Attachment 2

Nav. Study Comprehensive Overview

28th Meeting of the NECC
January 11-12, 2000

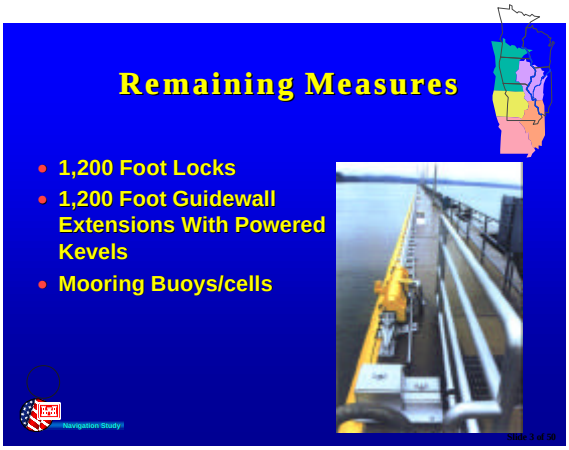
Presented by

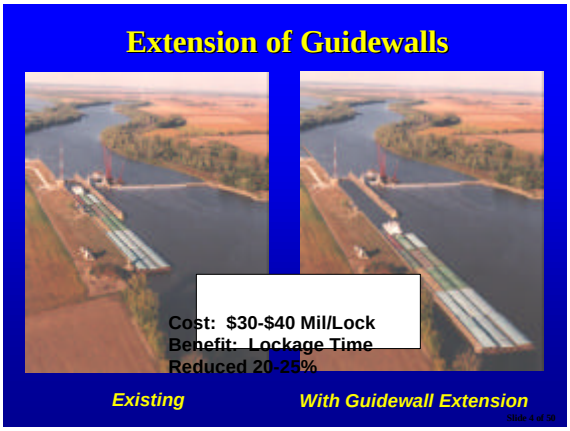
Ken Barr

Chief, Environmental Analysis Branch
US Army Corps of Engineers – Rock Island District

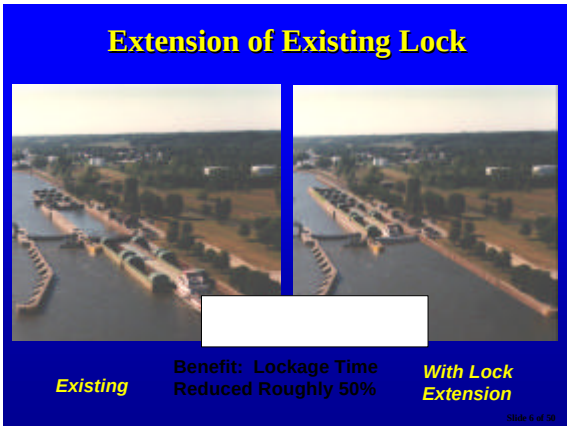

Upper Mississippi River - Illinois Waterway System Navigation Study
28th NECC Meeting
January 11-12, 2000
Mississippi Valley Division


What Do We Want to Accomplish?
• Review Evaluations of Alternatives to Date … Economic & Environmental
• Questions and Discussion
• Feedback from States


Remaining Measures
• 1,200 Foot Locks
• 1,200 Foot Guidewall Extensions With Powered Kevels
• Mooring Buoys/cells


Extension of Guidewalls
Cost: $30-$40 Mil/Lock
Benefit: Lockage Time Reduced 20-25%
Existing
With Guidewall Extension


Adjacent Moorings
Cost: $50,000 buoy and $500,000 cell
Benefit: Lockage Time Reduced 5-15%
Existing
With Mooring Buoy


Extension of Existing Lock
Existing
Benefit: Lockage Time Reduced Roughly 50%
With Lock Extension

Alternatives Under Consideration

- Alternative Plans - Combinations of the 3 Remaining Measures
- System Traffic Leads to Grouping of Improvements

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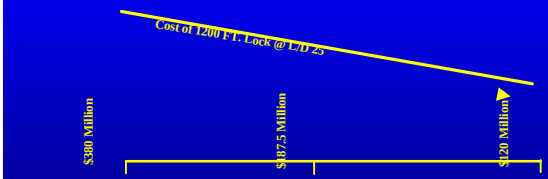
History of Large-Scale Measures



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Input Changes Since Workshops

