GLMRIS – Brandon Road

Appendix F - General Conformity Analyses for Clean Air Compliance

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Introduction

Brandon Road Lock and Dam

Brandon Road Lock and Dam is located on the Des Plaines River in Joliet, IL, a few miles downstream (south) of its confluence with the Chicago Sanitary and Ship Canal. Currently, the Brandon Road Lock is being assessed as a control point for preventing Aquatic Nuisance Species (ANS) transfer from the Mississippi River Basin to the Great Lakes Basin through the Chicago Area Waterways (Figure 1) as part of the GLMRIS - Great Lakes and Mississippi River Interbasin Study (USACE, 2014) Brandon Road Feasibility Study (USACE, 2015). A number of structural and nonstructural alternatives are being considered for implementation at the lock, however the focus of this report is on the lock closure (physical barrier) alternative that would permanently close the Brandon Road Lock. In addition to closing an aquatic pathway for ANS, this alternative would terminate commercial cargo navigation between the Mississippi Basin and the Chicago Area Waterway System (CAWS). This alternative would shift thousands of tons of commodities to land-based modes of transportation, representing the worst possible air quality impacts.

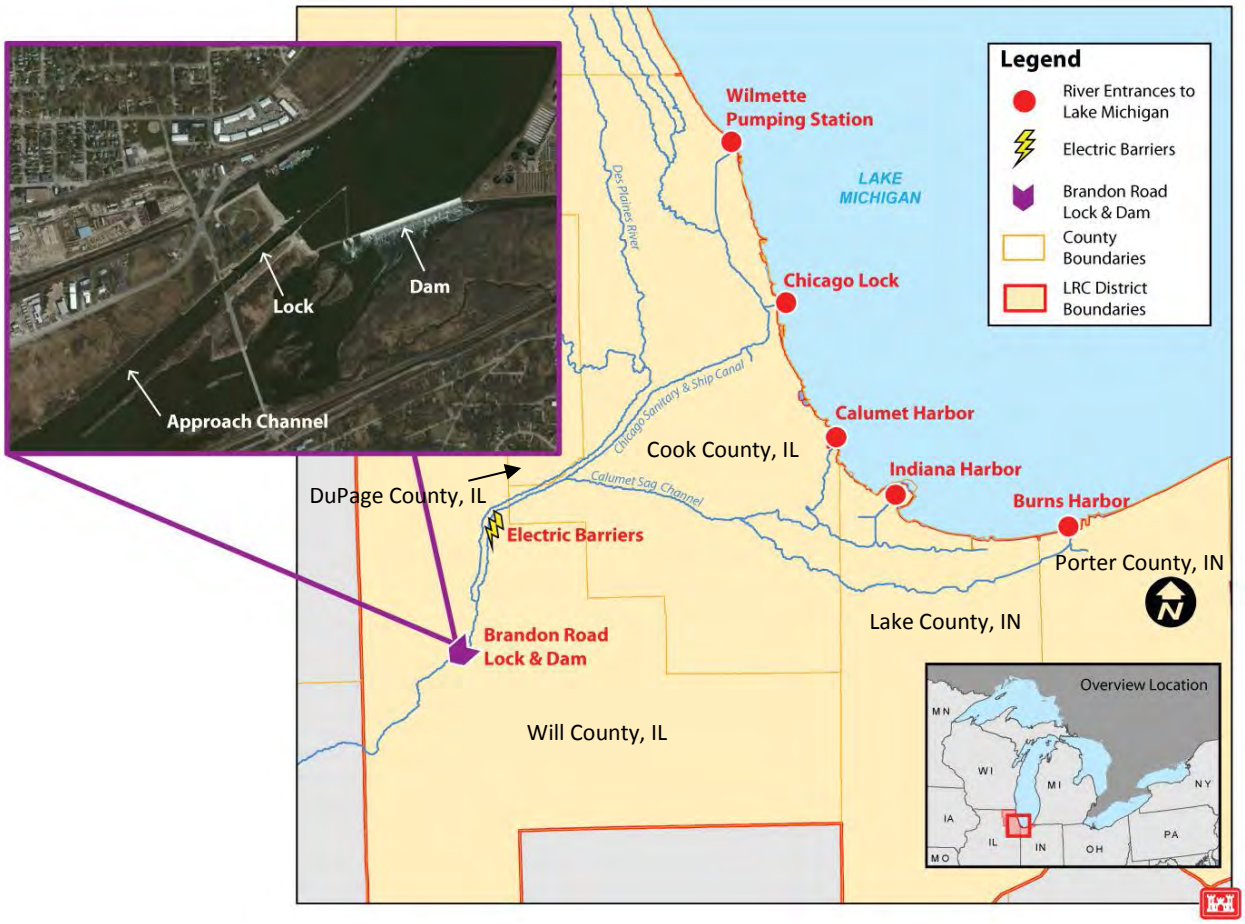

Figure 1. Brandon Road Lock and Dam in the GLMRIS Study Area (USACE, 2014).

