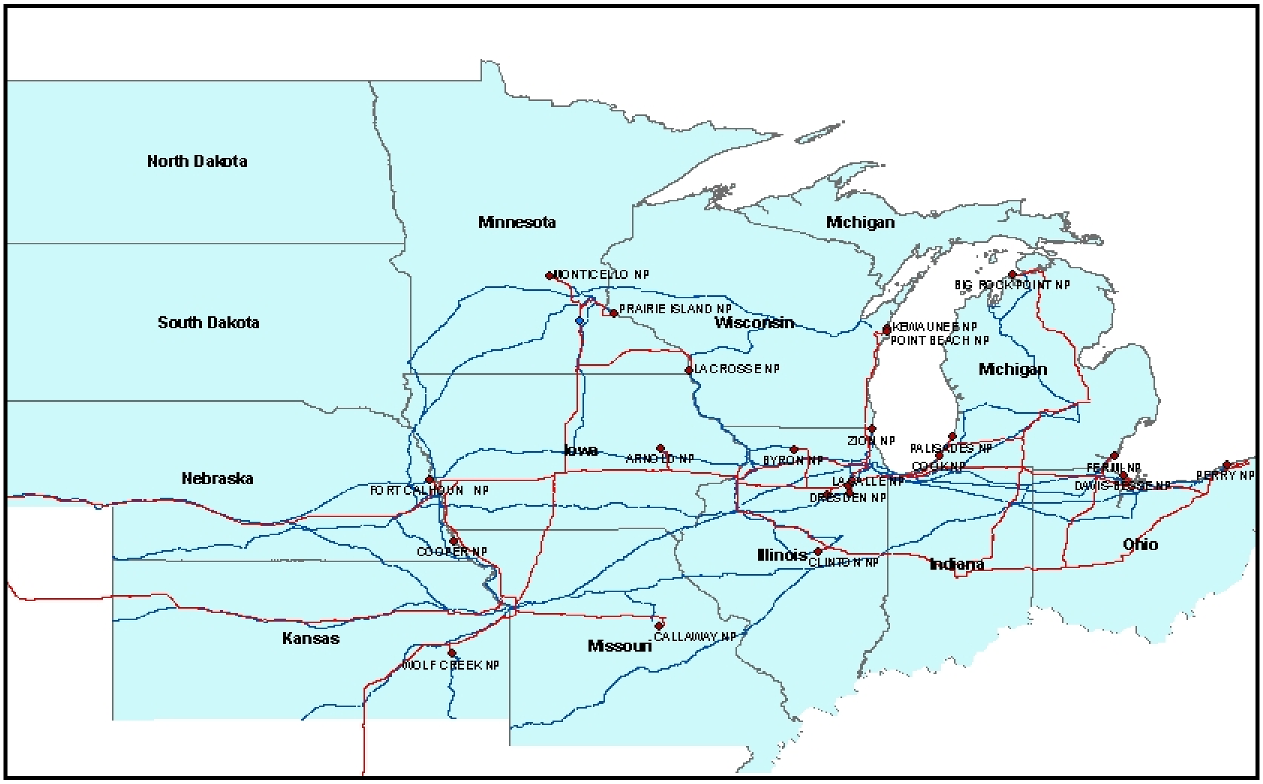
The Council of State Governments' Midwestern Radioactive Materials Transportation Committee

Route Identification Project:

Final Report to the U.S. Department of Energy's Office of Civilian Radioactive Waste Management



CSG Midwest

Cooperative Agreement No. DE-FC28-04RW12282

December 7, 2005

TABLE OF CONTENTS

PROJECT OVERVIEW

The Midwestern region originally proposed the idea of conducting a regional route identification project during a meeting in November 2003 with then Undersecretary Robert Card and the other state regional groups. The rationale for the project was that, since states are in a better position than the federal government to judge the quality of potential highway and rail routes through their jurisdictions, route selection for shipments under the Nuclear Waste Policy Act (NWPA) should begin with a regional review of available routes.

A few months later, The Council of State Governments' Midwestern Office (CSG Midwest) wrote the project into the regional work plan and DOE accepted the proposed project for fiscal year 2005. On December 7, 2005, the Midwest presented its findings to representatives of the U.S. Department of Energy. This report summarizes the work that CSG Midwest and the states performed to complete the project.

Work on the route identification project began in June 2004, at the spring meeting of the Midwestern Radioactive Materials Transportation Committee in Topeka, Kansas. The committee organized a work group of five states to participate: Illinois, Iowa, Missouri, Nebraska, and Ohio. Each state was asked to appoint at least one person to serve on the work group. In some states, more than one person represented the state on conference calls and in meetings.

Over the course of its 18-month project period, the Midwestern Route Identification Work Group held 10 conference calls and two meetings. In addition, the staff and representatives of each of the five states attended a training session on DOE's TRAGIS routing software.

The group spent the first four calls developing its approach, the criteria for evaluating routes, and their relative weights. On the very first call, the group agreed that a good start would be to look first at the Department of Transportation's (DOT) *Guidelines for Selecting Preferred Highway Routes for Highway Route-Controlled Quantity Shipments of Radioactive Materials.* The group also considered some sample criteria that Dr. Ruth Weiner had provided at the April 2004 meeting of DOE's Transportation External Coordination Working Group.

The early discussions of route selection criteria centered on the three primary factors from the DOT *Guidelines:* radiation exposure to the general public from normal transport, public health risk from accidental release of radioactive materials, and economic risk from accidental release of radioactive materials. The group added five other criteria from Dr. Weiner's example: accident likelihood, urban centers transited, route length, track/road quality, and traffic density. The group later decided to eliminate route length from the list of factors. The rationale was that route length would have more relevance for national routes than for regional routes. In addition, because it was an essential element in the formulae for the primary factors, route length would already influence the results. Moreover, the group felt certain that DOE would adopt route length as a criterion so there was no urgent need for the region to do so for its own project.

By early September 2004, the work group had settled on three primary criteria and four secondary criteria. The staff sent out a written project update to the full committee later that month. A few weeks later, CSG Midwest hired Sarah Wochos, who joined the Route Identification Work Group.

On the work group's fifth call, in October 2004, the members first discussed the idea of asking DOE for training on TRAGIS, the department's routing software. The training took place the following January in Oak Ridge, Tennessee. In November 2004, the work group made its first oral report to the full committee on the project's progress. The committee approved the route selection criteria at that meeting.

Several conference calls were devoted to refining the factors to aid the group's understanding of what data to use, where to get it, how to calculate the final scores, and how to narrow down the list of available routes. The work group also walked through examples using potential routes from the Dresden plant in Illinois; sample data were plugged in to help the group verify the model that the staff had developed using Microsoft Access. In early 2005, the work group identified a need to purchase more powerful software than CSG Midwest had available. In April 2005, therefore, the office purchased ArcView for the staff to use to analyze land use data and to generate detailed maps to support the project. This analysis was just one step in the long process of collecting data, generating routes using TRAGIS, putting inputs into the model, and assigning relative rankings to the routes.

In June 2005, the work group reported on its progress to the full committee at the spring meeting in Traverse City. Following this meeting, work group members met in Lombard, Illinois, on June 21-22 to review the preliminary analysis of the routes. At that meeting, the members narrowed down the list of available routes considerably. The work group briefed the full committee on its preliminary findings on a conference call on July 28. The committee members agreed to consult with their state departments of transportation and other agencies to obtain feedback on the proposed routes. The committee also gave the work group permission to begin its outreach to the railroads, the other regions, and other stakeholders, as necessary.

At the end of August, the staff wrote to the Southern and the Western committees to let them know how the Midwest's proposal might impact those regions. The feedback from the regions did not affect the proposed routes. In its reply, the West reiterated its belief that DOE, not the regions, should initiate the route selection process, therefore the region felt it would be inappropriate to comment on the Midwest's work. The South replied that the region did not have any problems with the Midwest's proposed maps. The staff did not consult the Northeast region because the routes leaving the Midwest do not enter the Northeast.

In September and October, three work group members met separately with the six major railroads (NS, UP, BNSF, CP, CN, and CSX) to discuss the rail routes the group had identified, as well as to obtain information on the rail planning process. The feedback resulted in some changes to the map, particularly with regard to transfer points between railroads. Additional feedback from the states resulted in a few of the smaller rail lines being removed from the final map. In October, the Route Identification Work Group held its ninth call, the purpose of which was to review the feedback from the states and other parties.

At the committee's fall meeting, the work group reported once more to the full committee and sought feedback on an information flyer as well as "key messages" pertaining to the route identification project. The purpose of the flyer was to assist the states in their outreach to the governors' offices, the legislatures, or any other agencies the members chose to notify about the project and the presentation that the region would make to DOE.

The goal in requesting that states reach out to their governors was not to obtain approval, but rather to avoid any surprises. Above all, the work group members asked the states to emphasize that the region would not recommend that DOE use the proposed routes through the Midwest. Instead, the recommendation would be that DOE use the proposed route maps as a starting point for discussions at the national level. The purpose of the key messages was to assist the committee members in answering any questions they might receive from within state government or from the press, in the event there would be some media interest in the project.

The final work group call took place on Monday, December 5, in preparation for the group's final presentation to DOE in Lombard, Illinois, at the CSG Midwest office on December 7.

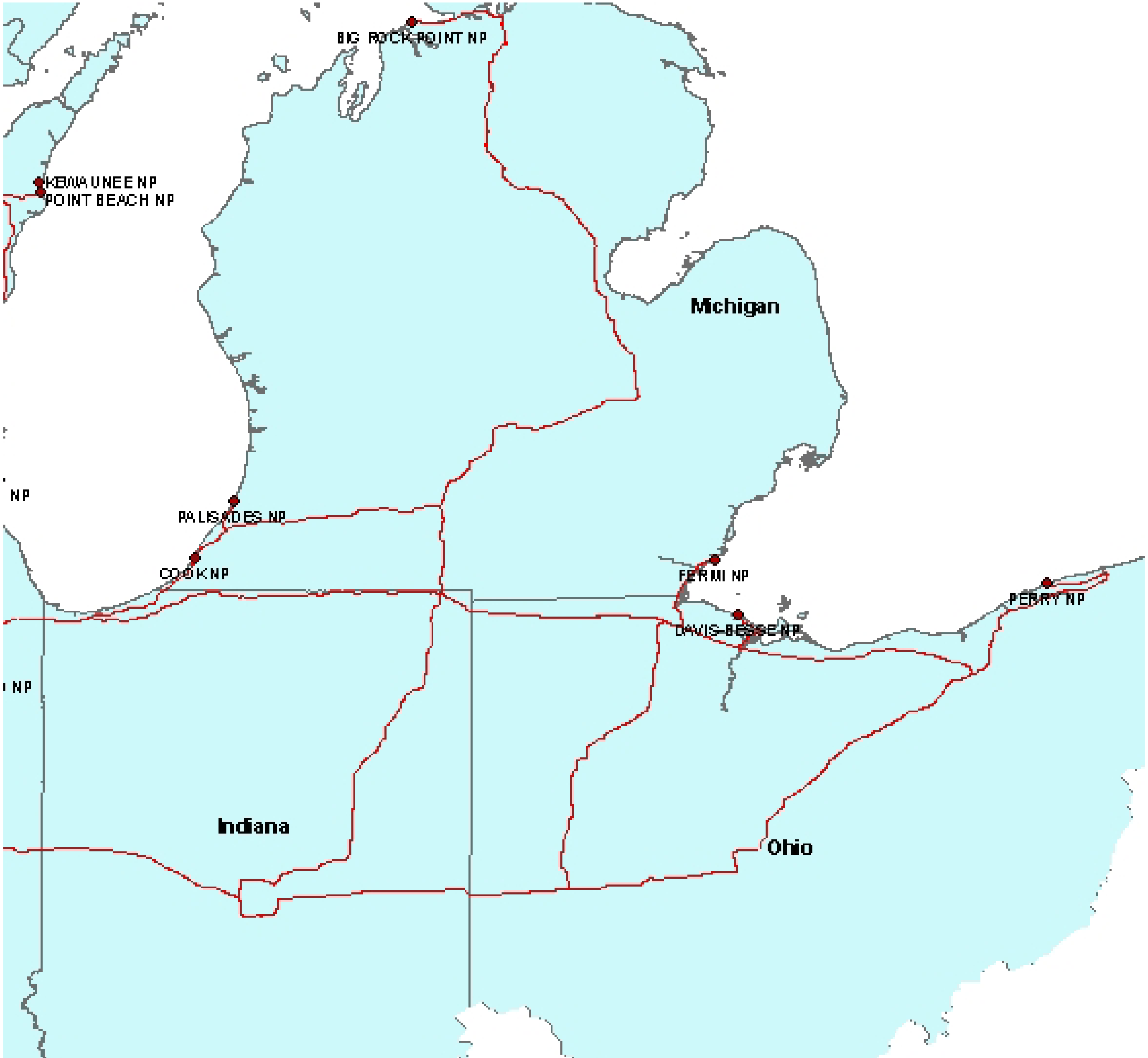
Over the lifetime of the project, the work group made only two changes to the original scope. First, the group decided not to look at routes from power plants that are located outside the region. Originally, this decision stemmed from the belief that the other regions would pursue their own route identification projects, with the Midwest having an opportunity to review the resulting routes that would affect the region. The other regions ultimately decided not to work on their own projects, however the work group still felt that it was appropriate to limit the regional project to just the Midwestern reactors.

Second, the work group decided not to reach out to the tribes in the same manner as the states. The concern was that the region might get ahead of DOE in interacting with the tribes, which would not be productive in the long run. Tribal outreach, therefore, was set aside as something for DOE to do at the appropriate time.

