

Project-Level Conformity Determination Air Quality Fine Particulate Matter (PM_{2.5})

PM_{2.5} Hot Spot Conformity Determination for the Dan Ryan Expressway (FAI-94/90) Reconstruction Project from 31st Street to I-57 / Halsted Street and I-94 / M.L.K. Drive Cook County, Illinois

I. Purpose of this document

The *Clean Air Act section 176(c)* requires that federally supported highway and transit project activities are consistent with state air quality goals, found in the *state implementation plan* (SIP). The process to ensure this consistency is called Transportation Conformity. Conformity to the SIP means that transportation activities will not cause new violations of the *national ambient air quality standards* (NAAQS or “standards”), worsen existing violations of the standard, or delay timely attainment of the relevant standard.

Transportation conformity is required for federal supported transportation projects in areas that have been designated by the U.S. Environmental Protection Agency (EPA) as not meeting a NAAQS. These areas are called *nonattainment areas* if they currently do not meet air quality standards or *maintenance areas* if they have previously violated air quality standards, but currently meet them and have an approved *Clean Air Act section 175A* maintenance plan.

EPA amended the Transportation Conformity rule on March 10, 2006¹, requiring a hot-spot analysis to determine project-level conformity in PM_{2.5} and PM₁₀ nonattainment and maintenance areas. A hot spot analysis is an assessment of localized emissions impacts from a proposed transportation project and is only required for “projects of air quality concern.” The March 10, 2006 rule provides examples of projects of air quality concern. The PM_{2.5} and PM₁₀ hot-spot requirements in the final rule became effective April 5, 2006. Project level conformity determinations are required pursuant to *40 CFR §93.116. and §93.123*.

Cook County is designated as nonattainment for fine particulate matter, called PM_{2.5}². It was determined that the Dan Ryan is a project of air quality concern, a federal approval or authorization is required subsequent to April 5, 2006, and thus a hot spot analysis was completed for the project. The analysis is being made available for public review and comment as required by the conformity requirements.

II. Dan Ryan Expressway - General Project Description

The Dan Ryan project consists of reconstruction, reconfiguration and widening of a 9¼-mile section of Interstate 94/90, the Dan Ryan Expressway between 31st Street and I-57 / Halsted Street and I-94 / Martin Luther King Drive.

¹ EPA posted the final rule on its website on March 1, 2006 and the final rule was published in the Federal Register on March 10, 2006.

² USEPA: Last updated on Wednesday, March 15th, 2006; URL: <http://www.epa.gov/oar/oaqps/greenbk/>

The improvements include: new pavement and pavement resurfacing; added travel lanes between 47th Street and Illinois Route 1 (Halsted Street); new retaining walls; new bridge structures, bridge widenings, and bridge replacements; addition of traffic safety barriers; upgrading ramp geometry and vehicle weaving distances; consolidation and/or relocation of expressway access (ramp removal and addition) as necessary; upgrading the Chicago Skyway interchange; improving frontage roads as necessary; traffic signal modernization; roadway lighting; accident investigation sites; landscaping with aesthetic treatments; and the maintenance of access to transit facilities. Construction associated with the frontage roads required minimum property acquisition of approximately 0.691 acres for right-of-way (14 partial acquisitions) and 0.07 acres of temporary construction easement (1). There are no businesses or residential relocations associated with the construction.

III. Background

What is Particulate Matter (PM)?

Airborne particulate matter (PM) consists of many different substances suspended in air in the form of particles (solids or liquid droplets) that vary widely in size. The particle mix in most U.S. cities is dominated by fine particles (less than 2.5 micrometers in diameter) generated by combustion sources, with smaller amounts of coarse dust (between 2.5 and 10 micrometers in diameter). Particles less than 10 micrometers in diameter include both fine and coarse dust particles. These particles pose the greatest health concern because they can pass through the nose and throat and get into the lungs. Particles larger than 10 micrometers in diameter that suspend in the air are referred to as total suspended particulates (TSP). These larger particles can cause irritation to the eyes, nose and throat in some people, but they are not likely to cause more serious problems since they do not get down into the lungs.

Motor vehicles (*i.e.*, cars, trucks, and buses) emit direct PM from their tailpipes, as well as from normal brake and tire wear. In addition, vehicles cause dust from paved and unpaved roads to be re-entrained, or re-suspended, in the atmosphere. In addition, highway and transit project construction may cause dust. Finally, gases in vehicle exhaust may react in the atmosphere to form PM. Particles come in a wide variety of sizes and have been historically assessed based on size, typically measured by the diameter of the particle in micrometers. PM_{2.5}, or fine particulate matter, refers to particles that are 2.5 micrometers in diameter or less. (*Note*: A human hair is about 70 micrometers in diameter and a grain of sand is about 90 micrometers in diameter). The National Ambient Air Quality Standards (NAAQS) for fine particulate matter include an annual standard (15.0 micrograms per cubic meter (ug/m³)) and a 24-hour standard (65 ug/m³). The annual standard is based on a 3-year average of annual mean PM_{2.5} concentrations; the 24-hour standard is based on a 3-year average of the 98th percentile of 24-hour concentrations.

