

# APPENDIX B

# COMMODITY FLOWS

NOVEMBER 2018 DRAFT

## CURRENT COMMODITY FLOWS IN THE BIRMINGHAM REGION

A commodity flow analysis for a region allows for an understanding of which commodities generate a significant amount of freight traffic and how they move. One method of tabulating this is provided by a partnership between the Federal Highway Administration (FHWA) and the Bureau of Transportation Statistics (BTS). The Freight Analysis Framework (FAF) integrates data from a multitude of sources in order to create a comprehensive understanding of freight movements throughout the United States. Currently in its fourth version, FAF estimates tonnage and value by origin and destination, commodity type, and mode. This dataset not only provides current movements for 2012 through 2015 but also forecasts for 2020 through 2045 in 5-year increments, allowing for users to develop an understanding of how these movements may change. Data can be tabulated by state or by region, depending on a user's needs. Birmingham is included in this as a specific FAF zone, allowing for the determination of movements to and from the region. This zone consists of the Birmingham-Hoover-Talladega, AL Combined Statistical Area (CSA).

### OVERVIEW

The first component to understand is how commodities are moving and in which way. Table B.1 details current tonnage movements by both mode and direction. As expected, trucks dominant total tonnage, moving 68 percent of all commodities into, out of, and within the region. In particular, trucks are utilized for 96 percent of all movements within the Birmingham region. This is expected as other modes are inefficient at such short distances. The second highest-used mode in the region is rail, accounting for 20 percent of all movements, although there are no internal rail movements included in this analysis. This is not surprising as rail is more efficient over longer distances, rather than for short intercity trips. Pipelines also account for a significant amount of freight movements, particularly inbound commodities, although this network is not evaluated as part of this freight plan. The remaining modes account for less than 4 percent of the total tonnage movement. In particular, air accounts for very little by tonnage as most products shipped via this mode are high value, low weight, and time-sensitive goods. Waterway movements were not included in the FAF database for the Birmingham region based on the location of the facilities, but are documented separately in Section B.3.

**Table B.1: Tonnage Moved by Mode and Modal Share, 2015**

Mode	Origin (1,000 tons)	Destination (1,000 tons)	Internal (1,000 tons)	Total (1,000 tons)
<b>Truck</b>	33,953	26,135	34,088	94,176
<b>Rail</b>	8,013	19,053	1,389	28,455
<b>Pipeline</b>	872	11,698	0	12,570
<b>Multiple Modes &amp; Mail</b>	1,512	2,161	126	3,799
<b>Air (Includes Truck-Air)</b>	15	12	0	27
<b>Other/Unknown</b>	1	2	0	3
<b>Water</b>	0	0	0	0
<b>Total</b>	<b>44,366</b>	<b>59,061</b>	<b>35,604</b>	<b>139,031</b>

Mode	Origin (1,000 tons)	Destination (1,000 tons)	Internal (1,000 tons)	Total (1,000 tons)
Truck	77%	44%	96%	68%
Rail	18%	32%	4%	20%
Pipeline	2%	20%	0%	9%
Multiple Modes & Mail	3%	4%	0%	3%
Air (Includes Truck-Air)	0%	0%	0%	0%
Other/Unknown	0%	0%	0%	0%
Water	0%	0%	0%	0%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

Source: FHWA, FAF 4.4.

A different perspective of commodity flows is illustrated in Table B.2, which compares the value of goods moved by mode, rather than their weight. Trucks here account for a greater share (81 percent) of the total value of goods moved than they did for the total tonnage. This can be accounted for by looking at the type of product moved by each mode. Rail commodities tend to be more low-cost, bulk items (e.g. gravel). These cost less per unit weight than say a television might which results in a lower share of the overall value moved.