Clean Air Act

The 1990 amendments to the Clean Air Act (CAA) [42 United States Code 7401 *et seq.*] require Federal agencies to ensure that their actions conform to the appropriate State Implementation Plan (SIP). A SIP is a plan that provides for the implementation, maintenance, and enforcement of the National Ambient Air Quality Standards (NAAQS), and includes emission limitations and control measures to attain and maintain the NAAQS. Conformity to a SIP, as defined in the CAA, means conformity to a SIP's purpose of reducing the severity and number of violations of the NAAQS to achieve attainment of such standards.

The Federal agency responsible for an action is required to determine if the action conforms to the applicable SIP. Section 176(c) of the Clean Air Act prohibits Federal entities from taking actions in nonattainment or maintenance areas which do not conform to the State implementation plan (SIP) for the attainment and maintenance of the National Ambient Air Quality Standards (NAAQS). Therefore, the purpose of conformity is to (1) ensure Federal activities do not interfere with the budgets in the SIPs; (2) ensure actions do not cause or contribute to new violations, and (3) ensure attainment and maintenance of the NAAQS.

General Conformity

On November 30, 1993, the United States Environmental Protection Agency (USEPA) promulgated regulations, known as the General Conformity Regulations, to ensure that other Federal actions (other than transportation projects, which are addressed separately) also conformed to the SIPs (58 FR 63214). With respect to General Conformity, all Federal Actions are covered unless otherwise exempt, e.g. actions covered by transportation conformity, actions with clearly de minimis emissions, exempt actions listed in rule, or actions covered by a Presumed to Conform demo (approved list). Conformity can be demonstrated by: (1) showing emission increases are included in SIP; (2) State agrees to include increases in SIP; (3) areas without SIPs, no new violations of NAAQS and/or no increase in frequency/severity of violations; (4) Offsets, and (5) Mitigation. Some emissions are excluded from conformity determination, such as those already subject to new source review; those covered by CERCLA or compliance with other environmental laws, actions not reasonably foreseeable, and those for which the Agency has no continuing program responsibility.

The purpose of this analysis is to document determination of conformity for Brandon Road Lock closure, which could impact Cook, DuPage, and Will Counties in Illinois, and Lake and Porter Counties in Indiana by shifting modes of transport from barge to overland rail or road. This conformity determination has been prepared in accordance with the final rule of the USEPA, *Determining Conformity of General Federal Actions to State or Federal Implementation Plans*, published in the *Federal Register* on November 30, 1993. The general conformity rule [40 Code of Federal Regulations (CFR) Part 93, Subpart B] was effective January 31, 1994.

Criteria Air Pollutants

National Ambient Air Quality Standards (NAAQS) have been established for six common air pollutants considered harmful to public health and the environment (NAAQS Table, 2016). The criteria pollutants for which air quality standards have been established under the CAA are particulate matter, ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. Table 1 provides a summary of the current NAAQS for each pollutant.

Table 1. National Ambient Air Quality Standards for Six Critical Pollutants (NAAQS Table, 2016).

Pollutant		Primary/Secondary Pollutant Status	Averaging Time	Level	Form
Carbon Monoxide (CO)		Primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hours	35 ppm	
Lead (Pb)		Primary & secondary	Rolling 3 month average	0.15 ug/m^3	Not to be exceeded
Nitrogen Dioxide (NO_2)		Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Primary & secondary	1 year	53 ppb	Annual Mean
Ozone (O_3)		Primary & secondary	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate Matter (PM)	$PM_{2.5}$	Primary	1 year	12.0 ug/m^3	annual mean, averaged over 3 years
		Secondary	1 year	15.0 ug/m^3	annual mean, averaged over 3 years
		Primary & secondary	24 hours	35 ug/m^3	98th percentile, averaged over 3 years
	PM_{10}	Primary & secondary	24 hours	150 ug/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		Primary	1 hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

Nonattainment Areas

Areas of the country where air pollution levels persistently exceed the NAAQS are designated as nonattainment areas. The general conformity rule applies to Federal actions occurring in air basins designated as nonattainment for criteria pollutants or in attainment areas subject to maintenance plans (maintenance areas). Table 2 describes Illinois and Indiana counties in the CAWS region (Figure 1) that are potentially impacted by Brandon Road Lock closure and are currently maintaining or not attaining NAAQS (IL Nonattainment Status, 2016; IN Nonattainment Status, 2016).

Table 2. Illinois and Indiana Nonattainment and Maintenance Areas impacted by Brandon Road Lock closure (IL Nonattainment Status, 2016; IN Nonattainment Status, 2016).

