully before completing the Risk spreadsheet

This workbook is used in screening for the worst-case operating scenario for an air pollution source operation that has a potential to emit one or more air toxics (or HAPs) above the reporting threshold. Based on the methodology used, the following sources may not use this workbook: (1) sources without a stack as the sole point of air contaminant discharge, such as certain dry cleaners, degreasers, certain storage tanks, and gasoline stations, (2) sources with stacks with a horizontal or downward discharge direction, or (3) sources with stack heights less than **15 feet**. Sources that cannot use this workbook may be subject to AERSCREEN modeling analysis or Refined Health Risk Assessment. See the AMR VI Techincal Guidelines document and instructions below for more information on AERSCREEN modeling and Refined Health Risk Assessment.

To see a listing of air toxics by CAS number, click on the "CAS Index" tab at the bottom of this workbook

This is a protected file. Changes are allowed only to cells highlighted in yellow on the Risk tab. To save the data you input, select "File" on the menu above, then "Save as" in your own files, under the name of your choice. Input data only to yellow fields. Incremental cancer risk (IR) and hazard quotient (HQ) will calculate automatically when you type in the stack parameters (stack height and distance to property line) and an emission rate.

Further Evaluation Required (FER)

If the Risk Worksheet generates a “FER” result for any air toxic, the facility should evaluate if the health risk level can be reduced through mitigating actions. Mitigating actions that could lower health risk levels include, but are not limited to, the following:

1. Reducing air toxic emissions through:

   i. Installation of an APC device or improving the efficiency of an existing APC device.
   ii. Replacing the air toxic substance with a non-toxic or less toxic substance.
   iii. Decreasing the annual operative hours.
   iv. Decreasing the annual or hourly throughput.

2. Increasing the stack height.

3. Relocation of the source to a location further from the property line.

If the health risk levels need further review after this evaluation, Refined Health Risk Assessment must be conducted. Only those air toxics with a “FER” result need to undergo a Refined Health Risk Assessment.

Refined Health Risk Assessment

The refined risk assessment consists of a refined atmospheric dispersion modeling analysis for air pollution sources that estimates ambient air concentrations of emitted air toxics more accurately. This analysis relies on using stack- and source-specific data as well as representative meteorological data, as input into U.S. EPA’s AERMOD air quality dispersion model. All source-specific information for this analysis must be consistent with the information provided in the attendant Installation Permit or Plan Approval application.

Applicants must submit an atmospheric dispersion modeling protocol in accordance with procedures outlined by U.S. EPA for AERMOD air quality dispersion modeling. Program files and instructions for performing AERMOD modeling can be found on U.S. EPA’s website: https://www.epa.gov/scram/air-quality-dispersion-modeling

Note: Other air quality dispersion models or use of source-specific ambient air monitoring / fenceline monitoring data may only be accepted in the refined risk assessment evaluation if first approved by the Department.

Refer to the Department's Technical Guidelines for Air Management Regulation VI or contact your permit evaluator for further details.

Notes

The emission points, stack parameters, short-term emission rates (lb/hr) and annual emission rates (tpy) entered in the Worksheet and provided in the protocol must be consistent with your permit application. If changes to your permit are needed, please contact your permit evaluator.

[For Storage Tanks] Short-term emission rates (lb/hr) for storage tanks must be based on the worst-case operating scenario, which may result from scenarios like breathing, filling, roof landing, tank cleaning, or tank degassing as applicable. Short-term emission rates for storage tanks are only required to be permitted for air toxics for which there is a short-term reference concentration (RfC). Please indicate any HAPs listed in your permit that do not have short-term reference concentrations in the health risk assessment submitted with the permit application.

PHILADELPHIA AIR MANAGEMENT SERVICES - AMR VI RISK SCREENING WORKBOOK
For Long-Term Carcinogenic and Noncarcinogenic Effects and Short-Term Effects

April 28, 2022

Read the Instructions tab carefully before completing this Risk spreadsheet

Date	
Facility ID No.	
Activity ID No.	
Facility name	
Facility location	
File name (.xls)	

Emission Unit/Batch Process ID No.		Stack height		ft
Emission Point ID No.		Distance to property line		ft
Equipment ID No(s).		**Annual air impact value, C'**		**(µg/m^3)/(ton/yr)**
Operating Scenario(s)		**1-hour air impact value, C'$_{st}$**		**(µg/m^3)/(lb/hr)**

Long-Term Effects

- **Q =** Annual emission rate (in tons per year)
- **C =** C' x Q = Annual average ambient air concentration
- **URF =** Unit risk factor (for carcinogenic risk)
- **IR =** C x URF = Incremental risk (for carcinogen)
- **RfC =** Reference concentration (for noncarcinogenic effects)
- **HQ =** C/RfC = Hazard quotient (for noncarcinogenic risk)
- **RsIt =** The result of comparing the IR or HQ to the negligible threshold (FER if > threshold, Negl. if <= threshold)
- **FER =** Further Evaluation Required (See Notes for thresholds)
- **Negl. =** Negligible (See Notes for thresholds)

Short-Term Effects

- **Q_h =** Hourly emission rate (in pounds per hour)
- **C_{st} =** C'_{st} x Q_h = Short-term average ambient air concentration
- **RfC_{st} =** Short-term reference concentration (for noncarcinogenic effects)
- **HQ_{st} =** C_{st}/RfC_{st} = Hazard quotient for short-term noncarcinogenic effects
- **RsIt =** The result of comparing the HQ_{st} to the negligible threshold (FER if > threshold, Negl. if <= threshold)
- **FER =** Further Evaluation Required (See Notes for thresholds)
- **Negl. =** Negligible (See Notes for thresholds)

				LONG-TERM EFFECTS								SHORT-TERM EFFECTS				
						Cancer Risk			Non-cancer Risk							
	HAP	CAS No.	Air Toxic (HAP) Name	Q (ton/yr)	C (µg/m^3)	URF [(µg/m^3)$^{-1}$]	IR	RsIt	RfC (µg/m^3)	HQ	RsIt	Q_h (lb/hr)	C_{st} (µg/m^3)	RfC_{st} (µg/m^3)	HQ_{st}	RsIt
1	*	75070	Acetaldehyde			2.2E-06			9					470		
2	*	60355	Acetamide			2.0E-05										
3		67641	Acetone						31000					62000		
4		75865	Acetone cyanohydrin						2							
5	*	75058	Acetonitrile						60							
6	*	98862	Acetophenone						0.02							
7	*	53963	Acetylaminofluorene (2-)			1.3E-03										
8	*	107028	Acrolein						0.02					2.5		
9	*	79061	Acrylamide			1.0E-04			6							
10	*	79107	Acrylic acid						1					6000		
11	*	107131	Acrylonitrile			6.8E-05			2							
12		309002	Aldrin			4.9E-03										
13	*	107051	Allyl chloride			6.0E-06			1							
14		117793	Aminoanthraquinone (2-)			9.4E-06										
15	*	92671	Aminobiphenyl (4-)			6.0E-03										
16		7664417	Ammonia						100					3200		
17	*	62533	Aniline			1.6E-06			1					3000		

18	*	90040	Anisidine (o-)			4.0E-05											
19	**	1309644	Antimony trioxide						0.2								
20		140578	Aramite			7.1E-06											
21	*		Arsenic (inorganic)			4.3E-03			0.015					0.2			
22	**	7784421	Arsine						0.05								
23	*	1332214	Asbestos			7.7E-03											
24		103333	Azobenzene			3.1E-05											
25			Barium											0.5			
26	*	71432	Benzene			7.8E-06			3					27			
27	*	92875	Benzidine			6.7E-02											
28	**	50328	Benzo(a)pyrene			1.1E-03											
29	*	98077	Benzotrichloride			3.7E-03											
30	*	100447	Benzyl chloride			4.9E-05								240			
31	*		Beryllium			2.4E-03			0.02								
32	*	92524	Biphenyl (1,1-)						0.4								
33		108601	Bis(2-chloroisopropyl)ether			1.0E-05											
34	*	117817	Bis(2-ethylhexyl)phthalate			2.4E-06											
35	*	542881	Bis(chloromethyl)ether			6.2E-02											
36		7440428	Boron (elemental)						20								
37		7637072	Boron trifluoride						0.7								
38		74975	Bromochloromethane						40								
39		75274	Bromodichloromethane			3.7E-05											
40	*	75252	Bromoform			1.1E-06											
41	*	106945	1-Bromopropane						101					5030			
42	*	106990	Butadiene (1,3-)			3.0E-05			2					660			
43	*		Cadmium			4.2E-03			0.02								
44		105602	Caprolactam						2.2					50			
45	*	133062	Captan			6.6E-07											
46	*	75150	Carbon disulfide						700					6200			
47	*	56235	Carbon tetrachloride			6.0E-06			40					1900			
48	*	463581	Carbonyl sulfide						10					660			
49	*	57749	Chlordane			1.0E-04			0.7								
50		108171262	Chlorinated paraffins			2.0E-05											
51	*	7782505	Chlorine						0.2					210			
52		10049044	Chlorine dioxide						0.2					28			
53		75683	Chloro-1,1-difluoroethane (1-) (HCFC-142b)						50000								
54	*	532274	Chloroacetophenone (2-)						0.03								
55	*	108907	Chlorobenzene						1000								
56	*	510156	Chlorobenzilate			3.1E-05											
57		75456	Chlorodifluoromethane (HCFC-22)						50000								
58	*	67663	Chloroform			2.3E-05			300					150			
59	*	107302	Chloromethyl methyl ether			6.9E-04											
60		95830	Chloro-o-phenylenediamine (4-)			4.6E-06											
61		95692	Chloro-o-toluidine (p-)			7.7E-05											
62		76062	Chloropicrin						0.4					29			
63	*	126998	Chloroprene			5.0E-04			20								
64		75296	Chloropropane (2-)						100								
65	**		Chromic acid mists (Cr VI)						0.008								
66	**	18540299	Chromium VI (total)			1.2E-02											
67	**		Chromium VI dissolved aerosols						0.008								
68	**		Chromium VI particulates						0.1								
69	*		Cobalt			9.0E-03			0.006								
70	*	8007452	Coke oven emissions			6.2E-04											
71			Copper											100			
72		120718	Cresidine (p-)			4.3E-05											

73	*		Cresol mixtures						600								
74		98828	Cumene						400								
75		135206	Cupferron			6.3E-05											
76		110827	Cyclohexane											6000			
77	*	72559	DDE			9.7E-05											
78		50293	DDT			9.7E-05											
79		615054	Diaminoanisole (2,4-)			6.6E-06											
80		124481	Dibromochloromethane			2.7E-05											
81	*	96128	Dibromo-3-chloropropane (1,2-)			2.0E-03			0.2								
82		764410	Dichloro-2-butene (1,4-)			4.2E-03											
83		95501	Dichlorobenzene (1,2-)						200								
84	*	106467	Dichlorobenzene (1,4-)			1.1E-05			800								
85	*	91941	Dichlorobenzidine (3,3'-)			3.4E-04											
86		75718	Dichlorodifluoromethane						100								
87	*	111444	Dichloroethyl ether			3.3E-04											
88	*	542756	Dichloropropene (1,3-)			4.0E-06			20								
89	*	62737	Dichlorvos			8.3E-05			0.5								
90		77736	Dicyclopentadiene						0.3								
91		60571	Dieldrin			4.6E-03											
92			Diesel particulate matter			3.0E-04			5								
93	*	111422	Diethanolamine						3								
94		112345	Diethylene glycol monobutyl ether						0.1								
95		75376	Difluoroethane (1,1-)						40000								
96	*	77781	Dimethyl sulfate			4.0E-03											
97	*	60117	Dimethylaminoazobenzene (4-)			1.3E-03											
98	*	79447	Dimethylcarbamyl chloride			3.7E-03											
99	*	68122	Dimethylformamide (N,N-)						30								
100	*	57147	Dimethylhydrazine (1,1-)						0.002								
101		540738	Dimethylhydrazine (1,2-)			1.6E-01											
102	*	121142	Dinitrotoluene (2,4-)			8.9E-05											
103	*	123911	Dioxane (1,4-)			5.0E-06			30					3000			
104	*		Dioxin	See footnote "a"													
105	*	122667	Diphenylhydrazine (1,2-)			2.2E-04											
106	*	106898	Epichlorohydrin			1.2E-06			1					1300			
107	*	106887	Epoxybutane (1,2-)						20								
108	*	140885	Ethyl acrylate						8								
109	*	100414	Ethylbenzene			2.5E-06								1000			
110	*	51796	Ethyl carbamate			2.9E-04											
111	*	75003	Ethyl chloride											10000			
112	*	106934	Ethylene dibromide			6.0E-04			0.8								
113	*	107062	Ethylene dichloride			2.6E-05			400								
114	*	107211	Ethylene glycol						400								
115	*	111762	Ethylene glycol monobutyl ether						1600					14000			
116	**	110805	Ethylene glycol monoethyl ether						200					370			
117	**	111159	Ethylene glycol monoethyl ether acetate						300					140			
118	**	109864	Ethylene glycol monomethyl ether						20					93			
119	**	110496	Ethylene glycol monomethyl ether acetate						90								
120	*	75218	Ethylene oxide			3.0E-03			30					42			
121	*	96457	Ethylene thiourea			1.3E-05											
122	*	151564	Ethyleneimine			1.9E-02											
123	*	75343	Ethylidene dichloride			1.6E-06			500								
124		16984488	Fluoride						13								
125	*	50000	Formaldehyde			1.3E-05			9					55			
126		98011	Furfural						50								
127			Gasoline vapors			1.0E-06			15								

