Process Document for Minn. Stat. § 116.07, subd. 4a

Cumulative Levels and Effects Process v.02

Minnesota Pollution Control Agency

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I. Executive Summary

Minn. Stat. § 116.07, subd. 4a was revised in 2008 to require the Minnesota Pollution Control Agency (MPCA) to analyze and consider cumulative levels and effects for proposed permitting projects in a specific area located in Minneapolis. The MPCA has developed the Cumulative Levels and Effects (CL&E) Process as guidance for developing the information needed to comply with the statute.

This document outlines requirements for air permit applicants for projects located in areas described by Minn. Stat. § 116.07, subd. 4a, which states that the MPCA may not issue a permit without first analyzing and considering the CL&E of past and current environmental pollution from all sources on the environment and residents. This document is to be used in conjunction with the "Reference Document for Minn. Stat. § 116.07, subd. 4a: Information Source for Use in Complying with Statute" (Reference Document).

In order to allow for a streamlined approach to this analysis, permit applicants are strongly encouraged to contact the MPCA as soon as it is determined that the facility is located in an area described by Minn. Stat. § 116.07, subd. 4a. Through this early contact, timelines for submittal and review of the various components may be discussed. Due to the unique nature of this process, MPCA staff is available to discuss and/or meet with permit applicants undergoing this analysis to answer questions and provide guidance.

II. Statute Language

Minn. Stat. § 116.07, subd. 4a states that a permit may not be issued:

> *"…without analyzing and considering the cumulative levels and effects of past and current environmental pollution from all sources on the environment and residents of the geographic area within which the facility's emissions are likely to be deposited, provided that the facility is located in a community in a city of the first class in Hennepin County that meets all of the following conditions:*
>
> *(1) is within a half mile of a site designated by the federal government as an EPA superfund site due to residential arsenic contamination;*
>
> *(2) a majority of the population are low-income persons of color and American Indians;*
>
> *(3) a disproportionate percent of the children have childhood lead poisoning, asthma, or other environmentally related health problems;*
>
> *(4) is located in a city that has experienced numerous air quality alert days of dangerous air quality for sensitive populations between February 2007 and February 2008; and*
>
> *(5) is located near the junctions of several heavily trafficked state and county highways and two one-way streets which carry both truck and auto traffic…"*

III. Overview of the Cumulative Levels and Effects Process

Table 1 provides an overview of the process for complying with Minn. Stat. § 116.07, subd. 4a. Each step is described in detail below.

Table 1. Overview of Cumulative Levels and Effects Process

	Who is responsible?	Pre-application?
Determine if project is located in an area described by the statute	Permit applicant and MPCA	Pre application
Modeling protocol, submit prior to application	Permit applicant, with MPCA review and approval	Pre application
Emissions calculations spreadsheets for criteria pollutants and air toxics – to be included with the modeling protocol	Permit applicant, with MPCA review and approval	Pre application
Criteria pollutant modeling and AERA forms	Permit applicant, with MPCA review and approval	Pre application
CL&E scoping information	Permit applicant, with MPCA review and approval	Pre application
CL&E analysis, submit as part of complete permit application	Permit applicant, with MPCA review and approval	

IV. Community Outreach and Participation

If a proposed project is located in the area described by this statute, the permit applicant is encouraged to begin an outreach program with members of the community as soon as possible, providing information about the proposed facility or project that would require a permit. Due to the diverse nature of the communities, the MPCA also suggests that the permit applicant make selected written communication available in additional languages (e.g., Spanish, Somali, Hmong and Vietnamese)[1].

The MPCA will use the following types of outreach activities to inform and engage stakeholders throughout the permit review process.

1. Webpage (www.pca.state.mn.us/qzqh484)
   - permit applications
   - information on the CL&E process
   - a way to sign up for e-mail notifications
   - links to other MPCA air permitting information
   - MPCA staff contacts

[1] These are the languages used to develop and report the Hennepin County Survey of the Health and All the Population and the Environment (SHAPE). Spanish and Somali are the top two languages requested at Language Services of Hennepin County Medical Center.