County, State	NAAQS	Nonattainment Classification	Maintenance
Cook, IL	8-Hour Ozone – 2008	Moderate	No
	Lead – 2008 (Chicago)	N/A	No
	PM_{10} – 1987 (SE Chicago and Lyons Twsp)	Moderate	Yes
	$PM_{2.5}$ – 1997	Former Subpart 1	Yes
	Sulfur Dioxide – 2010 (Lemont)	N/A	No
DuPage, IL	8-Hour Ozone – 2008	Moderate	No
	$PM_{2.5}$ – 1997	Former Subpart 1	Yes
Will, IL	8-Hour Ozone – 2008	Moderate	No
	$PM_{2.5}$ – 1997	Former Subpart 1	Yes
	Sulfur Dioxide – 2010 (Lemont)	N/A	No
Lake, IN	8-Hour Ozone – 2008	Moderate	No
	Carbon Monoxide – 1971 (East Chicago)	Not Classified	Yes
	PM_{10} – 1987 (East Chicago)	Moderate	Yes
	$PM_{2.5}$ – 1997	Former Subpart 1	Yes
	Sulfur Dioxide – 2010	N/A	Yes
Porter, IN	8-Hour Ozone – 2008	Moderate	No
	$PM_{2.5}$ – 1997	Former Subpart 1	Yes

General Conformity Determination Process

The general conformity rule consists of three major parts: applicability, analysis, and procedure. These three parts are described in the following sections.

Applicability

The general conformity rule ensures actions by federal agencies in nonattainment and maintenance areas do not interfere with a state's plan to meet national air quality standards. Brandon Road Lock closure would increase atmospheric emissions by forcing barge traffic from the Chicago Area Waterways (between Brandon Road Lock and Lake Michigan, Figure 1) onto land in Cook, DuPage, and Will Counties in Illinois and Lake and Porter Counties in Indiana,

locations that are nonattainment areas (NAA) or maintenance areas (MA) for ozone, carbon monoxide, particulate matter, or sulfur dioxide (Table 2).

De Minimis Emissions Levels

To focus conformity requirements on those Federal actions with the potential to have significant air quality impacts, threshold (de minimis) rates of emissions (Table 3) were established in the final rule. With the exception of lead, the de minimis levels are based on the CAA's major stationary source definitions for the criteria pollutants (and precursors of criteria pollutants), and vary by the severity of the nonattainment area. A conformity determination is required when the annual net total of direct and indirect emissions from a Federal action, occurring in a NAA or M A , equals or exceeds the annual de minimis levels. In this report, calculated emissions estimates are compared to de minimis levels to evaluate if a conformity determination is needed. The levels circled in red in Table 3 are applicable to this determination.

Table 3. De Minimis Emission Levels (De Minimis, 2016).

Pollutant and Area Designation	Attainment Type	Tons per year[a]
Ozone (VOC and NOx)	Serious nonattainment	50
	Severe nonattainment	25
	Extreme nonattainment	10
	Other areas outside an ozone transport region	100
Ozone (NOx)	Marginal and moderate nonattainment inside an ozone transport region	100
	Maintenance	100
Ozone (VOC)	Marginal and moderate nonattainment inside an ozone transport region	50
	Maintenance within an ozone transport region	50
	Maintenance outside an ozone transport region	100
Carbon Monoxide, SO_2 and NO_2	All nonattainment & maintenance	100
PM_{10}	Serious nonattainment	70
	Moderate nonattainment and maintenance	100
$PM_{2.5}$ Direct emissions, SO2, NOx (unless determined not to be a significant precursor), VOC or ammonia (if determined to be significant precursors)	All nonattainment & maintenance	100
Lead (Pb)	All nonattainment & maintenance	25

[a] **Rates circled in red are those applicable to this conformity determination.**

Regional Significance

A Federal action that does not exceed the threshold of rates of criteria pollutants may still be subject to a general conformity determination. The direct and indirect emissions from the action must not exceed 10% of the total emissions inventory for a particular criteria pollutant(s) in a nonattainment or maintenance area. If the emissions exceed this 10% threshold, the Federal

action is considered to be a “regionally significant” activity, and thus general conformity rules apply. The concept of regionally significant is to capture those Federal actions that fall below the de minimis emission levels, but have the potential to impact the air quality of a region.

Analysis

The conformity analysis for the Federal action examines the net impacts of the direct and indirect emissions from mobile and stationary sources, and emissions from any reasonably foreseeable Federal action. Indirect emissions include those emissions the Federal agency can practicably control and has continuing program responsibility to maintain control, and emissions caused by the Federal action later in time and/or farther removed in distance from the action itself, but that are still reasonably foreseeable. Reasonably foreseeable emissions are those from projected Federal actions that can be quantified at the time of the conformity requirements and are included in the analysis.

Reasonably foreseeable emissions analyzed for Brandon Road Lock closure include:

- Criteria pollutant emissions from mobile sources (diesel engine equipment) during transfer of cargo between barge and land at an intermodal facility; and
- Criteria pollutant emissions from mobile sources (gas and diesel engine trucks) during transport of cargo on roadways.

Only indirect mobile source emissions related to the shift from barge traffic are considered in this analysis because direct emissions from lock wall construction are temporary and are relatively minor. No stationary sources are considered in this analysis.

Emission Calculation

<u>MOVES Modeling</u>
The Motor Vehicle Emission Simulator (MOVES) is a USEPA modeling software that predicts mobile source emissions for criteria and other air pollutants under a wide range of user-defined conditions (MOVES, 2016). For this analysis, the latest version of MOVES (MOVES2014a) is used to estimate nonroad and onroad emissions at county-level for year 2021 (when lock closure would be expected to occur), then summed across all nonattainment and maintenance areas for comparison with de minimis pollutant levels. Model scenarios, specifications, and inputs were derived from an extensive transportation dataset and a number of conservative judgements and assumptions to obtain cautious yet realistic estimates. The approach for this analysis was agreed upon through multiple interagency consultations.