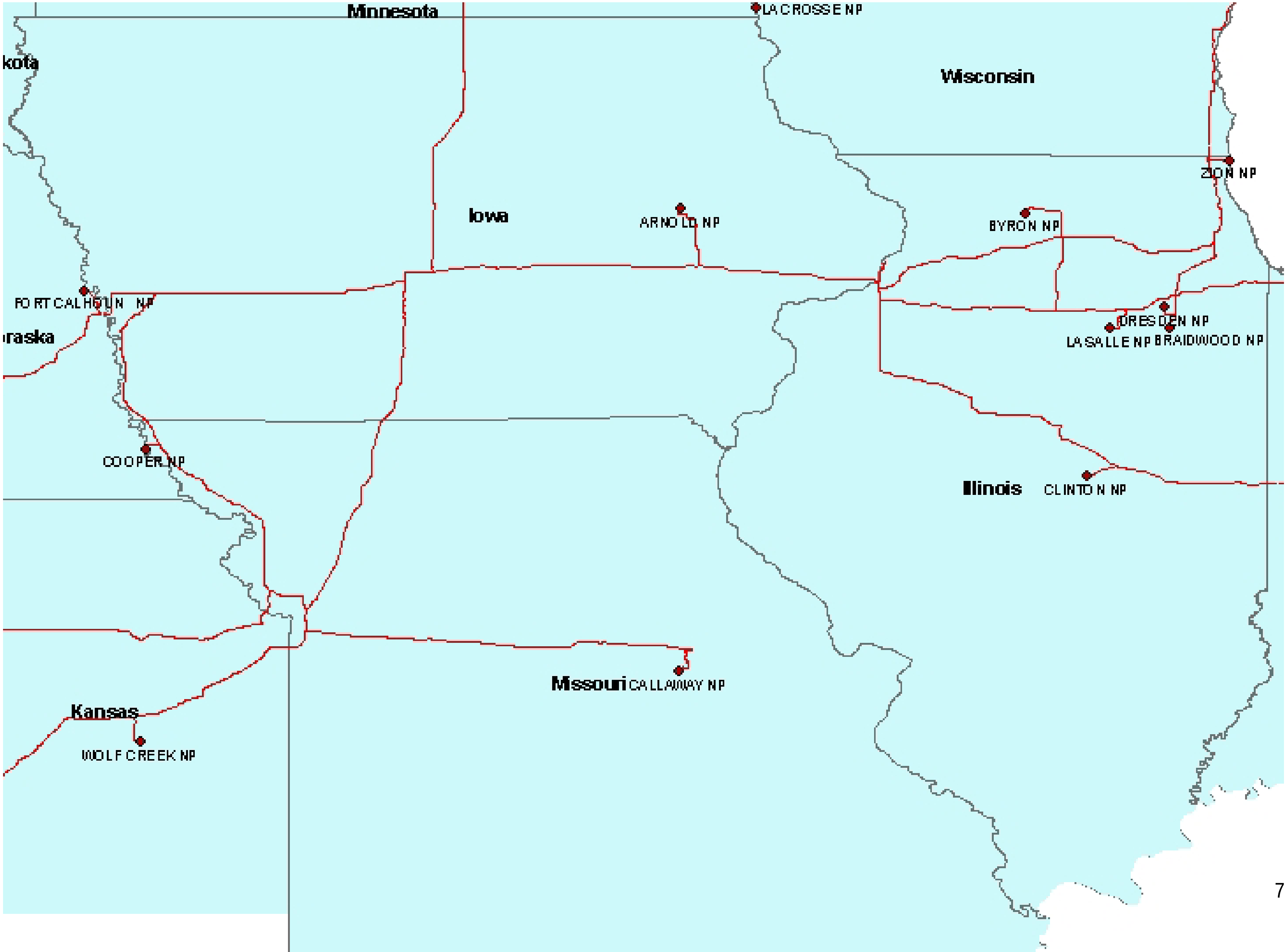
MAPS

Final Highway Map

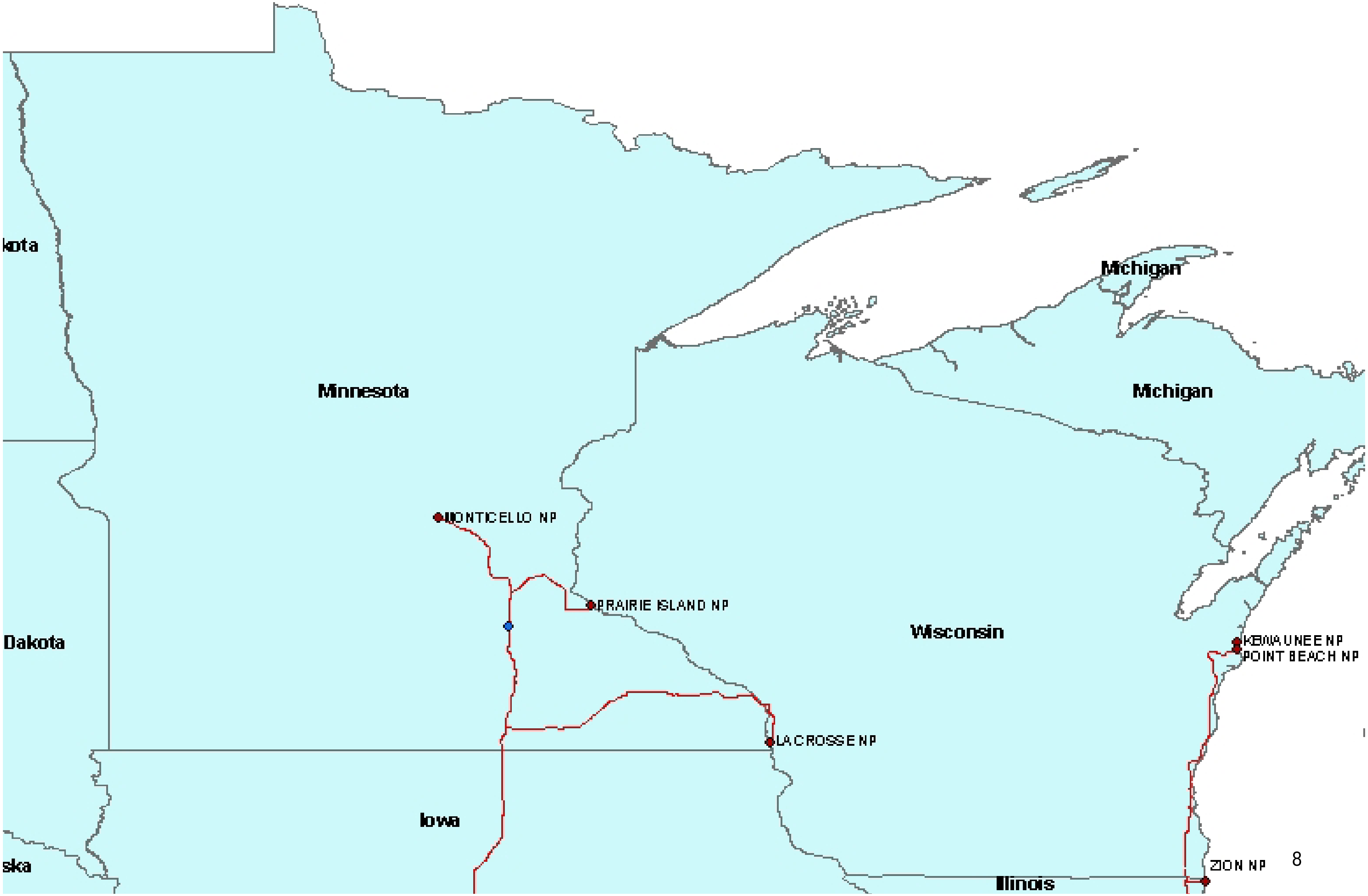
Final Highway Map – MI, OH & IN Detail



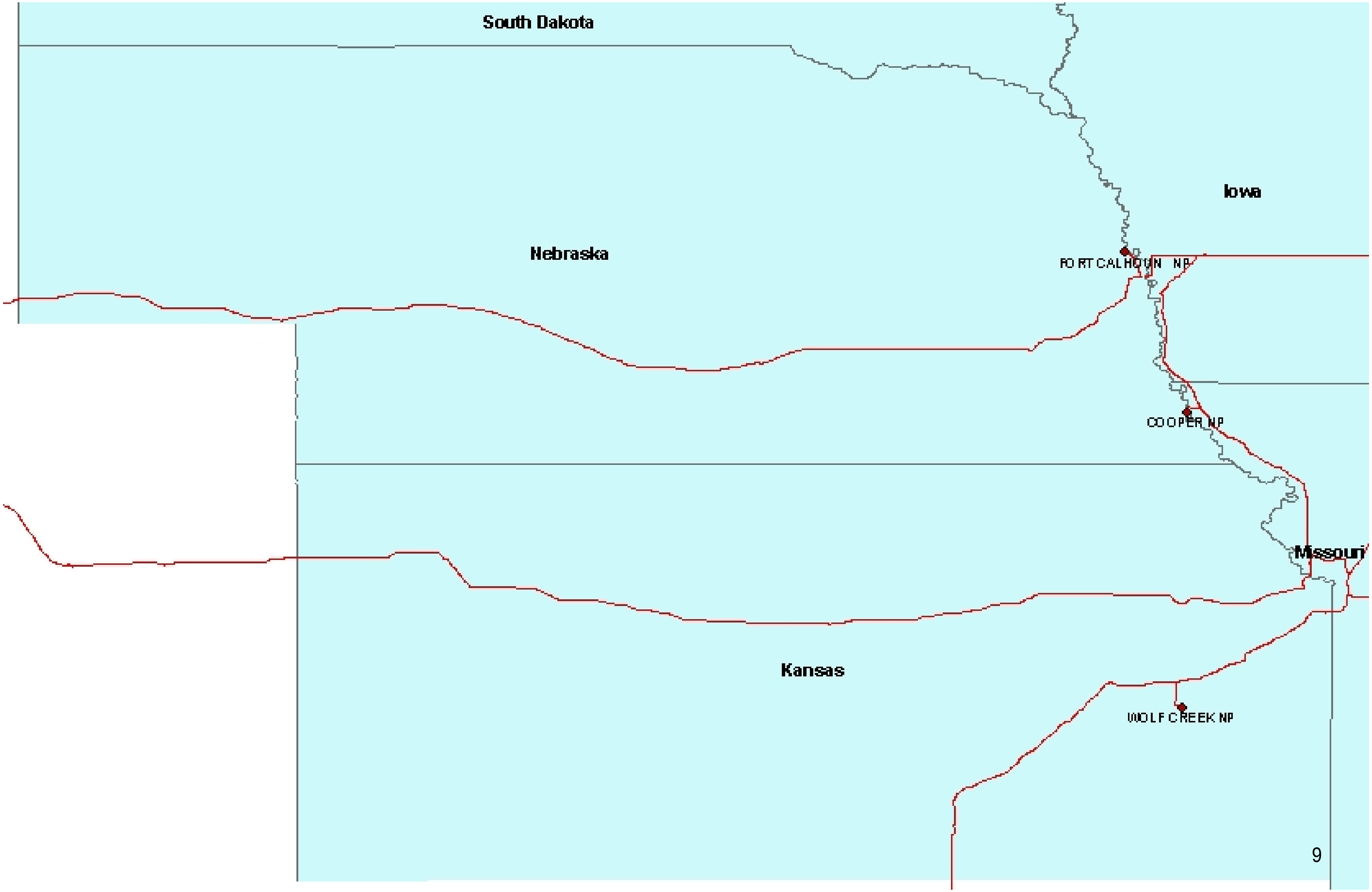
Final Highway Map – IL, IA & MO Detail



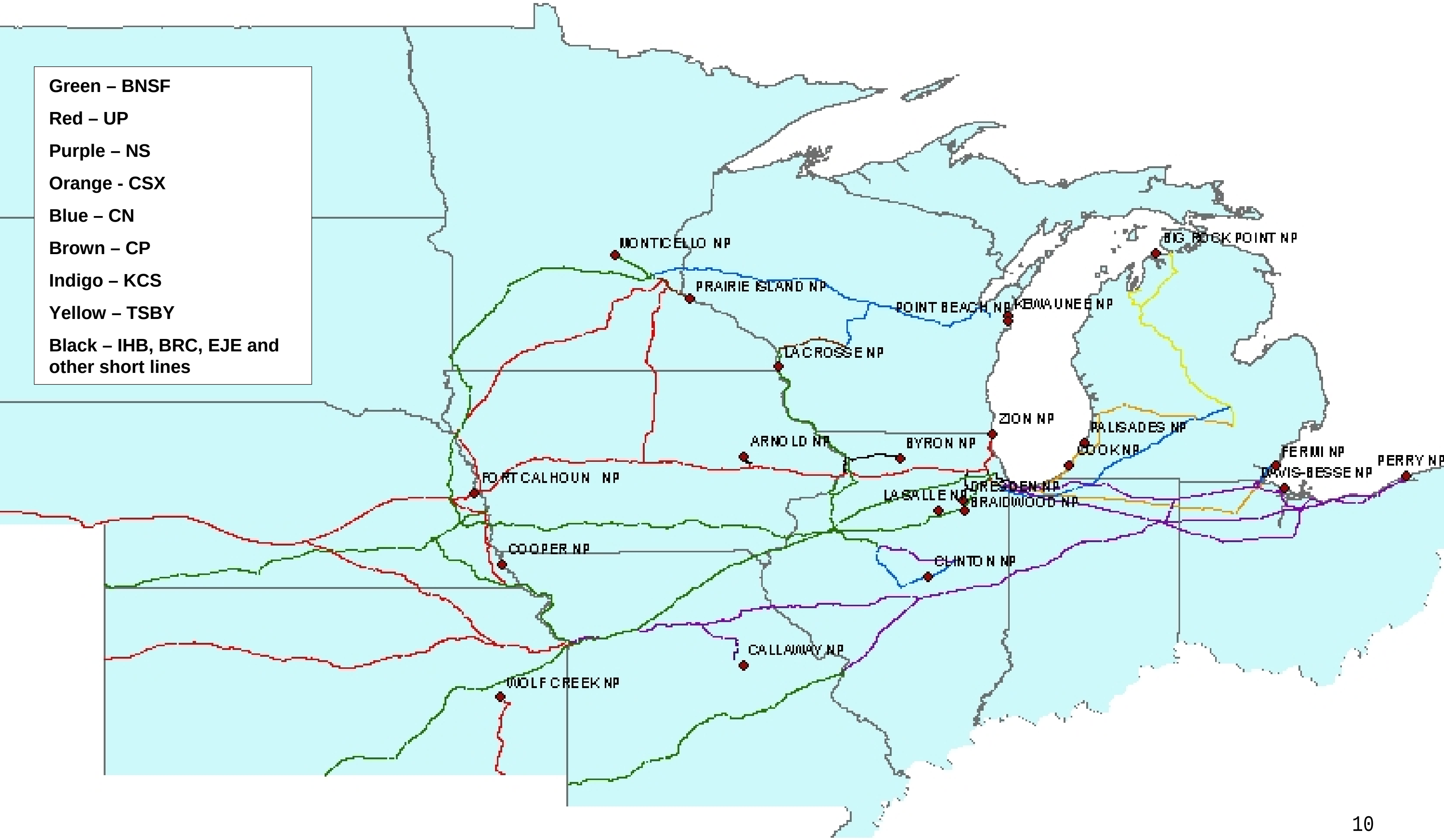
Final Highway Map – MN & WI Detail



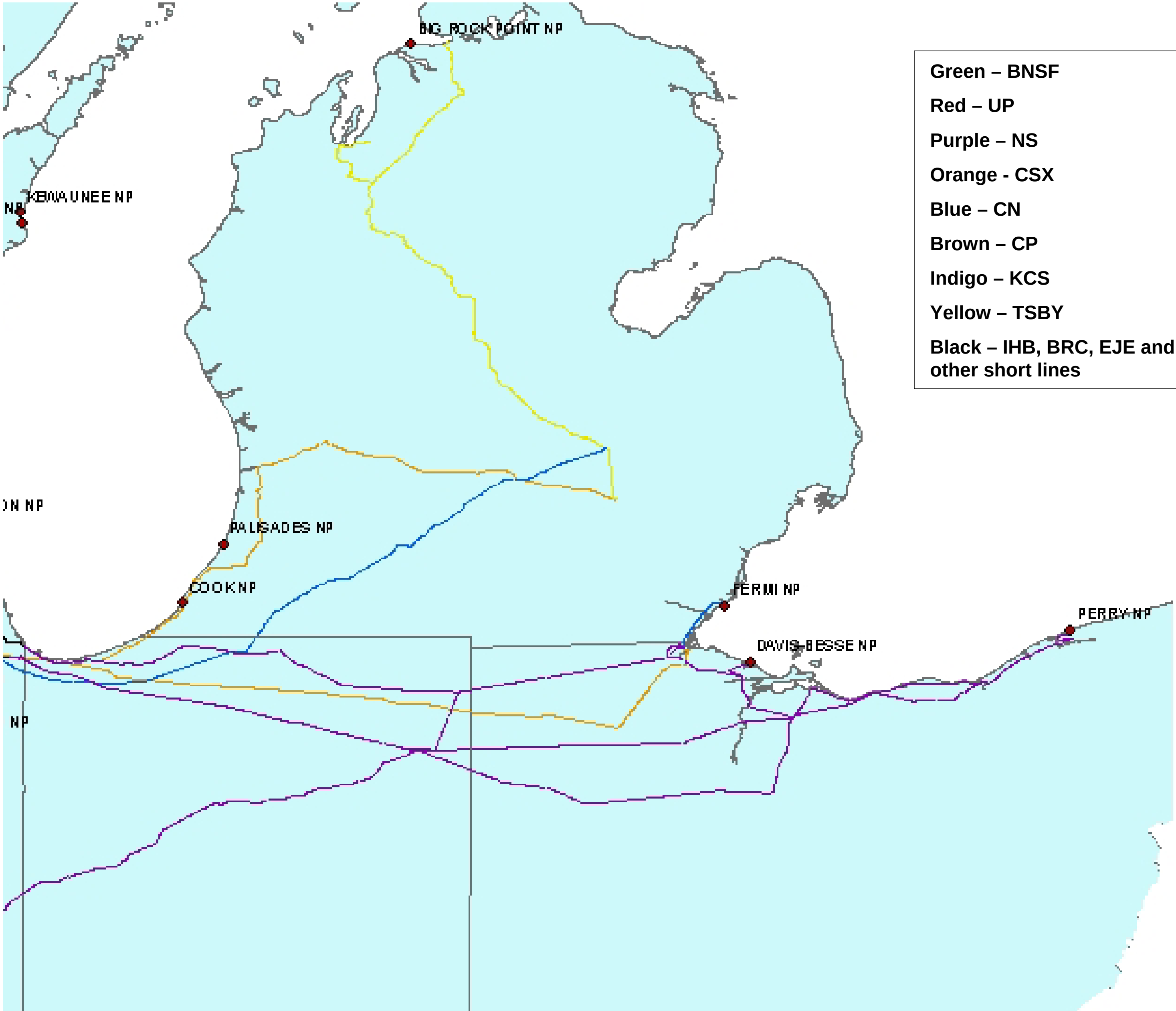
Final Highway Map – KS & NE Detail



Final Rail Map

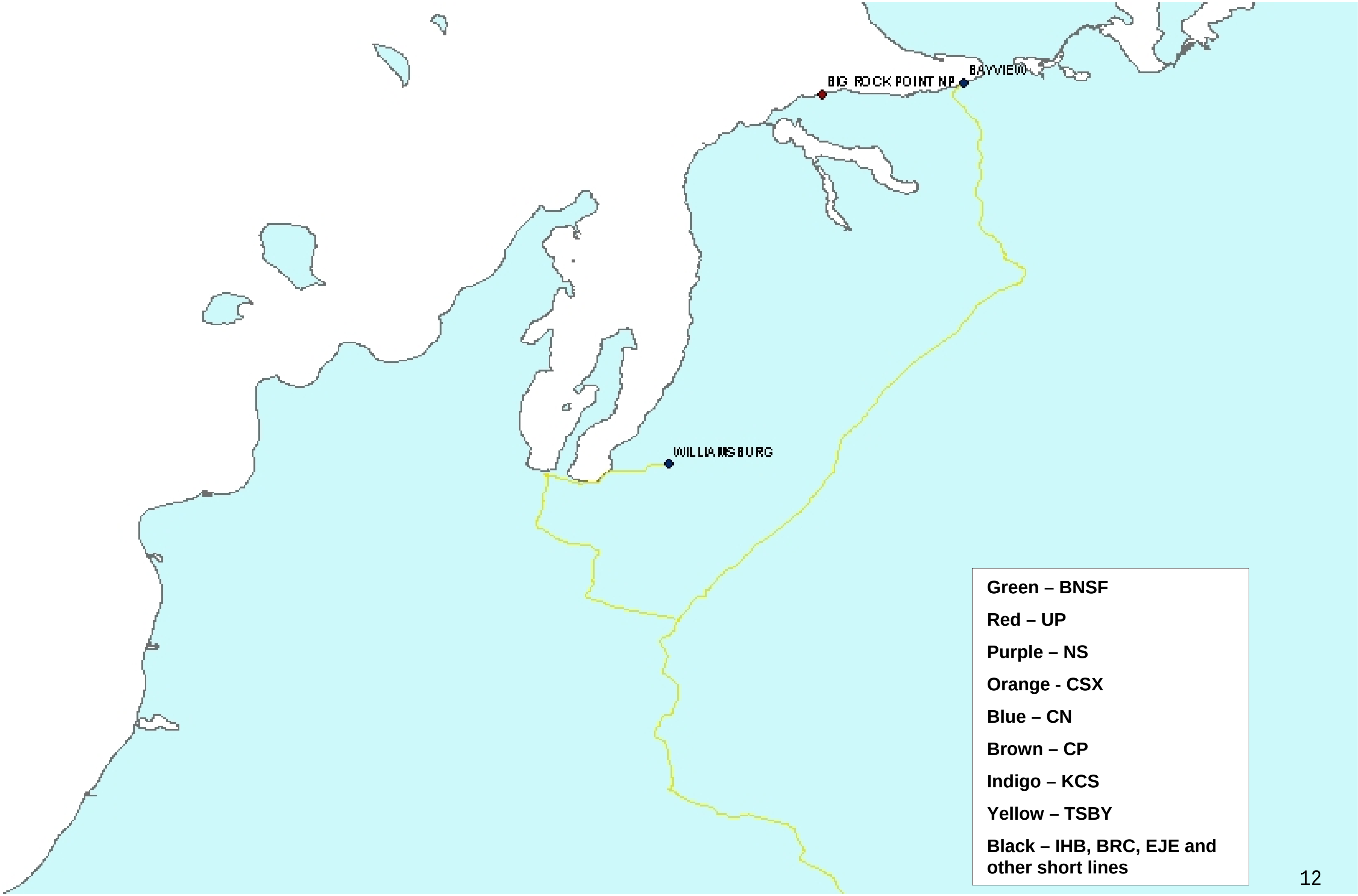


