

Process for Cumulative Levels and Effects Analysis for Minn. Stat. § 116.07, subd. 4a

Summary

This document outlines requirements for permit applicants for facilities located in areas indicated by Minn. Stat. § 116.07, subd. 4a, which states that the MPCA may not issue a permit without first *analyzing and considering the cumulative levels and effects of past and current environmental pollution from all sources on the environment and residents.*

In order to allow for a streamlined approach to this analysis, permit applicants are strongly encouraged to contact MPCA as soon as it is determined that the facility is located in an area described by Minn. Stat. § 116.07, subd. 4a. Additionally, due to the new nature of this process and the uncertainty involved in the existing data and analyses, MPCA staff are available to discuss and/or meet with permit applicants undergoing this analysis to answer questions and provide guidance.

Background

Minn. Stat. § 116.07, subd. 4a was revised in 2008 and now states that a permit may not be issued to a facility:

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.*

Process Overview

The permit applicant and the MPCA will follow these steps. Each step is described in detail below.

Step	Who is responsible?
Determine if facility is located in an area described by the statute	Permit applicant and MPCA
Prepare and submit permit application	Permit applicant, with MPCA review and approval
Identify Area of Impact through Air Dispersion Modeling of both criteria pollutants and air toxics	Permit applicant, with MPCA review and approval of protocols and results
Conduct Cumulative Levels and Effects analysis and submit Report	Permit applicant, with MPCA review and approval
Permit Determination	MPCA

Process Detail

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

To date, one area has been identified as meeting the conditions set out in Minn. Stat. § 116.07, subd. 4a. This area is shown in Figure 1, and includes the portions of several neighborhood communities in Minneapolis. If there is any question about whether a facility is located within the boundary, contact MPCA in order to verify.

Note: If a facility is within the boundary depicted in Figure 1, the permit applicant should begin communicating with the surrounding neighborhoods early in the process, providing information about the proposed facility or project that would require a permit. The permit applicant will participate in public meetings held by MPCA regarding the permit and/or cumulative levels and effects analysis report. Due to the diverse nature of the community the MPCA also suggests that the permit applicant make written communication available in the following additional languages: *Spanish, Somali, Hmong and Vietnamese*¹.

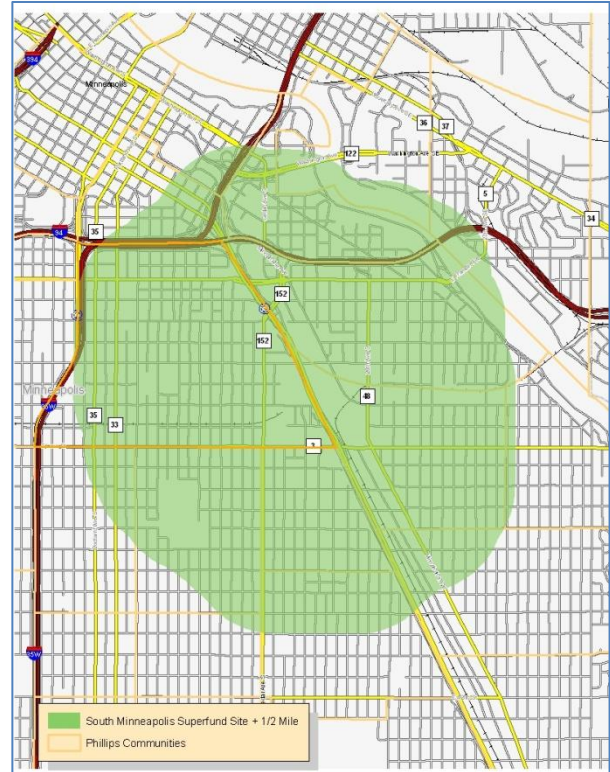


Figure 1. Map of area described by Minn. Stat. § 116.07, Subd 4a. At this date (January 11, 2010) the area described by the Statute would include both the Phillips Neighborhoods, depicted by a green outline, and a one half mile buffer around the South Minneapolis Residential Soil Site (Superfund site), depicted in beige.

¹ These are the languages used to developed and report the Hennepin County Survey of the Health and All the Population and the Environment (SHAPE).

2. Prepare and submit permit application (Permit applicant)

- a. Use MPCA permit forms and guidance at <http://www.pca.state.mn.us/air/permits/forms.html>.
- b. Submit application prior to or at same time as modeling protocol (item 3).
- c. When a permit application for a facility in the area described by Minn. Stat. 116.07, subd. 4a is under review by the MPCA, a public meeting will be scheduled. At this initial meeting, it is expected that there will be discussion about the facility operations, information included in the permit application, and opportunities for public questions and comments. A second public meeting will be held when a draft permit has been prepared.