MOVES Nonroad Approach. The nonroad modeling scenario assumes the transfer of commodities between barge and truck by cargo-handling equipment at an intermodal facility. MOVES2014a was used to generate emission factors for various types of construction equipment. The following equation was then used to calculate annual emissions from nonroad engines (USEPA, July 2010) and local equipment population, power, and activity data:

*Emissions (g) = Engine Population * Average Power (hp) * Load Factor (fraction of available power) * Activity (hrs/yr) * Emission Factor (g/hp-hr)*

Default and exported nonroad 'nr' data tables were entered through the Nonroad Data Importer (detailed inputs are discussed below). The simulation was run for Will County, IL, where barge-truck transfer would likely occur near Brandon Road Lock.

MOVES Onroad Approach. The onroad modeling scenario assumes the overland transport of commodities between intermodal facility and various CAWS harbors and canals by roadway. MOVES2014a was used to calculate annual emissions estimates directly for each nonattainment county. An analysis of CAWS transportation data was undertaken to obtain project-specific Source Population, Vehicle Miles Traveled, and Road Type Distribution data that were input through the County Data Manager (detailed inputs are discussed below). The onroad model was run individually for each of the five counties (Table 2) impacted by alternative transportation routes.

CAWS Transportation Data

Model specifications and inputs were derived from the transportation analysis, *Transportation Rate and Social Cost Analysis of the Chicago Area Waterway System,* performed by the University of Tennessee, Center for Transportation Research (CTR) for the GLMRIS Report (University of Tennessee, 2013). As part of the analysis, CTR conducted a survey of shippers, docks, and carriers that utilized the CAWS over a three year period (2007–2009), sampling 2,265 waterborne commodity movements carrying 27 million tons of cargo that originated, terminated, or passed through the CAWS. The data represent the most diverse commodity and geographic flows in the CAWS region annually by retaining all unique movements over the three year period and deleting only duplicates. Shippers were also surveyed for their reaction to waterway closures ranging from 15 days to 180 days, which included shifting transportation modes, shifting origin-destination patterns, or permanently closing docks and no longer remaining in business.

All movements through Brandon Road Lock (2,153 movements, 21,526,802 tons) were analyzed for MOVES modeling including cargo tonnage, commodity description, and river (or off-river) origin and destination. Should the lock close for 180 days, 812 origin-destination movements (associated with 8,500,524 tons of cargo) were expected to continue routing by other modes of transportation. These data were considered a surrogate for permanent closure of the Brandon Road Lock and used to estimate numbers of vehicles and equipment, alternative land-based routes and mileage, activity hours, and other input data needed for modeling.

Modeling Assumptions

A number of judgements and assumptions were required to apply the transportation data and manage data gaps and uncertainties. The following assumptions were used to obtain conservative potential emission estimates.

- Shippers indicating they would remain in business in the CAWS region during 180 day CAWS closure by switching or adding modes of transportation were assumed to remain in business if permanent Brandon Road Lock closure occurs. Shippers that did not

indicate remaining in business during a 180 day closure were assumed to close or move to another location if permanent lock closure occurs. Thus, 180 day closure data were used as a surrogate for permanent closure of Brandon Road Lock.

- Cargo tonnage for each movement was divided in half to accurately represent the average tonnage that moves through Brandon Road Lock. The transportation dataset spans three years to account for a diversity of movements through the lock, however the 3-year high tonnage recorded for each movement overestimates a typical year. By halving the dataset tonnage through the lock to 10,763,401 tons (4,250,262 tons for those shippers remaining in business), the value accurately reflects the average annual sample tons through Brandon Road Lock (10,641,910 tons from 2007-2009).

- Cargo is assumed to move entirely by truck, as this mode of transportation produces the highest emissions compared to barge or train. This is a conservative assumption since most shippers indicated the use of rail for overland transport. Trucks are assumed to be combination trucks (tractor-trailers).

- Trucks are assumed to haul 20 tons of freight per truck. This is a reasonable estimate considering the Federal gross vehicle weight limit on national highways (80,000 lbs) minus the weight of a sleeper tractor (16,000 -19,000 lbs) and empty trailer (14,000 lbs) results in maximum payload capacities of 47,000 – 50,000 lbs or 23.5 - 25 tons (NRC, 2010). To determine the number of trucks needed to haul cargo, the tonnage of each movement was divided by 20 tons and rounded to the next highest whole number.

- Assume backhaul of trucks from destination back to origin. The return of empty trucks essentially doubles the mileage for each movement, a conservative assumption since empty backhauls would weigh significantly less and/or shippers may combine movements to reduce costs.

- CenterPoint Intermodal Center (Figure 2) is the assumed facility for transfer of cargo between barge and truck. CenterPoint is the largest inland port in North America (CenterPoint, 2016) and located a few miles southwest (downstream) of Brandon Road Lock in Will County, IL. Because of its location in a nonattainment area, nonroad emissions are included in this analysis.