Final Rail Map – MI, OH & IN Detail



Green – BNSF
Red – UP
Purple – NS
Orange - CSX
Blue – CN
Brown – CP
Indigo – KCS
Yellow – TSBY
Black – IHB, BRC, EJE and other short lines

Final Rail Map – Northern MI Detail



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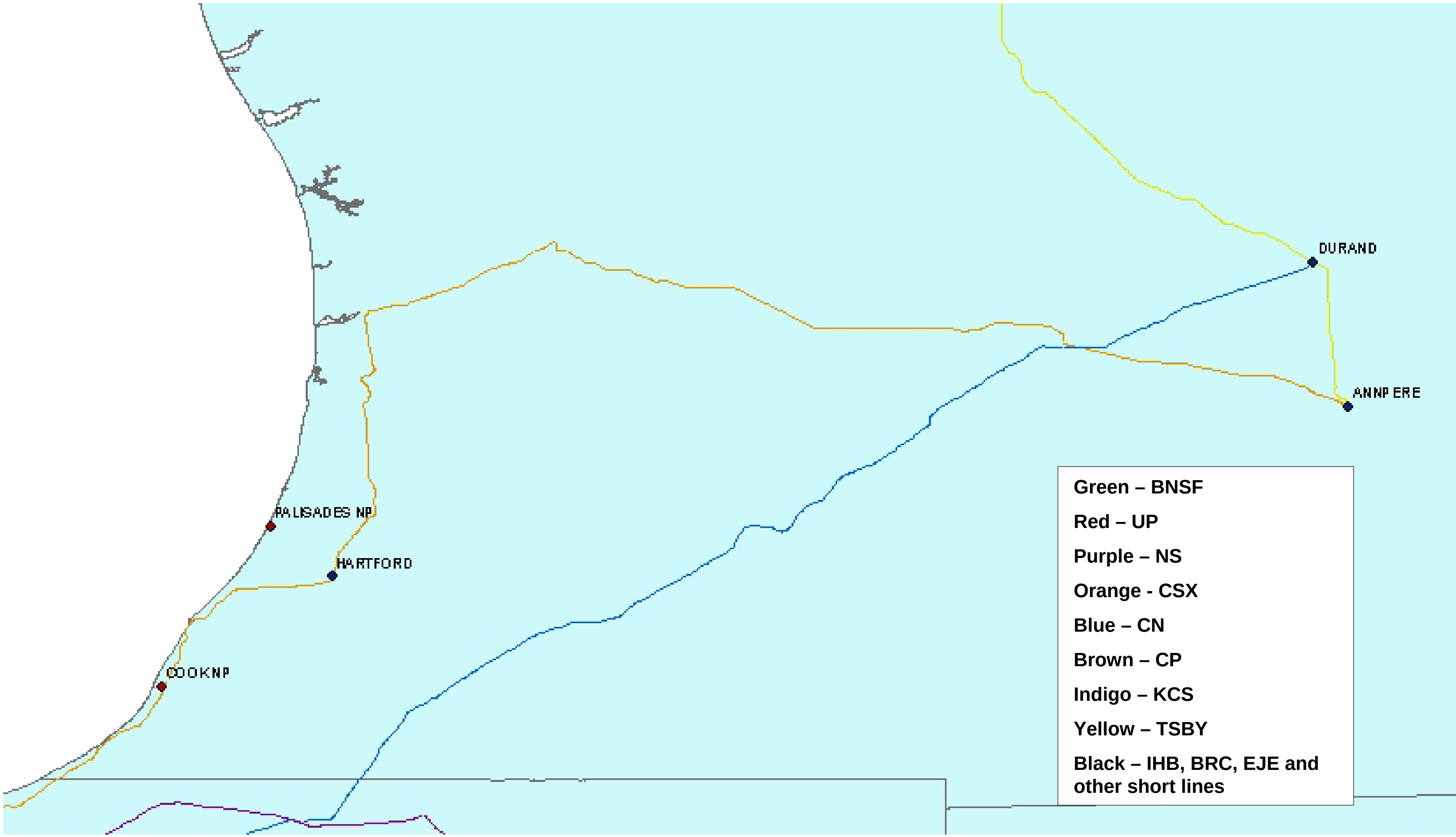
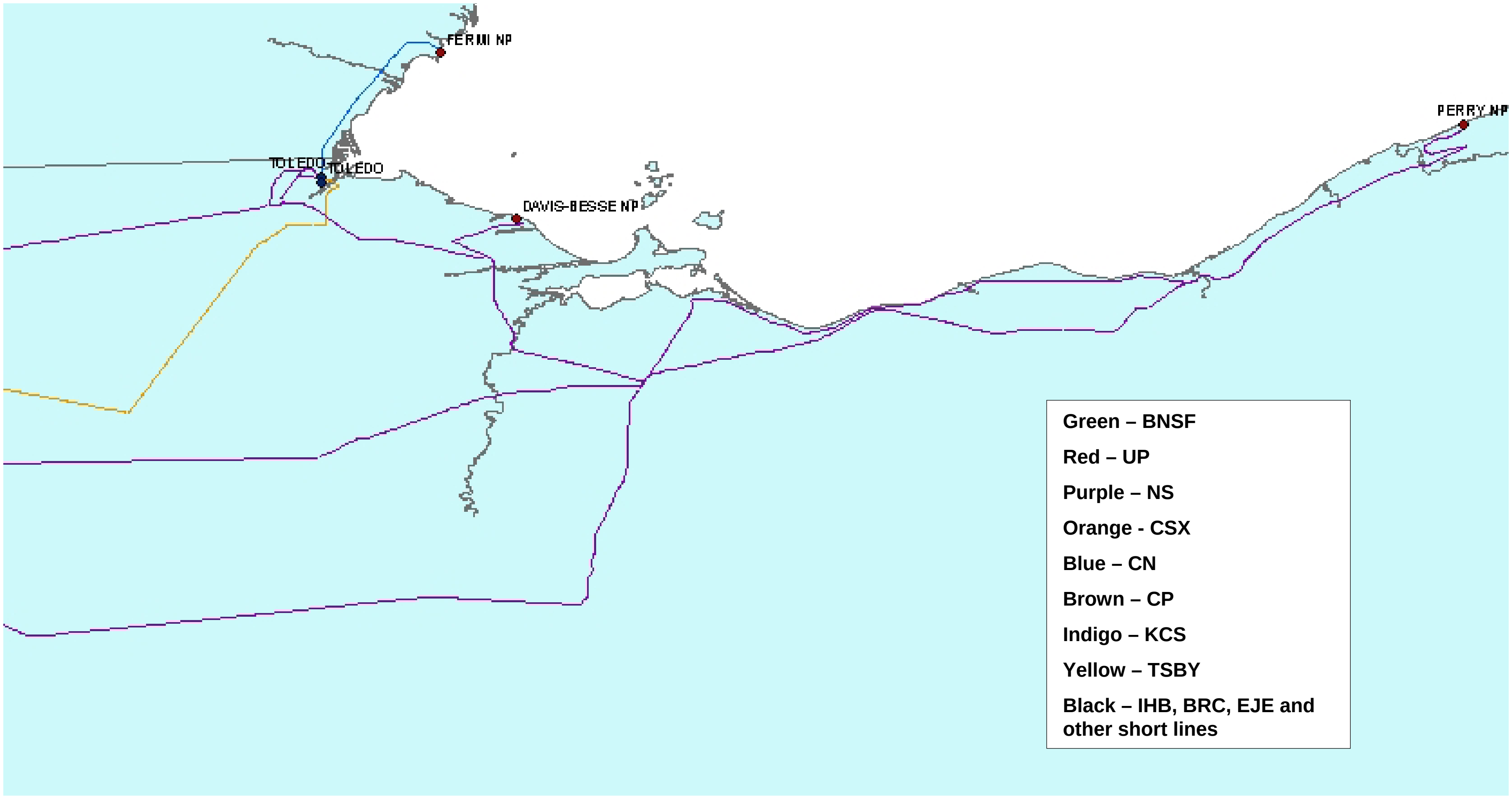
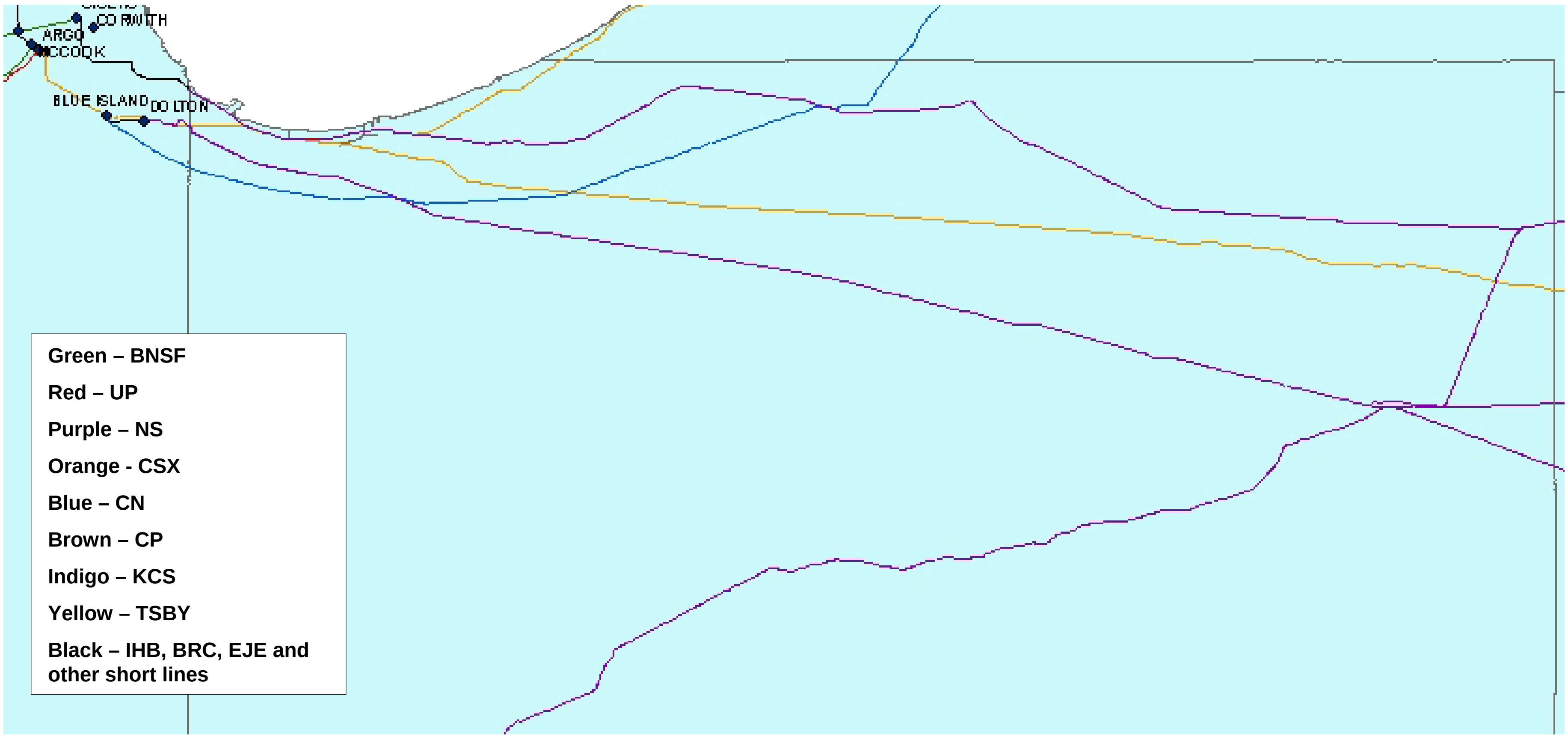
Final Rail Map – Southern MI Detail



