IV. FINDINGS

This section of the report presents three types of findings: (1) benefits to the general public and benefit-cost ratio; (2) economic impact results; and (3) related jobs. Before presenting the results, a few context-specific assumptions are in order:

- All dollar values are adjusted to 2009 value.
- Life cycle of port is 50 years.
- Real discount (interest) rate is 2.7 percent, per Office of Management and Budget (OMB) Memorandum.
- The value of a statistical life (VSL) and injury severity levels as a fraction of VSL are from the U.S. Department of Transportation (DOT) memorandum dated February 5, 2008.
- Fatality rates per billion ton-miles by mode of transportation, injury rate per billion ton-miles by mode of transportation, gallon spills per million ton-miles by mode of transportation, and grams of CO_2 emission per ton-mile are obtained from a study titled "A Modal Comparison of Domestic Freight Transportation Effects on the General Public" in 2007 (amended in 2009) by the Center for Ports and Waterways, Texas Transportation Institute, Texas.
- As per the guidelines of the U.S. DOT, estimates for fatality reduction include lower and upper values of a VSL, and estimates for injury reduction include the application of the DOT relative disutility factors to the lower and upper VSL values.
- The BERC used state crash severity data to calculate the percent of crashes by severity, and the number of injuries reduced in the study region is redistributed across crashes by severity level.

IV.a. Benefit-Cost Analysis

Based on the total throughput of nearly 1.6 million tons, investment in the port is estimated to generate noteworthy benefits. Not all benefits in Tables 13 and 14, however, are monetized. According to BERC estimates,

- The port will increase efficiency in the transportation system and save local businesses $2.2 million annually.
- The port will improve highway safety by saving about 37 lives and preventing 832 injuries during the life cycle of the port (50 years).
- The port will improve livability from an environmental perspective by reducing green house emissions (CO_2) by 8,760 tons annually and preventing 563 gallons of hazardous material spills annually.
- The Port will help reduce the life-cycle maintenance cost of highways by reducing the number of long trucks on highways about 22 percent and the number of vehicle miles traveled more than 69 percent.

Table 13: Intermodal Transportation System at Cates Landing: Benefits Summary

A. Effieciency: Transportation Saving (Annual 2009 $)

Mode	Current (Baseline)	With the Port	Difference (Savings)
Barge	$0	$622,543	$622,543
Railroad	$184,933	$95,011	-$89,922
Truck	$3,942,028	$1,193,448	-$2,748,580
Total	**$4,126,960**	**$1,911,001**	**-$2,215,959**

B. Safety: Fatality Reduction (50-year life cycle, total number)

Mode	Current (Baseline)	With the Port	Difference (Lives Saved)
Barge	0.00	0.20	0.20
Railroad	0.97	0.50	-0.47
Truck	52.19	15.80	-36.39
Total	**53.16**	**16.50**	**-36.66**

B1. Safety: Injury Reduction (50-year life cycle, total number)

Mode	Current (Baseline)	With the Port	Difference (Injuries Prevented)
Barge	0.00	0.32	0.32
Railroad	8.72	4.48	-4.24
Truck	1,188.01	359.67	-828.34
Total	**1,196.73**	**364.47**	**-832.26**

C. Livability: Green House Emission Reduction (Carbon Dioxide (CO_2)) (Annual, Tons)

Mode	Current (Baseline)	With the Port	Difference (Tons Reduced)
Barge	0.00	2,460.96	2,460.96
Railroad	731.38	375.75	-355.63
Truck	15,583.62	4,717.94	-10,865.68
Total	**16,315.00**	**7,554.65**	**-8,760.35**

C1. Livability: Hazardous Material Spill Reduction (Annual, Gallons)

Mode	Current (Baseline)	With the Port	Difference (Gallons Prevented)
Barge	0.00	506.83	506.83
Railroad	115.75	59.47	-56.28
Truck	1,453.77	440.13	-1,013.64
Total	**1,569.52**	**1,006.43**	**-563.09**

Benefit-Cost Ratio (BCR). Table 14 presents the benefit-cost ratio for the proposed investment in intermodal transportation system at Cates Landing. The following assumptions have been made in calculating the benefit-cost ratio:

- All values are in constant 2009 dollars.