Statutory Requirements for PM Hotspot Analyses

On March 10, 2006, EPA issued amendments to the Transportation Conformity Rule to address localized impacts of particulate matter: “PM_{2.5} and PM₁₀ Hot-Spot Analyses in Project-level Transportation Conformity Determinations for the New PM_{2.5} and Existing PM₁₀ National Ambient Air Quality Standards” (71 *FR* 12468). This rule amendment requires the assessment of localized air quality impacts of Federally-funded or approved transportation projects in PM₁₀ and PM_{2.5} nonattainment and maintenance areas deemed to be *projects of air*

quality concern.³ This assessment of localized impacts (*i.e.*, “hot-spot analysis”) examines potential air quality impacts on a scale smaller than an entire nonattainment or maintenance area. Such an analysis is a means of demonstrating that a transportation project meets Clean Air Act conformity requirements to support State and local air quality goals. If a project still requires a Federal Highway Administration (FHWA) or Federal Transit Administration (FTA) approval or authorization, a project-level conformity determination will be required prior to the first such action on or after April 5, 2006, even if the project has already completed the National Environmental Policy Act (NEPA) process. After project-level conformity is determined for a project, a new conformity determination is only required under the scenarios discussed in 40 CFR 93.104(d).⁴

Qualitative hot-spot analysis is required for these projects before EPA releases its future quantitative modeling guidance and announces that quantitative PM_{2.5} hot-spot analyses are required under 40 CFR §93.123(b)(4). EPA requires hot-spot findings to be based on directly emitted PM_{2.5}, since secondary particles take several hours to form in the atmosphere giving emissions time to disperse beyond the immediate area of concern. The Conformity Rule requires PM_{2.5} hot-spot analyses to include road dust emissions only if such emissions have been found significant by EPA or the state air agency prior to the PM_{2.5} SIP or as part of an adequate PM_{2.5} SIP motor vehicle emissions budget (40 CFR §93.102(b)(3)). Emissions resulting from construction of the project are not required to be considered in the hot-spot analysis if such emissions are considered temporary according to 40 CFR §93.123(c)(5).

The PM_{2.5} and PM₁₀ hot-spot requirements in the final rule became effective April 5, 2006. A qualitative PM_{2.5} and PM₁₀ hot-spot analysis that meets the final rule's requirements must be completed for project-level determinations for projects of air quality concern completed on or after April 5, 2006.

IV. Regional Conformity Determination

Section 176(c) of the Clean Air Act and the federal conformity rule require that transportation plans and programs conform to applicable state air quality implementation plans (SIPs) and Section 174 and 176(c) and (d) of the Clean Air Act (42 U.S.C. 7504, 7506(c) and (d)). The project was included in the FY 2005 – 2009 Transportation Improvement Program (TIP), endorsed by the Policy Committee of the Chicago Area Transportation Study (CATS), the Metropolitan Planning Organization (MPO) for the region in which the project is located. Projects in the TIP were considered to be consistent with the 2030 Regional Transportation Plan (RTP) endorsed by CATS. On July 11, 2005, the FHWA and the FTA determined that the TIP conformed to the State Implementation Plan (SIP). In addition, the FHWA and the FTA made a PM_{2.5} conformity determination on February 15, 2006. These findings were in accordance with 40 CFR Part 93, “Criteria and Procedures for Determining Conformity to State or Federal Implementation Plans, Programs, and Projects Funded or Approved under Title 23 USC or the Federal Transit Act.”

³ Criteria for identifying *projects of air quality concern* is described in 40 CFR 93.123(b)(1), as amended.

⁴ 40 CFR 93.104(d) states, "FHWA/FTA projects must be found to conform before they are adopted, accepted, approved, or funded. Conformity must be redetermined for any FHWA/FTA project if one of the following occurs: a significant change in the project's design concept and scope; three years elapse since the most recent major step to advance the project; or initiation of a supplemental environmental document for air quality purposes. Major steps include NEPA process completion; start of final design; acquisition of a significant portion of the right-of-way; and, construction (including Federal approval of plans, specifications and estimates)."

The project's design concept and scope are consistent with the project information used for the TIP conformity analysis. Therefore, this project conforms to the existing SIP and the transportation-related requirements of the 1990 Clean Air Act Amendments. This project's TIP number is # 01-00-0024. The Dan Ryan project was included in the regional emissions analysis and there have been no significant changes in the project's design concept or scope, as used in the conformity analyses. Therefore, the project comes from a conforming plan and program in accordance with *40 CFR §93.115*.