**Table B.2: Value Moved by Mode and Modal Share, 2015**

Mode	Origin (\$M)	Destination (\$M)	Internal (\$M)	Total (\$M)
<b>Truck</b>	\$38,099	\$45,326	\$35,951	\$119,287
<b>Rail</b>	\$4,022	\$4,323	\$182	\$8,526
<b>Pipeline</b>	\$199	\$2,992	\$0	\$3,191
<b>Multiple Modes &amp; Mail</b>	\$4,935	\$8,097	\$898	\$13,930
<b>Air (Includes Truck-Air)</b>	\$950	\$637	\$0	\$1,587
<b>Other/Unknown</b>	\$3	\$14	\$0	\$17
<b>Water</b>	\$0	\$0	\$0	\$0
<b>Total</b>	<b>\$48,207</b>	<b>\$61,298</b>	<b>\$37,031</b>	<b>\$146,537</b>

Mode	Origin	Destination	Internal	Total
<b>Truck</b>	79%	74%	97%	81%
<b>Rail</b>	8%	7%	0%	6%
<b>Pipeline</b>	0%	5%	0%	2%
<b>Multiple Modes &amp; Mail</b>	10%	13%	2%	10%
<b>Air (Includes Truck-Air)</b>	2%	1%	0%	1%
<b>Other/Unknown</b>	0%	0%	0%	0%
<b>Water</b>	0%	0%	0%	0%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

Source: FHWA, FAF 4.4.

## COMMODITIES BY TONNAGE

In looking at the commodities accounting for the greatest movements into, out of, and within the region, the most significant are bulk products such as coal, coal – n.e.c., and gravel, which account for 42 percent of all commodities by weight. Coal accounts for the largest inbound and outbound shipments whereas gravel is the commodity most commonly moved within the region. The top ten commodities, shown in Table B.3, comprise nearly three quarters of all goods associated with Birmingham. Many of these goods are destined for Birmingham (42 percent) or move within the region (26 percent) versus exported from the region (32 percent). This is an indication that there is more of a consuming population in the area than production.

**Table B.3: Value Moved by Mode and Modal Share, 2015**

Commodity	Origin (1,000 tons)	Destination (1,000 tons)	Internal (1,000 tons)	Total (1,000 tons)	Percent of Total
Coal	9,057	14,366	4,514	27,938	20%
Coal – n.e.c.	2,253	14,229	874	17,357	12%
Gravel	4,096	817	8,651	13,564	10%
Nonmetal Min. Prods.	6,220	861	3,160	10,241	7%
Base Metals	3,906	3,216	800	7,923	6%
Woods Prods.	3,619	1,506	1,451	6,577	5%
Motorized Vehicles	786	1,521	2,767	5,074	4%
Other Foodstuffs	2,750	1,688	507	4,946	4%
Articles – Base Metal	3,546	886	399	4,831	3%
Waste/Scrap	131	1,797	2,545	4,472	3%
All Others	8,000	18,173	9,936	36,109	26%
<b>Total</b>	<b>44,366</b>	<b>59,061</b>	<b>35,604</b>	<b>139,031</b>	<b>100%</b>

Source: FHWA, FAF 4.4.

## SIGNIFICANT TRADING PARTNERS

An understanding of where these goods are trading from is an important attribute to consider when examining key transportation routes. As shown in Table B.4, Alabama is the largest trading partner for Birmingham, largely driven by those movements internal to the region. In total, goods originating or destined for the state of Alabama comprise 52 percent of all movements in the Birmingham region. Nearby states including Mississippi, Georgia, and Tennessee also rank in the top five trading partners. One outlier geographically in this top ranking is Wyoming. Nearly 100 percent of all goods affiliated with Wyoming have a destination within Birmingham and account for 7 percent of all goods for the region. This is due to the mining of coal within Wyoming which is brought to Birmingham.

**Table B.4: Top Trading Partners by Tonnage, 2015**

State	Origin (1,000 tons)	Destination (1,000 tons)	Internal (1,000 tons)	Total (1,000 tons)	Percent of Total
Alabama	20,644	15,814	35,604	72,062	52%
Mississippi	2,765	11,540	0	14,305	10%
Wyoming	2	9,111	0	9,113	7%
Georgia	2,906	3,198	0	6,104	4%
Tennessee	2,986	1,672	0	4,658	3%
Minnesota	166	3,067	0	3,233	2%
Florida	2,088	1,102	0	3,189	2%
Texas	1,660	763	0	2,422	2%
Indiana	1,296	1,111	0	2,408	2%
Oklahoma	69	2,337	0	2,406	2%
Illinois	1,020	1,302	0	2,322	2%
All Others	8,763	8,035	0	16,799	12%
<b>Total</b>	<b>44,366</b>	<b>59,061</b>	<b>35,604</b>	<b>139,031</b>	<b>100%</b>

Source: FHWA, FAF 4.4.