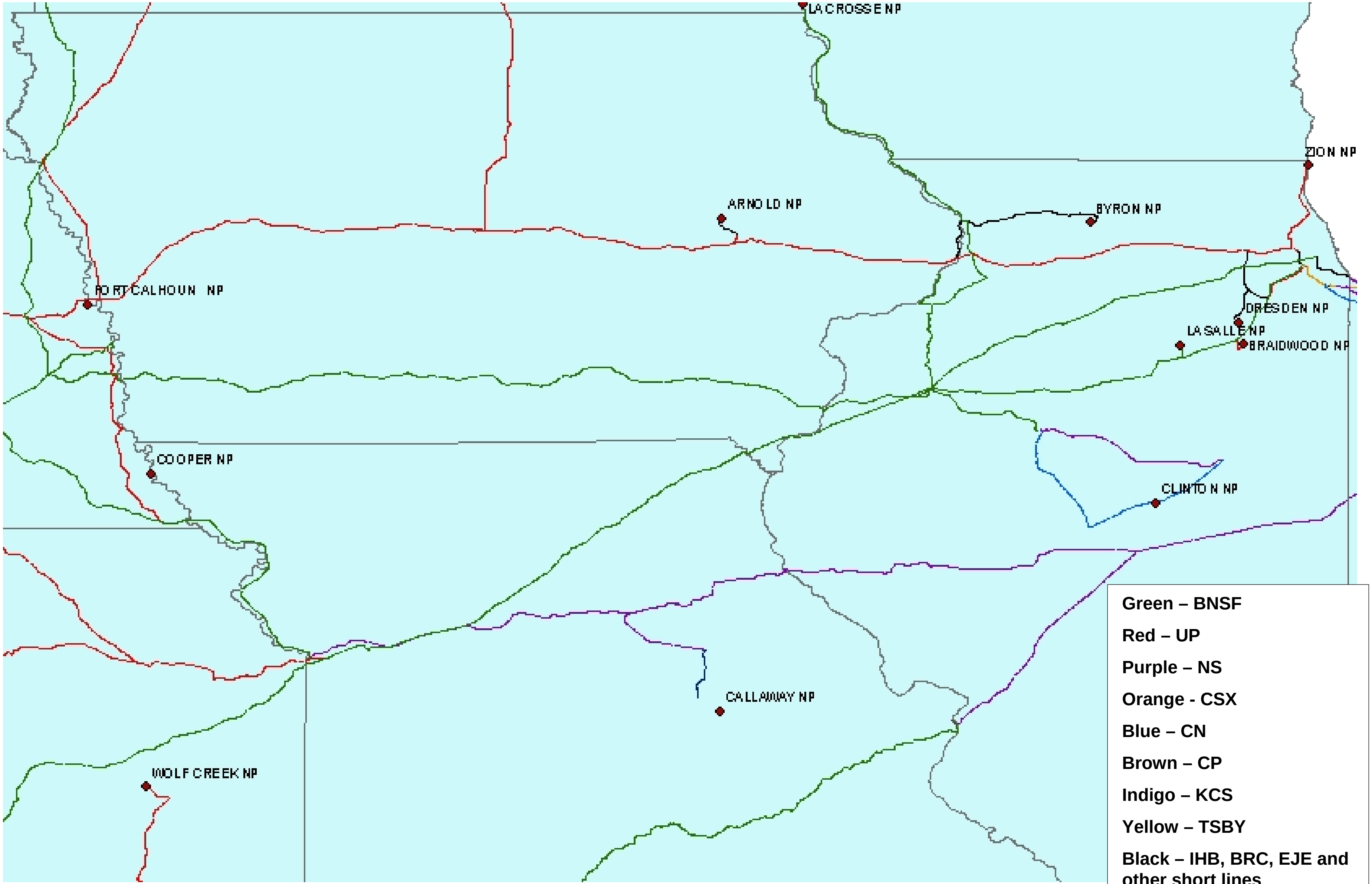
Final Rail Map – Toledo Detail



Final Rail Map –IN Detail



Final Rail Map – IL, IA & MO Detail



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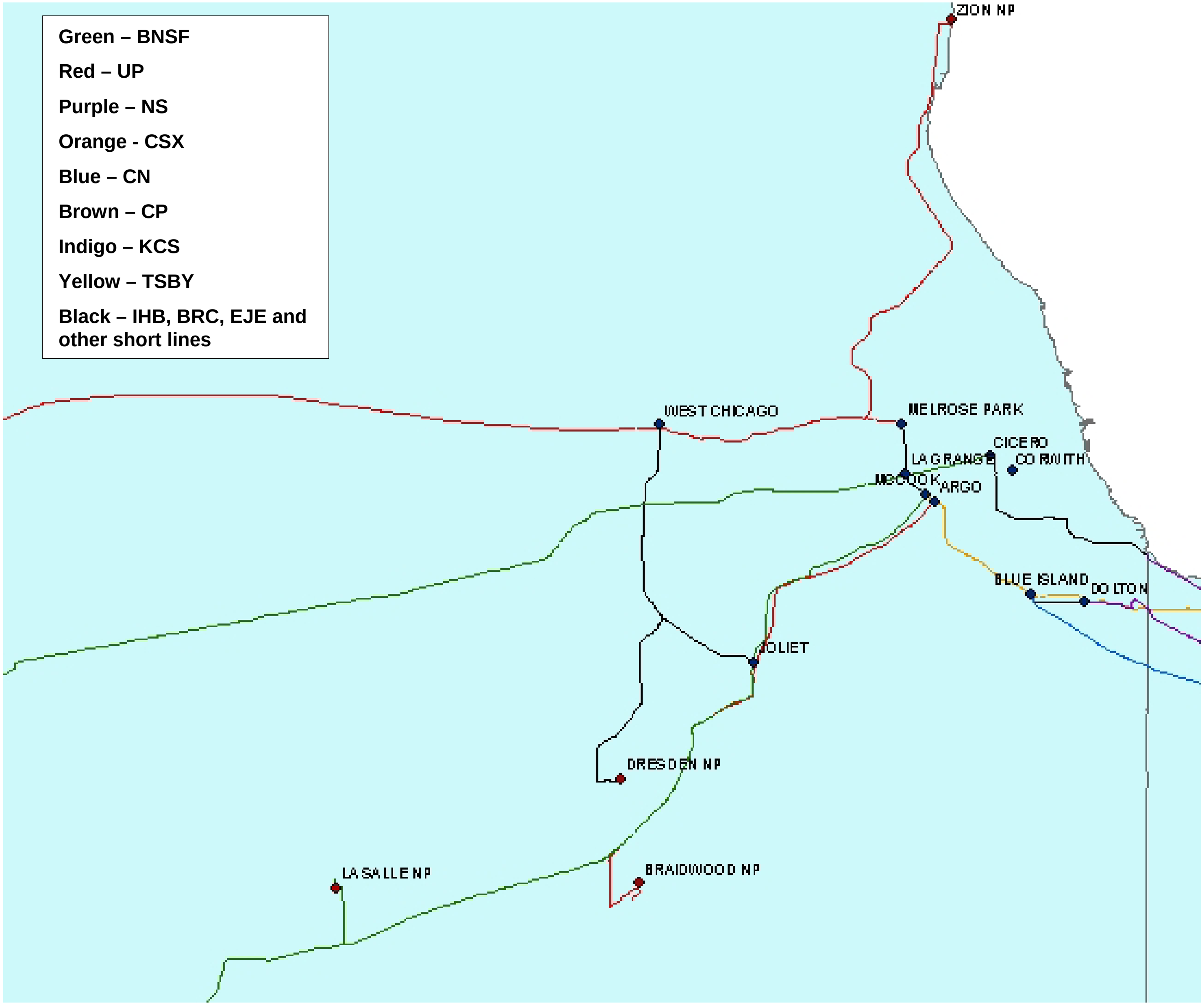
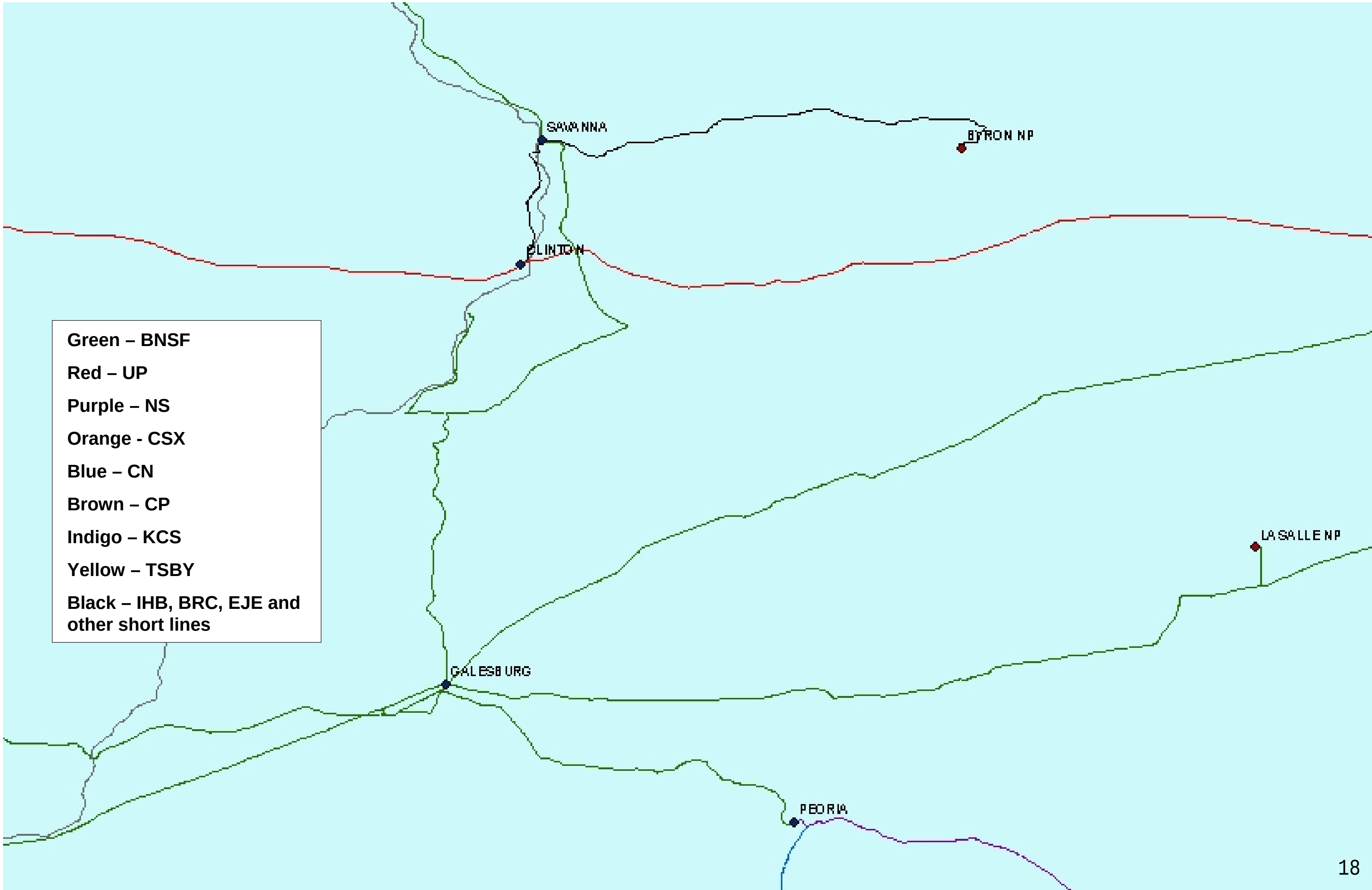
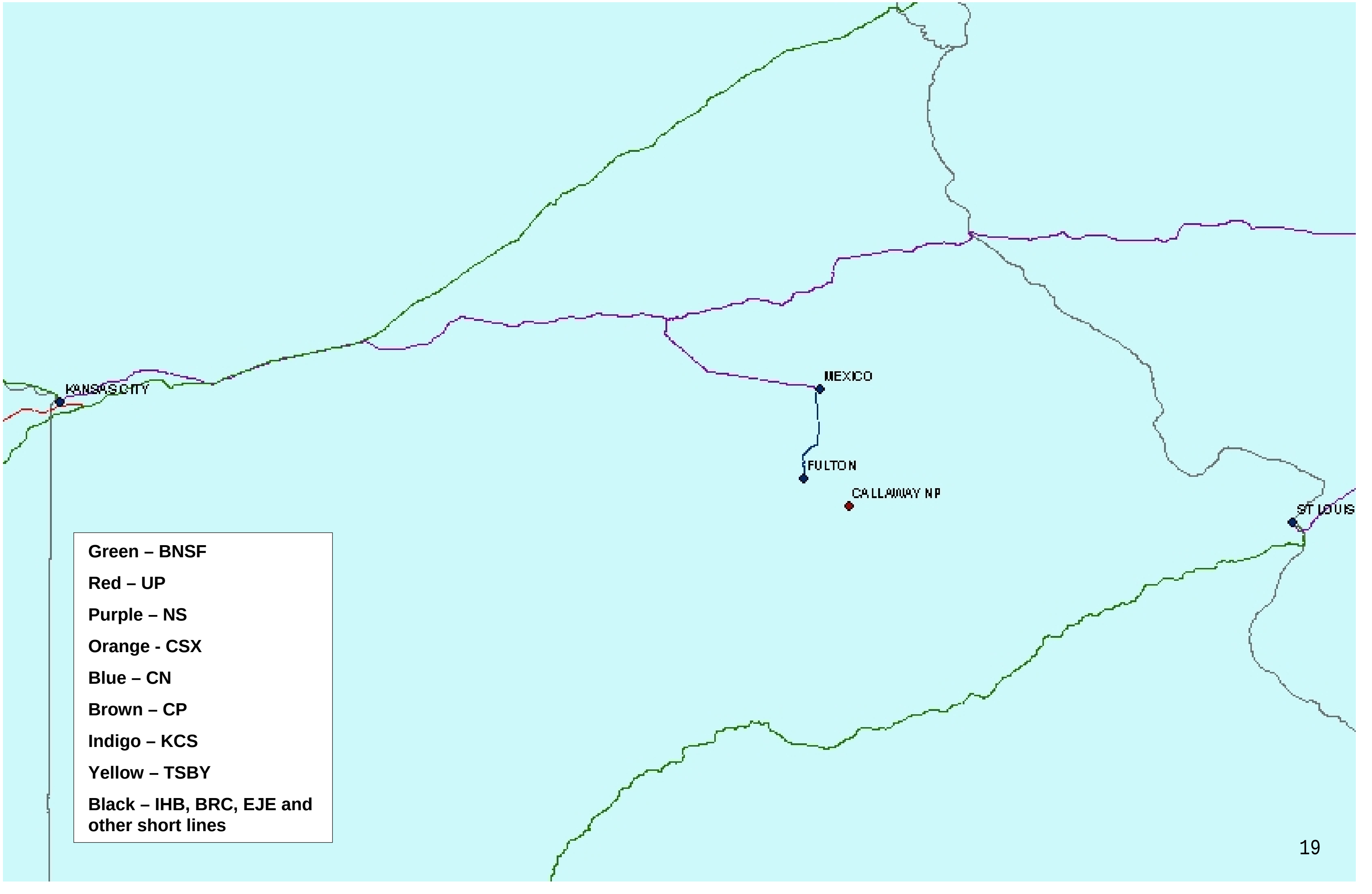
Final Rail Map – Chicago Detail