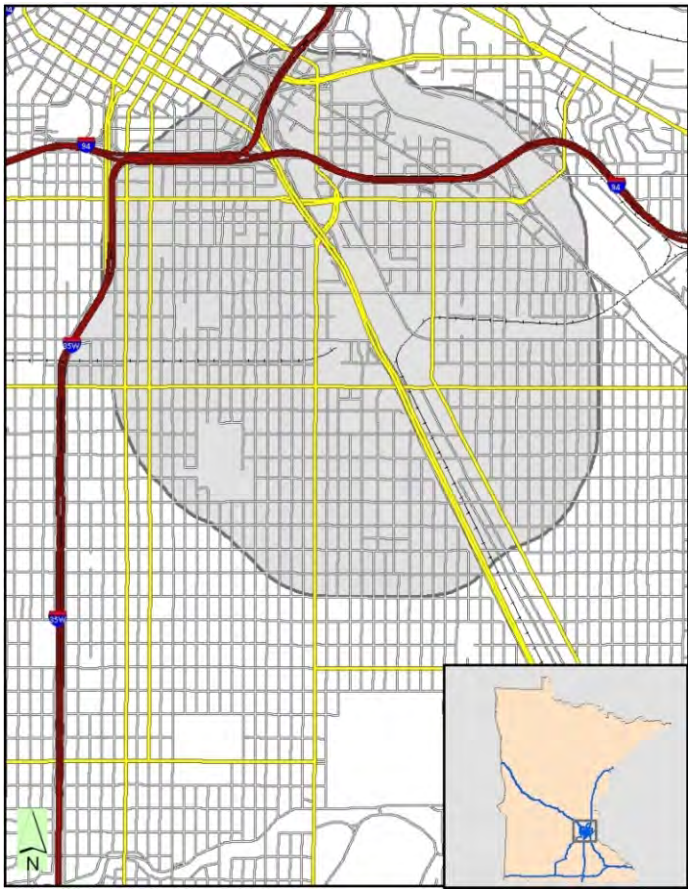
2. E-mail notification system
   - updates to website
   - activity on a permit application, such as revised applications, notifications of meetings, start of public notice, etc.
3. Information sessions in the community – when permit application is received
   - One or more informational sessions will be held during the MPCA review of a permit application for a facility in the area described by Minn. Stat. §116.07, subd. 4a.
   - This is an opportunity for stakeholders to review the application, ask questions of MPCA staff, and provide comments and suggestions on the permit application materials. These sessions would include discussion and Q&A with MPCA staff.
   - These sessions would not be formal public meetings and no formal presentations would be planned.
4. Extended public comment period – 45 days
5. The MPCA will develop a summary (or fact sheet) of the results of the CL&E process for community members
6. Public meeting during public comment period
7. Additional outreach options
   a. Let interested parties know they are always welcome to complete a technical review of the air permit application including the cumulative levels and effects report. This can be done at the MCPA offices, at local information sessions, at any computer-using the wepbage, or using printed copies of materials.
   b. MPCA staff is available to attend neighborhood/community meetings/events to answer questions. Additionally, MPCA staff may volunteer to attend neighborhood/community meetings/events as part of expanded outreach.
   c. Contact neighborhood/community leaders for assistance in enhancing outreach (information onto neighborhood webpages, help with possible locations for public meetings, ideas for successful meeting formats, help with agendas and the types of content people may be interested in, etc.)
   d. Expanded press releases to neighborhood newspapers/websites
   e. Event notifications through Facebook/Twitter, etc.

V. Steps for Completing the Cumulative Levels and Effects Process

1. Determine if the facility is located in an area described by statute (permit applicant and MPCA)

To date, one area in Minneapolis has been identified as subject to Minn. Stat. § 116.07, subd. 4a. This area includes the Phillips communities and a one half mile buffer around the South Minneapolis Residential Soil Contamination Site (Superfund site) and is shown in Figure 1. If there is any question about whether a facility is located within the boundary, contact the MPCA in order to verify.