## COMMODITY FORECASTS

Over time, shifts will occur in the mode of transport, types of commodities, and origins and destinations of these goods. FAF provides projections of these anticipated shifts through 2045 based on market research and collaboration with industry stakeholders. These projections allow for municipalities, regions, and states to anticipate how their transportation needs may shift in the coming years.

### OVERVIEW

Based on the FAF estimates, trucking will continue to be the dominant mode of transportation for goods and services affiliated with the Birmingham region as shown in Table B.5. Trucking will account for approximately 71 percent of all movement, an increase from the 68 percent share seen in 2015. Trucking tonnage is estimated to grow a total of 31 percent, driving the region to an overall growth in freight tonnage of 25 percent. While other modes, such as air, also are expected to experience high growth rates, their current tonnage weights are much smaller, which minimizes the impact of any significant future increase. The most interesting anticipated change is in rail traffic. Rail tonnages are estimated to decrease by 3 percent, resulting in a loss of mode share. Given the importance of a multimodal network, the loss of traffic on this mode can have a profound impact on traffic patterns within the region. Efforts should be made to ensure that rail usage maintains its share of traffic in order to have an efficient transportation system. Interestingly, many markets throughout the U.S. are seeing similar trends as railroads continue to invest in their intermodal service networks; this translates into a greater focus on lower weight, higher value consumer products moving in containers and/or trailers.

**Table B.5: Forecasted Tonnage Moved by Mode and Modal Share, 2045**

Mode	Origin (1,000 tons)	Destination (1,000 tons)	Internal (1,000 tons)	Total (1,000 tons)	Total Growth (2015 – 2045)
Truck	43,893	46,466	33,358	123,717	31%
Rail	7,971	18,456	1,052	27,469	-3%
Pipeline	413	15,557	0	15,970	27%
Multiple Modes & Mail	1,890	3,943	103	5,935	56%
Air (Includes Truck-Air)	47	34	0	81	200%
Other/Unknown	2	7	0	9	200%
Water	0	0	0	0	0
<b>Total</b>	<b>54,205</b>	<b>84,463</b>	<b>34,513</b>	<b>173,181</b>	<b>25%</b>

Mode	Origin	Destination	Internal	Total	Change in Mode Share
Truck	81%	55%	97%	71%	+3%
Rail	15%	22%	3%	16%	-4%
Pipeline	1%	18%	0%	9%	0%
Multiple Modes & Mail	3%	5%	0%	3%	0%
Air (Includes Truck-Air)	0%	0%	0%	0%	0%
Other/Unknown	0%	0%	0%	0%	0%
Water	0%	0%	0%	0%	0%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>0%</b>

Source: FHWA, FAF 4.4.

In looking at the value of these goods that are forecasted for the year 2045 as seen in Table B.6, a different perspective is shown. While trucking increases against the other modes in the value of goods moved, it still loses a 3 percent share of the market. The trucking mode experiences only a 50 percent growth rate compared to an overall growth rate of 59 percent. In this case, rail sees much higher growth in the value of goods moved compared to truck. This suggests that while rail is moving lighter products, those same products have a higher value per ton. This supports the possible increase in intermodal service and decreased bulk/carload service discussed above.

**Table B.6: Forecasted Value Moved by Mode and Modal Share, 2045**

Mode	Origin (\$M)	Destination (\$M)	Internal (\$M)	Total (\$M)	Total Growth (2015 - 2045)
Truck	\$55,704	\$78,936	\$44,136	\$178,777	50%
Rail	\$5,317	\$9,279	\$175	\$14,771	73%
Pipeline	\$96	\$3,992	\$0	\$4,087	28%
Multiple Modes & Mail	\$10,506	\$17,507	\$2,039	\$30,052	116%
Air (Includes Truck-Air)	\$3,105	\$1,885	\$0	\$4,990	214%
Other/Unknown	\$5	\$55	\$0	\$60	253%
Water	\$1	\$0	\$0	\$1	0%
<b>Total</b>	<b>\$74,732</b>	<b>\$111,654</b>	<b>\$46,351</b>	<b>\$232,737</b>	<b>59%</b>