- A discount (real interest) rate of 2.7 percent is used.
- A life cycle of 50 years is used for the port.
- Cost figure includes cost of borrowing compounded at the end of the year for 50 years.
- Benefits for each benefit category are expressed in present value.
- Transportation cost-saving and underlying cargo assumption are assumed to be constant over the life cycle of the port (no growth assumption).

Based on these assumptions, the BERC estimated two BCRs:

- Lower Bound: **2.89**, suggesting that for every dollar ($1) invested, the society will gain at minimum $2.89 in return.
- Upper Bound: **6.21**, suggesting that for every dollar ($1) invested, the society will gain a maximum of $6.21 from this project.

Table 14: Northwest Tennessee Regional Port at Cates Landing and Industrial Park
Benefit-Cost Ratio

Assumption:
I. 50 year life cycle of the port
II. Fatality Reduction = 37 (in 50 years) with a VSL value ranging from $3.3 million to $8.7 million (2009)
III. Injury Reduction = 832 (in 50 years) // injury severity adjustment has been made // DOT relative disutility factors are applied to the lower and upper VSL value

A. Cost					
	Life Cycle	50 years			
	Base Year	2009	All values assumed to be in 2009 $		
	Total Investment	$34,768,347			
	Real Interest rate	2.70%	OMB Circular No. A-94		
	With Cost of Borrowing	$71,828,284	Compounding at the end of the year		
B. Benefits		***Lower Bound (in 2009 $)***		***Upper Bound (in 2009 $)***	
	Discount Rate	2.70%	Present Value	2.70%	Present Value
	Transportation Savings	$2,215,956	$60,411,610	$2,215,956	$60,411,610
	Emission Reduction	Not Estimated		Not Estimated	
	Fatality Reduction	$2,431,317	$66,282,802	$6,382,208	173,992,380
	Injury Reduction	$2,960,638	$80,713,203	$7,771,674	211,872,136
	Total		$207.41 million		$446.28 million
C. Benefit/Cost Ratio		**2.89**		**6.21**	

IV.b. Economic Impact Analysis

In addition to societal benefits of the proposed port investment, critically important is job creation in the study region, where unemployment rate and poverty are significantly higher than for the U.S. Furthermore, investment in the port will increase economic diversity in the region. For

example, there are no manufacturing companies in Lake County, where Cates Landing is located. The port investment will attract several manufacturing companies to the area. Similarly, the region does not have any employment in water transportation. This will change with the port investment.

This section presents two types of impact results:

- Short-term economic impact
- Long-term economic impact

For short-term economic impact, there are two scenarios:

- Port construction spending
- What-if scenario: Steel Mill construction spending

The long-term economic impact includes three scenarios:

- Port operation (marine-related activities)
- Port operation + industrial park tenants
- Port operation + industrial park tenants + relocation of a steel mill company to the area

To estimate short- and long-term economic impact of the port operation, industrial park tenants, and steel mill relocation, the BERC constructed a regional economic impact model (for Dyer, Lake, and Obion) with the widely used economic impact software IMPLANpro. Economic impact figures generated by the IMPLAN model are divided into three sub-groups: direct, indirect, and induced:

- Direct impact—involves expenditures of businesses directly related to the operation of Cates Landing.

- Indirect Impact—involves business-to-business transactions in the regional economy triggered by the initial spending of businesses directly related to the port operation.

- Induced impact—involves the effect of employee spending on the regional economy.

IV.b.i. Port and Industrial Park: Construction and Operation

Short-run economic impact of the proposed investment. The proposed investment in the port will stimulate the regional economy by creating much-needed jobs. In the short run, the construction spending of **$35 million will create 406 new jobs** in the region, total short-term business revenue created of $45.9 million; gross regional product of $20.2 million; personal income of $16.1 million; and local and state taxes totaling $1.1 million.

Medium- to long-term economic impact of the proposed investment. In the long run, the proposed investment in Cates Landing will be a boon to the regional economy. The proposed $35 million investment **will create 1,703 new permanent jobs** in the region (Phase III, Table 15). Given the

nature of investment, the leverage ratio is very high: for every $20,552, one (1) new permanent job is created.

Considering other regional economic aggregates, the return to the proposed investment is quite handsome: for example, total business revenue (output) generated as a result of the proposed investment is $259.2 million with a business revenue/proposed investment ratio of 7.41, suggesting that for every dollar invested, $7.41 in new revenue is generated in the region.