128		111308	Glutaraldehyde						0.08								
129		765344	Glycidaldehyde						1								
130	*	76448	Heptachlor			1.3E-03											
131		1024573	Heptachlor epoxide			2.6E-03											
132	*	118741	Hexachlorobenzene			4.6E-04											
133	*	87683	Hexachlorobutadiene			2.2E-05											
134	**	319846	Hexachlorocyclohexane (alpha-)			1.8E-03											
135	**	319857	Hexachlorocyclohexane (beta-)			5.3E-04											
136	*	58899	Hexachlorocyclohexane (gamma-) (Lindane)			3.1E-04											
137	**	608731	Hexachlorocyclohexane (technical grade)			5.1E-04											
138	*	77474	Hexachlorocyclopentadiene						0.2								
139		19408743	Hexachlorodibenzo-p-dioxin, mixture			1.3E+00											
140	*	67721	Hexachloroethane			1.1E-05			30								
141	*	822060	Hexamethylene diisocyanate						0.01								
142	*	110543	Hexane (N-)						700								
143	*	302012	Hydrazine			4.9E-03			0.2					10			
144		10034932	Hydrazine sulfate			4.9E-03											
145	*	7647010	Hydrogen chloride (Hydrochloric acid)						20					2100			
146	**	74908	Hydrogen cyanide (& cyanide coumpounds)						0.8					340			
147	*	7664393	Hydrogen fluoride (Hydrofluoric acid)						14					240			
148	**	7783075	Hydrogen selenide											5			
149		7783064	Hydrogen sulfide						2					42			
150	*	78591	Isophorone						2000								
151		67630	Isopropanol											3200			
152	*		Lead			1.2E-05								0.1			
153	*	108316	Maleic anhydride						0.7								
154	*		Manganese						0.05					0.17			
155	*		Mercury (elemental)						0.3								
156	*	7439976	Mercury (inorganic)						0.03					0.6			
157		126987	Methacrylonitrile						0.7								
158	*	67561	Methanol						4000					28000			
159	*	74839	Methyl bromide						5					3900			
160	*	74873	Methyl chloride			1.8E-06			90								
161	*	71556	Methyl chloroform						1000					9000			
162		78933	Methyl ethyl ketone						5000					13000			
163	*	108101	Methyl isobutyl ketone											3000			
164	*	624839	Methyl isocyanate						1								
165	*	80626	Methyl methacrylate						700								
166		25013154	Methyl styrene (mixed isomers)						40								
167	*	1634044	Methyl tert butyl ether			2.6E-07			3000								
168		108872	Methylcyclohexane						3000								
169	*	101144	Methylene bis(2-chloroaniline) (4,4'-)			4.3E-04											
170	*	75092	Methylene chloride			1.3E-08			600					14000			
171	*	101779	Methylenedianiline (4,4-)			4.6E-04			20								
172	*	101688	Methylene diphenyl diisocyanate (4,4'-)						0.08					12			
173	*	60344	Methylhydrazine			1.0E-03			0.02								
174		90948	Michler's ketone			2.5E-04											
175	*		Mineral fibers (<1% free silica)						24								
176	*	91203	Naphthalene			3.4E-05			3								
177	*		Nickel and compounds			2.4E-04			0.014					0.2			
178	**	1313991	Nickel oxide						0.02								
179	**		Nickel, soluble salts						0.2								
180		7697372	Nitric acid											86			
181		88744	Nitroaniline (o-)						0.05								
182	*	98953	Nitrobenzene			4.0E-05			9								

183	*	79469	Nitropropane (2-)			2.7E-03			20								
184		55185	Nitrosodiethylamine (N-)			4.3E-02											
185	*	62759	Nitrosodimethylamine (N-)			1.4E-02											
186		924163	Nitrosodi-n-butylamine (N-)			1.6E-03											
187		621647	Nitrosodi-n-propylamine (N-)			2.0E-03											
188		86306	Nitrosodiphenylamine (N-)			2.6E-06											
189		156105	Nitrosodiphenylamine (p-)			6.3E-06											
190		10595956	Nitrosomethylethylamine (N-)			6.3E-03											
191	*	59892	Nitrosomorpholine (N-)			1.9E-03											
192		759739	Nitroso-n-ethylurea (N-)			7.7E-03											
193	*	684935	Nitroso-n-methylurea (N-)			3.4E-02											
194		100754	Nitrosopiperidine (N-)			2.7E-03											
195		930552	Nitrosopyrrolidine (N-)			6.1E-04											
196	*	87865	Pentachlorophenol			5.1E-06											
197	*	108952	Phenol						200					5800			
198	*	75445	Phosgene						0.3					4			
199	*	7803512	Phosphine						0.3								
200	*	7664382	Phosphoric acid						10								
201	*		Phosphorus (white)						0.07								
202	*	85449	Phthalic anhydride						20								
203	*	1336363	Polychlorinated biphenyls (PCBs)			1.0E-04											
204	*		Polycylic aromatic hydrocarbons (PAHs)	See footnote "b"													
205	*		Polycylic organic matter (POM)	See footnote "b"													
206		7758012	Potassium bromate			1.4E-04											
207	*	1120714	Propane sultone (1,3-)			6.9E-04											
208	*	57578	Propiolactone (beta-)			4.0E-03											
209	*	123386	Propionaldehyde						8								
210		115071	Propylene						3000								
211	*	78875	Propylene dichloride			1.0E-05			4								
212		107982	Propylene glycol monomethyl ether						2000								
213	*	75569	Propylene oxide			3.7E-06			30					3100			
214	**		Selenium and compounds						20								
215		7631869	Silica (crystalline, respirable)						3								
216		1310732	Sodium hydroxide											8			
217	*	100425	Styrene			5.7E-07			1000					21000			
218	*	96093	Styrene oxide			4.6E-05											
219			Sulfates											120			
220		7664939	Sulfuric acid						1					120			
221		2699798	Sulfuryl fluoride						60					1700			
222	*	1746016	Tetrachlorodibenzo(p)dioxin (2,3,7,8-)			3.8E+01			0.00004								
223		630206	Tetrachloroethane (1,1,1,2-)			7.4E-06											
224	*	79345	Tetrachloroethane (1,1,2,2-)			5.8E-05											
225	*	127184	Tetrachloroethylene			5.9E-06			40					20000			
226		811972	Tetrafluoroethane (1,1,1,2-)						80000								
227		109999	Tetrahydrofuran						2000								
228		62555	Thioacetamide			1.7E-03											
229	*	7550450	Titanium tetrachloride						0.1								
230	*	108883	Toluene						5000					37000			
231	*	584849	Toluene diisocyanate (2,4-)			1.1E-05			0.07					2			
232	*	26471625	Toluene diisocyanate (2,4-/2,6-)			1.1E-05			0.07					2			
233	*	91087	Toluene diisocyanate (2,6-)			1.1E-05			0.07					2			
234	*	95807	Toluene-2,4-diamine			1.1E-03											
235	*	95534	Toluidine (o-)			5.1E-05											
236	*	8001352	Toxaphene			3.2E-04											
237		76131	Trichloro-1,2,2-trifluoroethane (1,1,2-)						30000								

238	*	120821	Trichlorobenzene (1,2,4-)						2								
239	*	79005	Trichloroethane (1,1,2-)			1.6E-05											
240	*	79016	Trichloroethylene			4.8E-06			2					2			
241		75694	Trichlorofluoromethane						700								
242	*	88062	Trichlorophenol (2,4,6-)			3.1E-06											
243	*	121448	Triethylamine						7					2800			
244	*	1582098	Trifluralin			2.2E-06											
245		95636	Trimethylbenzene (1,2,4-)						7								
246		7440622	Vanadium						0.1					0.8			
247		1314621	Vanadium pentoxide											30			
248	*	108054	Vinyl acetate						200								
249	*	593602	Vinyl bromide			3.2E-05			3								
250	*	75014	Vinyl chloride			8.8E-06			100					180000			
251	*	75354	Vinylidene chloride						200								
252	*		Xylene (m-,o-,p-, or mixed isomers)						100					22000			

If any calculated long-term or short-term effects for an air toxic result in "Further Evaluation Required" (FER) on this Risk Screening Worksheet, a Refined Risk Assessment is required for that air toxic.

NOTE:

* **Clean Air Act hazardous air pollutant (HAP)**

** **Clean Air Act hazardous air pollutant, but not listed individually (part of a group)**

a Dioxins may be considered to be all 2,3,7,8-tetrachlorodibenzo(p)dioxin, or separated into congeners.

b PAH or POM may be considered to be all benzo(a)pyrene, or separated into individual PAHs.

The results are determined by comparing the long-term and short-term effects to the single-source thresholds, listed below.
The threshold value of negligible risk for incremental cancer risk is 1 in a million (1.0E-06). A risk value less than or equal to 1 in million is considered negligible.
The threshold value of negligible risk for long-term hazard quotient (HQ) for non-carcinogenic risk is 1.0. An HQ less than or equal to 1.0 is considered negligible.
The threshold value of negligible risk for short-term hazard quotient (HQ_{st}) for non-carcinogenic risk is 1.0. An HQ_{st} less than or equal to 1.0 is considered negligible.

PHILADELPHIA AIR MANAGEMENT SERVICES - AMR VI RISK SCREENING WORKBOOK

For Carcinogenic and Long-Term and Short-Term Noncarcinogenic Effects

Air Toxics (HAPs) on the Risk Screening Worksheet in Order of CAS Number

To search for an air toxic by name, select the "Find" menu item and type in part of name.

Those marked with an asterisk (* or **) are HAPs under Section 112(b) of the 1990 Clean Air Act Amendments.