Figure 2. CenterPoint Intermodal Center (CenterPoint, 2016).

- Cargo handling equipment needs and productivity rates were estimated for the transfer of commodities at an inland barge terminal at CenterPoint (Table 4). Estimates were based on experience with similar USACE projects and the following calculations:
    - Coal is a common commodity considered less efficient for on- and off-loading than liquid, containerized, and other dry bulk commodities. Thus coal was chosen as a representative yet conservative commodity for this analysis.
    - The volume of material per barge (2,493 cy) was estimated by dividing jumbo coal barge tonnage (1,750 tons) by assumed coal bulk density (52 lbs/cf or 0.702 tons/cy).
    - A hydraulic excavator (14 cy bucket) (Figure 3) and front end loader (9 cy bucket) working in tandem could unload up to 6 jumbo barges (14,958 cy) or 10,500 tons of coal per day.
    - It would take 405 days to unload all 4,250,262 tons (6,054,504 cy) of material to truck at 10,500 tons/day. Assuming 260 work days/yr (five days per week and 8 hours per day), 2 sets of equipment would be needed to work throughout the year, averaging at least 1620 hours/yr each. Assume 2080 hrs/yr of activity for each piece of equipment (Table 4).

Table 4. Cargo Handling Equipment Specifications.

Equipment type (SCC)[a]	Number of machines (Engine Population)	Average Power (hp)	Load factor[b] (fraction of available power)	Activity (hours/year)
Hydraulic Excavator[c] (2270002036)	2	525	0.53	2080
Front End Loader[d] (2270002060)	2	500	0.48	2080

[a]Source Classification Codes obtained from USEPA (2016).
[b]Load Factors obtained from USEPA (2010) estimates for Excavator and Rubber-tired Loader diesel engines.
[c]Hydraulic excavator, crawler, 140,000 lb, 14.00 cy bucket, Sennebogen 875 R-HD, 525hp, Diesel.
[d]Loader, front end, wheel, 9.00 cy bucket, articulated, 4x4, CAT 988H, 500hp, Diesel.

Figure 3. Hydraulic excavator, crawler, 140,000 lb, 14.00 cy bucket, Sennebogen 875 R-HD, 525hp, Diesel, unloading a coal barge.

- Truck routes (Figure 4) were defined using the CAWS transportation dataset and mapping applications. Nearly all movements through Brandon Road Lock originated or terminated at one of seven CAWS locations: Burns Harbor, Calumet Harbor, Chicago River, Cicero/Chicago Sanitary and Ship Canal, Gary Harbor, Indiana Harbor, or Lake Calumet. Routes between CenterPoint Intermodal Center and these seven locations were identified based on fastest travel times according to Google Maps and edited for accuracy in Google Earth Pro. Shippers downstream of CenterPoint (and a few in WI routed through Calumet Harbor) are assumed to barge the remainder of the way. Figure 4 also tabulates one-way road mileage for each route broken down by county. For the onroad analysis, Vehicle Miles Traveled (VMT) are calculated by multiplying the route mileage shown (plus mileage for backhaul) by the number of trucks on each route (Table 5).