Mode	Origin	Destination	Internal	Total	Change in Mode Share
Truck	75%	71%	95%	78%	-3%
Rail	7%	8%	0%	6%	0%
Pipeline	0%	4%	0%	2%	0%
Multiple Modes & Mail	14%	16%	4%	12%	2%
Air (Includes Truck-Air)	4%	2%	0%	1%	0%
Other/Unknown	0%	0%	0%	0%	0%
Water	0%	0%	0%	0%	0%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>0%</b>

Source: FHWA, FAF 4.4.

## COMMODITIES BY TONNAGE

Generally speaking, the commodities anticipated to move in 2045 are the same as 2015 with one exception, as shown in Table B.7. The natural sands commodity moves into the tenth place, removing motorized vehicles from the top 10 by weight. Coal and coal n.e.c. are anticipated to continue to be the top two commodities, although the gap between the two will shrink. Gravel will no longer be the third highest but is anticipated to maintain a position in the top five. Overall, the top ten commodities are anticipated to represent 72 percent of all goods that will be moved into, out of, and within the region, a slight decrease from 74 percent in 2015.

**Table B.7: Forecasted Top Commodities by Tonnage, 2045**

Commodity	Origin (1,000 tons)	Destination (1,000 tons)	Internal (1,000 tons)	Total (1,000 tons)	Percent of Total	Previous Rank
<b>Coal</b>	8,835	14,933	2,039	25,467	15%	1
<b>Coal – n.e.c.</b>	2,265	19,464	528	21,504	14%	2
<b>Nonmetal Min. Prods.</b>	10,913	1,300	4,514	15,881	10%	4
<b>Base Metals</b>	3,838	5,306	824	9,969	6%	5
<b>Gravel</b>	2,771	1,110	5,852	9,732	6%	3
<b>Waste/Scrap</b>	220	4,234	3,929	8,383	5%	10
<b>Woods Prods.</b>	4,417	1,873	1,704	7,995	5%	6
<b>Other Foodstuffs</b>	3,878	2,925	752	7,555	4%	8
<b>Articles – Base Metal</b>	4,731	1,841	746	7,318	4%	9
<b>Natural Sands</b>	576	5,461	917	6,954	4%	-
<b>All Others</b>	11,761	24,071	12,102	47,934	28%	
<b>Total</b>	<b>54,205</b>	<b>84,463</b>	<b>34,513</b>	<b>173,181</b>	<b>100%</b>	

Source: FHWA, FAF 4.4.

A more detailed look at anticipated changes in commodity tonnages between 2015 and 2045 is shown in Table B.8. This includes the five commodities that are forecasted to see the largest gains as well as the five commodities that are forecasted to see the largest decreases. By total quantity, nonmetal mineral products are anticipated to see the highest growth, by nearly 7,000 ktons, which would be largely driven by movements out of the region for a total growth of 68 percent. Waste and scrap commodities are anticipated to experience a larger growth, by 87 percent, which would be largely driven by these goods moving into the region for a total growth of nearly 4,000 ktons. On the other end of the spectrum, decreases in tonnages are anticipated among the following four commodities: gasoline, coal, fuel oils, and gravel. Of these, gravel is anticipated to result in the largest decline by approximately 3,800 ktons, or 28 percent. However, this would be due to a significant reduction in internal movements which may signify a more efficient supply chain versus an actual decrease in this commodity. Fuel oils similarly are anticipated to result in a large drop of 54 percent, which can mostly be attributed to a decrease in internal movements.