Figure 1. Map of the area described by Minn. Stat. § 116.07, subd. 4a (full size version included as Attachment 4)



2. Modeling protocol (permit applicant, with MPCA review and approval)

   Criteria pollutant and air toxics dispersion modeling will be conducted to determine the Study Area for the proposed project. A modeling protocol will need to be submitted for MPCA review and approval prior to conducting modeling. Criteria pollutant and air toxics modeling protocols may be combined for these analyses. Information for the modeling protocol is included with MPCA criteria pollutant modeling guidance which can be found at www.pca.state.mn.us/air/modeling.html.

3. Air Emission Risk Analysis (AERA) and criteria pollutant modeling forms

   - MPCA criteria pollutant modeling guidance is found at www.pca.state.mn.us/air/modeling.html.
   - For air toxics, the permit applicant will conduct Emission Rate/Chemical Health Index (Q/CHI) air dispersion analysis. The permit applicant shall provide emissions estimates for the facility according to emissions estimation guidance on the MPCA website (www.pca.state.mn.us/air/aera-emissions.html). The Q/CHI spreadsheet to be used in this analysis needs to be requested from the MPCA. Instructions are in a readme sheet in the spreadsheet. The Q/CHI spreadsheet is a "RASS-like" spreadsheet that calculates Q/CHI sums. Once the Q/CHI sums are calculated, their dispersion is modeled using AERMOD. The results are estimated risks that can be mapped using a geographic information system. The Q/CHI spreadsheet has been modified for the area described by Minn. Stat. §116.07, subd. 4a to

include an urban residential exposure which includes breathing outdoor air, incidental ingestion of soil, consumption of eggs from homegrown chickens, and ingestion of produce from home gardens.

This modeling effort may be iterative. Emissions may be adjusted through physical changes in the facility, proposed permit operating limits, and/or inclusion of controls in order to meet desired modeled outcomes. If emissions, facility design, or operational limits are adjusted during modeling iterations in a way that reduces potential exposures and/or risks, this information should be described in text in the CL&E analysis.

4. CL&E analysis scoping information (permit applicant, with MPCA review and approval)

   a. Define Study Area

      The *geographic area within which the facility's emissions are likely to be deposited*[2] will be defined through the results of air dispersion modeling. This geographic area will be called the *Study Area*.

      Air dispersion results are compared to screening values in order to determine the radius of the Study Area. The screening level for air toxics is 10 percent of the facility risk guidelines (0.1 for hazard indices and 0.1 in 100,000 for cancer). The screening level for criteria pollutants is the Significant Impact Levels (SILs). The facility will define the geographic area within which the facility's emissions are likely to be deposited or the 'Study Area' as the circle with a radius determined by the farthest point identified through modeling (i.e. the farthest point where risk estimates are more than 10 percent of risk guidelines or where modeled concentrations are above the SIL). This results in one Study Area for the CL&E analysis. Results that are screened in for further study do not imply that there are potential facility specific impacts.

   b. If the Study Area extends beyond the facility's property boundary, the permit applicant shall provide the following CL&E scoping information:

      1. identify pollutants that screened in for further study
      2. identify human health endpoints that are related to pollutants in (1.), and therefore screened in for further study
      3. list the types of environmental health data to be included in the CL&E analysis

   c. If the Study Area does not extend outside the property boundary, the permit applicant shall submit those results. This CL&E scoping information will include a discussion of modeling results that support the conclusion that no further cumulative analysis is needed.