- Jul/Aug Workshops to Oct/Nov 99
  - Cost Contingencies: 25% for all 1200-ft chambers including Peoria & La Grange
  - Major Rehab Cost Savings: further refined major rehab info, 25-year cycles, cost savings varies depending on improvement timing and availability of 600-ft chamber
  - Added Alt. J: Alt. H plus mooring facilities

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Major Rehabilitation

- Cost estimates developed
- Major rehab schedule developed
- Rehab costs foregone are benefits

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Rehab Costs & Schedule

(Costs are in $ millions)

	Lock: UM 25		Lock: UM 24		Lock: UM 22		Locks: UM 20,21,		Peoria, LaGrange		
Year	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project New Lock	With Project Old Lock
2010	-	1,200' Lock ready	-	- 1,200' Lock ready	-	1,200' Lock ready	-	- 1,200' Lock ready	-	-	-
2015	-	-	-		30	-	30		30	Lock Imprvmt	-
2020	30	-	25	-	-	-	-	-	-	-	21
2025	-	-	-	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-	-	-	-
2035	-	25	-	-	-	25	-	-	-	-	-
2040	-	-	-	25	25	-	25	25	25	17.5	-
2045	25	-	30	-	-	-	-	-	-	-	-
2050	-	-	-	-	-	-	-	-	-	-	-
2055	-	-	-	-	-	-	-	-	-	-	-
2060	-	35	-	-	-	35	-	-	-	-	-
2065	n.a.	n.a.	n.a.	35	30	n.a.	30	35	30	24.5	-

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Economics

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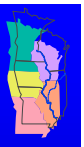
Topics



- Results Summary
- Sensitivity Analysis
- Regional Economic Development (RED) Analysis

Navigation Study

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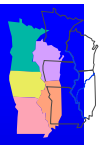
Results Summary



Navigation Study

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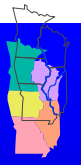
Results Summary



- Two Cases
  - Build ASAP
  - Optimal Timing
- Lock Extensions (2R) - UMR; New Locks (1C) - IWW with Existing Chamber Not Operational
- Rehab Savings Reflect Revised Expenditure Schedule
- All Lock Construction Costs Reflect 25%Contingencies

Navigation Study

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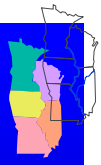
Results Summary



- Evaluations Do Not Reflect System Environmental Costs

Navigation Study

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Build ASAP
Mid Traffic Growth
Mid Elasticity
Interest Rate = 6.375 Percent, 1997 Price Levels
($1,000's)

	Alternative	Average Annual Rehab Cost Savings	Average Annual Navigation Benefits	Total Average Annual Benefits	First Costs Const. & Site Specific Environ. Costs	Average Annual Costs	Average Annual Net Benefits
A	**Mooring Cells: 12,18,20,22,24** Begin Construction 2001 End Construction 2003	0	1,797	1,797	700	218	1,579
B	**Mooring Cells: 12,18,20,22,24** **Powered Kevel Guidewalls 20-25** Begin Construction 2001 End Construction 2007	0	37,770	37,770	190,241	24,860	12,910
C	**Locks 20-25** Begin Construction in 2003 End Construction in 2012	7,122	48,434	55,556	542,054	46,870	8,686
D	**Locks 20-25** **Powered Kevel Guidewalls 14-18** Begin Construction in 2003 End Construction in 2012	7,122	68,928	76,050	705,175	62,962	13,088
E	**Mooring Cells: 12,18,20,22,24** **Locks 20-25** **Powered Kevel Guidewalls 14-18** Begin Construction in 2001 End Construction in 2012	7,122	72,523	79,645	705,875	63,182	16,463

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Build ASAP
Mid Traffic Growth
Mid Elasticity
Interest Rate = 6.375 Percent, 1997 Price Levels
($1,000's)

	Alternative	Average Annual Rehab Cost Savings	Average Annual Navigation Benefits	Total Average Annual Benefits	First Costs Const. & Site Specific Environ. Costs	Average Annual Costs	Average Annual Net Benefits
F	**Mooring Cells: 12,18,20,22,24** **Locks 20-25** **Powered Kevel Guidewalls 14-18, Peoria,LaGrange** Begin Construction in 2001 End Construction in 2012	7,122	78,204	85,326	765,207	68,791	16,535
G	**Locks 20-25, 14-18** Begin Construction in 2003 End Construction in 2016	10,790	80,138	90,928	1,076,785	83,703	7,225
H	**Locks 20-25, Peoria, LaGrange** **Powered Kevel Guidewalls 14-18** Begin Construction in 2003 End Construction in 2014	9,851	85,407	95,258	1,039,974	87,539	7,719
I	**Mooring Cells: 12,18,20,22,24** **Powered Kevel Guidewalls 20-25, 14-18** Begin Construction 2001 End Construction 2011	0	41,314	41,314	353,360	42,022	(708)
J	**Mooring Cells: 12,18,20,22,24** **Locks 20-25, Peoria, LaGrange** **Powered Kevel Guidewalls 14-18** Begin Construction in 2003 End Construction in 2014	9,851	88,934	98,785	1,040,674	87,759	11,026