3. Identify Area of Impact through Air Dispersion Modeling of both criteria pollutants and air toxics and submit AERA documents (Permit applicant)**a. Modeling**

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.

For criteria pollutants MPCA modeling guidance is found at <http://www.pca.state.mn.us/air/modeling.html>.

For air toxics, the permit applicant will conduct Q/CHI air dispersion analysis. The permit applicant shall provide emissions estimates for the facility according to emissions estimation guidance on the MPCA website (<http://www.pca.state.mn.us/air/aera-emissions.html>). The Q/CHI spreadsheet to be used in this analysis should be requested from a MPCA risk assessor. 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 farthest location from the facility fence line, where the estimated risks reach 10% of risk guidelines, will be the area of impact and carried into the cumulative analysis.

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. The permit application will need to be updated as necessary for changes incorporated into modeling. If emissions, facility design or operational limits are adjusted during modeling iterations, this information should be described in text in the Minn. Stat. § 116.07, subd. 4a report.

b. Define Area of Impact

The air dispersion model will identify the *geographic area within which the facility's emissions are likely to be deposited*². This will be called the *area of impact*.

² Minn. Statute § 116.07, subd. 4a (amended) includes the following language: “...analyzing and considering the cumulative levels and effects of past and current environmental pollution from all

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For air toxics the geographic area to be considered is where the estimated inhalation summed risks are more than 10% of the risk guidelines (0.1 for hazard indices and 0.1 in 100,000 for cancer). For criteria pollutants the geographic area to be considered is the radius around the facility where the air concentrations fall above the Significant Impact Levels (SILs). The facility will use the larger of these two areas to define *the geographic area within which the facility's emissions are likely to be deposited* or the area of impact.

c. Results

Modeling results and the AERA will need to be submitted to MPCA for approval prior to conducting the cumulative levels and effects analysis. The results will include a conclusion for whether or not a cumulative levels and effects analysis is needed based on the following.

- 1) If the defined area of impact extends beyond the property boundary the permit applicant shall conduct a cumulative assessment as described in Step 4 and submit the results in a Minn. Stat. § 116.07, subd. 4a Report (see example outline provided in Attachment 1 of this document). Pollutant concentrations determined through air dispersion modeling will be used in the cumulative levels and effects analysis.
- 2) If the defined area of impact does not extend outside property boundary, the permit applicant shall submit those results in a Minn. Stat. § 116.07, subd. 4a Report (see example outline for this result provided in Attachment 2 of this document) for MPCA review and approval. This report will include a discussion of the conclusion that no further cumulative type analysis is needed and become part of the permit application. This report should include a discussion of the conclusion that no further cumulative type analysis is needed.

4. Conduct cumulative levels and effects analysis and submit report

The report should address each of the following. (See example outline in Attachment 1) (Permit applicant)

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 toxic air pollution is the inhalation pathway that depends 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.

- a. All results from air toxics and criteria pollutant modeling will be discussed in the cumulative levels and effects report.
- b. MPCA's Reference Document for Minn. Stat. § 116.07, subd. 4a: Information Source for Use in Complying with Statute 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*" that has been prepared by MPCA staff. This compilation is to be used as the basis for the cumulative levels and effects analysis and may be referenced as needed. The MPCA will continue to maintain and update this compilation.
- c. If the facility emits pollutants that are determined to be persistent, bioaccumulative and toxic (PBTs), the facility will need to discuss potential next steps with the agency. The legislative language requires the agency to "consider cumulative levels and effects on the environment and residents..." The Reference Document for Minn. Statute § 116.07 subd. 4a contains data sources which describe potential impacts to humans as a sensitive receptor. The area described by Minn. Statute § 116.07 subd. 4a is an urban area, but 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 impact on environmental-type receptors such as plants, animals other than humans, etc. in an urban setting includes greater scientific uncertainty and has not been developed.
- d. Provide quantitative and qualitative analysis to describe the facility's potential impact on the environment and residents in the context of past and current environmental pollution from all sources, as detailed in MPCA's Reference Document for Minn. Stat. § 116.07, subd. 4a: Information Source for Use in Complying with Statute.
 1. In this specific type of Air Emissions Risk Analysis (AERA), a Q/CHI analysis will be run (described previously).
 2. 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, egg consumption from homegrown chickens and produce consumptions from home gardens.
 3. These resident, urban resident and inhalation exposure scenario results will be summarized according to endpoint (e.g. respiratory, neurological, etc.).
 4. Potential Human Health Endpoints and suggested material to include from the Information Document for the Minn. Stat. § 116.07, Subd. 4a are presented below in Table 1. Socioeconomic data shall be included regardless of endpoint findings in the AERA. Some of the data are summarized by census tract. A map of census tracts for the area described by the statute, Figure 2, is included at the end of this document.
- e. Identify other sites (potential sources of pollution) located within the facility's area of impact. MPCA has developed What's in My Neighborhood, 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.

