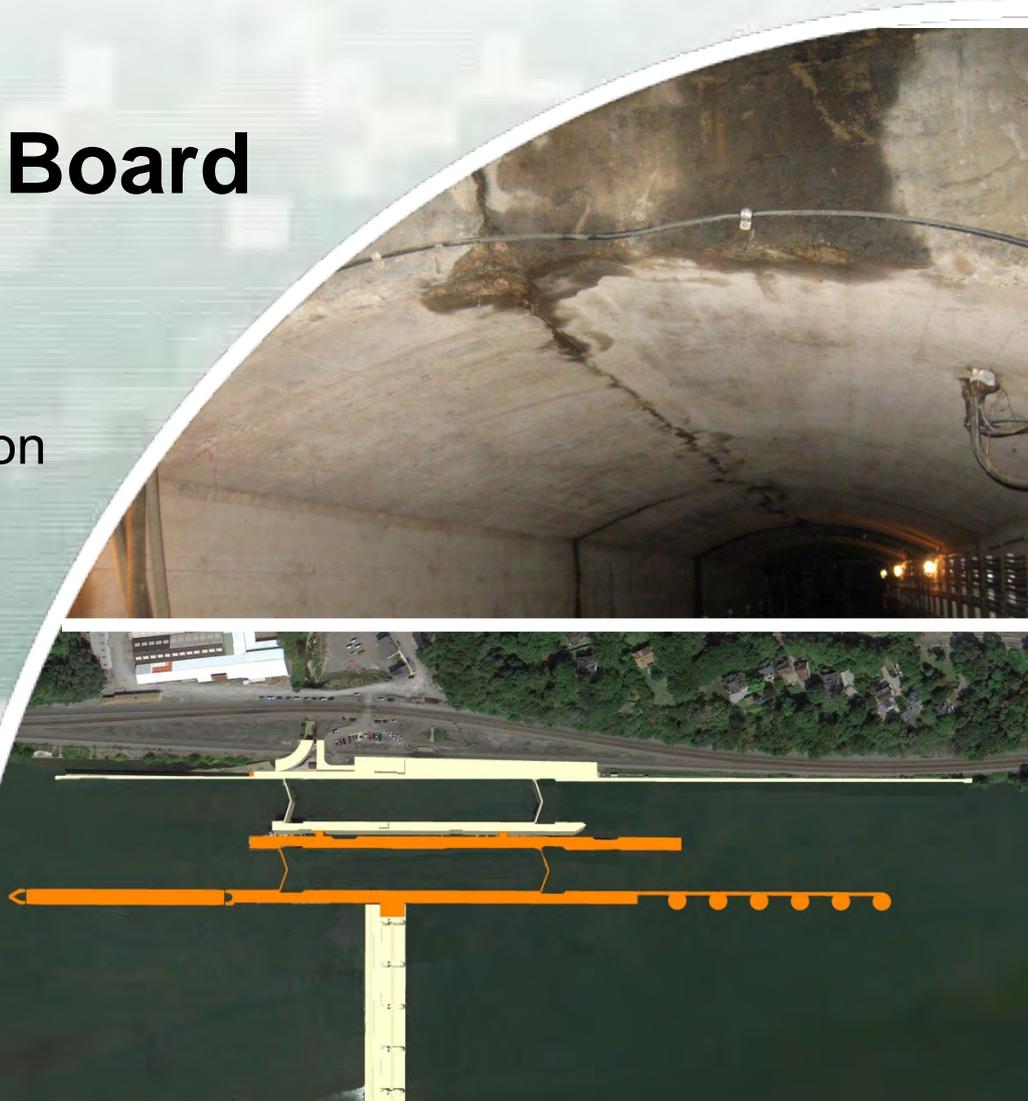


# Upper Ohio Navigation Study, Pennsylvania

## Civil Works Review Board

21 October 2014

Great Lakes and Ohio River Division  
Pittsburgh District



# Upper Ohio Navigation Study, PA

## *Project Briefing*

COL Bernard R. Lindstrom, *Commander, Pittsburgh District*

### Outline

- Overview of Recommended Plan
- Navigation system & study context
- Formulation process
- Reviews & certifications
- Recommended Plan – in detail
- Recommendation for CWRB action



# Upper Ohio Navigation Study, PA

## Recommended National Investment

Construct 3 new lock chambers (110'x600')

- Remove existing auxiliary river chambers

Retain existing land chambers (110'x600')