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Optimally Timed
Mid Traffic Growth
Mid Elasticity
Interest Rate = 6.375 Percent, 1997 Price Levels
($1,000's)

	Alternative	Begin Const.	End Const.	Total Average Annual Benefits	First Costs Const. & Site Specific Environ. Costs	Average Annual Costs	Average Annual Net Benefits
A	Mooring Cells: 12,18,20,22,24	2001	2003	1,779	700	218	1,579
B	Mooring Cells: 12,18,20,22,24 Powered Kevel Guidewalls 20-25	2001	2007	37,770	190,241	24,860	12,910
C	Locks 20-25	2018	2027	31,189	542,054	18,548	12,641
D	Locks 20-25, Powered Kevel Guidewalls 14-18	2011	2020	53,398	705,175	38,403	14,995
E	Mooring Cells: 12,18,20,22,24 Locks 20-25, Powered Kevel Guidewalls 14-18	2001 2011	2003 2020	56,678	705,875	38,625	18,053
F	Mooring Cells: 12,18,20,22,24 Locks 20-25, Powered Kevel Guidewalls 14-18 Powered Kevel Guidewalls, Peoria, LaGrange	2001 2011 2026	2003 2020 2030	61,611	765,207	40,468	21,143

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Optimally Timed
Mid Traffic Growth
Mid Elasticity
Interest Rate = 6.375 Percent, 1997 Price Levels
($1,000's)

	Alternative	Begin Const.	End Const.	Total Average Annual Benefits	First Costs Const. & Site Specific Environ. Costs	Average Annual Costs	Average Annual Net Benefits
G	Locks 20-25, Locks 14-18	2018 2024	2027 2033	46,782	1,076,785	31,429	15,353
H	Locks 20-25, Powered Kevel Guidewalls 14-18 Locks Peoria, LaGrange	2011 2018	2018 2025	69,273	1,039,974	50,847	18,426
I	Mooring Cells: 12,18,20,22,24 Powered Kevel Guidewalls 20-25 Powered Kevel Guidewalls 14-18	2001 2003 Beyond 2050	2003 2007	37,770	190,241	24,860	12,910
J	Mooring Cells: 12,18,20,22,24 Locks 20-25, Powered Kevel Guidewalls 14-18 Locks Peoria, LaGrange	2001 2011 2018	2003 2020 2025	72,552	1,040,674	51,069	21,483

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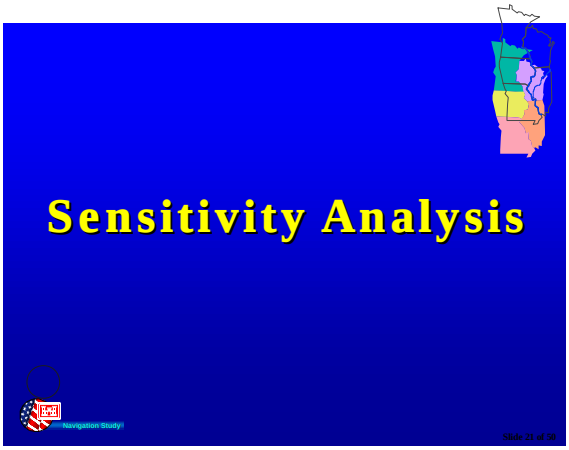

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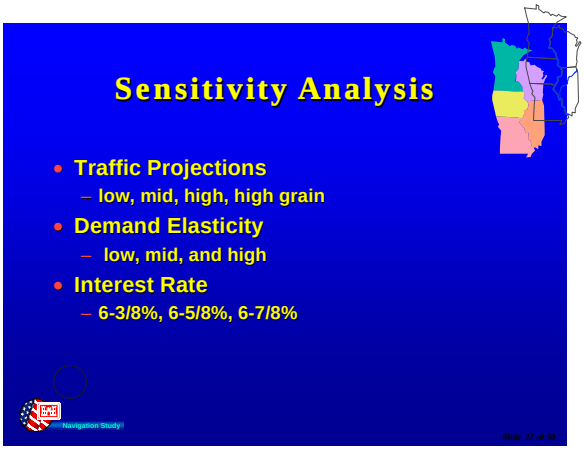