V. PM Hot Spot Analysis

According to *40 CFR §93.123(b)(2) and (4)*, a quantitative analysis for applicable projects is not required until EPA releases modeling guidance in the Federal Register. However, a qualitative hot spot analysis is still required. For this Illinois Department of Transportation Dan Ryan Expressway project, a qualitative project-level hot-spot assessment was conducted in order to assess whether the project will cause or contribute to any new localized PM_{2.5} violations, or increase the frequency or severity of any existing violations, or delay timely attainment of the PM_{2.5} NAAQS.

Existing Conditions

The affected area for the purposes of this analysis is the Dan Ryan Construction area, as discussed in Section II of this document. Additional details are further elaborated in the "Environmental Assessment (EA), Dan Ryan Expressway (FAI-94/90), 31st Street, and to I-57 / Halsted Street and I-94 / M.L.K. Drive, Cook County, Illinois", and the "Combined Design Report, 31st Street, and to I-57 / Halsted Street and I-94 / M.L.K. Drive, Cook County, Illinois" and their associated documentation. This section includes a discussion of currently available information on existing conditions related to air quality and traffic conditions in the Dan Ryan reconstruction project area.

Air Quality – Monitors

Illinois EPA - In the "Illinois Annual Air Quality Report 2004"⁵ there were thirteen (13) PM_{2.5} monitoring sites in Cook County nonattainment area. Air quality monitoring information for PM_{2.5} levels were obtained from the three (3) closest sites to the Dan Ryan Construction project (Farr Dormitory – 3300 South Michigan Avenue [1887-feet east], Southeast Police Station – 103rd & Luella [2.98-miles east], and Com-Ed Maintenance Building – 7801 Lawndale Avenue [4.55-miles west]). The data results are published in the "Illinois Annual Air Quality Report, 2004" issued by the Illinois EPA. The report identifies no violations in 2004 of the air quality standards for particulate matter PM_{2.5}. **Attachment 1** provides data from the Illinois EPA monitoring stations Farr Dormitory (Chi-Farr), Southeast Police Station (CHI-SE), and Com-Ed Maintenance Building (Chi-Com Ed) for the PM_{2.5} Annual Standard Assessment and PM_{2.5} 24-hour Standard Assessment.

Statewide Trends - The following identifies the recent trends throughout the State including Cook County for which data was available in the "Illinois Annual Air Quality Report, 2004". In 2003, there were 19 days where air quality in some part of Illinois was considered "Unhealthy for Sensitive Groups" compared to just seven (7) days in 2004. Throughout the state, monitoring was conducted at 37 stations for PM_{2.5}. Valid 1999 through 2004 annual

⁵ Information extracted from the "Illinois Annual Air Quality Report 2004", Illinois Environmental Protection Agency, Bureau of Air 1021 North Grand Avenue, East, P.O. Box 19276, Springfield, Illinois, 62794-9276; December 2005

averages (meeting minimum statistical selection criteria⁶) were obtained for 36 of the 37 sites. Six (6) stations recorded averages above 15.0 ug/m³, the level of the annual standard compared with 9 stations in 2003 and 14 stations in 2002. The Statewide average of annual averages was 12.5 ug/m³ in 2004 compared with 14.1 ug/m³ in 2003 and 14.9 ug/m³ in 2002. The trend of the statewide annual averages for PM_{2.5} for the period 2000-2004 was downward. There were no exceedances of the 24-hour standard of 65 ug/m³ in 2004. The Statewide peak in 2004 of 54.3 ug/m³ was recorded in Schiller Park in the northern part of Cook County. The Statewide average of the 98th percentile of 24-hour averages was 30.9 ug/m³ in 2004 compared with 34.1 ug/m³ in 2003 and 33.9 ug/m³ in 2002.

Dan Ryan Construction Monitoring⁷ – IDOT has been monitoring air quality prior to and during the re-construction of the Dan Ryan. The air quality data collection of baseline monitoring began September 2004 through December 2004 while monitoring during the reconstruction of the Dan Ryan Expressway began in January 2005 and is continuing into 2006 with the mainline construction continuing to completion in the fall of 2007. The monitoring extends one-mile from the reconstruction zone in all directions, from approximately 23rd Street to the north, 103rd Street to the south, Cottage Grove Avenue to the east, and Halsted Street to the west.

There have been nine (9) PM_{2.5} monitoring locations established for the Dan Ryan construction project. These are the locations:

- IDOT Service Yard - 6543 South Wentworth Avenue
- Attucks Community Academy - 3813 South Dearborn Street
- Bronzeville Academy - 220 West 45th Place
- Armour Square Park - 3309 South Shields Avenue
- Parkman School - 245 West 51st Street
- McCorkle School - 4421 South State Street
- Harlan High School - 9652 South Michigan Avenue
- Hughes School - 226 West 104th Street
- McDade School - 8801 South Indiana Avenue

June 28, 2005

An exceedance of PM_{2.5} standard (NAAQS standard is 65 ug/m³ averaged over 24 hours) was detected at one location. A value of (70.0 ug/m³) was detected at Attucks Community Academy – 3813 South Dearborn Avenue. Environmental Design International (EDI) field logs indicated that June 28, 2005 was an Air Pollution Action day. The entire Chicago region was experiencing poor air quality and thus the elevated PM_{2.5} levels were attributed to a regional air quality issue and not a project level issue caused by the Dan Ryan.