To summarize the findings of the long-term impact of the proposed investment in Cates Landing:

Every dollar of the proposed investment in Cates Landing will leverage:

- $7.41 in business revenues (output)
- $2.58 in gross regional product (value-added)
- $1.71 in personal income
- $0.15 in state and local revenues

In addition, every $20,552 of the proposed investment will leverage:

- One (1) new permanent job

Table 15:
The Northwest Tennessee Regional Port at Cates Landing and Industrial Park
Short- and Long-Term Economic Impact of Port Construction, Operation, and Industrial Park Tenants

Horizon	*Short Term (One-Time)*	*Medium-Long Term*	
Economic Impact Categories	**Phase I: Construction***	**Phase II: Operation****	**Phase III: Phase II + Industrial Park Tenants*****
I. Employment (Number of Jobs)			
Direct	296	783	**986**
Indirect	46	457	**496**
Induced	64	172	**221**
Total	406	1,412	**1,703**
II. Business Revenue (in Million $)			
Direct	$34.0	$169.3	**$197.9**
Indirect	$5.7	$33.6	**$39.1**
Induced	$6.3	$17.4	**$22.2**
Total	$45.9	$220.3	**$259.2**
III. Gross Regional Product (In Million $)			
Direct	$13.8	$45.7	**$56.8**
Indirect	$2.9	$18.3	**$20.8**
Induced	$3.6	$9.9	**$12.6**
Total	$20.2	$73.9	**$90.2**
IV. Personal Income (In Million $)			
Direct	$12.2	$29.6	**$38.4**
Indirect	$1.9	$12.5	**$14.1**
Induced	$2.0	$5.6	**$7.1**
Total	$16.1	$47.7	**$59.7**
V. Local and State Taxes (In Million $)			
Local	$0.4	$1.0	**$1.2**
State	$0.8	$3.5	**$4.2**
Total	$1.1	$4.5	**$5.4**

Notes: Sums may not be equal to the totals due to rounding.

*Construction breakdowns are provided in Table 5.

**Port operation and marine-related jobs are presented in Table 8. The BERC utilized MARAD PortKit to translate the port cargo assumptions into direct jobs by sector. These direct jobs by sector then are used as inputs into the IMPLAN regional economic impact model.

***When the port becomes fully operational ,the industrial park is likely to have a greater than 60 percent occupancy rate. Assumptions regarding the industrial park occupancy are presented in Table 7.

IV.b.ii. What-If Scenario: Steel Mill Construction and Operation

In the past 10 to 15 years, port officials have received several inquiries and letters of interest from different segments of industries across the U.S. expressing their decision to consider Cates Landing as their first choice for relocating their companies. However, none of these inquiries has materialized because the port is not up and running. The proposed investment of $35 million in the port will open the door for fresh inquiries, and eventually a major industry is likely to relocate to the port. Table 9 in the previous chapter summarizes some of the inquiries received by port officials.

Based on the previous industry inquiries, this section develops a what-if scenario and measures the impact of that scenario on the regional economy. Given the overwhelming interest expressed by steel mills, we assume that Cates Landing will be able to accommodate a small steel mill with 300 jobs and $550 million investment. The economic impact results are presented in Table 16.

Short-term impact of steel mill construction. Putting a small-scale steel mill operation in Cates Landing creates a significant short-term impact on the local economy. We assume in Table 16 that the construction phase of the steel mill will last three (3) years, generating an average of 2,184 new jobs. Other short-term impacts are (1) $236 million in business revenue (output), (2) $105.2 million in gross regional product (value-added), (3) $82.8 million in personal income, and (4) $4.6 million in local and state tax revenues.

Long-term impact of a steel mill operation. In the long run, since the relocation of a steel mill to Cates Landing will be contingent upon the realization of the proposed $35 million investment, we added the impact of operating a steel mill to the long-term impact of the port operation and industrial park (Phase III, Table 15). The combined long-term impact then is presented as Phase IV in Table 16. We assume that the figures in Phase IV, Table 16, represent the upper bound of the long-term economic impact leveraged by the proposed $35 million investment.

In the long run with a steel mill, the proposed $35 million investment will leverage

- 2,355 new jobs
- $463.6 million in business revenue (output)
- $133 million in gross regional product (value-added)
- $87.3 million in personal income
- $8.5 in state and local government revenues

Revisiting some of the leverage ratios presented above, study findings indicate that the proposed $35 million investment in Cates Landing will be instrumental in creating significant regional economic benefits in the study region. **Every dollar of the proposed investment will be instrumental in creating as much as**

- $13.25 in business revenues
- $3.8 in gross regional product

- $2.49 in personal income
- $0.24 in state and local government revenues

In addition, every $14,862 invested will be instrumental in creating one (1) permanent job in the region.