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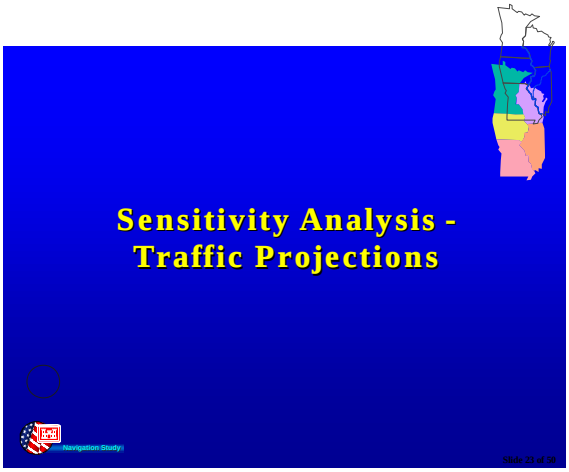

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Upper Mississippi River
Compound Annual Growth Rates
1993-2050
Alternative Traffic Scenarios

	Low	Mid	High	High Grain
Corn	1.1	1.7	2.1	2.0
Soybeans	0.6	1.2	1.5	1.5
Wheat	1.6	2.1	2.4	2.1
Farm NEC	0.3	0.6	0.9	0.6
Coal	0.2	0.4	0.7	0.4
Petroleum	-0.1	-0.1	0.2	-0.1
Ind. Chems.	0.5	1.2	1.6	1.2
Agg. Chems.	-0.2	-0.2	0.1	-0.2
Iron & Steel	0.6	1.0	1.4	1.0
Aggregates	0.2	0.7	1.1	0.7
Miscellaneous	0.7	1.1	1.5	1.1
Total	0.7	1.1	1.5	1.3

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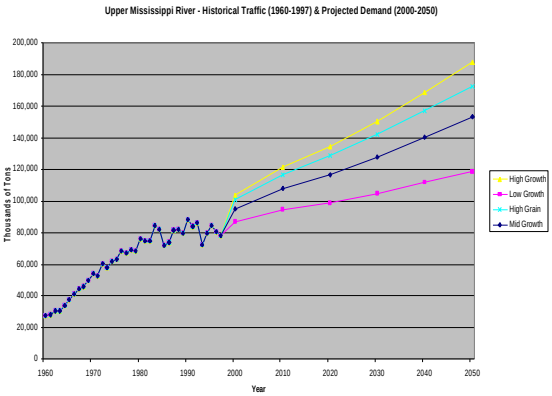

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Illinois Waterway
Compound Annual Growth Rates
1993-2050
Alternative Traffic Scenarios

	Low	Mid	High	High Grain
Corn	1.3	1.9	2.2	2.2
Soybeans	0.6	1.1	1.5	1.4
Wheat	1.5	2.0	2.3	2.0
Farm NEC	0.3	0.6	0.9	0.6
Coal	-0.1	0.0	0.4	0.0
Petroleum	0.4	0.4	0.7	0.4
Ind. Chems.	0.6	1.3	1.6	1.3
Agg. Chems.	-0.2	-0.3	0.0	-0.3
Iron & Steel	0.7	1.1	1.4	1.1
Aggregates	0.5	1.1	1.5	1.1
Miscellaneous	0.7	1.1	1.4	1.1
Total	0.7	1.1	1.4	1.3

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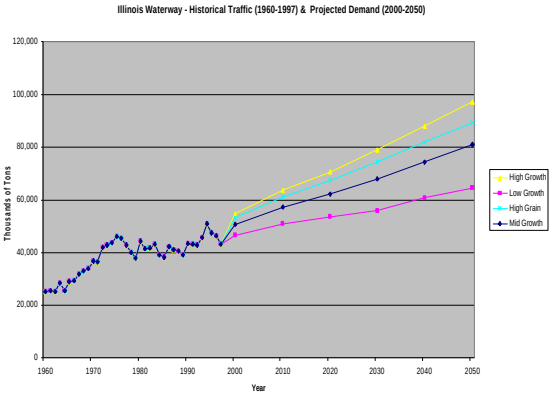