- Reactive maintenance

Cost: \$2.32 B

*FY 2015 price level*

*Inland Waterways Trust Fund (50/50)*

BCR: 2.6 @ 3.5% discount rate

National Economic Development Plan

- Maximizes national economic net benefits

Sustains navigation capability and capacity

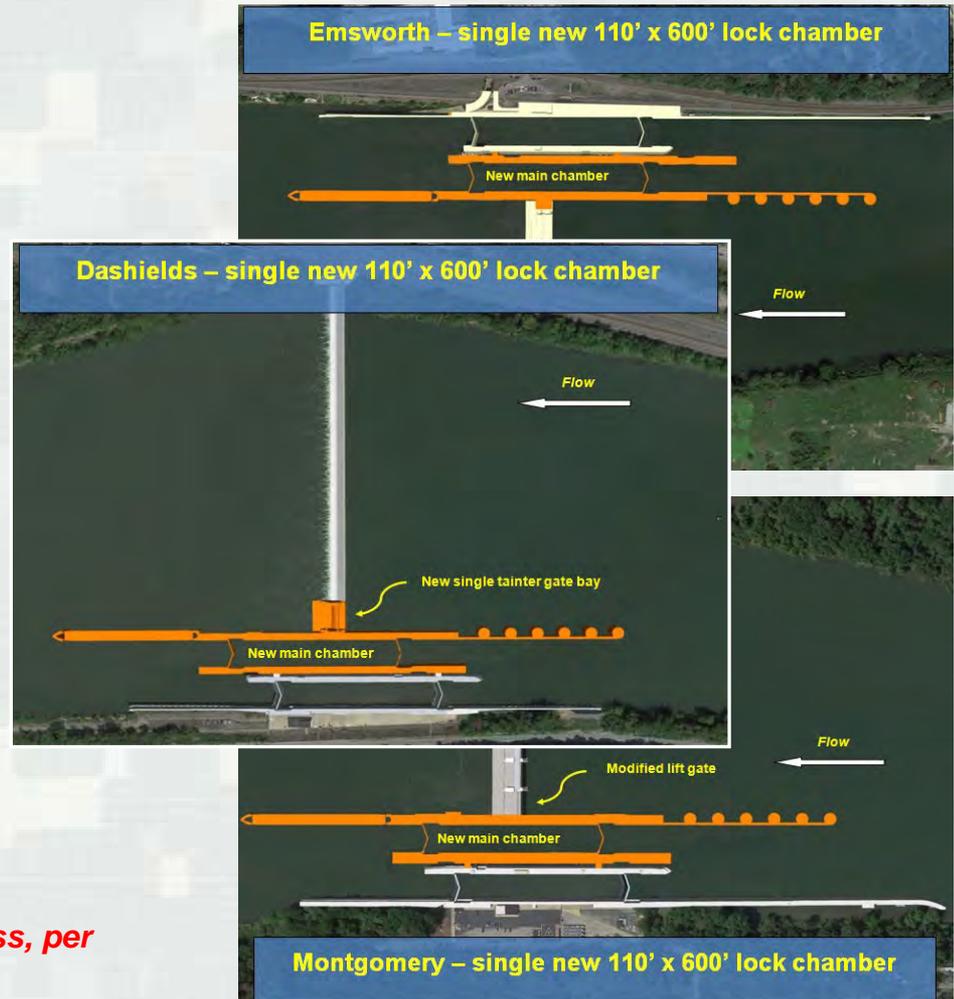
- Minimizes risk of river closure

Meets the Planning Objectives

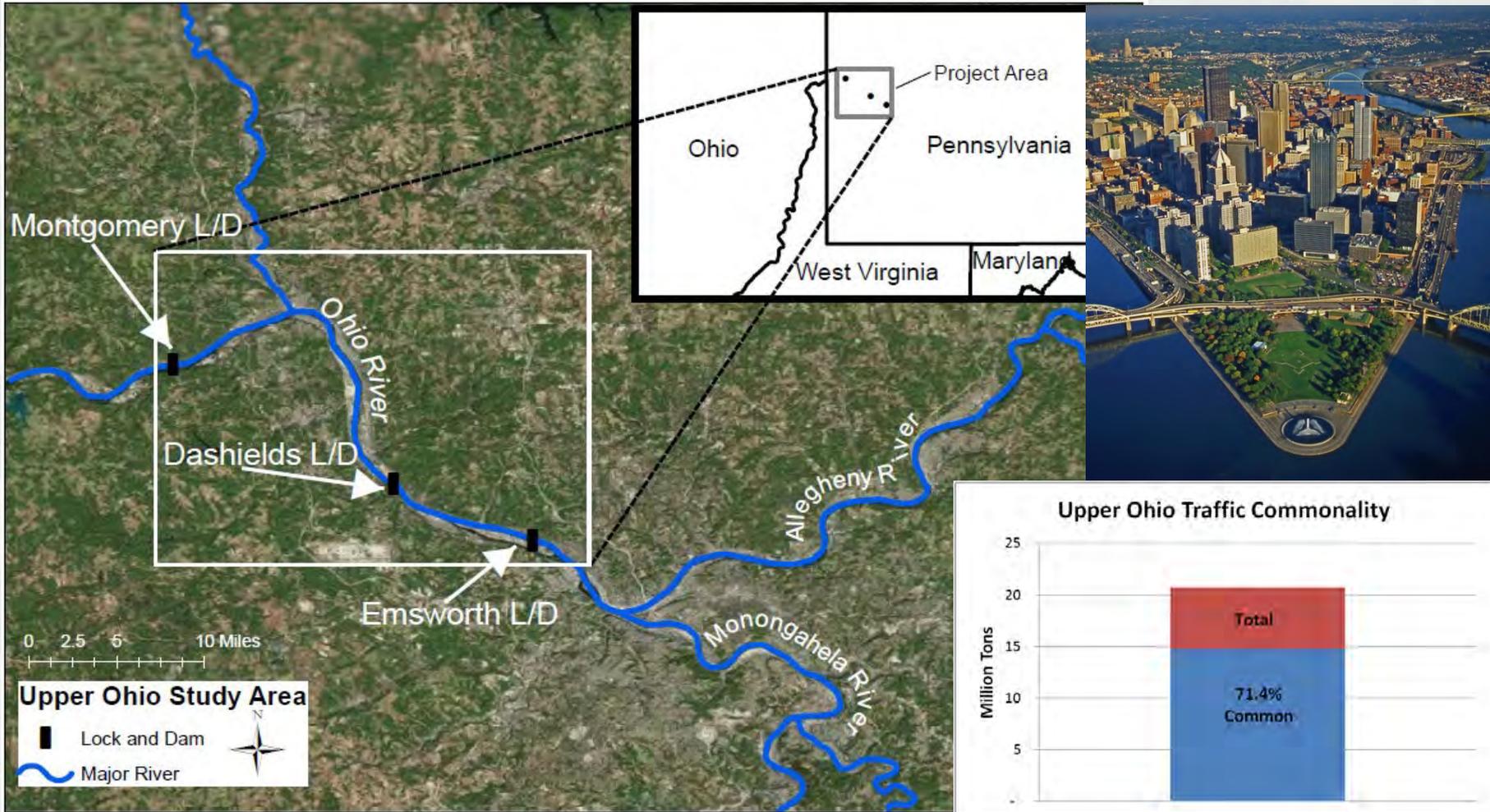
- Safe, reliable, efficient & sustainable navigation
- Protection of the environment