	CAS No.	Air Toxic	Synonym
*	50000	Formaldehyde	
	50293	DDT	
**	50328	Benzo(a)pyrene	
*	51796	Ethyl carbamate	Urethane
*	53963	Acetylaminofluorene (2-)	
	55185	Nitrosodiethylamine (N-)	
*	56235	Carbon tetrachloride	
*	57147	Dimethylhydrazine (1,1-)	
*	57578	Propiolactone (beta-)	
*	57749	Chlordane	
*	58899	Hexachlorocyclohexane (gamma-)	Lindane
*	59892	Nitrosomorpholine (N-)	
*	60117	Dimethylaminoazobenzene (4-)	
*	60344	Methylhydrazine	
*	60355	Acetamide	
	60571	Dieldrin	
*	62533	Aniline	
	62555	Thioacetamide	
*	62737	Dichlorvos	
*	62759	Nitrosodimethylamine (N-)	
*	67561	Methanol	
	67630	Isopropanol	
	67641	Acetone	
*	67663	Chloroform	
*	67721	Hexachloroethane	
*	68122	Dimethylformamide (N,N-)	
*	71432	Benzene	
*	71556	Methyl chloroform	1,1,1-Trichloroethane
*	72559	DDE	
*	74839	Methyl bromide	Bromomethane
*	74873	Methyl chloride	Chloromethane
**	74908	Hydrogen cyanide	
	74975	Bromochloromethane	Chlorobromomethane
*	75003	Ethyl chloride	
*	75014	Vinyl chloride	
*	75058	Acetonitrile	
*	75070	Acetaldehyde	
*	75092	Methylene chloride	Dichloromethane

*	75150	Carbon disulfide	
*	75218	Ethylene oxide	
*	75252	Bromoform	
	75274	Bromodichloromethane	
	75296	Chloropropane (2-)	
*	75343	Ethylidene dichloride	1,1-Dichloroethane
*	75354	Vinylidene chloride	1,1-Dichloroethylene
	75376	Difluoroethane (1,1-)	HCFC-152a
*	75445	Phosgene	
	75456	Chlorodifluoromethane	HCFC-22
*	75569	Propylene oxide	
	75683	Chloro-1,1-difluoroethane (1-)	HCFC-142b
	75694	Trichlorofluoromethane	
	75718	Dichlorodifluoromethane	
	75865	Acetone cyanohydrin	
	76062	Chloropicrin	
	76131	Trichloro-1,2,2-trifluoroethane (1,1,2-)	Freon 113
*	76448	Heptachlor	
*	77474	Hexachlorocyclopentadiene	
	77736	Dicyclopentadiene	
*	77781	Dimethyl sulfate	
*	78591	Isophorone	
*	78875	Propylene dichloride	1,2-Dichloropropane
	78933	Methyl ethyl ketone	MEK
*	79005	Trichloroethane (1,1,2-)	
*	79016	Trichloroethylene	
*	79061	Acrylamide	
*	79107	Acrylic acid	
*	79345	Tetrachloroethane (1,1,2,2-)	
*	79447	Dimethylcarbamyl chloride	
*	79469	Nitropropane (2-)	
*	80626	Methyl methacrylate	
*	85449	Phthalic anhydride	
	86306	Nitrosodiphenylamine (N-)	
*	87683	Hexachlorobutadiene	
*	87865	Pentachlorophenol	
*	88062	Trichlorophenol (2,4,6-)	
	88744	Nitroaniline (o-)	
*	90040	Anisidine (o-)	
	90948	Michler's ketone	
*	91087	Toluene diisocyanate (2,6-)	
*	91203	Naphthalene	
*	91941	Dichlorobenzidine (3,3'-)	
*	92524	Biphenyl (1,1-)	
*	92671	Aminobiphenyl (4-)	
*	92875	Benzidine	
	95501	Dichlorobenzene (1,2-)	

*	95534	Toluidine (o-)	
	95636	Trimethylbenzene (1,2,4-)	
	95692	Chloro-o-toluidine (p-)	
*	95807	Toluene-2,4-diamine	2,4-Diaminotoluene
	95830	Chloro-o-phenylenediamine (4-)	
*	96093	Styrene oxide	
*	96128	Dibromo-3-chloropropane (1,2-)	
*	96457	Ethylene thiourea	
	98011	Furfural	
*	98077	Benzotrichloride	
	98828	Cumene	
*	98862	Acetophenone	
*	98953	Nitrobenzene	
*	100414	Ethylbenzene	
*	100425	Styrene	
*	100447	Benzyl chloride	Chloromethylbenzene
	100754	Nitrosopiperidine (N-)	
*	101144	Methylene bis(2-chloroaniline) (4,4'-)	
*	101688	Methylene diphenyl diisocyanate (4,4'-)	
	101779	Methylenedianiline (4,4-)	
	103333	Azobenzene	
	105602	Caprolactam	
*	106467	Dichlorobenzene (1,4-)	
*	106887	Epoxybutane (1,2-)	
*	106898	Epichlorohydrin	
*	106934	Ethylene dibromide	1,2-Dibromoethane
*	106945	1-Bromopropane	n-Propyl bromide
*	106990	Butadiene (1,3-)	
*	107028	Acrolein	
*	107051	Allyl chloride	
*	107062	Ethylene dichloride	1,2-Dichloroethane
*	107131	Acrylonitrile	
*	107211	Ethylene glycol	
*	107302	Chloromethyl methyl ether	
	107982	Propylene glycol monomethyl ether	
*	108054	Vinyl acetate	
*	108101	Methyl isobutyl ketone	MIBK
*	108316	Maleic anhydride	
	108601	Bis(2-chloroisopropyl)ether	
	108872	Methylcyclohexane	
*	108883	Toluene	
*	108907	Chlorobenzene	
*	108952	Phenol	
**	109864	Ethylene glycol monomethyl ether	2-Methoxyethanol
	109999	Tetrahydrofuran	
**	110496	Ethylene glycol monomethyl ether acetate	
*	110543	Hexane (N-)	

**	110805	Ethylene glycol monoethyl ether	2-Ethoxyethanol
	110827	Cyclohexane	
**	111159	Ethylene glycol monoethyl ether acetate	
	111308	Glutaraldehyde	
*	111422	Diethanolamine	
*	111444	Dichloroethyl ether	Bis(2-chloroethyl)ether
*	111762	Ethylene glycol monobutyl ether	2-Butoxyethanol; EGBE
	112345	Diethylene glycol monobutyl ether	
	115071	Propylene	
	117793	Aminoanthraquinone (2-)	
*	117817	Bis(2-ethylhexyl)phthalate	Di(2-ethylhexyl)phthalate; DEHP
*	118741	Hexachlorobenzene	
	120718	Cresidine (p-)	
*	120821	Trichlorobenzene (1,2,4-)	
*	121142	Dinitrotoluene (2,4-)	
*	121448	Triethylamine	
*	122667	Diphenylhydrazine (1,2-)	
*	123386	Propionaldehyde	
*	123911	Dioxane (1,4-)	
	124481	Dibromochloromethane	Chlorodibromomethane
	126987	Methacrylonitrile	
*	126998	Chloroprene	2-Chloro-1,3-butadiene
*	127184	Tetrachloroethylene	Perchloroethylene
*	133062	Captan	
	135206	Cupferron	
	140578	Aramite	
*	140885	Ethyl acrylate	
*	151564	Ethyleneimine	Aziridine
	156105	Nitrosodiphenylamine (p-)	
*	302012	Hydrazine	
	309002	Aldrin	
**	319846	Hexachlorocyclohexane (alpha-)	
**	319857	Hexachlorocyclohexane (beta-)	
*	463581	Carbonyl sulfide	
*	510156	Chlorobenzilate	Ethyl-4,4'-dichlorobenzilate
*	532274	Chloroacetophenone (2-)	
	540738	Dimethylhydrazine (1,2-)	
*	542756	Dichloropropene (1,3-)	
*	542881	Bis(chloromethyl)ether	
*	584849	Toluene diisocyanate (2,4-)	
*	593602	Vinyl bromide	Bromoethene
**	608731	Hexachlorocyclohexane (technical grade)	
	615054	Diaminoanisole (2,4-)	
	621647	Nitrosodi-n-propylamine (N-)	
*	624839	Methyl isocyanate	
	630206	Tetrachloroethane (1,1,1,2-)	
*	684935	Nitroso-n-methylurea (N-)	

	759739	Nitroso-n-ethylurea (N-)	
	764410	Dichloro-2-butene (1,4-)	
	765344	Glycidaldehyde	
	811972	Tetrafluoroethane (1,1,1,2-)	
*	822060	Hexamethylene diisocyanate	
	924163	Nitrosodi-n-butylamine (N-)	
	930552	Nitrosopyrrolidine (N-)	
	1024573	Heptachlor epoxide	
*	1120714	Propane sultone (1,3-)	
**	1309644	Antimony trioxide	
	1310732	Sodium hydroxide	
**	1313991	Nickel oxide	
	1314621	Vanadium pentoxide	
*	1332214	Asbestos	
*	1336363	Polychlorinated biphenyls (PCBs)	
*	1582098	Trifluralin	
*	1634044	Methyl tert butyl ether	MTBE
*	1746016	Tetrachlorodibenzo(p)dioxin (2,3,7,8-) (2,3,7,8-TCDD)	Dioxin
	2699798	Sulfuryl fluoride	
*	7439976	Mercury (inorganic)	
	7440428	Boron (elemental)	
	7440622	Vanadium	
*	7550450	Titanium tetrachloride	
	7631869	Silica (crystalline, respirable)	
	7637072	Boron trifluoride	
*	7647010	Hydrogen chloride	Hydrochloric acid
*	7664382	Phosphoric acid	
*	7664393	Hydrogen fluoride	
	7664417	Ammonia	
	7664939	Sulfuric acid	
	7697372	Nitric acid	
	7758012	Potassium bromate	
*	7782505	Chlorine	
	7783064	Hydrogen sulfide	
**	7783075	Hydrogen selenide	
**	7784421	Arsine	
*	7803512	Phosphine	
*	8001352	Toxaphene	
*	8007452	Coke oven emissions	
	10034932	Hydrazine sulfate	
	10049044	Chlorine dioxide	
	10595956	Nitrosomethylethylamine (N-)	
	16984488	Fluoride	
**	18540299	Chromium VI (total)	
	19408743	Hexachlorodibenzo-p-dioxin, mixture	
	25013154	Methyl styrene (mixed isomers)	
*	26471625	Toluene diisocyanate (2,4-/2,6-)	

108171262 Chlorinated paraffins

EXHIBIT 3 – Transcript of the August 10, 2022, Public Hearing

CITY OF PHILADELPHIA
AIR POLLUTION CONTROL BOARD

IN RE: Public Hearing – proposed amendments
Air Management Services Regulation VI

DATE: Wednesday, August 10, 2022

LOCATION: Zoom Teleconference

REPORTED BY: Stacy Raub, Court Reporter

HELD BEFORE: DR. PALAK RAVAL-NELSON, Chair APCB
DR. EDWARD WIENER, Member, APCB
DR. CHERYL BETTIGOLE, Member, APCF
JIAZHENG LI, Board staff

ALSO PRESENT:

MICHELLE MABSON, Staff Scientist, Earth Justice
STEVEN KRATZ, President, PCIC
ADAM NAGEL, Campaign Manager, PennFuture
MATT WALKER, Advocacy Director, Clean Air Council
AMANI REID, Pennsylvania Interfaith Power and Light
PETER FURCHT, Resident, City of Philadelphia
MATTHEW PAGE, Eco Energy Distribution Services
SAGE LINCOLN, Resident, City of Philadelphia
JONATHAN CHASE, Assistant VP, Environmental Health and Radiation Safety at Drexel University
LYNN ROBINSON, Director, Neighbors Against the Gas Plants
RUSSELL HICKS, Co-Chair, POWER Interfaith Climate Justice
MITCH CHANIN, Member, POWER Interfaith Climate Justice
KATLYN CONNOR, Resident, City of Philadelphia
LYNDSAY CHRISTINEE, Delegate, Southeastern Pennsylvania chapter, the Sierra Club
LISA HASTINGS, Environmental Justice Chair, Pennsylvania Legal Women Voters Environment Committee
CORYN WOLK, Resident, City of Philadelphia

STREHLOW & ASSOCIATES COURT
REPORTERS – VIDEOGRAPHERS
54 FRIENDS LANE, SUITE 16
NEWTOWN, PENNSYLVANIA 18940

P R O C E E D I N G S

DR. RAVAL-NELSON: Good evening everybody and thank you for joining us for the Public Health Hearing regarding Air Management Services Regulation VI, also known as AMR VI. This public hearing will end at 9:00 pm and we will make every attempt to include everyone that would like to speak.

We have 13 participants that have pre-registered requesting to provide verbal comments. They will each be given five minutes to speak. At 4 minutes and 30 seconds I will buzz in and let folks know that they have 30 seconds left.

Apologies, my name is Dr. Palak Raval-Nelson and I am the Deputy Health Commissioner for the Philadelphia Department of Public Health. Please note that responses in the Q&A or items put in the chat will not be counted or considered as comments. We ask that everybody provide additional written comments and direct them to Benjamin.hartung@phila.gov. Additional written comments will be accepted until September 9, 2022.

Please state and spell your full name and we will begin with the order of speakers that have registered. Once those thirteen speakers have finished their

testimony and/or verbal comments we will then allow a raising of hands for those that want to speak. We will then at that point unmute the folks that are on the phone as well and they will get an opportunity to explain that they would like to speak at which point we will go in the order in which the requests were made.

The Air Pollution Control Board will be listening to all of the comments. There will be no dialogue or responses this evening. Instead, all comments will be recorded and transcribed for the Board to review and a response will be provided after the review.

We will begin with Mr. Edward Wiener of AMS who will provide a brief description regarding the proposed changes to this regulation, Ed.

MR. WIENER: Thank you Palak. My name is Edward Wiener. I am the Chief of Source Registration, which is the permitting section for Air Management Services of the Philadelphia Department of Public Health. Please note that this public hearing is being recorded.