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[2] Minn. Stat. § 116.07, subd. 4a includes the following language: "*…analyzing and considering the cumulative levels and effects of past and current environmental pollution from all sources on the environment and residents of the geographic area within which the facility's emissions are likely to be deposited…"* The term "deposited" has a specific technical meaning in the field of air pollution and is distinct from the term "air concentration". The measurement and/or estimation of deposition is considerably more uncertain than the estimation of air concentration. In an urban setting the pathway of most concern for exposure to air pollution is the inhalation pathway. Risk estimates for this exposure pathway depend upon the air concentration. On the other hand, deposition of air pollutants onto surfaces followed by uptake into the food web is of more concern for pathways such as beef, pork, and dairy consumption, which are atypical in the urban environment. The MPCA interprets the statutory language, "*…facility's emissions are likely to be deposited…"* as referring to the pathways that affect human and environmental health in the designated location. The pathways existent in this context include inhalation, soil ingestion, vegetable consumption and egg production.

5. Cumulative levels and effects analysis.

   a. Briefly summarize and discuss results from air toxics and criteria pollutant modeling. Results from the AERA Q/CHI analysis will be summarized in a table according to endpoint (e.g. respiratory, neurological, etc.) as shown below. Other pollutants having modeled results above an SIL will also be included in this table.

Pollutant	HQ/cancer risk	Percent of total project contribution	Exposure duration	Endpoint or physiological system (cancer is summed as one health endpoint)
			Acute/noncancer or cancer	

   b. If needed, conduct additional modeling identified through modeled concentrations or other applicable requirements. Discuss these results in the CL&E analysis.

   c. Table 2 provides likely topics to be included in the report based on identified health endpoints and criteria pollutants. The health endpoints for air toxics may be identified using the "ToxValues" tab of the MPCA RASS or Q/CHI spreadsheets. The endpoint of cancer is always summed as one disease; however, the specific non-cancer endpoints are specified and are found in the "Toxic Endpoint" description of each toxicological value within this spreadsheet tab. After identifying the health endpoints (see above), use Table 2 to select related environmental health data for inclusion in the CL&E report. The environmental health data to discuss for criteria pollutants may be found directly in Table 2.

Table 2. Health endpoints, pollutants and topics to be included in the CL&E report

Identified human health endpoint/criteria pollutant	Acute (hourly exposure)	Chronic (lifetime exposure)
Respiratory/olfactory	Traffic, environmental tobacco smoke (ETS), criteria pollutants, air toxics*, AQI**, asthma data	Traffic, ETS, criteria pollutants, air toxics, AQI, asthma hospitalization data
Developmental/ reproductive/ endocrine/fetotoxicity	Air toxics, SMRSE site****	Air toxics, drinking water***, SMRSE site
Hematological (e.g. hematopoietic, blood, lymph system, immune system)	Air toxics	Air toxics
Neurological (e.g. central nervous system)	Air toxics	Air toxics, mercury in fish, drinking water, SMRSE site, blood lead
Eyes (irritant)	Traffic, air toxics, AQI	Traffic, air toxics, AQI
Alimentary (e.g. digestive)	Air toxics, drinking water	Air toxics, drinking water
Bone & teeth	Air toxics	Air toxics, drinking water, blood lead
Cardiovascular	Traffic, air toxics, AQI, ETS, criteria pollutants	Traffic, air toxics, AQI, SMRSE site, ETS, criteria pollutants
Kidney (e.g. renal)	Air toxics	Air toxics, drinking water
Hepatic (e.g. liver)	Air toxics	Air toxics, drinking water

Identified human health endpoint/criteria pollutant	Acute (hourly exposure)	Chronic (lifetime exposure)
Cancer	Not applicable	ETS, traffic, criteria pollutants, air toxics*, AQI, drinking water, SMRSE site, blood lead
Ozone	See respiratory endpoint above	Similar to respiratory endpoint above
Lead		Similar to neurological and carcinogenic endpoints above.
Particulate matter (TSP, PM_{10}, $PM_{2.5}$)	Similar to respiratory endpoint above, but should include cardiovascular data as well	Similar to respiratory endpoint above, but should include cardiovascular data as well
CO	Similar to cardiovascular and neurological endpoints above.	Not Applicable
NO_2 *****	Similar to respiratory endpoint above	Similar to respiratory endpoint above, but should include cardiovascular data as well.
SO_2 *****	Similar to respiratory endpoint above	Similar to respiratory endpoint above, but should include cardiovascular data as well.