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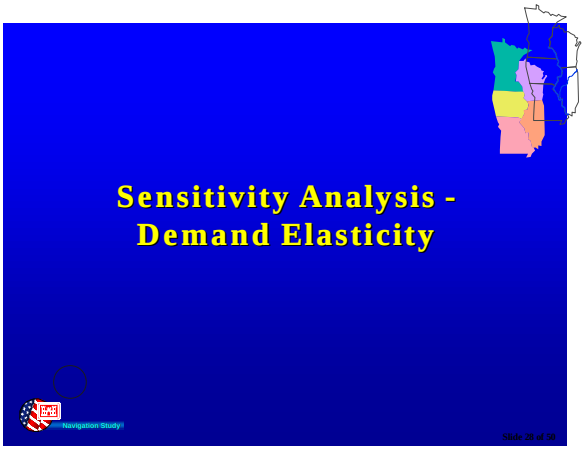

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Demand Elasticities
Non-Grain

Commodity	Demand Elasticity Scenario Low	Mid	High
Coal	-0.66	-0.77	-0.87
Petroleum	-0.62	-0.69	-0.75
Ind. Chems.	-0.32	-0.34	-0.36
Agg. Chems.	-0.32	-0.34	-0.36
Iron & Steel	-0.49	-0.55	-0.61
Aggregates	-0.65	-0.70	-0.75
Miscellaneous	-0.47	-0.50	0.54

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Weighted Average
"N-Values"

Commodity	Demand Elasticity Scenario Low	Mid	High
Corn	1.00	1.20	1.40
Soybeans	1.00	1.20	1.40
Wheat	1.00	1.20	1.40
Farm NEC	1.00	1.20	1.40
Coal	0.02	0.02	0.02
Petroleum	0.99	1.09	1.18
Ind. Chems.	0.33	0.35	0.37
Agg. Chems.	0.11	0.11	0.12
Iron & Steel	0.38	0.43	0.48
Aggregates	0.84	0.91	0.98
Miscellaneous	0.36	0.32	0.41

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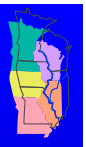
Sensitivity Analysis - Interest Rates



Navigation Study

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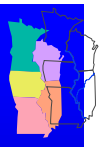
Interest Rates

- FY 99 Rate - 6 7/8%
- FY 00 Rate - 6 5/8%
- FY 01 Rate - 6 3/8% (Anticipated)



Navigation Study

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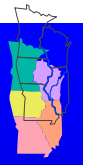
Sensitivity Analysis - Results



Navigation Study

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Build ASAP
Average Annual Net Benefits
1997 Price Levels
($1,000's)

	Alternative	All Mid	Low Traffic	High Traffic	High Grain	Low Elasticity	High Elasticity	6 5/8%	6 7/8%
A	Mooring Cells: 12,18,20,22,24	1,579	2,167	-	-	-	-	1,625	1,670
B	Mooring Cells: 12,18,20,22,24 Powered Kevel Guidewalls 20-25	12,910	4,523	-	-	-	7,708	12,161	11,381
C	Locks 20-25	8,686	(1,698)	-	-	14,777	4,057	6,742	4,754
D	Locks 20-25 Powered Kevel Guidewalls 14-18	13,088	-	-	-	-	5,215	10,614	8,088
E	Mooring Cells: 12,18,20,22,24 Locks 20-25 Powered Kevel Guidewalls 14-18	16,463	(385)	26,041	23,875	26,035	8,505	14,007	11,501
F	Mooring Cells: 12,18,20,22,24 Locks 20-25 Powered Kevel Guidewalls 14-18, Peoria,LaGrange	16,535	(3,404)	31,140	26,623	26,442	8,181	13,569	10,552
G	Locks 20-25, 14-18	7,225	-	8,329	8,584	15,271	-	3,913	541
H	Locks 20-25, Peoria, LaGrange Powered Kevel Guidewalls 14-18	7,719	(17,769)	31,335	22,256	15,545	-	4,074	376
I	Mooring Cells: 12,18,20,22,24 Powered Kevel Guidewalls 20-25, 14-18	(708)	(7,443)	4,034	-	-	-	4,398	2,726
J	Locks 20-25, Peoria, LaGrange Powered Kevel Guidewalls 14-18	11,026	-	34,774	27,221	22,101	2,198	7,028	3,348

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Sensitivity Analysis - Formulation Summary