We are here to accept testimony on the proposed amendments to Air Management Regulation VI, control of emissions of toxic air contaminants. The proposed modifications to Air Management Regulation VI include increasing the current list of toxic air contaminants

from 99 chemicals to 217 chemical compounds and compound groups, including all chemicals designated as a hazardous air pollutant or HAP by the US Environmental Protection Agency or EPA.

The proposed modifications would also establish threshold levels for each toxic air containment and require a risk assessment for permit applications for projects that have the potential to emit at least one toxic air containment beyond their threshold limit.

DR. PALAK RAVAL-NELSON: Excellent, thank you very much Ed. At this point we are going to begin with our first verbal comment speaker, Michelle Mabson of Earth Justice, staff scientist of Healthy Communities. You will have five minutes to provide your verbal comments.

MICHELLE MABSON: Hi, can I just take a moment to make sure you all can hear me?

DR. PALAK RAVAL-NELSON: Yes, we can hear you loudly and clearly. Thank you very much.

MS. MABSON. Excellent, okay well good evening my name is Michelle Mabson. And again I am a staff scientist at Earth Justice which is an environmental non-profit law organization working to protect the right to a healthy environment. We have offices around the country, including in Philadelphia. The Air

Pollution Control Board and Air Management Service's decision to take action to amend and strengthen AMR VI by incorporating health risk assessments into the air permitting and licensing process is an important step toward ensuring all Philadelphians can live in safe and healthy communities with clean air.

While we recognize the significance of the amendments, we are concerned that they would not do enough to address serious health threats and because they do not take in account accumulative health risks, they may not fully protect the public from toxic air pollution.

We urge the Board to listen carefully and respond to all community members concerns raised here and written comments and to ensure your action fully and faithfully implements all clean air requirements and provides stronger health protections for Philadelphians, especially neighborhoods long over-burdened with air pollution.

The regulation and associated benchmarks for action need to be strengthened to account for health risks based by a vulnerable populations like children, infants and fenceline communities that are disproportionately burdened by environmental hazards.

Studies show us that pollution burden and adverse health outcomes are not distributed equally across the city.

Respiratory conditions like asthma have been linked to increased exposure to toxic air pollution and according to a Center of Excellence in environmental toxicology report, black and Hispanic children in Philadelphia experience asthma related hospitalization at a rate that is five times higher than non-Hispanic white children. We and other commenters have identified and outlined what we hope the Board will find to be helpful and positive changes to the current regulations that would meaningfully protect communities from pollution. We urge you to make targeted improvements to the rule and guidelines and finalize these as soon as possible this year so they can take effect.

More specifically, the regulations should afford the public the opportunity to review and provide input on health risk assessments and risk mitigation plans. Because the community needs to be able to access and have a voice in the implementation of this rule. We ask that the health risk assessments and risk mitigation plan be made publicly available, and that

AMS be required to respond to public input before final action is taken.

Similarly, we ask that the Board commit to revise and review the AMR VI regulations and associated guidelines every five years to account for advances in the best available science. Such review will allow the Board to learn from implementation of the rule and to strengthen it and the guidelines over time. This will ensure that adequate protection of communities and give the public the opportunity to weigh in on any of these that impact community health as scientific knowledge advances.

The Board should also strengthen key components of the rule and guidelines for risk assessment. The guidelines need to do more than just assess health risks from individual pollutants, one by one, and it is essential for the Board to employ an approach that aggregates or combines health risks across multiple pollutants emitted by a single source. The guidelines should account for the cumulative cancer and non-cancer risk associated with all pollutants that may be emitted from a given source and the added risk from multiple polluting sources that are located in close proximity to communities.

The EPA has outlined best practices for conducting risk assessments and at minimum this includes aggregating cancer risks from all pollutants at a given sources and combining non-cancer health risks for pollutants that target the same organ or organ system. Additionally, EPA recognizes the importance of considering multi-pathway risks associated with the ingestion of persistent and bio accumulative pollutants, like lead and mercury. Such pollutants can cause added health risks when they are emitted from a source and build up in the soil of nearby communities.

To conclude, we thank the Board for taking much needed steps incorporate health considerations into its air permitting and licensing procedures. And even so, allowing a 100 in a million cancer risks from just a single pollutant is far too high that leaves children and other vulnerable populations unprotected. Ensuring mitigation at least at one in a million is essential based on the worth current approach as we have discussed in written comments. Sister agencies employ a far low cancerous benchmark for mitigation and action and the Board should draw on those helpful tools here to protect Philadelphians.

We sincerely hope the Board will seriously consider

our written comments and all comments from the public today and elsewhere and follow through with stronger new actions make the City of Philadelphia a true leader on these critical issues for public health. Thank you for your time.

DR. RAVAL-NELSON: Thank you very much, you hit it right on the mark. I appreciate that and at this point I know there is a question regarding a call-in number. So, I am going to ask before we move to Mr. Steve Kratz at the next testifier, I would like that Jiazheng from AMS please state the phone number for call in.

MR. LI: Hi, this is Jaizheng Li. I just posted all the call-in numbers in the chat box. I can read – there's many – I can read out a few.

DR. RAVAL-NELSON: That would be great. If you could read out at least three Jiazheng that would be great because folks that are on the phone may not have access to the chat.

MR.LI: Okay, so you can call 1(646)931-3860 or 1-(301)715-8592, or 1(312)626-6799.

DR. RAVAL-NELSON: Wonderful, is there a passcode Jiazheng that folks will need to enter?

MR. LI: There is no passcode. There is a webinar id, which is 881 4046 9905 and if you are prompted to

enter your personal id you can just press #.

DR. RAVAL-NELSON: Excellent, we will go ahead and make that reannouncement after every so many speakers. Thank you, Jiazheng.

Mr. Steve Kratz, you are up next. You are the president of the Pennsylvania Chemical Industry Council. You will have five minutes to speak. At 4 minutes and 30 seconds I will let you know you have thirty seconds left. Mr. Kratz?

MR. LI: Mr. Kratz, you can unmute yourself.

DR. RAVAL-NELSON: Mr. Kratz, are you available to speak?

DR. BETTIGOLE: He'S, I think, in the chat asking if we can hear him, so I think there is a problem with unmuting.

MR. KRATZ: I just got a notification I am unmuted now. So, thank you for doing that.

DR. RAVAL-NELSON: Wonderful, thank you. You have 4 minutes and 30 seconds sir, starting now.

MR. KRATZ: Thank you for the opportunity to provide public comments this evening in regards to the proposed revised to Air Management Regulation VI governing the control of emissions of toxic air contaminants. For the last 30 years the Pennsylvania

Chemical Industry Council (PCIC) has served as the industry trade group representing Pennsylvania chemical and plastics manufacturing operations. The chemical industry has always been an important sector of Philadelphia's economy and essential for providing products that protect the health and safety of our citizens. Our industry is critical for manufacturing everyday products that are essential to living modern life, ranging from nearly every healthcare product that is the building block for cleaner energy options, high performing building materials, food packaging, and the list goes on.

Our members are continually and voluntarily seeking new ways to improve energy efficiency and reduce emissions in manufacturing and operations. In fact, many of our member companies are leading the charge to advance new innovations with a focus of sustainability, circular manufacturing, and establishing lower no carbon goals. The health and safety of our environment, our employees, and all citizens of Philadelphia is our highest priority and PCIC supports regulation that uses sound science to achieve societal goals.

Unfortunately, our members believe that many

provisions with the proposed revisions to Air Management Regulations VI are unattainable, if not impossible, for the regulated industry to achieve and for regulators to implement. On behalf of PCIC we respectfully request the city of Philadelphia to revisit the proposed regulation and work with industry and other stakeholders through a regulatory advisory panel to advance the regulation that will be effective for protecting public health without stifling economic growth and job creation. We believe this panel should be engaged prior to the proposed regulation being published and implemented.

Our industry has a strong track record of working with regulators to develop such solutions to protect and enhance public health and safety. The operations of our facilities are already subject to multiple levels of state-of-the-art pollution controls, and federal, state and local regulation. These include, but are not limited to, Title V air permits, PA and Philadelphia RACT rules, the federal MACT as part of the national emissions standards for hazardous air pollutants program, and best management practices including responsible care which is the foundation of our industries commitment to sustainability.

These comprehensive regulatory requirements at all levels of government are in place to ensure that our members operate their facilities in a manner that takes great care to protect the health, safety and environment for all Philadelphians.

The proposed AMR VI regulations contains various segments that would create uncertainty both for the regulatory community and the implementing agencies. Here are a few examples, the proposed regulation calls for the reforms of a health risk assessment for toxic air contaminants but states no criteria upon which the study is to be performed or reviewed. The triggers for a full risk assessment are unclear in the proposed changes. Site specific permitting decisions is based on existing ambient conditions that do not result from a facility is inconsistent with the permitting approach taken by surrounding states in the EPA. Also, it is not practical or appropriate for an applicant to be responsible for emissions of other surrounding operations over which they have no control over.

For Title V facility permit renewals the proposed AMR VI does not provide any guidance on how a facility is expected to address results of an assessment that indicate an unacceptable risk. There are no guidelines

for consideration of costs or technical feasibility of a potential emission abatement approach. There is also uncertainty around the air contaminants included in the changes due to different variations listed in the proposal compared to other risk screen workbooks.

The current version of the regulation will result in potential unintended consequence of shuttering valuable facilities due to a net calculation of health risks, that far exceeds actual risks, and presumed unlikely confluence of events used in modeling assumptions.

On behalf of our members PCIC makes the following recommendations for consideration. Any facility that is already subject to an industry specific NESHAP'S or MACT or RACT regulation is exempt from this regulation because facilities are not able to control unregulated non-permitted sources of emissions beyond their facility boundaries, we believe permitted operations should be evaluated only on their actual emissions. Background emissions we don't believe should be part of any permit renewal. The provision regarding review of the existing air toxic concentrations surrounding the emissions source prior to approving or disapproving a permit we believe should not be included. And due to

uncertain definition of lack of information and the ability to collect such information reliable and accurately, reviewing surrounding area emissions should not be a requirement for a permitted facility.

DR. REVAL-NELSON: Sir, excuse me you have thirty seconds left.

MR. KRATZ: Okay, thank you. The Department of Public Health and AMS should take into consideration the full costs and benefits of any regulatory change, including the potential loss of jobs, disruptions in supply chains and the potential that the closure or reduced operation of facilities could lead to an increase in emissions or facilities right outside of your border with less stringent regulations.

We respectfully request the City of Philadelphia revisit this proposed regulation and work with industry and other stake holders through a regulatory advisory panel to develop a regulation that will protect human health and the environment while allowing our members to continue operating, investing, and thriving in the City of Philadelphia. Thank you for your time and for the opportunity to provide comment tonight.

DR. REVAL-NELSON: Excellent, thank you very much sir. You ended exactly at thirty seconds. We have Mr.

Adam Nagel that will be speaking next. But before we get to Adam I just want to reiterate that we will be accepting written comments and they can be submitted via email to the same person you have been sending the comments to, Benjamin.hartung@phila.gov up until September 9th and this hearing is being recording, and the Board will get the full transcription of this recording as well. So, without further adieu, Mr. Adam Nagel I will unmute you and you are with PennFuture Campaign Manager.

You have 4 minutes – or, 5 minutes to start talking and I will let you know when we are at the 4 minute and 30 seconds mark.

MR. NAGEL: Okay, thank you very much. Good evening and thank you for providing me with the opportunity to provide verbal comments regarding the proposed amendments to Air Management Regulation VI. My name is Adam Nagel and I do serve as campaign manager for PennFuture in the City of Philadelphia.

PennFuture is a statewide environmental advocacy non-profit. We are leading the transition to a clean energy economy in Pennsylvania and beyond. We are protecting our air, water, and land and powering so that we can build sustainable communities for future

generations. As stated in the generally submitted written comments, we are pleased that Air Pollution Control Board, Department of Public Health, and the Air Management Services are operating health considerations in the air permitting and licensing process with a goal to better protect public health.

So, we believe that the proposed amendments point to a greater recognition of the need to update Philadelphia's air management regulations. We maintain that the Board must strengthen the proposed regulations to better protect the health of frontline communities and vulnerable populations. PennFuture strongly recommends that guidelines should assess the cumulative risk or impact of all pollutants that single source releases to the greatest extent feasible, rather than the proposed approach that only analyzes individual risks from a single source. To do so would finally recognize that Philadelphia residents do not experience individual health impacts from individual pollutants. But experience cumulative impacts from the collection of toxic emitted pollutants across the city.