***** air toxics monitored and modeled as applicable
** AQI, Air Quality Alert Days and the Air Quality Index. This includes an analysis of relevant criteria pollutants.
***Drinking water should be discussed as applicable based on the City of Minneapolis Drinking water report for the current year (i.e., exceedances in MCLs)
****SMRSE site, South Minneapolis Residential Soil Exposure Site. Also include discussion of arsenic biomonitoring data from the MN Department of Health.
Note: Individual sites (Superfund, VIC, tank, leak, etc.) other than the SMRSE site will be included if located within "Study Area" as determined above. Air emissions sites are likely included within MNRiskS calculations and ambient monitoring data.
*****Cardiovascular data for SO_2 is included due to its association with secondary $PM_{2.5}$ formation.

d. The types of data identified in Table 2 may be found in *Reference Document for Minn. Stat. § 116.07, subd. 4a: Information source for use in complying with statute* (www.pca.state.mn.us/index.php/view-document.html?gid=14030), or other sources. The Reference Document is a compilation of data and descriptions from known informational sources to provide documentation of "*past and current environmental pollution from all sources on the environment and residents."* Use the information, text and references included in this document as a basis for describing the facility-specific analysis in context with past and existing environmental health data. The MPCA will continue to maintain and update this compilation.

e. The CL&E analysis report described will be both a quantitative and qualitative discussion of the potential contribution of the proposed project to existing stressors and vulnerabilities within the community.

- Include all relevant environmental health data identified from Table 2 or other sources.
- Include a synthesis or discussion of the environmental health data. In developing this synthesis one may consider the following types of questions: Are there nearby facilities that emit pollutants with similar endpoints and exposure durations as the screened in health effects?, How do the asthma hospitalizations compare with the rest of the city/state?, Is the study area a potential area of environmental equity concern?, How close is the nearest heavily trafficked highway?, etc.

- Socioeconomic data and a discussion of percent of the population with health insurance shall be included regardless of health endpoint outcomes from facility-specific modeling. Some of the data are summarized by census tract; other summarized data are less spatially refined. A map of census tracts for the area described by the statute is included in Attachment 3 at the end of this document.

f. If the facility has the potential to emit pollutants that are determined to be persistent, bioaccumulative and toxic (PBTs), the facility will need to discuss potential next steps with the MPCA. The legislative language requires the MPCA to "consider cumulative levels and effects on the environment and residents…". The Reference Document contains some environmental health data related to PBTs as it pertains to human health. The area described by Minn. Stat. § 116.07, subd. 4a is an urban area and contains two water bodies of interest: the Mississippi River and Powderhorn Lake. At this time a process for the determination of a specific facility's potential ecological impacts (plants, animals other than humans, etc.) in an urban setting includes greater scientific uncertainty. This process has not yet been developed.

g. Include other sites that have the potential to contribute exposures related to the health effects that screened in through the facility-specific analysis and are located within the facility's Study Area. These sites may be identified through the MPCA, U.S. Environmental Protection Agency (EPA), or other sources. Describe the potential for exposures related to the health effects that screened in through the facility-specific analysis from these nearby sites (type of site, pollutants involved, affected media, mitigation activity, etc.).

The Minnesota Pollution Control Agency's "What's In My Neighborhood" (WIMN) (www.pca.state.mn.us/wimn/index.cfm) is one tool that may be used to identify sites located within a facility's Study Area and to access initial information related to those sites. WIMN is a web based tool designed to identify sites of environmental interest. This website includes information about environmental permits issued by the MPCA, registrations and notifications required by the MPCA, and investigations of potentially contaminated properties undertaken by the MPCA or its partners.