What's In My Neighborhood can be used to identify sites located within a facility's area of impact and to access initial information related to those sites.

1. Go to <http://www.pca.state.mn.us/wimn/index.cfm>.
 2. Click on Map Search.
 3. Zoom in to the area to identify street names.
 4. Click on the blue cube (Tools) and select Radius Query.
 5. Select a radius (i.e. 0.50 miles). It is recommended that you choose a radius somewhat larger than the modeled area of deposition 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.
- f. EPA brownfield sites will need to be identified separately from the "What's In My neighborhood" analysis described above. Included in the documents provided to the permit applicant is a spreadsheet of potential sites within the area described by the statute. EPA brownfield sites (capitalized in the spreadsheet) can be searched by address and added, if applicable, to the list of sites within a facility's area of impact (described below).
- g. Create a list of sites located within the facility's area of impact described in e and f above. Describe the contributions of each of these sites (type of site, pollutants involved, affected media, mitigation activity, etc.) and discuss the emissions from the proposed facility or project with respect to existing sites within the area of impact. For Air Emissions sites, the discussion may be somewhat different in that the majority of these sites have been included in the MNRiskS analysis. A spreadsheet version of the sites in the area is also included with the materials, which provides some additional site data. The permit applicant may need to contact the MPCA for information on specific sites. The MPCA's What's In My Neighborhood web site (<http://www.pca.state.mn.us/wimn/index.cfm>) is a helpful resource for this part of the analysis.
- h. 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 (<http://www.mntap.umn.edu/>), collaboration with the MPCA Small Business Environmental Assistance Program (http://www.pca.state.mn.us/programs/sbap_p.html), use of low emitting products such as low voc paints, air pollution control equipment, nearby offsets, etc.)

- i. Submit the Minn. Stat. § 116.07, subd. 4a Cumulative Levels and Effects Analysis Report for consideration by the MPCA.

Table 1. Health Endpoints and Topics to be Included in the Minn. Statute § 116.07, subd. 4a Cumulative Levels and Effects Analysis Report

	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, lymphsystem, 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
Cancer	Not Applicable	ETS, traffic, criteria pollutants, Air Toxics*, AQI, drinking water, SMRSE site, blood lead

* air toxics monitored and modeled as applicable (see Reference Document for Minn. Statute § 116.07, Subd 4a

** AQI, Air Quality Alert Days and the Air Quality Index. This index includes an analysis of relevant criteria pollutants.

***Drinking water should be discussed as applicable depending 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. Please 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 “area of impact” as defined and calculated above. Air emissions sites are included within MNRisks calculations and ambient monitoring data.

- 5. Permit Determination** (MPCA) The Minn. Stat. § 116.07, subd. 4a Cumulative Levels and Effects Analysis Report will be reviewed as part of making a permit determination. If the

determination is made to proceed with a permit, the permitting process would continue as follows:

- a. The permit application would need to be updated and/or revised with a complete/correct application submitted prior to public notice in accordance with Air Quality Permit Section policy.
- b. MPCA would include discussion of the analysis and consideration of *“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”* in the Technical Support Document for the permit.
- c. A final permit would likely include limits that are applicable based on the cumulative levels and effects analysis.
- d. A public meeting will be held on the draft/proposed permit content and the results of the cumulative levels and effects analysis.

Attachment 1: Outline for report when area of impact extends beyond property boundariesAnalysis for Use in Complying with Minn. Stat. § 116.07, subd. 4a

- I. Describe general facility specific impacts.
 - 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. Map delineating area of impact

- II. Summary of Human Health Endpoints Potentially Impacted by Facility Emissions
 - a. Include/ Enter each pollutant whose concentrations are above risk driver levels along with a summary of the exposure duration (acute, chronic) and the respective human health endpoint (i.e. respiratory, neurological, etc.) in a summary table such as the example below.

Pollutant	HQ/cancer risk	% of total project contribution	Exposure Duration	Endpoints or physiological system (cancer is summed as one health endpoint)
			Acute/ /Noncancer or Cancer	

- III. For pollutants that are associated with the human health endpoints reported using the summary table, identify the associated data using MPCA data compilation (Reference Document for Minn. Stat. § 116.07, subd. 4a: Information Source for Use in Complying with Statute) and other known sources.(e.g. if lead or another neurotoxin is emitted at risk driver levels, blood lead levels in the communities will need to be discussed; if respiratory irritants are emitted, then measured concentrations or modeled risks for criteria pollutants and other respiratory irritants should be addressed in the report, etc.) Table 1 in the Process for Cumulative Levels and Effects document identifies which data to use dependent on which human health endpoints were identified.