We also reiterate that the guidelines should also address the particular vulnerability, toxic air pollution that children and other community members

face based on age of exposure, socioeconomic disparities and other factors. We can no longer ignore that low-income communities and communities of color have suffered a disproportionate impact from historically racist practices like red-lining and short-sided environmental policies that directly harm their friends and families. Acknowledging this history will allow us to begin to recalibrate our priorities and move away from racist practices that have created sacrifice zones of the city in the name of economic gain.

Cumulative impact analysis is gaining momentum across the country as legislatures and regulators of every level of government seek to address the undue burden of environmental harm born by communities of color and low-income communities. California began focusing on cumulative impact in the early 2000s. In 2020 New Jersey passed the nations' first comprehensive law on environmental justice and community impact, cumulative impact, at the state level.

Similar legislation has been introduced in Pennsylvania by members of the General Assembly. At the local level, the City of Newark passed it's own environmental justice and cumulative impact ordinance

in 2016 and in Philadelphia, City Council Member Helen GYM introduced the Community Health Act earlier this year.

The City of Philadelphia, the Department of Public Health, the Air Pollution Control Board and the Division of Air Management Services are uniquely situated to lead on this critical initiative to better protect public health given it's delegated authority from the state to regulate air emissions and establish standards that protect our constitutional right to clean air as defined in Article I, Section 7 *[sic]* of the Pennsylvania Constitution which clearly states, "The people have a right to clean air, pure water and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustees of these resources the Commonwealth shall conserve and maintain them for the benefit of all the people."

The Board is also better equipped to measure cumulative impact because it is situated within local government, which provides a distinct advantage in gathering data at a more granular level, to better

illustrate the pollution burdens experienced by local communities. PennFuture also recommends that the guidelines be revised to more clearly define and strengthen opportunities for public participation and public input throughout the permitting process. Though not unique to the Board, public engagement of proceedings tend to take the shape of a formal meeting. They are often held toward the end of the decision-making process and are organized to fulfill requirements by streamlining the collection of public input. This can have a chilling effect on public participation and reflect structural inequalities in society. Community members may not feel comfortable providing testimony in a formal setting and rightfully question whether their input will impact the final outcome.

As the Board's position within local government defers on it a greater ability to truly measure cumulative impact on neighborhoods across Philadelphia, that same position also offers a more direct line of communication with residents than the public typically enjoys with state or federal officials. This should allow the Board to facilitate more meaningful efforts to solicit public participation and input over a longer

period of time. Public participation guidelines should ultimately empower community members and provide clearly prescribed methods for the Board and regulated industry to engage with residents as decision makers, rather than embody vague standards that are purely performative and fall short of guaranteeing substantive input from those most impacted by toxic communities.

DR. PAVAL-NELSON: Sir, you have thirty seconds.

Mr. NAGEL: Thank you very much. Environmental justice and public health considerations must be at the heart of our policies and regulations related to land use, zoning, and development. Environmental justice and public health considerations must be at the heart of our environmental policies and emission relation. For far too long we have subjected overburdened communities to the increasingly negative impact of polluting industries for the sake of profit. PennFuture supports the Board's proposed aim of giving greater consideration to the health impact of emissions, however, the proposed amendments must be strengthened to ensure that the regulations actually provide the necessary protection to Philadelphia's frontline communities and it's most vulnerable population. Thank you again for this opportunity.

DR. PAVAL-NELSON: Excellent. Thank you very much sir. Our next speaker will be Tammy Murphy, I do not see you on the list. I don't know if you are as a participant calling in. If you are, please unmute yourself. Tammy is with the Physicians for Social Responsibility and is a Pennsylvania Advocacy Director.

(No response)

DR. RAVAL-NELSON: Okay, we will move to the next speaker. Mr. Matt Walker from Clean Air Council, he is the Advocacy Director. Sir, you will have 5 minutes to speak and at 4 minutes and 30 seconds I will politely interrupt you and let you know the time. You may begin.

MR. WALKER: Can everyone hear me? My name is Matt Walker and I am the Advocacy Director at Clean Air Council. We are a non-profit environmental health organization headquartered in Philly. The Council has been working to protect everyone's right to a healthy environment for over 50 years.

The Council appreciates that the Air Pollution Control Board and Air Management Services recognized the critical need to better regulate sources of toxic air pollution and reduce cancer risks from large industrial sources in Philadelphia. The Council

strongly supports the decision to include a health risk assessment requirement to better consider health impacts during the air permitting process. If done right, this rule could be a major step forward in protecting public health especially for cities most vulnerable populations. However, the Council believes that the current rule should be strengthened to be sure we better protect all Philadelphia residents. Especially children, the elderly, those with pre-existing health issues, and black and brown communities already harmed by existing pollution sources. Black communities are exposed to 38% more pollution than white communities and black residents are 75% more likely to live in fence line communities near industrial facilities than the average American.

According to the ALA the Greater Philadelphia area continues to be among the 25 most polluted regions in the US. Philadelphia has a 7.5% higher cancer rate than the national average, with some parts of the city having even higher rates. Philadelphia communities, specifically black and Hispanic residents, experience disproportionally higher rates of asthma related hospitalization and are more vulnerable to health impacts caused by high levels of multiple air toxics.

The Council strongly urges the Board to strengthen the proposed risk benchmarks in the rule as they do not adequately protect against accumulative health impacts of pollution. The proposed regulations would only look at individual risks from individual pollutants and does not take into account the cumulative impacts of all pollutants that are released from a single source, let alone multiple industrial pollution sources.

From a public health perspective, it is unacceptable to access cancer and non-cancer risk pollutant by pollutant. Cancer risk is additive, yet the proposal does not require operators to aggregate cancer risks from the same source. This could allow a single source to have a significant adverse health impact on nearby residents already exposed to risks from other sources. Looking to cancer risks from individual pollutants separately could significantly undercount the overall health impacts and allow a single source to cause an unacceptable high lifetime cancer risk to Philadelphia residents.

The proposed high number for the acceptable cancer risk benchmark would compound this even more. The Board should require applicants to aggregate the cumulative health impacts of multiple pollutants that

would be emitted by a facility to establish the total cancer risk and also to combine non-cancer risk of pollutants that affect the same organ or organ system. Consistent with current science, EPA has set scientific principles in its air toxics rules for combining risks and will soon release new guidelines for analyzing cumulative risks. This type of aggregation is already being implemented at other permitting programs, such as Oregon's Department of Environmental Quality, The South Coast Air Quality Management District and The Bay Area Air Quality Management District in California.

In addition, the Board should reduce the cancer risk benchmark in the rule for when AMS requires risk mitigation and for when the risk is too great and AMS denies the permit. The Council recommends that the board require risk mitigation plan when the combined cancer risk of a proposed risk facility is 10 in a million or more. AMS should deny a permit when the combined cancer risk of a proposal is 25 in a million or more.

Reducing the benchmarks is important to ensure the Board's intended positive impact from this rule. The proposed regulation should also be strengthened by improving public participation, so the communities have

a chance to meaningfully participate in the risk assessment process. The Board should ensure that the residents will be able to get timely information about, have input on, and have the opportunity to challenge a risk assessment and mitigation plan for a facility that affects their neighborhood.

The Board should also commit to reviewing and responding to public comments to ensure they are meaningfully considered in the final decision, when possible.

The Board should also commit to review and strengthen the rule as scientific updates occur, but at least every five years. Again, the council appreciates that the board has taken the necessary first steps of considering the health risks from air toxics. By straightening the rule, the board has the opportunity to better protect the health of all Philadelphia residents and demonstrate strong leadership on environmental justice and clean air policy. We believe that these four key recommendations are easy to implement into the proposed regulation and could lead to better health protections for the most vulnerable Philadelphians. Thank you.

DR. PAVAL-NELSON: Excellent. Thank you so much.

You were right under time. I appreciate that. I'm not sure if Ms. Tammy Murphy has joined and would like to speak since she was not available in the order. Also, if other attendees that have joined would like to speak, please raise your hand if you're calling on the phone, after all the comments are provided, we will unmute you and give you an opportunity to speak as well.

With that said, we're going to move to Ms. Amani Reid from the Pennsylvania Interfaith Power and Light and Power Interfaith Project, Ms. Reid.

Okay, I don't believe Ms. Reid is on anymore, so we will move to...

MR. SELLASSIE: She have some problem connecting to video. He is there.

DR. RAVAL-NELSON: Okay, I don’t – Amani Reid? Okay, in the interest of time we will move to Marta Gutenberg.

DR. BETTIGOLE: Sorry, Dr. Raval-Nelson there is a message in the chat that Amani Reid is trying to figure out how to connect to audio. Does somebody need to unmute her?

DR. RAVAL-NELSON: Sure, I’m not seeing here in the participant list that’s the problem.

DR. BETTIGOLE: Yes, she is there.

DR. RAVAL-NELSON: Okay, I see you now. Apologies. Again. You'll have 5 minutes to comment and at the 4 minute and 30 second mark, I will go ahead and politely interrupt you. Thank you very much. Sorry, you disappeared for a minute in the attendees list.

MS. REID: No. I want to apologize. I believe that was my fault. So yeah, apologies and thank you so much.

DR. RAVAL-NELSON: No worries, no fault -- you may begin now.

MS. REID: Thank you. Good evening, everyone. my name is Armani Reid. I am the Policy Engagement Manager for Pennsylvania Interfaith Power and Light, which is a community of work congregations, faith-based organizations, and individuals of faith responding to climate change as an ethical and moral issue. We do this through advocacy, education, energy conservation, energy efficiency stewardship, and the use of and promotion of clean, renewable energy. I'm also a Philadelphia resident. I've been a resident for four years or so now. Predominantly was in North Philadelphia, which is facing quite a bit of air pollution.

We thank the Air Pollution Control Board for holding this public hearing regarding the amendments to the air toxics and risk assessments . And our organization, along with organizations across the state, are strongly supporting the decision to better regulate toxic air pollution and to reduce cancer risks from pollution which is being emitted by our facilities in the city of Philadelphia.

A bit more about the organization, we're a national religious response to the threat of climate change. And we see climate change as a moral issue, one that demands response from people of faith. We represent members on the local, state, city level and national to advocate for things like this. As well as legislation that will increase energy efficiency, reduce air pollution, reduce climate change as a whole, and the impacts and injustices that there are.

As members of a common humanity we recognize the impacts of climate change are now touching the lives of those in the city and those least able to adapt. Being part of this effort offers us the opportunity to care for creation and put our faith into action and that is why we're here representing today. Our unique message is to focus attention on moral implications and

inequalities from climate change. And we urge you to ensure that Philadelphia residents will be able to get information about and have input on the risk assessment and mitigation planning process first at a facility affects their neighborhood community.

Once again, as a person of faith and young adult, I'm concerned about the impacts facing our communities, by (indiscernible) communities and the health impacts from air pollution due to the fossil fuel industry. As we know, Philadelphia has some of the highest cancer rates in the country. We should not take that lightly. We believe -- and I believe in holding the values of human dignity conscious first and foremost. I believe we need to protect our communities from the harms of this air pollution and from climate change. And we also need to speak on the root causes of these injustices. And many neighborhoods in the city, low income and communities of color are dealing with these harmful emissions and other releases that putting them at an increased risk.

This inequity and exposure is due to a long history throughout the country and abroad through discriminary *[sic]* practices of other facilities. And I believe we all deserve to live in a healthy community. Yet many

people in the country and more locally are at a greater risk once again because of where they live, work and play.

We urge you to require an assessment of chemical impacts on human health of the multiple air toxics from facilities in the city. And we believe that the regulations must be strengthened and we're standing with organizations across the state that believe the Board should make the needed changes for the sake of our health and future generations.

Once again, we're strongly supporting the decision to better regulate toxic air pollution and reduce cancer risk from pollution emitted by large industrial facilities in Philadelphia. Thank you.

DR. RAVAL-NELSON: Thank you very much. Excellent. Okay, next we have Marta Gutenberg. Marta, I don't see you on the list but I don't know if you are one of the four folks calling in.

Okay, we will move to Peter Furcht, if I'm saying your name incorrectly I apologize. Peter and all of the callers have been unmuted so you have the control to unmute yourselves directly. If you're on the phone either Marta or Peter.

MR. FURCHT: Hi, this is Peter. Good evening and

thank you for the opportunity to speak tonight. My name is Peter Furcht. I'm a resident of Pennsylvania or Philadelphia.