For sites identified through WIMN, the MPCA will assist the permit applicant in identifying the specific activities involved at sites with the "Multiple Activity" descriptor. The MPCA may also assist permit applicants in screening the list of sites for those which are not likely to add to the screened in health effects. For air emissions sites, the discussion may be somewhat different in that many of these sites have already been included in the MNRiskS analysis, and further discussion will not be needed. Sites that are not in

Instructions for "What's In My Neighborhood"

1. Go to www.pca.state.mn.us/wimn/index.cfm.
1. Click on Map Search.
2. Zoom in to the area to identify street names.
3. Click on the blue cube (Tools) and select Radius Query.
4. Select a radius (i.e. 0.50 miles). It is recommended that you choose a radius somewhat larger than the Study Area because locations for sites shown in the map may not be exact or may not show the extent of past and current pollution from that site. Extraneous sites may be deleted later.
6. Click on the blue dot next to the recycling container. Next, click on location of facility on the map. The map will show the radius you have selected. A spreadsheet will pop up identifying all sites in the selected radius. Through this spreadsheet you will be able to link to MPCA information regarding each site.

MNRisks and sites that are not air emissions sites need to be evaluated against the identified health endpoints. The permit applicant may need to contact the MPCA for assistance in limiting this discussion to those sites that are not included in MNRiskS modeling, do not have potential for exposures related to the health endpoints that screened in during the facility-specific analysis, or are inactive (dependent on screened in health effects). Additional sites may be identified through EPA's Brownfield Program.

h. Include information about the project proposer's community outreach activities. This might include flyers, newsletters, meetings, facility tours, mailings, etc.

i. Include descriptions of any efforts, either within the proposed project or other work within the facility, that mitigate potential exposures from the facility (e.g. work with Minnesota Technical Assistance Program (www.mntap.umn.edu/), collaboration with the MPCA Small Business Environmental Assistance Program (www.pca.state.mn.us/aj0r7d7), use of low emitting products such as low voc paints, air pollution control equipment, onsite rain gardens, sustainable energy or energy efficiency efforts, pollutant reduction based on operation alone, nearby offsets, other beneficial environmental efforts, etc.). In some circumstances the proposed project may result in emissions reductions and this should be made clear in your discussion.

6. Permit application (permit applicant, with MPCA review and approval).
   a. Facility operating assumptions and proposed operating and emission limits identified in the modeling and the CL&E analysis need to be included as proposed limits in the permit application.
   b. Use MCPA permit forms and guidance at www.pca.state.mn.us/nwqh472.
7. Permit determination - The CL&E analysis, along with the other permit application materials, will be reviewed and considered as part of the MPCA's permit review process.

Attachment 1: Outline for report when Study Area extends beyond property boundaries

Cumulative Levels and Effects Analysis Report

I. Describe the facility-specific analysis results (i.e. results of the AERA and criteria pollutant modeling):
   a. brief project summary
   b. summed hazard indices and cancer risks from the AERA
   c. qualitative information from the AERA
   d. map delineating Study Area
   e. results from criteria pollutant modeling

II. Summarize human health endpoints screened in by facility-specific analyses:
   a. Briefly define each human health endpoint (example: *Respiratory/olfactory effects associated with acute exposures to some air pollutants can include respiratory/olfactory illnesses, decrements in lung function, exacerbation of asthma, etc. The cardiovascular effect associated with short-term exposure to PM2.5 is ischemic heart disease. Ischemic heart disease is a category of adverse cardiovascular effects that is characterized by reduced blood supply to the heart*.)

b. Include each pollutant that screened in for further study; the exposure duration (acute, chronic); the respective human health endpoint (i.e. respiratory, neurological, etc.); and other information suggested in the summary table below. The Risk Driver Summary page of the Q/CHI spreadsheet may be used for this table.