### Consequences of no action

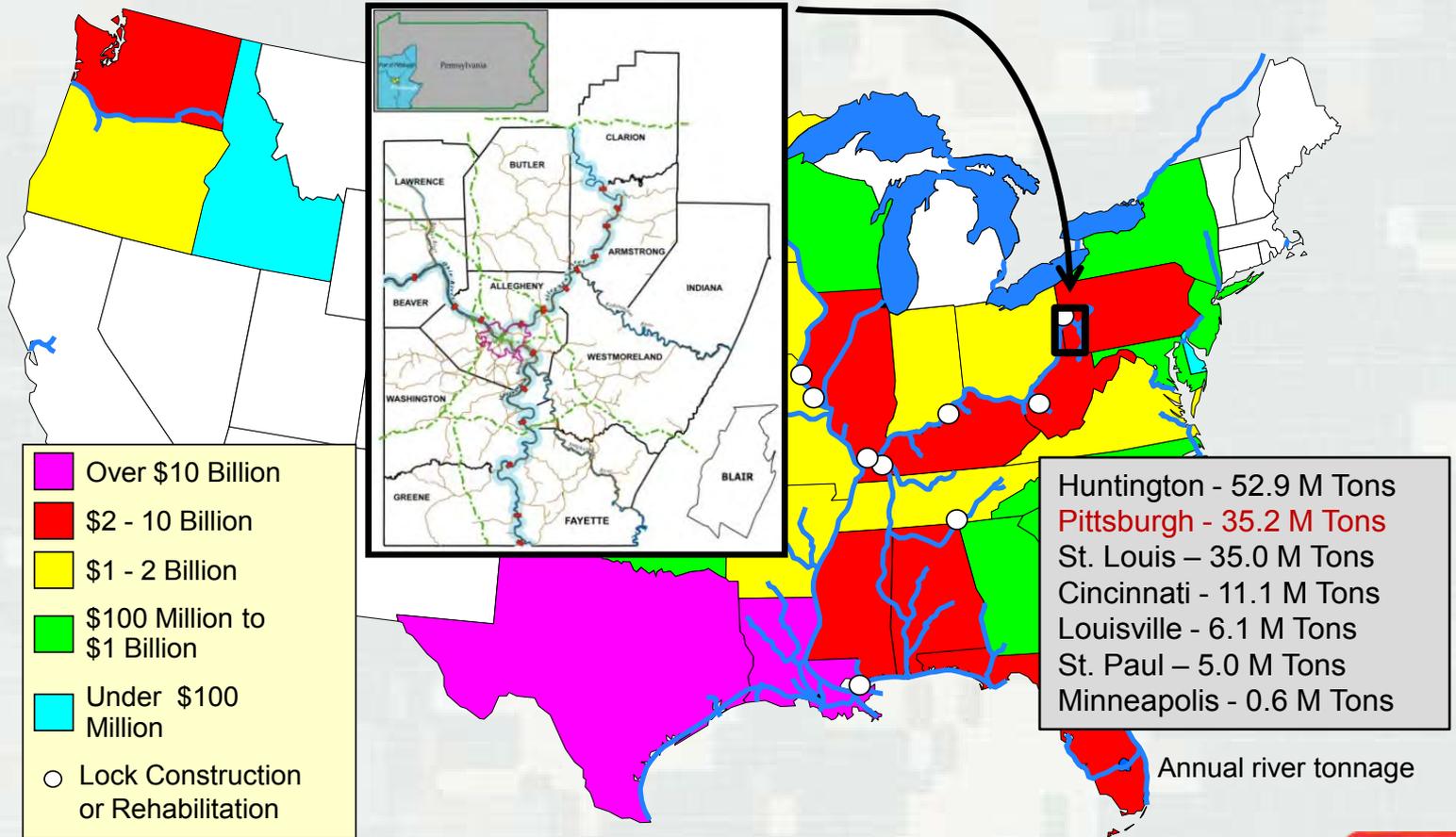
- River closure = \$430M economic loss, per year, per site



# Upper Ohio Navigation Study, PA



# Port of Pittsburgh

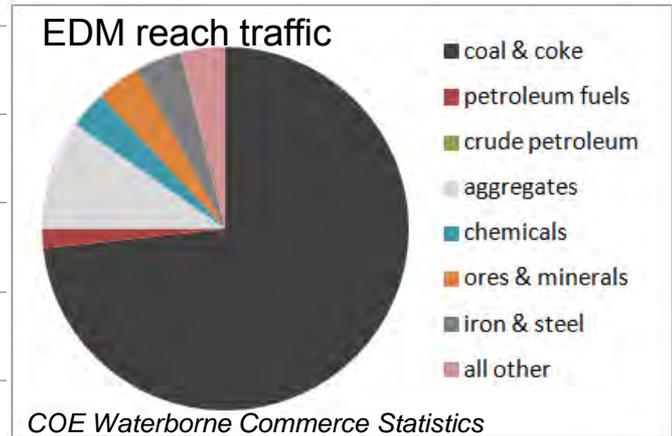
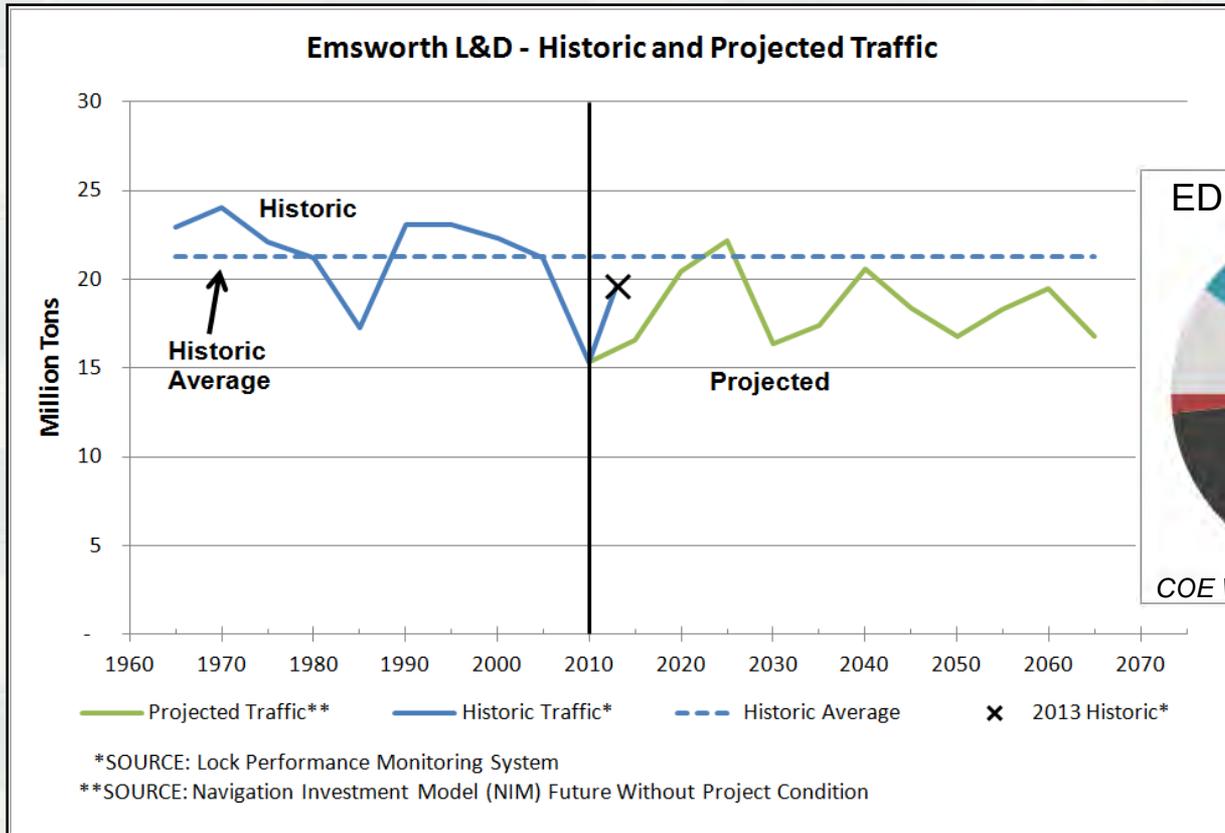


Annual value of river commerce

Based on data developed by North Dakota State University and USACE.