**Table B.8: Forecasted Largest Tonnage Change by Commodity, 2015-2045**

Commodity	Origin (1,000 tons)	Destination (1,000 tons)	Internal (1,000 tons)	Total (1,000 tons)	Total Change
<b>Nonmetal Min. Prods.</b>	4,693	582	1,714	6,988	68%
<b>Coal - n.e.c.</b>	12	6,258	149	6,419	37%
<b>Waste/Scrap</b>	90	2,438	1,384	3,911	87%
<b>Other Foodstuffs</b>	1,128	1,237	245	2,610	53%
<b>Natural Sands</b>	61	2,348	97	2,505	56%
<b>Tobacco Prods.</b>	-1	-1	-1	-3	-73%
<b>Gasoline</b>	-150	-463	-831	-1,444	-40%
<b>Coal</b>	-223	1,345	-2,725	-1,603	-6%
<b>Fuel Oils</b>	12	-417	-1,228	-1,633	-54%
<b>Gravel</b>	-1,326	293	-2,800	-3,832	-28%

Source: FHWA, FAF 4.4.

## SIGNIFICANT TRADING PARTNERS

The top trading partners with the Birmingham region are anticipated to remain unchanged in 2045, albeit with some shifts in the rankings. The top five would remain the same, although Wyoming is anticipated to drop from third place to fifth. Oklahoma is anticipated to have the largest increase as a trading partner, moving from tenth place to sixth. Overall, these top trading partners will consist of 87 percent of all trade to, from, and within the Birmingham region, a slight decrease from 88 percent in 2015. This suggests a marginally more diversified supply chain in 2045.

**Table B.9: Forecasted Top Trading Partners by Tonnage, 2045**

State	Origin (1,000 tons)	Destination (1,000 tons)	Internal (1,000 tons)	Total (1,000 tons)	Percent of Total	2015 Rank
Alabama	26,776	27,227	34,513	88,516	51%	1
Mississippi	2,970	15,095	0	18,065	10%	2
Georgia	3,465	5,559	0	9,024	5%	4
Tennessee	4,074	2,607	0	6,681	4%	5
Wyoming	2	6,473	0	6,475	4%	3
Oklahoma	83	4,687	0	4,769	3%	10
Florida	2,086	1,741	0	3,827	2%	7
Texas	2,043	1,664	0	3,707	2%	8
Minnesota	178	3,306	0	3,485	2%	6
Illinois	1,504	1,462	0	2,966	2%	11
Indiana	959	1,962	0	2,921	2%	9
All Others	10,066	12,679	0	22,745	13%	
<b>Total</b>	<b>54,205</b>	<b>84,463</b>	<b>34,513</b>	<b>173,181</b>	<b>100%</b>	

Source: FHWA, FAF 4.4.

Table B.10 shows more detail in the forecasted changes of products to be moved by these trading partners. This includes the five trading partners with the most significant increases as well as the five with the lowest increase, or decrease as is the case for Wyoming. Wyoming is the only state that is expected to decrease its trade with the region, solely driven by a reduction in coal movements. Internal movements within Birmingham are also expected to decrease although trade with Alabama as a whole is anticipated to grow by 16,453 ktons, or 23 percent. The state with the largest percentage growth (excluding those such as Vermont which produce significant growth from very low volumes) is Oklahoma. Trade with this state will nearly double by 2045, predominately driven by an increase of movements into the Birmingham region.

**Table B.10: Forecasted Largest Tonnage Change by Trading Partners, 2015-2045**

Commodity	Origin (1,000 tons)	Destination (1,000 tons)	Internal (1,000 tons)	Total (1,000 tons)	Total Change
Alabama	6,131	11,413	-1,091	16,453	23%
Mississippi	205	3,555	0	3,761	26%
Georgia	559	2,361	0	2,920	48%
Oklahoma	13	2,350	0	2,363	98%
Tennessee	1,088	935	0	2,023	43%
Rhode Island	2	1	0	3	29%
Vermont	0	2	0	3	104%
Hawaii	2	0	0	2	103%
Alaska	1	0	0	2	176%
Wyoming	0	-2,639	0	-2,639	-29%