There has been no exceedance of PM_{2.5} standard (NAAQS standard is 65 ug/m³ averaged over 24 hours) since June 28, 2005.

⁶ Ibid. "Appendix B Air Quality Data Interpretation", page 45

⁷ Air quality and monitoring data collected, with reports prepared and provided to the IDOT and IEPA by Environmental Design International, inc (EDI), 200 South Michigan Avenue, Suite 700, Chicago, IL 60604.

Transportation and Traffic Conditions

The Chicago Area Transportation Study (CATS) concluded that since the area surrounding the Dan Ryan reconstruction project is fully developed (residential, commercial, institutional, and industrial), any population increase will be minor within the vehicle trip generation areas. The overall increase in Average Daily Traffic (ADT) as a result of population growth will be minor and can be assumed to be no greater than 3%.⁸ Dan Ryan traffic for the year 2030 was therefore increased by 3%. (See **Table 1** - All traffic volumes in **Table 1** are for the Build condition.)

TABLE 1

I-90/94 (Dan Ryan Expressway)
from 31st Street to I-57 / Halsted Street and I-94 / M.L.K. Drive

	2002 Existing	2010 Build	2020 Build	2030 Build
Average ADT	232,000	234,000	236,500	239,000
Daily VMT* Using Segment Length	2,088,000	2,106,000	2,128,500	2,151,000
Daily Truck VMT Using Segment Length	313,200	315,900	319,275	322,650
Truck % Prorated by Segment Length and ADT	15%	15%	15%	15%

* Vehicle miles of travel

Built and Natural Environment

The Dan Ryan project is within the City of Chicago. The Dan Ryan Expressway is an important facility for providing access to businesses within the Dan Ryan corridor and providing access to the central business district of Chicago. Various light industrial, manufacturing and warehouse distribution facilities rely on the Dan Ryan Expressway. The Dan Ryan also provides access for the development of new employment entities. These businesses create and maintain a stable tax base for the area.

The project area includes a mixture of vacant property, occupied residential, commercial, local shopping, light industrial and service facilities throughout. There are established neighborhoods throughout the project limits that have developed and that coexist with the Dan Ryan Expressway facility. Residential, commercial or business, public or institutional, industrial or manufacturing structures are present along both sides of the Dan Ryan Expressway and are adjacent to the local parallel street system that serves as frontage roads to the facility. This includes approximately 4,870 residential properties, 33 churches, 7 schools (e.g. Illinois Institute of Technology and Kennedy King Community College, Harlan Academy), 2 hospitals (*i.e.* Provident, St. Bernard), 21 parks (*e.g.* Abbott Park), 1 existing fire station and 1 planned fire station, the Chicago Area 2 Police Headquarters located at 51st and South Wentworth Avenue, and 4 high rises (residential apartment buildings, Robert Taylor Homes). The project area includes the urban communities of Armour Square, Douglas, Fuller Park, Grand Boulevard, Washington Park, New City, Englewood, Greater Grand Crossing, Chatham, Washington Heights, Roseland, Pullman, Bridgeport, and Bronzeville.

⁸ "Combined Design Report F.A.I. 94 / 90 (Dan Ryan Expressway) 31st Street to I-57 / Halsted and I-94 / M.L.K. Drive", IDOT July 2004; Volume 6/9, Appendix H - Traffic Analysis.

Some of the larger single entity traffic destinations and land uses directly adjacent to the Dan Ryan Expressway include U.S. Cellular Field (Chicago White Sox) and the Illinois Institute of Technology (IIT). There are also several active shopping districts along the corridor such as near the 55th Street, 79th Street and 87th Street interchanges.

Five major intermodal facilities within and around the Dan Ryan project limits that use the Dan Ryan Expressway and/or its frontage road system for access and traffic routing are important to the area traffic pattern. These facilities include BNSF – “Railport” Intermodal Facility, BNSF – “Corwith Yard”, CSX Intermodal, Inc. - 59th Street Intermodal Yard, Norfolk Southern (NS) – 47th Street Yard, and the Norfolk Southern (NS) – “63rd Street Yard”.