Pollutant	HQ/cancer risk	Percent of total project contribution	Exposure duration	Endpoints or physiological system (cancer is summed as one health endpoint)
			Acute/noncancer or cancer	

III. Identify the environmental health data from the health endpoints screened in for further study. The permit applicant may use the data in the MPCA's Reference Document and other available sources. For example, if lead or the summed neurological health-endpoint estimate is at or above the screening levels, existing blood lead levels in the Study Area will need to be discussed. If the respiratory endpoint is estimated to be at or above the screening levels, measured air concentrations or modeled risks for criteria pollutants and other respiratory irritants should be addressed in the report. Table 2 in the process document identifies data to be used dependent on which human health endpoints or criteria pollutants were identified.

IV. Where possible, discuss the contribution of the facility to similar community background risks or levels. Where there are not exact matches in the data, describe the potential contribution of the facility to the existing background more qualitatively in text format. A table such as the example below could be used to organize the environmental health data.

	Specific descriptors	General discussion *
Stressors	-Ambient air toxics measurements -Ambient $PM_{2.5}$ measurements -traffic densities -exposure to tobacco smoke -consideration of potential exposures from nearby facilities (point sources)	-Similar to other urban areas in St. Paul/Minneapolis -Lower than national std, similar to other urban areas in St. Paul/Minneapolis -Similar to 10X statewide averages -Tied for highest smoking rates in the area -~8 nearby facilities with potential exposures
Descriptions of vulnerabilities	-Asthma hospitalizations and emergency room visits -Cardiovascular hospitalizations -Socioeconomic status -Percent of population without health insurance -Ranking in AAFA 100 Cities Asthma ranking -Comparisons with Healthy People 2020 Objectives	-~1.5 – 2 times higher than Minneapolis city-wide average -High variability, uncertain -Potential environmental justice area -One of the higher in Hennepin County -Ranked best place in the nation to live with asthma** -Asthma hospitalizations and ED visits in the Study Area do not meet the 2020 Healthy People objectives
Pathways/media	Outdoor air, indoor air (surrogate), ingestion of homegrown produce, incidental ingestion of soil	
Routes	Inhalation, ingestion	
Subpopulations	General population in the Study Area	**Consideration for children included (early lifestage exposure)**

	Specific descriptors	General discussion *
Endpoints	i.e. Short-term respiratory or cardiovascular effects	
Proposer risk reduction activities	Activity 1 Activity 2 Activity 3	**-lower NO_2 emissions** **-lower particulate and VOC emissions** **-lower run-off from the site**

*See text in the CL&E Report for appropriate qualifications that are important for all report descriptors.
**based on air quality, access to inhalers, tobacco free areas, etc.

V. Describe all proposed mitigation, risk reduction programs, or similar actions that will result in potential risk reductions as a result of the proposed project. This may include a discussion of emissions reductions implemented previous to or during permit application, discussions/work with Clean Air Minnesota (www.environmental-initiative.org/projects/past-projects/clean-air-minnesota), discussions/work with MNTap (www.mntap.umn.edu/), process and operations adjustment, air pollution control equipment, etc.

Attachment 2: Outline for report when Study Area is within property boundaries (as described in item 3)