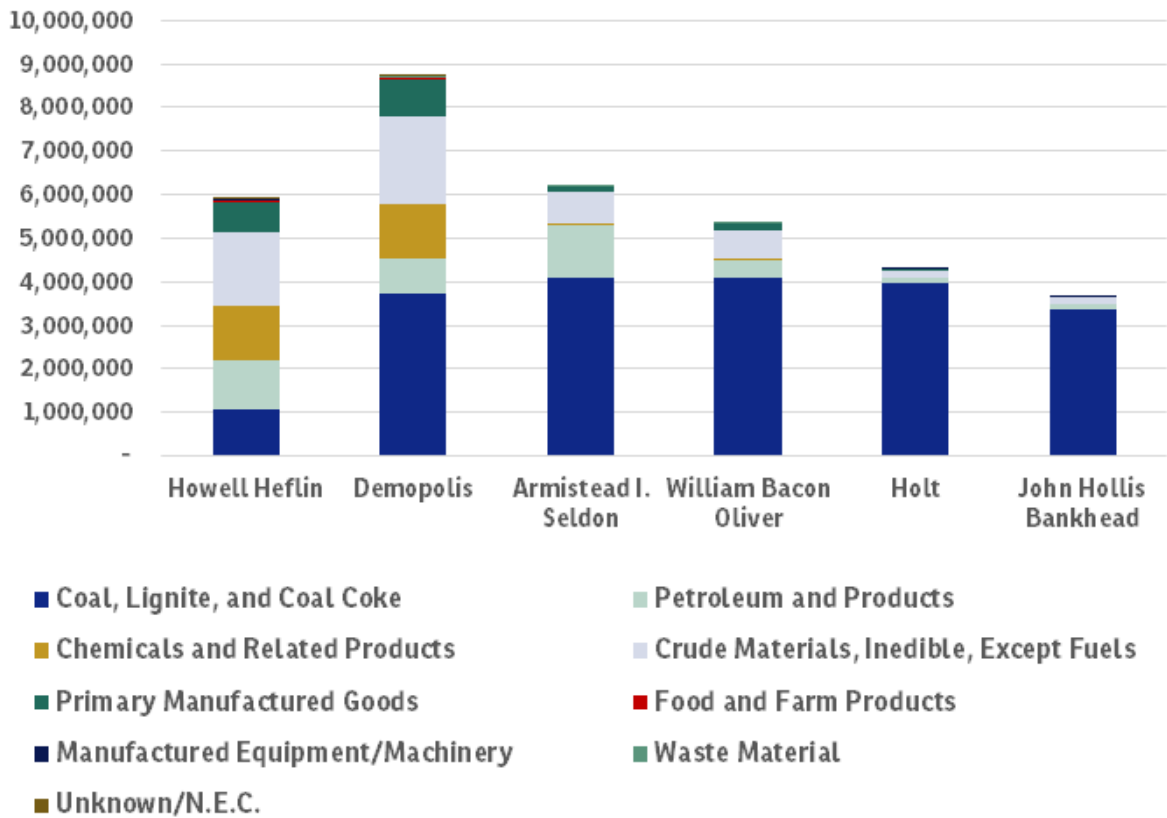
Source: FHWA, FAF 4.4.

## WATERWAY MOVEMENTS

Waterway movements are not prevalent in FHWA's FAF data for the Birmingham zone. While Port Birmingham is located in the zone, it represents the terminus of the navigable waterway; the majority of the relevant waterway system is located outside of the designated region and is not included. However, the waterway system is an important attribute to the region as it provides an alternative mode of transport for freight users and some amount of system usage can be captured by data provided by the U.S. Army Corps of Engineers (USACE). USACE monitors the movements at locks and dams to then report out the tonnage moved by commodity. Figure B.1 shows the tonnage moved in 2015 at the locks and dams from the Howell Heflin Lock and Dam on the Tombigbee River and the Demopolis Lock and Dam on the Black Warrior up to the John Hollis Bankhead Lock and Dam near Birmingham.

Of these facilities, the Demopolis location has the most traffic at the confluence of the Tombigbee River and the Black Warrior with approximately 8.8 million tons. Of this, the largest commodity share belongs to Coal, Lignite, and Coal Coke, which account for 42 percent of the total, or 3.7 million tons. The next largest is All Crude Materials, Inedible, Except Fuels with 24 percent of the total or nearly 2 million tons. The third largest is All Chemicals and Related products with 14 percent of the total or 1.2 million tons. Together, these top three commodities represent 79 percent of the total tonnage moved through the Demopolis location. The Howell Heflin facility has a similar mix of products, albeit in smaller volumes. However, as one moves north along the Black Warrior, both the volume and diversity of products begins to wane. Beginning with the Armistead I. Seldon Lock and Dam, the share coal, lignite, and coal coke begins to represent the majority of total commodity tonnage with 66 percent passing through this facility. At the William Bacon Oliver Lock and Dam it again increases to 76 percent of the total before reaching over 90 percent at both Holt and John Hollis. This illustrates an increased reliance on such products for shipping and receiving facilities closer to Birmingham.