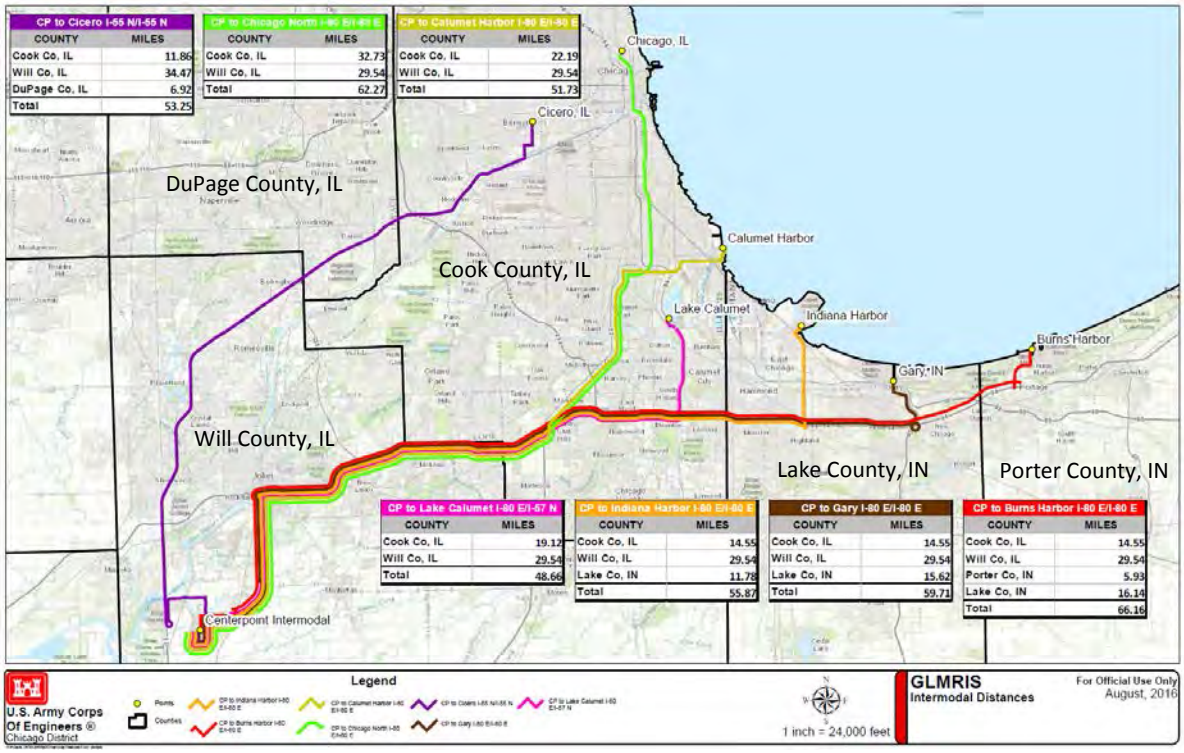

Figure 4. Truck Routes and Mileage between CenterPoint and CAWS Locations.

Table 5. Truck Route Data (with Backhaul).

Route	Number of Trucks (source type population)	Total Mileage with Backhaul (miles)	Vehicle Miles Traveled (vehicle-miles)	Fraction of Mileage by County
Cicero / Chicago Sanitary and Ship Canal	115,414	106.5	12,291,591	0.22 (Cook, IL) 0.13 (DuPage, IL) 0.65 (Will, IL)
Chicago River – North Branch	15,971	124.54	1,989,028	0.53 (Cook, IL) 0.47 (Will, IL)
Calumet Harbor	43,439	103.46	4,494,199	0.43 (Cook, IL) 0.57 (Will, IL)
Lake Calumet	14,953	97.32	1,454,927	0.39 (Cook, IL) 0.61 (Will, IL)
Indiana Harbor	7,488	111.74	836,709	0.26 (Cook, IL) 0.53 (Will, IL) 0.21 (Lake, IN)
Gary Harbor	11,057	119.42	1,320,427	0.24 (Cook, IL) 0.50 (Will, IL) 0.26 (Lake, IN)
Burns Harbor	4,554	132.32	602,494	0.22 (Cook, IL) 0.45 (Will, IL) 0.24 (Lake, IN) 0.09 (Porter, IN)

- US Census Bureau TIGER (Topologically Integrated Geographic Encoding and Referencing) data were used to identify road types in each route and calculate road type mileage per county. All road mileage was classified as either urban or rural, and restricted or unrestricted with respect to access. Roads were designated as restricted if Feature Class was S1100 Primary Road (defined as a divided, limited-access highway) or S1630 Ramp (defined as a controlled access onto a limited-access highway); otherwise they were designated unrestricted. Road type miles by route and county are given in Table 6. Road type distributions were then calculated in terms of Vehicle Miles Traveled for each county.

Table 6. Road Type Mileage[a] by Route and County.

Route	Rural Restricted	Rural Unrestricted	Urban Restricted	Urban Unrestricted
Cicero / Chicago Sanitary and Ship Canal	3.47 (Will, IL)	0.30 (Will, IL)	9.27 (Cook, IL) 6.92 (DuPage, IL) 22.63 (Will, IL)	2.59 (Cook, IL) 8.07 (Will, IL)
Chicago River – North Branch		4.86 (Will, IL)	32.19 (Cook, IL) 16.25 (Will, IL)	0.54 (Cook, IL) 8.43 (Will, IL)
Calumet Harbor		4.86 (Will, IL)	18.74 (Cook, IL) 16.25 (Will, IL)	3.45 (Cook, IL) 8.43 (Will, IL)
Lake Calumet		4.86 (Will, IL)	6.96 (Cook, IL) 16.25 (Will, IL)	12.15 (Cook, IL) 8.43 (Will, IL)
Indiana Harbor		4.86 (Will, IL)	14.55 (Cook, IL) 16.25 (Will, IL) 6.58 (Lake, IN)	8.43 (Will, IL) 5.20 (Lake, IN)
Gary Harbor		4.86 (Will, IL)	14.55 (Cook, IL) 16.25 (Will, IL) 14.33 (Lake, IN)	8.43 (Will, IL) 1.29 (Lake, IN)
Burns Harbor		4.86 (Will, IL)	14.55 (Cook, IL) 16.25 (Will, IL) 16.14 (Lake, IN) 2.67 (Porter, IN)	8.43 (Will, IL) 3.25 (Porter, IN)

[a]Mileage from 2015 Census TIGER data.

- Default fuel, meteorology, age distribution, and average speed distribution inputs from the MOVES database were used where local data were not available or sufficient. Default fuel and meteorology data are specific to region and county respectively, and assumed to be adequate for this analysis. For the onroad analysis, age distribution data were generated using the USEPA age distribution tool for year 2021, and considered conservative since fleets in the Chicago region are younger than the national average. Average speed distribution data were considered adequate. No inspection/maintenance (I/M) data were entered, a conservative assumption since I/M programs are established in the region.