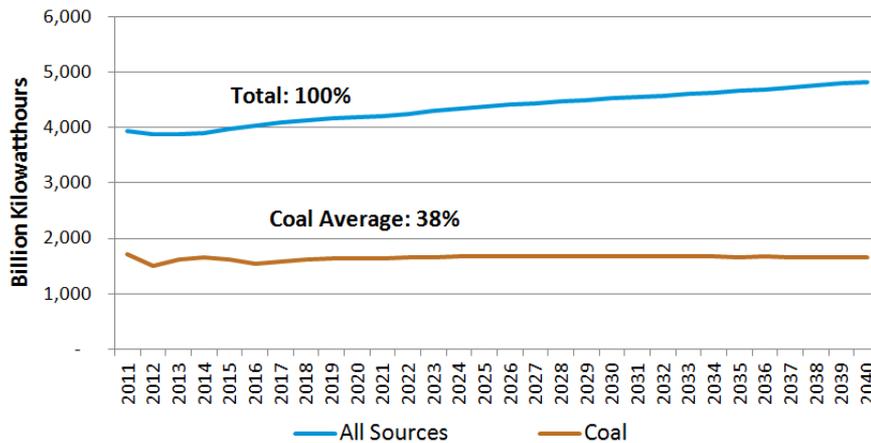


# Upper Ohio Traffic



# Coal, a Major Component of Electric Generation

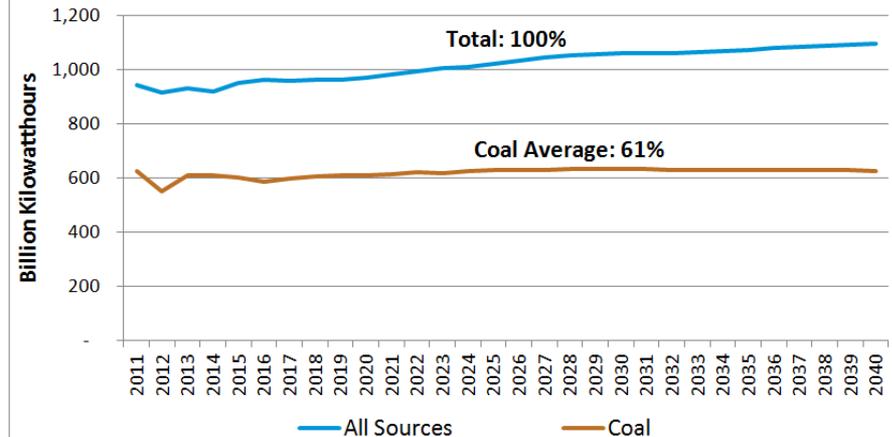
## U.S. Electric Generation Projections



SOURCE: Energy Information Administration Annual Energy Outlook 2014

NOTE: Percent of coal is 38% in 2013 and 38% in 2040.

## Ohio River Basin Electric Generation Projections



SOURCE: Energy Information Administration Annual Energy Outlook 2014

NOTE: Percent of coal is 66% in 2013 and 57% in 2040.



# *Emsworth Locks and Dams*



## Significant dates

1922 – In service for 92 years

1938  
Gated Dams

1981-1986  
Major Rehab (locks)

2008-2015  
Major Rehab (dams)



Ohio River Mile 6.2



# *Dashiels Locks and Dam*



## Significant dates

1929 – In service  
for 85 years

1987-1990  
Major Rehab  
(locks)



Ohio River Mile 13.3



# Montgomery Locks and Dam



## Significant dates

1936 – In service for 78 years

1985-1989  
Major Rehab (locks)



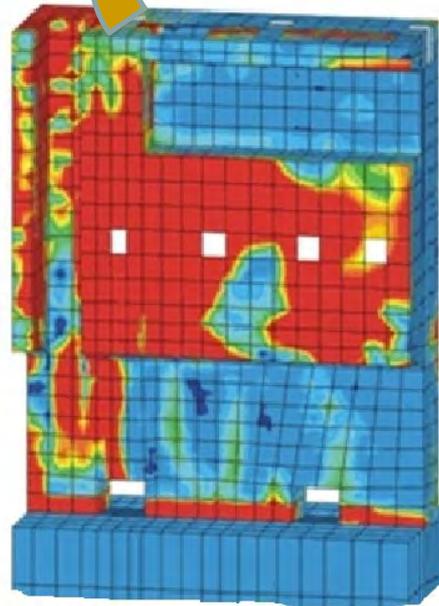
Ohio River Mile 31.7



# Navigation Problems

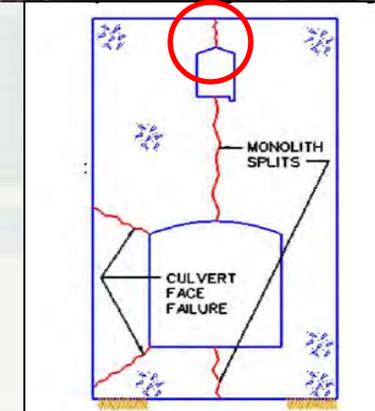
## Lock wall condition

- Concrete deterioration
- Structural cracks
- Wall stability
- Internal stresses
- Foundations



modeled cracking: Montgomery Middle Wall monolith

Model validation:  
Montgomery gallery



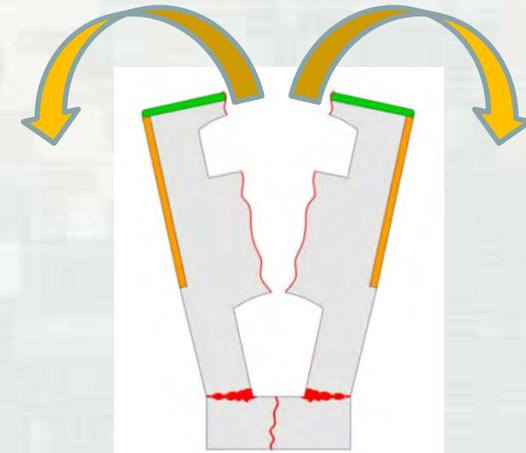
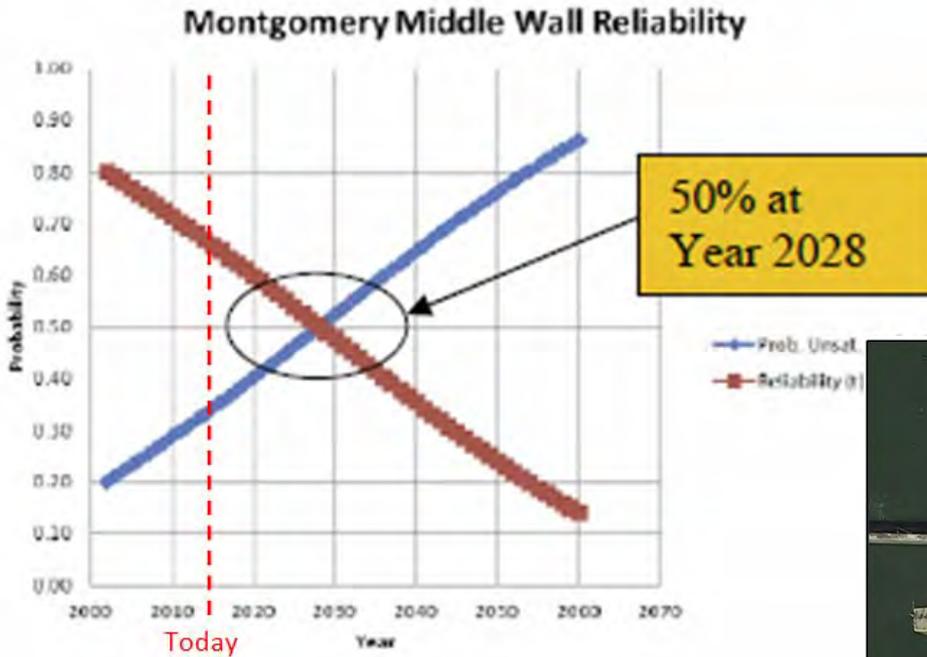
monolith cross-section