I am a chemical engineer and I have spent my career in the chemical industry in the field of plant modernization and process automation. While I'm a member of a number of environmental and social justice organizations tonight I am representing myself and I'd like to thank lots of other people who didn't know about this meeting.

Let's be honest do we really have anything new to discuss this evening? The economics of pollution control have been well understood for decades. How much an industry pollutes is an economic decision, period. Either an industry pays for the cost of evading pollution or the communities surrounding the facilities pay for the pollution, excuse me, with their health and their lives. I ask you since industry is not volunteering to pay the cost of pollution abatement and the surrounding communities are not volunteering to pay with their health and their lives. Who should be forced to pay? The industry or the community? Where should the line be drawn that says a community has to pay X amount for the indirect cost of unabated

pollution, while the industry pays y amount to abate their pollution? This is the real issue we are discussing, and you are deciding.

Industry has made it pretty clear from the start of the industrial revolution that they weren't and still aren't willing to spend any money on pollution abatement unless forced to do so. As far as most industry management was and still is concerned the local environment is their free dumping ground regardless of the damage that dumping may do. In their minds why pay to contain waste if they can dump it for free?

It wasn't until the creation of the EPA and the state and local regulatory bodies came into existence that industry was forced to pay some of the cost of containing or eliminating their waste. In most cases, engineers know how to design a facility to pollute more or less or to a very specific amount. It is a management decision to decide whether or not the engineers can spend the money to design and build the equipment needed to abate the pollution. Yes, pollution control does cost money. There's no arguing that. It costs money to build the pollution abatement equipment and it costs money to operate. Industry

representatives tell us the industry can't afford that. It makes them uncompetitive. We've heard the arguments over and over again while the management gets rich from outsized salaries and bonuses.

There are options available to management to be competitive like putting some of that bonus money towards flex monetization, but I digress. For some reason also, regulatory bodies such as the AMS often side with industry and accept industry suggestions to keep abatement requirements low and limit the cost companies have to incur. Why is this? You do this to the detriment of the communities in the wake of that pollution who are forced to pay the cost of that pollution in asthma, cancer and birth defects, miscarriages and delayed cognitive development and decimated property values, in stink and filth and countless other quality of life issues and issues we do not even yet understand.

It is time for this to stop. It must stop. I am not expert enough to discuss many of the new proposed regulations, but in general, it is time for the AMS to require the sources of industrial pollution to strictly control all their pollution and behave as responsible corporate citizens. Period.

Regulations must be strengthened to ensure they achieve meaningful health protections for all Philadelphians. AMS must lower the health hazard benchmark used to decide when to require a risk mitigation plan or when to deny a permit. AMS must require a risk mitigation plan when the combined cancer risk of a proposed facility is at the very most ten in one million. And I'm talking about a combined or cumulative cancer risk, not one individual pollutants risk.

AMS must be sure Philadelphians are able to get information about and have input into the risk assessment and mitigation plans planning process for facilities that impact their neighborhood. AMS must be sure they are updating regulations to reflect the latest scientific knowledge. Lastly, the AMS must stop siding with irresponsible industry management who only care about their bonuses and force them to protect the communities in which they operate.

DR. RAVAL-NELSON: You have 30 seconds, sir.

MR. FURCHT: Why should the community, why should Philadelphians pay with their health, with their lives? It is time to significantly strengthen air quality regulations. Thank you.

DR. RAVAL-NELSON: Thank you very much. Okay, next we have Matthew Page and we'll go ahead and make sure we allow -- unmute you. You should be unmuted and you will have five minutes to speak at the 4 minutes and 30 second mark I will let you know.

We have had additional speakers added. There's going to be five additional speakers after our last pre-registered speaker. Also, if you have joined and would like to speak, feel free to please raise your hand and we will record that. And don't worry, Mr. Page, this is not eating into your time, I promise. You will also have the opportunity to continue to provide written comment until September 9, 2022 and those comments may be sent to the same individual, Benjamin.hartung@phila.gov.

Thank you, Mr. Page. You have five minutes -- time starts now.

MR. PAGE: Thank you so much. I appreciate it. I also appreciate the effort that all you have kind of gone into developing this rule. I've been a regulator for seven years. I'm a consultant now.

So let me start off. I represent Eco Energy Distribution Services in Philadelphia. There's a (indiscernible) source, but I have submitted written

comments, and basically we just have some concerns with this revised regulation that could potentially impact our operations. But I do realize air toxic regs, I mean, Eco Energy is very much committed to the environment. I'm kind of hearing a lot of other people commenting and all that. And it's like industry does really care about the environment. We've been working with industry for about 25 years now, and they do care, and Eco Energy cares. So, we appreciate the effort that you have put into developing this new or amending this regulation. But I have submitted some written comments.

Quite frankly, I'm not going to go in those into detail, but what I will say is that I noticed that there was an FAQ document that was published by AMS in July last month, and it mentions that Title V renewals will have to go through a health risk assessment. And the regulation, or the Appendix B only mentions initial Title V permits. And I know that you guys can't give any initial feedback, but if you can kind of clarify that as soon as possible because we're working with clients right now, that it's just initial and it's not renewal permits for qualified sources.

I know you can't do it right now, but if you could

probably try to have an updated document make sure I believe it's question nine mentions -- Yeah, it mentions the -- renewals on question nine of the FAQ document. So that's my only verbal comments. I would appreciate it if the AMS can clarify that, because we have to kind of plan out six to nine months in advance for these renewal permits, and if we have to do health risk assessment, that affects our budget and all that.

DR. PAVAL-NELSON: Thank you for your verbal comments, Mr. Page.

MR. PAGE: That's it.

DR. RAVAL-NELSON: We will follow up with you separately – we will not -- because we want to make sure we allow everybody the opportunity to speak. We had agreed at the beginning of the meeting we would not have a dialogue back and forth, but we will follow up with you. AMS will follow up with you next week.

MR. PAGE: Thank you so much. I appreciate it. That's it.

DR. PAVAL-NELSON: You're welcome. Excellent. Our next speaker is going to be Sage Lincoln with the University of Pennsylvania Law School. And please note that anyone that would like to have follow up from AMS regarding a question, we will be sure to follow up with

you. Sage, I believe you're unmuted and give me one second. I'm going to restart the timer here, and you'll have five minutes starting now.

MS. LINCOLN: Great. Thank you so much. Good evening and thank you for the opportunity to provide testimony. My name is Sage Lincoln, and I'm a Philadelphia resident and a law student in the city.

I grew up across the state in Pittsburgh, which is a city very well known for its poor air quality and I've had asthma since I was a child. Because of my asthma, poor outdoor air quality can impact my ability to breathe when doing outdoor activities that I love, such as running in Cubs Creek and along the Schuylkill.

So, I would first like to thank AMS and the Air Pollution Control Board for really taking a critical step of considering health effects during the air permitting process. This step is really necessary to actually protect the health of all Philadelphia residents, including myself. The proposed guidelines also take a really important step of adding a pollutants cancer risk from both the proposed facility as well as the background risk. And this shows that the board really understands that cancer risk is additive and that health risks must be looked at

cumulatively.

However, in my opinion, AMR VI does not go far enough and may still allow new facilities with really large negative health impacts to be constructed in the city. For example, by looking at health risk for each pollutant separately, AMR VI does not follow the current science and also fails to assess the cumulative health impact that Philadelphia residents like myself actually experience.

Facilities emit many different pollutants, and AMR VI allows each individual pollutant from a facility to create a cancer risk of up to 100 in one million. And so, this means that under ARM VI, one facilities total cancer risk could be much greater than 100 in one million and that it might still receive a permit despite this huge cancer risk.

According to the EPA, the total cancer risk from refineries, which adds up the cancer risk from all different pollutants, rarely exceeds a 100 in one million, which goes to show that a 100 in one million unacceptable benchmark is really far too high, especially when looking at a single pollutant.

Because of this, AMR VI should be amended to look at the total additive cancer risk from the entire

facility. But if the Board does decide to continue looking at risk pollutant by pollutant, it must drastically reduce what the unacceptable benchmark is to something more like 10 in one million, because this will actually protect Philadelphia residents as opposed to allowing up to 100 in one million cancer risk per pollutant.

In my opinion, other improvements are also needed to the regulation. The community must have a meaningful opportunity to comment on health risk assessments and risk mitigation plans during the permitting process, and it's not clear whether or not this is guaranteed right now. The Board should also commit to reviewing and revising this regulation at least every five years. Additionally, the risk mitigation plans must actually require facilities to reduce their health impacts and install monitors.

Right now, it's not very clear what facilities will be required to do under the risk mitigation plans. So, these facilities might still be emitting up to 100 in one million, creating 100 in 1 million cancer risk per pollutant, and it's not clear what the risk mitigation plans would be required to do to abate this. And furthermore, these regulations really must account for

how much harmful air pollution, how much more harmful it is to children and other vulnerable populations. I still remember being a child and having the terror of having an asthma attack, gasping for breath through closed airways, being put on a nebulizer. And the new AMR VI regulations should really strive to make sure that no child in Philly develops asthma or suffers an asthma attack as a result of air pollution in Philadelphia.

Because of this, I urge the Board to strengthen the regulations and consider this testimony and the testimony of others tonight and in written comments who live in Philly's overburdened low income and minority communities, because those folks are the folks who have experienced the negative health consequences of the city's air pollution for far too long. And so, thank you again for the time to speak tonight and I do hope that you reconsider the regulations and strengthen them and implement them as soon as possible. Thank you so much.

DR. RAVAL-NELSON: Thank you so much. I really appreciate it. I just want to clarify something before we move to our next speaker that is going to be Jonathan Chase. I just want to clarify that all of the

comments, including the comments that were made by Mr. Page, all of these discussions and these comments, the written comments, the verbal testimony, all of that is going to be reviewed and transcribed by the Board.

Everyone's feedback to ensure transparent process will be reviewed and assessed. When I said that we would follow up next week apologies, it's going to take time for us to get through all of the feedback in the comments. So, there will be a written process involved of the comments and discussion. So, I apologize if my stock response is "I will get right back to you or I will get back to you next week." So, apologies for that.

But just to be clear, everybody's feedback, everybody's comments are equitably valuable and that's why we're having this process and we're all listening and taking notes and we will provide full feedback and transcription and review. So, with that, our next speaker will be Mr. Jonathan Chase from Drexel University Environmental Health and Radiation Safety. So, Mr. Chase, you're up next. And once I see you on the screen, we'll go ahead and start your timer at five minutes.

MR. CHASE: Okay? Can you hear me okay?

DR. RAVAL-NELSON: Yes sir. And your timer starts now.

MR. CHASE: Well, thank you very much for the opportunity to speak tonight. Most importantly, thank you for your time and efforts that you all put into this and for everything that you guys do on a daily basis. My name is Jonathan Chase. I'm the assistant vice president of Environmental Health and Radiation Safety at Drexel University. And I wanted to respectfully request additional discussion regarding the Section II, C.5 of the proposed changes from April of this year 2022, also known as AMR VI.

The section that I referenced is in a list of exemptions that were removed from previous iterations of the code. This specific exemption is as, quote, "incidental or minor sources, including laboratory scale operations, fireplaces and household appliances, cooking appliances, general comfort ventilation of occupied spaces, house cleaning operations, residential scale solvent use and pesticide application, and other such sources or categories of sources which are determined by the Department to be of minor significance for the purpose of this regulation." Similarly, this issue was discussed, and where the

exemption originally came from was the 1995 review of the Clean Air Act when it was promulgated by the EPA. And there's a response from the EPA in June of 1995 confirming that these sources are considered minor and that the burden of compliance and enforcement significantly outweigh the benefit from exempting these minor sources.

So, I just wanted to go on record and ask for the time and to discuss this point and to better understand why this exemption was removed, the impact to both the regulatory agency and the community and to further discuss alternative options and or reinstating the exemption. And that is all I have for tonight. I want to thank you for your time. I give back remaining time to the group.

DR. RAVAL-NELSON: Thank you very much, Mr. Chase. And again, just so that everybody is aware, we're accepting all of these comments, and everything will be reviewed fairly and equitably.

Our next speaker is Mr. Maurice Sampson with Clean Water Action. Please unmute yourself and once I see that you're on the screen, I will go ahead and start the timer.

Mr. Sampson?

MR. SAMPSON: Yes.

DR. RAVAL-NELSON: Okay, excellent. I will start your timer now.

MR. SAMPSON: No, actually I did not intend to speak tonight. I'm in listening mode.