Table 16:
Northwest Tennessee Regional Port at Cates Landing and Industrial Park
What-If Scenario Regarding Further Development of the Port Industrial Park

Horizon	*Short Term (One-Time)*			*Medium-Long Term*	
	Construction Stage: Steel Mill*			Steel Mill Starting Operation in Year 4	
Economic Impact Categories	**Year 1: 2009**	**Year 2: 2010**	**Year 3: 2011**	**Steel Mill: Operation****	**Phase IV: Phase III + Steel Mill Operation*****
I. Employment (Number of Jobs)					
Direct	1,669	1,659	1,553	300	**1,286**
Indirect	265	173	246	239	**735**
Induced	342	328	318	113	**334**
Total	**2,276**	**2,160**	**2,117**	652	**2,355**
II. Business Revenue (in Million $)					
Direct	$181.0	$177.5	$169.3	$155.1	**$353.0**
Indirect	$31.8	$21.6	$29.6	$38.3	**$77.4**
Induced	$33.3	$31.9	$31.0	$11.0	**$33.2**
Total	**$247.1**	**$231.0**	**$229.9**	$204.5	**$463.6**
III. Gross Regional Product (In Million $)					
Direct	$69.2	$84.1	$64.4	$21.0	**$77.8**
Indirect	$16.7	$11.8	$15.5	$15.5	**$36.3**
Induced	$19.0	$18.2	$17.7	$6.3	**$18.9**
Total	**$104.0**	**$114.1**	**$97.6**	$42.7	**$133.0**
IV. Personal Income (In Million $)					
Direct	$64.3	$64.4	$59.8	$14.0	**$52.4**
Indirect	$11.0	$7.8	$10.3	$10.1	**$24.2**
Induced	$10.7	$10.3	$10.0	$3.6	**$10.7**
Total	**$86.0**	**$82.5**	**$80.0**	$27.6	**$87.3**
V. Local and State Taxes (In Million $)					
Local	$1.0	$1.0	$0.9	$0.7	**$1.9**
State	$3.8	$3.4	$3.6	$2.4	**$6.6**
Total	**$4.8**	**$4.4**	**$4.5**	$3.1	**$8.5**

Notes: Sums may not be equal to the totals due to rounding.

*Assumes $550 million investment that will be completed in three years.

**See Table 9 for assumptions.

***This represents the optimistic assumption that (1) the Port will be operational, (2) marine-dependent and other tenants will occupy the industrial park with about a 40 percent vacancy rate, and (3) a steel mill will be constructed that employs 300 people.

IV.c. Related Jobs

The proposed $35 million investment in Cates Landing will have a measurable impact on the regional transportation system. The current single modal transportation system will shift to the intermodal transportation system. This modal shift will help the manufacturing companies whose line of business depends on foreign exports. With the presence of a relatively inexpensive alternative, the manufacturing companies will gradually divert a portion of their foreign exports and intermediate goods imports to the port to remain globally competitive. Although it is difficult to precisely determine the level of port dependency of the companies in the region without a survey, we nevertheless attempted to estimate the number of port-related jobs. It is important to bear in mind that **"related jobs" are not new jobs created or leveraged** by the proposed port investment. These are the jobs **retained in the region due to the increasing competitiveness of area business as a result of port-related transportation cost savings.**

IV.c.i. Recent Layoffs

A glance at recent layoff figures in the core and surrounding regions shows how important the "related jobs" are for the regional economy. Table 17 shows the extent of manufacturing flight between 2008 and January 2009. Manufacturing employment declined about 15 percent in the core region and 31 percent in the surrounding region in one year. **The proposed $35 million port investment is expected to stabilize the manufacturing sector by retaining existing jobs and attracting new ones to the region.**

Table 17: Northwest Tennessee Regional Port Authority at Cates Landing
Recent Layoff Analysis of the Study Region