Scenario	Alternative with Highest Annual Net Benefits ($1,000s) Build ASAP		Optimize Implementation		
Mid	F	16,535	J	21,483	UMR:2021 IWW:2026
Low Traffic	B	4,523	E	9,735	UMR:2028 IWW:2050+
High Traffic	J	34,774	J	38,676	UMR:ASAP IWW:2025
High Grain	J	27,221	-	-	
High Elasticity	E	8,505	J	16,274	UMR:2028 IWW:2026
Low Elasticity	F	26,442	J	30,761	UMR:ASAP IWW:2026
6 5/8%	E	14,007	-	-	
6 7/8%	E	11,501	-	-	

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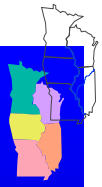
RED Analysis



Navigation Study

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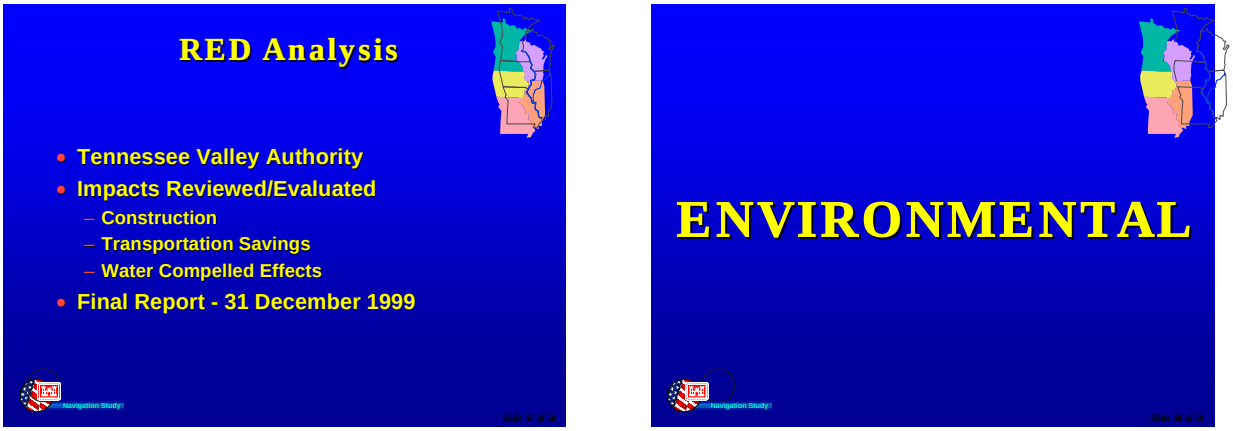
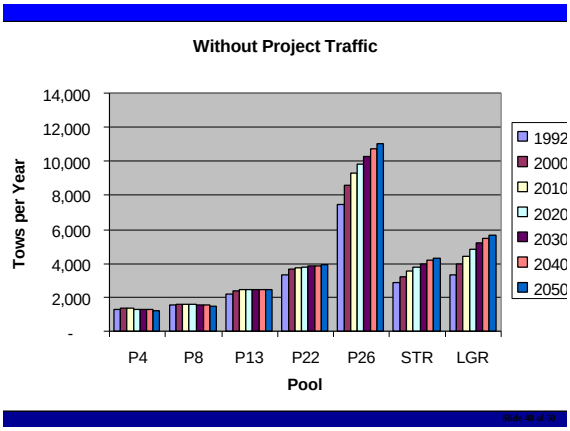
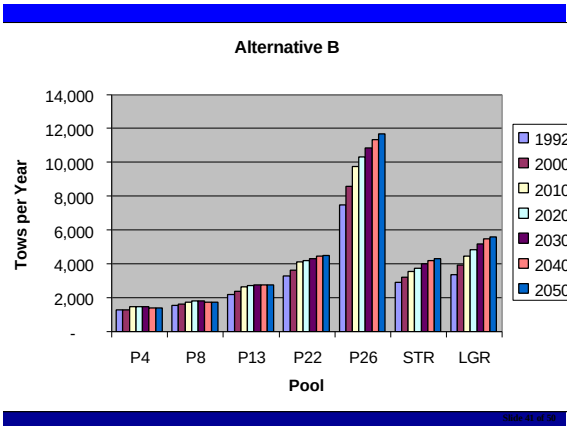
RED Analysis