Air Quality Environmental Commitments Implemented on the Dan Ryan Project

A Special Provision to the Dan Ryan construction project provides for specific environmental commitments generally paraphrased as follows:

Dust Control - Development and implementation of a detailed Dust Control Plan (DCP) is required in “Non-attainment” and “Maintenance” areas, per Article 107.36 of the “Standard Specifications for Road and Bridge Construction”. All construction activities on the Dan Ryan are governed by the DCP. The nature and extent of dust generating activities, and specific control techniques appropriate to specific situations were discussed at the Dan Ryan pre-construction meetings. With subsequent development of the DCP the contractor is responsible for the control of dust at all times during the duration of the contract, 24 hours per day, 7 days per week, including non-working hours, weekends, and holidays. His work is only considered complete after the completion of all permanent erosion control measures required for the contract, and after all temporary and permanent seeding has taken place. All work on the Dan Ryan contracts shall be conducted in a manner that will not result in generating excessive air borne particulate matter (PM) or nuisance dust conditions. The DCP provides for implementation of control measures before, during and after conducting any dust generating operation. The controls must be in place on non-working days and after working hours, not just while work is being done on the site. The DCP contains information specific to the project construction site, proposed work, and dust control measures to be implemented.

Diesel Emissions - The reduction of emissions of Carbon Monoxide (CO), Hydrocarbons (HC), Nitrogen oxides (NO_x), and Particulate Matter (PM) is being accomplished by installing Retrofit Emission Control Devices (RECD) and/or by using cleaner burning diesel fuels on any and all diesel fuel powered devices rated at 50 horsepower (HP) and above, used on the project site for any length of time, (including any “rented” or “rental” equipment).

Diesel powered equipment with engine horsepower ratings of 50 HP and above, that are on the project or are assigned to the contract shall be prohibited from using “off-road” diesel fuel (above 500 parts per million (ppm) sulfur content) at any time. In addition, diesel powered equipment shall be either (1) retrofitted with Emissions Control Devices (ECD) and use cleaner burning “on-road” diesel fuel (500 ppm sulfur content or less), or (2) use Ultra Low Sulfur Diesel fuel (ULSD) exclusively (15 ppm sulfur content or less), in order to reduce diesel particulate matter emissions. The Retrofit Emission Control Device must be used with on-road diesel fuel (500-ppm sulfur content or less). If used, ULSD fuel shall conform to American Society for Testing and Materials (ASTM) D-975 diesel with the following additional specifications:

- ASTM D-5453 15 ppm sulfur max

- ASTM D-6078 Lubricity (SBOCLE) 3100 g min
- ASTM D-613 Cetane 45 min
- Dyed (for “off-road” use)

Diesel Engine Idling - The contractor has established truck-staging areas for all diesel-powered vehicles that are waiting to load or unload material at the contract area. Such zones are located where the diesel emissions from the equipment will have a minimum impact on adjacent abutting properties and sensitive receptors of the general public. The sensitive receptors include, but are not limited to hospitals, schools, residences, motels, hotels, daycare facilities, elderly housing and convalescent facilities. All diesel-powered engines shall also be located as far away as possible from fresh air intakes, air conditioners, and windows. All diesel-powered engines are not allowed to idle, except only as follows:

- Five (5) minutes idling is allowed for loading and unloading vehicles
- When equipment remains motionless because of traffic conditions or mechanical difficulties over which the operator has no control
- When necessary to operate auxiliary systems installed on the equipment
- To bring the equipment to the manufacturer's recommended operating temperature
- When the outdoor temperature is below forty-five (45°F) degrees Fahrenheit or above eighty (80°F) degrees Fahrenheit
- When the diesel equipment is being repaired

Future Conditions

For the State, in terms of air quality during 2004, there were seven days (all for PM_{2.5}) when air quality in some part of Illinois was considered “Unhealthy for Sensitive Groups” which is a significant decrease over that from 2003 with 19 days. In general, air quality trends for the criteria pollutants are continuing to show downward or stable trends well below the level of the NAAQS over the ten-year period, 1995 to 2004 particulate emission trend showed a ten percent (10%) decrease.⁹

According to EPA, the 2007 heavy-duty engine standards will result in the introduction of new, highly effective control technologies for heavy-duty engines, beginning in 2007. Particulate matter emission levels is expected to be 90 percent lower on a per vehicle basis than 2000 standards levels due to the 2007 diesel engine and fuel program.¹⁰ On-Road diesel trucks will implement ULSD in the fall of 2006.

The Dan Ryan Expressway traffic volumes identified previously in **Table 1** will not increase significantly, since the freeway capacity will not increase significantly on any of the major inputs (*i.e.*, Chicago Skyway, I-57, Bishop Ford Freeway [IL-394], or I-94 north of 31st Street). Any reconstruction improvements to the Dan Ryan Expressway would only move the existing and the modest 3 percent increased traffic demand more efficiently by improving or reducing the existing bottleneck points (*e.g.*, stop and idle locations).¹¹

⁹ *Op. cit.*, Illinois Annual Air Quality Report 2004”, pages ix and 10

¹⁰ “Fine Particles (PM_{2.5}) Standards Air Quality Conformity Assessment”, December 21, 2005, National Capital Regional Transportation Planning Board, Metropolitan Washington Council of Governments

¹¹ *Op. cit.*, “Combined Design Report F.A.I. 94/90 (Dan Ryan Expressway)”, Section 2.3, page 4.