Final Rail Map – Western IL Detail



Final Rail Map – MO Detail



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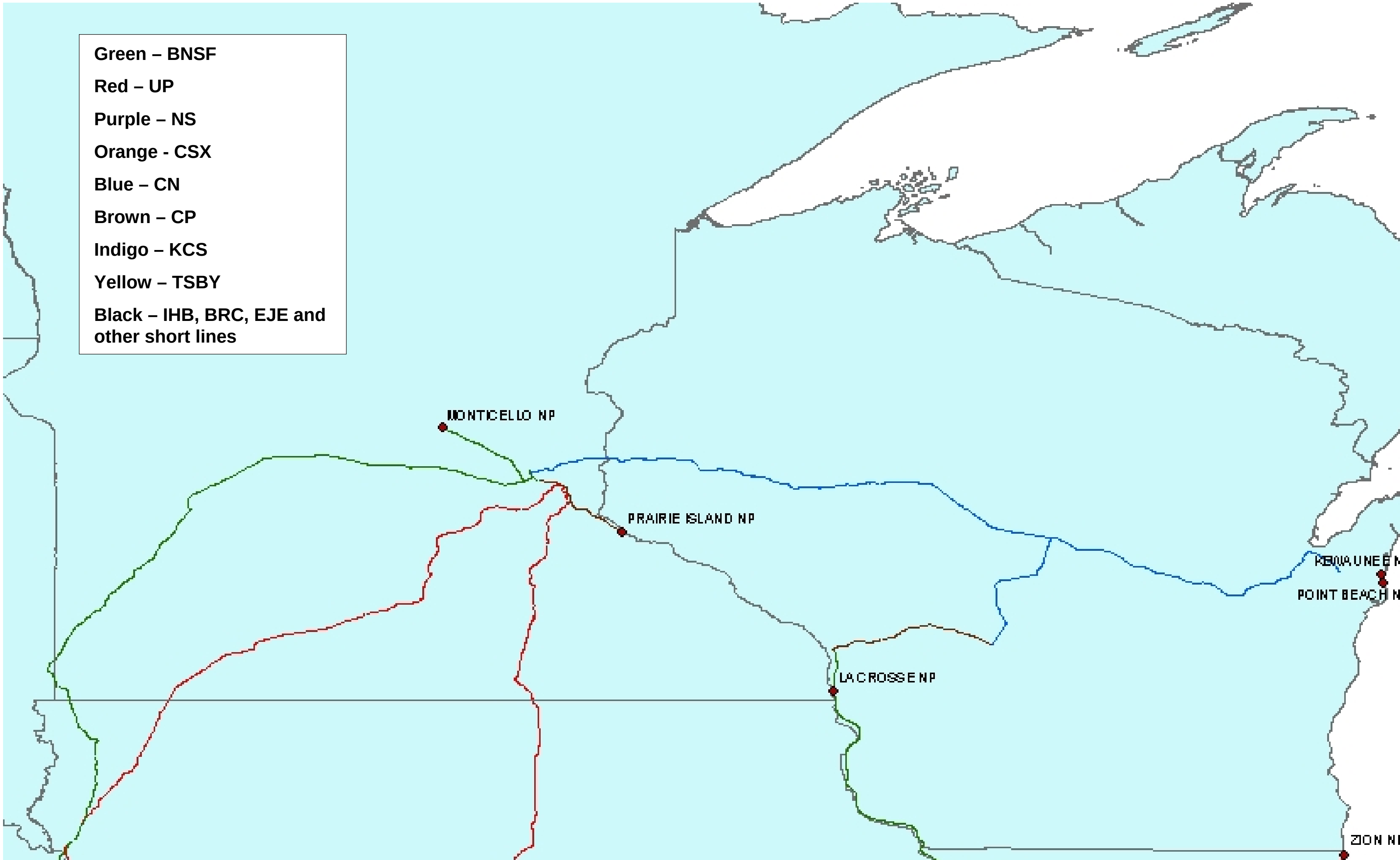
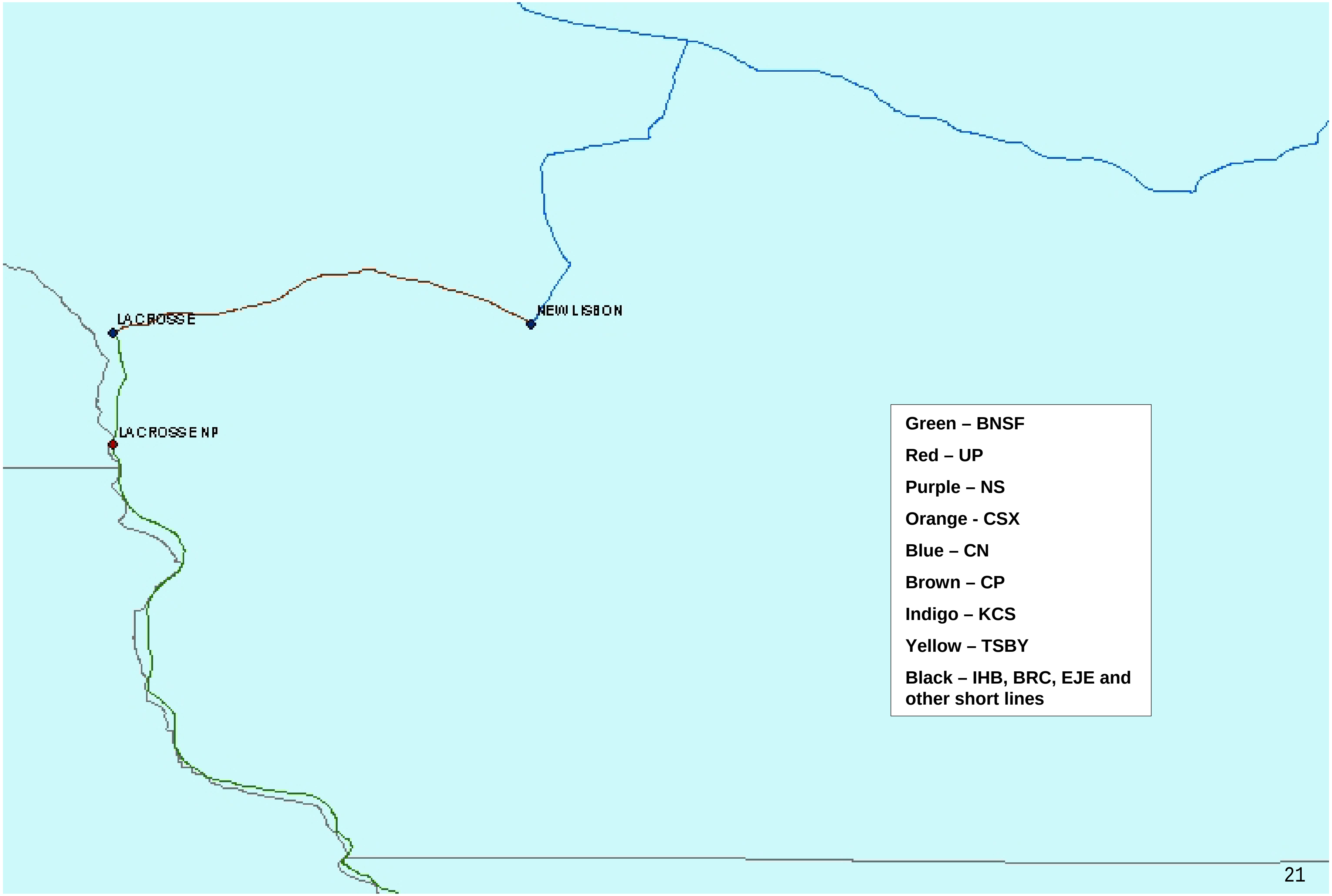
Final Rail Map – MN & WI Detail



Final Rail Map – Western WI Detail



PROJECT TIMELINE

November 2003	The Midwest first suggested the idea to DOE during a meeting with Undersecretary Robert Card.
June 2004	The route identification project was incorporated into the SRGs' generic project description.
July	At its spring meeting in Topeka, the Midwestern Radioactive Materials Transportation Committee identified five states to lead the project: Illinois, Iowa, Missouri, Nebraska, and Ohio.
	The Work Group held its first conference call on July 29.
August	The Work Group held its second conference call on August 12.
September	The Work Group held its third conference call on September 7.
	The Work Group provided a written update on its progress to the full committee on September 15.
	Sarah Wochos joined the project on September 20.
	The Work Group held its fourth conference call on September 30.
October	The Work Group held its fifth conference call on October 19.
November	The Work Group provided an update to the full committee in Dublin, Ohio, on November 9-10. The committee accepted the Work Group's recommendations regarding the regional factors for evaluating routes and their relative weights.
	The Work Group held its sixth conference call on November 30.
January 2005	Members of the Work Group and the staff obtained training on TRAGIS in Oak Ridge on January 19-20.
	Data collection began.
February	The Work Group held its seventh conference call on February 3.
March	The Work Group held its eighth conference call on March 24.
May	The Work Group provided an update to the full committee in Traverse City, Michigan, on May 24-25.
June	The Route Identification Work Group met on June 21-22 in Lombard, Illinois, to develop the preliminary suite of routes.

July	The full committee held a conference call on July 28 to discuss the Route Identification Work Group's recommendations. The committee accepted the Work Group's recommendations regarding preliminary routes and proposed outreach to the regions and the railroads. The states also agreed to consult with their departments of transportation and other agencies to get their feedback on the routes.
August	*Stateline Midwest* featured an article on the Midwestern Route Identification Project.
	The Midwest notified the Southern and Western committees regarding the potential impact of its preliminary routes on those regions.
September	Work Group representatives initiated their meetings with the six major railroads regarding the region's preliminary routes.
	The states provided their feedback on the preliminary routes.
October	Work Group representatives concluded their meetings with the six major railroads regarding the region's preliminary routes.
	The Work Group held its ninth conference call on October 17.
	The Work Group provided an update to the full committee in Okemos, Michigan, on October 25-26. The committee accepted the Work Group's recommendations regarding the final maps and information materials for committee members to use in their outreach to the governors, legislative leaders, and any other state agencies.
December	The Work Group held its tenth conference call on December 5.
	The Work Group made its final presentation to DOE on December 7 at CSG's Midwestern Office in Lombard, Illinois.

EVALUATION CRITERIA

Table A. Primary Factors		
	Factor	**Weight**
1	**Radiation exposure to the general public from normal transport** Formula uses population density, average traffic count, average speed of vehicles, and accident rate (solely to account for delays)	**33 1/3**
2	**Public health risk from accidental release of radioactive materials** Formula uses population and general traffic accident rate	**33 1/3**
3	**Economic risk from accidental release of radioactive materials** Formula uses land use data and general traffic accident rate	**33 1/3**
	Total	**100**

Table B. Secondary Factors		
	Factor	**Weight**
1	**Urban centers transited** Percentage of mileage within designated urban area	**50**
2	**Accident rate** Total route-specific accident rate	**20**
3	**Track/Road quality** Highway: Lane width; median width; pavement condition rating Rail: FRA track class, % distance along dual-track	**15**
4	**Traffic density** Average daily traffic	**15**
	Total	**100**

EXPLANATION OF PROCESS

Primary Factors

1. Radiation exposure to the general public from normal transport

Formula:	**Truck:**	**Rail:**
dose to inhabitants + dose to other vehicles + dose to people at truck stops/rail yards	$((PL/v)*C_1)$ $+ ((LT/v^2)*C_2) + ((LT^2/v^3)*C_3)$ $+ (.2L/v)$	$((PL/v)*C_1)$ no other vehicles $+ (.2L/v)$
Data Key: P = people per square mile L = length in miles T = average traffic count in vehicles per hour v = average speed in miles per hour (for rail determined by track class) $C_1 = 6.8 \times 10^{-5}$ C_2 = conversion factor determined by distance between opposing lanes of traffic C_3 = conversion factor determined by average vehicle separation (v/T) in feet		

2. Public health risk from accident release of radioactive materials

Formula:	**Truck:**	**Rail:**
Risk to inhabitants	(POP/L)*AR	(POP/L)*AR
Data Key: POP = total population L = length in miles AR = accident rate in accidents per mile per day		

3. Economic risk from accidental release of radioactive materials

Formula:	**Truck:**	**Rail:**
Risk to land	$((SM \times M_1)/L)*AR$	$((SM \times M_1)/L)*AR$
Data Key: SM = square mileage for rural, single family, multiple family, commercial, and parks/public land usage L = length in miles AR = accident rate in accidents per mile per day		

PRIMARY SCORE – the same process is done for each segment in the route. The Factor 1 scores for all the segments in a route are added together to get the total Factor 1 score for the route. The same is true of Factor 2 and Factor 3. Once Factors 1, 2, and 3 scores are calculated for each route, we normalize each route's scores (i.e. add the total Factor 1 scores for all the routes together and then determine each route's score as a percentage of the whole score). Since all of our Primary Factor scores are weighted equally, we can simply add the normalized Factor 1, 2, and 3 scores for each route to get the route's Primary Score. An example of the process is in the table on the next page.

Primary Factors	Total Factors Value		Factor Values	Normalized Values	
	Rte. A	Rte. B		Rte. A	Rte. B
Factor 1	C	D	C + D	C/(C + D)	D/(C+D)
Factor 2	E	F	E + F	E/(E + F)	F/(E + F)
Factor 3	G	H	G + H	G/(G + H)	H/(H + I)
	Route Primary Factor (Figure of Merit)			Sum of each above	Sum of each above

The work group decided that after running the primary routes, any route that has a value that is less than 20% greater than the lowest (best) value should be included in the secondary analysis

Secondary Factors

1. Urban centers transited

Formula:	**Truck:**	**Rail:**
Square mileage of land that is urban	(L*3.2)*Urban SqM Percentage	(L*3.2)*Urban SqM Percentage
Data Key: L = length in miles Urban SqM Percentage = percentage of the route that is urban		

2. Accident rate

Formula:	**Truck:**	**Rail:**
Accident rate in accidents per mile per day	AR	AR
Data Key: AR = accident rate in accidents per mile per day		

3. Track/road quality

Formula:	**Truck:**	**Rail:**
Road quality or track quality factors	LWF + MWF +PCF	TCF + DTPF
Data Key: LWF = lane width factor MWF = median width factor PCF = pavement condition factor TCF = track class factor DTPF = dual track percentage factor		

4. Traffic density

Formula:	**Truck:**	**Rail:**
Cars/tonnage per day	ADT	ADT
Data Key: ADT (truck) = average daily traffic ADT (rail) = average daily tonnage		

SECONDARY SCORE: the same process is done for each segment in the route.

Once Secondary Factors 1, 2, 3 and 4 are calculated for each route, we normalize each route's scores (i.e. add the total Secondary Factor 1 scores for all the routes together and then determine each route's score as a percentage of the whole score).

The Secondary Factors are weighted differently, so the calculations are as follows:

Normalized Secondary Factor 1 score * .5 +
Normalized Secondary Factor 2 score * .2 +
Normalized Secondary Factor 3 score * .15 +
Normalized Secondary Factor 4 score * .15 = **Secondary Score**

DATA SOURCES

1. **P**: people per square mile – population within 2500 meter band along the segment (**POP**) determined from TRAGIS. To find people per square mile (**P**), we divide the population (**POP**) by the square mileage, which is determined by multiplying the length (**L**) by the band width (2500m/1.6 miles on either side for a total of 5000m/3.2 miles).