DR. RAVAL-NELSON: Excellent, well, thank you for that clarification. And with that said, we will move to our next speaker, Ms. Lynn Robinson. Ms. Robinson, once I see you on the screen, I will start your timer.

MS. ROBINSON: Good evening. Can you hear me?

DR. RAVAL-NELSON: Yes, we can. And you can put your hand down if you'd like and then I will start your timer now.

MS. ROBINSON: Great. Good evening. My name is Lynn Robinson, director of Neighbors Against the Gas Plants, retired Philadelphia public school teacher and resident of Germantown. I want to be sure to express appreciation to the Health Department for their intention to strengthen AMR VI.

Up until now, I have developed little trust in the Air Pollution Control Board when it comes to protecting air quality or climate or health, because my only experience with them in the last five years was to witness how they prioritized industry. I attended an

Air Pollution Control Board meeting about a year or more ago when the topic of changes to Air Management Regulation VI was on the table. At the time, Joe Minott of Clean Air Council was on the Board and he presented a white paper advocating assessing cumulative health impacts. He was not listened to as if he was speaking a foreign language. Non burning and non-poisonous technologies must be shifted into and burning natural gas is not the answer to our energy needs and desires. I mentioned desires because much of what we manufacture ends up in the trash. Since Philadelphia incinerates 40% of our trash, we breathe most of the manufacturing process and the incinerated commodities themselves.

So other people are covering crucial topics like how to do a realistic health assessment. I just want to go over some of the loopholes and exemptions in the AMR VI documents that really, I believe, need to be rooted out. In the amendments document, Section II notice requirements, the first paragraph describes the requirement for permitted facilities to give written notice to AMS of their toxic emissions. In the past, AMS has omitted toxics for gas burning sources in their public notice. So, AMS needs to add to that paragraph that it will be in compliance with PA Code 25, chapter

127.45(a), which means that the AMS will include toxics in public notices in (a)(3), (a)(3) is crossed out, and I feel it needs to be reinstated. It requires permitted facilities to give notice to AMS about toxics that have been added to the AMS list -- (a)(4) has two loopholes that need to be closed. First, an applicant should be esquire to identify the toxic air contaminants emitted. It should not be a maybe, so please change the word may to shall.

Second, the cross out needs to be reinstated. The start date for air contamination should be provided to AMS and to the public. And (a)(5), as far as I know, needs to be reinstated. It requires that the applicant provide a material safety data sheet that conforms to US department of Labor OSHA requirements.

Page 89 is subsection (c) exemptions -- and to me, that's the most egregious part of the document. Because there should be no exemptions. Every permitted facility should give notice to AMS about toxic emissions. By having these exemptions, a state code is being violated because all contaminants from minor sources have to be posted in The Pennsylvania Bulletin.

But here's the two craziest ones. One is for complex sources. Complex sources is exactly what it

sounds like. It's more than one source on one property. That means you could have a synthetic minor, a minor, a major all on one piece of property. And to exempt them from noticing toxics is crazy.

The other one is number (4), any non Title V source. That means its synthetic minors, which are borderline major that are a major plant but have an agreement to run under capacity, and that's not really monitored. So, we're talking about a whole lot of facilities that just don't have to report their toxic emissions. That's not following state code either, because they have to be reported in The Pennsylvania Bulletin. There's also…

DR. RAVAL-NELSON: Ms. Robinson, apologies. You have 30 seconds.

MS. ROBINSON: Okay, there's four unacceptable exceptions to health assessments in the technical documents, and the worst one is for major gas burning facilities up to 50 million BTU an hour.

Also in the exemptions page ten, section III. Conditions of Approval, number 2, this language says that the applicant, not the health department, will be responsible for assessing health risks to the public. The applicant has a conflict of interests, it should be

the health department. And last number 3 --.

DR. RAVAL-NELSON: Ms. Robinson, apologies, your time is up.

MS. ROBINSON: Thank you.

DR. RAVAL-NELSON: So, you're welcome. Please send the comments to the email address so that we can have your full written testimony as well. We appreciate that.

MS. ROBINSON: Great, thank you.

DR. RAVAL-NELSON: Thank you. Okay, we have next up is Russell Hicks. So, when I see you on the screen, I will go ahead and start the timer for you for five minutes. Mr. Hicks?

DR. BETTIGOLE: He appears to be muted.

DR. RAVAL-NELSON: I -- just made sure you were unmuted. Okay, wonderful. Okay, put your hand down, sir, and your time will start now.

MR. HICKS: Thank you. My name is Russell Hicks, co-chair of the POWER Interfaith Climate Justice and Jobs Team, representing POWER’s comment on the amendment to Air Management Regulation VI on review health impacts from new sources of toxic air contaminants tax. Philadelphians deserve to have access to information about health assessments, regular monitoring of air

quality and cumulative health impact analysis and other analysis needed and performed on facilities in their neighborhoods.

This rule should be updated more frequently as new scientific information becomes available on hazardous air pollutants. Residents shouldn't have to wait 40 years for regulations to catch up with science. We also want to consider mobile sources of air pollution such as vehicles, as well as stationary resources when examining cumulative impacts. That's something that came up in our permitting fight in Nicetown with a Nicetown gas plant. Since the plant is located next to a SEPTA bus depot and is very close to a major highway.

This amendment does improve on the previous regulation, by more than doubling the number of hazardous air pollutants that has been included. While this is a positive change, this regulation should also take into account that cumulative impact of exposure to multiple hazardous air pollutants and the cumulative impact of nearby sources that emit the same pollutants. In particular, the facility wide health risk assessment should be expanded to include all air toxins emitted from all air pollution from all nearby sources instead of just within the facility.

We want air screen and air modeling should also take into account emissions of nearby facilities. Apart from modeling, we also would like to see continuous monitoring sites that sample hazardous air pollutants and ultrafine particles across Philadelphia in order to develop a better understanding of ambient conditions, transient events and overall health impacts from new facilities.

In addition to assessment and cumulative impacts, we would like to see certain materials added to the list, other ultra-thin particles that included in the updated list of hazardous air pollutants and the cumulative risk assessment. Ultrafine particles have the ability to enter the bloodstream and cross the blood brain barrier, leading to numerous adverse health effects, including cardiovascular respiratory diseases. These ultrafine particles have critical health impacts and cumulative health risks. This air pollution has to be monitored more, mitigated and possibly removed from our living environment to ensure a livable future.

Thank you.

DR. RAVAL-NELSON: Excellent. Thank you very much, sir. Our next person to speak will be Mitch Chanin. Once I see you and my apologies if I'm mispronouncing

any names, but once I see you on the screen and unmuted, I will go ahead and start your timer.

MR. CHANIN: Great. Can you hear me?

DR. RAVAL-NELSON: Yes, we can. I'm going to start your timer and you may put your hand down. Excellent. Thank you. Timer starts now.

MR. CHANIN: All right, thank you so much for the opportunity to speak tonight and -- appreciate the work that has gone into crafting the updated proposed regulation. My name is Mitch Chanin. I'm a resident of Northeast Philadelphia. I'm a member of POWER Interfaith as well as a number of other organizations.

I fully support the additional recommendations from POWER, Penn Future, Clean Air Counsel, Earth Justice - really also appreciated the comments from Sage Lincoln around strengthening some of the regulations in terms of lowering thresholds, mandating cumulative health impact assessment of multiple pollutants from the same facility and from ambient sources nearby. The need to look at cumulative impact of pollution through multiple pathways.

I wanted to just bring a couple of other things into focus based on my past experience engaging with permitting around SEPTA's gas, fire, power plant in

Nicetown and other struggles. I want to echo that I think it is important to examine the impact of mobile as well as stationary sources. Vehicle traffic is one of the leading sources of air pollution in Philadelphia, and facilities are sometimes responsible for vehicle traffic along with emissions from smokestacks or other equipment on site. For example, when we were challenging the permit for SEPTA's power plant, there was no examination of the combined emissions from the plant and the 300 plus diesel busses that were serving the depot immediately adjacent. And I think that's inappropriate not to consider the combined impact of those multiple sources or looking at the impact of traffic pollution from traffic in combination with the impact of pollution from a new source.

In addition, kind of lifting up something that Russell was talking about. There are currently no regulations for ultrafine particulate matter. EPA most recent review indicated that there wasn't sufficient information to establish thresholds. The World Health Organization determined the same thing, but that doesn't mean that there isn't a problem. I'm very aware that sometimes members of the public raise concern about issues where I believe the preponderance

of evidence shows that there isn't a significant threat to the public. But I don't think that's the case with ultrafine particulate matter.

There's growing evidence of very serious health impacts, including respiratory, cardiovascular impacts on the nervous system, diabetes and cancer. Those pollutants cannot be measured in the same way that larger particulates can, according to the particle mass. It's important to look at the number of particles and the surface area. In the absence of thresholds determined by the EPA or other larger agencies, I don't feel 100% clear on what Air Management Services should do. But I think when reporting to the public about the potential impact of a new source of pollution, to my mind it feels irresponsible not to have any assessment or provide any information about ultrafine particulate matter, even in the face of uncertainty.

I don't know really what that means from a regulatory standpoint. I don't know how to quantify risks when the data is insufficient. But I feel given the Environmental Rights Amendment in the state constitution and the commitment of the city to promote public health, it just feels irresponsible to ignore a

whole area of pollutants where there's growing and very significant concerns. So, I would implore AMS to look at some way to address that, even in the face of significant uncertainty. Yeah, I think I'll leave it there. I support the other comments that were made by the health advocates and would really like to see -- I'd like to see AMS look at mobile sources and find some way to address the significant and growing concern about ultrafine particulate matter. And thanks very much for the time.

DR. RAVAL-NELSON: Excellent. Thank you very much. You came in right at the 4 minute 30 second mark. I appreciate it.

We next have Katlyn Connor. So, Katlyn, once you are unmuted and on screen, I will start your timer.

MS. CONNOR: Hello? Can you hear me?

DR. RAVAL-NELSON: Yes, we can. Wonderful. I'm going to start your timer now.

MS. CONNOR: Thank you. My name is Katlyn Connor and I am a concerned citizen in the East Falls neighborhood of Philadelphia. I appreciate the opportunity to be able to speak on AMR this evening. I'm a volunteer with Penn Environment and lobby to pass legislation in PA to reduce air and water pollution,

among other climate actions. I work at a small business, Rabbit Recycling, to address the waste crisis in Philadelphia.

Personally, I consistently strive to reduce my environmental impact with low waste solutions. Pouring so much effort into the fight against the climate crisis can feel minimized when pollution caused by corporations is unchecked. A specific example is the explosion at Philadelphia Energy Solutions refinery, which released toxic chemical hydrochloric acid into the atmosphere. A study conducted by UPenn shows that before the refinery explosion, PES accounted for 72% of Philadelphia's toxic emissions. Additionally, PES had violated the Clean Air Act's emission limits for nine of the twelve quarters prior to its closure. Allowing operations to continue without interference is a gross environmental injustice considering that neighboring communities are predominantly of color and below the poverty line.

It is long overdue to hold commercial polluters accountable for their deeply harmful actions. I am not familiar with the specific details of AMR VI, but I have heard comments tonight raising concern that the revisions to AMR VI are not strong enough in tackling

the health impacts of air pollution.

I support the strongest regulations and echo the former comments of everyone tonight. That's all I have and thanks again for giving me the time to speak.

DR. RAVAL-NELSON: Thank you so much. All right, next we have Cordon Fuller. Once you're on the screen and unmuted, I will start your timer. I do not see Cordon in the participant list anymore.

DR. BETTIGOLE: I still do, but muted.

DR. RAVAL-NELSON: Okay, let’s see if we can find you.

JIAZHEN LI: Cordon, please unmute yourself.

DR. RAVAL-NELSON: Cordon, you should be able to unmute yourself.

DR. BETTIGOLE: Cordon just put in the chat, “I’m just observing.”

DR. RAVAL-NELSON: Okay, wonderful. So, we will go to the next speaker, Lindsay Christinee. I'm thinking I'm saying the name wrong, the last name wrong. But Lindsay -- once you are on screen you've been unmuted. Once you are on screen, we'll go ahead and start the timer.

MS. CHRISTINEE: Okay.

DR. RAVAL-NELSON: Hello. Wonderful. We can hear you

and I will start your timer.

MS. CHRISTINEE: Okay, perfect. My name is Lindsay. Christinee. I am a delegate for the Southeastern Pennsylvania chapter, the Sierra Club, an environmental organization with chapters in all 50 states, Washington DC and Puerto Rico. I am also a mother and local parent of my public school, George A. McCall.