User-defined Inputs

MOVES model inputs are summarized in Table 7 through Table 10. Run Specifications were created for one nonroad (Table 7) and five onroad (Table 8) simulations. The nonroad input database (Table 9) was created using the Nonroad Data Importer, and five onroad input databases (Table 10) were created using the County Data Manager. These inputs are based on the modeling approach, transportation dataset, and assumptions described above, as well as

MOVES2014 user guidance (USEPA, 2014; USEPA, 2015a; USEPA, 2015b) and interagency consultation.

Table 7. MOVES2014a Nonroad Run Specification Parameters.

Analysis Option	Description	Notes
Calculation Type	Inventory	Only option/default.
Scale/Domain	National	Only option/default.
Time Span	Year 2021 (all months, all days)	Year lock closure would occur.
Time Aggregation Level	Day	Only option/default.
Geographic Bounds	Will County, IL	Location of intermodal yard.
Sector	Construction	Cargo handling equipment.
Fuel Types	Gasoline, Nonroad Diesel, Compressed Natural Gas, Liquefied Petroleum Gas	All valid fuel/sector combinations.
Road Type	Nonroad	Only option/default.
Pollutants	VOCs, NO_X, CO, $PM_{2.5}$-Total, PM_{10}-Total, SO_2	All criteria pollutants (except Pb N/A) and prerequisites (Table 3).
Equipment Operating Processes	All processes	Running exhaust, vapor venting, permeation, refueling loss, etc.
Output Emission Details	SCC (Source Classification Code) and HP (horsepower) Class	To classify emission factor results.
Output Units	Grams, joules, miles	Mass, energy, distance.

Table 8. MOVES2014a Onroad Run Specification Parameters.[a]

Analysis Option	Description	Notes
Calculation Type	Inventory	Pollutant mass within region and time span.
Scale/Domain	County level	Regulatory requirement.
Time Span	Year 2021 (all months, all days, all hours)	Year lock closure would occur.
Time Aggregation Level	Hour	Regulatory requirement/default.
Geographic Bounds[a]	Cook, DuPage, and Will Counties in Illinois, and Lake and Porter Counties in Indiana	Each county individually modeled.
Vehicle Types	Combination Short-haul Truck (Source Type 61)	Short haul assumes less than 200 miles per trip.
Fuel Types	Gasoline and Diesel	All valid fuel/vehicle combinations.
Road Type	Rural Restricted (RR), Rural Unrestricted (RU), Urban Restricted (UR), Urban Unrestricted (UU), Off-network	All road types.
Pollutants	VOCs, NO_X, CO, $PM_{2.5}$-Total, PM_{10}-Total, SO_2	All criteria pollutants (except Pb N/A) and prerequisites (Table 3).
Vehicle Operating Processes	All processes	Running exhaust, start exhaust, evaporation, brake and tire wear, fuel leaks, refueling spillage, etc.
Output Units	Grams, joules, miles	Mass, energy, distance.

[a]Five RunSpecs were created, one for each county. The only parameter that changed was Geographic Bounds.

Table 9. MOVES2014a Nonroad Input Data.

Data Entered	Description	Notes
Fuel	Exported fuel tables	National data applied at regional level.
Meteorology	Exported meteorology tables	National data applied at county level.
Generic Nonroad/NR Tables	Default tables	All other nonroad data tables imported.

Table 10. MOVES 2014 Onroad Input Data.[a]

Data Entered	Description	Notes
Vehicle Miles Traveled (vehicle-miles)	6,954,589 (Cook, IL) 1,597,330 (DuPage, IL) 13,714,696 (Will, IL) 668,841 (Lake, IN) 53,919 (Porter, IN)	Total of 22,989,375 truck miles (includes backhaul).
Source Type Population (number of trucks)	212,876 (Cook, IL) 115,414 (DuPage, IL) 212,876 (Will, IL) 23,099 (Lake, IN) 4,554 (Porter, IN)	Total of 212,876 combination short-haul trucks.
Road Type Distribution (by VMT)	RR RU UR UU 0 0 0.82 0.18 (Cook, IL) 0 0 1.00 0 (DuPage, IL) 0.06 0.07 0.61 0.26 (Will, IL) 0 0 0.84 0.16 (Lake, IN) 0 0 0.45 0.55 (Porter, IN)	2015 Census TIGER data.
I/M Programs	No Inspection/Maintenance Program	Conservative assumption.
Fuel	Exported default fuel data	Recommended.
Meteorology	Exported default meteorology data	National data applied at county level.
Age Distribution of Combination Short-haul Truck Fleet	Default age distributions	Source Type Age Distribution Tool (version 11/21/14) used for analysis year 2021.
Average Speed Distribution	Default speed distributions	National averages.

[a]Five separate input databases were created, one for each county. Vehicle Mile, Source Population, and Road Type data for each county are shown.

Emissions Results

Once the nonroad model simulation was complete, emission results were obtained by running a MySQL post-processing script on the Nonroad Output Database. The script generated pollutant emission factors per horsepower-hour by equipment type (SCC). Table 11 summarizes the maximum emission factors for the assumed equipment and horsepower combinations. These results are combined with equipment specifications (Table 4) using the nonroad emission equation (USEPA, 2010) to calculate pollutant emission rates (Table 12).