   For example, if we were measuring the segment of I94 from Waukesha, WI to the I94/I43 junction in Milwaukee, and TRAGIS gave us a length (L) of 10 miles and a population (**POP**) of 75,000, the population per square mile would be 75,000/(10 * 3.2) = 2,344.

2. **L**: length – determined for the segment by TRAGIS.

3. **T**: average traffic count in vehicles per hour – determined from data received from the Federal Highway Administration, Office of Highway Policy Information. FHA provided us with average traffic for all highways throughout the Midwest. Because each state measures average daily traffic at different length intervals (i.e. .1 miles, .25 miles, etc), the only way to stay consistent is to find the beginning and end mileage point for each segment and average the average daily traffic counts. TRAGIS provides the length of the segment, but it does not provide the beginning milepost. Each highway starts its milepost count at the western border/start and ends the milepost count at the eastern border/end (if the route is north/south the count begins at the south border/start). Based on the length of the segment and the length of the highway from the border to the beginning of the segment, we can determine the beginning and end mileposts.

   For example, if we are measuring I94 in Wisconsin from Waukesha to the I94/I43 junction with a length of 10 miles, we would use TRAGIS to measure the length of I94 from the MN/WI border to the beginning of our segment. TRAGIS tells us it is 296.1 miles, so the beginning milepost of our segment is 296.1. We would then find the appropriate row for that milepost and average the traffic counts for all rows that cover the miles 296.1 to 306.1.

   Example: Waukesha to the I94/I43 junction (I94), 10 miles.

ADT	IRI	Median	County	Route	Begin	End	State
97429	86	26	Waukesha	"000000094E00"	296.04	296.73	WI
97429	86	26	Waukesha	"000000094E00"	296.73	296.92	WI
97429	86	26	Waukesha	"000000094E00"	296.92	297.22	WI
136092	86	26	Waukesha	"000000094E00"	297.22	297.55	WI
136092	86	26	Waukesha	"000000094E00"	297.55	298.27	WI
136092	82	46	Waukesha	"000000094E00"	298.27	300.32	WI
141503	89		Waukesha	"000000094E00"	300.32	300.7	WI
141503	89		Waukesha	"000000094E00"	300.7	301.37	WI
141503	81	36	Waukesha	"000000094E00"	301.37	301.89	WI
141503	81		Waukesha	"000000094E00"	301.89	302.42	WI
141503	90		Milwaukee	"000000094E00"	302.42	303.22	WI
141503	90		Milwaukee	"000000094E00"	303.22	303.36	WI
142900	90		Milwaukee	"000000094E00"	303.36	303.37	WI
142900	91		Milwaukee	"000000094E00"	303.37	303.83	WI
142900	91		Milwaukee	"000000094E00"	303.83	303.89	WI

142900	91		Milwaukee	"000000094E00"	303.89	303.95	WI
ADT	IRI	Median	County	Route	Begin	End	State
142900	91		Milwaukee	"000000094E00"	303.95	304.1	WI
142900	91		Milwaukee	"000000094E00"	304.1	304.12	WI
142900	91		Milwaukee	"000000094E00"	304.12	304.13	WI
142900	91		Milwaukee	"000000094E00"	304.13	304.27	WI
142900	91		Milwaukee	"000000094E00"	304.27	304.28	WI
142900	91		Milwaukee	"000000094E00"	304.28	304.38	WI
142900	91		Milwaukee	"000000094E00"	304.38	304.4	WI
155690	91		Milwaukee	"000000094E00"	304.4	304.41	WI
155690	91		Milwaukee	"000000094E00"	304.41	304.45	WI
155690	91		Milwaukee	"000000094E00"	304.45	304.5	WI
155690	91	28	Milwaukee	"000000094E00"	304.5	305	WI
155690	91		Milwaukee	"000000094E00"	305	305.02	WI
153450	88		Milwaukee	"000000094E00"	305.02	305.19	WI
153450	88		Milwaukee	"000000094E00"	305.19	305.8	WI
153450	88		Milwaukee	"000000094E00"	305.8	305.93	WI
154025	109	28	Milwaukee	"000000094E00"	305.93	306.6	WI

To find average daily traffic (**ADT**) we average all the counts in the ADT column above to get a count of 141,072. To find average hourly traffic (**T**) we divide the ADT by 24 to get 5878.

4. **v (truck)**: average speed in miles per hour – this is measured as the posted speed limit for the segment, i.e. the maximum speed the truck could travel. Speed limits are standard by state as reported by the Insurance Institute for Highway Safety. Some states have different truck maximums for urban and rural, so if a segment is predominantly rural, the rural speed limit was assigned, if the segment is predominantly urban, the urban speed limit was assigned.

IL trucks 55 rural 55 urban
IN trucks 60 rural 55 urban
IA trucks 65 rural 55 urban
KS trucks 70 rural and urban
MI trucks 55 rural and urban
MN trucks 70 rural 65 urban
MO trucks 70 rural 60 urban
NE trucks 75 rural 65 urban
OH trucks 55 rural and urban except 65 on turnpike
WI trucks 65 rural and urban

In the example above, which is entirely in the Milwaukee metro area, the maximum possible speed limit is 65 mph.

v (rail): average speed in miles per hour (i.e. the maximum speed the train could travel) – this is determined by the track class of the segment. Oak Ridge National Laboratories provided us a list of rail subdivisions (subdivision basically means the owner and main track corridor) and the track class and dual track percentage for each subdivision. The TRAGIS output for most of our segments shows one or two subdivisions that each segment travels on. We took the subdivision that had the most mileage for each segment and applied that track class to the segment. Based on an example of the chart ORNL provided (below) we can see what subdivisions of NS have what track class.

Subdivision	Owner	Track Class	Dual Track Percentage
Springfield-Hannibal District	NS	4	1%
St. Louis District	NS	4	0%
Streator District	NS	4	3%
Toledo District	NS	4	0%

For example, we look at the TRAGIS database output for the segment and see that the majority of the mileage falls in the Toledo District subdivision. This segment is then scored as a track class 4. Based on the chart below, we see that a track of class 4 can travel 60 mph. Some segments do not have a subdivision and therefore can not be assigned a track class. In these cases, the average speed assigned to the segment is 43, which is the average of the below speeds.

·Class 1 max speed : 10 mph freight
·Class 2 25 mph
·Class 3 40 mph
·Class 4 60 mph
·Class 5 80 mph

5. **C_1**: constant - .00068

6. **C_2**: conversion factor determined by distance between opposing lanes of traffic – this is determined by adding the average median width along the segment with the lane width to find the distance between the center of the two closest opposing lanes. To find the average median width along the segment, we need to find the beginning and end milepost as we did above for ADT. Then we average the median width counts in the appropriate rows. Lane width is standard 12 feet along the entirety of the Eisenhower system.

   In the example above, we would average the median column to get 30 and then add 12 for a total of 42. Then based on the chart below, we round the number to 40 and get a **C_2** value of .0011.

Distance between opposing traffic lanes	C2
10	4.9×10^{-3}
20	2.5×10^{-3}
30	1.5×10^{-3}
40	1.1×10^{-3}
50	9.4×10^{-4}
60	7.5×10^{-4}
70	6.5×10^{-4}
80	5.7×10^{-4}
90	4.9×10^{-4}
100	4.1×10^{-4}
150	2.6×10^{-4}
200	1.9×10^{-4}
300	1.0×10^{-4}

7. **C**$_3$: conversion factor determined by average vehicle separation in feet – this is determined by multiplying the average speed (**v**) by 5280 to get feet per hour, and then divide that by the average hourly traffic (**T**).

   For our example: (65*5280)/5878 = 58 feet. Based on the chart below, we round the number to 50 and get a **C**$_3$ value of .000016.

Distance between vehicles (v/T)	C_3
10	1.8×10^{-5}
50	1.6×10^{-5}
100	1.3×10^{-5}
200	1.3×10^{-5}
300	1.0×10^{-5}
400	8.6×10^{-6}
500	7.3×10^{-6}
600	6.0×10^{-6}
700	5.0×10^{-6}
800	4.0×10^{-6}
900	3.3×10^{-6}
100	3.0×10^{-6}
1200	1.3×10^{-6}

8. **POP**: population along the route – this is determined by TRAGIS.

9. **AR (truck)**: accident rate in accidents per mile per day – this is determined by summing the accidents along the specific route in the counties which the segment passes through. Each state Department of Transportation provided us with accident counts along each highway in each county. The states do not necessarily mark at which milepost each accident occurred, so to maintain consistency and to be conservative, we include all the accidents for each county even if the segment does not go the entire length of the county. We then divide the total number of accidents by 365 to get the daily accident rate, and then divide that number by length (**L**) to get daily accidents per mile.

   In our example, our segment goes through Waukesha and Milwaukee counties. In the chart below, we see that there were 565 accidents in Waukesha County and 1399 accidents in Milwaukee County for a total of 1964. (1964/365)/10 = .53808 accidents per mile per day.

County	**39**	**43**	**90**	**94**	**535**	**794**	**894**
Brown		170					
Columbia	168		66				
Dane	431		5	97			
Douglas					10		
Dunn				195			
Eau Claire				205			
Jackson				237			
Jefferson				194			
Juneau			256				

County	39	43	90	94	535	794	894
Kenosha				197			
La Crosse			165				
Manitowoc		150					
Marathon	102						
Marquette	86						
Milwaukee		1420		1399		190	302
Monroe			143	85			
Ozaukee		156					
Portage	164						
Racine				178			
Rock	309	37	17				
St. Croix				293			
Sauk			148				
Sheboygan		129					
Trempealeau				34			
Walworth		99					
Waukesha		127		565			
Waushara	56						

AR (rail): accident rate in accidents per mile per day – this is determined by summing the accidents along the specific route in the counties which the segment passes through. The FRA provides accident data for each rail line for each state. We downloaded the total accident data for each state, deleted any duplicate incident numbers so as to not over count accident rates, and counted the accidents for each rail line in each county. An example of the NS accidents in Ohio is below:

RR	Incident #	County
NS	012338	ALLEN
NS	012128	ASHTABULA
NS	015081	ASHTABULA
NS	015340	ASHTABULA
NS	011325	BUTLER
NS	012029	BUTLER
NS	012910	BUTLER
NS	013459	BUTLER
NS	012650	COLUMBIANA
NS	014580	COLUMBIANA
NS	015080	COLUMBIANA
NS	015083	COLUMBIANA
NS	011772	CUYAHOGA
NS	011964	CUYAHOGA
NS	012652	CUYAHOGA
NS	014033	CUYAHOGA
NS	012071	ERIE
NS	012256	ERIE
NS	012443	ERIE
NS	012549	ERIE
NS	013379	ERIE
NS	013914	ERIE
NS	013965	ERIE
NS	014304	ERIE
NS	014642	ERIE
NS	014948	ERIE
NS	011680	FRANKLIN
NS	012447	FRANKLIN
NS	012915	FRANKLIN
NS	013968	FRANKLIN
NS	015076	FRANKLIN
NS	013189	FULTON
NS	013531	GALLIA
NS	011306	HAMILTON
NS	013038	HAMILTON
NS	013346	HAMILTON
NS	014105	HAMILTON
NS	014570	HAMILTON
NS	011837	HANCOCK
NS	014026	HANCOCK
NS	011593	HURON
NS	011624	HURON
NS	011786	HURON
NS	013495	HURON
NS	013681	HURON
NS	014729	HURON
NS	011362	JEFFERSON
NS	013636	JEFFERSON
NS	013895	LAKE

RR	Incident #	County
NS	011293	LORAIN
NS	011418	LORAIN
NS	012398	LORAIN
NS	013547	LORAIN
NS	013676	LORAIN
NS	014366	LORAIN
NS	012551	LUCAS
NS	014221	LUCAS
NS	015128	LUCAS
NS	013952	MADISON
NS	011450	MARION
NS	013871	MARION
NS	011655	MONTGOMERY
NS	011278	OTTAWA
NS	011449	OTTAWA
NS	013074	OTTAWA
NS	014171	PAULDING
NS	012740	PERRY
NS	013972	PICKAWAY
NS	012937	PIKE
NS	012058	PREBLE
NS	013690	PREBLE
NS	011728	SANDUSKY
NS	011926	SANDUSKY
NS	012435	SANDUSKY
NS	012470	SANDUSKY
NS	013944	SANDUSKY
NS	014617	SCIOTO
NS	014977	SCIOTO
NS	011944	SENECA
NS	012841	SENECA
NS	012552	SUMMIT
NS	011750	TRUMBULL
NS	014200	WARREN
NS	013947	WOOD

For example, if a segment goes through Lucas, Fulton, and Williams counties, then we count the number of accidents as 3 in Lucas, 1 in Fulton, and 0 in Williams for a total of 4. We then divide the count by 365 and then by the length (100) to get .00011 accidents per mile per day.

10. **Square mileage** for rural, multiple family, single family, commercial, and parks/public land use along the route. To determine the land use square mileage for each land use category we use ArcView and land use data provided by the USGS. We create a shape file for each segment using TRAGIS, import it into ArcView, create a 2500 meter buffer around the segment and then intersect the buffer with the land use cover. The resulting intersection is then analyzed spatially to find the area of each land use category. The area is not square mileage, but rather area according to projection size, so after calculating the area of each land use category we then calculate the percentage of the total area for each category. USGS does not narrow its land use cover to the 5 categories we need, so we combined the USGS categories as follows to get our categories:

Rural = Orchards/Vineyards/Other + Grasslands/Herbaceous + Pasture/Hay + Row Crops + Small Grains + Fallow

Single Family = Low Intensity Residential

Multiple Family = High Intensity Residential

Commercial = Commercial/Industrial/Transportation + Bare Rock/Sand/Clay + Quarries/Strip Mines/Gravel Pits

Parks/Public = Open Water + Deciduous Forest + Evergreen Forest + Mixed Forest + Shrubland + Urban/Recreational Grasses + Woody Wetlands + Emergent/Herbaceous Wetlands

For our example, let's say the following percentages were determined by ArcView:

Rural: 55%
Single Family: 3%
Multiple Family: 1%
Commercial: 3%
Parks/Public: 38%

We then multiply the percentage for each by the area of the buffer (L * 3.2) to get the square mileage for each category:

Rural:	0 * (10*3.2)	0 sq m
Single Family:	.03 * (10 * 3.2)	1 sq m
Multiple Family:	.57 * (10*3.2)	18.2 sq m
Commercial	.32 * (10*3.2)	10.2 sq m
Parks/Public:	.08 * (10*3.2)	2.6 sq m

11. **M1**: Multiplier – as follows.

Rural square mileage = .002
Single family square mileage = .1
Multiple family square mileage = 2
Commercial square mileage = .2
Parks/Public square mileage = .265

12. **Percentage of route that is urban:** determined by TRAGIS. TRAGIS tells us what percentage of the 2500 meter buffer (on either side) is urban, or has a greater population density than 3326 people per square mile.

    For our example, let's say that 30% of the segment is urban. The urban square mileage for each segment is added together and divided by the total square mileage of the route. In our truck example, 9.6 square miles of the segment was urban. If this was the only urban square mileage along a 1000 mile route, the total route urban percentage would be as follows:

    Urban Square Mileage/(L*3.2) = 16/(1000*3.2) = .5%

    If this was not the only urban square mileage in a route of 1000 miles we would first have to add together the urban square mileage of all the route's segments before dividing it by (L*3.2).

13. **Lane width factor:** all interstate highways that are part of the federal Eisenhower system have a standard lane width of 12. All of the segments receive a low 1 point for a 12 foot lane width.

14. **Median width factor**: the median width is determined by finding the beginning milepost and the end milepost and averaging the median width counts between those two points. Data is from the Federal Highway Administration, Office of Highway Policy.

    In our truck example, the median width of our segment was 30. In the scoring chart below, we see that this median width would receive score of 2.