# Lock wall condition

Decreasing lock wall reliability

Increasing risk of failure



**Middle Wall Failure**



## *Navigation Opportunities*

- Improve structural integrity
- Enhance reliability
- Increase auxiliary capacity

## *Measures*

- New replacement facilities (3 for 3)
- Fewer facilities (2 for 3)
- One new lock chamber per facility
- Two new lock chambers per facility
- Advanced maintenance
- Major Rehabilitation
- Low-cost features to improve efficiency



# *Without-Project Condition*

*(Baseline; NEPA – No Action Alternative)*

## Navigation

*Status quo: Three structurally deficient lock facilities*

- Maintenance (routine, cyclic, and reactive)
  - ✓ No major component replacement
  - ✓ No major rehabilitation
- High & increasing probability of structure failure
  - ✓ Progressive deterioration
  - ✓ Significant consequences
    - Multi-year closures
    - Potential pool loss



## *Planning Objectives*

1. Identify and evaluate all reasonable alternatives for maintaining safe, reliable, efficient, & sustainable **navigation**.
2. Identify and evaluate all reasonable alternatives for cost-shared **ecosystem restoration** projects.
3. Assure consistency with **protection of the Nation's environment**.



# Upper Ohio Navigation Study, PA

## Project Delivery Team (PDT)

Pittsburgh District  
Great Lakes and Ohio River Division  
Buffalo District  
Huntington District  
Nashville District  
Planning Center of Expertise  
for Inland Navigation  
Inland Navigation Design Center  
(Rock Island)  
Norfolk District  
Engineering Research and  
Development Center (ERDC)  
US Fish and Wildlife Service (6 offices)

## Vertical Coordination (USACE/CELRD/PDT)

2006 – 2014 In-Progress Reviews  
(4 reviews)  
2007 – 2009 Executive Steering Group  
(12 meetings)  
2007 Feasibility Scoping Meeting  
2010 Alternative Formulation Briefing  
2013 - 2014 Office of Water Project Review



## Models

### **Economic** (certified/approved for use)

- ORNIM - *Ohio River Navigation Investment Model*
- WAM - *Waterway Analysis Model*
- BCM - *Barge Costing Model*

### **Environmental** (grandfathered)

- HEP/HSI - *Habitat Evaluation Procedures/  
Habitat Suitability Indices*



## *Plan Formulation - Navigation*

### **Measures eliminated**

- Replace locks & dams (all new 3 for 3)
- Remove one lock & dam (2 for 3)
- Add new third locks (retain existing)
- Major Rehabilitation

### **Measures carried forward for analysis**

- Reactive maintenance without future authorized project
- Advanced maintenance
- New lock construction (at existing locations)



# *With-Project Condition Navigation Final Alternatives*

<b><u>ALTERNATIVES - Final Array</u></b>				<b><u>ACRONYM</u></b>
[Same application at each - Emsworth, Dashields, & Montgomery]				
<b><i>Advance Maintenance - No new chambers</i></b>				
Advance maintenance - existing main & auxiliary chambers				<i>AMA</i>
<b><i>Lock Modernization - Two new chambers</i></b>				
<b>New main:</b>	110' x	600'	<b>New auxiliary: 110' x 600'</b>	<i>LMA 1</i>
<b><i>Lock Modernization - One new chamber</i></b>				
<b>New main:</b>	110' x	600'	Retain existing main as auxiliary	<i>LMA 7</i>
		800'		<i>LMA 8</i>
		1200'	<b>Reactive Maintenance</b>	<i>LMA 9</i>

AMA = Advance Maintenance Alternative

LMA = Lock Modernization Alternative



# With-Project Condition Final Alternative Ranking

<u>ALTERNATIVES - Final Array</u> [Same application at Emsworth, Dashields, & Montgomery]				<u>ACRONYM</u>	<u>Incremental Annual Net Benefits</u> ( \$M, 4 1/8%, FY09 )	<u>Principles &amp; Guidelines System of Accounts</u>			
						NED	RED	EQ	OSE
<b>No new chambers - Advance Maintenance</b>				AMA	\$76.6				
<b>Two new chambers</b>	110' x	600'	New auxiliary: 110' x 600'	LMA 1	\$113.8				
New main:									
<b>One new chamber</b>	110' x	600'	Auxiliary = existing main Reactive Maintenance	LMA 7	<b>\$118.9</b>				
		800'		LMA 8	\$102.3				
		1200'		LMA 9	\$75.2				

**NED** - National Economic Development  
**RED** - Regional Economic Development  
**EQ** - Environmental Quality  
**OSE** - Other Social Effects



# Reviews - Agency

## Agency Technical Review

- 2011 Main Report
- 2013 HTRW supplement
- 2014 Fish & wildlife mitigation calculations
- 2014 Major Rehabilitation assessment
- 2014 Cost certification
- 2014 Legal certification

## Office of Water Project Review (2013/14)

### Significant OWPR issues - **all addressed**

- ✓ *Major rehabilitation as an alternative*
- ✓ *Real estate plan*
- ✓ *Document air quality impact calculations*
- ✓ *Verify fish and wildlife mitigation calculations*

## Agency Review Team

- St. Paul District – lead
- Detroit District
- Huntington District
- Nashville District
- North Atlantic Division
- New England District
- Tulsa District
- Rock Island District
- Risk and Reliability DX
- New Orleans District
- Cost Center of Expertise

## Value Engineering Study (2013)



## Reviews - External

### Independent External Peer Review

- 2014 – concurrent with public review
- 17 comments (16 resolved)
- One non-concur comment:

*“Reactive Maintenance Alternative costs incomplete & could impact selection of the future WOPC”*