Analysis and Considerations

Air quality information supplied by the IEPA found that the monitoring stations in the project's vicinity had violations in 2000, 2001, 2002 and 2003 and for the Annual Average 2000-2002 and 2001-2003 as identified in **Attachment 1 - IEPA Standard Assessment**.¹² This information also showed that PM_{2.5} short-term trends for the monitoring stations in the project's vicinity showed a downward trend.¹³ In addition, the Particulate Matter (PM) emissions trend from existing sources (categories), where fuel combustion is the second highest contributor, throughout the State of Illinois continues to show a future decreasing trend from 1995 to 2004.¹⁴

The hot-spot analysis has not considered PM_{2.5} road dust emissions, since USEPA or the Illinois EPA has not made a finding of significance.

The traffic change resulting from the project was not a significant factor since the capacity of the Dan Ryan is at saturated flow. It is generally consistent with existing vehicle miles of travel (VMT) and VMT increases in the Chicago metropolitan area where no increases in PM_{2.5} emissions or concentrations are noted.

Although prevailing winds in the Chicago area are from the west, air-sampling locations were located on both sides of the Dan Ryan because local wind direction along the reconstruction project area can change during the day with an associated "lake effect". There is often wind that acts to disperse PM_{2.5} emissions in both easterly and westerly directions along the Dan Ryan's north-south configuration. Temperature, humidity, and rainfall do not seem to influence nor been shown to influence the level of PM_{2.5} emissions along or surrounding the Dan Ryan reconstruction project area.

CATS estimated the overall direct PM_{2.5} vehicle emissions for projects based on overall VMT and diesel VMT data for the project year 2002 (the baseline year), 2010, 2020 and 2030. **Attachment 2 - PM_{2.5} Hot Spot Analysis** provides the analysis and information that applies to the direct PM_{2.5} emissions factors to VMT from CATS transportation model that was developed for the PM_{2.5} hot spot conformity determination. The analysis was sent to the USEPA and other members of the interagency consultation team for review, and comments from the team were incorporated into the PM_{2.5} Hot Spot Analysis titled, "I-90 94 DAN RYAN EWY FROM 15TH ST (COOK/CHICAGO) TO I-57 (COOK/CHICAGO) – TIP ID 01-00-0024". The "Hot Spot Analysis Summary Results" below (**Table 2**) shows a decrease in the Annual Fine Particulate Matter from the existing year 2002 to the design year 2030.

¹² *Op. cit.*, Illinois Annual Air Quality Report 2004", pages 51 and 57

¹³ *Ibid.* pages 54 and 58.

¹⁴ *Ibid.* pages 25.

TABLE 2**Hot Spot Analysis Summary Results**

I- 90 94 DAN RYAN EWY FROM 15TH ST (COOK/CHICAGO) TO I- 57
(COOK/CHICAGO) - TIP ID 01-00-0024

Total Emissions

Year	Annual Fine Particulate Matter		
	VMT	Global Rate (gm/mi)	Tons
2002	732,666,452	0.0474608	38.330
2010	738,982,485	0.0360964	29.403
2020	748,875,566	0.0175055	14.451
2030	754,772,826	0.0154200	12.829

Notes

2002 Annual VMT is Daily VMT times 350.838, the ratio of annual to daily VMT for 2010 and 2030

2002 Global emissions rate is from PM2.5 conformity analysis

2002 emissions are Global Rate times applicable VMT

VI. Conclusion

Based on the analysis and monitoring data for the Dan Ryan reconstruction project, it is determined that the Dan Ryan reconstruction project meets all the project level conformity requirements, and that the Dan Ryan reconstruction project will not cause or contribute to a new violation of the PM_{2.5} NAAQS, or increase the frequency or severity of a violation. Therefore, the project meets the conformity hot-spot requirements in *40 CFR §93.116 and §93.123* for PM_{2.5}.

ATTACHMENT 1

IEPA Standard Assessment

PM_{2.5} Air Quality Monitoring Stations

Dan Ryan Expressway (I-94/90) Project

31st Street to I-57/Halsted Street and I-94/M.L.K. Drive

Cook County, Illinois

PM_{2.5} 24-hour Standard Assessment

98th Percentile Value

Violation is 3 -Year Average > 65 ug/m³

Site	Years					Average 2000-2002	Average 2001-2003	Average 2002-2004
	2000	2001	2002	2003	2004			
Chi-Farr	32.5	41.9	37.2	39.0	33.4	39.6	38.1	36.2
Chi-SE	39.8	41.2	35.4	34.8	34.2	38.8	37.1	34.8
Chi- Com Ed	33.7	37.4	36.0	32.6	39.7	35.7	35.3	36.1
Average	34.2	39.5	35.3	34.2	33.7			