- IV. Where possible, discuss quantitatively the contribution of the facility to similar community background risks or levels.

- V. 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.

- VI. 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 (<http://www.mn-ei.org/cam/about.html>), discussions/work with MNTap (<http://www.mntap.umn.edu/>), process and operations adjustment, air pollution control equipment, etc.

Attachment 2: Outline for report when area of impact is within property boundaries
(As described in Step 3)

Analysis for Use in Complying with Minn. Stat. § 116.07, subd. 4a

- I. Describe general facility specific impacts.
 - 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. Map delineating area of impact

- 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 (<http://www.mn-ei.org/cam/about.html>), discussions/work with MNTap (<http://www.mntap.umn.edu/>), process and operations adjustment, air pollution control equipment, etc.

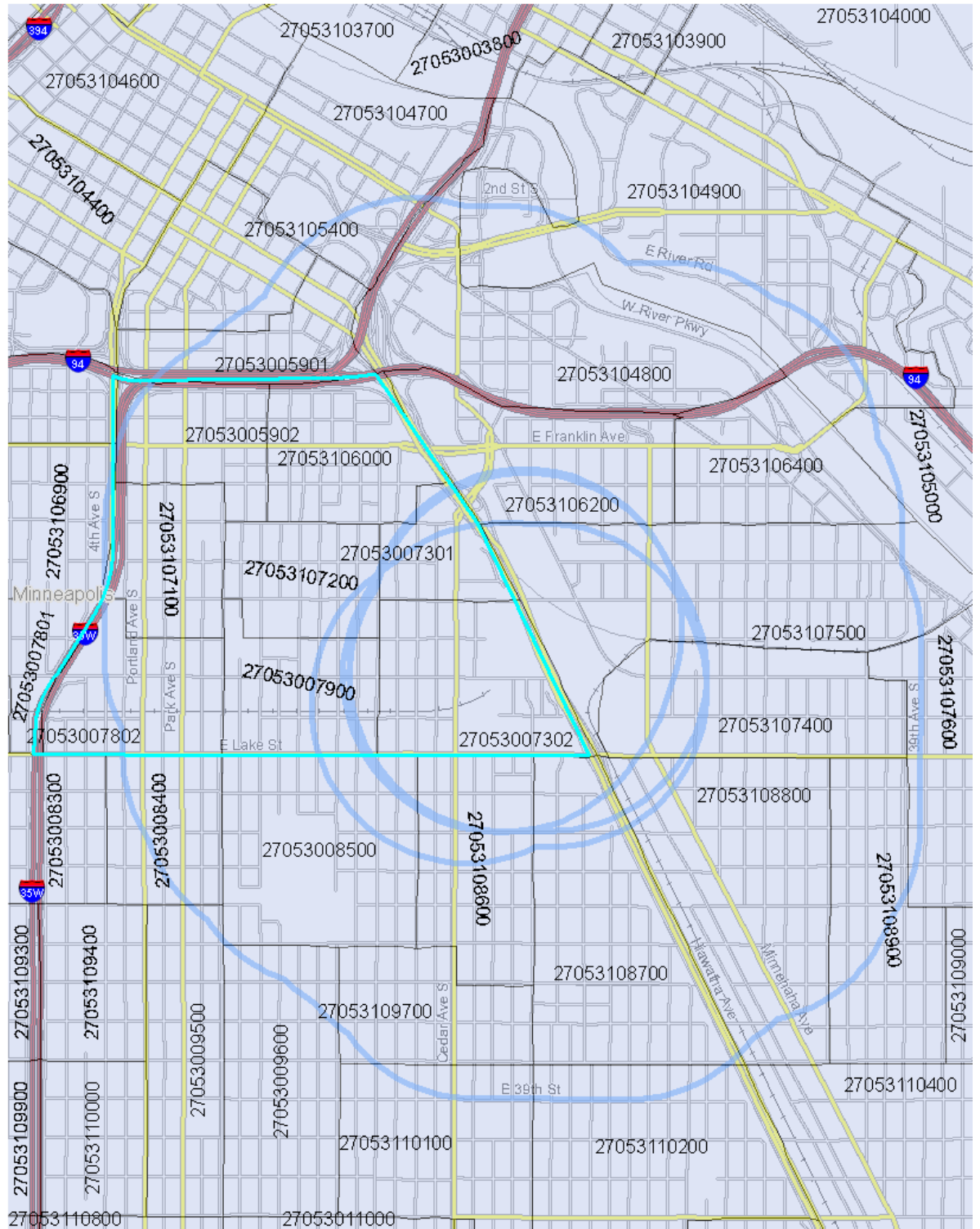


Figure 2: Census Tracts in the Area Described by the Statute