Interagency Working Group: 11 meetings (2008 – 2011)

### National Environmental Policy Act

- Notice of Intent & Scoping Meeting (2006)
- Draft EIS 45-day public review (2014)

Significant NEPA review issues (from USEPA) – **all addressed**

- ✓ No fish passage mitigation for historic connectivity impacts
- ✓ Environmental Justice assessment
- ✓ Clean Air Act assessment
- ✓ Climate change assessment



# *Environmental Compliance*

- ✓ National Environmental Policy Act
- ✓ Fish and Wildlife Coordination Act
- ✓ Endangered Species Act
- ✓ Clean Water Act
- ✓ Clean Air Act
- ✓ Comprehensive Environmental Response, Compensation and Liability Act
- ✓ National Historic Preservation Act
- ✓ Environmental Operating Principles



## *Recommended Plan* [National Economic Development Plan]

### Lock Modernization Alternative 7

- Construct 3 new (110'x600') lock chambers (one @ each facility)
- Retain existing land chambers with reactive maintenance

(Project First Cost at FY 2015 price level)

Emsworth	\$737 M
Dashields	\$801 M
<u>Montgomery</u>	<u>\$782 M</u>
	<b>\$2.320 B</b>

Certified risk-informed cost,  
Includes 28% contingency @ 80% confidence level

**BCR = 2.6** @ 3.5% discount rate

<u>Work Breakdown Structure</u>	<u>(\$x000)</u>
01 Lands	\$3,491
04 Dams	\$54,267
05 Locks	\$1,794,089
06 Fish & Wildlife	\$1,287
18 Cultural Resources	\$674
30 PED	\$281,438
31 Construction Mgmt	\$184,836

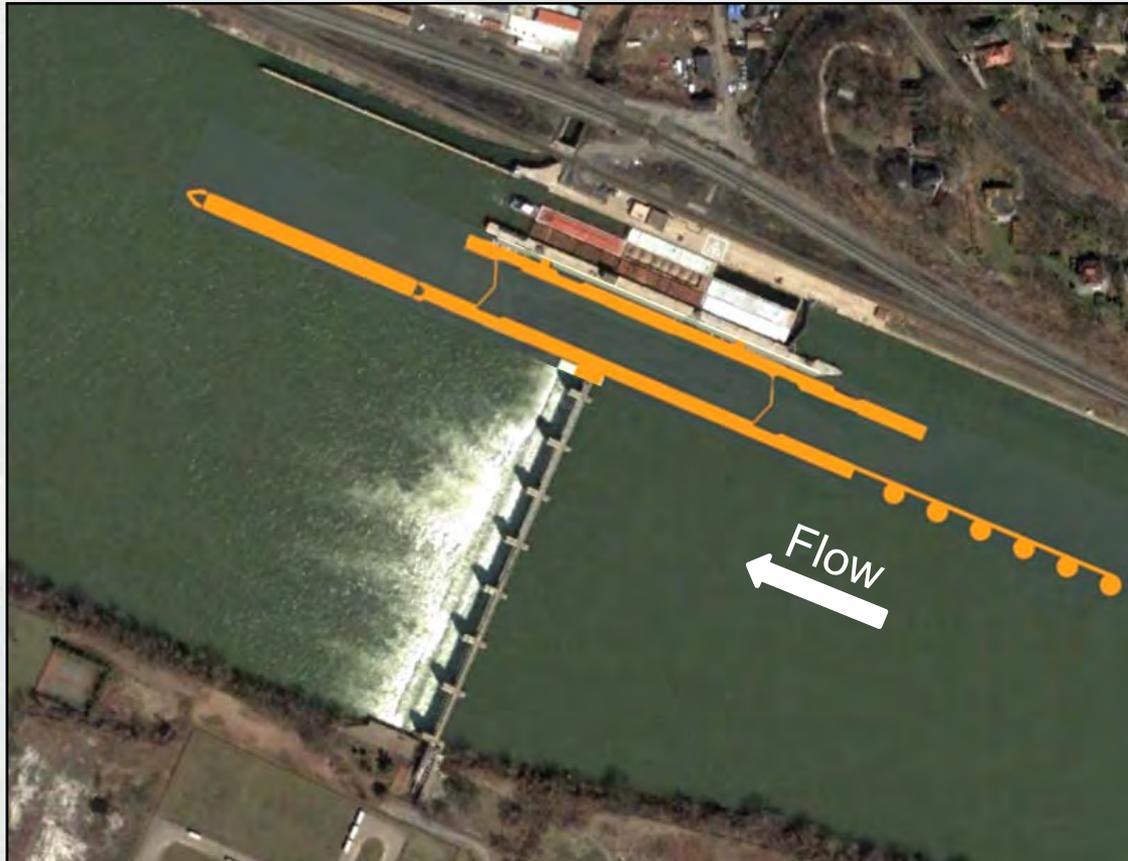
Schedule (work at all facilities is concurrent):