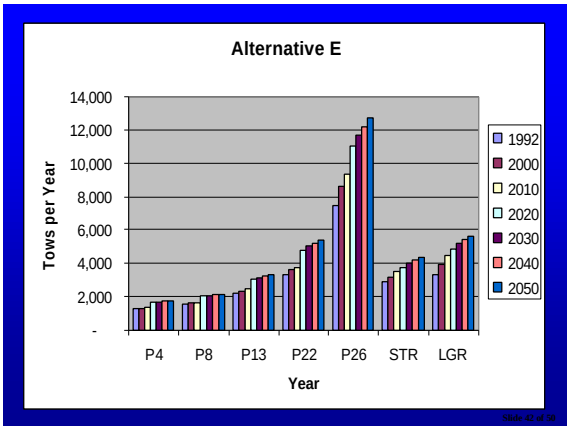
- Tennessee Valley Authority
- Impacts Reviewed/Evaluated
  - Construction
  - Transportation Savings
  - Water Compelled Effects
- Final Report - 31 December 1999

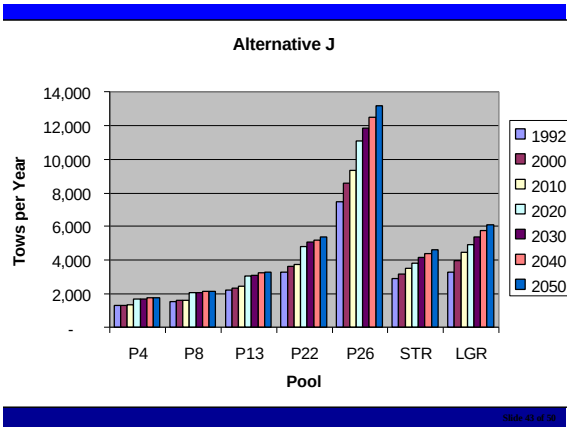
ENVIRONMENTAL

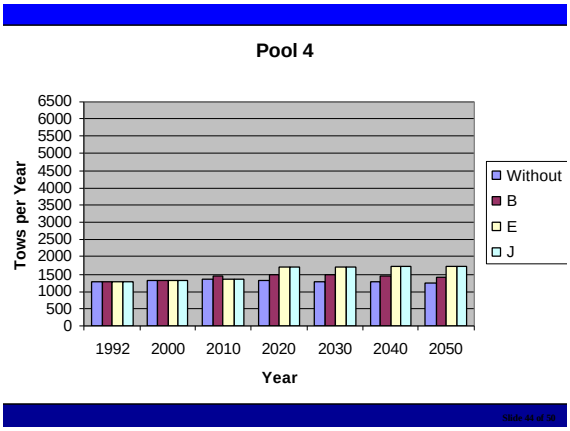


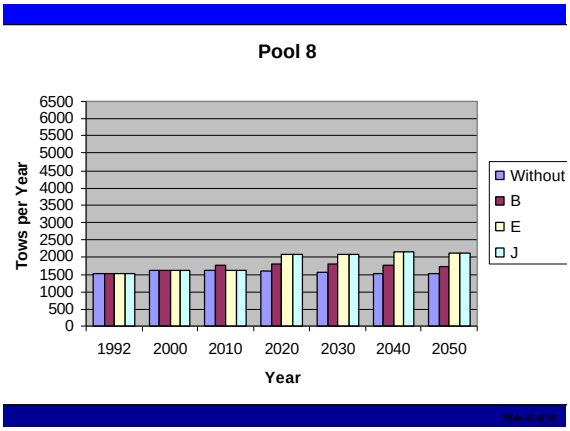


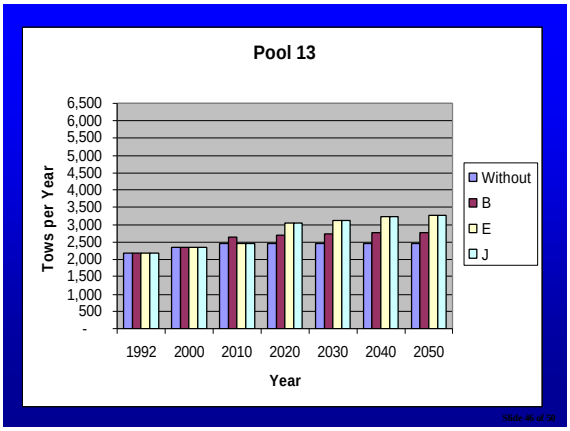


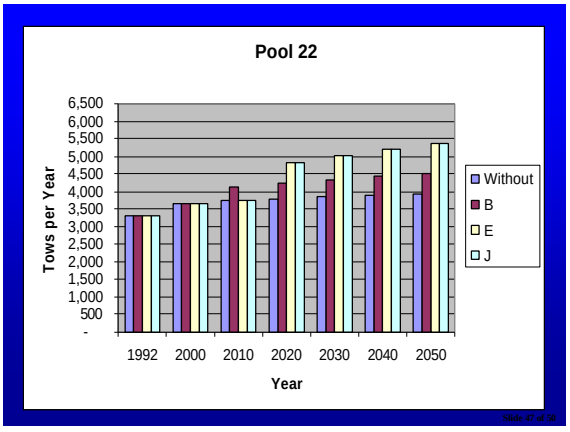


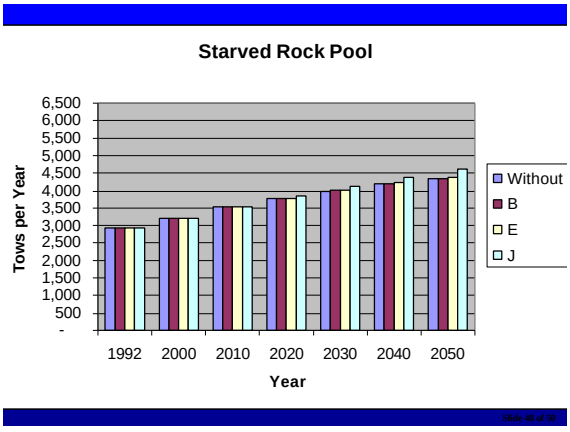

Alternative J
Tows per Year
14,000
12,000
10,000
8,000
6,000
4,000
2,000
-
P4
P8
P13
P22
P26
STR
LGR
Pool
1992
2000
2010
2020
2030
2040
2050

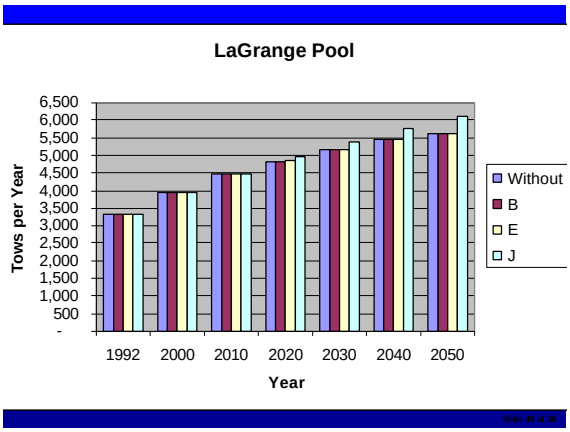

Pool 4
Tows per Year
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1992
2000
2010
2020
2030
2040
2050
Year
Without
B
E
J

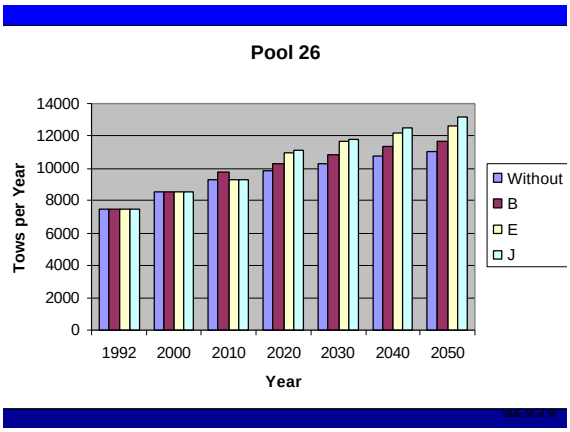

Pool 8
Tows per Year
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1992
2000
2010
2020
2030
2040
2050
Year
Without
B
E
J


Pool 13
Tows per Year
6,500
6,000
5,500
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
-
1992
2000
2010
2020
2030
2040
2050
Year
Without
B
E
J


Pool 22
Tows per Year
6,500
6,000
5,500
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
-
1992
2000
2010
2020
2030
2040
2050
Year
Without
B
E
J


Starved Rock Pool
Tows per Year
6,500
6,000
5,500
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
-
1992
2000
2010
2020
2030
2040
2050
Year
Without
B
E
J


LaGrange Pool
Tows per Year
6,500
6,000
5,500
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
-
1992
2000
2010
2020
2030
2040
2050
Year
Without
B
E
J


Pool 26
Tows per Year
14000
12000
10000
8000
6000
4000
2000
0
1992
2000
2010
2020
2030
2040
2050
Year
Without
B
E
J