	< 30.5
	30.5 - 40.4
	40.5 - 65.4
	> 65.5

PM_{2.5} Annual Standard Assessment

Violation is a 3 -Year Average > 15 ug/m³

Site	Years					Average 2000-2002	Average 2001-2003	Average 2002-2004
	2000	2001	2002	2003	2004			
Chi-Farr	15.9	17.1	15.5	15.1	13.2	16.2	15.9	14.6
Chi-SE	16.5	18.1	15.5	15.3	13.8	16.7	16.3	14.8
Chi- Com Ed	16.6	16.5	15.7	14.9	14.1	16.3	15.7	14.9

	<= 13.0
	13.1 - 15.0
	15.1 - 17.0
	17.1 - 19.9
	>= 20.0

ATTACHMENT 2

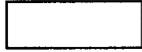
PM2.5 Hot Spot Analysis Method

for

- **I-90 94 DAN RYAN EWY FROM 15TH ST (COOK/CHICAGO) TO
I- 57 (COOK/CHICAGO)
TIP ID 01-00-0024**



Chicago Area Transportation Study



To: File

From: Ross Patronskey, Chief of the CMAQ Program

Date: April 26, 2006

Subject: PM_{2.5} Hot Spot Analysis Method for :

- I-90 94 DAN RYAN EWY FROM 15TH ST (COOK/CHICAGO) TO I- 57 (COOK/CHICAGO) - TIP ID 01-00-0024

Background

The subject project was analyzed for direct PM_{2.5} emissions following a determination that it qualified as a “project of air quality concern.”

Following discussion at the April 17, 2006 consultation meeting, the approach to this hot spot analysis is to estimate project-level emissions for the baseline and analysis years, and to evaluate the trends in these emissions against monitoring data from nearby sites.

CATS’ responsibility is to estimate overall direct PM_{2.5} emissions for the project based on overall VMT and diesel VMT data for the project in 2002 (the baseline year), 2010, 2020 and 2030. These results will be supplied to the project implementer for incorporation into the hot spot analysis.

Method

Spreadsheets that apply direct PM_{2.5} emissions factors to VMT from CATS’ transportation model were developed for the supplemental PM_{2.5} conformity determination approved by the CATS Policy Committee in October, 2005. The assumptions and parameters for the MOBILE6.2 runs used to generate the emissions factors are documented in Chapter 8 of Appendix B of the documentation for that conformity determination.

These spreadsheets were adapted for hot spot analysis by scaling the daily VMT output from the transportation model to equal the project daily VMT supplied by the implementer. Since the transportation model VMT are provided by facility type, speed and vehicle type, the VMT scaling factors are computed by facility type, to match the VMT by facility type provided by the implementer. For the project analyzed, all VMT was assigned to the freeway facility type.

In addition, the VMT by vehicle type was rescaled to match the percentage of diesel VMT supplied by the implementer. This was accomplished by computing the ratio of percent diesel VMT for the project to the percent diesel VMT for the facility type. The ratio was greater than one, increasing the diesel VMT for emissions calculations. The increase in diesel VMT was offset by a comparable ratio for gasoline VMT (percent gasoline VMT for the project to the percent gasoline VMT for the facility type), which reduced the gasoline VMT.

The rescaled daily VMT values were then extended to the full year and multiplied by the applicable direct PM_{2.5} emission rates. This method is described in Chapter 8 of Appendix B of the conformity documentation.

The IEPA analysis for the baseline year (2002) was created in a different manner than the conformity analysis for the three scenario years (2010, 2020, and 2030). As a result, the 2002 project data cannot be directly applied to PM_{2.5} emission rates from the conformity analysis.

As a surrogate approach, a “global” emissions factor was used. This factor is total direct PM_{2.5} emissions for 2002 divided by total VMT for 2002. Project emissions are then simply equal to the global factor times project VMT. To scale the daily VMT supplied by the implementer to an annual value, the ratios of annual VMT to daily VMT from 2010 and 2030 were averaged and multiplied by the 2002 daily VMT (2020 was not used because it is a leap year). Since the overall diesel percentage for the region (about 6.25% of VMT) is so much less than the diesel percentage on the projects (15% and 17% of project VMT), the global factor understates the emissions on the project for 2002, thus making the baseline estimate conservative.

Results

The results are presented in the attached summary tables. In addition, a summary input and results page from each scenario year is included. These document the VMT and percentage of diesel VMT data used in the analysis.