2017 – 2018 Preconstruction, Engineering, and Design

2019 – 2024 Construction



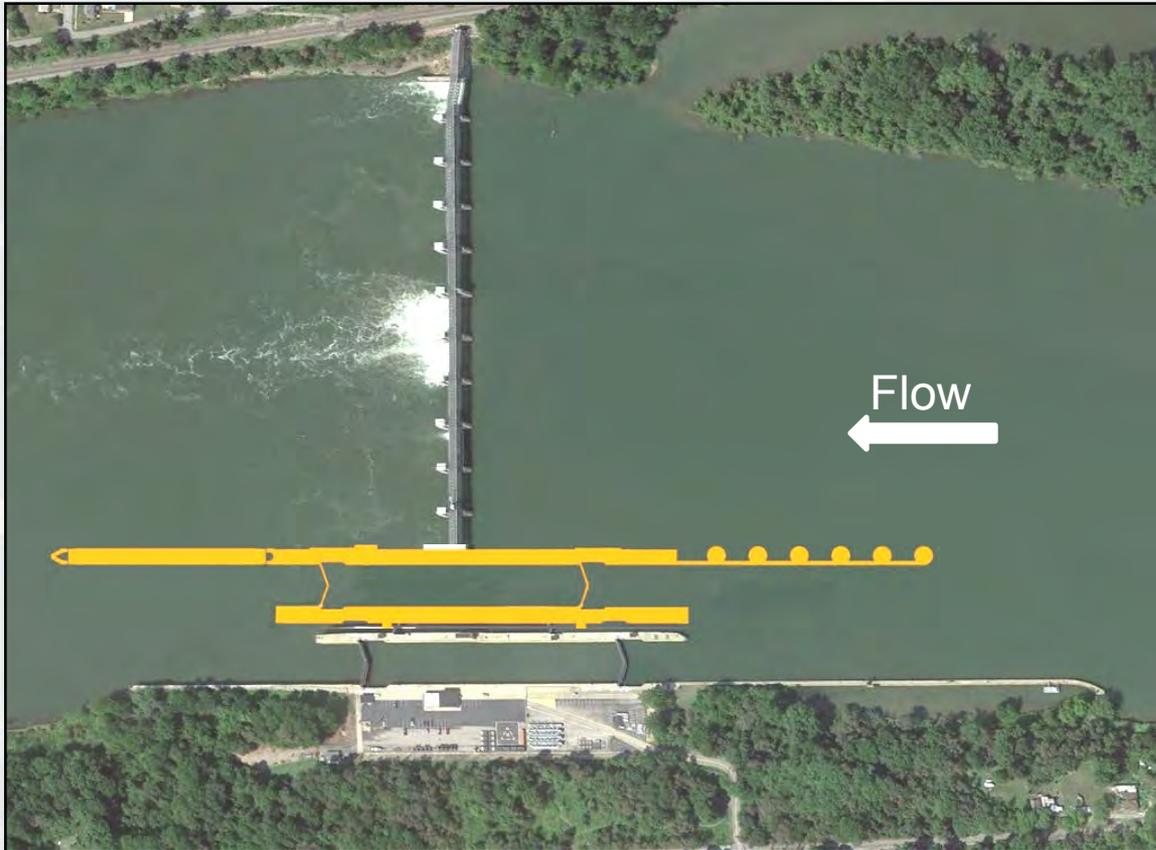
## *Recommended Plan - Emsworth*



# *Recommended Plan - Dashields*



# *Recommended Plan - Montgomery*



# Upper Ohio Navigation Study, PA

## *Why & why now?*

### Alternatives to Recommended Plan:

- Advance Maintenance – **river closure**  
(fix before fails)
- Reactive Maintenance – **river closure**  
(fix as fails)
- Fail to fix – **river closure**

### Alternatives to Recommended Plan **DO NOT:**

- Minimize risk of closure
- Maximize national economic net benefits
- Meet the Planning Objective:
  - Safe, reliable, efficient & sustainable navigation



# Upper Ohio Navigation Study, PA

## *Recommendation to the Board*

Approve release of the draft  
Chief's Report for State and  
Agency review



# Upper Ohio Navigation Study, PA

## *The Way Ahead*

21 October 2014	Civil Works Review Board
29 Oct – 18 Dec 2014	State, Agency & Final EIS reviews
27 January 2015	Chief's Report



# Upper Ohio Navigation Study, PA

## *Stakeholder Discussions*



# Upper Ohio Navigation Study, PA

## *Division Remarks*

BG Richard Kaiser, *Commander, Great Lakes and Ohio River Division*

- Emsworth, Dashields, & Montgomery Locks and Dams
- Final response to 1982 congressional resolution for a study on “improvement or replacement” of Emsworth, Dashields, & Montgomery
- Value to the Nation
- Retains the navigation benefits that the nation and region enjoy through recapitalization
- Risk informed recommendation Costs and Benefits



# Upper Ohio Navigation Study, PA

## *Agency Technical Review*

Team Member	Discipline(s) @ time of review	Organization
Rebecca Seal-Soileau	PCXIN ATR Manager	St. Paul District
Michael T. Abernathy	Chief Real Estate Division	Nashville District
Jonathan J. Aya-ay	Chief Environmental Analysis Section	Huntington District
Jack Carr	Supervisory Economist	Rock Island District
Domenico Chianesi	Navigation Ops and Readiness	Huntington District
John D. Clarkson	Chief Structures Section	Huntington District
Rodney Clausen	Construction Control Rep	Rock Island District
Amanda Cruz	Biologist	Detroit District
Thomas Gambucci	MVD-RTS Navigation & Flood Cont	Rock Island District
Mark Haab	Regional Economist- Nav Support	New Orleans District
Karen Krepps	District Archeologist	Detroit District
Marc Masnor	RTS – Plan Formulation	Tulsa District
Lawrence Oliver	Chief Ecosystem Restoration Sect	New England Dist
Robert Patev	NAD-RTS Navigation/Risk & Rel	North Atlantic Div
Robert Porter	Electrical Engineer	Huntington District
Edwin Rossman	Chief Planning Branch	Tulsa District
Rick Schulz	Mechanical Risk & Reliability	Mechanical R&R DX
Neil Schwanz	MVD-RTS Geotechnical	St. Paul District
Donald Whitmore	LRD-RTS Civil Engineering	Huntington District



# ATR REVIEW OUTCOMES

- All ATR activities are complete and all comments have been closed.
  - ▶ Draft Feasibility Report ATR
    - All comments were resolved by conclusion of review.
  - ▶ Phase II HTRW ATR
    - All unresolved HTRW ATR comments were resolved through coordination with MSC, HQUSACE, and OC.



# SIGNIFICANT ATR ISSUES/RESOLUTION

## ■ Real Estate Acquisition

- ▶ Issue . Identification of CERCLA hazardous substances at construction support areas proposed to be acquired, and the quality of chemical data generated for HTRW Phase II.
- ▶ Resolution.
  - Fresh data will be obtained within 6 months of Real Estate action as required by regulation.
  - Use new data to maximize avoidance of potentially contaminated areas and assure compliance with USACE HTRW policy and the law.



# Independent External Peer Review (IEPR) Upper Ohio Navigation Study Draft Feasibility Report, Pennsylvania

Presented to the USACE CWRB on October 21, 2014

Karen Johnson-Young, PMP  
*Program Manager*

Lynn McLeod, PMP  
*Project Manager*



# IEPR - Panel and Schedule

Upper Ohio Panel Members	Panel Discipline
Daniel Smith (Panel Lead)	Economics
Lewis Hornung	Planning
Gary Loss	Engineering
Nathaniel (Skeeter) McClure	Environmental

## Upper Ohio IEPR was conducted in April/May 2014

- The Panel reviewed the April 2014 version of the documents.

# IEPR Bottom Line Up Front

The Panel concurred with all but one PDT Response to the Final Panel Comments.

The Panel concluded that incomplete RMA costs associated with the lock failure and the assumption that emergency funding will be provided and prioritized may have led to a WOPC that is not the most efficient and cost-effective choice.

The DEIR assumed that emergency repair funding will receive high priority if an EDM lock fails (similar to the response to Hurricanes Katrina and Sandy). However, it is unlikely that EDM lock failure would result in comparable loss of life and property damages. The tight federal budget and intense competition for funding raises significant doubt that timely supplemental appropriations would be made available for lock repairs.

The preparation of a rehabilitation report may be required to demonstrate that lock repairs are economically justified and should be prioritized based on USACE budget criteria. This process could require several years and increase project costs. These costs should be accounted for in the RMA.