Median Width
0-25 feet = 3 points
26-50 feet = 2 points
51+ feet = 1 point

15. **Pavement condition factor:** this is determined from the data provided by the Federal Highway Administration, Office of Highway Policy. In the same fashion as median width and ADT, we use TRAGIS to determine the beginning milepost and the end milepost for each segment and then average the pavement condition scores between those two points.

    In our truck example, the average of the pavement condition rating in the above table is 89. In the scoring chart below, we see that this average pavement condition would receive a score of 2.

Pavement Condition
0-75 = 3 points
76 -99 = 2 points
100+ = 1 points

16. **Average daily traffic:** the ADT is determined from data provided by Federal Highway Administration, Office of Highway Policy by using TRAGIS to determine the beginning milepost and the end milepost for the segment and then average the ADT counts in between those two points.

    In our example, the ADT was 141, 072

17. **Track class factor**: the track class is determined by finding the subdivision that the majority of the segment is part of. Data provided by Oak Ridge National Laboratories.

    In our rail example, the track class of our segment was 4. In the scoring chart below, we see that this track class would receive score of 2.

    Track Class
    1-3 = 3 points
    4 = 2 points
    5+ = 1 point

18. **Dual track percentage factor**: the dual track percentage is determined by finding the subdivision that the majority of the segment is part of. Data provided by Oak Ridge National Laboratories.

    In our rail example, the dual track percentage of the NS Toledo District was 0%. In the scoring chart below, we see that this average pavement condition would receive a score of 3.

    Dual Track Percentage
    0-50 = 3 points
    51-75 = 2 points
    76+ = 1 points

19. **Average daily tonnage**: determined from data received from TRAGIS. In the TRAGIS output, each link is given a tonnage density rating of 1-7. We average the tonnage density counts for all the links in the segment and then use the following chart to determine the total density per year.

Tonnage Score	Tonnage Miles
1	0
1.1	100,000
1.2	200,000
1.3	300,000
1.4	400,000
1.5	500,000
1.6	600,000
1.7	700,000
1.8	800,000
1.9	900,000
2	1,000,000
2.1	1,400,000
2.2	1,800,000
2.3	2,200,000
2.4	2,600,000
2.5	3,000,000
2.6	3,400,000
2.7	3,800,000
2.8	4,200,000
2.9	4,600,000

3	5,000,000
3.1	5,500,000
3.2	6,000,000
3.3	6,500,000
3.4	7,000,000
3.5	7,500,000
3.6	8,000,000
3.7	8,500,000
3.8	9,000,000
3.9	9,500,000
4	10,000,000
4.1	11,000,000
4.2	12,000,000
4.3	13,000,000
4.4	14,000,000
4.5	15,000,000
4.6	16,000,000
4.7	17,000,000
4.8	18,000,000
4.9	19,000,000
5	20,000,000
5.1	21,000,000

Tonnage Score	Tonnage Miles
5.2	22,000,000
5.3	23,000,000
5.4	24,000,000
5.5	25,000,000
5.6	26,000,000
5.7	27,000,000
5.8	28,000,000
5.9	29,000,000
6	30,000,000
6.1	31,000,000
6.2	32,000,000
6.3	33,000,000
6.4	34,000,000
6.5	35,000,000
6.6	36,000,000
6.7	37,000,000
6.8	38,000,000
6.9	39,000,000
7	40,000,000

In our rail example, the TRAGIS output is listed above. The density scores for each link are bolded. The average of these scores is 7, which according to the above chart, is 40,000,000 tons per year.

NS	392100565-TOLEDO	OH	31.9	392200277	6.0	1	**7**	5.97
NS	392100559-COUNTY LINE	OH	32.1	392200202	0.1	1	**7**	0.15
NS	392100524-CP286	OH	33.0	392200199	0.9	1	**7**	0.91
NS	392100515-FASSETT	OH	33.3	392200181	0.3	1	**7**	0.32
NS	392100509-CP-MAUMEE	OH	33.6	392200177	0.3	1	**7**	0.35
NS	392100507-	OH	33.9	392200174	0.3	1	**7**	0.25
NS	392100501-	OH	34.1	392200171	0.2	1	**7**	0.19
NS	392100474-CP-289	OH	35.6	392200168	1.6	1	**7**	1.55
NS	392100471-AIRLINE JCT	OH	36.5	392200169	0.8	1	**7**	0.85
NS	392100500-	OH	37.9	392200185	1.4	1	**7**	1.39
NS	392100499-RICE	OH	37.9	392200187	0.1	1	**7**	0.05
NS	392100505-	OH	38.2	392200191	0.2	1	**7**	0.23
NS	392100677-COUNTY LINE	OH	52.2	392200287	14.1	1	**7**	14.06
NS	392100904-COUNTY LINE	OH	76.8	392200380	24.5	1	**7**	24.54

To find average daily traffic, we divide the yearly tonnage by 365.
In our example the calculation is: 40,000,000/365 = 109,589 tons per day

SAMPLE FLYER

The Council of State Governments' Midwestern Radioactive Materials Transportation Committee

Route Identification Project

In 2004, the Midwestern Radioactive Materials Transportation Committee undertook an ambitious project to identify potential routes for shipping spent nuclear fuel and high-level radioactive waste. This leaflet explains the purpose, results, and next steps for this unprecedented project.

For more information, contact Lisa R. Sattler (920.803.9976) or Sarah Wochos (630.925.1922).

Why did the Midwestern Radioactive Materials Transportation Committee undertake a project to identify potential shipping routes?

The role of the Midwestern Radioactive Materials Transportation Committee is to identify, prioritize, and work to resolve issues related to the U.S. Department of Energy's (DOE) shipments of radioactive waste. In 2004, the committee identified as a key regional issue the selection of routes for DOE's shipments of spent nuclear fuel and high-level radioactive waste to a national repository at Yucca Mountain, Nevada. The committee had several reasons for singling out route selection as a key issue.

First, to prepare adequately for shipments, the states will need to know which routes DOE will use well in advance of shipments. The committee felt that a regional project would give the states an early indication of which shipping routes are likely to be used. This information will allow states to get a head start on assessing their potential needs with regard to training and public outreach.

Second, because the states are in a better position than the federal government to judge the quality of potential highway and rail routes through their jurisdictions, the committee felt that route selection for shipments should begin with a regional review of available routes. The next step would be to engage in discussions at the national level to compile a composite set of routes reflecting input from all the regions.

Third, the states were concerned that DOE's starting point for discussions about routing would be the route maps that appeared in the department's environmental impact statement on the repository site. The states felt they could identify a better starting point by evaluating routes on a regional basis first, followed by national discussions with DOE and other stakeholders.

Through its cooperative agreement with DOE, the Council of State Governments' Midwestern Office (CSG Midwest) asked for and received funding from DOE to undertake a project in which the committee would analyze available rail and highway routes through the region and propose a potential suite of routes to DOE for consideration.

What do the routes on the maps represent?

The maps represent the Midwestern region's suggested starting point for national discussions that will result in DOE's selection of routes for shipping spent nuclear fuel and high-level radioactive waste to a national repository. The committee will not recommend that DOE use these routes, nor will it present them as "acceptable" to the Midwestern states. Rather, the committee will present the routes as a set of available routes that meet the regional criteria for ensuring the selection of safe routes. The committee will recommend that DOE use the routes as a starting point for discussions with the Midwest and other stakeholders as the department proceeds with the selection of a final set of shipping routes.

How did the committee identify these routes?

Five states volunteered to work with the CSG Midwest staff on the route identification project: Illinois, Iowa, Missouri, Nebraska, and Ohio. The full committee had input into the process at major steps in the development of the preliminary and final suites of routes. The work began in July 2004 and will conclude in December 2005 with the committee's presentation to DOE.

The five-state work group began its work by establishing the criteria by which to evaluate routes. The health and safety of the public were the primary consideration for the group when analyzing potential routes. Traditionally, the Midwest has adhered to the principle that shipments of similar material should be treated in similar fashion, unless there are defensible reasons not to do so. To promote such consistency, the region evaluated both rail and highway routes using the same criteria.

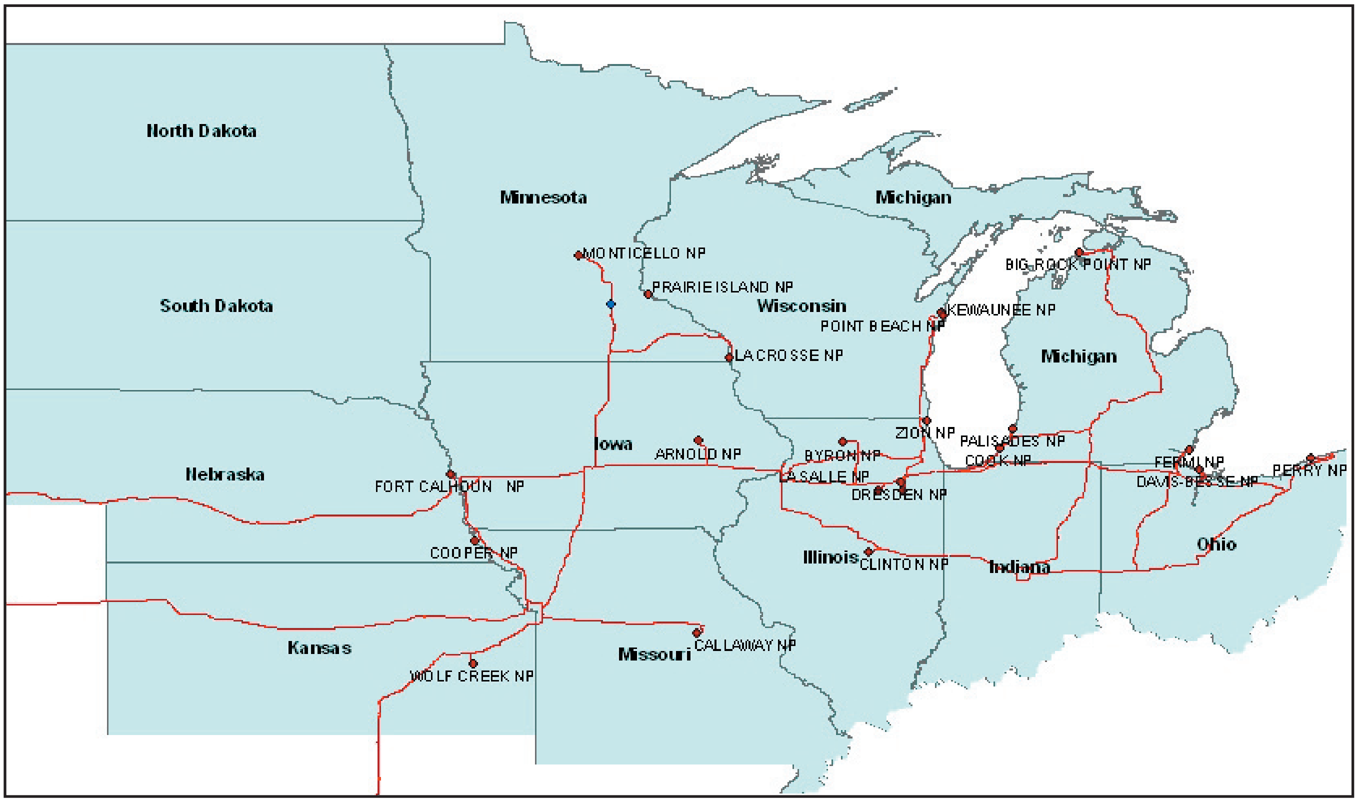
The three primary criteria were derived from factors recommended in the Department of Transportation's (DOT) *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials*. Those factors were radiation exposure to the general public from normal transport, public health risk from accidental release of radioactive materials, and economic risk from accidental release of radioactive materials. The work group found that, although DOT's primary factors were formulated for truck shipments, the factors worked equally well in discriminating between rail routes. In addition to the primary factors, the committee agreed to further narrow the list of available routes using four secondary criteria: accident rate, urban areas transited, track/road quality, and traffic density.

After the full committee agreed to the primary and secondary factors, the CSG Midwest staff collected data from multiple federal and state sources. To generate proposed routes for evaluation, the staff used DOE's highway and rail routing model, called "TRAGIS." The work group reviewed the available routes from Midwestern shipping sites and selected for further consideration only those routes that ranked most desirable according to the primary and secondary factors. After consulting with the individual states and the major railroads, the work group further refined the set of routes by winnowing out any routes that were unacceptable from a safety standpoint or for logistical reasons (e.g., the absence of suitable transfer facilities). The committee reviewed the final maps and the work group's recommendations at its October 2005 meeting in Okemos, Michigan.

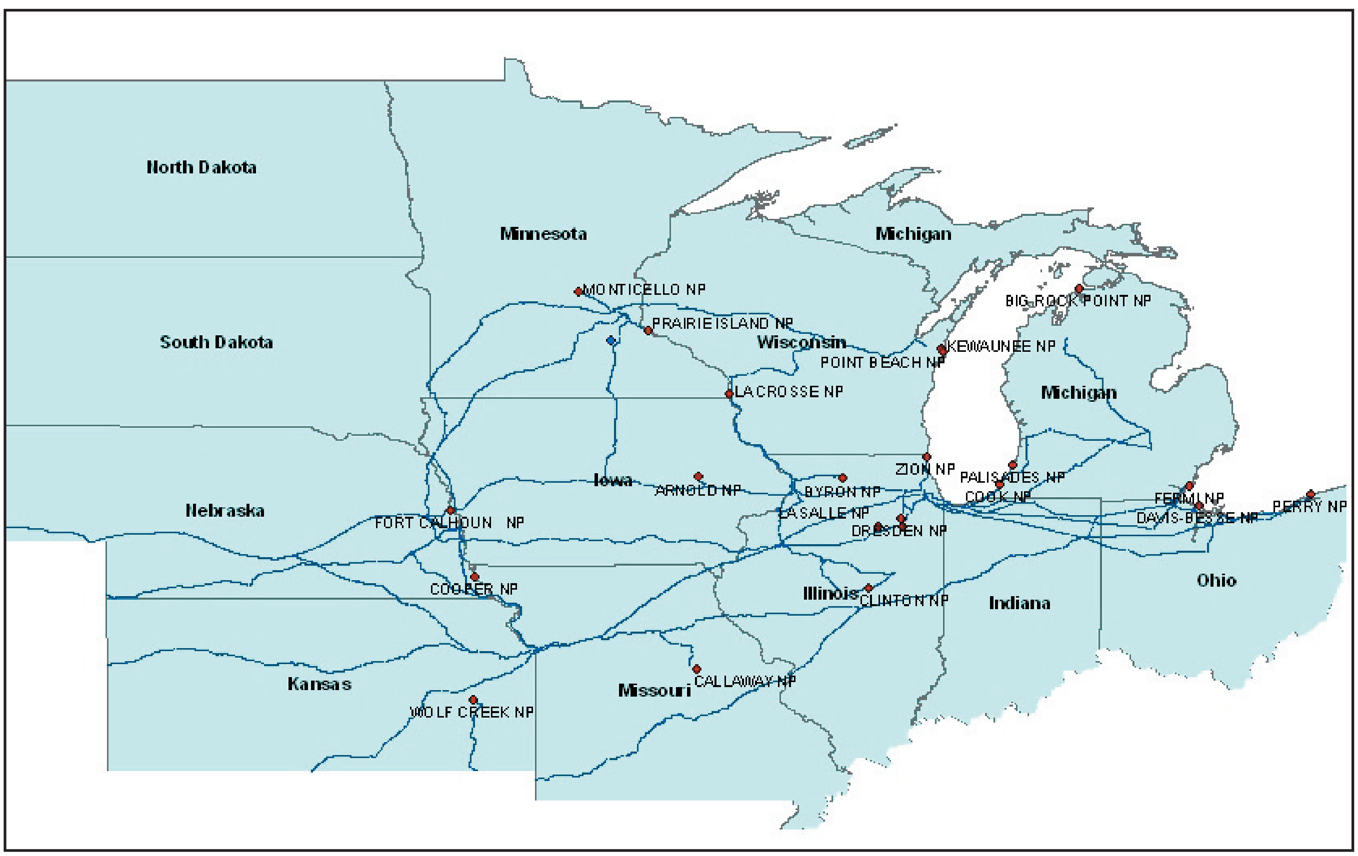
Will DOE use these routes?