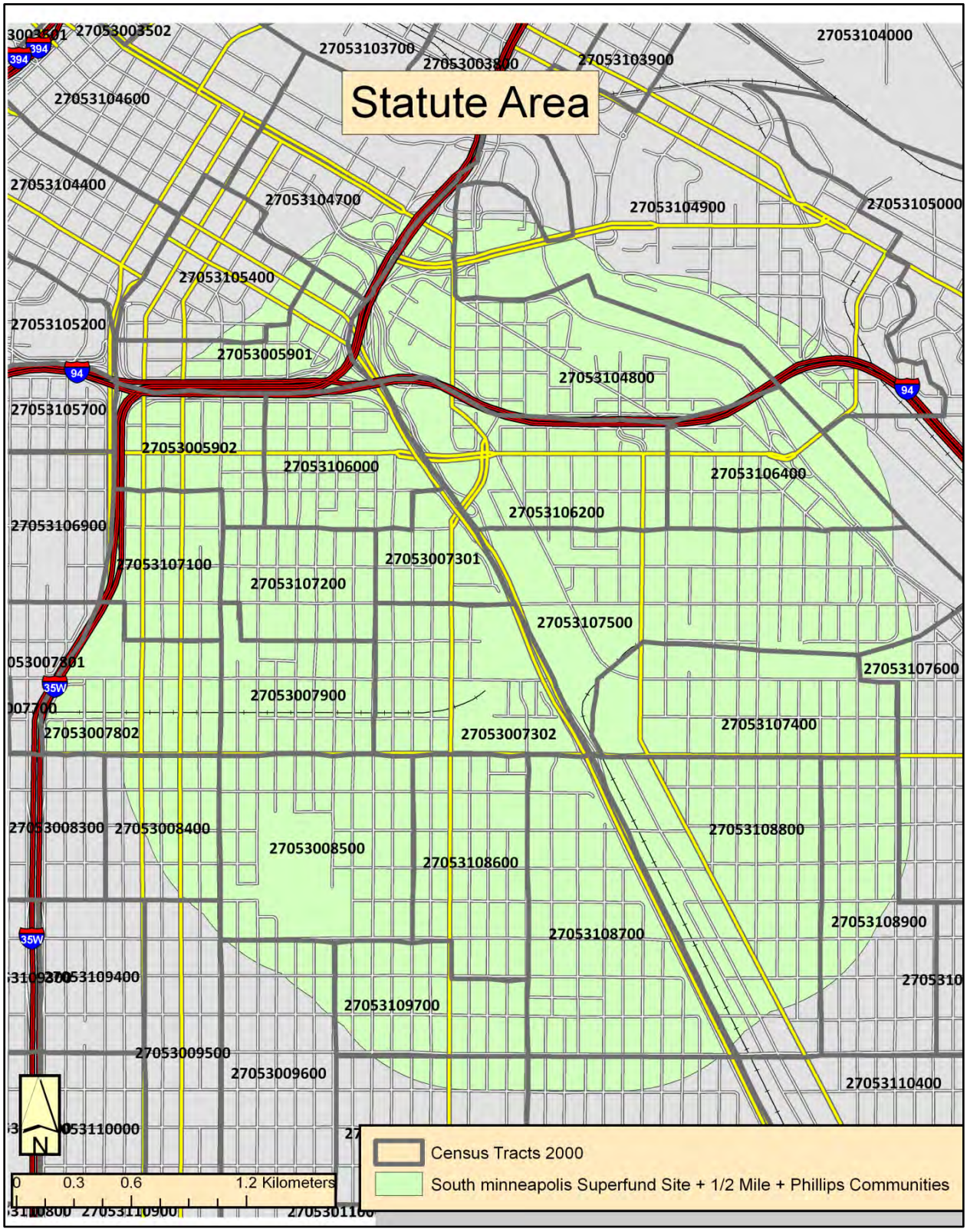
Cumulative Levels and Effects Analysis Report

I. Describe results from the facility-specific analyses (i.e. results from the AERA and criteria pollutant modeling).
   a. brief project summary that includes any alternatives that were considered
   b. summed hazard indices and cancer risks from the AERA
   c. qualitative information from the AERA
   d. criteria pollutant report
   e. map delineating Study Area

II. Discuss the conclusion that no further cumulative type analysis is needed.

III. Describe all proposed mitigation, risk reduction programs, or similar actions that will result in potential risk reductions as a result of the proposed project. This may include a discussion of emissions reductions implemented previous to or during permit application, discussions/work with Clean Air Minnesota (www.environmental-initiative.org/projects/past-projects/clean-air-minnesota), discussions/work with MNTap (www.mntap.umn.edu/), process and operations adjustment, air pollution control equipment, etc. In some circumstances the proposed project may result in emissions reductions that should be discussed in this section of the report. This should also include all activities that may result in an environmental benefit.

Attachment 3: Map of statute area with census tracts



Attachment 4: Map of the statute area