# IEPR - Results

Final IEPR Report submitted on May 27, 2014

## Results:

- 17 Final Panel Comments
  - 4 high significance
  - 5 medium-high significance
  - 6 medium
  - 2 medium-low significance

Post-Final Panel Comments/Response Results documented on July 14, 2014

## Results:

- PDT Evaluator Responses to Final Panel Comments
  - 4 concurs
  - 13 non-concurs
- Panel BackCheck Responses to the PDT Responses
  - 16 concurs
  - 1 non-concur

# IEPR - Notable Findings

1. The RMA costs are incomplete and could impact the evaluation of the future WOPC.
2. The traffic forecasts and rate analyses are outdated, and therefore are no longer a reliable basis for estimating project benefits or the BCR.
3. The sources and validity of the truck and rail rates used in the ORNIM analysis and other parts of the analysis were unclear; therefore, the accuracy of the estimated transportation cost savings and the BCR could not be determined.
4. The sensitivity analysis did not address the vulnerability of the benefits estimate and the BCR to recent traffic volume declines, estimated truck and rail rates, potential changes in coal sourcing, or combinations of these factors.
5. The assumption that all authorized projects will be implemented in the future may not be realistic, which could affect the impacts of the with-out project condition (WOPC) and with project condition (WPC) alternatives.

# HQUSACE REVIEW CONCERNS

## Civil Works Review Board

### Upper Ohio Navigation Study, Pennsylvania

Lee Ware, PE  
Office of Water Project Review  
Planning and Policy Division  
Washington, DC – 21 October 2014



US Army Corps of Engineers  
**BUILDING STRONG**®



## HQUSACE Team Reviews:

- Feasibility Scoping Meeting- 5 Sept. 2007
- Alternative Formulation Briefing- 30 June 2010
- Draft Report- Sept. to Nov. 2013, Back Check- March 2014, approval 3 April 2014
- Draft Report concurrent review– June to July 2014
- Final Feasibility Report/EIS HQUSACE review in Sept. 2014, now completed

## HQUSACE Team Members:

Debby Scerno

Chandra Pathak

Scott Murphy

Mike Kidby

Mayely Boyce

Jeremy LaDart

Al Golden

Jay Warren



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# Policy Issues from AFB, Draft, and Final Report Reviews

- Model Certification
- Agency Technical Review
- Future Without Project Conditions
- HTRW**
- Base Year, Period of Analysis
- Economic Analysis, Price Level, Discount Rate
- Age of Data
- Plan Formulation, NED Plan
- Rehabilitation Assumption**
- Environmental Restoration
- Mitigation- Scale, Units, Monitoring, Success Criteria**
- Cultural Resources-MoA, Eligibility, Area of Potential Effect**
- Comparative Cost Estimates, Risk Analysis
- Environmental Compliance- Air Quality**
- Environmental Operating Principles
- Legal Certification
- Value Engineering
- Real Estate Plan



# HTRW

**CONCERN:** The recommended plan proposes the use of sites adjacent to the existing Corps locks as construction support areas that appear to contain CERCLA hazardous substances. Risks associated with use of the HTRW-contaminated lands may differ depending on the real property interest acquired.

**BASIS:** Corps projects should avoid use of contaminated lands in accordance with ER 1165-2-132.

**RESOLUTION:** After considering the potential liabilities associated with various options, the district's Real Estate Plan recommends acquisition of temporary construction easements for those sites. Areas of contamination can be avoided while using them.

**RESOLUTION IMPACT:** Concern is resolved.



# Rehabilitation Assumption

**CONCERN:** The draft report documented that the major rehabilitation alternative was screened out during the formulation. Policy review of the report questioned the rationale for that assumption.

**BASIS:** ER 1105-2-100 states that rehabilitation should be considered when it can significantly extend a structure's life and it is economically justified. Its purpose is to improve the reliability of the structure, while deferring larger capital costs for replacement .

**RESOLUTION:** The revised report explains that rehabilitation was screened out due to the poor structural condition of the underlying concrete and conditions resulting from prior repairs and improvements, which would require complete replacement. Rehabilitation costs were similar to the recommended plan, but risked \$1.4B in disruption costs if work was not done concurrently. The screening rationale was endorsed by both the Inland Navigation Design Center and PCX.

**RESOLUTION IMPACT:** Concern is resolved.



# Mitigation- Scale , Units, Monitoring, Success Criteria

**CONCERN:** A number of mitigation-related comments on the draft report questioned the extent of terrestrial and aquatic mitigation, the units used in the analysis, the 10-year duration of monitoring, and the lack of specified success criteria.

**BASIS:** Mitigation requirements are discussed in Section C-3.e. of the PGN. WRDA07 and subsequent HQ guidance direct that the Corps determine success criteria of implemented mitigation.

**RESOLUTION:** The district reevaluated the impacts and mitigation requirements using habitat units and the scale of mitigation was reduced in the final report as well as the length of monitoring. The success criteria for mitigation was also clarified.

**RESOLUTION IMPACT:** Concerns are resolved.



# Cultural Resources

**CONCERN:** The policy review noted the need for clarification regarding the Area of Potential Effect (APE) and the status of the consensus determinations of eligibility for listing of each lock and dam on the National Register of Historic Places (NRHP). In addition, the Draft MOA which had been prepared for the project and coordinated with the Pennsylvania State Historic Preservation Office (SHPO) appeared to commit the Corps to nominating the structures for listing on the register.

**BASIS:** Section 106 of the National Historic Preservation Act.

**RESOLUTION:** The text was revised in the final report to clearly show the APE and to explain that each structure is eligible for listing on the register. The draft MOA has been revised to delete the paragraph related to nomination and is being re-coordinated with the SHPO.

**RESOLUTION IMPACT:** Concerns are resolved.



# Environmental Compliance- Air Quality

**CONCERN:** The draft report did not substantiate the conclusion that the project was in conformity with air quality requirements. No emission calculations had been performed and the air quality information was dated.

**BASIS:** In regards to the conformity determination, 40 CFR 93.153 requires that a Federal action determine whether it would exceed the specified emission rates for each criteria pollutant.

**RESOLUTION:** The district performed the emission calculations to confirm its conclusion that the project impacts are de minimus and modified the report text to update the air quality information and discuss the analysis.

**RESOLUTION IMPACT:** Concern is resolved.



# HQUSACE POLICY REVIEW TEAM RECOMMENDATION

**Release the Report and Draft Chief's  
Report for State & Agency Review**



# Lessons Learned

## REVIEWS:

- Vertical reviews would be more efficient and effective if consistent processes of Dr. Checks and the standard 4-part comment format were employed
- Develop risk based study cost estimate and schedule that takes into account all risks, including vertical coordination, review slippage, and funding delays

## PROCESS:

- Planning model development and approval process is too long
- Horizontally and vertically integrated throughout USACE

## EXECUTION:

- Use of regional resources enhanced project delivery and quality