Hot Spot Analysis Summary Results

I- 90 94 DAN RYAN EWY FROM 15TH ST (COOK/CHICAGO) TO I- 57
(COOK/CHICAGO) - TIP ID 01-00-0024

Total Emissions

Year	Annual Fine Particulate Matter		
	VMT	Global Rate (gm/mi)	Tons
2002	732,666,452	0.0474608	38.330
2010	738,982,485	0.0360964	29.403
2020	748,875,566	0.0175055	14.451
2030	754,772,826	0.0154200	12.829

Notes

2002 Annual VMT is Daily VMT times 350.838, the ratio of annual to daily VMT for 2010 and 2030

2002 Global emissions rate is from PM2.5 conformity analysis

2002 emissions are Global Rate times applicable VMT

Hot Spot Analysis Summary Results

Project Identification: I- 90 94 DAN RYAN EWY FROM 15TH ST (COOK/CHICAGO) TO I- 57 (COOK/CHICAGO) - TIP ID 01-00-0024

EMME/2 scenario: EMME/2 Module: 3.14 Date: 05-06-23 07:56 User: E170/CATS.....cmh Page:84775
Project: c05a conformity (from Busch Parkway supplement)

Mobile6 input

File PM10J-M
Year 2010
I&M PM 2.5 rates are same for I/M & non-I/M

Diesel VMT factors

	expressway	arterial	local	ramp
Baseline percent gas	88.28%	95.05%	97.35%	92.30%
Baseline percent diesel	11.72%	4.95%	2.65%	7.70%
Project percent gas	85.00%	0.00%	0.00%	0.00%
Project percent diesel	15.00%	0.00%	0.00%	0.00%

VMT consistency check

source	value	% of baseline
EMME/2 grand total:	179,198,592	100.0000%
Total at 28-vehicle split	179,198,606	100.0000%
Implementer VMT (daily):	2,106,000	100.0000%
VMT after diesel adjustment	2,106,000	100.0000%
Annual Total Project VMT:	738,982,485	n/a

Total Emissions

Facility	Fine Particulate Matter (annual)		
	Grams	Kilograms	Tons
freeway	26,674,634	26,675	29.40
arterial	0	0	0.00
local	0	0	0.00
ramp	0	0	0.00
Total	26,674,634	26,675	29.40
Global emissions rate (gm/VMT)	0.036096436		

Hot Spot Analysis Summary Results

Project Identification: I- 90 94 DAN RYAN EWY FROM 15TH ST (COOK/CHICAGO) TO I- 57 (COOK/CHICAGO) - TIP
ID 01-00-0024

EMME/2 scenario: EMME/2 Module: 3.14 Date: 03-08-22 07:31 User: E170/CATS.....kww Page:80090
Project: c03 conformity (from 2004-09 TIP Conformity)

Mobile6 input

File PM20J-M
Year 2020
I&M PM 2.5 rates are same for I/M & non-I/M

Diesel VMT factors

	expressway	arterial	local	ramp
Baseline percent gas	88.56%	95.16%	97.34%	92.40%
Baseline percent diesel	11.44%	4.84%	2.66%	7.60%
Project percent gas	85.00%	0.00%	0.00%	0.00%
Project percent diesel	15.00%	0.00%	0.00%	0.00%

VMT consistency check

source	value	% of baseline
EMME/2 grand total:	197,626,067	100.0000%
Total at 28-vehicle split	197,626,069	100.0000%
Implementer VMT (daily):	2,128,500	100.0000%
VMT after diesel adjustment	2,128,500	100.0000%
Annual Total Project VMT:	748,875,566	n/a

Total Emissions

Facility	Fine Particulate Matter (annual)		
	Grams	Kilograms	Tons
freeway	13,109,428	13,109	14.45
arterial	0	0	0.00
local	0	0	0.00
ramp	0	0	0.00
Total	13,109,428	13,109	14.45
Global emissions rate (gm/VMT)	0.017505482		

Hot Spot Analysis Summary Results

Project Identification: I- 90 94 DAN RYAN EWY FROM 15TH ST (COOK/CHICAGO) TO I- 57 (COOK/CHICAGO) - TIP ID 01-00-0024

EMME/2 scenario: EMME/2 Module: 3.14 Date: 03-08-25 14:23 User: E170/CATS.....kww Page:84332
Project: c03 conformity (from 2004-09 TIP Conformity)

Mobile6 input

File PM30J-M
Year 2030
I&M PM 2.5 rates are same for I/M & non-I/M

Diesel VMT factors

	expressway	arterial	local	ramp
Baseline percent gas	88.48%	95.22%	97.37%	92.27%
Baseline percent diesel	11.52%	4.78%	2.63%	7.73%
Project percent gas	85.00%	0.00%	0.00%	0.00%
Project percent diesel	15.00%	0.00%	0.00%	0.00%

VMT consistency check

source	value	% of baseline
EMME/2 grand total:	212,741,703	100.0000%
Total at 28-vehicle split	212,741,691	100.0000%
Implementer VMT (daily):	2,151,000	100.0000%
VMT after diesel adjustment	2,151,000	100.0000%
Annual Total Project VMT:	754,772,826	n/a

Total Emissions

Facility	Fine Particulate Matter (annual)		
	Grams	Kilograms	Tons
freeway	11,638,590	11,639	12.83
arterial	0	0	0.00
local	0	0	0.00
ramp	0	0	0.00
Total	11,638,590	11,639	12.83
Global emissions rate (gm/VMT)	0.015419991		