Table 11: MOVES2014 Nonroad Emission Factors in g/hp-hr per day.[a]

Equipment	NOx	VOC	SO2	PM2.5
Hydraulic Excavator (525 hp)	0.8215	0.1605	0.0027	0.0375
Front End Loader (500 hp)	1.4624	0.1750	0.0029	0.0858

[a]MySQL post-processing script used to obtain results: EmissionFactors_per_hphr_by_SCC_and_ModelYear

Once an onroad model simulation was complete, emission results were obtained by post-processing outputs to produce a Summary Report. Report parameters included the year, pollutants, and precursors associated with nonattainment or maintenance status of that simulation (aka county). Annual pollutant masses reported were directly comparable to de minimis levels (Table 12).

In summary, NO_X, VOCs, CO, SO_2, PM_{10} and $PM_{2.5}$ emissions were calculated by MOVES for nonroad and onroad mobile sources and are shown in Table 12. Pollutant emissions were summed across all counties for total nonattainment and maintenance area estimates. Total emissions were found to be well below all de minimis pollutant levels required for the nonattainment areas. VOC emissions were the most significant, but at 23 tons/yr were still well below the de minimis level of 100 tons/yr. SO_2, PM_{10} and $PM_{2.5}$ emissions are very low at under 1 ton/yr each, compared to de minimis levels of 100 tons/yr. Because all mobile source emissions are de minimis for criteria pollutants, the act of closing Brandon Road Lock demonstrates conformity.

Table 12: MOVES2014 Estimated Emission in Tons/Yr

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Onroad						
Cook, IL	1.51	8.42		0.02	0.24	0.22
DuPage, IL	0.34	4.68				0.10
Will, IL	3.02	8.61		0.03		0.27
Lake, IN	0.15	0.93	11.41	0.00	0.03	0.02
Porter, IN	0.01	0.19				0.00
Nonroad (Will, IL)						
Hydraulic Excavators	1.05	0.20		0.00		0.05
Front End Loaders	1.61	0.19		0.00		0.09
Total NAA/MA Emissions	**7.69**	**23.22**	**11.41**	**0.05**	**0.27**	**0.75**
De Minimis Emission Levels	100	100	100	100	100	100
Conformity Determination Required?	No	No	No	No	No	No

Sources of Error

Despite best efforts to provide accurate estimates, actual emissions will vary to some degree due to various sources of error within the model and input-related uncertainties. This analysis is based on data from the *Transportation Rate and Social Cost Analysis of the Chicago Area Waterway System* (University of Tennessee, 2013) that have been validated for accuracy, reliability, representativeness, and usefulness in USACE GLMRIS analyses. A number of judgements and assumptions were required to utilize these data for the purpose of conformity however, including assuming an intermodal transfer facility location, estimating overland truck routes, assuming movements after 180 days of lock closure will occur after permanent lock closure, and assuming historical movement and decision data accurately reflects movements or

decisions in year 2021. To safeguard against underestimating actual emissions, many conservative assumptions were also applied. These include moving all commodities by truck instead of rail (which most shippers indicated they would choose), including mileage for backhaul of empty trucks once movements were complete, elevating estimated activity hours of cargo handling equipment, and considering only emission increases rather than 'net' emissions (aka not accounting for emission reductions from elimination of barge traffic). Default datasets were used when project-specific data was unavailable, which are generally considered to be conservative for the Chicago region. For instance I/M programs were not accounted for although they exist, and fleet age and equipment age are likely to be younger than national averages (Corps of Engineers construction estimates assume 3-year old equipment).

Ultimately, while actual emissions will vary from those predicted by MOVES, there exists such a large margin between the de minimis levels and our current emissions estimates that it is highly unlikely these sources of error would push our emissions out of compliance.

Procedure

Procedural requirements of the conformity rule allow for public review of the Federal agency's conformity determination. Although the conformity determination is a Federal responsibility, state and local air agencies are provided notification and their expertise consulted. No documentation or public participation is required for applicability analyses that result in de minimis determination.

The Federal agency must provide a 30-day notice of the Federal action and draft conformity determination to the appropriate USEPA Region, and State and local air control agencies. The Federal agency must also make the draft determination available to the public to allow opportunity for review and comment. For the Brandon Road Fish Barrier Feasibility Study, the public and agency review process will occur within the National Environmental Policy Act review framework.

Conclusions

This report documents determination of conformity for Brandon Road Lock closure, the worst-case emissions alternative currently being examined under the GLMRIS Brandon Road Feasibility Study. If selected, Brandon Road Lock closure would decrease air quality in the CAWS region by shifting barge traffic onto roads and rail. Mobile source emissions were estimated using USEPA guidance and MOVES (Motor Vehicle Emission Simulator) models with quality transportation data and conservative modeling assumptions. Emission estimates were found to be de minimis for criteria air pollutants. Based on these findings, Brandon Road Lock closure demonstrates conformity. This determination is subject to review by state and local authorities, and also by the public. The review will take place as part of the review of the Environmental Impact Statement, which will allow an opportunity for review and comment by interested parties.

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