**Figure B.1: Commodities Moved via Waterway near Birmingham, 2015**

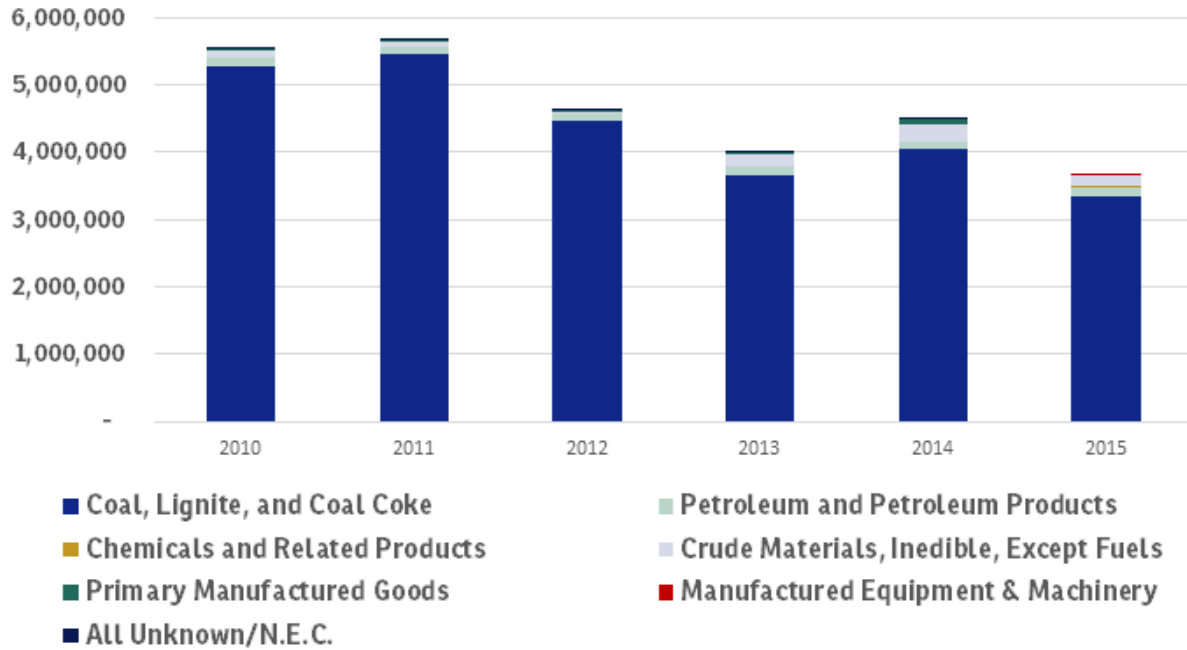


Source: U.S. Army Corps of Engineers.

An examination of movements at the nearest lock and dam location, John Hollis Bankhead, yields an understanding of present trends on the waterway system. As evidenced by the movements at all locations on the waterway system, Coal, Lignite, and Coal Coke has historically been the most significant commodity tonnage-wise to be moved via waterways as shown in Figure B.2. In any given year since 2010, this commodity has represented 90 to 95 percent of the total tonnage moved at this lock and dam. However, consistent with nationwide trends and influenced by changes in energy sourcing, this commodity has seen a significant decline. In 2010, approximately 5.3 million tons of coal, lignite, and coal coke were moved through this facility. By 2015, the total tonnage of this commodity had dropped to 3.4 million, or only 64 percent of the 2010 value.

This trend has been reflected by the freight users of the region who have witnessed the severe decrease in the movement of this commodity. While the U.S. Army Corps of Engineers (USACE) does not provide forecast data for the locks and dams, national trends suggest a continued downward trend in coal movements which can have a significant impact for facilities which rely upon this commodity.

Figure B.2: Historic Waterway Commodity Movements



Source: U.S. Army Corps of Engineers.