It is uncertain whether DOE will ultimately use these routes. The region's recommendation will be for DOE to use the attached maps as a starting point for its national dialogue on route selection. DOE has indicated its intent to start that dialogue in 2006. The department must select the final routes in time to support the award of training grants to affected states as early as 2008. DOE will not begin to ship spent nuclear fuel or high-level radioactive waste until the national repository becomes available.

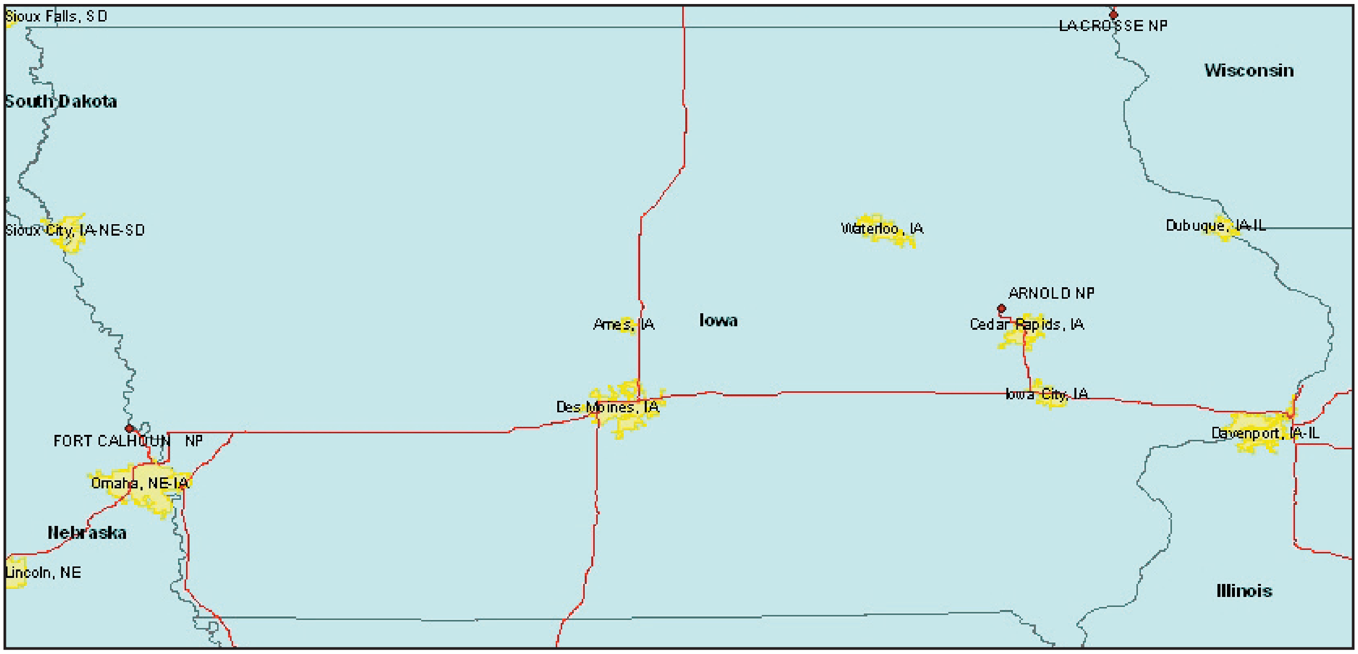
In addition to the federal program, however, there is a private initiative to construct and operate a centralized storage facility in Utah. It is possible that shipments to this private storage facility could begin as early as 2007. The consortium of utilities that is developing the storage facility – Private Fuel Storage, Ltd. (PFS) – has expressed an interest in reviewing the rail routes the Midwest has analyzed. As a result, the committee will share the results of its routing project with PFS. The committee will also attempt to work with PFS not only to identify the best available routes through the region but to plan a transportation program that will result in safe shipments of spent nuclear fuel through the Midwestern states.



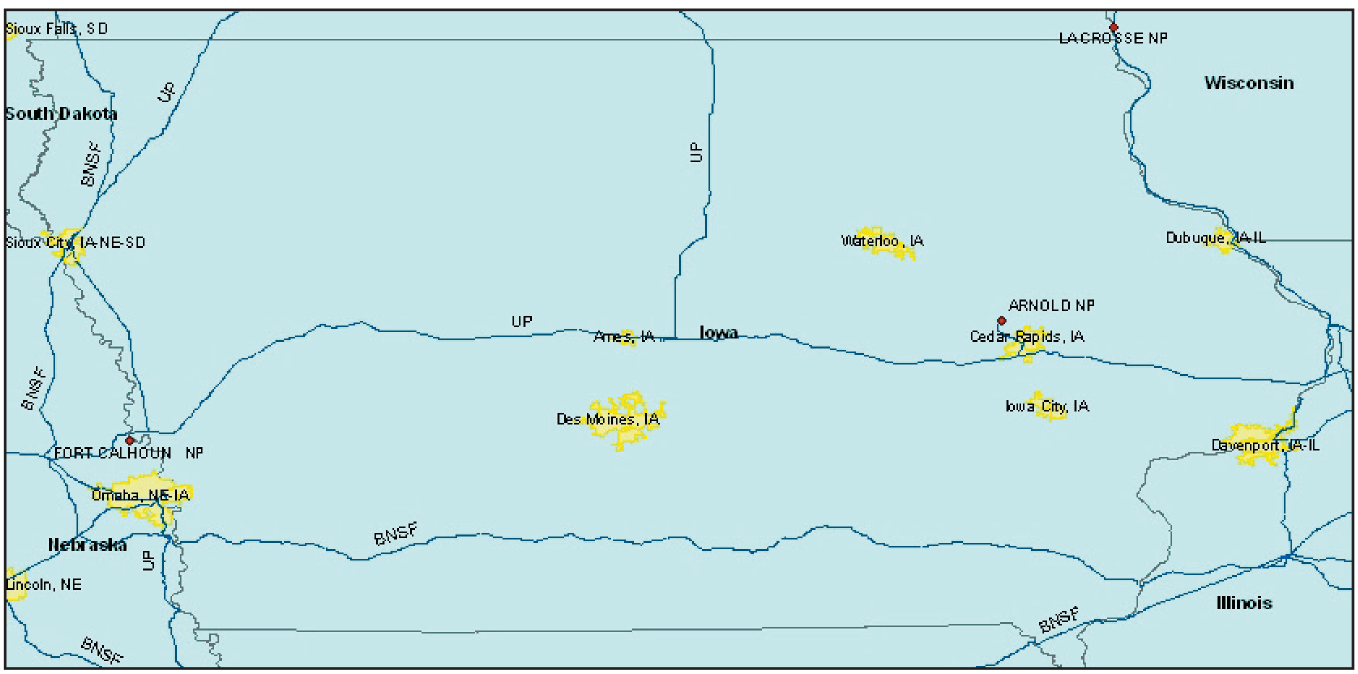
HIGHWAY: Regional map of available highway routes through the Midwest. *Source: CSG Midwest, 2005.*



RAIL: Regional map of available rail routes through the Midwest. *Source: CSG Midwest, 2005.*



HIGHWAY: State detail of available highway routes. *Source: CSG Midwest, 2005.*



RAIL: State detail of available rail routes. *Source: CSG Midwest, 2005.*

KEY MESSAGES

Some members of the Midwestern Radioactive Materials Transportation Committee indicated their intent to prepare bullet points to accompany the informational flyer when notifying the governors' staff regarding the results of the route identification project. The key messages were revised to assist the states in developing those bullet points.

1. The member states of the Midwestern Radioactive Materials Transportation Committee feel that route selection for shipments under the Nuclear Waste Policy Act (NWPA) should begin with a regional review of available routes, since states are in a better position than the federal government to judge the quality of potential highway and rail routes through their jurisdictions.

2. Through its cooperative agreement with the U.S. Department of Energy (DOE), the Midwestern committee asked for and received permission from DOE to undertake a project in which the region would analyze available rail and highway routes and propose a potential suite of routes to DOE as a starting point for national discussions about routes for NWPA shipments.

3. The Federal Motor Carrier Safety Administration regulates the selection of highway routes (see 49 CFR 397.101, which can be found at www.csgmidwest.org/About/MRMTP/PublicInformation/49cfr397.101.pdf). There are no federal regulations governing the selection of rail routes, however the FRA's Safety Compliance Oversight Plan does provide some guidance (e.g., the use of the high-quality track) (www.csgmidwest.org/About/MRMTP/Links/frascop.pdf).

4. Traditionally, the Midwest has adhered to the principle that shipments of similar material should be treated in similar fashion, unless there are defensible reasons not to do so. For this reason, the region evaluated both rail and highway routes using the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* (hazmat.fmcsa.dot.gov/secure/ramguide.pdf). The work group found that, although DOT's primary factors were formulated for truck shipments, the factors work equally well in discriminating between rail routes.

5. The health and safety of the public were the primary consideration for the Midwestern states when analyzing potential routes.

6. To identify potential routes for the work group to evaluate, the CSG staff used DOE's own routing model – Transportation Routing Analysis Geographic Information System, or TRAGIS. This GIS-based model evolved from two earlier DOE-developed models that predicted routes for highway, rail, and barge transport. DOE offices having been using TRAGIS or its predecessors since 1979 to analyze potential shipping routes.

7. The Midwest's route identification project analyzed routes only from shipping sites located in the Midwest.

8. While the Midwestern committee tapped five states to work with the CSG staff on the route identification project, the full committee had input into the process at major steps in the development of the preliminary and final proposed suites of routes.

9. Members of the route identification work group consulted with the major railroads whose tracks were identified as potential shipping routes through the Midwest. The consultations involved seeking feedback on the viability of the routes that TRAGIS identified, as well as discussions of railroad operating practices and other issues pertaining to the transport of spent fuel and high-level radioactive waste by rail.

10. The final maps represent the Midwestern states' suggested starting point for national discussions that will result in DOE's selection of routes for shipping spent fuel and high-level radioactive waste under the NWPA.

11. The national repository will open no earlier than 2012. It is possible, however, that either amendments to the NWPA or private initiatives could result in shipments of spent nuclear fuel beginning prior to 2012.

RECOMMENDATIONS AND OBSERVATIONS RELATED TO ROUTE IDENTIFICATION

- **TRAGIS Recommendations**
  - Provide an option screen to calculate factors listed in the DOT *Guidelines*. Only the primary factor calculations would be necessary, as any secondary analysis would best be left to the individual states.
  - Add land use counts using U.S.G.S. data similar to population counts in current version. When following the DOT *Guidelines*, one of the hardest pieces of data to obtain for each route is land use, which is often the deciding factor between routes.
  - Allow more than one intermediate node in the Origin/Destination page. In order to replicate routes it is often easier to say where the route *should* go instead of blocking where the route should *not* go. In addition, for rail routes, if a goal is to limit transfer points within each city, it would be extremely useful to be able to identify those transfer points at the front end of route generation instead of blocking a slew of points. Although it is understood that one can achieve the same outcome by running multiple routes using intermediate points as destination/origin pairs, the process is much more cumbersome than it would be if one could select multiple intermediate nodes.
  - Add counties and legislative districts as an importable layer. This may be especially important for routing for Yucca shipments. It would allow people to see how many districts would be affected by the entire campaign, etc. Another option is what census data calls 'places.' Currently TRAGIS has all metro areas, but in the event of Yucca shipments, each affected municipality will be eligible for training or public outreach of some sort, so it would be useful for states to see which municipalities are affected by each route.
  - Add average traffic counts for each link. This is similar to population in that, when routing, shippers may want to use less frequented highways. A good example is I80 at the Illinois/Indiana border. It looks like a great choice, but the traffic for that segment is very high and inevitably would cause delays. The challenge for this is to figure out how to accurately capture average traffic. States presumably measure traffic the same way (car counts), however the counts are measured at different segment intervals. For instance Iowa has a count for every half mile and Illinois may have a count for every 2 miles. There is no national standard.
  - Add accident rates. Data can be obtained from state DOTs and calculated by segment. The Federal Highway Administration has a federal database of fatal accidents, but as our work group pointed out, an accident is an accident, and any accident will cause a delay. It would be especially helpful if TRAGIS could provide total accident rate, truck or hazmat truck accident rate, and fatal accident rate, so that users could have all the information available at the same time, regardless of the accident measure they decide to use.

- For plants and other sites without direct rail access, make sure the node identified as “nearest rail node” in the TRAGIS manual is actually capable of truck-to-rail transfers. Conversely, if it is understood that a terminal is *not* currently equipped to make such transfers, then state so in the manual.

- **DOT *Guidelines* Recommendations**
  - If no central data source can be created, at least provide references for the data points. Many of the data sets are hard to find so providing potential references would be very helpful.
  - Change Primary Factor 3 to reflect actual U.S.G.S. data. U.S.G.S. data is split into a considerably larger number of categories than those in the *Guidelines*. The U.S.G.S. categories can be combined to meet the *Guidelines* categories, but it would be easier and more accurate if the *Guidelines* reflect the data limitations. Also, an explanation of the land use values would be useful. Currently the *Guidelines* place a high value on urban, suburban, and public lands. Although it is pretty obvious why urban lands have a high value, our group wondered why public lands, forests, and recreational areas were valued so much higher than rural lands.
  - Consider using accidents as a whole as the accident measure as opposed to truck or even hazmat truck accidents. Our work group came to the conclusion that any accident would cause a delay in shipping and would lengthen the exposure to both the crew and the public during normal transport. Therefore we used an overall accident rate to reflect actual delays.

- **DOE/Regions**
  - Use the DOT *Guidelines* as a base, and then change as necessary. While the *Guidelines* are somewhat outdated, they provide a good starting point and do prefer routes that are less populated and less dangerous (accident-wise).
  - Although developed for highway, the *Guidelines* can be adapted for application on rail routes. It is appropriate to do so because, when comparing rail routes, less populated and less accident-prone routes are preferable.
  - Understand that states measure traffic, accidents, etc., differently. This can be overcome by developing a standard measure and adapting the data to meet that measure. For instance, you can easily obtain accident counts per county per state. You can then easily adapt that to accidents per mile or accidents per car- mile by using traffic counts.
  - When generating rail routes from TRAGIS, before calculating alternate routes, decide whether having uniform transfer points is a goal. For instance, there are a multitude of transfer points in Chicago between the eastern railroads and the western railroads. It may be useful to check with the railroads to see which are operationally viable before running routes.
  - When generating routes from TRAGIS, before calculating alternate routes, decide on what percentage above the shortest route’s mileage you will accept for comparison. TRAGIS will provide an immense number of routes in many cases,

so therefore it is advisable to eliminate any alternate routes that are more than 20% (or whatever percentage you deem acceptable) longer than the shortest route.

- Check with state DOTs to see what the state opinion is on rail and highway segments. The DOT *Guidelines* do a good job of weeding out high accident and high population routes, but even the low population and low accident routes may have particularly bad segments that could be avoided. The state DOTs have a great understanding of the roads and rail in their states.
- Consider working with the FRA (either formally or informally) and the SRGs to develop an approach to state inspections of rail shipments that is similar to the CVSA's Level VI truck inspections. The railroads with whom our group spoke were open to such an idea. They much preferred this type of national, reciprocal approach over having their shipments be subjected to multiple state inspections.
- It was very important for some of the railroads that DOE or some other entity stay on top of things with regard to public outreach. One of the railroads specifically mentioned the need for the public to understand that the railroads have certain obligations as common carriers. The railroads were also very much interested in being kept in the loop about the OCRWM program.