Core Region	*Number of Job Losses*	*Period*	
Dyer	659	2008-2009	
Lake	N/A		Manufacturing companies migrated from the county in the 1990s
Obion	800	2008-2009	Through Buy-Out
Subtotal	1,459		
2008 Manufacturing Employmer	8,190		
2007 Manufacturing Employmer	9,649		
Percent Decline in One Year	-15.12%		
Surrounding Region			
Crockett	10	2009	
Gibson	2,048	2008-2009	
Lauderdale	500	2008	
Weakley	157	2008	
Subtotal	2,715		
2008 Manufacturing Employmer	6,149		
2007 Manufacturing Employmer	8,864		
Percent Decline in One Year	-30.63%		

Source: Compiled from various regional sources including media reports

IV.c.ii. Export Dependency

Based on the layoff figures in Table 17, retaining existing manufacturing jobs is critically important to the region. Estimated transportation savings due to modal shift with construction of the port will increase competitiveness of the regional manufacturing companies in the global economy. According to our estimates, **the proposed $35 million investment in the port will help the core and surrounding regions retain 2,293 manufacturing jobs.** Tables 18 and 19 show the process of estimating these figures.

Table 18:
Estimated Port-Related Jobs: Dyersburg, Obion, and Lake

Commodity	Employment	Foreign Exports (FE) (million $)	Share of FE in Total Export	FE Dependent jobs	Cates Landing Related Jobs
Tire manufacturing	2,373	$164.78	21.34%	506	192
Air conditioning/refrigeration/warm air	427	$64.33	23.70%	101	38
Power-distribution and specialty transformers	288	$35.30	67.70%	195	74
Switchgear and switchboard apparatus	279	$25.50	35.27%	98	37
Oilseed farming	1,229	$25.48	52.39%	644	245
Motor vehicle parts manufacturing	605	$24.17	12.93%		
Grain farming	1,767	$22.12	45.31%	801	304
Construction machinery manufacturing	105	$19.25	55.33%	58	22
Cotton farming	308	$18.10	85.69%	264	100
Other rubber product manufacturing	501	$17.46	9.62%		
Rubber and plastics hoses and belting	280	$16.24	28.03%	78	30
All other chemical producst and preparation	136	$10.40	22.18%	30	11
Surgical appliance and supplies manufacturing	102	$8.67	19.93%	20	8
All other textile product mills	151	$8.04	16.45%		
Heating equipment (except warm air furnaces)	279	$8.00	11.64%		
Total	8,830	$467.83		2,796	1,063
Foreign Exports as Percent of Region's Total FE		61.28%			
Criteria for Related Jobs	20 percent foreign export dependency Large amount of foreign export volume Jobs are proportional to foreign export share. Related jobs are proportional to the share of noncontainerized cargo exports. Noncontainerized is estimated at around 38% for total foreign exports.				
Total-Related Jobs	**1,063**				

Note: It is hard to measure the level of port dependency without a survey. These are the closest estimates the BERC derived given the layoff figures in the region in recent years in Table 17.

Table 19: Northwest Tennessee Regional Port Authority at Cates Landing
Estimated Port-Related Jobs: Crockett, Gibson, Lauderdale, and Weakley

Commodity	Foreign Exports (FE) (million $)	Employment	Share of FE in Total Export	FE Dependent jobs	Cates Landing Related Jobs
Cotton farming	80.64	1,422	86.19%	1,226	466
Motor vehicle parts manufacturing	44.22	1,131			
Grain farming	29.99	2,272	46.07%	1,046	398
Oilseed farming	27.20	1,272	52.39%	666	253
Other aircraft parts and auxiliary equipment	26.24	101	88.82%	90	34
Switchgear and switchboard apparatus	23.68	280	35.30%	99	38
Aluminum refining and primary aluminum products	16.89	223			
Ammunition manufacturing	13.80	561			
All other chemical products and preparation	11.82	142	24.98%	35	13
Power boiler and heat exchanger manufacturing	4.39	104	21.62%	22	9
Other plastics product manufacturing	4.18	160	31.98%	51	19
Mining and quarrying sand/gravel/clay	3.87	172			
Total	286.91	7,840		3,237	1,230
Foreign Exports as Percent of Region's Total FE	55.21%				
Criteria for Related Jobs	20 percent foreign export dependency Large amount of foreign export volume Jobs are proportional to foreign export share. Related jobs are proportional to the share of noncontainerized cargo exports. Noncontainerized is estimated at around 38% for total foreign exports.				
Total-Related Jobs	**1,230**				

Note: It is hard to measure the level of port dependency without a survey. These are the closest estimates the BERC derived given the layoff figures in the region in recent years in Table 17.