First, I would like to thank the council and the Board for taking the time to listen to the community and representatives from various environmental organizations advocating for the best interests of Philadelphians. A lot of what I will say you have previously heard today, such as the fact that the American Lung Association ranked the Philadelphia Reading-Camden Metro area among the top 25 most polluted in the United States in terms of two of the most common and dangerous ambient air pollutants measured nationally. And also, as we've also heard today, a lot of these impacts from poor air quality disproportionately impacts communities of color.

For instance, Nicetown, which has a population that is 75% African American and 24.5% white, has an incident rate of 577 cancer cases per 100,000 residents from 2012 to 2016, which is higher than the city's

average of 473. The other demographic that is negatively impacted by poor air quality are children. About 25% of children in Philadelphia have asthma, which is higher than the national rate. Researchers at the University of Pennsylvania have acknowledged that increased levels of air pollution are a primary contributor, especially in neighborhoods near industrial sites. I myself fit into the statistics as a black child who grew up during the ‘80s in the suburbs of Philadelphia and I'm still dealing with the health problems associated with asthma.

Additionally, Drexel University has also noted that environmental toxins are among the various factors that contribute to neighborhood disparities in cancer rates. Taking all of these health risks into consideration, I ask the council to please consider that currently the threshold for contaminant means that any amount less than threshold amount does not need to be reported or considered when looking at health effects. But what about the chemicals and the contaminants that must be considered as potentially affecting our health when they accumulate. I ask that you please do not wait until a lot of these contaminants accumulate to be harmful to our health. Please make stricter

regulations against air toxins and those that can accumulate in the environment.

Also, in section III, I ask that this should not be deleted. It should be improved that to inform all facilities immediately and that the facility shall file notice to the AMS within 30 days of emitting the new contaminant. I also recommend that the AMS should give notice to the public about the contaminant and give notice to facilities and potentially to other publications.

The other recommendation that I ask is that currently the synthetic minor sources have no obligation to report the TACs. Please consider that facility must announce all contaminants when posting a notice. I also ask that you include the communities and some of these decisions to kind of give us the options or better understanding about how these adjustments will impact us as far as air quality control and the potential health benefits.

I believe that a lot of these adjustments could make Philadelphia a national leader in advancing environmental justice and making us a more livable, breathable and healthy city to live in now and in the future. Again, I thank you for your time.

DR. RAVAL-NELSON: Excellent. Thank you very much, Ms. Christinee.

Next we have Lisa Hastings. Ms. Hastings, when you are able to unmute yourself and I see you on the screen, I will start your timer and then we will open it up to the phone calls to see if anybody that's on the phone line would like to speak.

MS. HASTINGS: I believe I'm unmuted.

DR. RAVAL-NELSON: Perfect. I will -- give me one second. I want to be fair to you and your timer starts now.

MS. HASTINGS: My name is Lisa Hastings. I'm a resident of Philadelphia and the environmental justice chair for the Pennsylvania Legal Women Voters Environment Committee.

While it is good, the department is acknowledging that more toxic air contaminants harm public health, the amendment to AMR VI, as written, does more to enable AMS and polluters to look good while withholding vital information from the public about toxic releases and doing little to protect them. It needs to be revised in many ways before it will help protect public health.

Please develop meaningful thresholds in health risk

assessments as suggested by prior commenters and with continued public input. However, even with these improvements, this regulation is full of extreme exemptions for polluters. It exempts polluters and AMS from providing public information on toxic emissions. It lacks methods for public review and input. It also may have significant negative consequences for the public, especially for people living in areas with ongoing toxic pollution where there are no remaining major sources. The regulation would exempt most pollutant sources from even having to notify AMS of their toxic emissions and exempt most polluters, including all minors, synthetic minor, and even some natural gas facilities that are large enough to be major sources. The exemptions where even quite large natural gas burning facilities was not included in the body of the amendment, but while it was tucked into one of the technical documents contained in an appendix.

The location of this large exemption for natural gas polluters raises questions in itself. Under this amendment, hazardous emissions that AMS is notified of would be excluded from public notices, performance, and plan approvals, which is also a potential violation of state environmental law. Information AMS would require

from some, not all, permit applications relating to their toxic emissions would instead be kept on file for the public to come in and look at during business hours.

This places an unfair burden on the public and releases AMS's polluters from work. How does public health benefit from not telling the public what toxins they are exposed to? Especially in a permitting project -- a permitting application where you're supposedly asking for public review and comment. Also, exempting every source except selected major sources from this regulation also has other serious consequences, especially for EJ communities like Graves Ferry. Benzene levels around the old refinery, continuate levels that are higher than EPA's action level, but the remaining facilities are considered minor sources by AMS. AMS did not continue to require fenceline benzene monitoring and new permits, even though the public asked for it.

Under this regulation, they'll just be able to say that there is no major source on the property and the public would never know what they were exposed to or what source it was coming from. This is convenient for polluters, but not for the public. It would also enable

AMS to just ignore many toxic threats to public health and the environment because the sources of the toxins would be exempt from regulation, under this regulation.

This is the only toxic pollutant regulation AMR has. Thus, AMS, which only enforces regulations, will claim that it can't consider toxic contamination and permitting for most sources, let alone require monitoring or mitigation measures where toxins are already high and high, because the permits do not involve major sources that are covered under the regular --

DR. RAVAL-NELSON: Ms. Hastings, Sorry, you have 30 seconds, Ms. Hastings. Thank you.

MS. HASTINGS: Okay. This amendment would let both polluters and AMS off the hook and would keep the impacted public in the dark, which would not protect their health or the environment. The existing and amended regulations need to be replaced with regulations that better protect the public health and the environment from toxic air pollutants, including following all state public notice requirements, plan approvals, and making them stronger.

DR. RAVAL-NELSON: Your time is up, Ms. Hastings. I would suggest the additional information, please do

send it as a form of written comment, to Benjamin Hartung at Benjamin.hartung@phila.gov.

We have an additional speaker, Coryn Wolk, or Ms. Wolk. I apologize. When you are ready and on the screen, you may unmute yourself. And when you are on the screen, I will start your timer.

MS. WOLK: Hi. I have unmuted myself.

DR. RAVAL-NELSON: I apologize for the wrong reference. Apologies.

MS. WOLK: That's fine. So, my comments today will be a summary, and I do intend to submit written comments. And I'm a longtime Philadelphia resident and I'm also a graduate student at the University of Delaware focusing on industrial pollution and climate change. And my research includes comparing state and federal toxic air pollution management and there are a lot of flaws in the proposed regulations that I appreciate AMS trying new things, basically, but for example, one area I've been looking at is the South Coast Air Quality Management District and who it seems like some of these regulations or mis-regulation is modeled after, and they have significantly stronger regulations and oversight overall, and they still have cancer hotspots and areas with community complaints

that take years to deal with.

For example, one site that I'm researching has been under Health and Emission Study for over five years and more detailed analysis that was only prompted by years of public complaints of cancer, terrible odors, headaches, issues of children being basically too sick to pay attention in school that resulted in them discovering a large amount of hexavalent chromium airborne emissions coming from an unknown source, and the facility in question is a Title V source.

But this is why more minor facilities should not be exempted from this. If you don't know what's out there, there's no way for -- if the major agency doesn't know what the risks are, what's in the air, how are citizens supposed to understand their risks or what they're being exposed to or where their cancer may have come from?

Also, I question why AMS used meteorological data from 2010 to 2014, especially given that we're in one of the most rapidly warming areas in the country. And also for non-carcinogens AMS is using threshold science and many non-carcinogens don't follow threshold theory for harm. Many of them are individual or begin harm at very low doses, so should be treated more like

carcinogens. And so I encourage AMS -- seems like you're modeling some of this after other states to look either to places that are looking more at the actual dose response for different pollutants or do some of your own science.

However, only burdening smaller facilities with more reporting and more impact studies is not useful at all if they are able to make up the numbers and there's no enforcement and no actual verification. So instead of – I'm not -- I advocate for more record keeping and more disclosures however, that's not enough. AMS really should be doing more air monitoring or requiring it for a lot of these new rules for different facilities, that they have fenceline monitors and that data become public so that people can see the numbers themselves as they change and verify that these monitors are working properly, and that AMS actually take action. Because we've seen over and over again that for one time more acute incidents, AMS tends to come in about 20 hours later take a measurement and say, "Okay, well, within this 24 hours for a short term exposure, 20 hours later, we didn't measure much. So probably nobody was harmed by this." And this is a pattern and even for places like PES, which, as people

have mentioned, no longer needs a Title V, when we know that there's large amounts of benzene being emitted, that data keeps being questioned over and over, and there's no actual agreement and no enforcement.

So, I really encourage you to explain some of the data that was used for building these and some of the science are looking for best practices for them and really strengthen more of the public data component and actual verification and consider what you can do to improve your actual enforcement, not just adding more record keeping. Thank you.

DR. RAVAL-NELSON: Oops. I apologize. I was muted. Thank you very much for your testimony. You were the last registered speaker that rose a hand.

So, I want to go ahead and open up the opportunity for our three folks that are on the phone. So, if your phone number is 215-510-0—3392 or 302-893-7800 or 603-770-3623, if you would like to speak now, I will ask Jiazheng to unmute you, and if you would like to provide testimony, please just state your number and let us know that you'd like to provide testimony, and then we will do it in orderable fashion.

Would any of the folks on the phone like to provide any feedback or comment?

MR. LI: The number with 3623 is muted.

DR. RAVAL-NELSON: Great.

MR. GILES: Yes. Phil Giles. No comment. My name is Phil Giles. No comments. Thank you.

DR. RAVAL-NELSON: Okay, thank you for attending. Would any of the other two callers be interested in providing any feedback or comment? There's a number with a 302 and a number with a 215.

The 302 number, please. You've been unmuted. Feel free to state your name and your organization and let us know if you'd like to provide any comment.

Okay, and then the number 215-510-3392. If you'd like to provide comment, please unmute yourself and state your name and your organization.

Hearing none, at this point in the hearing. I would like to go ahead and ask if there are any other participants that would like to provide comments and I'm seeing that there's three additional numbers that are on the list. And if I have missed you, I'm going to let Jiazheng state those numbers out loud and ask if they have comment. I'll mute myself Jiazheng, and could you ask the numbers?

MR. LI: Okay, I see 215-510-3392, and if you would like to speak, please unmute yourself. Another number,

603-770-3623, if you would like to speak, please unmute yourself.

DR. RAVAL-NELSON: Let us know that they're not interested in speaking. Last number that I see is 302-893-3800.

Okay, hearing no additional comments. I would like to take this opportunity and share the email address and once again about the details. And one of our air pollution control board members is our Philadelphia department of public health commissioner, and I would like to open it up for her to provide some words.

But before we do that, we will be expecting --

DR. BETTIGOLE: I think we just lost Dr. Ravel-Nelson. I'm guessing that she wanted to give the email to send comments from last time. I also put it in the chat that you can send comments to Benjamin.hartung, H-A-R-T-U-N-G at phila P-H-I-L-A gov G-O-V, also in the chat.

DR. RAVAL-NELSON: My apologizes. I lost the connection.

DR. BETTIGOLE: You were guessing? I was guessing you were just going to give the email address, Dr. Raval-Nelson, but did you want to say something else?

DR. RAVAL-NELSON: No, the email address and we can

also ask and then they can put the email address in the chat as well. And then Dr. Bettigole –

DR. BETTIGOLE: Yes, I did put the email address in the chat, so it's there.

I just wanted to take a minute to thank you all for spending your evening with us, for your really thoughtful, incredibly well-informed comments and also just for this dialogue. This is a time when a lot of the reaction we get from the public is sort of either yay or screaming. And this has been a really thoughtful, very informative discussion.

So, I want to thank all of you who took part in it. We do take your comments very seriously. We are looking forward to reading through them. We will be responding and posting that response publicly and that will inform the eventual decision of the Air Pollution Control Board and that decision will take place in a public hearing which will be announced. We can also put information where we post the results on that.

So, thank you so so much. Please get a chance to relax this evening. We really do appreciate your help and making our city a little bit healthier. So, thank you. Have a wonderful evening.

DR. RAVAL-NELSON: --Thank you very much for all of

the work and the technical activities involved in making this a successful public hearing. Everybody have a great night.

C E R T I F I C A T I O N

I, hereby certify that the proceedings and evidence noted are contained fully and accurately notes taken by me in the foregoing matter, and that this is a correct transcript of the same.

STACY RAUB

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